THE

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A

MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S., Sc.D.

Observe — Compare — Reflect — Record.

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THE

DENTAL COSMOS.

VOL. LV. JANUARY 1913. No. 1.

ORIGINAL COMMUNICATIONS.

FURTHER STEPS IN THE PROGRESS OF ORTHODONTIA.

By EDWARD H. ANGLE, M.D., D.D.S., New London, Conn.

(Read before the Alumni Society of the Angle School of Orthodontia, at its seventh annual meeting, September 5, 1912.)

MR. PRESIDENT AND MEMBERS OF THE ALUMNI SOCIETY:

AT our meeting one year ago, as you will recall, I presented a new plan of treatment of malocclusion of the teeth, with new forms of appliances for accomplishing the various tooth movements in accordance with this plan, a description of which was published in the DENTAL COSMOS for August last. A close study of that description is necessary for a full comprehension of what I shall present today.

As a result of wider observation, much thought, and careful experimenting, I think I can today not only greatly simplify the technique in the adjustment and operation of the appliances then presented, but lead you to a more intelligent appreciation of the possibilities and advantages to be gained by the employment of the new method of treatment.

NECESSITY OF EXACT DIAGNOSIS.

All of you here today are fully aware of the importance of a thorough knowledge of the normal occlusion of the teeth and normal facial balance as a guide to the intelligent direction of your efforts in the correction of malocclusion. Also you are aware of the importance of the full complement of teeth, and the very important part that each tooth plays in its relation to all the other teeth of the denture, that the denture may not only be in function most efficient, but that it may contribute its full part to the normal beauty and balance of the face according to the individual type, and also its normal part in the possibility of normal growth and development of the throat and nose, all of which are so essential to the health and growth of the individual.

For a number of years we have been able to classify malocclusion, to note quite accurately the degree of variation of position from the normal of the crown of each tooth, and to judge of its necessary movement in establishing normal occlusion. But heretofore the crowns of the teeth have received our chief attention, both in diagnosis and in tooth movement, and we have been largely dependent upon nature for the movement of the roots, the positions they will finally occupy being largely problematical—due chiefly to the limitations of the orthodontic appliances heretofore at our disposal. But a new era is before us, with far greater possibilities, but with these possibilities come, also, greater responsibilities as to diagnosis, knowledge of the tissues we operate upon, and technique. We must now study our cases so carefully in the beginning as to enable us to determine accurately not only how great are the variations of position from the normal of the crowns of the teeth, but the extent of the apical displacement and incorrect angle of inclination of each root, and also the extent of arrest in development of the alveolar process and co-related bone, that we may have a clear conception of the exact direction and extent each tooth should be moved and the amount of bone development necessary in order that nature may build the denture to full completion in accordance with the architectural design of the individual type.

STUDY OF BONE-GROWTH A PREREQUISITE TO SUCCESSFUL REGULATION.

Science discountenances guessing and exacts accuracy, and I believe it is now quite possible to fulfil the demands of science in orthodontic procedure; but this necessitates, as we have said, closer study and a more intimate knowledge of the habits of bone-growth and of the tissues we are to operate upon, for let us ever remember that we can do nothing of permanent value by ourselves in our efforts at treatment, but only as we work in conjunction with nature, studying her carefully, interpreting her wishes, and intelligently assisting her in her efforts of growth and development of the denture to be in harmony with the line of occlusion and the forces which govern occlusion.

Fortunate are we at this time in having access to those splendid chapters on bone life contained in Dr. Noyes' recently published book, and to the wonderful researches in bone-growth by another of our own number, Dr. Oppenheim of Vienna, together with the epoch-marking researches on the development and growth of bone by Dr. McEwen of the University of Glasgow, just issued, all of which will later be reviewed at this meeting.

DELICACY OF THE NEW APPLIANCES.

Having determined the exact requirements of crown and root movement, and the bone development necessary, our appliances should be such as will best fulfil these demands, namely, to exert pressure upon the teeth in the right direction and with only the proper force to normally stimulate the various bone cells in their work of absorption and rebuilding the bone. As we now know that this pressure should be very gentle, our appliances may be very delicate—far more delicate than we formerly believed practicable, and the new appliances have been designed with a view to fulfilling as nearly as possible these natural requirements.

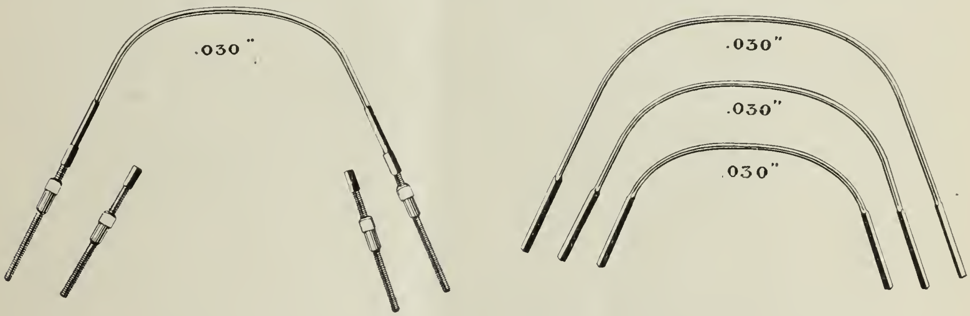
In order to refresh your memories regarding the new appliances let me briefly review the description of the more important of them, together with that of their adjustment and manner of operation.

THE EXPANSION ARCH IN ITS PRESENT PERFECTION.

The ideal principle in an orthodontic appliance, that of the expansion arch, is still employed, but the arch now used is of necessity of much greater delicacy than the one formerly employed, and it is also further modified for greater convenience in use. It is divided into three sections, a middle and two end sections. The middle section is very elastic, is smooth, round, and very delicate in size, being only .030″ in diameter. It has squared ends which accurately fit into square holes in the ends of the threaded end sections, Fig. 1. In operation the end sections are slipped into the sheaths of the anchor bands on the teeth used as anchorage. The middle section is carefully bent so that it will lie passively in close relation with the buccal and labial surfaces of the teeth in their malpositions, with its ends telescoping with the threaded end sections for about one-eighth of an inch.

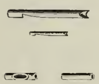
Instead of being attached to the teeth to be moved as heretofore by means of wire ligatures, bands, and spurs, the attachment of the arch is now made more direct and positive by means of delicate pins soldered to it, which engage delicate

FIG. 1.



tubes soldered to bands on the teeth to be moved. The pins and tubes are shown in Fig. 2, and the whole appliance, Fig. 3, is shown on the upper dental arch of an ordinary case belonging to class I, which requires much bodily movement of the

FIG. 2.



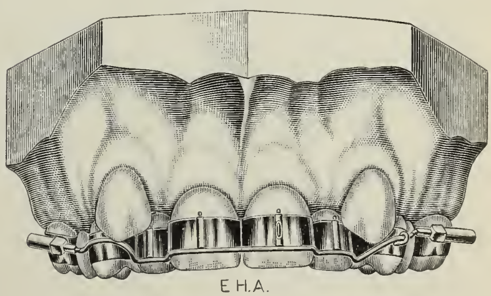
incisors, with a large amount of bone development.

Force is exerted on the teeth to be moved by the elasticity of the middle section of the arch and the pins, the middle section being occasionally removed from the teeth and one or more of the bends in it slightly straightened, after which it is again sprung into position on the teeth, and this is repeated at intervals until both crowns and roots of the teeth have been carried into their normal positions in the line of occlusion. It will thus be seen that the force derived from the elasticity of the arch and pins is so distributed to the teeth that the latter will be carried bodily, apices of roots as well as crowns, in the direction in which force is exerted.

PREDETERMINING ROOT MOVEMENT BY AN IMPROVED TECHNIQUE.

And here I wish to improve upon some of the technique that I gave you one year ago. I then said that the pins were occasionally to be bent forward or laterally to accelerate or change the direction of movement of the apices of the roots of the teeth, thus resorting to a considerable amount of guessing as to the amount and

FIG. 3.



direction of the force. I now believe we should have clearly fixed in our minds, before the adjustment of the appliances, the exact direction and extent that the apex of each root should be moved, and that we should so place our pins in the beginning, giving them the requisite inclination for the proper root movement, as to avoid the necessity for their subsequent bending, the only subsequent change in the mechanism then required being the straightening of the bends in the middle section of the arch and the proper adjustment of the end sections through the manipulation of the nuts. Only by this means can we avoid unnecessary disturbance of the tissues, with the resultant inflammation and injury. To make this clear, if it has been previously determined that the apices of the roots of one or both of the lateral incisors require more movement labially than those of the centrals, the pins should be given the necessary additional inclination when they are soldered to the arch. In like manner, other additional root movements should be anticipated, and the pins be placed for their accomplishment, thus reducing to the minimum the necessity for subsequent changes.

POSITION OF PINS AND TUBES.

In order that the force may best be exerted on the roots of the teeth, the pins and tubes should be made to line parallel with the axes of the teeth whenever possible, and at the same time they should be parallel with each other, in order to permit the telescoping of the pins with the tubes. But as the teeth are often found in such irregular positions, the first impression in such cases would probably be that if the tubes were placed parallel with the axes of the teeth, the tubes themselves would diverge so greatly from the parallel as to make the insertion of the pins impossible. But if you will study your models carefully, accurately noting the direction of the line of axis of each tooth, you will doubtless be surprised, as I have been, to find that when the tubes have been placed so that they align with the axes of the teeth, they will be parallel in nearly all cases, or sufficiently so as easily to permit, with gentleness and care, the telescoping of the pins with them, the slight divergence from the parallel being accommodated by the spring of pin and arch. In some instances, however, the irregularity of position of a tooth may be so great as to necessitate slightly varying the inclination of the tube from the parallel in its placing.

DEVICE FOR SOLDERING PINS TO ARCH WITH PERFECT ACCURACY.

According to the technique for placing the pin which I gave you one year ago, the pin was to be held while being soldered by means of a pin-holder (Fig. 4) in one hand, while the arch was supported by the other hand, thus relying on the skill and judgment of the operator for the inclination of the pin, and, while many of you are sufficiently skilful to place it with a considerable degree of accuracy by this method, yet the possibilities of inaccuracy are great, often requiring the re-soldering of the pin at a different angle, and its frequent final bending to give it the proper alignment, which often results in breaking it or weakening it at the point of its attachment. The importance of the accuracy of this operation I have already dwelt upon, and if you will observe care in the method I shall now give you, you may entirely eliminate inaccuracy in the operation.

FIG. 4.

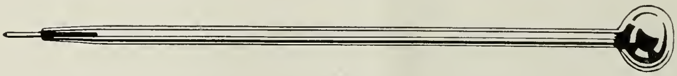
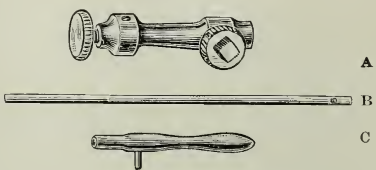


FIG. 5.



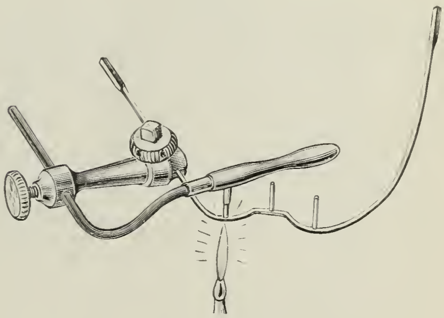
For supporting the pin in the proper

alignment while it is being soldered to the arch I have devised a peculiar form of soldering jig, shown in Fig. 5. It consists of a delicate vise, A, a section of soft copper wire, B, and a pin-carrier, C. In use the jaws of the vise are firmly clamped on the middle section of the arch at a point not more than half an inch from where the pin is to be soldered, the arch lying passively in contact with the buccal and labial surfaces of the teeth, and the opposite end of the vise projecting outward between the lips of the patient, for in practice the appliances should always be fitted directly to the natural teeth, never to plaster models. The round end of the copper wire telescopes a round hole near the outer end of the vise and is firmly clamped in position by a thumb-screw. The copper wire is then bent around so that its other end, slightly flattened on one side, is made to rest passively at the exact point that the head of the pin is to occupy after it is soldered to the arch. Usually this point is at the gingival end of the orifice of the tube on the tooth to be moved. If, however, it is desired to move the apex of the root of a tooth more than its crown in a certain direction, the pin must be given the necessary angle of inclination to accomplish this movement. The flattened end of the copper wire is therefore made to rest exactly at the point necessary to give this inclination, independent of the position of the mouth of the tube. Considerable care is necessary in the bending and manipulating of the copper wire that it may rest passively at the exact point desired, and this operation is made much easier by keeping the copper wire very soft by occasional annealing.

The wire is now gently disconnected from the vise without changing its form, and laid aside. The middle section of the arch is also carefully disconnected from the end section, and it and the vise are removed from the mouth without changing the form of the arch or its relation with the vise.

The round end of the copper wire is now replaced in its original position in the vise and reclamped, and the pin-carrier slipped over the flattened end of the copper wire to the full depth of the hole in its end. Then the pin is placed in the hole in the pin-carrier, with its hook pointing lingually, and the pin-carrier is turned to bring the chisel crescent end of the pin in a similarly formed delicate notch in the middle arch section, its position having been previously carefully determined and the notch carefully made at a point directly opposite the orifice of the tube on the band against which the middle section of the arch is to rest and into which the pin is to fit. By this means the pin is accurately aligned and supported and

FIG. 6.



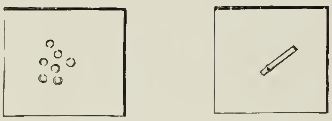
ready to be soldered in position, as shown in Fig. 6.

I am indebted to Drs. Gough and Lane for suggestions relative to the soldering jig—to Dr. Gough for suggesting the detached pin-carrier, and to Dr. Lane for the suggestion of the thumb-screw in the end of the vise for clamping the segment of copper wire in position.

CONVENIENT FORM OF SOLDER TO INSURE ACCURACY IN SOLDERING PINS TO ARCH.

Another point on which I wish to improve the suggested technique of one year ago is in the form of the solder to be used for making these attachments. I then said we should guess at the amount of solder, cutting it in the usual small squares, and either previously partially fusing it upon the middle section of the arch, or hoping it would remain in contact with pin and arch while being fused. The result, following this time-honored custom of soldering, was that too often the fragment of solder became displaced, or was found imperfectly distributed after it was fused, or that too little or too much had been used. All of these difficulties are now overcome by having

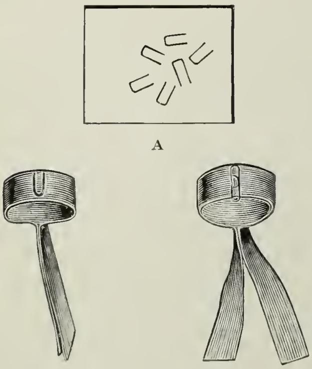
Fig. 7.



a *b*

the bits of solder of proper size and shape. This I have accomplished by first drawing the solder into very delicate wire and then forming it into minute rings, *a*, Fig. 7, the inner diameter of which is the same as the diameter of the pin over which one little ring is slipped before putting the pin in the carrier, as shown in *b*, Fig. 7. The sample rings which I shall

Fig. 8.



A B C

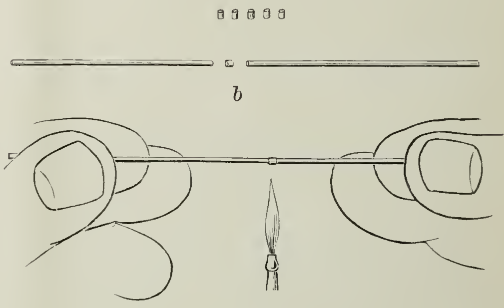
A, Staple form of solder. B, Staple of solder on band. C, Tube, solder, staple, and band.

pass around I believe will be found to contain just the proper amount of solder and of the correct karat, which result has been attained after considerable experimentation.

In fusing the solder it is held in contact with the delicate flame, the point of the flame striking the arch directly underneath the pin, as shown in Fig. 6, and I wish to impress upon you the importance of observing care in this operation. First, the notch in the arch must be delicate and of the proper shape to best engage the thin, crescent-shaped end of the pin. Just the requisite amount of flux should be used, and the ring of solder must not only encircle the end of the pin, but lie in actual contact with the arch, otherwise there will be no union be-

Fig. 9.

a



b

c

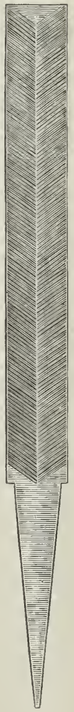
tween pin and arch. The flame must be very delicate. That from the Grünberg blowpipe is the best, and the heat must be applied slowly and very evenly so that the pin and arch will be equally heated, and the temperature very gradually raised to just the fusing-point of the solder. You will note how beautiful and how strong are the soldered joints (Fig. 6), and how evenly the solder has flowed. If a flame larger than necessary be used, as many of you will persist in employing, there is almost a certainty of injuring, if not of ruining, either the pin or the arch, or both.

STAPLE-SHAPED PIECES OF SOLDER FOR SOLDERING TUBES TO BANDS.

Taking advantage of this principle of soldering, I have applied it also to the attachment of the tubes to the bands, in which case the pieces of solder are made in the form of minute staples (A, Fig. 8), one of which is picked up with a very delicate camel's-hair brush, previously dipped in liquid flux, and carried to the desired position on the band, B, Fig. 8. The tube is then placed in position between the projections of the staple, C, Fig. 8, and carried to the flame, which should be even more delicate than the

FIG. 10.

FIG. 11.



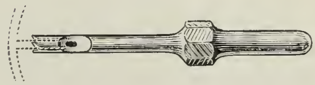
one used in soldering the pin, because there is less metal to be heated, and the temperature very slowly and evenly raised to the fusing-point of the solder. If good flux be used and the temperature be raised very slowly and be very evenly distributed, so that the tube and band and solder are equally heated, the most even and perfect distribution of the solder, without the least displacement of the tube, will result. On the other hand, if a large flame be used, the band and tube will be heated unequally and the solder fused on one side before it is on the other, which will always displace the tube to the side on which fusion first takes place. If, however, the tube is slightly displaced while the solder is melting, it may, before removal from the flame, be best teased back to its correct position with the point of an ordinary sewing needle, about No. 10, the needle being held in the fingers, not in a broach.

TUBES OF SOLDER FOR SOLDERING ACCURATE BUTT JOINTS.

And here is still another extension in the use of this novel method of soldering,

FIG. 12.

FIG. 13.



with which I believe you will be pleased: It is occasionally necessary to unite, end to end, a broken middle section of the arch, or to lengthen a middle section by adding to it a segment of wire of the same diameter, and you all know how difficult it is to make an accurate, even, soldered butt joint, but with the method I shall now give you it becomes a very simple operation. I have drawn the solder for the purpose into tubes, the bore of which is the same as the diameter of the middle sections of the arch, *i.e.* .030″. The wall of the tubes is very thin. This solder tubing is cut in short segments (*a*, Fig. 9). Flux is placed on the ends of the wires to be united and one of the little ferrules of solder is slipped for half its length over one of these ends (*b*, Fig. 9). The end of the other wire is then inserted in the other end of the ferrule (*c*, Fig. 9), and all carried to the flame, with the little ferrule making a sure and accurate support for the ends of the wires. The temperature is then slowly raised to the melting-point of the solder by applying heat, not directly to the solder, but to the wire on each side, alternating from one side to the other. The little ferrules of solder insure not only the accurate apposition of the ends of the wires, but the proper quantity and distribution of the solder for making a very strong and perfect joint. And if you will use thought and cultivate skill in this operation, you may make joints that are not easy to detect. Of course the ends of the wires to be united should be round and made to abut accurately—with, possibly, a very small groove across the end of one of them to take up any superfluous solder.

Fig. 14.

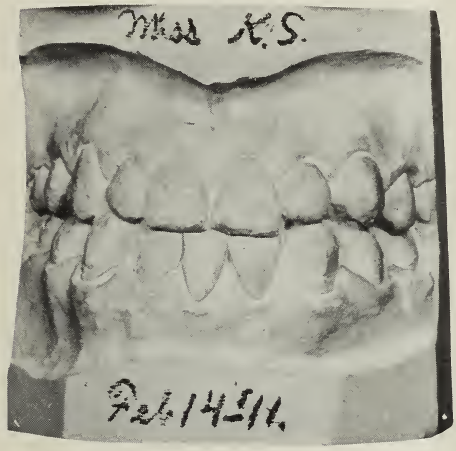
Fig. 15.

It is well worth while to cultivate judgment and skill in all our technique, and we all can easily do this. It will result not only in the saving of much time, but in real satisfaction in our work.

CAUTION IN STRAIGHTENING THE ARCH.

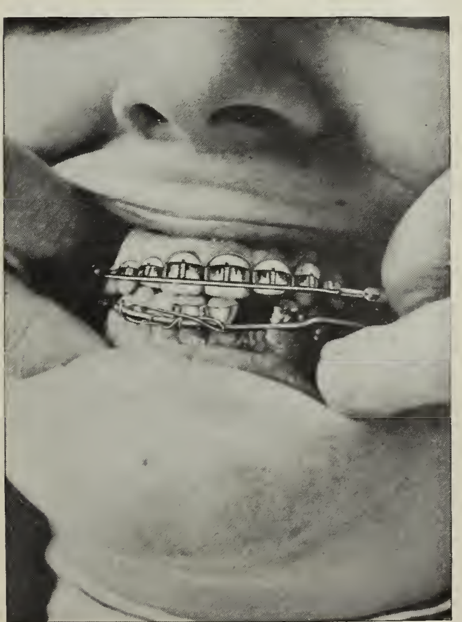
Now a word of caution. It should be remembered that there is practically no loss of energy with this method of treatment by slipping or displacement of parts, as compared with the probability of much loss of force in this way in the older method. So, in straightening the bends in the middle section of the arch from time to time, it is highly important that not too much force be given to the moving teeth, and that the orthodontist shall know quite accurately its amount and direction. Dr. Young, who has had much experience in the use of the new appliances, assures me that he is now convinced that rarely more than one, or at most two of the bends should be slightly straightened at any one appointment of the patient, leaving the balance of the arch as it is for control of the force, and that the amount of straightening

Fig. 16.



should never be more at any one time than would change the relation of the

Fig. 18.



pin with the tube the thickness of the wall of the tube.

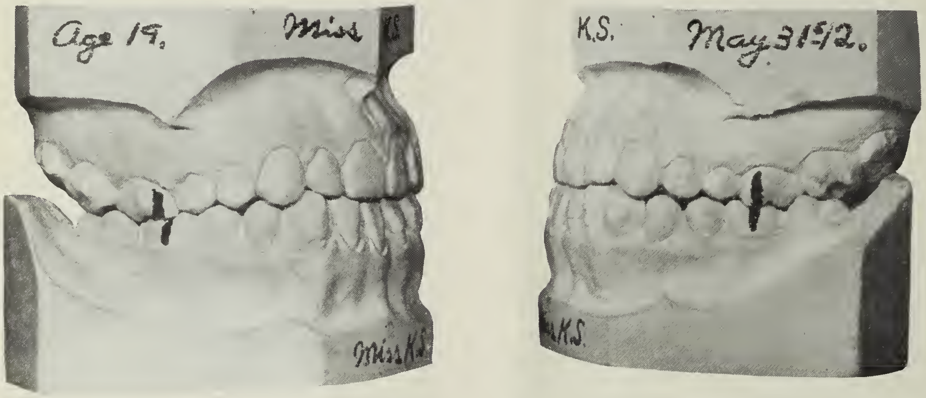
It is also important that the square ends of the middle section of the arch

Fig. 17.

shall be kept in proper relations with the holes in the screw sections. In other words, if slightly straightening one or more of the bends should result in giving the ends of the middle section of the arch too much buccal or lingual displacement to be in general harmony with the ends of the screw sections, the middle section, in the region of its ends, should receive additional modification of form to restore harmony with the anchorage when the middle section is again placed in position, so that unnecessary soreness or displacement of the anchor teeth may be avoided.

Dr. R. H. W. Strang, one of our number, has devised an ingenious instrument for recording the exact amount that the middle section of the arch is modified in the straightening at each appointment of the patient. Dr. Strang will later describe this instrument himself. If it is practical and will do what it so well promises, it will be a most valuable adjunct to orthodontic operations, for we can then for the first time actually measure the exact extent of movement of not only the crowns but the roots of any or all of the teeth, from appointment to

Fig. 19.



appointment. This is progress; this is science.

A FEW ACCESSORY INSTRUMENTS.

As a means for properly bending and straightening the middle section of the arch I have designed a pair of delicate pliers (Fig. 10), which I think you will find as efficient as they are simple.

I have already spoken of the importance of the form and position of the little notch in the middle section of the arch for the reception of the crescent end of the delicate pin during soldering. By far the most efficient instrument for this purpose I have yet found is the extremely delicate-edged file shown in Fig. 11. It should be kept for this purpose only.

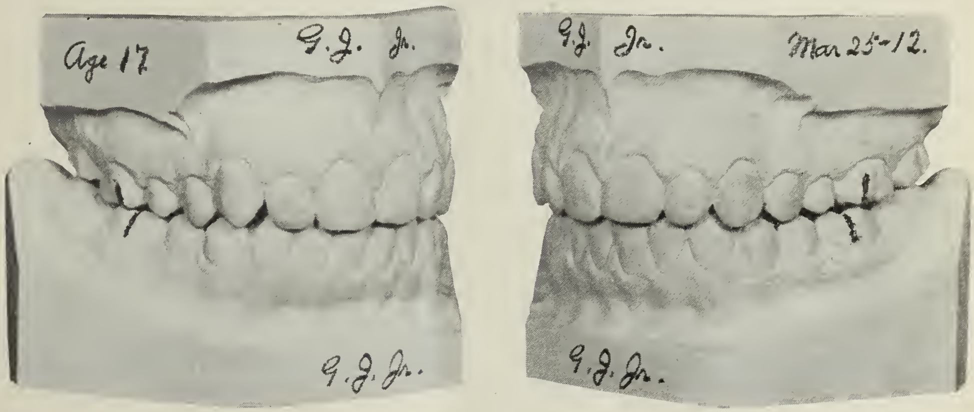
I have also designed two other delicate instruments to aid us in this work. That shown in Fig. 12 is a reamer for enlarging the mouth of the little tubes, and that shown in Fig. 13 is a solder trimmer for trimming away any excess solder around the base of the pin which would prevent the proper seating of the pin in the tube.

I am glad to be able to tell you that we will soon be able to procure the various parts of these appliances, together with the solder in the forms I have described, also the various instruments I have described, and others, for the orthodontic technique, and that all will be of the most excellent quality and of beautiful proportions and finish. Some of them have been sent us for use in the clinic today. I am greatly delighted with the accuracy

Fig. 20.

with which they have been manufactured, and I am still more delighted with the future possibilities for orthodontia in their intelligent use. But remember that at best the orthodontic appliances are only a factor in treatment—one of the means to an end, and let me incite you to a broader study of the basic principles of orthodontia, and especially of the tis-

Fig. 21.

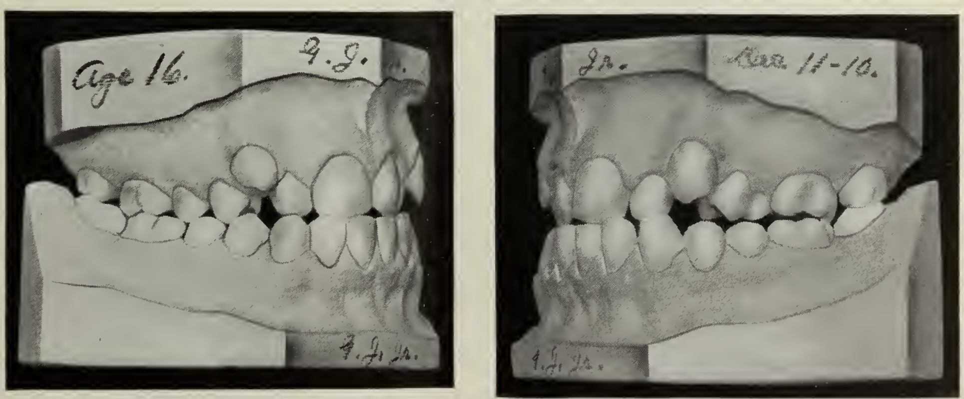


sues you operate upon, for orthodontia is no longer merely mechanics, but science.

PRACTICAL RESULTS OBTAINED WITH THE IMPROVED APPLIANCES.

And now I want to show you some splendid results in the use of these appli-

Fig. 22.



ances in a case treated by one of our number, Dr. A. H. Ketcham of Denver, who could not be with us today, but who has sent the report of this case. You will see that the results are such as could probably not have been accomplished by any other method of treatment heretofore employed.

The original conditions of occlusion and facial lines of the patient are shown in Figs. 14 and 15. The case was treated, up to a certain point, with the old appliances, exactly in the way in which we have all been treating similar cases, and very good results were accomplished, as you will see by the model and the face of the patient at this time, Figs. 16 and 17. We have all been quite happy over equal successes, but I do not think we will be content in the future to rest with such results. Dr. Ketcham was not satisfied with the occlusion nor with the resultant facial balance. So the new appliances were adjusted to the teeth of the upper arch with a view of inducing further bone growth and of gaining better angles of

Fig. 23.

inclination of the incisors and cuspids. The ordinary expansion arch was adjusted to the lower teeth, and through its means the lower dental arch was enlarged and space provided for the missing lateral incisor, all as shown in Fig. 18. Now, if you will please study the occlusion of the

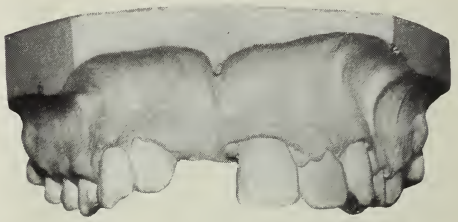
Fig. 24.

case shown in the models in Fig. 19, after the completion of tooth movement, together with the facial lines of the young lady at this time (Fig. 20), I am sure you will feel, with me, that the result is simply wonderful. Dr. Ketcham will doubtless later report this case more fully himself, but the point I wish to here bring out is what has been accomplished in bone-building by the new method of treatment.

Of course the new appliances might just as well have been employed from the beginning of the treatment, both on the upper and lower arches, and I believe the results would have thus been accomplished more easily and quickly, with decidedly fewer appointments and the consequent conservation of much time of both patient and orthodontist.

You will remember that one year ago, in connection with the explanation of the new appliances, I also reported another case then being treated by Dr. Ketcham. Although splendid progress was shown in the treatment of this case, it had not been completed when I gave the report

Fig. 25.



of it. So you will, I am sure, be pleased to see now the final results of Dr. Ketcham's work on this case, shown in Fig. 21, as compared with the original condition, shown in Fig. 22.

You will also be interested in the report of another case, treated by another of our members, Dr. Mendell of Minneapolis, wholly by means of the new appliances (Figs. 23, 24, and 25). Not only has there been extensive and pronounced bodily movement of the teeth, but most gratifying results in bone-growth.

Certainly the excellent results attained in these cases ought to be an inspiration to you all for deeper study and finer technique, and I sincerely hope that each and every one of you will be able to show equally gratifying results in the use of the new appliances in the reports of your cases at the meeting of this society one year hence.

PRACTICE CLINIC.

And now, gentlemen, in order that you may better familiarize yourselves with the various steps in the technique of adjusting the new appliances, I am going to give a clinic, but it will not be the kind of clinic that we have always been accustomed to, where men congregate around a chair or table to watch an operator do all the work. We will reverse this order and ask each of you to give the clinic himself, under the instruction of myself and Drs. Gough and Lane, who have been with me in my laboratory for several days specially fitting themselves to help you in this clinic. Every preparation has been made to enable you to do careful, thoughtful work in each detail of each operation, and I believe you will derive much practical benefit from this clinic.

Of course it would be impossible to provide actual patients for so many, and for our purpose this is not essential. Each will fit an appliance to a carefully made model of a practical case, but I repeat that the only true way in practice is to perform the operations directly upon the teeth of your patients.

There are many more interesting questions in regard to this method of treatment which cannot be brought out in a two days' clinic, but which we hope to reach at our next annual session.

DEFORMITY OF THE JAWS CAUSED BY THE EXTENSION BANDAGE IN THE TREATMENT OF SPONDYLITIS.

By G. LIND, D.D.S., Amsterdam, Holland.

IN the fall of 1911, I was called to one of the Amsterdam hospitals for consultation. The patient, who had been suffering from spondylitis for several years, complained of severe pain in the mouth, especially during eating and speaking.

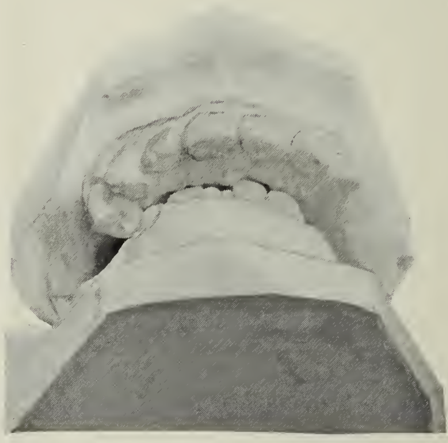
CASE HISTORY.

The aspect of the chin and lower jaw immediately convinced me that a mechanical injury had been done to the patient, imparting to the jaw an abnormal shape. The patient's history was as follows: Miss M., age thirty-five, became ill in the summer of 1904. After having been under observation for several months, the case was diagnosed as one of spondylitis, and the patient was immediately placed in the customary plaster bandage, extending around the neck and resting on the shoulders. This bandage was worn by the patient until 1906, when it became too uncomfortable, and was replaced by the Glisson extension bandage, which the patient wore until March 1911. Fig. 1 shows how this bandage is put on, a rather heavy weight being suspended by the cord from the iron bar, keeping the neck straight. In 1908, oral trouble first arose, which in 1911 became so severe that the patient could not tolerate the pressure of the bandage. Treatment with this bandage was subsequently abandoned, and the patient was placed with her head in a suspended position. In the meantime the patient's face had greatly changed, as evinced by photographs that were taken before her illness. The chin and lower jaw were small, and on either side of the jaw a depression was noted corresponding to the leather straps of the bandage. The skin and lips were normal. The upper anterior teeth were very much protruded and loose, several of them exhibiting pyorrhea alveolaris and caries. All the upper bicuspids and molars, with the exception of the upper right first bicuspid, were missing. The mucous membrane of the palate was ulcerated and sore from the bite of the lower teeth. In the mandible one central incisor, one bicuspid, and two molars were missing. Several of the remaining teeth were carious, but none of them was affected with pyorrhea. The patient said that the missing central

Fig. 1.

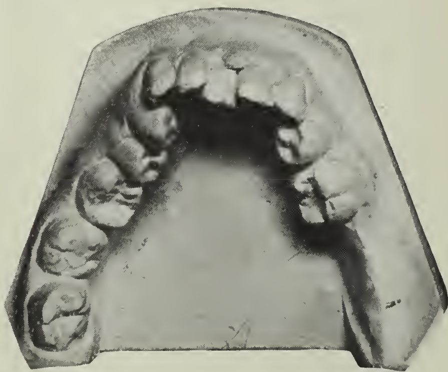
incisor had been pressed slowly out of alignment, and had been extracted in 1909, when it was very loose. The remaining five incisors were now bunched, while the bicuspids and first molars were tipped lingually, as shown in Fig. 3, leaving but little room for the movement of the tongue. The lower right bicuspids were in infra-occlusion with the remaining upper right first bicuspid. The patient asserted that she had had a normal denture just like her sister's, whose mouth I have examined. It was evident that the constant pressure of the extension bandage had caused this deformity of the jaws, viz, the pressing upward of the chin, the tipping and bunching of the lower teeth, and the

Fig. 2.



enormous protrusion of the upper ones, together with the concomitant complications, consisting in severe pain in the

Fig. 3.

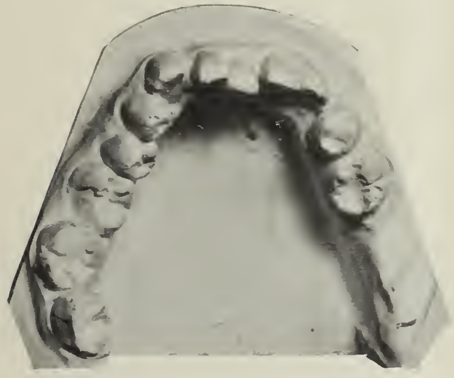


palatal region, inability to masticate food, and trouble in moving the tongue.

TREATMENT.

The patient's deplorable condition rendered rational treatment impossible. I therefore decided upon the following procedure: A bite-plate was made for the upper jaw to relieve the palate, the ulcerations of which were treated. The carious teeth were filled, and the pyorrheal condition combated, as well as possible, the suspended position of the head rendering these manipulations rather difficult. An old-style coffin plate was then constructed, to expand the lower jaw.

FIG. 4.



After four months' treatment, the jaw was expanded so far that the lower right bicuspids were in normal occlusion with the remaining upper right bicuspid, and the tongue could move freely. (See Fig. 4.) For the purpose of retention, a plate was made carrying one molar. The upper bite-plate was replaced by a partial denture. The protrusion in the upper jaw was not treated, as I only wished to relieve the patient of her suffering, and enable her to masticate her food better. The result was very satisfactory from the standpoints of both patient and operator.

SUGGESTED MODIFICATIONS IN THE USE OF THE EXTENSION BANDAGE.

I have been unable to find any literature on the ill effects of the extension bandage upon the jaws, etc., perhaps because this bandage is usually not worn for such a long time as in the case described. Still, if it is to be worn even for a shorter time, it would be advisable in my opinion to replace the chin support of leather with one of rigid metal, made after an impression and model of the patient's chin, thereby preventing the compression of the lower jaw. Furthermore, it is necessary to take into consideration the occlusion of the teeth. If the occlusion is abnormal, I should advise the construction of an upper vulcanite plate fashioned like a retention plate provided with the impressions of the incisal edges and masticating surfaces of the lower teeth, so as to guide them into proper occlusion. If such precautions are taken, I am sure that complications like the one described can be avoided, and the deplorable condition of sufferers from spondylitis will not be aggravated by pain in the oral cavity.

AN EROSION CAVITY IN A GOLD CROWN.

By H. JAMES MORRIS, L.D.S., Sheffield, Eng.

THE illustration shows a model of the bicuspid region in the mouth of a young married woman who came to consult the writer. The remarkable thing about it is that the upper left first bicuspid is a gold crown exhibiting a well-marked erosion cavity in the most prominent place. The edges of the gold have been worn very thin and the floor of the cavity consists of cement.

The lady said that she had brushed her teeth "twice a day for twenty years," and other erosion cavities, chiefly on the left side (as she is righthanded) tend to support this statement, as does the general condition of the mouth. The powder used during the last four years is a private recipe which the writer had no chance of examining.

This cavity in a gold crown in such a position on the buccal surface hardly admits of any explanation except that it was cut by a brush and powder, and lends strong support to the mechanical theory of the origin of many such cavities. The researches of the late Professor Miller

(See DENTAL COSMOS, 1904, vol. xlvi, p. 177; 1907, vol. xlix, pp. 1, 109, 225, 677) tended strongly to prove this, if they did not absolutely do so.

THE GREAT NEED OF IMPROVEMENT IN THE MANUFACTURE OF DENTAL ALLOYS.

By C. M. McCAULEY, B.S., D.D.S., Abilene, Texas.

(Read before Section I of the National Dental Association, at its annual meeting, Washington, D. C., September 10, 1912.)

THE subject of this paper will be treated under three headings, namely —(1) The present status of the amalgam situation. (2) What has been done toward the correction of existing evils. (3) Prospects for improvement in the future.

REITERATION OF A FEW STATEMENTS CONCERNING AMALGAMS.

My experience during the past year prompts me to emphasize certain points touched upon in my paper—which was read before Section III of this association last year and published in the February 1912 issue of the DENTAL COSMOS, p. 174. Namely:

I still maintain that the method of making and balancing alloys as discovered by Dr. G. V. Black is the only scientific and dependable method which has been introduced up to this time.

That shrinkage, flow, weakness, and excessive expansion are serious faults found in most amalgams, and that of these faults shrinkage is the worst.

That silver, tin, and copper are the only metals that should be used in alloys.

TWO MAJOR ELEMENTS IN THE MAKING OF EVERY GOOD AMALGAM.

There are two major elements which enter into the making of every good amalgam operation, namely, a good alloy and correctness of manipulation. Where either of these elements is lacking, even in a slight degree, the result fails to reach that degree of perfection which characterizes efficiency in any scientific undertaking. When one appreciates the importance of each of these elements, then considers the vast number of operations done with amalgam, and observes the large percentage of failures therein, no apology for presenting a paper on this subject at this time will be necessary.

IMPORTANCE OF THE SUBJECT OF AMALGAMS.

I do not hesitate to say that, in view of the remarkable deficiency of many commercial alloys, and the seeming indifference on the part of so many dentists, there is not a subject before us today that calls for closer study, better teaching, and more profound investigation than the subject of amalgam.

ONLY ONE OUT OF SIX ALLOYS FOUND GOOD.

According to tests which have been made up to the present time, only one out of six alloys has proved good. In other words, the man who is a capable amalgam operator and selects his alloy from the market stands one chance in six of securing good results! To make it still worse, many men believe in an alloy and earnestly advocate its supremacy when, as a matter of fact, it may be unfit for use as a filling material. For example, one man brought in a specimen of alloy, in which he had the utmost confidence, to be tested by the committee. He had been searching for several years for his ideal alloy, having tried a great many kinds, and the specimen presented he honestly believed to be the best of all. In making the tests, he watched the readings of the micrometer very closely. The first filling showed shrinkage. Not being satisfied, another was made, and then a third; still shrinkage occurred. Three months from that time these same fillings had expanded to an extreme degree. This operator was one of the leaders in his state, and the alloy tested is being sold in many states, thus bearing out my claim that the most vigilant observation of our best operators is insufficient to determine the quality of dental amalgams. No one should be blamed for such an attitude as is assumed by this man (and there are many just like him), because he has no means of knowing of such defects as can only be found by the micrometer, the microscope, or long years of clinical experience. No one will question the assertion that clinical experience throughout the country is far from satisfactory, and is of only secondary importance in determining the quality of alloys.

THE MANUFACTURERS' SHARE OF BLAME.

In bringing about a reform in the present amalgam situation we must give the manufacturer his share of the blame. Many of them seem to be lacking in knowledge of their business. And yet the strongest claims for superiority of their products are set forth in glaring advertisements; circulars are sent broadcast over the land, telling of the long years of experience, giving testimonials from the leading men, etc.

"NAMELESS" ALLOYS.

It is estimated that over two hundred different brands of alloys are made and sold in the United States today, of which less than one-fourth bear the name of the maker. In most states there are local dealers in dental supplies who have one or more alloys made, and give them some catchy name. The maker of these alloys is aware of the dealers' ignorance and perhaps indifference as to the quality of the alloy, and he, the maker, being in no way responsible to the dentist for the quality, the main incentive to honest and conscientious manufacture is utterly lost. This class of alloys composes practically three-fourths of the entire market. Not one of this class has been found to be up to the standard—nay, worse, all of them which have been tested in our experiments have been found bad.

UNSCIENTIFIC ALLOYS.

Of the remaining alloys, which bear the name of the maker, more than three-fourths are still made by unscientific and haphazard methods. Some adhere to the use of zinc, some to that of gold, and others to various modifying metals which are quite detrimental. One manufacturer claims to make twenty different alloys, each from a separate formula—none of which, judging from the formulæ he gives us, could be expected to stand the micrometer test. Some manufacturers not only use ingredients which are positively harmful, but some of them herald their use throughout the country in glaring headlines on advertising matter, claiming originality, new discovery, superior quality, and so forth—and the dentist believes, hence the sale of the article.

Of the remaining small number which are balanced by the micrometer and properly made, a few, a very few, are composed of the right materials. Is it any wonder that some of our best operators frown upon amalgam? Is it any wonder that results as a whole are so far from perfect?

The above conditions have produced innumerable unnecessary failures in our work, and have stood in the way of good being done in other lines. Some of our best operators will not use amalgam because they have failed to render the best service with it. The trouble was a defective alloy. The best efforts of our best operators will fall short of perfection unless the amalgam is perfect. Make the alloy right and put it in the hands of an efficient operator, and the result will be right.

What has been done toward the correction of existing evils? So far as the writer is aware there has never been a systematic examination made of any considerable number of alloys with a view of ascertaining their physical properties and reporting the same to the profession.

RESULT OF INVESTIGATIONS CARRIED ON IN SEVERAL STATES.

Such work was begun a year ago, when Section III of this association requested the writer to co-operate with a committee appointed for that purpose. Owing to an oversight the appointment of this committee was not officially confirmed. The work has consequently been deferred, pending confirmation of the committee appointed.

The writer was invited to the states of Iowa, Nebraska, and South Dakota in May of the present year to do some work along this line. At my request, a committee was appointed in each state to assist me, and to check up my notes. The plan adopted by each of these committees was to present the alloy to be tested in sealed envelopes, bearing only a number. The name was unknown to us until after the tests were made and recorded. Special effort was made to do all the work in a strictly fair and unbiased manner. The tests made in these states were highly significant, because the standard of efficiency among the members of these societies is very high, thus indicating that the highest-grade materials are in use. The specimens tested were supplied by the best men of these states. These specimens included many, in fact most, of the alloys which enjoy a wide reputation. We presume that the cream of the market was represented in the specimens thus secured. Added to these specimens are a few brands sent me from different sources and tested by me in my office, bringing the total number tested to thirty-seven. Out of this number only six or eight brands proved to be good, or medium good. All the rest should be eliminated from the usable class. Twenty-two out of the thirty-seven show excessive expansion, ranging from 5 points up to 342 points. Several fillings showed over 100 points expansion. Dr. Black says that 2 points expansion is desirable. We may safely say that expansion in excess of 5 points should be avoided, and that shrinkage in the slightest degree is harmful. To be on the safe side and to give every alloy a fair test, we regard 1 point in all tests as coming within the range of unavoidable error, hence where only 1 point shrinkage is shown, we do not place the alloy on the condemned list. The number of usable alloys taken from over the country would probably be less than one in twenty.

THE PROSPECTS.

The future of dental amalgam depends upon the action of the dental profession. We should take the initiative. If let alone, conditions will, in all probability, grow worse; if we take the aggressive, much good can be done. If the work is ever completed as it should be done, co-operation is imperative. A vast amount of work and considerable outlay of money will be required. Of the two hundred alloys on the market at least four specimens of each should be secured from different sources. Each of these should be carefully tested for shrinkage, expansion, strength and flow. If everything were in readiness to begin, this work would require the constant attention of one investigator for several months. Besides the time and expense, there is a responsibility attached to making such a report, which one man would not care to shoulder.

The accompanying brief report of partial tests* made is presented only to give this body an idea of the deplorable condition existing. It represents only a beginning.

The tests made are incomplete, therefore they cannot be absolutely relied upon.

Certainly the worst are condemned without further work, but those which appear good might not prove so if tests for flow and strength were made, and the tests were repeated a sufficient number of times. In view of the incompleteness of this report in some respects, I ask that it be accepted only for what it is, and that judgment be withheld pending further investigation, in the event that such action is officially taken by this association.

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* See *Discussion*, printed under "Proceedings of Societies," this issue.

THE SIGNIFICANCE OF NORMAL OCCLUSION.

By LAWRENCE G. SINGLETON, D.D.S., Pittsburgh, Pa.

(Read before Section I of the National Dental Association, at its annual meeting, Washington, D. C., September 10, 1912.)

IN the presence of the naturalist an explanation of the value of the normality of a dentition would be equivalent to an effort to demonstrate the potency of a perfectly self-evident and well-known truth. As enlightenment for the dentist, it may appear like "employing a steam engine to crack a nut." But for the sake of humanity, it should prove itself an element of defense against deformity, disease, and the various disharmonies contingent upon perverted growth in the development of the individual.

Since the practitioner of dentistry renders expert testimony regarding all matters pertaining to the teeth, and in view of the fact that his decisions constitute the opinions of the court of last resort, it becomes necessary to occasionally classify the experiences of the past in order to standardize the verdicts of the future.

Owing to the practitioner's laudable success in the inauguration of methods for the attainment of much in the harmony of the human face, as well as his contributory responsibility for some of the disharmonies, it is clearly incumbent upon him to early recognize the fact that a mild indifference toward the importance of the normality of the dentition as regards the units and their relations, involves not less responsibility in the ultimate result than the failure to institute measures for their correction and prevention when such procedures are clearly indicated.

Mortal man, occupying as he does such an enviable position toward the other forms of life upon the earth, is apt to overestimate his importance in the economy of the universe. But with all his experience, and as the result of all his skill, there remains, as the issue of the aggregate of the combined efforts of the whole of mankind, nothing that is permanent, nothing that is fixed, which can resist the ravages of time and stand out as a permanent monument to his superior intelligence and skill in the operations of his functions.

There is abundant evidence to prove that for eons of time before man assumed the ascendancy on this planetary rib of the sun, those identical forces which shall have control of its ultimate destiny in the annals of time were in as complete operation, and were possessed of the same absolute certainty of effect, as has ever obtained during the period of his most phenomenal records of advance.

It is assuredly unnecessary to prove the precincts of our origin in order to enjoy the emoluments of our existence. But it is incumbent upon us to recognize the conditions of our existence, and place ourselves in conformity with those forces which govern the same, in order to derive the most benefit from their operation.

In this attitude we may direct our inquiries toward the significance of certain considerations involved in the study of teeth in their relation to the face, for the sake of a clearer interpretation of those problems which confront us in our daily pursuits. But it is frequently necessary to check our mad course among the lofty heights of the spectacular and drop to the level of mediocrity, by faithfully considering basic principles, in order to arrive at a substantial estimate of our progress.

Owing to their intimate relation to the necessities of nutrition and their formidable position in the matter of defense, the teeth have been inseparably associated with the history of animal life upon the earth for untold millions of years. In the matter of their significance in the functions of prehension and nutrition they have, even in the higher mammals, unmistakably antedated the uses of the hand. But with the advance of civilization, through discovery and invention, manual dexterity and skill has largely superseded the function of these pioneer organs of nutrition and defense, sacrificed, it may be, at the expense of some of their most valuable properties, as is evidenced by the ravages of disease with which we are so intimately concerned.

In the matter of evolution the forces of nature have been extremely prolific in the variety of designs effective in the purpose for which they have been evolved, and having traversed a wide range of possibilities in the adaptation of the mammalian forms for the uses of man, the human dentition represents a convenient apparatus for a generalized diet.

The problems of teeth have been most indelibly stamped upon the records of the past, and these organs, by virtue of the nature of their composition, have persisted as one of the most substantial evidences of pre-existing species. It is a significant fact that much of the mystery of the past has been satisfactorily unraveled by the careful interpretation of the characteristics of teeth.

Since nature has been creating designs and arranging teeth for a period of time sufficiently long to entitle her to respect, even before man entered the arena of combat, her precedents in regard to occlusion should receive the careful consideration that their importance demands. And it is a thought worthy of our most serious consideration, that as long as man has existed as a separate species in the zoölogical kingdom—which comprises a period of untold thousands of years—his typical dentition has been retained as a most persistent and dominant characteristic. Since this design has been in continuous service for a sufficient length of time to prove its utility and efficiency, it is manifestly an undertaking which borders upon presumption to set up artificial standards of occlusion as a substitute for the accredited plan of creation.

Neither are we justified in assuming that the human dentition is in a transitional stage because of occasional aberrant forms, discrepancies in number, and departures from the normal in position. There are undoubtedly conditions of "variation" from obscure causes, constantly arising, which according to the evidence of the past may be potent for the institution of new forms to come. That, however, will be a problem for the paleontologist of the future rather than a consideration for the anatomist of the present. But judging from her previous hesitating disposition toward the inauguration of new or spectacular forms, and before these processes of variation have culminated in the new and more perfect man, mother earth herself may have been separated into her elements, and then, having been shifted into the oblivion of time and space, may go drifting nonchalantly down some starry pathway, preparatory to beginning anew the cycle of her primordial existence.

According to a theory of heredity promulgated by Weisman, the germ plasm constitutes the physical basis of heredity, and only those characteristics which have been impressed upon this medium possess the potentialities for realization in the inheritance. The normal dentition, therefore, may be considered an expression of our ancestral inheritance. Aside from the "continuity of the germ plasm," there are other influences, immediately operative, which may deflect the course of development and retard or finally prevent the full expression of the inheritance in the individual. Irregularities of nutrition in the embryonic state, the effects of disease, and the absorption of drugs create conditions of environment which militate against the expression of the potential design, but these cannot in any sense be considered a part of the germinal inheritance.

We may therefore credit the malocclusion of teeth—including impactions as well—which are, in form and position, at variance with the type of the species, to the absence of appropriate environmental conditions and developmental stimuli. The function, therefore, of the orthodontist, and likewise the aim of the idealist, is not merely tooth alignment or the construction of ingenious appliances, not the reversal or obstruction of nature's processes, nor the creation or mutilation of types, but the endeavor to realize the purest expression of the inheritance in the individual.

The only scientific basis for the attainment of this goal consists in the application of the principles of normal occlusion as advocated by Dr. Angle; not as a dogmatic theory arbitrarily adopted, but as a natural standard most beautifully and continuously illustrated all through the records of the past, and enjoying the distinction of having been universally incorporated as a part of the architectural design in the creation of species.

The significance of normal occlusion loses a most potent motive in the absence of a genuine conception of the "line of occlusion," which has been defined as "the line with which, in form and position according to type, the teeth must be in harmony if in normal occlusion." Furthermore—"it is more than the tangible or material. It may be regarded as the basic ideal of the dental apparatus, the comprehension and appreciation of which will grow in proportion as our knowledge of the science of occlusion unfolds." (Angle.)

Without this basic principle, normal occlusion would represent nothing more than the mere contact of surfaces and the close approximation of the units in alignment, regardless of their number and denomination. In conformity with such a conception, the individual units lose their significance in the economy of the organism, and rank as accidental appurtenances, to be eradicated at will or left to destruction by default.

This virtually constitutes the parting of the ways, the slough of despond, where many an unwary traveler has struggled, and in the darkness has dismally met his Waterloo.

Each organism contains the potentialities for the completion of its cycle of existence in a perfectly characteristic and well-ordered fashion. The conditions of its environment form an absolutely essential complement for the innate peculiarities of its inheritance. Should the characteristic order of its development meet with unusual or disproportionate resistance, the perversion of its purpose constitutes the confused witness of its conflict.

In the event of such a contingency, and providing there exists sufficient inherent developmental vigor to induce the requisite activity, the rehabilitated forces proceed anew, from the point of interruption, to follow the remaining stages of the cycle to its ultimate termination.

In a technical sense, and in conformity with its ideal conception, orthodontia, based as it is upon the science of normal occlusion, affords no sanction for the mutilation of the dental apparatus. Extraction, therefore, has not been featured in the true science of orthodontia.

The most elementary conception of orthodontia demands the establishment of the "line of occlusion." The realization of this idea demands the full complement of teeth, characteristic in their form, position, and relations; and in this connection it may be stated that the standard of procedure for the dentist is not less rigid than for the orthodontist, inasmuch as the final verdict admits of no middle ground.

In this august presence a formal definition of normal occlusion would be superfluous, but an analysis of its significance would be manifestly incomplete in the absence of an explicit statement concerning its major premise in the form of its original interpretation. The value of much that has been written regarding the relations of the teeth might readily be determined by the measure of its conformity to this ideal conception of the line of occlusion.

There can be but one line of occlusion, and it must be the same as the architectural line on which the dental apparatus was constructed. This ideal line was intended to govern not only the length, breadth, and peculiar curve of the dental arches, but the size and pattern of each tooth, cusp, and inclined plane composing these arches. And more than this: That as the dental apparatus is only a part of the great structure—the human body—each part and organ of which was fashioned according to lines of design, it must have been intended that the line of occlusion should be in harmony in form and position with, and in proper relation to, all other parts of the great structure, according to the inherited type of the individual. (Angle.)

The phraseology—"fashioned after lines of design"—was probably not intended to indicate that natural forces work according to a preconceived plan, but rather that the design is the result of the operation of these forces. But since their operation has been observed to follow characteristic pathways, the result being a typical form, it was probably in this sense classified as architectural design.

In conformity with this interpretation of nature's plan, and as justification for the true science of orthodontia, it may be asserted that the sizes and shapes of teeth themselves, which are a distinct item of the inheritance, together with their growth-force, and these co-ordinating with the physiological stimulation of appropriate environmental conditions, determine the size, form, and position of the dental arches, in conformity with the typal design.

In recognizing the continuity of the cycle of development in regular and characteristic sequence, it becomes equally incumbent to concede its susceptibility to interruption, as well as to affirm the direction of its course. Its interruption constitutes a perversion proportionate to the force; its direction is forward, to the culmination of its purpose.

The inexcusable disregard of this natural condition leads to numerous embarrassing conclusions relative to the province of orthodontia. The contention that the results of the application of the principles of normal occlusion in orthodontic procedure do not justify the claims of its advocates is an evidence of a misconception of the very spirit of orthodontia. In view of the fact that orthodontia implies "the science which aims to assist nature in building the line of occlusion" (Angle), its advocates are not in accord with the idea that the dentition may be permitted to pursue a precarious course of development until the teeth have reached an uncertain position of latitude and longitude, and then, by the institution of some form of mechanical violence, pretend to eradicate all the evidences of perverted growth, and obtain a result comparable with the perfect correlation of parts in unrestricted development.

The forms of teeth, including their roots, are a continuation of characteristics which are a part of the heritage of the species, and are generated in conformity with the laws of heredity. And the weight of the evidence obtaining throughout the whole animal kingdom conclusively proves that normal occlusion of the teeth is the inevitable result of the operation of natural force in the presence of appropriate physiological stimulation and nutrition.

The course of development pursues characteristic pathways, but its full realization is susceptible to interruption and perversion. However, either in its perfection or its deviation, it comes fully within the bounds of natural laws.

And herein lies the value of orthodontic procedure. Not that we shall stand idly by, countenancing perverted efforts of growth, hoping to step in later on and invite nature to reverse her course. Her persistent refusal is an evidence of the astounding folly of such a course.

Rather should we fortify ourselves by familiarity with the architectural design, anticipate its requirements, and superintend the construction as indicated, in conformity with natural laws. Then only shall the structure be in full accord with the design; then asymmetry shall give place to symmetry, and harmony and balance shall rule supreme.

The significance of normal occlusion is therefore manifest, representing with all the eloquence of truth the culmination of natural force in the majesty and perfection of its design.

[See also *Discussion*, printed under "Proceedings of Societies," this issue.]

CHRONIC ALVEOLAR OSTEOMYELITIS (PYORRHEA ALVEOLARIS) —ITS CAUSES, AND TREATMENT WITH VACCINES:

With a Bacteriological Study and Report of 115 Cases.

By LEON S. MEDALIA, M.D,, Boston, Mass.,
LATE INSTRUCTOR IN PATHOLOGY AND BACTERIOLOGY, TUFTS COLLEGE MEDICAL AND DENTAL SCHOOLS, PATHOLOGIST AND VISITING PHYSICIAN FOR VACCINE THERAPY, MT. SINAI HOSPITAL, BOSTON, MASS.

(Read before the National Dental Association, Section I, at its sixteenth annual meeting, Washington, D. C., September 11, 1912.)

Introduction.

DURING my investigations of the opsonic index and the use of vaccines in the treatment of diseases due to bacterial infections, I was approached (in 1907) to find out if anything could be done with this new method of treatment for "pyorrhea." I have since had under my personal observation 115 cases, besides several other cases where I have acted as consultant. The cases here reported are all private patients, most of them sent to me by their respective dentists or physicians, while others applied for treatment of other diseases or for relief of other symptoms.

The laboratory work in connection with this study was carried out in the beginning at the pathological laboratory of Tufts medical and dental schools, and has continued, since 1910, in my private laboratory.

This work was carried out with the following objects in view:

(1) To help clear up, if possible, the etiology of this disease by means of the opsonic index, bacterial cultivations, and specific therapy.

(2) To establish the value of the vaccine method of treatment in this disease.

(3) To establish the relation of cause and effect of the bacteria isolated from the pus, by means of animal inoculation.

Etiology.

The understanding of the etiology of this disease depends upon a thorough knowledge of the true anatomical relation that the tissues surrounding the tooth bear to its socket, and what the alveolar process is.

Almost all authorities and text-books on dental pathology refer to the tissue between the root of the tooth and the alveolar bone as the periosteum, or peri-odontal or peridental *membrane.* According to Malassez(1), on the other hand—

> The so-called "alveolar-dental periosteum" or "peridental membrane" is nothing more than an alveolo-dental ligament, because of the fact that if one examines microscopically longitudinal or transverse sections comprising the tooth and the neighboring parts of the maxilla one does not find in the alveolar dental space anything that resembles a periosteum nor any other *enveloping membrane.* What one does find there are solid bundles of fibers which emanate from the wall of the alveolar cavity, go convergently to insert themselves into the surface of the dental root, thus forming a sort of circular ligament. They penetrate deeply in the form of fibers of Sharpey into the bone of the maxilla as well as into the cementum, similar to what takes place in the solid tendinous insertions (in other parts of the body). Some of the bundles, the most superficial ones, those which spring from the alveolar margin, gen-

erally speaking have their maxillary attachment higher or more superficial than the dental-root attachment, in such a way that the tooth finds itself suspended by these bundles on the inside of the alveolar cavity. Mastication, therefore, cannot produce painful compression—as it would if it were a "periosteum"—but simple traction, as is true of all ligaments. What is more, there exists between these tendinous bundles large spaces filled with a loose cellular tissue or medullary tissue communicating with other neighboring medullary spaces, and it is in these spaces that are found the voluminous blood-vessels and the numerous nerves of that region.

From a study of comparative anatomy(2), he says we learn that—"In many animals the teeth are not inclosed in alveolar sockets. They are simply found contained in the gingival mucosa, but they are also fastened to the maxilla by solid ligamentous bundles, which are analogous to our so-called 'alveolo-dental periosteum.'" Malassez quotes Ranvier and other observers as siding with him, and all his statements are backed up by drawings from microscopic specimens that are sufficiently clear for anyone to draw his own conclusions from.

Personally, I cannot help but side with Malassez and the other authorities whom he cites.

The alveolar process is not therefore a bone distinct from the maxilla, but is *part* of the maxilla. The socket is nothing more than an enlarged medullary space of the maxilla, and instead of being lined by a supposedly thin plate of compact bony substances as Talbot(3) would have us believe, it is simply made up of the thinned-out edges of the maxillary bones and their trabeculæ or bony offshoots, as seen on microscopic specimens. Also, instead of an elastic "peridental membrane," which is supposed to act as a cushion for the teeth, we really have an alveolo-dental ligament—a circular ligament—which keeps the tooth suspended in the alveolar cavity.

From the above short sketch of the anatomy of these parts it is very easy to understand the morbid changes that take place in this disease. According to Znamensky(4), whose microscopic studies of the pathological specimens are considered the best, the disease begins with an inflammatory process of the gum margin at the gingival space; it destroys the epithelial tissue and gradually involves the bones, which latter become necrotic. New bone formation (osteoid tissue) takes place and results in a partial involucrum (a partial encapsulation). It is the involvement of the bony socket which is considered by almost all the observers to be the characteristic feature of the disease.

Now, since the chief characteristic feature is the involvement of the alveolar bone and the tooth socket, the latter being nothing more than an enlarged medullary space of the maxillary bones, the only term it seems to me that we can properly apply to such a disease is CHRONIC ALVEOLAR OSTEOMYELITIS. This term, as you can see, is truly descriptive of the disease; it immediately suggests to one its morbid anatomy, its causes and the modes of its progressiveness, and, above all, its proper treatment, while the other terms—Riggs' disease, pyorrhea, or periodontal disease—do not describe the affection and are therefore misleading.

Having made the normal and morbid anatomy of these parts clear, the etiological factors of chronic alveolar osteomyelitis become apparent. They are local and general.

The local causes are (1) mechanical and (2) infectious.

The mechanical are by far the more important ones in starting the disease, but less so in keeping it up. It is the local infectious causes, on the other hand, that are the more important in keeping up the disease.

The local mechanical causes are the same that are responsible for ordinary gingivitis, and the most frequent of them are calculi or tartar deposits. Tartar as a cause of alveolar osteomyelitis was recognized by Ambroise Paré(5) (1550) and other early writers centuries ago. It has been recently emphasized by Fletcher(6), at the last meeting of the American Medical Association. In a previous communication(7) I called attention to the necessity for an albuminous or organic nucleus for the formation of calculi. The organic nucleus may be some food remains on the gingival space together with some epithelial cells and bacteria. The organic matter, if allowed to remain any length of time, will ferment. The products of the fermentation will cause the precipitation of salts from the saliva or other secretion and form a calculus in the same way as calculi form in other parts of the body.*

The local infectious causes comprise the bacteria, principally those capable of pus production. The important ones are the pneumococcus in chain or diplo forms, staphylococcus aureus, streptococcus, and M. catarrhalis. These organisms are recognized today as the infectious agents, affecting the tissues either spontaneously—due to disuse and the consequent improper blood supply—or following a mechanical injury. They are always responsible for keeping up the disease. (A careful review of this phase of the subject as found in the literature as well as my own findings will be described later.)

The careless use of infected instruments as a possible cause of alveolar osteomyelitis should be emphasized here. The same instrument used in scaling or cleaning an affected tooth, if used without being re-sterilized in treating other unaffected teeth in the same patient at the same sitting, might spread the disease to the healthy teeth.†

The general or systemic causes are more in the nature of predisposing causes—lowered resistance—as a rule, rather than exciting causes. It is conceivable that acute infectious diseases—pneumonia or typhoid fever—will render the general resistance of the patient to various organisms so low that a beginning of an alveolar osteomyelitis would follow, especially so if the cleanliness of the mouth be neglected, and if there be present some local irritant, rough edges of cavities, calculi, or artificial bridge work. As a general rule, however, the systemic disturbances met with during this disease, in my opinion, follow the local trouble, and in turn are responsible for keeping it up. The systemic importance of this disease, or rather its consequences, I will take up later.

* In the gall-bladder typhoid bacilli act as an organic nucleus. Living typhoid bacilli have been found in the center of gall-stones, and experimentally it was found that if typhoid bacilli were injected into the gall-bladder of healthy rabbits they would produce gall-stones. The necessity for an organic nucleus in the production of calculi is thus established.

† One of the best methods for sterilizing instruments during the progress of an operation is to dip them in a jar of alcohol and then burn off the alcohol. This can readily be done by bringing the alcohol-saturated instruments in contact with the flame of an alcohol lamp.

Brief Review of the Literature.

I shall limit myself to the discussion of that part of the literature which deals only with the relation of bacteria to this disease. The important bacteriological investigators on this subject are Galippe(8), who isolated two organisms from pyorrheal pus, one of which he described as a double bubble. He succeeded in causing suppuration by inoculating this organism under the skin and in the joints of guinea-pigs and rabbits. His attempts to produce pyorrhea by inoculations in the gums of rabbits were not conclusive.

W. D. Miller(9) isolated twenty different organisms from twelve cases of human pyorrhea. Among them he found staphylococcus aureus twice, staphylococcus albus once, and streptococcus once. The other sixteen were not identified by him. He therefore concludes that "Pyorrhea is not caused by a specific bacterium which occurs in every case, but various bacteria may participate in it." His attempts to produce pyorrhea in healthy dogs artificially were unsuccessful. He did succeed, however, in producing inflammation, and in one case a little suppuration, but inside of a week the lesions were completely healed. He recommends experiments to be carried out on old, emaciated, or sick dogs.

Personally I have tried the artificial

production of alveolar osteomyelitis in two dogs. The cultures used for the inoculations were those isolated from two patients. One was a streptococcus and the other a pneumococcus in chains. The only results I obtained from the gum inoculations was an acute inflammation which subsided within a week. I repeated the inoculation three times, with similar results each time, *i.e.* the gums were healed up at the end of one week.

I believe the negative results to be due (1) to the natural resistance of the dogs, both of them being in a very healthy condition, and (2) to the lack of sufficient injury done to the alveolar process at the time of inoculation—sufficient to produce an osteomyelitis. I must confess that I was not aware at the time I made the experiments that pyorrhea so called is in reality a chronic alveolar osteomyelitis. The negative results of the other investigators cited are probably due to the same reasons. In my future experiments I shall know better.

Kirk's (10) finding of a pure culture of diplococcus pneumoniæ in a few cases of freshly opened pericemental abscesses is of importance because of the minimal chances of contamination under such circumstances. Black (1), Von Arkövy (12), and others found bacteria in pyorrheal pus, but they failed to identify or properly describe them.

Simms (13) records the following bacteria in 10 cases of pyorrhea which he identified: Staphylococcus aureus 2, staphylococcus albus 1, streptococcus pyogenes longus 1, M. catarrhalis (?) 10; streptococcus brevis, spirilla, and fusiform bacilli occurred in every case.

All the investigators thus far cited approached the bacteriological study of the diseases merely from the standpoint of establishing the etiological relation of bacteria to pyorrhea. Goadby (14) (1905) was the first to study the relation of bacteria to pyorrhea both from the standpoint of etiology and that of treatment, making use of Wright's bacterial vaccines in this disease. According to Goadby (15) the streptococcus pyogenes, M. catarrhalis, and staphylococcus aureus and albus are the most frequent organisms met with in this disease. Apparently he left out of consideration the possibility of pneumococcus occurring in chain forms, and considered all the organisms occurring in chains as streptococci.

The confusing of the streptococcus with the pneumococcus in chains is met with in the literature and in a great number of text-books, to which I have already called attention in a previous communication (7). It has also been called attention to by Ricketts (16) and others.

In a recent article Goadby (17) reports 70 cases of early pyorrhea treated by vaccines; 45 of these he reports as cured, 13 relieved, 11 disappeared, and 1 died from an intercurrent disease. He therefore concludes that "The prognosis of early cases is 60 per cent. of cures, while without the vaccine treatment the majority will progress not only to the loss of the teeth, but to diseases of divers natures which have been shown to be associated with pyorrhea."

Jones and Humphreys (18) reported 5 cases treated by autogenous vaccines with good results. The organisms found by them in all of the cases they described as streptococcus, occurring often as a diplococcus in short chains or chains of diplococci. The organisms described by these authors correspond exactly to the one I found in most of my cases, but which I designated as pneumococcus in chains.

Eyre and Payne (19) (1909) reported the bacteriological findings in 33 cases of pyorrhea as follows: Staphylococcus aureus 2 cases, M. catarrhalis 9 cases, M. catarrhalis and streptococcus pyogenes longus 11, streptococcus pyogenes longus 7, streptococcus lanceolatus pneumoniæ 4. They treated with vaccine 26 of the above 33 cases, with the following results: 21 cured and remained cured from nine to fifteen months, 4 improved, and 1 died. All these were advanced cases of the worst type. They were all followed up with vaccine treatment as well as local and general treatment.

Beebe (20) reported 17 cases of pyorrhea treated with good results by vaccines: 6 of them showed a pure growth of pneumococcus both in chains and diplo forms, while the other 11 showed the same pneumococcus mixed with staphylococcus aureus.

The foregoing brief review of the literature indicates that observers in all parts of the world who have had any experience at all in the treatment of this disease by means of vaccine are unanimous as to the good results obtained with this method of treatment. It is to be remembered that the observers, be they bacteriologists or medical men, have always handled their cases together with the dental surgeons, and their reports are the conclusions reached by both the medical man and the dentist.

Personal Work.

The study of the 115 cases of "chronic alveolar osteomyelitis" or pyorrhea alveolaris, which makes up the subject-matter of this communication will best be described under three groups, divided according to their clinical appearance and chronicity into—I: *Incipient.* II: *Moderately Advanced.* III: *Far Advanced.* Before taking these groups up under their separate headings, it will be best to describe the method of procedure in handling the patients as a whole, the method of obtaining the cultures, and also in a general way the findings, treatment, and results.

METHOD OF PROCEDURE.

Each patient was given a thorough physical examination when he first applied for treatment, also a careful urine analysis and examination of feces, both chemical and bacteriological. Specimens of blood were obtained for the opsonic index. The blood was also tested by Talquist Hem. scale and smears of blood stained and examined microscopically. No further examination of the blood was made when the above were found negative. Cultures from the gums, nose, and throat were obtained, both for bacteriological examination and the preparation of vaccines.

Technique. Cultures from the gums were obtained in the following manner: The lips or buccal parts were kept away from the affected tooth by means of a sterile tongue-depressor by the patient or an assistant. The gums around the affected tooth were carefully wiped off with sterile cotton. The pus was then squeezed out by means of a sterile swab. This pus in turn was collected with a fresh swab and labeled No. 1. Further pressure would cause a second and third drop to ooze out, which were collected on a second and third swab respectively. The first drop of pus was smeared upon cover-slips for the direct microscopic examination, while the second and third drops of pus were used for cultural purposes. In cases where there was no visible pus present (incipient and some moderately advanced cases), the gums that showed the most sponginess, inflammation, or recession were used. A sterile, heavy platinum wire was used to obtain material for cultural purposes, alongside of the swabs, from the gingival space or from a pocket if any were present. Several culture tubes were inoculated at the same time and results compared. In a word, all efforts were made in each individual case to obtain cultures from the pus or affected places, as free from contaminating material or contaminating organisms as is possible under the strictest bacteriological methods.

Culture media used were glucose agar made of fresh meat, beef blood serum, plain and glucose bouillon, and Schottmüller's blood agar (prepared by mixing 2 cc. of fresh human blood obtained from a vein and 5 cc. plain agar). This latter medium was used for plating purposes in order to establish the hemolytic property of a streptococcus when found. The glucose agar was found to be the best medium for the growing of the bacteria for the preparation of autogenous vaccines.

BACTERIOLOGICAL FINDINGS.

(a) *Direct microscopic examination of smears.* The smears of pus were stained by my methylene-blue stain([21]), also by Gram's method, and at times Wright's modification of Leishman's blood stain. As the microscopic findings of the smears were practically the same in all cases, one description of the bacteria found will be given here which will be applicable to all.

The direct smears of pus when stained and examined microscopically showed, aside from a great many pus cells, a variety of bacteria, both bacilli and cocci, as well as spirochetes of all sizes and shapes. A few red blood corpuscles were also found, especially if bleeding occurred in collecting the pus.

The bacilli were very numerous, but rarely those identified as pathogens. They also rarely grew upon the artificial culture media known. A great many of the cocci, on the other hand, were those found associated with pus or disease production in other parts of the body, and grew readily on artificial culture media. Aside from a number of micrococci, varying in size and arrangement, which could not be identified, there were almost always present large masses of groups of staphylococci, diplococci resembling pneumococci, tetrads, a rare chain of diplococci, and at times a few short chains of streptococci. Masses of biscuit-shaped diplococci resembling M. catarrhalis were also met with at times.

Gram's stain helped to identify the various organisms; the bacilli only rarely stained by Gram, and a great many of the cocci were also found Gram negative, while the chains of diplococci (pneumococci) and the streptococci were almost always found Gram positive.

(b) *Cultural findings.* During the early part of the work it was at once apparent, both from the opsonic index and cultural findings as well as from results obtained by the administration of autogenous vaccine, that the bacteria to reckon with in this disease belong to the coccal group rather than the bacillary types. Among the cocci found, those that are known to be responsible for the production of pus in other parts of the body are the ones, and the only ones, that are of any importance in this infection. Specifically, they are pneumococci in chains or diplo forms, staphylococci, streptococci, and M. catarrhalis—either alone or in combinations. The most frequent of these, and the one that appeared in practically all the cultures—107 times out of 112—was the pneumococcus in chains, or the so-called "streptococcus lanceolatus pneumoniæ." The others were less frequent, and occurred rather in combination with this organism than alone. Thus in the whole series of cases I found—

	Times.
Pneumo. (strepto. lanceolatus pneumoniæ)	26
Pneumo. and staphylo.	67
" " strepto.	3
" staphylo., and strepto.	10
" and M. catarrhalis	1
Staphylo. " " "	2
" aureus	2
Strepto. and staphylo.	1
Sterile	3

These findings recall to one's mind the findings of Galippe (double bubble) and Kirk's findings of a pure culture of pneumococcus in freshly opened abscesses. Goadby, Humphreys, Jones, and other observers, as I have already pointed out, have apparently confused the streptococcus lanceolatus pneumoniæ, or pneumococcus in chain forms, with the true streptococcus.

Chronic alveolar osteomyelitis is therefore not due to a specific micro-organism present in all cases, in the same way as tuberculosis is always caused by the tubercle bacillus, but is due, according to my own findings and those of other investigators, to a mixed infection of different bacteria, and may vary according to the pathogenic organisms most prevalent in the oral cavity in the particular locality or part of the world.

OPSONIC INDEX AND IDENTIFICATION OF THE RESPONSIBLE MICRO-ORGANISMS.

A. E. Wright's discovery of the opsonic index and his development of bacterial vaccines for purposes of treatment gave us two new methods by means of which we could determine the causal relation of a given bacterium to a given disease.

In the beginning of this work I made it a point to test the opsonic index to as many stock or laboratory pathogenic bacteria as were found expedient, and in some cases also to the bacteria isolated from the patient's own pus. This, together with clinical results obtained from the use of autogenous vaccines, was the method by means of which the identification of the responsible organism and its relation to the disease was established. A detailed description of the opsonic method of treatment, also the technique as modified by myself, will be found in a previous publication (22).

In this series a number of cases were also followed up in the beginning with the opsonic index as a guide to treatment. Later, however, after a great deal of experience with this method of treatment, the clinical reaction of the patient at the point of the injection and the amelioration of the disease were considered sufficient guides to establish the causal relation of the organism found to the alveolar infection, without having to resort to the opsonic index.

FECES EXAMINATION.

The examination of the feces was (1) bacteriological, and (2) chemical.*

Technique. The bacteriological examination of the stool consisted of direct smear examination, stained by methylene blue and by Gram's method. Cultures were made upon glucose agar (stab and surface cultures), beef blood serum, and sterile milk. The milk media were used to detect the presence of the bacillus aerogenus capsulatus. The cultures were made use of for the purpose of determining the presence in the stool of the same organism that was found in the pus of the alveolar sockets, also for the preparation of vaccines to be used in combination with the gum vaccine in those cases that were suffering from intestinal disturbances.

The chemical analysis revealed the presence of excessive amounts of undigested meat remains, starch remains, or excess of fat. Also, by means of the Strassburger fermentation tube it was possible to detect whether the particular intestinal fermentation of which the patient complained was a carbohydrate fermentation or a meat putrefaction. This chemical examination was found of the utmost value in deciding upon the proper diet in the individual case.

TREATMENT.

All the cases were treated by (1) immuno-therapy or vaccine therapy; (2) general systemic treatment, and (3) local treatment by the dentist.

(1) *Immuno- or vaccine therapy.* I call this method of treatment immunotherapy because it consists of an active immunization of the patient against the bacterium with which he is infected. This treatment is carried out by means of bacterial vaccines, and is also known as the opsonic treatment. The bacteriological and opsonic investigations seemed to indicate that this disease was due to a bacterial infection plus a low resisting power to the particular bacterium. The treatment, then, according to these findings, would be along the lines of raising the resistance of the patient to the infecting agent, which could be accomplished by means of bacterial vaccines and attention to the general condition.

The technique for obtaining cultures for making the vaccine is the same as that described for the bacteriological examination. The vaccine, which consists of killed bacterial cultures, was prepared and standardized according to Wright's method as described in detail in the communication already referred to (22).

All the cases had autogenous vaccines made up which were used in combination with the corresponding stock vaccines, *i.e.* vaccines made of the same bacteria obtained from other similar cases. The combination of stock with autogenous vaccine was found to be more efficacious

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* In order to obtain the specimen the patient was directed to sterilize a wide-mouthed jar ("lightning" or any other preserve jar) by boiling it for half an hour. The boiled empty jar was covered up while still hot and kept covered until used. The movement was passed directly into it. This gave a sterile specimen which could be used for bacteriological as well as chemical purposes.

than either alone. (The combined vaccines were used in one injection.) The dose varied from 50 to 100 million of pneumo. vaccine and from 50 to 300 million of staphylo. aureus vaccine, except where the latter was used at the same time for a staphylo. skin infection (acne, furunculosis), when its dose was increased. The dose of the strepto. vaccine varied from 15 to 75 million. The interval varied from five days in the beginning to eight and fourteen days or longer later, according to the local amelioration of the condition. The vaccines were injected in the upper arm, deep-subcutaneously or intra-muscularly. A marked local reaction was met with only rarely; a general reaction was never present.

(2) *Systemic treatment.* Systemic treatment was principally attention to diet, the developing of a water-drinking habit (two quarts daily), proper personal hygiene, and attention to proper elimination. Tonics were found to be needed only rarely. Emphasis was put chiefly upon the diet and personal hygiene, and the results, in my opinion, justified the procedure.

The gastro-intestinal symptoms as a rule yielded to the appropriate diet, while the intestinal flatulence and fermentation responded best by addition to the diet of lactic acid milk prepared at home with the bacillus acidi lactici — Medalia([23]). Any other pure culture of a good lactic acid bacillus may be used.

(3) *Local treatment.* The local treatment was left entirely in the hands of the dentist, who removed calculi and necrotic bone when present, kept the teeth free from tartar, established free drainage of the pockets, and instructed the patient in the home care of the teeth. He found it necessary to delay local treatment in many cases where the teeth were too loose and the gums too tender for instrumentation. Such patients were first followed up by vaccine treatment until the teeth were rendered tighter and the gums less inflamed and less tender. These cases helped to establish the value of the vaccine treatment independent of local treatment.

I wish to say here that local surgical treatment by the dentist is absolutely necessary in conjunction with vaccine treatment for the final successful outcome of the case. It is not to be expected of vaccine treatment to supplant, but rather to supplement, surgical treatment. Similarly we cannot expect local treatment alone to do it all, because, as long as the resistance of the blood of the patient remains low to that particular infecting agent, just so long will the disease persist.

In connection with local treatment it may be of interest to quote from a letter of Dr. H. S. Draper (dentist) of Boston. He says in part:

> A number of years ago it seemed to me that "pyorrhea" was only a symptom of a constitutional disorder, and that local treatment alone would be of no avail, or only palliative. Consequently I have not urged local treatment unless the patient would also try systemic remedies, which most patients did not seem inclined to do. I attached so little faith to the purely local treatment that I told patients so, and sent them to specialists in local treatment who did have faith in it. The cases usually resulted in a return to me to have artificial substitutes for the teeth, which they finally lost, or in being turned over by the local-treatment specialist to someone who practiced vaccine therapy. The only cases which I feel I have helped by local treatment were cases where the teeth had been neglected and tartar allowed to accumulate—the inflammatory condition disappearing after thorough scaling and treatment. In the worst cases there oftentimes is no deposit present, and in these cases I have no faith in treatment locally only.

The above is the opinion on local treatment alone as expressed by a man for whose observation and conservative judgment I have a great deal of respect.

Besides the local treatment, mild antiseptics were also advised, most of them for purposes of calling attention to the cleaning of the teeth and tartar deposits. A favorite prescription was the following:

℞—Liquor iod. comp. (U.S.P.).
Glycerin, āā ℥ss.
Aquæ destil., ad ℥ij.

Sig.—Apply on gums each morning or at bedtime, with a cotton pellet wound round a toothpick, or with a camel's-hair brush.

This iodin preparation was advised to be applied at the junction of tooth and gum. The patient was told it would not stain the enamel, but would stain any foreign matter or tartar. Hence, as soon as there was much staining the patient knew that he had to go to his dentist to have it removed. This worked well for the purpose of attracting attention to the teeth and gums. Its antiseptic property is of course very mild, especially under the circumstances, where it is washed off by the saliva as soon as applied.

Results.

The results of the treatment have been classified as "cured," "improved," and "no improvement." It might be well to state here what I mean by the term "cured." I considered a case cured when the local condition of the gums became healthy as to color and firmness, when no pus could be squeezed out of the sockets, when loose teeth had tightened up, and when no inflammatory condition was found; also when symptoms such as bad metallic taste in the mouth, soreness and bleeding of gums, and tenderness during mastication disappeared. The recession, of course, that took place before treatment was begun could not be mended by this or any other treatment; further recession, however, was checked. Finally, when any systemic symptoms present, such as rheumatism, gastro-intestinal disturbances, and neuralgic pains, also disappeared or were relieved, and the patient considered himself as feeling "quite well." When these changes for the better in the patient's condition lasted for several months without a recurrence, I thought I had a right to consider such a case as cured.

We will now discuss the cases under their respective groupings:

Group I: *Incipient Stage* (14 *cases*).

Description. The cases grouped under this heading are those where the disease was in its incipience. The gums and teeth taken as a whole appeared in fair condition, but here and there the gum margin of individual teeth showed signs of inflammation. There was congestion and swelling, distinct discoloration, or slight recession of gum margin. The gums around the affected teeth were found to have lost their elasticity. In some cases the congestion was so marked that bleeding occurred at the slightest touch. Visible pus was rarely present, but smears made from these affected parts showed microscopically the presence of pus corpuscles, also dead epithelial débris and a large number of bacteria.

The teeth in these cases were not found loose, but the necks of the affected teeth were always found uncleanly, surrounded by food débris and tartar deposits. Some of the patients complained of a local discomfort and a dull ache on mastication, while others were not aware that there was anything wrong with their teeth and gums, except perhaps for some bleeding caused by the use of the brush.

Bacteriological findings. The direct smear findings already described are applicable to this as well as to the other groups. The cultural findings of this group are as follows:

Pneumo. and staphylo.	10 cases.
"	2 "
Staphylo. and strepto.	1 case.
Sterile	1 "

The predominating organism culturally was the pneumococcus in chains; the staphylococci were as a rule less abundant.

The *opsonic index* was tested in 3 cases; they were all below normal to pneumo.; 2 were found normal to staphylo., and 2 below normal to colon. One of them was normal to strepto. and colon.

Treatment. The average number of treatments was six—the maximum being eleven and the minimum two, at an interval of from once a week to once in two weeks or less often.

The average duration of treatment was six and one-half weeks, with a maximum of twelve weeks and a minimum of three weeks.

Results. Of 14 cases 13 were cured, while the remaining 1 was greatly benefited. Even in the fourteenth case, where improvement was noted only at the time she discontinued treatment, the gums were still in good condition when she was last seen—about a year later. The progress of the disease was apparently checked.

The permanence of the cure can only be judged from the length of time that the cured cases remained cured. Two remained cured for from twenty-four to twenty-seven months; three from twenty to twenty-three months; five from ten to fifteen months; and three from three to seven months.

Systemic disorders. In this group of 14 cases, 4 suffered from rheumatism and gastro-intestinal disturbances, 1 had rheumatism and asthma, 2 had acne and intestinal fermentation, 1 chronic catarrh and chronic bronchitis, 1 secondary anemia (menorrhagia, low coagulability of the blood), 1 had severe headaches (neuralgias?), 1 had empyema of the antrum and facial eczema, and 3 had gastro-intestinal disorders. Almost all of them complained of a lack of energy and general debility. They were all cured or relieved of the systemic symptoms while under treatment for their local conditions. Nor is this my experience alone; other observers have reported similar results (Eyre and Payne, Goadby, Lewin Payne).

Urinalysis. The urine analysis showed in 9 of the 14 cases an increased amount of indican, probably due to the intestinal fermentation. In none of these cases was there any albumin or sugar. The reaction was found neutral in 3 cases and acid in 11. The acidity was not markedly abnormal, and the only thing that attracts attention in the urinalysis is the indicanuria.

Feces examination. The bacteriological findings of the feces in this group was colon (B. coli) in 9 cases; B. coli and diplo. (pneumo.) in 3 cases; no record in 2 cases. We might infer that the diplo. (pneumo.) found in the stool were swallowed with the pus from the gums, escaped the injurious effects of the gastric juice, and finally landed in the intestines.

The chemical examinations were made in 9 of the 14 cases; 6 showed undigested meat remains; 2 of these 6 had in addition undigested starch remains. The remaining 3 of the 9 cases had an excess of undigested starch remains.

Carbohydrate fermentation was present in 3 cases, meat fermentation or putrefaction in 4 cases, while 2 others had a combination of meat and carbohydrate fermentation. These cases showed a tendency to an improper digestion of meat foods rather than of starchy foods, in the proportion of 6 to 3. The old idea of eliminating meat in this disease, which was found empirically to be of value, is here corroborated by actual analysis.

GROUP II: *Moderately Advanced Stage* (16 *cases*).

Description. The cases under this heading are those in which the disease was much farther advanced than in the previous group. The gums on the whole were found congested and inflamed at the margins. Around most of the teeth they were either spongy (hypertrophied) or showed marked recession (atrophied). Bleeding was producible in all cases by the slightest touch. Visible pus was present in all cases, and it could easily be squeezed out by pressure over the affected part. The number of teeth affected in this group ranged from one to several, but the looseness was not very marked, and only in a few of the teeth. All the patients in this group complained of local discomfort and tenderness and difficulty in chewing. All of them were definitely aware that they had gum trouble which they wanted to have treated.

Bacteriological findings. The direct smear findings have already been described. Cultural findings are—

Pneumo. and staphylo.	8 cases.
"	6 "
Staphylo.	1 case.
Sterile	1 "

In this group, as in the preceding, the predominating organism found culturally was the pneumo. in chains. The number of cases that showed a pure growth of pneumo. was greater than in the incipient cases. No definite explanation could be given for the case that was found sterile culturally.

Opsonic findings. Of the 16 cases, 9 were tested opsonically; 7 were found below normal to pneumo. and one above normal. Of these 8 with an abnormal opsonic index to pneumo., 4 were also low to staphylo., 1 to strepto., and 3 to B. coli, while they were normal to the other pathogenic organisms tested. Of the 9 cases tested, 1 was normal to

TABLE I.—

No.	Initials.	Sex and age.	Date.	Teeth affected.	Treatments.	Duration of treatments.
1	C. O. B.	F. 48	7-22-11	Left lateral incisors.	2	1 month.
2	L. H. B.	M. 30	5-8-11	General recession.	8	2 months.
3	E. C.	F. 35	8-18-10	General recession.	7	2 months.
4	G. L. D.	F. 44	3-27-12	Recession + inflammation.	9	10 weeks.
5	S. W. D.	M. 39	2-10-12	General recession.	4	4 weeks.
6	R. E.	F. 25	5-12-11	Bleeding + general recession.	9	7 weeks.
7	H. H.	F. 35	4-30-10	Bleeding + general recession.	5	5 weeks.
8	C. M. K.	F. 28	12-13-10	2 lower lateral incisors.	3	3 weeks.
9	H. K.	M. 32	9-11-11	Recession.	2	6 weeks.
10	S. McC.	M. 60	9-21-11	General recession.	4	6 weeks.
11	G. H. M.	F. 40	10-21-11	Recession.	8	2 months.
12	M. McG.	F. 43	9-14-10	General recession.	11	3 months.
13	K. W. M.	F. 29	9-19-10	Recession + inflammation.	7	1 month.
14	E. P. M.	M. 35	10-13-11	Recession.	4	6 weeks.

TABLE II.—

No.	Initials.	Sex and age.	Date.	Teeth affected.	Treatments.	Duration of treatments.
15	A. A.	M. 45	4-1-11	Bleeding + recession.	7	4 weeks.
16	W. B. B.	M. 50	8-19-10	Few molars. Pus.	19	7 months.
17	F. C. B.	M. 29	2-17-10	Bleeding. Right wisdom tooth.	12	9 weeks.
18	L. W. B.	M. 47	7-9-10	Pus + marked recession.	17	6 months.
19	J. B.	F. 43	3-24-10	General recession + pus.	22	7 months.
20	D. J. C.	M. 44	10-7-10	Molars. Pus + inflammation.	8	4 weeks.
21	C. F. C.	F. 41	9-27-09	Recession + anemia. Bleeding.	15	5 months.
22	S. G.	F. 42	11-27-10	Recession + pus.	8	7 weeks.
23	F. R. K.	M. 49	6-7-11	Left upper molars + inflammation.	6	1 month.
24	F. E. K.	F. 33	7-19-10	Upper bicuspids + upper and lower molars.	15	6 months.
25	P. L.	M. 42	7-26-10	Pus, bleeding + recession.	7	2 months.
26	J. M.	M. 33	2-4-10	Pus + recession.	22	6 months.
27	H. F. S.	M. 30	2-13-10	Molars.	18	5 months.
28	E. S.	F. 66	10-4-10	Recession.	3	2 weeks.
29	G. N. T.	M. 46	10-20-11	Bicuspids + molars.	9	9 weeks.
30	S. L.	M. 40	5-14-11	General recession.	4	5 weeks.

Note.—Unless otherwise designated, staphylo. on pneumo. (1.18); the cultures from the gums of that case showed a pure growth of staphylo. The index to staphylo. in treatments in this group was twelve, with a maximum of twenty-two and a minimum of three, at an interval of five days

INCIPIENT CASES.

Bacteriological findings.	Opsonic indices. Pn.	staph.	strep.	col.	Results.	Other symptoms.
Pneumo. in chains					Markedly imp.	Secondary anemia. Menorrhagia.
Pneumo. + staphylo.					Cured. 3 months.	Hypo-thyroidism. Staphylo. skin infection.
Pneumo. + staphylo. Few macro.					Cured. 22 months.	Rheumatism. Intestinal flatulence.
Staphylo. Some pneumo.					Cured. 4 months.	Hypo-thyroidism. Rheumatism. Intestinal flatulence.
Pneumo. + staphylo.					Cured. 7 months.	Rheumatism. Intestinal flatulence.
Pneumo.					Cured. 15 months.	Acne. Intestinal flatulence.
Staphylo. + pneumo. in chains.	.65	.69	.98	1.08	Cured. 27 months.	Indigestion. Rheumatism.
Sterile.	.76	.67		.72	Cured. 20 months.	Severe headaches.
Pneumo. Few staphylo.					Cured. 1 year.	Stomach + intestinal flatulence.
Staphylo. + strepto.					Cured. 11 months.	Empyema of left antrum. Facial eczema.
Pneumo. + staphylo.					Cured. 10 months.	Chronic post nasal catarrh + bronchitis.
Pneumo. + staphylo.					Cured. 21 months.	Asthma. Rheumatism.
Pneumo. + staphylo. Some macro.	.73			.70	Cured. 2 years.	Indigestion.
Pneumo. + staphylo.					Cured. 10 months.	Acne. Intestinal fermentation.

MODERATELY ADVANCED CASES.

Bacteriological findings.	Opsonic indices. Pn.	staph.	strep.	col.	Results.	Other symptoms.
Pneumo. + macrodiplo.					Cured. 17 months.	Psychasthenia.
Pneumo. + staphylo.	.78	.75	.76	.87	Cured. 17 months.	Rheumatism.
Pneumo. in chains + staphylo.					Cured. 2½ years.	
Staphylo. + some diplo.					Cured. 2 years.	Muscular rheumatism. Intestinal flatulence.
Pneumo. + staphylo.	.73	.57		.78	Cured. 2 years.	Muscular rheumatism.
Pneumo. in chains. Few staphylo.					Cured. 2 years.	Muscular rheumatism. Intestinal flatulence.
Pneumo.	.59	.73	.85	.62	Cured. 3 years.	Intestinal flatulence.
Sterile.	.66	.82		.83	Cured. 19 months.	Gastritis + rheumatism.
Pneumo. + yeast fungi. Many long thin bacilli.					Cured. 14 months.	Chronic furunculosis. Intestinal flatulence.
Pneumo.	.75	.83			Cured. 20 months.	
Pneumo. + staphylo.					Cured. 1 year.	Marked intestinal fermentation.
Pure staphylo.	1.18	.67	.73	1.16	Cured. 2 years.	Intestinal fermentation. Chronic furunculosis.
Pneumo. + staphylo.	.68	.75	1.13	.68	Cured. 2 years.	Chronic sore throat.
Pneumo. + macrococci.	.52	.88	.96		Cured. 23 months.	Rheumatism. Indigestion.
Pneumo. + staphylo.					Cured. 8 months.	Intestinal flatulence.
Pneumo.	1.30	1.04			Improved.	Asthma. Intestinal flatulence.

these charts refers to staphylococcus aureus.

this case (No. 26, J.M.) was very low (0.67), slightly low to strepto. (0.73), and normal to colon (1.16).

Treatment. The average number of in the beginning, to two weeks or longer later, according to the amelioration of the condition. The average duration of treatment was three and one-half months

—with a maximum of seven months and a minimum of two weeks.

Results. Of the 16 cases, 15 were cured and one was benefited. This last patient discontinued treatment at the end of five weeks, after he had received four treatments. The teeth stopped troubling him, and he thought that he had done his share toward them.

Of the cured cases, 2 remained cured for from thirty to thirty-six months, 7 from twenty to twenty-three months, 4 from fourteen to nineteen months, and 2 from eight to twelve months. The process, apparently, even in these cases did not as yet reach to necrosis of bone, at least not to any extensive necrosis. Of course this is merely a supposition, as no pathological specimens could have been examined, for obvious reasons.

Systemic disorders. Of the 16 cases in this group, 2 suffered from rheumatism, 4 from rheumatism and gastro-intestinal disturbances, 3 had gastro-intestinal disorders, 1 had asthma and intestinal flatulence, 2 had chronic furunculosis and intestinal fermentation, 1 chronic sore throat, and 1 a nervous break-down (psychasthenia); 2 had no general symptoms.

The rheumatic disturbances were muscular as well as joint affections. The pain in these cases yielded promptly to the vaccine treatment, while the ultimate good results may also be ascribed to the overcoming of the local affection.

Urinalysis. The urine was examined in 13 of the 16 cases. In none was there found any albumin or sugar. The reaction was found acid in all, and the indican abnormally high in 4. Here, too, the presence of indicanuria is the only thing to be commented upon.

Feces examination. The stool was examined bacteriologically in 12 of the 16 cases. The cultural findings were: Pure colon in 9 cases, colon and diplo. (pneumo.) in 3 cases. The pneumococci were found in this group in about the same percentage—33 per cent.—as in the preceding group.

The feces were examined chemically in only 5 of the 16 cases, 4 of which showed a great excess of undigested meat remains, while the 5th was found normal in all respects. The fermentation test in these 4 cases was marked by a violent gas fermentation, acid change, and a typical picture of carbohydrate fermentation. No deductions, of course, can be made from the small number examined.

(To be continued.)

EXPERIMENTS SHOWING THE EXCRETION OF MEDICINAL SUBSTANCES THROUGH THE SALIVARY GLANDS.

By PERCY R. HOWE, D.M.D., Boston, Mass.

IT is a matter of great interest and importance for those making a study of the oral secretions to note that many medicinal substances, when taken internally, are secreted through the salivary glands. These same substances are, as is well known, eliminated through other secretions of the body, but it is their appearance in the mouth that immediately concerns us.

The study of this topic discloses the fact that the majority of these remedial agents give to tests capable of identifying them a positive result in about twenty minutes after administration. This I believe to be much sooner than many are aware of, and shows that such remedies do not follow the metabolic processes involved in the from-food-to-tissue changes, but that they are early absorbed and carried on to the eliminating organs and surfaces. In this connection it is well to mention that some of these foreign bodies have been found in the tears and in the perspiration, while urinary analysis shows the presence of the greater part, if not all of them.

Another point brought out by these investigations is that it is a matter of several hours before they are so completely eliminated as not to be chemically detected; for after nine hours, when the tests were discontinued, their determination was as distinct as at the commencement of the experiment. The following morning, however, tests gave negative results.

Such a number of these preparations, when taken internally, give a positive reaction to tests for their presence in the saliva, that we may reasonably infer it to be generally true of the class.

We have, then, a means of bringing into intimate relation with oral conditions demanding them substances that have antiseptic, oxidation, reduction, and many other properties. Their effect is a constant one extending over a period of hours, in contradistinction to the transitory effects of the usual methods. Here, too, is additional information respecting the deleterious action of certain compounds upon the teeth, notably iron preparations, for as I will show farther on, ferric chlorid is no exception to the principle spoken of.

One other important thing for consideration advanced by these experiments is that the glandular system of the mouth becomes at times an eliminating organ. To this I have previously called attention in an article in the DENTAL COSMOS for May 1912, entitled "The Accelerating and Inhibiting Agents in the Oral Secretions." So that we may go a step farther, and conclude that substances foreign to the system are so eliminated, whether introduced into the system or produced within it by nutritional disturbance, by bacterial proliferation, or by other systemic derangements. In support of this idea the case reported by Dr. Combe in his work on Auto-intoxication is given, showing that a child during crises of intestinal fermentations eliminated several liters of saliva daily. I myself have found indican present in the saliva in acute cases of this trouble, and accompanying large amounts of sulfoethers in the urine.

The importance of this lies in the fact that the salivary secretions become abnormal under various systemic derangements, and either contain products which are directly injurious to tooth or to tissue, or which so modify the saliva that it loses its natural protective quality and thus engenders the very requirements best suited for bacterial growth.

The method of procedure together with some of the analyses adapted to the work will be described, in order to show the accuracy of the findings.

The medicaments were taken in gelatin capsules, the saliva being at once tested, when it should give a negative result; then, drawn directly from the glands by the apparatus described in the DENTAL COSMOS for April 1912, it was tested at five-minute intervals for the appearance of the substance. It developed that saliva allowed to run directly into a beaker answered all the requirements for this analytical work.

It is a well-known fact that halogens have a decided antiseptic action, and the following, together with a general and sensitive test, are reported: Iodin tincture, five drops with milk; iodids of sodium, potassium, mercury, hydriodic acid taken in sealed capsules, gave a positive test in about twenty minutes, and at the expiration of nine hours were still present in the saliva.

Test: To a small amount of saliva (one-half cc.) add directly one or two drops of nitrosyl-sulfate solution (preparation described in Mulliken's work on Carbohydrates) and shake with one-half cc. carbon disulfid. Deep amethyst purple indicates the presence of iodin.

The bromids of sodium and of potassium administered gave a positive reaction in the same time and were present over a similar period.

Test: Add to saliva freshly drawn 0.05 to 0.1 gm. potassium dichromate (free from chlorid) and 1 cc. dilute sulfuric acid; boil in a large test tube and place over the mouth a piece of fluoresceïn paper. A pink color means the formation of eosin and the presence of bromin.

It seems, therefore, that these are typical of the class, and it is safe to conclude that all iodids and bromids are excreted through the salivary glands.

The chlorids, being natural constituents of the saliva, require a volumetric estimation, the process for which I have described in the DENTAL COSMOS for April 1912. I do not, however, propose to enter upon the discussion of the chlorids here. Ammonium chlorid, being a medicinal agent, was taken internally and tested for in the saliva with Nessler's reagent, and gave a fair indication of its presence.

Tests were tried following the administration of other antiseptics in use in general medicine, such as sodium salicylate, sodium benzoate, guaiacol cinnamate, benzoic acid and salicylic acid, menthol, oil of peppermint, etc. Menthol, guaiacol, and oil of peppermint gave indication of their presence. The salicylates did not give the characteristic color with ferric chlorid, but compared with a control gave a deep change in color that approached it—in fact, being the nearest in tint according to Mulliken's color tables. These substances would, however, be in such dilution that their effect would amount to nothing, except possibly in the cases of menthol and guaiacol.

These results naturally lead us to test for iron preparations, to find if they act in the same way and hence explain the destructive action that so often accompanies their administration. Here we get a positive reaction which clearly shows that iron appears in the saliva in twenty minutes, as with the halogens, and remains as long. The usual preparations of iron were taken in a capsule with the above-indicated results; hence it is not so much the coming of the medicament into contact with the teeth during the act of swallowing, but the fact that it is soon secreted back into the mouth through the saliva, that accounts for its action. It is secreted as ferric or ferrous chlorid whether taken as such or as carbonate, for the carbonate is converted into the chlorid by the hydrochloric acid of the stomach.

Test: Evaporate 10 cc. of the saliva to dryness and redness, using a porcelain crucible. Dissolve in a little dilute HCl, add five drops of dilute HNO to oxidize any ferrous to ferric chlorid. Add excess of KCNS. One cc. of a saturated solution gives a deep red color and shows presence as ferric sulfocyanate.

For quantitative result, titrate against titanous chlorid until color disappears. Control test gives a slight amber color or none.

That ferric chlorid is very destructive of tooth structure is to be seen by placing tooth sections in a solution of it. This has been long known, and the experiments of Dr. Weld have been often quoted to show that this is so in great dilutions.

It has been shown repeatedly that KCNS appears in the saliva when given internally. Its time of appearance is twenty minutes and its duration as with the halogens. This substance has been administered on the supposition that it is a natural constituent of the saliva, but in this respect it acts as do the foreign bodies. I find that it slightly augments lactic bacterial growth. Its attributed effect of dissolving bacterial plaques is the common property of any neutral salt, as may be learned from any physiology. The iodids have a real inhibitory effect on lactic cultures, as I have demonstrated in my laboratory.

The points brought out, then, are—First, that foreign substances given medicinally appear in one form or another in the saliva; second, that those capable of passing through the system in their original form appear within twenty minutes; third, that they are secreted over a period of nine hours but are absent the following morning; fourth, here is the explanation of the injurious effect of iron upon the teeth during its administration; fifth, that the salivary apparatus becomes an eliminating organ; sixth, that we may reasonably conclude that deleterious substances of bacterial origin, of nutritional error, or of other systemic derangement are so eliminated; and last, that a specific compound of intestinal fermentation has been determined to be present in the saliva during acute cases, viz, indican.

These experiments serve to establish principles concerning the nature of salivary secretions and to strengthen the views of those investigators who hold to the opinion that these secretions are a very great factor in all oral disturbance It is true that bacteriologists have not considered that the saliva had much to do with microbic life. The writer has proved, however, by many experiments that salivas that contain much phosphates furnish most excellent media for bacterial growth, while saliva with a high sodium chlorid content and low phosphates is a very poor culture media. Here I speak of lactic cultures. Ammonium chlorid is an augmenting factor according to my experiments. The phosphates and the ammonia evidently supply a nutritional demand on the part of the micro-organisms.

These facts are not given in the expectation of their involving the full explanation of oral bacterial troubles, but as being decided conditions for or against bacterial proliferation.

From my studies, I do not feel as do those investigators who report that the salivary secretions have nothing to do with tooth decay. It may be true that our information on the subject is limited and imperfect, but these very experiments serve to strengthen the opinion that sufficient study of the topic will produce the most practical results yet seen exclusive of mechanics.

AN INQUIRY INTO THE POSSIBLE RELATION OF SULFOCYANATE TO DENTAL CARIES.

By WILLIAM J. GIES, M.S., Ph.D., New York, N. Y.,

WITH THE COLLABORATION OF

MAX KAHN, M.D., Ph.D., New York, N. Y.

(Address before the Dental Society of the State of New York, at its annual meeting, at Albany, May 9, 1912.)

Mr. President, Members of the Society, Ladies and Gentlemen:

It gives me great pleasure to present, informally, today a summary of the results of research that we have been conducting recently under your auspices.*

Scope of Research.

Investigation, as you know, is not the acquisition of predetermined or desired results; it is the search for and establishment of truth, irrespective of preference or prejudice. Sulfocyanate has excited much more debate than research. It was my privilege to suggest to your Research Committee that special attention be given to salivary sulfocyanate, because sulfocyanate, in one phase or another, has occupied a prominent place in your discussions for some years. I felt that we might be of special service if, as biological chemists working under your auspices and having no prejudices regarding possible dental relationships of sulfocyanate, we should review and analyze the available data on this general subject, and then report such additional chemical and physiological facts as might be established by experiment. When I offered my suggestions in response to your committee's invitation, it seemed opportune to correlate and summarize, and if possible to clarify, past findings, and at the same time to go forward so far as time and facilities would permit.

Let me remind you of the program suggested in my original proposal to your committee. In a letter to Dr. Dunning, which was subsequently printed as a part of the committee's report last year,* I called attention to a number of general facts pertaining to sulfocyanate and summarized them under twelve heads. I need not now repeat the details in that connection, but, after briefly indicating generalities of past findings on sulfocyanate, the following suggestion was offered:

> With the foregoing facts in mind, I believe that a thorough investigation of salivary sulfocyanate is now called for under the auspices of your society, because of the past efforts of its committees to solve related problems.

In the same letter I outlined the nature of the experimental work that I felt we could undertake to advantage. The three proposals at the head of the list, which I shall now read, are those toward which we were able to direct our experimental attention:

> (A) Devise *new methods* [or establish the validity of available ones] for the qualitative and quantitative estimation of sulfocyanate in saliva and animal liquids in general —methods which would not be influenced by diacetic acid and other extraneous substances.

* Previous contributions in this series were made by Seaman and Gies, Dental Cosmos, 1910, lii, p. 1141; Gies, *ibid.*, 1911, liii, p. 1324.

* Dunning: Dental Cosmos (Proc. Dental Society of the State of New York, forty-third annual meeting), 1911, liii, p. 1324.

Bunting's recent experiments in this connection should be very carefully and critically duplicated—[because of the fact that the whole matter of sulfocyanate values has been thrown into more or less confusion by his findings, provided they are accurate].

(B) Ascertain in experiments on mammals the full story of the *origin* of sulfocyanate and the reasons for its quantitative *fluctuations* in the saliva, urine, blood, and other parts that may contain it. [It is necessary to establish additional physiological facts regarding the biological occurrence of sulfocyanate.]

(C) Determine the *toxic and pharmacologic effects* of sulfocyanate for the purpose of establishing principles of dosage [provided the therapeutic use of sulfocyanate is indicated].

It seemed that this was the climax toward which we should direct our efforts—to ascertain whether the administration of sulfocyanate for prophylactic purposes might be productive of any harmful effects.

We have followed this general program as closely as possible, with as much detail as possible, with as much thoroughness as possible, and with as much skepticism as possible. We have declined to believe any of our own results until repetitions of the respective experiments offered no other alternative. We have had no desire to prove or disprove anything. We aimed to learn the truth and to establish the facts. We have adhered faithfully to that purpose.

Recently your president requested me to send him copies of a synopsis of our findings for the use of Dr. Low and others who intended to discuss our report. It gave me pleasure to do so. For the convenience of all concerned, I shall now use one of the copies of that synopsis as my guide in discussing the results of our work.

SYNOPSIS OF FINDINGS.

I.

SELECTION OF THE MOST RELIABLE METHOD FOR THE QUANTITATIVE DETERMINATION OF SULFOCYANATE.

(1) We began our research with a purpose to ascertain, if possible, which of the available methods is most reliable for the quantitative determination of sulfocyanate. The classical ferric chlorid process was naturally first in our thoughts in this connection, and Bunting's recent criticism* and proposed modification of the ferric chlorid process was first in our inquiry.

A CRITIQUE OF BUNTING'S PROPOSED MODIFICATION OF THE FERRIC CHLORID TEST.

Bunting's most significant conclusions regarding the method which has been employed by your Research Committees, and by many other previous workers, may be briefly summarized in the following statement: The test is "very delicate," but it may be made "more distinct, if the liquid [containing sulfocyanate and treated with ferric chlorid] is shaken with ether." It is possible, however, that "there may be present in the saliva some substance other than potassium sulfocyanate† which is capable of giving a red color with ferric chlorid; for example, diacetic acid."

Aiming to determine the "reliability of the ferric chlorid test for potassium (!) sulfocyanate"‡ Bunting sought to refine the usual method by carefully desiccating 5 cc. portions of saliva, then stirring "one drop of water and one or two drops of ferric chlorid solution"§ into each dry residue, and treating each *wet* mixture with 5 cc. of ether. Bunting believed that in this particular treatment the resultant ferric sulfocyanate would remain wholly *undissociated,* and that the ether would extract *all* of that colored

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* Bunting: DENTAL COSMOS, 1910, lii, p. 1346.

† No one has shown that sulfocyanate occurs in saliva as the *potassium* salt.

‡ *Soluble* sulfocyanate is evidently intended in this remark, for there is no such thing as a test for "*potassium* sulfocyanate."

§ *Water was returned* in this way, of course. In his concluding statement Bunting recommends the addition of "*one or two* drops of water and *one or two* drops of ferric chlorid solution. The disturbing influence of this water did not appear to impress Bunting.

substance from the moistened residue. He did not recognize the fact, however, that his addition of "a drop of water" and of the water in "one or two drops of ferric chlorid solution" prevented such a consummation, by markedly dissociating the ferric sulfocyanate, the sulfocyanate *ions* being insoluble in ether.

In discussing the supposed advantage of the proposed use of ether, Bunting says (regarding the effect of adding ether to the colored liquid of the *ordinary positive test*): "Ferric sulfocyanate, in the *undissociated* state, is soluble in ether; the undissociated portion, therefore, passes for the *greater part* [!] into the ether, a fresh amount of the undissociated compound is formed [?] in the *aqueous* solution, and this also goes into the ether. When the equilibrium is finally established, *there is much more undissociated ferric sulfocyanate in the ether than there was [in undissociated form?] in the water solution [originally?].*" These statements do not seem to be based on experience. Bunting has apparently not noted the fact that, if saliva-acid-ferric chlorid mixtures exhibiting the ordinary *positive* sulfocyanate reactions of average intensity are shaken with ether, the supernatant ether may fail to acquire a reddish tint and the intensity of the original color underneath may be very greatly diminished (in some cases to the vanishing point). Ether may render the classical test *less delicate* than ordinarily! On the other hand, 5 cc. of an ethereal solution of ferric sulfocyanate containing a proportion of the colored substance approximately equal to the proportion of sulfocyanate in saliva, when shaken with a few drops of water loses its color, *i.e.* undissociated colored ferric sulfocyanate is transformed into the *dissociated* colorless material that passes from the ether to the water. Bunting's conclusion that his ether-modification is a more delicate process than the classical method itself was not established by him.

In Bunting's tests, and in our own, the more accurate indications appeared to be obtained by the classical method rather than by the proposed ether-modification of it. Bunting's assumption that this *particular difference* in favor of the classical method is due to *something important in saliva that is not sulfocyanate,* and which occurs in saliva quite regularly, cannot, therefore, be regarded as probable. Bunting suggests diacetic acid as a substance of such confusing influence in the classical test for sulfocyanate. But Bunting ignores, in this connection, the fact that diacetic acid does not normally occur in saliva in detectable amounts. Then, too, while diacetic acid is reactive in an aqueous solution, in a way to stimulate sulfocyanate, it does not react in this way under the conditions prescribed for the classical test, *i.e.* in the presence of a chemical excess of hydrochloric acid.

Bunting states that "The salivas of several diabetic patients who had been excreting diacetic acid in their urine were examined, and in every case a ferric chlorid test was positive in water and negative in ether."* "Should *potassium* (!) sulfocyanate have been present in these cases," he adds, "it would have reacted in both water and ether solutions." The latter conclusion, as I have already indicated, cannot be correct. In careful tests of saliva from fifteen different persons, five of them typically diabetic, we found that the Arnold-Lipliawsky test for diacetic acid was wholly negative in each instance.

Although Bunting has not shown that his modified method is more reliable, as a rule, than the process he criticized, his general conclusion, that *various substances in saliva may prevent, modify, or simulate sulfocyanate in the ferric chlorid test,* accords with a well-known and long recognized fact—even ferric phosphate (and phosphate occurs in saliva) may cause confusion. It is this general fact, however, which makes it impossible to accomplish accurate quantitative work with the ferric chlorid test in

* From our point of view this shows merely that the ether-modification was less accurate than the classical process. Bunting should have gone further and determined by other methods whether sulfocyanate or diacetic acid, or both, were present.

any form, without due regard for the possible presence of various confusing substances; and even "clinical" work must be carefully safeguarded from the influence of many factors of interference in order to secure results of some reliability. Our own study of the ferric chlorid method led us to reject it as wholly unsuitable for the accurate quantitative analysis which is required for an investigation under your auspices by professional biological chemists.

THE RUPP, SCHIED, AND THIEL IODOMETRIC METHOD FOR QUANTITATIVE DETERMINATION OF SULFOCYANATE.

(2) Quantitative chemistry deals chiefly with masses that cannot be continuously perceived. In many cases it is impossible to determine quantities accurately by noting merely the appearance or disappearance of colors or precipitates, by ascertaining the volumes of masses, distinguishing shades of colors, or by obtaining any other direct result. Quantitative chemistry must be more precise, more detailed, more technical than the acquisition of such data requires. After several months of careful study in strictly technical comparisons, we found that it would be impossible to do accurate work on the content of sulfocyanate in tissues and parts of the body in general, if we did not employ a laborious, tedious, detailed and thoroughly accurate quantitative method. There are quite a number of accurate methods for the determination of sulfocyanate. Some of these methods are just as accurate as the finely detailed methods in use for the determination of atonic weights. We found, for instance, that Munk's method is very accurate. It involves the removal of sulfocyanate from its solution by precipitation with silver nitrate solution, the conversion of the sulfur of the precipitate into sulfate, and the calculation of sulfocyanate from the sulfur in the sulfate precipitated with barium chlorid solution. We finally adopted a method which, while not possessing the simplicity and facility of a clinical process, is apparently the most accurate now available. I refer to the iodometric method suggested by Rupp and Schied, and improved by Thiel.*. This method, in spite of its complicated character, is justly regarded generally as the best and most accurate for the quantitative determination of sulfocyanate in tissues and fluids.

The *Rupp, Schied, and Thiel iodometric method* is based on the fact that sulfocyanate solutions containing excesses of bicarbonate decolorize large amounts of iodin solution, cyanogen iodid (CNI) being formed with hydriodic acid (iodid) and sulfuric acid (sulfate). Typical equation:

$$KSCN + 4I_2 + 4H_2O = H_2SO_4 + 6HI + KI + CNI$$

The reaction is completed in about four hours at ordinary temperatures. By cautious acidification with hydrochloric acid, the iodid which results as a step in the first reaction is changed to chlorid and hydriodic acid, the latter converting the cyanogen iodid into hydrocyanic acid (cyanid)—

$$CNI + HI = HCN + I_2$$

The *essential* steps in the whole process may be indicated directly by the following typical equation:

$$KSCN + 3I_2 + 4H_2O = H_2SO_4 + 5HI + KI + HCN$$

i.e. one molecule of sulfocyanate is equivalent to six atoms of iodin (as iodid).

The reagents for the method are nitric acid solution (1 per cent.), silver nitrate solution (3 per cent.), iodin solution (N/10), sodium thiosulfate solution (N/10), hydrochloric acid solution (10 per cent.), starch paste (2 per cent.), infusorial earth (clean, washed in acid), sodium bicarbonate, and potassium iodid.

The method may be conducted as follows: The liquid under analysis is filtered. If the material to be analyzed is solid, it is finely minced, thoroughly extracted with water for twenty-four hours,

* Rupp and Schied, *Berichte d. d. chem. Gesell.*, 1902, xxxv, p. 2191; Thiel, *ibid.*. p. 2766; Edinger and Clemens, *Zeitschr. f. klin. Medizin*, 1906, lix, p. 223.

the extract freed from coagulable protein in the usual way, and the liquid filtered. The clear filtrate is acidified with nitric acid and then treated with a chemical excess of silver nitrate solution for the precipitation of the sulfocyanate as the silver compound. In order to cause complete sedimentation, a little infusorial earth is thoroughly stirred into the liquid and the mixture warmed over a water-bath for about ten minutes. The liquid is then filtered, preferably under pressure, through a filter in a perforated platinum cone. The filtrate must be perfectly clear. The precipitate is thoroughly washed with dilute nitric acid solution, when the filter and precipitate are transferred to a wide-necked Erlenmeyer flask (1 liter), there treated with a little water, 3 gm. or more of sodium bicarbonate (alkaline reaction) and 3 gm. of potassium iodid are added, and the solution is stirred until the bicarbonate and iodid wholly dissolve, and the filter paper is thoroughly disintegrated. Iodin solution (N/10) is then added until a permanent brown color is imparted to the mixture. The liquid is next carefully shaken and allowed to stand in a dark place for at least four hours. After cautious acidification with 10 per cent. hydrochloric acid solution (strong evolution of carbon dioxid may cause loss of volatile iodid), a few cubic centimeters of freshly prepared starch paste are added. Titration with sodium thiosulfate solution (N/10) in the usual way, and the customary calculations, complete the determination. In calculating the result, the number of cubic centimeters of N/10 iodin solution required multiplied by the factor 0.9847 gives the amount of sulfocyanate as hydrosulfocyanic acid, in milligrams, or, multiplied by the factor 1.6203, expresses the content as *potassium* sulfocyanate in milligrams.

II.

THE FUNCTIONAL SIGNIFICANCE OF SULFOCYANATE IN SALIVA.

(1) Sulfocyanate is a normal constituent of human saliva. What is the explanation of its occurrence in saliva? Where and how does salivary sulfocyanate originate chemically? *What is its functional significance?* It is obvious that precise knowledge of the place and circumstances of its production may throw a bright light on the functional import of salivary sulfocyanate—something no one has succeeded in explaining.

Sulfocyanate occurs in saliva in the form, presumably, of simple salts of hydrosulfocyanic acid, or as the sulfocyanate ion.* For the sake of convenience it is often assumed that *all* the sulfocyanate in saliva exists there in the form of *potassium* sulfocyanate. Whatever the form or forms may be in the saliva, chemists indicate the nature of hydrosulfocyanic acid by the formula $H—S—C\equiv N$, and of sulfocyanates in general by the chemical symbol $R—S—C\equiv N$, in which R signifies potassium or any other base, and SCN represents the sulfocyanate radical or anion. The formula $R—S—C\equiv N$ suggests that a sulfocyanate is a compound of sulfid and cyanogen radicals. Chemical analysis has established the truth conveyed by these formulas. It is plain, then, that the biological production of sulfocyanate depends upon the availability of *sulfur, nitrogen* and *carbon* atoms in one form or another, together with atoms like those of *potassium,* or radicals like those of *ammonium,* to complete the salt formation.

SUBSTANCES OR RADICALS YIELDING SULFOCYANATE IN THE LABORATORY.

Assuming for the moment that salivary sulfocyanate does not originate from preformed sulfocyanate in the food, it is natural to conclude that salivary sulfocyanate is *made* in the oral cavity, or is *produced* in, or *excreted* by, the salivary glands. In any event we should expect to gain an insight into the biological production of sulfocyanate, in any of the imaginable environments, from an inquiry into the processes by

* It has not been shown that more complex forms do not occur.

which it may be obtained in the chemical laboratory. It would be natural to conclude that the substances or radicals that yield sulfocyanate in the laboratory *might* be the same as, or analogous to, the substances or radicals that yield sulfocyanate in organisms. Permit me to summarize briefly certain well-known facts in this connection:

(A) When cyanid is fused with sulfur, sulfocyanate is formed. Typical equation:

$$\mathrm{K{-}C{\equiv}N + S = K{-}S{-}C{\equiv}N}$$

(B) A similar result may be obtained when a solution of cyanid and *yellow* ammonium sulfid is boiled. Typical equation:

$$\mathrm{K{-}C{\equiv}N + (NH_4)_2S_2 = K{-}S{-}C{\equiv}N + 2NH_3 + H_2S}$$

(C) Sulfocyanate is produced when carbon bisulfid and an alcoholic solution of ammonia are heated. Equation:

$$\mathrm{S{=}C{=}S + 4NH_3 = NH_4{-}S{-}C{\equiv}N + (NH_4)_2S}$$

(D) Sulfocyanate may be formed by decomposing a mixture of cyanid and protein (which readily yields *sulfid* radicals).

The foregoing simple facts suggest that sulfocyanate may be produced in organisms from sulfur-containing and cyanogen radicals. We know that such radicals are produced in organisms in the metabolism of proteins and other substances. We might expect, therefore, that sulfocyanate is not only produced biologically from such radicals, but that it is made from them in such active parts of the body as the liver, and that it is not peculiar to the salivary glands or the saliva. Let us consider this matter of *distribution* of sulfocyanate in the mammalian body before we proceed farther with our inquiry into the *origin* of sulfocyanate.

DISTRIBUTION OF SULFOCYANATE IN THE MAMMALIAN BODY.

(2) A thorough review of the literature on sulfocyanate warrants the general assertion that sulfocyanate occurs in the blood and lymph and in *practically all parts of the mammalian organism.* Although we have respected the evidence to this effect from the literature, we have conducted many analyses of our own, with the method I have already described, for the purpose of directly testing the matter.

Finding that blood invariably contains sulfocyanate, we felt it necessary, in our work on the *distribution* of sulfocyanate, to remove the blood from the body of the animal whose tissues were intended for analysis. For this part of the investigation, normal dogs were kept in cages, under preliminary observation, for several days. The daily food of the dogs consisted of hashed lean beef, cracker-meal, lard, bone-ash, and water—a mixture which in ordinary amounts is very nourishing, which we have used for years in our nutrition studies, and *which is free from sulfocyanate.* After we had learned that the dogs were normal in behavior and character, so far as that can be determined by superficial observation, we bled each to death from a femoral artery under local cocain anesthesia. Exsanguination was made as complete as possible, so that the volume of retained blood in any part was negligible in this connection. The parts that were intended for analysis were immediately removed very carefully, one at a time, without intermixture of liquids or juices, and without introduction of any extraneous matter. The entire part was subjected to analysis in nearly every case.

Table I presents the results of our analyses under these particular conditions. The data in Table II were obtained in the analyses of materials from normal animals—the *tissues,* from animals which had been bled to death.

Our analytic data in this particular part of the work indicate strongly that, in dogs, sulfocyanate is produced in and excreted from the liver; that sulfocyanate circulates in the blood to all the usual channels of excretion; that sulfocyanate is eliminated from the blood in bile and urine. Our failure to detect sulfocyanate

Table I.—Data pertaining to Content of Sulfocyanate in Fluids, Tissues, and Excreta from Six Dogs, after Complete Exsanguination.

Animal substance.	Sulfocyanate calculated as KSCN. Milligrams.						Extreme weights of material subjected to analysis. Grams.
No. of animal	(1)	(2)	(3)	(4)	(5)	(6)	1–6
Weight in kilos	(15.5)	(7.5)	(9.3)	(11.3)	(12.1)	(11.8)	....
Bile	0	0	4.3	7.7	3	0	4–37
Blood	52.9	27.3	32.6	42.3	17.8	20.4	598–955
Brain	0	0	0	0	0	0	58–87
Feces (dry)—(see *Note*)	....	....	....	....	60.7	57.6	213–258
Heart	0	0	0	0	0	0	53–92
Intestine:							
Small, and contents	....	....	7.4	22.7	9.6	9.4	589–670
Large, and contents	....	....	5.8	15	5.5	8.7	147–285
Kidneys	0	0	0	0	0	0	51–87
Liver	29.8	17.8	19.2	39.5	10.7	12.2	217–393
Muscle	0	0	0	0	0	0	200 (each)
Pancreas	0	0	....	....	....	....	21 and 30
Pancreas and spleen	....	....	0	0	0	0	58–79
Salivary glands	0	....	....	....	....	....	11
Spleen	0	0	....	....	....	....	22 and 32
Stomach and contents	....	....	....	0	0	0	128–210
Urine*	....	....	....	....	27.1	26.4	2530 cc. and 2835 cc.

Note.—See Table III for additional fecal and urinary data.

in the combined salivary glands from six dogs accords with previous observations to the effect that dog *saliva* does not contain sulfocyanate. The excellent condition of the average dog's teeth is an interesting fact for consideration by those who believe that caries in people is due to the absence (or reduction in the proportion) of salivary sulfocyanate. It is highly probable that the quantity of sulfocyanate (produced?) in the liver, and the proportion of that substance in the blood, of people is much greater than in dogs and that, on this account, the salivary glands in people are able to participate in the process of *excreting* sulfocyanate *from the blood.**

The foregoing facts regarding the *distribution* of sulfocyanate in exsanguinated dogs—very typical mammals—are not sufficient to warrant dogmatic assertions about the origin of sulfocyanate, although my inferences regarding its production in the liver, as stated above, are strongly indicated.

CHEMICAL ORIGIN OF SULFOCYANATE.

(3) Returning, now, from our digression into general facts of its distribution, to our inquiry into the chemical *origin* of sulfocyanate, let me remind you of my suggestion that sulfocyanate results in the body from a union of cyanogen

* Such a difference would be analogous to a number of dissimilarities between human and canine metabolism which are illustrated by the well-known discordance in the metabolism of nucleoproteins (and purins in general).

TABLE II.—MISCELLANEOUS DATA PERTAINING TO THE CONTENT OF SULFOCYANATE IN PARTS OF MAMMALS.

(See Tables I and III.)

Part.	Animal.	Weight of analyzed material.	Sulfocyanate, calculated as KSCN.
		Grams.	Milligrams.
Bile	Ox	500	9.7
Blood	Ox	500	7.6
Feces	Man	235	12.8
Liver	Ox	500	4.7
Muscle	Ox	500	0
Saliva	Man	500 cc.	12.8
Salivary glands	Dog (6)	65	0
Salivary glands	Ox	250	10.2
Thymus	Calf	370	0
Thyroids	Ox	605	0
Testicles	Dog (6)	107	0
Urine	Man	1000 cc.	26.2

and sulfid radicals. With this belief as a guiding influence, we sought to ascertain the truth about the chemical origin of sulfocyanate by studying the distribution and elimination (production) of sulfocyanate in dogs, after the administration of various substances that contain or yield sulfid radicals or cyanogen radicals.

The experiments were performed on a large number of normal dogs. During the progress of each experiment the animal was confined in a metabolism cage of the kind I have described elsewhere.* The daily food was uniform in character and amount, consisting of sufficient amounts of the mixture of hashed lean beef, cracker-meal, lard, bone-ash, and water, which we have been using for years in nutrition experiments on dogs, to the greatest advantage in the work and to the highest satisfaction of the animals.† During a preliminary period for each animal the total amounts of daily urine and feces were carefully determined and recorded, and the amounts of sulfocyanate in these excreta ascertained. In this way the normal elimination of sulfocyanate under the initial conditions of the experiment was established. Dosage with the substance under investigation was then begun and was continued in increased quantity daily. Sulfocyanate, as before, was determined in the urine and feces, for the purpose of ascertaining whether the dosage increased or affected its quantitative output. Finally, sufficient time having presumably elapsed for the registration of effects of the dosage on the elimination of sulfocyanate, the animal was bled to death from a femoral artery under local cocain anesthesia, and, after complete exsanguination, some of the blood and certain other carefully isolated parts of the body of the animal were analyzed for sulfocyanate, to determine whether the dosage had increased any local production or retention of such substance. The results of this part of the work are summarized in Table III.

Our data show that there were slight, though unimportant increases in the average daily excretion of sulfocyanate in urine and feces after administration of sulfur, sodium sulfid, and taurin. Thiourea and cystin did not induce elimination of quantities above normal average. The doses of each of these sulfur containers were comparatively large. Both the sulfur and the sodium sulfid certainly added appreciably to the usual amount of sulfid radicals in the body. Our observations in this connection suggest that added amounts of simple substances containing or yielding sulfid radicals do not markedly affect the sulfocyanate excretion. Since considerable HS sulfur results from ordinary metabolic transformations of proteins, it is probable that sulfur in such radicals is freely available at all times for any sulfocyanate synthesis that may tend to occur. On the other hand, the exceptionally violent toxicity of the CN radical suggests that this radical never occurs normally in proportions comparable with those of the HS radical. Our experi-

* Gies, *Amer. Journ. of Physiology*, 1905, xiv, p. 403.

† Gies, *Amer. Journ. of Physiology*, 1901, v, p. 235; Steel and Gies, *ibid.*, 1907, xx, p. 343.

TABLE III.—DATA PERTAINING TO THE DISTRIBUTION OF SULFOCYANATE* IN DOGS UNDER VARIOUS CONDITIONS OF TREATMENT.†

Dog.		Period.	Dosage.			Urine.		Feces.		Blood.		Liver.		Bile.		Stomach contents.		Intestine and contents.			
						Average per day.												Small.		Large.	
No.	Wt.	A-Preliminary. B-Dosage.	Days before dosage.	Days of dosage.	Substance given.	Vol.	KSCN	Wt. dry	KSCN	Wt.	KSCN	Wt.	KSCN	Wt.	KSCN	Wt.	KSCN	Wt.	KSCN	Wt.	KSCN
	kilos.				grams.	cc.	mg.	gm.	mg.	gm.	mg.	gm.	mg.	gm.	mg.	gm.	mg.	gm.	mg.	gm.	mg.
1.	12.1	..	0	0	....	405	3.9	34	8.7	765	17.8	280	10.7	9	3	128	0	589	9.6	175	5.5
2.	11.8	..	0	0	....	361	3.8	30	8.2	635	20.4	230	12.2	4	0	172	0	595	9.4	147	8.7
3.	11.4	A	5	..	....	482	3.7	42	8.6	...	...	...	...	...	...	...	...	...	...	...	...
		B	..	7	Sulfur (35)	384	4.0	67	10.4	653	27.6	258	25.8	17	3.2	110	0	253	10.3	127	8.7
4.	8.7	A	5	..	....	290	3.0	40	9.1	...	...	...	...	...	...	...	...	...	...	...	...
		B	..	7	Sulfur (35)	300	3.7	51	9.6	580	22.5	297	21.6	22	4.0	128	0	295	11.2	55	5.4
5.	6.9	A	5	..	....	268	2.8	26	4.9	...	...	...	...	...	...	...	...	...	...	...	...
		B	..	5	Sodium sulfid (0.75)	278	4.0	32	7.9	508	38.8	236	27.0	29	3.7	131	3.5	328	20.6	152	16.2
6.	8.2	A	11	..	....	290	2.5	34	5.8	...	...	...	...	...	...	...	...	...	...	...	...
		B	..	5	Sodium sulfid (0.75)	316	4.5	35	7.4	467	42.4	267	22.7	25	0	126	4.3	289	17.5	172	10.2
7.	8.4	A	8	..	....	276	4.0	35	7.3	...	...	...	...	...	...	...	...	...	...	...	...
		B	..	4	Taurin (2.5)	295	5.8	43	8.9	475	28.5	275	15.1	18	0	207	0	305	15.4	162	9.7
8.	8.6	A	8	..	....	310	4.3	32	6.1	...	...	...	...	...	...	...	...	...	...	...	...
		B	..	4	Taurin (2.5)	301	5.0	45	9.6	505	24.6	244	12.7	28	0	195	0	327	17.2	155	7.5
9.	7.9	B	..	6	Thiourea (32.5)	261	2.5	31	5.9	470	20.7	263	17.5	30	4.6	170	0	285	20.3	160	7.1
10.	8.0	B	..	6	Thiourea (32.5)	268	2.7	39	6.3	465	19.4	185	22.8	20	3.7	222	0	305	17.6	146	8.3
11.	7.8	A	3	..	....	183	2.1	30	3.2	...	...	...	...	...	...	...	...	...	...	...	...
		B	..	7	Cystin‡ (6.5)	186	2.5	28	3.4	...	...	242	24.7	32	4.4	...	...	...	...	84	9.2
12.	10.8	A	2	..	....	230	3.1	40	9.3	...	...	...	...	...	...	...	...	...	...	...	...
		B	..	5	Acetonitril (2.5)	284	5.9	35	8.6	560	47.0	287	18.4	16	6.5	142	0	340	21.5	144	10.6
13	7.9	A	6	..	....	238	2.7	36	4.4	...	...	...	...	...	...	...	...	...	...	...	...
		B	..	5	Alanin (24)	293	6.1	40	5.5	410	21.8	243	18.7	21	6.2	105	0	348	25.4	61	10.3
14.	9.2	B	..	5	Glycocol (5)	308	3.5	36	7.9	510	29.3	...	...	...	...	170	0	385	27.5	163	17.2
15.	6.5	A	2	..	....	155	1.8	20	2.5	...	...	...	...	...	...	...	...	...	...	...	...
		B	..	5	Glycocol (16.5)	148	6.1	21	6.2	380	20.4	192	17.3	20	5.3	142	0	207	11.2	141	12.7

* Sulfocyanate contents are given in terms of potassium sulfocyanate. † Experiments 1 and 2 were "controls." Experiments 3-11 were planned to determine effects of sulfur and sulfur-containing substances. Experiments 12-15 tested effects of a CN container and two typical amino acids (products of protein metabolism—CN yielders). ‡ Crude cystin.

mental data accord with the opinion that the amount of sulfocyanate depends primarily on the available supply of the constituent radical which happens to occur in the body in the smaller proportion, namely, the CN radical.

Acetonitril, alanin, and glycocol had an apparently marked effect on the elimination of sulfocyanate in the urine. The doses of alanin were comparatively large. The first of these two substances contains a CN radical, the second is capable of yielding such a radical. Direct addition of CN-yielding material to the small available supply of such substance in the body induced a notable increase in the elimination of sulfocyanate.

So far as production and retention (distribution) of sulfocyanate are concerned, the data in Table III indicate that the effects on the quantity of sulfocyanate in the blood were much the same as those in urine and feces, as might be expected. The amounts of sulfocyanate in the liver and the small and large intestines, with their contents, were above normal in most cases. The effects on the amounts of sulfocyanate in the bile and the small intestine with its contents were especially striking after administration of acetonitril, alanin, and glycocol. Sodium sulfid was the only substance whose administration was followed by the occurrence of sulfocyanate in the stomach. The results with taurin were anomalous, and additional experiments with that substance are especially required. Glycocol seemed to be responsible for the production of considerable sulfocyanate in the alimentary tract. Our experiments are now in process of extension along these lines. Further work in this direction promises to be particularly instructive.

Our experimental data on the origin of sulfocyanate suggest strongly that sulfocyanate results from the metabolism of protein, that the liver is the organ chiefly concerned in the production of sulfocyanate,* and that the salivary glands *excrete* rather than secrete sulfocyanate in saliva. Let me summarize the inferences in this connection to which our results lead us.

* It is probable that the sulfocyanate in the alimentary tract is derived from bile, and that the quantities found in the tract are the amounts which were not reabsorbed.

INFERENCES TO BE DRAWN FROM THE EXPERIMENTS ON ANIMALS.

Protein yields HS and CN radicals in the laboratory and in the organism. Hydrogen sulfid, methyl-mercaptan and cystin are among the ordinary HS-containing products of protein transformation. Amino acids, such as glycocol and alanin, arise from protein in the digestive processes, and nitrils (similar to acetonitril in significance) result in small proportion from amino acids in the bodily oxidative processes. These cyanogen products, in spite of their slight proportions, are very toxic. The chemical defenses of the organism are presumably just as effectively operative in this connection as in any other. The liver combines the HSO_3 radical with putrefactive indol from the intestine (after oxidizing the indol to indoxyl), thus converting the toxic indol into a much less toxic substance (indican) prior to its elimination in the urine and in other excretions.

In like manner, our data suggest, the toxic CN products of metabolism or extraneous introduction are suitably modified and combined, in part at least, with freely available, normally occurrent, HS radicals, apparently in the liver, into much less toxic sulfocyanate prior to elimination of the latter in the urine and in other excretions.* These deductions are in full accord with many previous observations, with our own findings, with analogous facts, and with the logic of present metabolic knowledge. If these views are correct, they suggest, further, why no one has shown that sulfocyanate, a waste product, bears any functional relation whatever to the teeth or oral membranes.

* Ordinary cyanid, such as the potassium compound, is transformed, in part at least, into sulfocyanate after its introduction into the body.

EFFECT OF FASTING ON ELIMINATION OF SULFOCYANATE.

If sulfocyanate is produced from CN radicals that are released in protein metabolism, the tissues and excretions would probably contain smaller proportions of sulfocyanate during a fast, because protein metabolism is thereby reduced to a minimum. We tested this matter by subjecting a normal dog weighing 8.46 kilos to a seven-day fast. At the end of that period the animal was completely exsanguinated by the method already described. There was marked diminution in the amounts of sulfocyanate in the urine, feces, and tissues, in some cases to 50 per cent. of the "normal" values.

SALIVARY GLANDS IN DOGS NOT PRODUCERS OF SULFOCYANATE.

Although we were unable to detect sulfocyanate in salivary glands from dogs, we concluded that slight proportions might be produced there and secreted into the saliva, and by passing into the stomach enter the blood, accumulate in the blood, and account for some of our observations. We then determined the effect of preventing the saliva from entering the stomach, upon the distribution and excretion of sulfocyanate.

A normal dog, weighing 10.4 kilos, was successfully subjected to an operation for the institution of an esophageal fistula. The dog was fed twice daily through a stomach tube in the gastric end of the esophagus, the food mixture, which was free from sulfocyanate, consisting of milk, cracker-meal, bone-ash, beef extract, Witte peptone, and gelatin. Suitable bandages prevented saliva from passing into the stomach. All samples of saliva collected from the oral end of the esophagus were free from sulfocyanate. The urine contained approximately the usual proportion of sulfocyanate. The experiment was continued for about two weeks. The blood contained about 5 mg. of sulfocyanate (calculated as KSCN) per 100 cc. The liver (272 gm.) contained 17.8 mg.; the bile (27 gm.), 5.4 mg. These facts further emphasize our conviction that the salivary glands are not producers of sulfocyanate—merely the outlets for its ejection from the blood in some animals; for other animals the salivary glands are not even excretory channels.

INHIBITING ACTION ON DENTAL CARIES OF SULFOCYANATE IN SALIVA DOUBTFUL.

Your society has given considerable attention to sulfocyanate, chiefly from the standpoint of the possibility that salivary sulfocyanate prevents, inhibits, retards, or delays the onset and progress of dental caries. If salivary sulfocyanate is an *excretory* product, as I have suggested, such a prophylactic relation to dental caries is improbable. The available experimental data on the subject of an inhibitory influence of sulfocyanate on plaque formation are not only discordant, but cannot be applied satisfactorily to oral conditions. No *rational* explanation has been offered for the supposed effects of sulfocyanate, in salivary proportions, on the formation of bacterial plaques or on bacterial growth or activity. Our studies under your auspices* have convinced me that sulfocyanate does not, and, in the proportions of its occurrence in saliva, *cannot* appreciably retard the growth of oral bacteria, or impair their nutrition, or reduce their capacity to produce acid from carbohydrate. I believe that the ease with which sulfocyanate may be detected in the saliva, and the striking and attractive nature of the test, have given sulfocyanate an importance it does not deserve.

Michel, who claims to have been the first to suggest sulfocyanate prophylaxis against dental caries, who complains that his European colleagues have declined to take seriously his suggestions at the Munich Congress in 1902, but who notes with pleasure the development of the sulfocyanate propaganda among Ameri-

* Seaman and Gies, DENTAL COSMOS, 1910, lii, p. 1141.

can dentists, has recently suggested* that the prophylactic value of sulfocyanate is due to its oral decomposition into prussic (hydrocyanic) acid, with consequent "extraordinary" local *bactericidal* action! Michel says nothing about any other effect of the resultant prussic acid. This opinion of the leader in the sulfocyanate crusade is a very stunning conception when considered in the light of reports to your society that sulfocyanate, in some way or other, restrains the carious activity of the oral bacteria without injuring, though perhaps by "stimulating," the organisms.

III.

INDISCRIMINATE INTERNAL ADMINISTRATION OF SULFOCYANATE BY DENTISTS UNSCIENTIFIC.

Earnest students of the problem of dental caries, who entered this field long before we did, and whose desire to explain and prevent the disease are quite as sincere as ours, believe the results of their work indicate that the internal administration of sulfocyanate is preventive, alleviative, and curative of dental caries. They attribute the therapeutic value of sulfocyanate to the smaller portion of the administered substance which reappears in the saliva, and seemingly ignore the influence and fate of the larger portion of the dose which does not pass into the saliva. In spite of the fact that the pharmacology of sulfocyanate has not been effectively studied, some dentists recommend the internal administration of comparatively large doses of sulfocyanate and have been administering such doses without any apparent regard for effects, good or bad, that may be registered on any other part of the body than the teeth. If it were impossible to ascertain the pharmacologic effects of sulfocyanate, this empirical treatment might be excusable, but the present concentration of attention on the effects of sulfocyanate on the teeth and the disregard for systemic influences it may exercise, is contrary to the spirit of modern medicine and a reflection on the practice of dentistry.

I say this without reference to the ultimate outcome of investigation of this matter. I cannot declare that the internal administration of sulfocyanate in certain doses is without therapeutic advantage—that such doses do not possess curative or palliative effects in dental caries—for I do not know. I cannot say that such doses, if valuable in dental caries, are appreciably harmful in other respects—for I do not know this either. I wish merely to insist that our profound ignorance of the pharmacology of sulfocyanate should prevent us from proceeding empirically in its therapeutic use without due regard for considerations more immediately important, possibly, than those of preventing or curing or alleviating dental caries by such dubious means.

I wish especially to urge you to note the difference between a harmony of coincidental circumstances on the one hand and the accord between cause and effect on the other. We might prescribe "sugar-water" for each of fifty cancer patients daily for some time. It is quite possible that one "*spontaneous* cure" would occur in such a group of cancer patients in a given period of time. Did the sugar-water bring about the one cure observed? Certainly it did—was it not our purpose and expectation to do that very thing with sugar-water? Isn't it evident that sugar-water could do that, especially since we desired it to do so?

How can there be any doubt of the wonderful power of sugar-water under such circumstances? We might very happily exhibit our "cured" patient before such a convention as this. An uncritical convention, unlike this one, might "raise the roof" in its celebration of the wonder of the sugar-water cure for cancer. But if, besides exhibiting the one "cure," we also presented the history of the remaining forty-nine patients—with its dismal commentary on the negative phase of the sugar-water cure—would even an uncritical convention get excited about the curative powers of sugar-

* Michel, *Ergebnisse der gesamten Zahnheilkunde,* 1910, i, p. 436.

water? How much information do we have about the sulfocyanate treatments which have accomplished nothing? How much that is claimed for sulfocyanate is comparable to the sugar-water wonder I have just brought to your imaginative attention. How much that is "prevention of dental caries by sulfocyanate" is coincidental circumstance?—how much is effect due to a definitely established cause? Who knows? It is to your interest and to the interest of your patients, and to the interest of advancement in dental art and science, that you insist upon judicial presentation of every claim, in this and every other connection, that may be offered for your personal and professional attention; and it is equally important that your reception of every such claim be characterized by judicial fairness, thoroughness, and poise. Science is a matter of fact, not a state of emotion.

PRELIMINARY OBSERVATIONS ON POISONOUS QUALITIES OF SULFOCYANATE.

What I have just stated in criticism of the empirical use of sulfocyanate internally for some assumed benefits orally is due, in part, to the results of our experiments on the toxicity of sulfocyanate. We worked forward in our research, step by step, along the lines indicated in my preliminary statement. A few minutes ago I remarked that additional experiments will be performed with acetonitril, alanin, and similar substances, in our effort to establish the origin of sulfocyanate. We are now in the early stages of a series of experiments on the poisonous qualities of sulfocyanate. I can report today only the results of preliminary observations. That being the case, I shall merely summarize briefly the conclusions our results suggest, and postpone, for a future report, presentation of the details of our work to date and any extension of it that we may be able to carry forward.

The growth of lupin seedlings in water cultures, and of timothy seedlings on wet blotting-paper, was strikingly impaired by potassium sulfocyanate in dilutions of 0.01 per cent. or even less. Fungi appeared under such conditions and grew luxuriantly in spite of the toxicity of the media for the green plants. Lupin seeds, soaked for eighteen hours in 0.02 per cent. potassium sulfocyanate solution, lost all power of germination; similar treatment of such seeds in 0.01 per cent. solution did not prevent germination in a favorable environment.

Tubes containing gelatin and gelatin-peptone media, were inoculated with mixtures of common bacteria and fungi. The growth of bacteria in such media, containing 3 per cent. or less of potassium sulfocyanate, was not inhibited. Concentrations of the sulfocyanate greater than 3 per cent. inhibited bacterial development, but the growth of fungi was luxuriant in tubes containing as much as 10 per cent. The growth of yeast in a 5 per cent. glucose solution, and the rate of fermentation, were not decreased by such large proportions of potassium sulfocyanate. The curdling of milk (lactic acid fermentation) was prevented for four days or more by potassium sulfocyanate in proportions equal to or greater than 0.5 per cent. The sulfocyanate interfered with the growth of the lactic acid bacilli and markedly prevented the development of lactic acid.

Subcutaneous doses of 5 mg. of potassium sulfocyanate in frogs weighing 20 grams caused hyperesthesia, convulsions, and sometimes death. The hyperesthesia lasted for several days in the frogs that recovered. Larger doses (7.5 mg. and more) caused violent death, sometimes in a few hours, the main feature of the symptoms being convulsions.

Subcutaneous injections of 50 mg. or more in guinea-pigs weighing from 350 to 450 grams, caused death in convulsions in about twenty-four hours or less. A subcutaneous dose of 25 mg. in a guinea-pig weighing 335 grams was without *visible* effect.

A dog weighing 8.1 kilos was given 0.61 gram of potassium sulfocyanate (75 mg. per kilo) in hashed meat on each of three successive days. After the second dose the dog refused to eat, vomited, and exhibited general tremor. The dog died in convulsions twenty-four hours after receiving the third dose.

A dog weighing 6.1 kilos was given 0.2 gram of potassium sulfocyanate (33 mg. per kilo) in hashed meat on each of five successive days. The treatment caused depression, tremor, diarrhea, and vomiting. The dog appeared to recover promptly after the treatment was stopped.

In a similar experiment on another dog, doses equal to 25 mg. of potassium sulfocyanate per kilo produced no *discernible* toxic effects.

In an extension of these experiments we are planning to include a study of possible influences of small doses as registered on blood pressure, heart-beat, respiration, kidney normality, digestive functions, nervous co-ordinations, and other important vital phenomena whose disturbance, even when not discernible in gross symptoms, may lead to abnormality and disease.

CAUTION IN INTERNAL ADMINISTRATION OF SULFOCYANATE ADVISED.

These results suggest that dosage with sulfocyanate may be a dangerous procedure. They certainly indicate that the pharmacology of sulfocyanate should be thoroughly understood by those who determine how much and how often sulfocyanate shall be administered.

Sulfocyanic acid is produced from its salts by mineral acid. Such a change doubtless occurs to some extent in the stomach after the administration of sulfocyanate. When heated, sulfocyanic acid changes readily into persulfocyanic acid, $H_2C_2N_2S_3$, and hydrocyanic (prussic) acid, HCN. By oxidation, sulfocyanates are convertible into sulfates and hydrocyanic acid. By reduction, hydrogen sulfid, ammonia, and hydrocyanic acid or methyl amin (CH_3NH_2) and trithioformaldehyd result $(CH_2S)_3$. Alkyl sulfocyanates are converted by reduction into mercaptans and hydrocyanic acid or methyl amin. These chemical facts suggest that the oxidations and reductions in organisms tend to produce one or more of these *poisonous* derivatives—derivatives which might be produced abundantly enough after dosage with sulfocyanate under one nutritive condition or another to cause harmful influences similar to, if not as decided as, those exhibited by our frogs, guinea-pigs and dogs in the few experiments I have just described.

I have not noted any statement, by those who used sulfocyanate therapeutically, that the products employed by them were free from hydrocyanic acid (cyanid). In all our work we used an imported product—potassium sulfocyanate—made by Kahlbaum. Large portions of the material, tested by the Noyes method,* were found to be free from cyanid.

Our results strongly suggest an extension of this work along the several lines I have indicated. They emphasize especially the need for thorough determinations of the hidden effects of doses of sulfocyanate that produce no gross toxic symptoms—doses given to mammals, and particularly to men who would volunteer to submit to such treatment after its possible dangers were clearly and fairly indicated.

I regret that we could not finish all that we planned to do, and I am sorry that I have had to take so much of your time to explain the little we have accomplished.

[See also *Discussion*, as reported under Proceedings of Societies, this issue.]

* Noyes, *Journ. of the Amer. Chem. Society*, 1912, xxxiv, p. 609.

THE QUESTION OF EXTRACTION: AN ANSWER TO DR. FERRIS' DISCUSSION.

By CALVIN S. CASE, M.D., D.D.S., Chicago, Ill.

I WISH to correct two misleading statements in Dr. Ferris' discussion of my paper published in the DENTAL COSMOS for February and March, 1912. First: On page 349 he says: "I have lived long enough to have practiced the essayist's methods of extracting the first premolars in cases of class II, division 1, and to see these patients grow to maturity. Likewise I have treated cases of the same class upon the principles set forth by Dr. Edward H. Angle's teachings. I have had the uncomfortable experience of having to undo a case started after Dr. Case's method, and having to introduce artificial teeth to fill the space that had partially closed."

I have endeavored in my papers, as in all my teachings for the last fifteen years, to explain the very wide difference in facial effect and demands of treatment in Dr. Angle's class II, division 1, and to show that in fully one-half the cases of this division—which is characterized by the upper denture occluding about the width of a cusp in front of a normal occlusion in relation to the lower—that extraction is decided malpractice, because the disto-mesial malrelation is due to a retrusion of the lower denture rather than a protrusion of the upper. Such cases demand a decided forward movement of the entire lower denture, with perhaps a slight retrusion of the upper to harmonize the facial outlines by thus placing the dentures in normal occlusion—the whole being easily accomplished with the intermaxillary force.

It unhappily is quite customary for the Angle men, who do not seem to recognize this marked difference in the two characters of this class, to exhibit all cases having this malocclusion with the statement or inference that these are the kinds of cases for which I advocate tooth extraction; whereas it is quite as likely as not that nothing could be farther from the truth. If they have fallen into the inexcusable error of extracting upper teeth in cases where the uppers were not decidedly protruded, I think it would be quite as well to try to gain something more than a superficial and prejudiced understanding of my teaching before claiming that they had followed my methods of treatment.

I wish to say further, that even in those cases of marked upper protrusion for which in my practice extraction is demanded, I should hesitate before advising an Angle orthodontist to extract, because in all probability the employment of the commercial single-molar-clamp-band-anchorage and arch—which it seems impossible for him to get away from—could not help but result in a decided mesial inclination movement of the crowns of the back teeth, as much if not more than a retruding movement of the front. It is not strange that men who wholly employ these appliances are disgusted with the extracting proposition.

Orthodontists who employ no other appliances than those advocated by Dr. Angle in his recently published text-book knew practically nothing of many of the most scientific and most important methods of moving teeth—nothing about absolutely stationary anchorages, composed of two and three bands, Nos. 35 and 36 gage in thickness, contoured and perfectly fitted to the teeth, soldered together with reinforcements for rigidity, and carrying long-bearing *rootwise* extension tubes for retruding bars for the movement of the canines alone; other tubes being attached for the incisor retruding bow, for the employment of the occipital force, and for the attachment of intermaxillary elastics to similar stationary anchorages on the lower—thus utilizing every possible means of distributing the force of reaction so that all the movement, if desired, may be confined to a retrusion of the six upper front teeth. When a bodily retruding movement is demanded, special methods of a positive and adequate nature are employed.

I speak of these things now because I resent the statement from any man that he has followed my methods and failed, when it is very likely he has gone exactly contrary to my teaching in extracting; or if the case is one in which extracting is demanded, he evidently has not followed my methods for retruding the front teeth after extracting, else there would have been no failure.

Second: On page 352 he says: "There are exceptional cases which demand exceptional treatment, but that 20 per cent. of this class of cases in the essayist's practice demand extraction seems to me extraordinary."

On page 140 I say: "To sum up the number of cases in which teeth are extracted by all skilled rational orthodontists as compared to the whole number of cases presented for treatment: There arises about one case in thirty or thirty-five in Dr. Angle's class I, and in his class II about one case in every twenty, making on the whole only about one case in every twelve or fifteen." In other words, about 3 per cent. of Dr. Angle's class I, and 5 per cent. of his class II, demand extraction, and practically 0 per cent. of his class III. Therefore, in an average of 100 cases in practice there will be only about six or seven cases in which extraction is demanded. This is quite different from Dr. Ferris' statement that I would extract in 20 cases out of every 100.

May it not be possible that the "exceptional cases" for which Dr. Ferris tacitly admits extracting is demanded, amount to 6 or 7 per cent. of all the cases he treats? It is certainly not a far-fetched belief, as stated in my paper (if the truth could be known), that nearly all experienced orthodontists of whatever school extract teeth in the correction of all the marked protrusions for which I claim extraction is demanded. Then why not come out frankly, and openly acknowledge, in their papers and on the floors of conventions, that which they feel they must do in private practice for their patients and for their own reputations.

When the whole question of extraction in orthodontia is summed up and the full truth is grasped, it seems a most senseless thing for men to fight over, when the truth is so self-evident; and then to quibble and cast untruthful slurs —among men whose main object in life should be for the development of truth, true principles, and true methods of practice for the advancement of their profession and the relief of suffering humanity!

Proceedings of Societies.

NATIONAL DENTAL ASSOCIATION.

Sixteenth Annual Meeting, held at Washington, D. C., September 10 to 13, 1912.

SECTION I: Prosthetic Dentistry, Crown and Bridge Work, Orthodontia, Metallurgy, Chemistry, and Allied Subjects.

Chairman—Weston A. Price, Cleveland, Ohio.
Vice-chairman—Harry E. Kelsey, Baltimore, Md.
Secretary—Marcus L. Ward, Ann Arbor, Mich.

(Continued from vol. liv, page 1372.)

Tuesday—*First Session.*

(Continued.)

The next order of business as announced by the Chairman was the reading of a paper by Dr. C. M. McCauley, Abilene, Texas, entitled "The Great Need of Improvement in the Manufacture of Dental Alloys."

[This paper is printed in full at page 16 of the present issue of the Cosmos.]

Discussion.

Dr. C. M. McCauley. I have here a table of results of experiments made with a few alloys, and I will read portions of it to give you an idea as to what the committees in the states visited have done. I have arranged the report in such a way as to show where the testing was done, the amount of shrinkage, the amount of expansion, and the time that the movement was followed up.

One point in the table means one ten-thousandth of an inch. The fillings were made in Wedelstaedt steel tubes. The cavity in each was 33/100 of an inch in diameter, and 38/100 of an inch in depth. At the bottom of the cavity is a groove, in which the amalgam is packed to prevent movement toward the orifice of the cavity. In other words, the filling is held in the bottom of the cavity so that the expansion is indicated by the protrusion of the filling from the cavity, and the shrinkage is indicated by its drawing into the cavity or away from the margins, either of which movements may be detected by the micrometer or microscope. The microscope is used to verify the work of the micrometer in both expansion and shrinkage movements.

The first test I will mention is that of a specimen of *Rego*, which showed no shrinkage, 4 points expansion, time ten days. Two other specimens showed practically the same result.

Crandall's Alloy. No shrinkage, 1½ points expansion, time seven days. Another specimen of Crandall's showed no shrinkage, no expansion, time one and one-half months. Another specimen showed no shrinkage, 3 points expansion, time one and one-half months. Another specimen showed 1 point shrinkage and 1 point expansion, three months' time.

A specimen of *Fellowship* tested in Lincoln showed no shrinkage, 2 points expansion, and read for two months. A specimen of Fellowship tested in Des Moines showed no shrinkage, 4 points expansion, three months' time.

Twentieth Century. Shrinkage 1 point, expansion 1 point, time ten days. Another specimen (test made at Lincoln), 1 point shrinkage, 20 points expansion, two months' time. Another specimen, 1 point shrinkage, 2 points expansion, three months' time.

Science Alloy. Shrinkage 1 point, expansion 6 points, four months' time. Another specimen, no shrinkage, 2 points expansion, two days' time.

Absolute Alloy. Shrinkage 1 point, 3½ points expansion.

All of these that I have read show only slight movement, and, if repeated tests showed similar movement, they could be relied upon in practice.

Dr. Conzett. Will you explain how you have expansion and shrinkage in the same filling?

Dr. McCauley. I have found in testing amalgam fillings that most of those that shrink at first show subsequent expansion. The greater part of shrinkage takes place in the first two hours. When expansion follows, it is sometimes slight, and again it reaches an enormous degree. In doing this work we made it a point to measure each filling in the micrometer, two or three times the first two hours; after that every two or three hours for the first day, then every day for eight or ten days if possible, and about once a week after that.

Dr. Moffitt. Will you tell how you verify the micrometer with the microscope?

Dr. McCauley. When the expansion or shrinkage reaches as much as 4 points, the binocular microscope will detect it very readily, the shrinkage being shown by the amalgam drawing away from the margins or into the cavity, and expansion by protrusion therefrom.

Dr. Moffitt. What size cavity?

Dr. McCauley. 33/100 of an inch in diameter.

Dr. Moffitt. What is the magnification?

Dr. McCauley. Fifty diameters. Under such a microscope 4 points can be seen by the untrained observer.

Next we have a specimen of *True Dentalloy,* which showed no shrinkage, 35½ points expansion. Another specimen, no shrinkage, 2 points expansion. Another specimen, 1 point shrinkage, 20 points expansion, two months' time. Another specimen, 1½ points shrinkage, 5½ points expansion.

Globe Alloy. Shrinkage 11 points, 1½ points expansion, time ten days. Another specimen of Globe, 6½ points shrinkage, 1½ points expansion.

Dr. Tileston. Do you count the expansion from the minimum or rest point?

Dr. McCauley. We count from the point of maximum shrinkage. For instance, we have a shrinkage of 6½ points, and after that the material expands 1½ points, leaving 4 points of shrinkage from where it started.

We have a specimen of what is called *Fox White Alloy,* which showed a shrinkage of 5½ points, and expansion of 2½ points, in ten days. *Standard,* shrinkage 6½, expansion ½, in six days. *Sterion White,* shrinkage 3½, expansion ½, in seven days. *Pure Dentalloy,* no shrinkage, 12 points expansion, in two months' time.

	Shrinkage.	Expansion.
Blanco	5½	4½
Gold Dust	9½	1½
Gold Premium	0	5
Perfection	½	8½
Improved Premier	3	103
Regal	0	60
"	0	56
P. D. Q.	2	1
Monarch	4	1
"	2	1
Fox Pyramid	4	17
" "	2	24
" "	6	142
Roberts' Gold Bullion	2	2
Keller's No. 3	0	29
M. O. B. Black's	0	34
" "	4	0
Garhart's Regal	4½	17½
Fidelity	3	9
Harper's	1½	12½
"	3	4
Security	0	18
Garhart's Gold White	4	342
Par Excellence	0	62
Montague's Gold Alloy	5	0
Rutherford's No. 10	6	5
Newborn's	2	17
S. S. White Special	0	21
Odontoid	4	0

It is not intended that the practitioner should accept the above figures as conclusive and select his alloy therefrom, but they are submitted here only to give dentists an idea of the necessity of a thorough and exhaustive series of tests covering the entire alloy market. Many tests of each kind must be made before a reliable conclusion can be reached.

Dr. J. A. Bliss, Ruthven, Iowa. I had the pleasure of being the chairman of the committee which tested these alloys in Iowa. The results were very surprising. We should remember in this connection the statement of Dr. Black in regard to alloys, mentioned by Dr. McCauley, that they should show no shrinkage, and not above from four to five points of expansion. Even though you realize that of this list of alloys tested very few come near to what alloys should be, still we must remember that the formula of many of those that seem to have reached the point of excellence demanded by the profession shows up improperly, no matter what the tests have shown; and when that is true, that alloy must be changed. For example, Dr. Black makes the statement that the only three elements that should enter into a perfectly good alloy are silver, tin, and copper. He emphasizes that any zinc introduced into an alloy is detrimental, owing to the fact that it does not alloy uniformly with other metals, and consequently, in one portion of one and the same ingot there may be a percentage of zinc above what is intended, and in another portion of that ingot there will be less zinc than intended, and this necessarily results in an uneven alloy. Dr. Black therefore excludes zinc as being detrimental and undesirable, and we are forced to the view that any alloy that contains zinc should be excluded from our tests, which means all but about two or three. This is alarming, when we consider the fact that of all the fillings made in the United States, at least seventy-five per cent. are made with amalgam. The investigation of this question is merely begun. I would be more than pleased, and Dr. McCauley no doubt concurs with me, if the National Dental Association would take some action, and that a committee be appointed and an appropriation set aside for further careful investigation of alloys with an eye to perfect fairness and justice. If the alloys that we are using are of no use to us, we want to know it; and if there are alloys that are what they should be, we want to know that.

Very recently we have received circulars from alloy-makers, who evidently have been stirred up by this movement, and it is amusing to read the many various statements of different makers in substantiation of the claim that their alloys are perfect. These circulars consist mostly of testimonials from prominent dentists, who state that they have been using such and such an alloy for a number of years with perfect results. With all deference to the operators who give such testimonials, I wish to go on record as saying that these recommendations are not worth the paper they are written on, for the reason that any such tests made clinically in the mouth are not scientific, and not dependable. We cannot depend on tests made by dentists in the mouths of patients. The only tests that can be relied upon are those made scientifically with the aid of accurate instruments. These tests are valuable, but anything outside of that is absolutely valueless.

We also must bear in mind, when any of these alloy-makers tell us that their alloy contains gold or platinum, that Dr. Black makes the statement that these metals are a detriment to an alloy, and of no advantage whatever. With regard to gold, I happen to know an alloy that contains a large percentage of gold, and we have made tests of this alloy, which brought out the fact that it shows a large amount of shrinkage, and fails to respond with the proper amount of expansion.

Regarding gold and platinum alloys, the statement is being made that these metals improve the color of the amalgam. All we have to do to dispose of that point—aside from the fact that it causes more shrinkage—is merely to remember that anything less than 18-karat gold will not be free from discoloration in the mouth.

Dr. Conzett. Twenty-four karat will discolor when mixed with mercury.

Dr. Bliss. That is a good point. We want to remember the plain fact that we, as the dental profession, should stop paying for stuff that is not worth anything as a filling material, and make the manufacturers furnish us with a suitable material. It seems to me that our way is clear. We are merely at the beginning, and it is unfair to condemn any alloy, or any maker who acknowledges the shortcomings of his product and stops furnishing such material.

Dr. McCauley speaks of the responsibility of making these tests. I assure you that it is a great responsibility, and if you knew some of the persecutions endured by him since he began these investigations, you would be indignant. It is a shame that one man should bear the brunt of these attacks. In justice, therefore, to Dr. McCauley and his fellow investigators, these tests should be made under the supervision of the National Dental Association or some state society, as a part of the society's work, thus relieving the investigators of any personal responsibility.

In closing, I wish to repeat that this work is merely begun, and I am sure that all appreciate what Dr. McCauley has done, and I hope in the future the society may see its way clear to lend assistance in this task.

Dr. R. E. L. Strickler, Bridgewater, Va. I would like to ask which of the alloys mentioned are the best to be used. I made some notes as best I could, while Dr. McCauley was reading, but he has the full report, and perhaps he may have in his mind several that he could recommend as the best.

Dr. McCauley. The question, as I understand it, is—What is the best alloy to use? I have been asked this question a number of times wherever I have spoken on amalgams, and I never have been able to answer it. I give you the figures and let you form your own conclusion. Any degree of shrinkage and any degree of expansion exceeding 5 points is detrimental. Those alloys in this list which come within that range of shrinkage and expansion may be easily determined by anyone in going over the list. Yet here is a case of four or five tests being made of a certain alloy, and all but one showed the alloy up well, that is, no shrinkage and less than 5 points of expansion; yet, in one of these tests, a specimen of the same alloy showed expansion of 20 points. I should hesitate, therefore, to say that this is not a good alloy, after such a small number of tests. If, after having made many careful tests of this same alloy, I find that the expansion and shrinkage will reappear time and again, and that the results are varying in different fillings, I shall be able to say that this alloy is not dependable. Again, if I find, in test after test, that this alloy shows no shrinkage and little expansion, then I shall be able to say that this alloy is good, and no better can be found. But we have not reached that point, because the tests I have made are incomplete. I have made only a few tests and none of these tests are complete. It would, therefore, be an injustice to other manufacturers, who perhaps are producing a good article, to point out five or six alloys as being satisfactory and recommendable. We must obtain results in the best way possible, without any undue hurry, and wait until thorough and conclusive tests have been made, and until we have enough data before us to determine whether or not a certain amalgam is good or bad.

A Member. Tell us what proportion of mercury you use, and how you mix amalgam?

Dr. McCauley. That varies with the alloy used. A balanced alloy, composed of silver, tin, and copper, requires about 55 per cent. of mercury and 45 per cent. of alloy. This proportion varies in that alloy as it grows older.

A Member. Do you get the proportions by weighing?

Dr. McCauley. Yes, by weighing, and observing the working properties of the alloy.

Dr. Kozer, Harrisburg. What attention do you give to the amalgamation of the alloy? Say you make three tests, do you try to give the same attention to amalgamation in each test?

Dr. McCauley. Yes, the idea being to obtain uniform results, if such can be obtained with the alloy in question. Of course, if we use varying proportions of mercury and a varying technique, we should not expect uniform results. In order to make tests and tabulate the results, we have to determine whether or not these tests will repeat themselves, and must therefore use as nearly as possible the same technique.

Member. What effect has age on the alloy?

Dr. McCauley. Age makes no difference in shrinkage or expansion. It affects, however, the amount of flow and strength; as it grows older, the alloy grows weaker. In my paper of last year (Dental Cosmos for February 1912, p. 174) I said that every alloy should be dated by the manufacturer, viz, the date should be placed on every batch before it leaves the manufacturer, so that the dentist may know whether or not the alloy has grown old.

Dr. Conzett. Dr. Ward found years ago that fillings made up a certain length of time increased in strength, but after a certain time began to decrease in strength. Have you made any tests along that line?

Dr. McCauley. The question is whether amalgam deteriorates in strength as it advances in age. I have not made any tests in that direction, but I am sure as to Dr. Black's opinion on that point. He says that amalgam does not lose its strength with age, but that alloy does lose its strength with age.

Dr. Mausteller. In one alloy you give five results, and the shrinkage in all was favorable; in two the expansion results were favorable; in one good, and in two bad. How do you account for that difference in the same alloy?

Before you answer that question, I should like to ask in addition, In amalgamating the alloy, how do you apply the mercury? Do you apply it all at once and attempt to incorporate the proper amount of alloy and expel no mercury, or do you expel mercury or add alloy after the amalgamation is started?

Dr. McCauley. The result that you mention in the first case, where three of the five tests showed favorable results, and two others showed unfavorable results, could be produced by errors in the alloying process, viz, either by not heating enough, so as thoroughly to dissolve the metals in each other, or by overheating and producing what is known as eutectica. Any failure to alloy the metals thoroughly, you can understand would leave an uneven distribution of those metals throughout the mass, and a filling made from a certain part of that ingot would be differently constituted from one made from another part of the same ingot. On the other hand, if you produce a eutectic formation by overheating, and that appears in one part of the ingot and not in another, you obtain a result that is not uniform.

As to mixing mercury with the alloy, it is better to start with the correct amount of mercury. The amounts of mercury and alloy should be carefully weighed, and only the amount should be used required to produce desirable plasticity of the mass. This is a point that should always be stressed in the manipulation of amalgam, *i.e.* the proper plasticity of the mass. Unless the amalgam has the proper plasticity it cannot be placed in any part of the cavity desired and kept there.

Dr. W. A. Smith, Denton, Md. In expressing mercury, would the tin leave the amalgam in greater excess than other metals?

Dr. McCauley. Not if you have a perfect alloy to begin with. If you have a mass that is improperly alloyed or in which the metals have not gone into accurate solution, you may lose more tin in the expression of mercury than other metals, but not so if you have an accurate solution or union between these metals.

I have been impressed with the importance of carrying on this work to a successful end. There is no doubt that the profession is being imposed upon, that we are getting inferior materials without knowing it, and we have no means of telling except by careful research work. We have to take what the manufacturers give us, and, as stated in my paper, ninety-five out of every hundred of the alloys that are offered to save teeth with are unfit. Are we going to sit still and let this state of affairs continue, and grow worse, or shall we take up the matter and see that we get the right kind of materials?

Dr. LUNDY. Have you any plan to suggest, so that we may make a motion to have it carried out at this time?

Dr. McCAULEY. I have no definite plan to suggest, further than that this association is the proper body to take this matter in hand; men of ability and integrity should be selected from this association, men who are above a purchasing price, men who have the ability to do the work accurately, and who will make a *bona fide* report of their findings to this association. This work must be done by such a committee, because it is too much for one man. A man cannot conduct a practice and do this work as it should be done. Your Research Committee would perhaps be a good one to which to assign this investigation, if they are willing to undertake it. At least this association should appoint a committee to take this matter up and complete the work as soon as possible. The business heads of the association are better prepared to lay out plans than I am, but this is a work that we must do before we can come to an understanding, and it should be done in such a way that everybody may get justice, and every manufacturer be condemned who should be condemned, because they have no right to supply the profession with such trash as many of the alloys now on the market represent.

Dr. W. E. LUNDY, Memphis, Tenn. I move that this section appoint a committee to meet with the Executive Council, take up this matter, and do what can be done to get the results we desire. And further, that this section request the Council to co-operate with the committee. [Motion carried.]

Dr. PRICE. I will appoint this committee later.

The section was then declared adjourned until a later session.

WEDNESDAY—*Afternoon Session.*

The second session of Section I was called to order on Wednesday afternoon, September 11th, at 2.30 o'clock, by the chairman, Dr. W. A. Price, Cleveland, Ohio.

Before proceeding with the regular program of the section, Dr. Price introduced to the section Dr. G. H. Watson, Berlin, Germany, secretary of the American Dental Society of Europe.

Dr. WATSON. *Mr. Chairman and Gentlemen,*—This is a little bit sudden. I am very grateful for the compliment and the courtesy which your chairman is conferring upon me in allowing me to bring to you the greetings of the American Dental Society of Europe. We extend to you an invitation to visit our meeting next year in Europe—which will be held at Easter time in Florence, one of the most beautiful cities of Italy and Europe. If we can have the pleasure of having any of you with us, we will be very glad to see you and will treat you as well as we can—and some of the men over there know how to do that.

The first order of business before the section was the reading of a paper by Dr. L. G. SINGLETON, Pittsburgh, Pa., entitled "The Significance of Normal Occlusion."

[This paper is printed in full at page 20 of the present issue of the COSMOS.]

Discussion.

Dr. J. A. GORMAN, New Orleans, La. The question of normal occlusion is most vital, not only for the orthodontist and the prosthodontist, but for every practicing dentist. The operator often wonders why his fillings do not remain in position, and if he stops to analyze the reason, he will find that normal occlusion plays a very important part in filling operations.

The essayist states that normal occlusion can obtain only if all the teeth are present. The day has come when the importance of preserving all the teeth and keeping them in normal occlusion is being more and more fully recognized. The extraction of teeth, in my opinion, is very much like a jeweler's statement that a watch which he is to repair has too many wheels in it. Would the manufacturer put too many wheels in a watch? This is an argument which I use every day in my practice, and this very question is a good start for educating the public, to say nothing of the dentist.

One of the greatest difficulties that the orthodontist encounters is when the patient has lost some of his teeth and the orthodontist is called upon to place the remaining teeth in their proper positions and retain them there. This maintaining of the spaces where teeth have been lost is one of most difficult tasks, and one that could be profitably discussed by the general practitioner.

Dr. H. C. Ferris, New York. From an orthodontic standpoint, I consider the paper we have just listened to a classic. Those who have made a close study of histology, embryology, and anatomy, will find on careful perusal of Dr. Singleton's paper that he has most ably covered every phase of the subject. He has treated this most scientific subject of the line of occlusion in a delicate and comprehensive manner. This line of occlusion is a mystery that we frequently consider solved when we present a record case of models showing the original condition and the finished product. That finished occlusion, as we see it in the plaster cast, although it may be perfect mechanically, and answer our definition of normal, does not represent the line of occlusion. We have to consider that occlusion in conjunction with the whole animal, with the development of the whole cranium, and it is in that particular that the true orthodontist will develop the ability to treat the individual case that comes before him. No man is able, in the present development of science, to set a plan for us to follow; the method of procedure must be based upon a knowledge and an artistic consideration of the whole anatomical structure.

The subject of heredity, which the essayist touches upon, is also far-reaching in its influence. We are now trying to apply Mendel's law in the interpretation of irregularities and the explanation of deformities, lost structures, etc. It must be considered in this connection that the human being is a much more difficult subject to study than the lower animals. I believe that on a second reading of this paper, you will all be edified.

Dr. R. A. Day, San Francisco, Cal. I wish to compliment Dr. Singleton upon this excellent paper. He has presented the subject so clearly that the orthodontist, as well as the general practitioner, cannot but fully appreciate its importance. We all should understand occlusion, and should devote a great deal of study to it. It is of great importance in every way, not only from the standpoint of the orthodontist, but from that of the general practitioner, as Dr. Gorman has said.

The dentist should recognize the principles set forth by the essayist early enough in life to be able to diagnose conditions and appreciate the necessity for correcting irregularities. This paper will give us much food for thought.

Dr. V. H. Jackson, New York. I have given this subject considerable thought, and wish to congratulate the essayist upon having covered it in such a concise manner. I firmly believe and advocate that every dentist should have very thorough instruction in this subject and know the consequence of the loss of each individual tooth, and practice accordingly. I wish I might be able to discuss this paper at greater length, but I am not at all prepared to do so.

Professor Subirana, Madrid, Spain. No puede haber ningún ortodoncista que no tenga ideas propias sobre la significación de la oclusión que constituye la base de la Ortodoncia? Creemos en las leyes de evolución orgánica establecidas por Darwin? Creo que no habrá ninguno de los que me escuchan que no comulgue en ellas. Con decir pués que la oclusión humana es el resultado de la sucesiva adaptación del sistema dentario animal á las necesidades por ese sentidas á través de las edades desde que apareció el primer diente en los peces, queda hecha su apología; y así como más descendemos en la escala zoológica vemos más uniforme y simplificado el sistema dentario, más vario y especializado lo encontramos á medida que ascendemos en la escala animal, hasta llegar al hombre, cuyo sistema es la cúspide de lo perfecto precisamente por ser el resultado de la adaptación, y así vemos cómo él tiene muelas, bicúspides, caninos, etc., variedad dentaria que responde á su cualidad de omnívoro. Quien mutile en una ó dos piezas esa oclusión, desde aquel momento deja de ser ortodoncista para convertirse en cirujano como dijo el Sr. Singleton, porque precisamente esa es la misión ortodóncica, la de restituir la normal oclusión alterada. Es qué solo tiene importancia esa oclusión bajo el punto de vista de la digestión? No; todos sabemos lo que representa en el orden biológico la *excitación funcional*, y ahí está precisamente su importancia, en el estímulo mecánico que representa, ejercida normalmente millones de veces, en la sangre, en la linfa, en los músculos, en los huesos é indudablemente en el cerebro. No solamente no hay diente que no cumpla su función excitadora, sino que no hay cúspide, ni plano inclinado que no ejercite su modesto papel, y quien al corregir un diente no lo considere así, merma la eficiencia de la oclusión.

Yo llego más allá; he dicho ya y repetiré aquí que por no ejercitarse la función masticatoria y por mutilarse la fórmula dentaria normal, y en consecuencia la oclusión, desde millones de generaciones, los niños que sufren de erupción dentaria dolorosa y difícil, es debido á que la herencia ha ido transmitiendo cambios de fórmula por falta de excitación funcional y los folículos dentarios han perdido su potencialidad de erupción.

La carencia del conocimiento de vuestro idioma me impide continuar, pido mil perdones al auditorio.

[Translation.]

Prof. SUBIRANA, Madrid, Spain. Can there be an orthodontist who has no ideas of his own as to the meaning of occlusion, which constitutes the basic principle of orthodontia? Do we believe in the laws of organic evolution established by Darwin? I do not think there is a man in this audience who is not influenced by them. By saying, therefore, that human occlusion is the result of the successive adaptation of the animal dental system to the needs developing through the ages since the appearance of the first tooth in the fish, its apology is made; and in the same way, the farther we descend in the zoölogical scale the more uniform and simplified a dental system we find. This system is the more varied and specialized as we ascend the animal scale until we reach man, whose system is the most perfect on account of its being the result of adaptation, and thus we see how he has molars, bicuspids, canines, etc., a dental variety necessary for its purpose of serving an omnivorous animal. He who mutilates that occlusion in one or two instances ceases to be an orthodontist and becomes a surgeon, as Dr. Singleton has said, because the orthodontist's mission is that of restoring the altered conditions of normal occlusion. Is this occlusion important only from the viewpoint of digestion? No; we all know what part the *functional stimulation* plays in the biological order, and on this depends exactly its importance, viz, in the mechanical stimulus that it represents, normally exercised millions of times in the blood, in the lymph, in the muscles, in the bones, and undoubtedly in the brains. Not only is there not one tooth which does not fulfil its exciting or stimulating function, but there is not a pyramid or an inclined plane which does not play its modest part, and the practitioner who, in correcting or restoring a tooth, disregards these rules entirely, will minimize the efficiency of occlusion.

I go further than that. I have already said that owing to the lack of exercise of the masticatory function and to the mutilation of the normal denture, and, with it, the mutilation of normal occlusion, which has been going on for millions of generations, the modern child suffers from painful and difficult eruption of its teeth, owing to the influence of heredity, by which changes in the denture have been transmitted owing to lack of functional stimulation, and the dental follicles have lost their potentiality of eruption.

I should like to proceed, but must now close, as I am not sufficiently familiar with your language to address you in it.

Dr. E. A. Bogue, New York. It is certainly with pleasure that, after two or three minutes' perusal of Dr. Singleton's paper, I take up the subject where he left off, and with your permission, go backward a little in its early history. Orthodontia, as I understand it, does not mean mutilation in any sense. Not long ago I received a letter from a friend in Europe who is an orthodontist and who made use of the following notable sentence: "Isn't it grand that, instead of repairing a few broken-down teeth, we undertake to repair or put in order the masticating apparatus of man and make it complete." The thought of mutilation had never entered his head, and I feel thankful to him for his mode of expression.

The title of this paper is, "The Significance of Normal Occlusion." Mr. Chairman, may I be permitted to modify it so as to read: "The Significance of Abnormal Occlusion"?

There are two sharp critics here, Dr. Ferris and Dr. Jackson, and when they find me wrong I hope they will correct my mistakes. Abnormal occlusion means, I think, almost always a diminution of the lumen of the air-passages. When, how, and why does that diminution take place? It often takes place before the first year of the child's life is completed. How does it take place? It very often—although I cannot give any statistics—is due to the presence of adenoids. At once we are confronted with the questions, What are adenoids, where do they come from, and why are they present? It is singular that adenoids should have existed always as far as we know. Canova made a statue of himself and represented himself as a mouth-breather with a stupid look, which, we know, did not belong to a man of his mental ability; yet in the lasting marble he has put himself down as a sufferer from adenoids.

There is the so-called tonsillar ring. We have heard it said many times that every baby is born with adenoids. This statement, I think, is a misuse of terms. Every baby is born with five little nodules, two of which become tonsils, while the other three are waiting perhaps for mischief. Most mothers, when their children catch cold, do not think much of it; they do not realize that by a single attack of cold the baby may be laying the foundation for shortening its days. The baby catches cold, and the irritation and inflammation perhaps extend into the nasal passages, down the naso-pharynx and beyond, to those nodules of the tonsillar ring, and these enlarge and become inflamed and form what we call adenoids, situated between the other two nodules and behind the pendulous portion of the soft palate. The child subsequently breathes through the mouth instead of the nose, because of this obstruction. Many mothers do not realize the seriousness of this condition. The adenoids become a mechanical obstruction to the child's breathing. When the child opens the mouth in order to breathe the muscles of the mouth are drawn against the row of teeth which are inside of the gum and not yet developed; the tongue is distracted from the roof of the mouth and no longer pushes upward and outward, and anterior protrusion ensues owing to lack of lateral growth. If no attention is paid to that condition, the air-passages will not be wide enough to allow a free flow of air to fill the lungs, and the lungs do not fully develop. If the lungs are not developed, the thorax cannot be developed, and instead of growing up straight, the child becomes round-shouldered, the spinal column becomes distorted, generally anteriorly. Very often a lateral curvature of the spinal column occurs, a weakness of the heart follows the diminution of lung capacity, a diminution of the thorax cavity ensues, and the child is manifestly an invalid. Many times when expressing before my professional brethren my views that I have yet to see a single case of saddle-shaped arch which was not accompanied by curvature of the spinal column, I have noted their utter surprise.

We are just beginning to realize that it is the dentist's duty to warn the mother that her child, though it be beautiful and perfect apparently, may belong to that seventy-one per cent. of defectives mentioned today by Dr. Ebersole, as found by the New York State Board of Health. If we are able to discover these defects and remedy them at an early age, we shall be of greatest service to the child. I am treating children from three and a half to five years of age, and I hope that the rest of my practice will be made up of that class of patients. Then I shall be able to say to many parents, as I said to a professor in a medical college yesterday: "I am glad that your baby has every prospect of having its life prolonged for years by what has been done. He breathes better, catches no more colds, and the prospects are that he will be a healthy child instead of a sick one."

Dr. M. C. SMITH, Lynn, Mass. I would like to say a few words on this vital question, also to call Dr. Bogue's attention to one error he has made when he spoke of the three nodules looking for mischief. They are not there looking for mischief, but for a physiological purpose, and in order to assist the economy of the body in supplying a deficiency. We are not getting at our patients early enough. We are only doing repair work, and the orthodontist does the most repair work of any. We must get at our patients earlier and not have so much repair work. The vital principle is to avoid delay of treatment. We may not know today just what all these enlargements of the glands of the throat mean, but there are a few facts which we know about them, and we should work on the basis of those.

We know, for instance, that, if we treat a cretin child with thyroid extract, the growth of the teeth is remarkably stimulated. We know also that the pituitary body has some influence in the fixation of lime salts in the body, and that the parathyroid glands have something to do with the lime salts in the blood-current. Let us, then, study these ductless glands and learn which one is controlling that part of the economy of the human body called the mouth. If the pituitary gland in a young person is diseased, giantism will result. Disease or enlargement of the pituitary body in adults causes a malady which is very rare in America but common in other countries—acromegaly, enlarged growth of the long bones, and especially of the lower jaw. A careful study of these glands should reveal which one is to blame for deformities in the mouth.

These nodules which Dr. Bogue spoke about have a physiological function to perform. They are not diseased glands, but by sympathetic enlargement they help supply what is lacking in the thyroid gland as the fixation agent of lime salts in the body. We have to go farther back, to the very first months of fetal life. If a pregnant mother seeks relief from nausea and morning sickness, she is given thyroid extract. If the nursing mother fails in the milk supply, she is given thyroid extract to stimulate the milk supply. Nursing is the physiological action of the child necessary for the development of the pharynx, the lungs, the spinal column, and the maxillary bones, and is one of the vital principles underlying orthodontia. The child must nurse in the way that nature intended it to, and if it does not receive its supply of milk from the mother, it cannot develop properly.

We must get down to the vital underlying principle and find out what is the reason for the sympathetic enlargement of the glands to supply the thyroid extract deficiency in the fixation of the lime salts in the body. The parathyroids are generally acknowledged as controlling the lime salts in the blood-stream, and the thyroid the fixation of the lime salts in the body. The pituitary body may have something to do therewith, but we must investigate and study, in order to ascertain which one of the ductless glands is at fault.

Dr. SINGLETON (closing the discussion). I will not take any more of your time in closing the discussion. My views have probably been expressed as carefully in the paper as I can express them. I wish, however, to thank those gentlemen who have assisted me in the effort to interpret the significance of normal occlusion. I think we are all beginning to realize that this significance is a very great one.

(To be continued.)

DENTAL SOCIETY OF THE STATE OF NEW YORK.

Forty-fourth Annual Meeting.

(Continued from vol. liv, page 1160.)

FRIDAY—*Afternoon Session.*

The society was called to order Friday afternoon at 2 o'clock, by the president, Dr. Hillyer.

The first order of business was the report of the Committee on Scientific Research, by the chairman, Dr. W. B. DUNNING, New York, as follows:

REPORT OF COMMITTEE ON SCIENTIFIC RESEARCH.

Your committee in its last report urged strongly the need of directing its work along some line of research which would have a definite value in the broad study of the causes underlying dental caries, and of possible measures to prevent the inception of that disease. It was suggested that a sum of money sufficient to pay a trained investigator be appropriated for that purpose, and that the work be placed in hands competent to carry out the most approved methods under the best laboratory facilities. It was hoped that such results, however scanty in extent, might be reached in a manner as nearly determinate as the nature of the problem admits, in order that future investigators might depend upon those findings as a groundwork for further inquiry. The importance of reducing to a minimum the necessity for duplicating work is self-evident.

It was voted that five hundred dollars be expended for this purpose during the year. Prof. William J. Gies of Columbia University, who for two years has conducted the experimental work of the committee, decided that an inquiry into the sulfocyanate question, as a whole, would be a contribution of essential value at this time. Your committee therefore placed this subject in his hands, and his report will speak for itself. The actual experimental work has been performed by Dr. Max Kahn, under the direction and with the co-operation of Dr. Gies, and this work has occupied Dr. Kahn's entire working time throughout the last winter. Dr. Gies has received no recompense for his personal work, and the very moderate charge of forty dollars was the only tax for supplies, many of the standard preparations being supplied by the university laboratory. The committee is sure that the society at large will appreciate this distinterested attitude of Dr. Gies and the authorities of Columbia University, who thus indicate their desire to further an inquiry of such public utility as the one in hand.

Respectfully submitted,
WM. B. DUNNING,
Chairman.

The next order of business was the reading of a paper by Dr. WILLIAM J. GIES, M.S., Ph.D., New York, entitled "An Inquiry into the Relation of Potassium Sulfocyanate to Dental Caries."

[This paper is printed in full at page 40 of the present issue of the COSMOS.]

Discussion.

Dr. E. C. KIRK, Philadelphia, Pa. I must as graciously as possible decline to open the discussion on this paper, for the reason that I do not regard it as discussable in its present stage. If I remember correctly it is recorded in the Old Testament scriptures somewhere of a horse in battle, that he said "Ha, Ha!" I heard of a little girl being asked about that equine incident, and she answered that what the horse said was, "Hay, hay!" I am rather inclined to the latter view myself, but I want to say "Ha, ha!" first for the presentation which Professor Gies has made here of the scientific attitude of mind toward this question. We have been heretofore dealing with it empirically and with prejudice—I want to put it just that way, in just those terms. The reaction of ferric chlorid with the saliva, containing what we believe to be sulfocyanate, is the most striking salivary reaction we have, and the tendency has been to jump to the conclusion that it must be as important as it looks. The ferric chlorid reaction is the most dramatic thing in a chemical and physical sense that the saliva happens to do with any reagent, and therefore we have concluded that it must be a very important thing. Doubtless scientifically it is important, bút I think we have attributed to that particular reaction an importance which is not as yet justified.

I want to thank Professor Gies for saying another thing with which I am in hearty accord, and that is that literally we know nothing about the meaning of the sulfocyanate reaction in saliva—that what we know about it is almost a minus quantity. In a clinical way I have studied the question somewhat, and I have been unable to trace any relation whatever between the occurrence or non-occurrence of sulfocyanates in the saliva, as indicated by the ferric chlorid reaction, with any activity or non-activity of the carious process. I have come to the general feeling—I do not want to dignify it with the name of a conclusion, because I have not reached any conclusion—but I have come to the feeling, which is entirely in sympathy with the statement made by Dr. Gies, that this substance is principally a waste product of metabolism, an excretory subtance that may be coincident with various observations made in a clinical way either for or against the caries problem, but that it has any causal relation to immunity or susceptibility itself I doubt very much. On the chemical side, the various lines of research as indicated by the experimentation which has been here reported are intensely interesting. I should like to ask Professor Gies to tell us in closing the discussion whether he has made any experiments to discover, if possible, the relation of the liver metabolism to potassium sulfocyanate or any basic sulfocyanate formation. That is to say, whether the blood entering the liver and leaving the liver has been examined to see what difference exists in the sulfocyanate content. I would like to ask him also as a physiological chemist whether he has any data or thought regarding the possible relationship of the existence of sulfocyanates in the blood or in the bodily secretions or excretions to urea formation. That, it seems to me, is of interest in view of the close relation of ammonium cyanate in its chemical composition to urea; whether it may not be one of those side products along the line of urea formation which has occurred incidentally as the result of an error in the metabolic processes.

I want further to congratulate the Dental Society of the State of New York for having gotten into relationship with a source of scientific activity that has, from my point of view, demonstrated its capacity and ability to ultimately solve this problem, and I want to express my pleasure in witnessing the laying of the scientific foundation, here, under the auspices of Professor Gies, that is, I believe, ultimately to bring us to the apex where that question which I know we as practical men want answered, shall be answered—that is, What has this dramatic chemical reaction of the sulfocyanates in the saliva in a practical way to do with the problems we are meeting in the effort to combat the ravages of dental caries? I may incidentally report from memory only one experiment that I made in this connection. In Professor Gies' report of his experiments I was constantly looking for my friend the rabbit in the list of animals as having been put through the sulfocyanate poisoning test. Some years ago I began feeding half a dozen rabbits on sulfocyanate of potassium in increasing step doses. I did not conduct the investigation with scientific accuracy, so that I can give you no figures. I was simply endeavoring to find what the obvious reactions to the drug were in the animal, and this I distinctly noticed—that it increased the arterial pressure and increased the frequency of the pulse beat, and that it produced a condition of hypersensitiveness or hyperesthesia upon the rabbits. It was interesting to note that, in the rabbits under the influence of potassium sulfocyanate, simply taking firm hold of the ear was sufficient to make them squeal. The rabbit is a timid animal, yet it takes much to make him squeal from pain, and this hyperesthetic state was related distinctly to the increase in the dosage of the sulfocyanate. It would seem, then, that nervous and vascular stimulation of that sort could not occur without some definite functional effect that might or might not be productive of harm.

I want to thank Dr. Gies for his emphasis on the possible physiological effect of this drug when internally administered, and for his verification of the work of other observers—confirming the view that, within the limits in which we find this substance in the saliva, it is practically without any antiseptic value whatever through the fluids of the mouth.

I do not offer this as a discussion, but merely as a running comment on what I regard as a most admirable presentation.

Dr. H. C. Ferris, New York, N. Y. I have learned more in the last hour than I have learned in five years' reading on this subject, and I believe that the scientific world can congratulate us upon the fact that we have Columbia College interested in this field. The National Dental Association has been undertaking this work in their scientific committee, and we have been endeavoring to bring out a technique which would be of practical diagnostic value. We have submitted our technique to criticism, but have been unable to get expert experience or expert experimental work in this particular field, so that I for one feel very grateful to Professor Gies for his efforts.

I want to cite my experience with thiocyanates from the clinical standpoint, and also the method which I have adopted to determine the quantitative value of thiocyanates in the saliva. Many are familiar with the technique adopted by the National Dental Association committee. Of course, we have used there the ferric chlorid as our reagent. As Dr. Gies said, ferric chlorid may be proved faulty in a certain percentage of cases where drugs have been administered to the patient, but in the majority of cases, from a personal experience of eight or nine years, during which I have been building up data upon this particular subject, I find that by this simple method of procedure I am able to obtain definite physiological results which are comparable with the blood pressure. The systolic pressure is registered by a most perfect machine, and the effects upon the cases in which the drug has been used in conjunction with the medical adviser have been remarkable, and I am only anxious to have the Columbia University investigators reach that point in their investigations. The method that we are utilizing to determine the percentage of thiocyanate requires the aid of these two little tubes [illustrating]. We utilize thiocyanate of ammonia as the basis or indicating carrier, as the thiocyanate of ammonia seems to strike a more normal color with that of saliva, using ferric chlorid as the reagent. In tube A we have 1 cc. of the specimen, and in tube B 1 cc. of a 1:2000 aqueous solution of thiocyanate of ammonia. In one tube we have a known quantity and in the other an unknown, and by adding one drop of dilute hydrochloric acid solution to the specimen, we precipitate the mucins and the albumins immediately, which also combine with any small quantity of diacetic acid if present, and that leaves a comparatively clear solution. Then by adding ferric chlorid, two drops to each tube, we strike colors. To this tube of known quantity we add water to reduce the color until it matches the specimen; then read the scale in thousandths. It is evident that there is a very small quantity of thiocyanate in this specimen [illustrating]. We then match these, and, if I think the eye is not sufficiently accurate, the specimen is placed in the colorimetric box, and the color determined by artificial light. In this instance it might read 18 thousandths, so we would consider that we have 1 part in 18,000 of thiocyanate in this test. I believe this method to be the most accurate and simple of any advanced today. By its use sufficiently accurate findings for diagnostic purposes can be made, and the accumulation of the drug in the patient's saliva under treatment observed. It is my practice to take blood pressure and record it when I undertake the administration of thiocyanate internally.

In order to bring this more potently to your attention, I would relate the effects of the treatment of a case which in its entirety is worthy of physiological notice. After listening to a paper read before the New York Institute of Dental Technique, by Dr. Bernard R. LeRoy of Athens, Ohio, on this subject, I was encouraged to recommend the treatment to a physician who was treating a male patient of seventy-five years for "chalk eye," or blindness due to an exudate in the anterior chamber of the eye following an operation for cataract. Dr. Peter Callan of New York performed the operation. In three weeks the trouble reappeared, and Dr. Callan performed a second operation and removed the exudate from back of the anterior chamber—which resulted in no value, as the exudate formed the second time. The man had no treatment for five years, and was totally blind.

At first examination I found with the aid of my colorimeter that the patient had 1 in 9600 parts of thiocyanates in the saliva. By centrifuging there developed 50 per cent. of solid matter in 20 cc. The blood pressure was 135, and the urine was as thick as molasses. This patient was given one grain of sodium thiocyanate in water per day, in three doses *t. i. d.* under the observation of C. E. Scofield, M.D. Four days afterward an examination was made for thiocyanates, and the scale read 1 in 9000, increasing 600 points. In nine days it increased to 1 in 7500. The blood pressure ran up to 190. We then reduced the dose to a half-grain per day, and at the end of two days took a specimen of the saliva, which showed a decrease in the strength of thiocyanate, making the figures 1 in 8500, and the blood pressure 150. We then put the patient on the original dose, and the results were as follows:

In seventeen days we took the blood pressure, which stood at 175; in twenty-one days it went down to 145; in thirty days it jumped again to 160; in forty-one days the thiocyanates showed 1 in 6000 parts, and the blood pressure stood at 195. The patient was then suffering with a bilious attack, which resulted in a second accumulation of the drug, and the treatment was reduced to one-half grain. The case went for seventeen days, and was examined again; we found 1 in 5000 parts, and the blood pressure stood at 180, when we stopped treatment. In a week's time, another finding resulted in 1 in 7800 parts, being reduced by 2800 in that time, and the blood pressure had come down to 160. Going over this you can see the definite relation of this drug to the blood pressure. This is heavy dosage, but the man's advanced age and the fact that he had arteriosclerosis, made it possible. I have noticed that, with a physiological dose of this drug, 1 in 2000 parts given one grain *t. i. d.*, in a week's time would raise the blood pressure from 140 to 149, and the thiocyanate would rise from 1 in 18,000 to 1 in 12,000.

At the completion of the treatment of the first case, the saliva was examined for its centrifuged sediment, which showed a reduction of 50 per cent. of the original, and at the end of nine days after the treatment was started, the urine became perfectly clear, all the phosphates having gone into solution, there being no albumin or sugar present; and while the man could not see when we started, the eye had cleared sufficiently so that he could note the passage of a dark object between his eye and a gas jet four feet distant. It is my belief that his vision would have been restored had he been willing to persevere in the treatment, but he became alarmed after a slight attack of indigestion, and, knowing the work to be experimental, he would not permit us to continue.

This case gives us a great deal of material for serious consideration, and would surely lead us to be cautious in the constitutional administration of this drug. It also demonstrates that, if these serious physiological changes are notable, a potency and influence of the drug upon caries must be recognized, and it remains for us to determine the manner of its action.

Dr. F. W. Low, New York. I am laboring under a considerable disadvantage, for two reasons, in attempting to discuss the presentation to which we have just listened with so much interest—first, because, concerning matters pertaining to biological chemistry, I am densely ignorant, and second, because no opportunity could be afforded that I might study or investigate concerning the conclusions and findings arrived at by Professor Gies, later than his 1911 report. My approach to the question as to what may be the effect, upon superficial enamel decay, of the presence or absence of potassium sulfocyanate in saliva, has been made mainly from the physical and clinical standpoints.

When your Committee on Scientific Research declared in 1910 that potassium sulfocyanate had no appreciable influence upon plaque formation that could be termed prohibitory, I immediately made a pilgrimage to New York, where I found that Professor Gies and I apparently were not viewing the same pictures.

Though the 1911 report was in no sense so positive concerning conclusions generally, and asked for an additional appropriation for continuance of the work, still I was not altogether satisfied, feeling that Professor Gies, even with considerably modified opinions, was even yet somewhat severe in his criticism of the behavior of us poor empirics; and since I am presumably the chief offender, I feel warranted in attempting some defense of our precipitate procedure.

The world is under many obligations to empiricism, yea, to the very fact that "Fools rush in where angels fear to tread." Dr. Butler* says:

> I recognize the use of the conservative element. It keeps the ignoramus, the charlatan, the therapeutic enthusiast from turning the medical world upside down too fast; it is well to remember, however, that every great advance of truth passes through the stage at which men call it heresy. The introduction of cinchona was at first most bitterly opposed, not only by the medical profession in England, but by the English church. To the impudent and presumptuous quack Paracelsus is the medical profession indebted for mercury as an internal specific remedy. The success of a patent medicine is responsible for colchicum. Arsenic was introduced into England as a remedy for intermittents in consequence of the success of a patent medicine. Iodin was discovered by a saltpeter manufacturer, sulfur was first used by the common people for scabies, and it took a long time for the "profession" to acknowledge that there was any virtue in it. Nearly every one of our indigenous medicinal drugs used today by the regular profession has been forced upon us by the eclectics. The use of lobelia was taught us by the American Indian. A dairy-maid gave Jenner the idea of vaccination. A marketwoman taught us how to catch the itch insect, and we borrowed acupuncture and moxa from the "heathen" Japanese. A monk taught us how to use antimony, a friar how to cut for the stone, and a postmaster how to sound the Eustachian tube.

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* Geo. F. Butler, A.M., M.D., professor and head of the Department of Therapeutics and professor of preventive and clinical medicine, Chicago College of Medicine and Surgery, in an article that appeared in the September 1909 issue of the *Medical Standard*.

And how had it been, gentlemen, about the crowning achievement of empiricism, if Horace Wells, the comparatively uneducated but venturesome empiric had failed to have the courage, simply because he saw a neighbor bark his shin and bleed into his boot while half intoxicated? If, for want of courage, Wells had failed to challenge anesthesia, even the while she wore the mask that dissembled the look of death, this priceless boon which we enjoy today might still be awaiting—some other Horace Wells, some other venturesome empiric.

If I am to be considered among "the venturesome"—to quote from Professor Gies' report of 1911*—"who have been prescribing sulfocyanate internally, in comparatively large doses—without reporting or seeming to know or even caring anything about the pharmacology of the quantities thus administered," yet let me say that I began as Professor Gies himself has recommended, by "trying it on the dog"—that is, upon myself; but lacking somewhat in courage, I first consulted Professor Hill, who at the time occupied the chair in chemistry at our Buffalo university, and who told me that personally he would not be afraid to self-administer ten grains at a single dose so far as toxic consequences were concerned.

As to the therapeutic properties of KCNS, I knew that Squibb's *Materia Medica* of 1906 had this to say: "Antispasmodic, nerve sedative, in dyspnea, spasmodic cough, mania, etc. Dose, 1 to 5 grs.," and this I had reported to this society.

Before advocating stomachic medication among my *confrères,* I knew also that Merck's 1907 *Index* recommended such administration as a sedative, antispasmodic, anodyne, to be prescribed in cases of phthisis, cough, catarrh, dyspnea, mania, etc., in doses of from three-fourths of a grain to three grains, the maximum dose being given as five grains at one single administration, and twenty-four grains as maximum *per diem.* To be sure, for our purpose such dosage is not necessary, but, even if in error others should so consider it, I have heard or read of no dentist exceeding these safe limitations.

So far as I know, none of my *confrères* have observed any untoward consequences following the administration of this drug. One highly excited gentleman only—he came from the sunny South—wrote to urge me to abandon sulfocyanate, saying that he had given—I am not quite positive whether it was one or two ounces—to a rat, and the rat died. I replied that I felt quite confident that his finding was correct, but that I had no doubt that, had he poisoned the poor rat with an equal quantity of common table salt, he would have attained the same result. I think that at least it may truthfully be said: "If it does no good, it will do no harm," and "will serve very well as a good placebo remedy."

It *is* true, even as Professor Gies avers, that "Observers in the past have not agreed" as to the value of potassium sulfocyanate in saliva as a deterrent to plaque formation on the enamel of the teeth, but that was before the advocacy of the iodin stain experiment which I suggested in my paper read before the National Dental Association last July.

In several instances, when I have made inquiries concerning methods of procedure and the number of retrials, I have been satisfied that adverse criticisms were unwarranted, and at least in one instance I cannot escape the conviction that your distinguished essayist permitted himself to be sponsor to an error. I refer to his conclusions after experimenting upon the students in Columbia College.

If each of you will picture in your mind's eye a series of experiments conducted upon some forty-odd college students varying in age anywhere from twenty-one to forty, most of whom were more or less addicted to the smoking habit, and few of whom within the range of the ages I have mentioned would probably be afflicted greatly with what we as dentists would designate *rapid superficial enamel decay,* and with the conditions in their mouths largely dependent upon the character and value of dental operations performed by practitioners of widely vary-

* *Journal of the Allied Societies,* vol. iv, No. 4, December 1911.

ing skill, you can easily comprehend the difficulty of arriving at any just conclusions as to whether the natural presence of potassium sulfocyanate had any deterrent influence.

Compare conclusions arrived at under such circumstances with that other series of experiments conducted by your essayist at about the same time, in which he had the co-operation of several of New York's most distinguished operators, both as to selection of cases and as to diagnoses, in which series Professor Gies himself reported that among immunes there was, on an average, just twice as much potassium sulfocyanate as among susceptibles.

In the latter series the diagnosticians knew whether superficial enamel decay was actively present at the time of examination; whereas, in the other series, this condition very likely *may* formerly have been active, but may have entirely or materially diminished even two or three years previous to the date of examination.

As you often have heard a learned advocate plead, "I object to the admission of the evidence"—the college student evidence—on the ground that it is unreliable, misleading, prejudicial, and irrelevant. And furthermore, I submit that my pet sulfocyanate theory is proved —by the "testimony of the most trustworthy and reliable witness for the prosecution."

That, even as upon sowing a tiny mustard-seed, the sulfocyanate theory is growing and spreading is attested by returns from far-off South Australia, from "sunny" England, and from benighted India. In the *Commonwealth Dental Review* for July 1911, published in Sydney, the leading article is the essay of one F. M. Bradshaw, L.D.S., B.D.S.Vic., which was read before the Odontological Society of South Australia. The paper is too long to be read at this time *in toto,* and I shall therefore make mention of only a few of its most interesting statements:

The observations of Dr. Lohmann show that at certain times and in certain diseases caries makes rapid progress, and during such periods no sulfocyanids could be found in the saliva, while caries is retarded as soon as sulfocyanids are again present.

At the present time research on this subject is in its infancy, and there are no definite conclusions to be drawn. From clinical experience, however, the administration of KCNS has been found to exert a decidedly favorable action on the secretions, and is especially beneficial in mouths where a thick and ropy saliva is present, . . . for deciduous teeth that are carious beyond any hope of repair, especially in nervous children. With hypersensitive dentin it renders excellent service. The presence of sulfocyanates also keeps the mucous membrane in a healthy condition. In many constitutional disorders it is found that sulfocyanates are absent from the saliva. . . . To verify the statement of Dr. Michaels that a very constant relationship exists between the absence of KCNS and the prevalence of caries at that period, Levy treated patients during pregnancy, whose saliva contained none or only a very slight trace of KCNS, with tablets containing 0.1 gm. malt, 0.05 gm. malt diastase, 0.008 gm. KCNS. The results were most gratifying. There had been no fresh occurrence of caries in any case, although several of the patients had suffered extremely from their teeth during previous confinements. In cases where caries had supervened before treatment was commenced, the extreme sensitiveness of the cavities had been relieved.

KCNS is especially indicated for boys and girls at the attainment of puberty, when the teeth suffer so much, and in women during pregnancy. An alkaline purge should also be advised to increase the fluidity of the blood and stimulate the kidneys to functionate normally, thereby assisting the metabolism. KCNS is often given by physicians in diseases which are associated with periods of rapid tooth decay.

From Bombay, India, we have the assurance, as late as December 7, 1911, that clinical observation leads L. H. Wirt, D.D.S., to believe that KCNS tends to restrain the growth not only of the plaque of Black, but also deposits of a slimy nature generally. Its use seems to tend to make the mouth more self-cleansing.

In the latest and most authoritative English work on "The Prevention of Dental Caries and Oral Sepsis," Professor Pickerill* says: "The amount of sulfocyanate in the saliva may be readily increased by internal administration," and that advantage of this may be taken in cases where a continuous antiseptic action is desirable, such as in rapid and acute caries of children. He adds: "The drug is not an active poison, and may be given advantageously in repeated doses of one-fourth to one grain."

It is an old saying that "A prophet is not without honor save in his own city." As a discredited and persecuted prophet I have no fear that I shall be crucified or burned at the stake in Buffalo, however. Attest—the spicy "Buffalo Letter" appearing in the December 1911 *Dental Practice* of Toronto. This epic is written under the *nom de plume* of Habec, which being untangled would be made to read "J. Wright Beach of Buffalo." It bears the euphonious caption of "Wind Pudding *à la Mode.*" After disporting somewhat facetiously at my expense as well as at the expense of the editor of the DENTAL COSMOS, in the language of the poem its author gets down to "brass tacks," and says that "Dr. Low *knows* . . . . while Dr. Kirk merely illusionizes," and then he queries, "Why not show the madness of our method, and hand out something that one can get hold of and turn into good teeth?" Habec then challenges Professor Kirk to—

deliver a package of the real article like this one: A miss of some eighteen happy summers whose ivories have been under the watchful care of Habec for at least eight of the above-mentioned seasons, was but yesterday within the environs of his dental outfit, and a test of the saliva of this young lady was made, and revealed a sufficient quantity of sulfocyanate in it to render the teeth comparatively safe from decay. History: For the first six years of our care it was a nip-and-tuck fight to save the teeth from destruction by caries. In spite of our best efforts cavities seemed to appear over night, as it were. Three years ago the saliva was tested and showed pale lemon in color, together with mucin much in excess. Potassium sulfocyanate was prescribed in the usual way, and after one year results began to be noticeable. At the end of the second year, decay of the teeth appeared to be nearly arrested, and yesterday but two slight repairs were made about defective fillings. For the last eighteen months no sulfocyanate had been taken, yet the saliva test showed the light red color indicative of full normal percentage of this necessary ingredient, and the quantity of mucin was not excessive. The enamel surfaces had changed from a dull, lifeless cast to that of glistening translucence, and were readily freed of the little extraneous matter. A bright, intelligent face enhanced by such teeth is the argument Habec puts up against a large wind pudding. And this case is but one among the many we might record to show the value of this treatment and the persistence of the sulfocyanate in the saliva after nature has been assisted to secrete it. So what care we whether or not Zoöglea is second cousin to Mucin, or Microbe is father to Gelatinous Plaque? It's "mox nix ouse" to us, so long as sulfocyanate of sodium and hydrastis in tablet form given internally does not interfere with physiological processes and puts the kibosh on Micro and his ilk.

Corroborative of Habec's testimony I offer the accompanying compilation—it records the behavior of the teeth in the mouths of two of my patients that I consider in the class of the most extremely susceptible: Marjory and Marion are sisters, who first came under my care in 1908. Marjory is the older by four years. Marjory had just passed the day of longer skirts and the critical experiences which are associated with the recurrence of every new moon, and was in several respects a fit and proper subject for systemic medication according to both Squibb and Merck.

Upon examination there appeared to be no sulfocyanate in her saliva, while it was extremely thick, ropy, and strongly alkaline; consequently I prescribed teaspoonful doses of Schlotterbeck compound (hydrastis and pepsin) after meals, and one-half grain potassium sulfocyanate each night at bedtime. This treatment I ordered continued for twenty days; then, after a rest of ten days, I again examined the saliva, and found, to

* "The Prevention of Dental Caries and Oral Sepsis," by H. P. Pickerill, M.D., Ch.B., M.D.S.Birm., L.D.S.Eng., professor of dentistry and director of the dental school, University of Otago, N. Z.

my very great surprise, that there was no apparent improvement in its condition, and that there was no indication of potassium sulfocyanate. Fearing I knew not what, inasmuch as the usual phenomena following such medication were not obtaining, I discontinued treatment, and went about the filling of her carious teeth. Thirteen cavities were attended to, mostly of recurrent superficial enamel decay occurring about the margins of fillings made by some other dentist.

Observing that these recurrent cavities still continued to develop rapidly, on January 2, 1909, I screwed up my courage and repeated the medication. Again no manifestation indicated that she had taken any medicine, and I gave up the fight, anticipating eventually the necessity of crowning and bridging as the only remedy; and I reported a first case of such idiosyncrasy that sulfocyanate treatment was entirely useless.

Let us here digress a moment to consider conditions that were obtaining in the mouth of the younger sister. Upon first coming under my care she was about nine years of age. No fillings had ever been made in her teeth. Immense crown cavities, involving all but a mere rim of occlusal surfaces, were present in the left upper and both lower first molars, while in her other teeth about a dozen small cavities were detected. Her saliva showed no potassium sulfocyanate and was extremely ropy.

On May 15th I placed her under the same treatment instituted for the older sister. Her system responded promptly to medication, and the condition of her saliva was almost immediately very much improved. During the year I filled the three bad and two other smaller cavities, but this young lady being somewhat headstrong failed repeatedly to keep appointments, though she submitted willingly—as did Miss Marjory—to regular monthly prophylaxis operations. Noting general progress of decay in her teeth, I was gratified to find that it was progressing *very slowly,* while following only her initial sulfocyanate treatment no diminution in its generous proportions seemed to be occurring. On May 21, 1909, I "prophylaxed" her teeth, and made the second of two small fillings. On this occasion she decided to "peach" on her sister, as she termed it, and the fact came out, and was shamefacedly acknowledged by the culprit, that Marjory had cheated herself, and lied to me—that she had never taken any of her medicine. Marjory avowed contrition, and as she promised that if I would prescribe once more she would faithfully take her medicine, I forgave her and consented to prescribe. In consequence, conditions in her saliva and also of her teeth showed marked improvement.

You will note that during the entire year 1910 I had to fill only two small new cavities, and not until the latter part of 1911 did her saliva or her teeth show retrograde conditions. On October 3d, there appearing to be no potassium sulfocyanate in her saliva, which once more was discovered to be extremely thick and ropy, I again prescribed for her, but this time I gave her the combination *sodium* sulfocyanate and hydrastis tablets, for which more agreeably taken substitution I am indebted to the doughty Habec. After the above date recurrent enamel decay necessitated the filling of nine new cavities.

The latest examination of Marjory's teeth and saliva occurred last Monday. I found three cavities in her teeth, two of which were recurrent in badly broken-down first molars that have long been merely "patched up" sufficiently with dwarfed amalgam fillings, so that I might eventually make some gold crowns upon them, and the third a very small cavity consequent upon contamination with the decay of one of these molars. All other teeth are holding fillings well. The appearance of the enamel of her teeth is satisfactory generally, and there is a more than a moderate showing of potassium sulfocyanate in her saliva. [Here the speaker exhibited test tubes of different specimens of saliva.] The sulfocyanate content in each of these tubes, taken in connection with the dates at which the specimens were secured and the coincident conditions at the time the samples were tested, all point conclusively, to my comprehension, to this conclusion: That the presence of potassium sulfocyanate in the saliva does have an inhibitory influence, if not on plaque formation, at least upon conditions of *rapid superficial enamel decay*.

To return once more to consideration of Marion's condition. During 1910 I filled ten cavities; they were all small. These operations were not very painful, and it should be remembered that every one of these had been located and was known about, from her very initial visit to my office (May 1908).

Though salivary conditions remained fairly satisfactory during 1911, I filled four cavities, notwithstanding which the translucence of her enamel remained apparently unimpaired until quite recently. She is now approaching the critical age which her sister passed through four years ago, and on May 3d just past, her saliva again suddenly appeared to be distressingly thick and ropy, and again at the present time she is taking sulfocyanate tablets.

Concerning a case of very remarkable immunity, accompanied by most generous proportions of potassium sulfocyanate in the saliva, I suggest that one of my Buffalo *confrères*, Dr. Murray, be asked to report, and that another, Dr. Meisburger, be induced to relate his experience in making an endeavor to overcome by systemic treatment a distressing condition of hypersensitive dentin and cementum about the cervical margins of the teeth of one of his patients.

Possibly it may be thought by some of you that the lengthy and hypercritical discussion of this subject had better not be taken altogether too seriously. Well, I feel about that as about the little sulfocyanate tablets: It is entirely immaterial whether they be taken seriously or otherwise, so long as they are taken.

Concerning the presence of potassium sulfocyanate in saliva, I have this to say in conclusion—and I would say it most emphatically: *If you don't find it, give it!*—in the meantime continuing to coerce Professor Gies until eventually he finds out the reason why its presence does the work.

Dr. R. Murray, Buffalo. I do not know that I have very much to say. I did not have the privilege of hearing the paper, and only arrived as Dr. Low was mentioning my name, so that I did not have the pleasure of enjoying the paper.

Dr. Low. Dr. Murray can verify what I have said. I simply wanted to prove by him the results in the case that he referred to me.

Dr. Murray. The case to which Dr. Low refers was that of a young lady of twenty-four, connected with the educational department of Buffalo. I found her teeth absolutely immune from decay, so I immediately took a sample of her saliva, and had Dr. Low examine it, with the result as stated—generous proportions of potassium sulfocyanate.

Dr. L. Meisburger, Buffalo. This paper has given me a great deal of pleasure, principally because of the instruction which I have received from it. Sometimes I cannot help but think in listening to such papers as these, which have a tendency to bring the allied professions together, that we are in reality coming closer to the medical profession in the matter of putting our patients gradually to sleep as the latter have been doing, and I wonder if we are not getting into that class possibly by the administration of drugs the systemic effects of which we do not know. I think therefore, that the New York State Dental Society is to be highly commended on bringing this subject to our attention in this way, because we do not want to administer anything that will do harm to our patients.

As to the case referred to by Dr. Low, I had a patient coming to me regularly for prophylactic treatment, a person with a highly sensitive condition of the teeth. I could in no way account for this condition, as the oral secretions were about normal, with the gums and teeth indicating good care except possibly that the patient's index was below par, she having been overworked in her profession as a nurse. I was somewhat nonplused as to what treatment to give in this case. I treated the teeth with formaldehyd of full strength, and recommended the use of bicarbonate of soda on the tooth-brush in direct contact with the tissues of the mouth, and finally the use of Phillips' milk of magnesia; but all of these procedures failed to give the desired relief. Dr. Low suggested the use of potassium sulfocyanate. I followed his suggestion and administered sulfocyanate, and the condition was relieved to a very great extent.

Dr. HOFHEINZ. In how short a time?

Dr. MEISBURGER. In less than three weeks.

Dr. HERMANN PRINZ, St. Louis. It would be folly on my part to discuss this exhaustive lecture we have just listened to. I have been vitally interested in this subject, and have made it a point to look up its literature. Very recently a most excellent summary on this subject has been published under the title, "Vergleichende Uebersicht der hauptsaechlichen Literatur ueber Vorkommen, Nachweis und Bedeutung der Rhodanverbindungen im menschlichen Koerper. Von Dentist Knoche." (*Ergebnisse der gesamten Zahnheilkunde,* vol. ii, No. 6.) I take the liberty of calling Dr. Gies' attention to this paper.

It seems to me that the whole question, when simmered down, resolves itself as follows: Sulfocyanate, as present in the saliva, has to be regarded as a waste product of tissue metabolism; it has no specific significance in regard to antiseptic or prophylactic measures. Dr. Low in his discussion has frequently mentioned the names of Merck and Squibb as references. It must be borne in mind that these names merely represent chemical houses, and that references taken from their price lists and catalogs should not be quoted as authoritative statements. From a pharmacologic point of view, Pauli of Vienna has published some notes on the therapeutic action of potassium sulfocyanate; he employed it principally as a sedative in doses of about one gram. At present, potassium sulfocyanate is rarely employed therapeutically.

Dr. W. B. DUNNING, New York. It is my great regret today that the other members of the committee, Dr. Merritt and Dr. Waugh of Buffalo, are not with us. Dr. Waugh has taken a very active interest in this topic, and I am sure that his discussion on this subject would be of great value. Dr. Merritt, of course, is an active worker in matters of this sort. I feel, however, that I am not taking a liberty with my colleagues in stating that it is the sense of the committee that its successors should be empowered to go on with this really important work. Dr. Gies' statements cover a field of investigation which has consumed an entire winter session. His splendid address has outlined what has been accomplished, yet no one sees more clearly than Dr. Gies that the work is only started—that there is yet much to do; that almost certainly, years will be needed for the attainment of that grand object, the knowledge of causes underlying dental caries. I trust that the Scientific Committee for the coming year will be empowered to continue this work in Professor Gies' hands.

Dr. GIES (closing the discussion). I appreciate the kindly comment by Professor Kirk. We have not yet arrived at the point of making comparative analyses of blood entering and leaving the liver at a given moment. What I have said about the liver as probably the most active organ in the production of sulfocyanate should have been accompanied by the statement that we hope to make such comparative analyses, among others, before we draw final conclusions. I have no data on the subject of sulfocyanate formation from, or in association with the production of, urea, but any positive opinion I might have entertained in that direction has been dispelled by our negative results with thiourea. The appended formulæ for thiourea and urea are interesting in this connection:

$$O{=}C{<}^{NH_2}_{NH_2} \qquad S{=}C{<}^{NH_2}_{NH_2}$$

Urea. Thiourea.

Although the SCN group of atoms is present in the formula of thiourea, our negative results indicate that the SC and NH_2 parts are not convertible into SCN *radicals,* but pass independently into other compounds, or remain wholly as thiourea without change prior to excretion. Since urea is produced by dehydration of ammonia, water, and carbon dioxid, after their collective conversion into ammonium carbonate—

$$2NH_3 + H_2O + CO_2 = OC\left\langle\begin{matrix} ONH_4 \\ ONH_4 \end{matrix}\right. \xrightarrow{-H_2O} OC\left\langle\begin{matrix} ONH_4 \\ NH_2 \end{matrix}\right. \xrightarrow{-H_2O} OC\left\langle\begin{matrix} NH_2 \\ NH_2 \end{matrix}\right.$$

—it is quite likely that sulfocyanate formation occurs along the CN and HS line of transformation, rather than on a modification of the NH_3 and CO_2 conversion.

We always welcome the invention of time-saving devices. Dr. Ferris' procedure is very interesting. It is not his fault that the ferric chlorid reaction is not suitable for accurate quantitative work. For general and convenient estimations it has all the virtues of many excellent "clinical" methods, but what is the use of getting *salivary* data by methods that we know beforehand cannot be reliable. Such data are insidiously misleading, and pseudo-science feeds upon them. We know so little about the significance of the quantitative variations in salivary composition, even when the constituents are very accurately determined, that we cannot rely upon easy and convenient methods that sacrifice precision for speed and comfort. If it is Dr. Ferris' purpose to use his method merely to determine salivary excretory responses to sulfocyanate treatment, it would doubtless be very useful in such observations, since analytic errors would probably be buried in the gross differences due to the medication.

I have listened with great interest to Dr. Low's emotional discussion of this matter, especially his elaborate apology for empiricism. His reference to himself as "the dog" in his tests, and the presence of our Missouri colleague, lead me to assure Dr. Low that I wish I could "quit kickin' his dog around," for I am not hunting trouble—my "hat is *not* in the ring."

Empiricism needs no defense when it is compared with ignorance, but when it is matched against science there is nothing at all to say for it—it stands to reason that the guessing which involves merely utter ignorance, poor logic, and no little complaisance, cannot uniformly yield the information that may be obtained by guessing which depends upon precise knowledge, sound reasoning, and impersonal considerations. Fortunate accidents have often accounted for great discoveries, but reliance upon happy accident *as a method* in dentistry would hardly be suggested by Dr. Low.

If Dr. Low proposes to exalt empiricism as a method, it would be well for him to choose examples of its superiority over the scientific method from the present era, and not from periods when science either did not exist or was in its infancy. We are considering the sulfocyanate question in 1912, not before the battle of Waterloo.

I learn, for the first time, that when Dr. Low came to see me in New York two years ago, he and I were "not viewing the same picture" in the matter of plaque formation in the presence of sulfocyanate. He came to see me *after* all but a few almost useless portions of our materials had been consumed in the detailed examinations on which our 1910 report was based. I informed Dr. Low of that fact. He himself picked out what he regarded as a typical plaque *in one of our least typical* test-tube specimens of the very few that happened to be available. I recall nothing in our conference to warrant Dr. Low's assertion about it today.

It is a great surprise to hear, in such a convention as this, that pharmacological reliance is placed upon the trade books —I almost said the trademarks—that Dr. Low has mentioned. This alone shows how completely empirical Dr. Low's position is on this subject. It is a new method—or rather, it is no method at all—to ignore original records of investigation, but instead to rely on trade prospectuses for scientific information. The *Journal of the American Medical Asso-*

ciation has recently shown that Squibbs misrepresented one of the remedies in which the firm is commercially interested.

I fail to see that Professor Hill's personal courage has anything to do with the question before us. Thousands of men are not afraid to get drunk as often as "free beer" is available, but no one considers that fact an indication that beer is a harmless beverage. The courage, or rather the foolhardiness, of such men is not even an *empirical* suggestion to that effect.

I am at a loss to comprehend Dr. Low's statement that in a former communication I reported that "among immunes there was, on an average, just twice as much potassium sulfocyanate as among susceptibles." The averages were 1 part of sulfocyanate in 40,000 parts of saliva for the "immunes," and 1 part of sulfocyanate in 48,000 parts of saliva for those showing caries,* in one group; in another group the averages were 1 part of sulfocyanate in 33,000 parts of saliva for the "immunes," and 1 part of sulfocyanate in 23,000 parts of saliva for those showing decay. Dr. Low did not tell you what was indicated by the *individual data* from which the averages were calculated. They further flatly contradict his assertion. If you are interested in the details in this connection, I suggest that you examine the data for yourselves in the reports referred to. You will find that Dr. Low has overlooked some essential points. Drs. J. Morgan Howe, G. S. Allan, and J. K. Burgess of the New York Stomatological Institute carefully studied and selected the forty cases from seventy medical students in the second group, which Dr. Low feels gave us inadmissible evidence. I am sure these gentlemen knew well what they were doing.

It was very amusing, as I listened to what Dr. Low said of the growth and spread of his "pet sulfocyanate theory" —"as upon sowing a tiny mustard seed" —to recall that Michel, the apparent originator of the theory ten years ago, lately complained of the fact that his European colleagues have refused to take seriously his sulfocyanate theory. In Europe the "mustard seed" is just as "tiny" now as it was when Michel planted it. I am very glad that I happen to have brought Pickerill's book with me—I feasted on it all the way from New York to Albany this morning.

I think, after what you have heard Dr. Low quote, that you will be quite as surprised as I am that he presented only such parts of Pickerill's comment as suited his present purpose. In this, also, I refuse to stand for the empirical and prejudiced as against the reasonable and impersonal way of doing things, and I now read from Pickerill's book certain significant parts that Dr. Low has suppressed:* "Reference has been made to the associations between percentage of sulfocyanate and immunity to caries. I have not made many observations in this direction, but such as they are, they do not entirely accord with the findings of Michel, Low, and Beach; but the numbers are too small to make any definite deductions. . . . Waugh has recently claimed that sulfocyanate has the property of preventing organisms from forming adhesive plaques. His experiments are, however, somewhat inconclusive, since ten tubes of broth to which sulfocyanate had been added, infected with mouth organisms, showed no plaque formation, but of ten control tubes only one showed plaque formation. . . . Whilst undoubtedly sulfocyanate of potassium is a beneficial element in saliva, and one making for freedom from disease, yet it cannot be regarded as the most important or only factor in producing a natural immunity to dental caries or oral sepsis, ... *All the normal constituents* of saliva are, if present in sufficient amount, of value and importance in protecting the teeth against the occurrence of dental caries, and in maintaining the health of the oral mucous membrane."

In short, Pickerill is not a convert to the "pet theory" and does not present

* Lothrop and Gies, *Journal of the Allied Dental Societies*, 1910, v, p. 267; 1911, vi, p. 88.

* Pickerill. "Prevention of Dental Caries and Oral Sepsis," 1912, pp. 176, 177, and 195.

any findings in favor of it. Pickerill would not have been quoted in support of this theory, if Dr. Low had been making a judicial presentation of the matter. I regret Dr. Low's choice of quotations, because it is not very agreeable to call attention to such striking evidence of extreme prejudice.

I suggest that instead of reporting a few favorable results after sulfocyanate medication, and ignoring all else, Dr. Low would do well to adopt the scientific method. If he would select, tomorrow, a number of cases for continuous treatment, and present here next year a full and accurate history of the outcome in each case, good or bad, we might all agree with him that sulfocyanate is the brilliant remedy he thinks it is. From that standpoint I wish him abundant success. I cannot say that Dr. Low is not right in his contentions—I have no knowledge on the subject—but what he states cannot be regarded as evidence, especially when we recall how he quoted Pickerill. I do not see that he has ruled out simple coincidence as an explanation of the results he has presented.

I have taken altogether too much of your time today. I thank you for your patience in listening so attentively to all that I have been privileged to say.

FRIDAY—*Evening Session.*

The meeting was called to order on Friday night, May 10th, by the president, Dr. Hillyer, at 8.30 o'clock.

DR. HILLYER. Ladies and gentlemen, it was said this afternoon that this particular occasion was to be the most unique in the history of this organization. I have never known of one of a similar character, and let us hope that for many years to come we may not have cause to repeat it. It is not intended, however, that this shall be in the least a sad occasion. We have had our sad moments regarding the particular ones we are honoring this evening, but these are feelings that we will attempt to set aside tonight. We will now hear from the Committee on Necrology, through the chairman, Dr. W. S. ROSE.

REPORT OF THE COMMITTEE ON NECROLOGY.

The report was as follows:

It is the sad duty of your committee to report the deaths of the following members:

Dr. Charles J. Holt.

DIED, at his home in Westport, N. Y., Feb. 18, 1911, Dr. CHAS. J. HOLT.

Dr. Holt was a graduate of the University of Maryland, Baltimore, in 1888. He joined the Fourth District Dental Society in 1898, and was a much respected and most faithful and useful member of this organization. He was elected unanimously to its presidency in 1909. He was elected to membership of the Dental Society of the State of New York in 1903. As a dentist Dr. Holt was exceedingly conscientious, had high ideals, and always commanded the esteem and co-operation of his *confrères,* among whom his early demise caused the most profound regret.

Dr. Chas. J. Barber.

DIED, in Auburn, N. Y., February 11, 1912, at the age of fifty-three, Dr. CHAS. J. BARBER.

Dr. Barber was born in Geneva, N. Y., and was graduated from the Baltimore Dental College, immediately after which he entered upon the practice of his profession at Auburn, where he enjoyed an excellent practice until his death. He was a member of the Rochester Dental Society, of the Seventh District Society, and of the New York State Society. His death resulted from an attack of pneumonia, subsequent to a surgical operation. Dr. Barber served during the Spanish war as captain of the Second Separate Company of New York, and as is often the case, the strenuous work of the campaign made too great a demand upon his physical resources. His courtesy, geniality, helpfulness, and efficiency will long live in the minds of his friends and professional brethren.

Dr. Thos. Clarence Phillips.

DIED, in Buffalo, N. Y., March 31, 1912, of endocarditis, THOS. CLARENCE PHILLIPS, D.D.S., at the age of thirty-seven.

Dr. Philips was a member of the class of '95 of the dental department of the University of Buffalo, and the ensuing year he acquired the M.D.S. degree from the University of the State of New York. After several years of practice he combined forces with his father, Dr. T. S. Phillips, continuing in this connection until his death.

Dr. Phillips was an ardent supporter of every movement for the welfare and advancement of his profession. He was devoted to society work, and in 1910 was president of the Eighth District Dental Society. As a dentist he displayed unusual judgment and ability, and enjoyed the confidence of a large *clientèle*. He did much of late in the investigation and treatment of pyorrhea.

Dr. Phillips exerted a strong influence locally upon the upbuilding of his profession. His sterling qualities were worthy of commendation and his professional ethics of emulation. His personal character was such as to endear him to all with whom he came in contact and attract to him a host of loyal friends, far greater than the average man might claim. It seems sad that one so promising should be called away so soon; yet will we cherish his memory, and his life will do us good.

Dr. Samuel Arthur Freeman.

Died, at Buffalo, N. Y., December 11, 1911, in his eighty-second year, Samuel Arthur Freeman, M.D.

Nearly sixty years ago a medical practitioner, for nearly fifty years a practitioner of dentistry, forty years identified with our State Society, and nearly thirty years an official exponent of the Presbyterian church, always modest, trusted, and esteemed, Dr. Freeman leaves us a heritage best prized by those who knew him best.

He was born in South Orange, N. J., in 1830, of New England ancestry, attended the public school of Hoboken, and was graduated an M.D. from the New York Medical College in 1855. He practiced medicine at Fort Wayne, Ind., and served as an army surgeon during the early years of the civil war. In 1864 he located as a dentist in Buffalo, where he practiced until his death.

As a pioneer in the organization and development of official dentistry Dr. Freeman was most active and influential. He was the first secretary of the Eighth District Dental Society, was its president in 1882 and 1883, and its librarian since 1895. In the last-named capacity he has secured for the society an invaluable dental library. He was made corresponding secretary of our State Society at its third meeting in 1871, served from 1875 for seven years as our recording secretary, made a record as its treasurer *pro tem.* in 1907, and was a member of its Fellowship Committee from 1907 until his death.

Dr. Safford Goodwin Perry.

Died, in New York, N. Y., December 22, 1911, of uremic poisoning, Safford Goodwin Perry, D.D.S.

Dr. Perry was born at Wilton, Saratoga county, N. Y., in 1844. He began the study of dentistry in Yonkers, N. Y., and was graduated from the Pennsylvania College of Dental Surgery in 1865, after which he entered into practice with his cousin and preceptor, Dr. Geo. Perry, at Yonkers. Soon an additional office was secured in New York city, which finally was assumed by Dr. S. G. Perry, and in this city he practiced until his death.

As a dentist Dr. Perry attained the highest rank. His ideals were abreast of those of the foremost exponents of the dental art, and these ideals he was indefatigable in striving to attain. He was lecturer on operative dentistry in the University of Pennsylvania, member of the Odontological Society of New York, member of the New York State Dental Society, of which society at his death he was Fellow-elect. He was also a member of the National Dental Association.

We have many devices in technique which we owe to his industry and ingenuity. Dr. Perry is entitled to a prominent place upon the world's roll of dental honor. His greatest contribution to dentistry was his own self. An article from his pen would cause the reader to desire to know him personally, while personal contact with him added dignity to dentistry, gave importance to its humblest task, impressed one with his culture, his magnanimity, and most of all his great and loving heart. He knew the "luxury of doing good." He was born well, lived nobly, and died beloved.

Respectfully submitted,

W. S. Rose,
C. S. Butler,
Committee.

Dr. Hillyer. We will next hear from the Fellowship Committee, through its chairman, Dr. R. H. Hofheinz.

The report was as follows:

Report of the Fellowship Committee.

Mr. President and Members of the Dental Society of the State of New York:

It is with much grief that your committee presents this report. At our last gathering in Albany, Dr. S. A. Freeman became chairman of the Fellowship Committee, and it was unanimously agreed to confer the medal on Dr. Safford G. Perry of New York city. Both of these gentlemen during the year have been called away from their earthly abode. As long as Dr. S. A. Freeman served on this committee he did it with the same integrity and justice that characterized him at all times.

Owing to his long acquaintance with Dr. Safford G. Perry, he would have added a personal loftiness to this report which no present member of this committee can hope to attain.

After the sudden departure of Dr. Perry the question arose as to what we were to do under the circumstances. On consultation, your committee was of one opinion. The medal and the honor that goes with it was not bestowed upon the perishable part of Dr. Safford G. Perry; it was given in recognition of his superior skill as a dentist, in recognition of his fine character and grand personality. These qualities have not died with him; "Beyond the poet's sweet dream, lives the eternal epic of the man." Every one of his fine qualities influences this very meeting, and permeates the entire profession. A man of such strength can never die. It is for that reason that your committee desires to honor the society by placing his name in the Fellowship class, and we beg the family of Dr. Safford G. Perry to accept the medal. It will show the profession and the family that this society appreciates the fact that human value and good professional qualities survive the body.

We therefore recommend the Fellowship medal to be given to the family of Dr. Safford G. Perry, of whom we may well say: "Describe him who can! He was an abridgment of all that is noble in man."

Respectfully submitted,
RUDOLPH H. HOFHEINZ, *Chairman*,
WILLIAM J. TURNER,
A. R. COOKE,
A. L. SWIFT, *Committee*.

Dr. HILLYER. The Fellowship fund was established about eight years ago by a member of this society, Dr. William Jarvie, who I regret to say has been detained at home by illness—the only thing that could have prevented his being with us at this time. It provides for the presentation of a medal once a year to some member of the profession in the United States or Canada who has shown by his achievements his particular fitness for the honor. It is given but once a year, and it is the highest honor that our society can bestow. According to the expressed wish of the chairman and the other members of the committee the medal is to be presented this year, as our particular token of affection for Dr. Perry, to his family, and I think it is particularly fitting that Dr. Darby has consented to receive the medal in behalf of Dr. Perry's family.

[Addresses in eulogy of Dr. Perry were then made by several members and visitors, and a number of communications in sympathy with the occasion, from prominent members of the profession, were read.]

The next order of business was the report of the Executive Council by Dr. G. B. BEACH.

Motion was made and carried that the report be adopted.

The next order of business was the installation of the newly-elected president, Dr. Baylis.

Dr. BURKHART. I move you, sir, that, when we adjourn, we adjourn until the second Thursday in May 1913. [Motion carried.]

Dr. HOFHEINZ. I move that we extend a vote of thanks and appreciation to our retiring president for his most efficient work during the meeting. [Motion carried.]

Dr. Baylis then declared the meeting adjourned until the second Thursday in May 1913.

The Clinics.

Dr. W. S. WATSON, Brooklyn. "Orthodontia."

The clinician demonstrated a method of taking plaster impressions of the mouth for obtaining models for orthodontic work or for prosthetic work (partial plates), consisting in the making of cores for spaces, allowing the plaster to set, removal of the tray without the plaster, and cutting of grooves over the canines.

Dr. G. A. Fletcher, Albany. "Orthodontia."

This clinic consisted in the demonstration of the application of grass line and rubber ligatures for the rotation and lingual movement of the incisors without the use of the expansion arch. The clinician also showed the use of the lingual bar to avoid ligating bicuspids and canines in expansion.

Dr. Bernard Fischler, Brooklyn. (1) "A Hollow Gold Shell Saddle with Cast Base Over Gold or Platinum Leaf."

Gold or platinum leaf is burnished over that part of the model which is to carry the saddle. This is covered with a thin layer of inlay wax and the hollow gold shell is added, following the same method of procedure as with the pivot.

(2) "A Moldine Flask Made of Thick Air-chamber Metal." (For making gold shell pivots and saddle.)

The advantage of this flask over the rubber ring usually furnished with the moldine outfit is that it can be separated into halves, and the model removed without distorting the impression; at the same time the air-chamber metal is pliable and will give, and can be pressed in the same manner as the rubber ring is used.

(3) "An Adjustable Soldering Tool."

This consists of a combination of two pairs of tweezers in one, and means for adjusting two pieces of metal, end to end, for soldering. This is especially useful for adding pieces of gold to shell crowns that have accidentally been cut too short.

Dr. R. E. Luther, Batavia. "Convenient Devices."

As a means of anchoring a large amalgam filling in a badly broken-down molar or bicuspid, a one-quarter inch platinoid wood screw is used. The screw is covered with soft cement and screwed into a root-canal, leaving the flat head projecting well up in the cavity. The amalgam is packed around the screw. In this way many teeth, which would otherwise have to be crowned, may be saved.

Dr. J. O. McCall, Buffalo. "Polishing Roughened Enamel."

The method advocated consists in grinding where necessary to secure a true enamel surface, then polishing with disks, etc., lubricated with a paste made of Arkansas oil-stone powder mixed with perfumed vaselin. The powder comes in different grits, numbered 0, 1, and 2, and is obtained from the Pike Mfg. Co. A fine garnet disk is used with paste No. 1, then a medium cuttle disk with paste No. 2, then a medium cuttle disk with paste No. 0, finishing with a crocus disk used dry. Paste No. 0 may have a little rouge or crocus powder mixed with it, to give distinguishing color and fine polish. Pastes are also used on stones, wood points, buff polishers, for polishing rough enamel, and for other polishing operations.

Dr. J. W. Canaday, Jr., Albany. "A Method of Restoring Lost Buccal or Lingual Cusps of Bicuspids with Porcelain."

This method is designed to do away with the necessity of placing gold crowns on bicuspids that have lost either cusp through accident or caries.

A porcelain flat-back tooth, or facing, is selected of the same shade as the broken tooth, and the pins are threaded. The root being filled, the cavity is shaped retentively, and a square butt joint is made between the facing and the root at the gingival border, or a little beneath. A threaded pin may be inserted in the canal and the pins bent around it and soldered. This gives considerable strength, and it is advisable to use the post whenever possible. The pin is cemented into the root and the cavity lined with oxyphosphate cement, and an alloy filling is inserted while the cement is plastic. The alloy may be best inserted if a matrix is placed about the tooth. If the pulp has not been exposed, the facing is ground as before, the pins threaded and bent to conform to conditions, and as much retention as possible is obtained in the cavity by burs and hand instruments. The cavity is now lined with cement, as before, and the facing anchored in place with alloy, care being taken to work it thoroughly around the pins. By using care in shade-selection and finishing, a very beautiful and useful result may be obtained.

Dr. H. G. Kittell, Troy. "Porcelain Faced Dummy with Gold Tips."

The facing is ground in the usual way, having the cutting edge beveled and shortened sufficiently to allow for a gold tip as heavy as desired. The facing is backed with pure gold, No. 34 or 36 gage, punching the holes with a sharp instrument rather than with the plate punch, and making them large enough to allow the backing to be easily removed. The backing is trimmed flush with the facing except at the cutting-edge, where it is allowed to extend over about one thirty-second of an inch. The backing is then removed, and on the portion covering the beveled edge of the facing 22-karat solder is flowed as thick as the tip is desired to be. The backing is then replaced on the facing and burnished thoroughly about the pins to exclude borax. A cusp is now stamped of pure gold, No. 34 or 36 gage, the parts are assembled on the articulator, and before the wax has thoroughly hardened, the articulator is closed firmly, whereupon the cusps of the opposing teeth will accommodate themselves in the soft pure gold to a perfect occlusion.

The joints are all burnished tightly, and any open spaces filled with wax; the whole is invested and soldered in the usual manner, after which the gold extending beyond the cutting-edge of the facing may be dressed down with files or stones.

Dr. J. H. Carter, Cohoes. "Cast Porcelain."

The success and universal use of the gold casting by means of the disappearing wax pattern no doubt prompted the pioneer workers in this field to adapt porcelain to the same method. Just what success has been attained, and how far toward taking the place of the baked porcelain this method has advanced, we have yet to determine.

My personal experience with the cast porcelain began last May at the state meeting, where I procured a small quantity of the Weldon casting porcelain. I followed directions, but my results were far from being successful. I found that with a Melotte's blowpipe and a foot bellows I could not get my material sufficiently molten to draw down, but by the use of a Brophy blue blast and a Vernon rotary motor, I was able to duplicate my wax patterns in the so-called cast porcelain. It, however, failed in the color, producing a variety of shades with a continued grayish tendency, apparently the result of oxidation. This grayish tendency continued even after insertion in the mouth, and in one particular instance the color, though having been true at the time of casting, assumed this grayish tinge after being in the mouth for a short time. With a later product I obtained results that were much more satisfactory. It cast at a much lower heat and was more positive as to color, with better adaptation, and apparently not affected by the oral secretions. The shades in which it can be cast are twenty in number, sufficient to cover the field of our work. The best results are obtained by the use of the Elgin machine, as the material will not stand pressure from without.

This product recommends itself to our further consideration.

Dr. H. E. Tompkins, New York. "Analgesia and Anesthesia by Nitrous Oxid and Oxygen."

The clinician demonstrated the use of several apparatus for the administration of nitrous oxid and oxygen, including the S. S. White, Teter, and Tompkins outfits, and the use of a regular yoke for the gas-bottle and four feet of hose. He also introduced a new nasal inhaler of his own design. He displayed a new pearl of aromatic ammonia wrapped in cotton and wound with China silk, used for the resuscitation of patients who show a disposition to faint. These pearls are known as Vaporole Ammonia.

His success with all of the apparatus was notable, but that obtained by the use of his own inhaler was especially good.

This inhaler consists of a spring clamp which fits over the head, and to which is fastened the nosepiece, adjustment for the air inlet, and the exhaust valve. The use of the yoke and hose attachment to the gas-bottle demonstrated that no especial apparatus for the administration of gas and oxygen was necessary as long as care was taken to admit gas at inspiration and to cut off the supply at expiration. The hose end was placed in the patient's mouth and the respiration watched; when the characteristic numbness was felt, a few breaths of air were allowed, and analgesia was then kept up by admitting alternate inhalations of gas and air.

Dr. Frank Wright, Ticonderoga. "Pressure Anesthesia."

Regarding the principles of pressure anesthesia, it should be remembered that we cannot force a liquid through healthy dentin by a mechanical device without injury to the tooth itself. If a cocain solution is held in close contact with the protoplasmic fibers of the dentin, the absorption of the cocain takes place in accordance with the law of osmosis. The imbibition of the anesthetic is enhanced by employing a physiological salt solution as a vehicle. On the other hand, living protoplasm reacts unfavorably against ready absorption of substances, for two reasons: First, its albumin molecules are relatively large and not easily diffusible; second, as an integral part of its life it possesses vital resistance toward foreign bodies. These attributes are sufficiently demonstrated by the fact that it is almost impossible to stain living tissue. Dehydration of protoplasm increases the endosmosis of the anesthetic solution markedly.

When we supply the same "pressure" anesthesia upon carious dentin, the above statement does not hold good. We are able to press fluid quite readily through carious dentin. We must bear in mind that such dentin has been largely deprived of its inorganic salts, leaving an elastic, spongy mass in position. By drying out this dentin, and then confining the anesthetic solution under a suitable watertight cover, the pressure applied by the finger is quite sufficient to obtain the desired results.

In teeth not fully calcified and in so-called "soft" teeth, pressure anesthesia is most readily obtained, while the process fails in teeth of old persons, abraded and eroded teeth with extensive secondary calcific deposits, teeth with metallic oxids in the tubules, or badly calcified teeth—all mainly for one and the same cause, namely, clogged tubuli.

In most cases no amount of pressure will prove successful. The successful anesthetization of the pulp depends largely upon this most important factor—allowing sufficient time for the proper migration and action of the drug. After the cavity of exposure has been cleansed of débris, isolated, and dehydrated, it is ready for the application of the anesthetic. As an anesthetic agent I use the cocain-adrenalin tablet or pellets put up by Parke, Davis & Co., about one-sixth of a grain in each tablet.

By moistening a small pellet of cotton held in the pliers and touching it to one-half of a pellet of cocain-adrenalin, the agent is easily conveyed to the cavity and point of exposure, if there be one, in the form of a thick paste. A pellet of soft yellow wax is then placed in the cavity in such a way as to confine the semi-fluid cocain directly against the pulp, and at the same time to exclude air-bubbles that might displace the anesthetic. Then by slight pressure on the wax, either with the finger or a pellet of cotton held in the pliers, the pulp is almost instantly anesthetized. If the cocain is allowed to remain in contact with the pulp for a few minutes before it is subjected to pressure, the anesthesia is usually accomplished without pain. After the pulp has been anesthetized, the cavity is enlarged and the pulp-chamber is drilled out and enlarged, so that free entrance may be had to the root-canals. For removing the pulp from the roots, I first use a smooth broach, by passing it between the walls of the canal and the pulp to the end of the root-canal; then a barbed broach deftly worked to the apex, which can usually be determined through a delicate sense of touch by a suddenly increased resistance; next, the broach is slightly rotated to break loose the pulp at the apex, and then the whole mass can be removed.

We find teeth, of course, with such constricted canals that it is practically impossible to remove from them all of the contents. But the difficulty in this case would not be obviated by the use of devitalizing agents, and in my opinion it is safer to leave these filaments in a sterile condition and risk their gradual degeneration than to leave them in what we know to be a septic condition. Nature is wonderfully resourceful in taking care of impaired tissue that has not been subjected to outward septic influences.

"F. D. I."

INTERNATIONAL DENTAL FEDERATION.

Summary of the Proceedings at the Annual Meeting held at Stockholm, August 28 and 29, 1912.

[Report furnished to the DENTAL COSMOS per courtesy of the *British Dental Journal.*]

THE International Dental Federation met at Stockholm on August 28 and 29, 1912. On the evening of August 27th, a reception of foreign visitors was held at the Opera Café.

Opening Session.

The opening session took place on Wednesday morning, August 28th, in the Aula of the University of Stockholm. On the invitation of Mr. W. B. Paterson (President of the Federation), Prof. Wilhelm Leche (Professor of Biology and Comparative Anatomy in the University) took the chair as Hon. President, being supported on his right by Mr. W. B. Paterson, and on his left by Stadsrodt Stäneström, the Minister of Education, Dr. Schaeffer-Stuckert (Frankfort, General Secretary of the F. D. I.); Dr. E. Rosenthal (Brussels, Hon. Treasurer); Dr. T. W. Brophy (Chicago), Dr. Florestan Aguilar (Madrid), and Hofrat Professor O. Walkhoff (Munich), Vice-presidents; Dr. W. Guy (Edinburgh), and M. Roy (Paris), Adjoint Secretaries.

Those present included: Dr. E. Förberg, Mr. Albin Lenhardtson, Mr. A. Hultgren, and Mr. H. Boström (Stockholm); Professor Jessen (Strasburg); Professor Christensen (Copenhagen); Professor Dieck (Berlin); Dr. Gabriel Wolf (Vienna); Mr. Horace Fletcher (New York); Mr. Walter Harrison (Brighton); Mr. H. R. F. Brooks (Banbury); Mr. G. Cunningham (Cambridge); Mr. G. Thomson, Mr. W. Penfold, Mr. H. Atkins (London); Mr. W. Dall (Glasgow); Mr. T. E. Johnston (St. Andrews); Mr. F. J. Turnbull (Edinburgh); Dr. C. Van der Hoeven (The Hague); Professor M. Ayrapaa, Dr. A. Aspelund and Dr. Th. Weber (Helsingfors); Dr. Ottesen (Christiania); Dr. Piperno (Rome); Dr. Guerini (Naples); M. R. Lemière (Paris); Mr. E. Huet (Brussels); Dr. J. Valenzuela (Chile); Dr. T. Shmamine (Tokyo); Dr. A. Scheele (Cassel); Dr. V. Bensow (Gothenburg); Dr. Punske (Berlin); Dr. A. Van Geldere (Zaandam), and a number of Swedish dentists, including Messrs. C. S. Bensow, Kior, Th. Sundvall, Carl Firm, Jessel, Nordströn, Häyer, M. Schmidt, Emil Lindblad, Carl Hultbom, J. Wessler, Svetlan, Charles Nilsson, S. de Verlier, N. Stene, Stangenberg, Amell, Thomsen, H. Strang, V. Renstrom, H. Romberg, G. Swen, W. Dumky, and others.

Professor Leche, on behalf of the Rector of the University, delivered an address of welcome and expressed gratification that the F. D. I. had again chosen Stockholm for its meeting-place.

Mr. Paterson, in the name of the F. D. I., thanked Professor Leche and the authorities of the University for their hospitable welcome, and for the use of the University buildings. Professor Leche had dwelt upon the scientific aspects of the Federation's work, and members would learn with pleasure that Professor Leche was not only a great advocate of Darwin's views on "Evolution" and the "Descent of Man," but was himself making researches in connection with the development of the teeth of man. Mr. Paterson introduced the Minister of Education, and then called upon Dr. Förberg.

Dr. Förberg said it was with feelings of pleasure that the Swedish dental profession heard that the F. D. I. had decided to hold its annual meeting in Stockholm. They considered it a great honor for their capital, as it was the second time the Federation had met there. At the 1902 meeting, resolutions were adopted which proved to be of fundamental importance in the organization of dental education in many countries. At the Cambridge meeting in 1901, a Commission on Dental Hygiene had been appointed, and at Stockholm a detailed report was presented, which concluded by stating that the public dental service was in a state of neglect, though here and there some signs of activity were manifest. Since then the appreciation of public dental hygiene had spread in all classes of society and the number of school clinics was continually increasing. They saw realized the prophetic words of the first president that the F. D. I. existed not only for the benefit of the dental profession, but for that of humanity at large. In the name of the Swedish Dental Society and Federation, he extended to the F. D. I. a most cordial welcome to Stockholm.

Letters of regret for absence were read from the Minister of the Civil Department, who expressed his best wishes for a successful meeting and his warm sympathy with the aims of the F. D. I.; the Lord Mayor of Stockholm; the General Director of the Royal Board of Health; and from members of the Federation.

Address of the President.

Mr. W. B. Paterson then delivered the following address:

Honored Colleagues,—The International Dental Federation has, at the end of a decade, returned to Stockholm, the scene of its early labors and pioneer work in dental education and public dental hygiene.

In accepting the cordial invitation of our Swedish *confrères* we were influenced by two chief reasons: The first was the remembrance of our former meeting in this fair city in 1902—a meeting of happy and pleasant memories, and one which laid the foundations of much good and useful work. The second reason was more closely connected with Sweden and its people. It was the universal feeling and unanimous desire of our members to offer their tribute of thanks in the capital of his kingdom to the monarch who, first among the rulers of the world, has permitted his name to be associated with a movement for the improvement of the dental health of the people.

To his most gracious Majesty, King Gustaf, our grateful thanks are due for his august patronage of the Hygiene Commission of the International Dental Federation. The association of his Majesty's name with the dental profession is no mere nominal act, for we know that his kingly interest is deeply stirred by all movements which are for the improvement of the health of his people. His interest in public dental hygiene is real. [Applause.] Knowing this, we are met here today, representatives of national dental associations from different parts of the world, to testify to the steady growth of ideas and measures for the relief of suffering humanity by means of properly devised systems of public dental hygiene.

If further illustration of the association of the ideas of the F. D. I. with those of Sweden is required, I would point to the fact that the Swedish government was among the first to recognize the importance of the care of the teeth of the school children, and in response to dental opinion to inaugurate a scheme of inspection and treatment of school children's teeth in this city and throughout the country. Whilst Sweden was active and awake in these matters, most of the world remained dormant until a few years ago, although the need for action was, and still is, equally great in all civilized communities throughout Europe and America, as we of the Federation were able to demonstrate in Stockholm in 1902 by means of the very full and extremely valuable report presented to us by our colleagues, Frank, Cunningham, and Förberg. With these strong reasons for revisiting Stockholm it is unnecessary for me to dwell for more than a moment upon a minor one—such as a natural desire to visit the scene of the recent struggles in the Olympic games. For while dentists are hard workers in their profession, they are, many of them, keen sportsmen out of it, and, as sportsmen and internationalists, they heartily congratulate Sweden on her success in the Olympic games. [Applause.]

But there is one other reason I must not forget, and it is the welcome of the Swedish Dental Society and the Swedish Dental Federation, which you, Dr. Förberg, have in such friendly and eloquent terms extended to us. To the members of those societies and to you, sir, we are indebted for the success of our meeting. On behalf of my colleagues of the F. D. I., I offer to those gentlemen our cordial thanks for their kind and highly valued services.

Coming to the work immediately before the Federation, I wish to say that, apart from the important subjects which will occupy the attention of the commissions, we have a duty to perform in making an award, for the second time, of the Miller Memorial prize to the person or persons who, in the opinion of the Executive Council of the International Dental Federation, have rendered the most eminent services to dentistry. The national committees have doubtless already weighed the claims of those who are qualified to receive this honor, and this afternoon the Executive Council, consisting of the national representatives, will sit as a jury to decide upon their merits. You will remember that upon the last occasion of the award of the Miller prize, our choice fell upon Dr. G. V. Black, of Chicago, U. S. A., and it proved to be a happy one, judging by the chorus of approval in the world's dental press which greeted our selection. A facsimile of the diploma presented to Dr. Black was printed on a reduced scale as a frontispiece in the Transactions of the F. D. I. for 1911. The medal ordered to be struck in memory of Professor Miller is now finished, and before sending it to Dr. Black I purpose presenting it for your inspection during this meeting.

Amongst other business of the Executive Council, two subjects stand prominently out. One relates to our duties as an international bureau of dental congresses in connection with the work of the national committee of the inviting country in the organizing of the next congress, to be held in London, in August 1914.

The other refers to the proposed establishment of an official journal of the F. D. I.

On the first subject, Hofrat Prof. Walkhoff has a useful suggestion, which is set down in the program for our consideration, viz, the formation of an International Directory of Dental Societies and Dentists. Dr. Schaeffer-Stuckert, from his profound experience of the organization of an international dental congress, may have advice to offer us on the means to be taken to check the introduction of papers on matters of national rather than of international importance in the various sections of the congress—a practice, unfortunately, only too commonly seen in medical and dental international congresses. I would suggest that we might, through the F. D. I., assist the Organizing Committee of the congress by requesting our delegates from the different national dental associations to invite the leaders and exponents in dental thought and practice in their own countries to read papers, or give demonstrations, on selected subjects of international interest.

The second subject to which I referred is the proposal to use as the official journal of the F. D. I., the *Internationalen Archiv für Mund-Hygiene.* The idea of an official journal of the F. D. I. is an old one. Dr. Förberg, in 1902, gave us his views on the establishment of an Analytical Review, which, in addition to the Transactions of the F. D. I., should embrace the latest items of dental science from all parts of the world. Later, when Dr. Förberg was succeeded by Dr. Harlan as president of the Committee on International Dental Press, the question was fully considered in its financial aspects, and owing to lack of sufficient support the idea fell through. The proposal on the present occasion, however, differs somewhat from the last one, and an offer of support, whether sufficient or not I cannot say, appears to be forthcoming. We have in the past depended largely upon the courtesy of the proprietors and editors of various dental journals, *e.g.* the DENTAL COSMOS, *L'Odontologie, Archiv für Mund-Hygiene,* and the *British Dental Journal* (the organ of the British Dental Association), as well as upon the individual efforts of certain of our members, for a printed record of our Transactions.

There can be no doubt as to the value of an official record and publication of the Transactions of the F. D. I. and its commissions, if printed in French, German, Spanish, and English, and more especially if the accuracy of the translations could be guaranteed; but the financial considerations involved are the whole crux of the matter, and with regard to them we must perforce be largely guided by the report of our hon. treasurer (Dr. Rosenthal). The financial constitution of our Federation is at present such that it might be seriously imperiled by any hasty attempt to reach an ideal publication.

Individual effort, loyalty and *esprit de corps* amongst the members of the F. D. I. have done much in the past and are doing good and great work still—work which enhances the reputation of the Federation, and it is upon this happy combination of forces that I rely in the future for the continuance of our success. Whether the results of our labors are duly and accurately recorded in official journals or not, I earnestly hope that we shall not relax our efforts in the slightest degree in the cause of dental science on behalf of the Federation.

In conclusion, I would draw your attention to a revival of a practice of the Federation in having a paper read or a demonstration given on some subject of scientific interest during the meeting.

At this session we are promised four short papers on subjects of public dental hygiene in the Commission of Dental Hygiene, and one demonstration, which is the first of its kind yet given before a scientific gathering. The subject of it is: "How to Save a Nation's Teeth," and Mr. George Cunningham submits it for our inspection and judgment as a cinematographic film, which he has had prepared by Messrs. Pathé Frères of Paris. I believe you will find the demonstration interesting. With the help and advice of our members, the cinematograph may become an important factor in the movement for the education of the public on the care of the teeth.

With these observations upon the work before us, I conclude by expressing the hope that our business may be transacted with precision and in a spirit of harmony and *camaraderie.*

Brief Addresses by Delegates of National Dental Societies.

Hofrat Prof. O. WALKHOFF (Germany) said the splendid city and the far-famed hospitality and kindness of their Swedish colleagues would insure a happy and successful meeting, which he trusted would be of great value to their profession. It was high time that dentists of all countries became more closely united for defense against unjust attacks which were made from various quarters. For example, dentists who had created modern scientific and practical dentistry had been excluded from the International Medical Congresses. Let them, therefore, do their utmost to insure that the next International Dental Congress in London should be a brilliant success. Let them also work for definite proof of the fact that civilized nations absolutely need an abundant and sufficient number of practical dentists from the standpoint of national health. They should strive to enlighten governments on this question, and also urge upon them the necessity of certain stipulations for the practice of their profession. For these purposes the F. D. I. was the most efficient means, and only the united, earnest efforts of dentists in all countries could render it possible for the dental profession to be conceded "a place in the sun," which was its due. He hoped the Stockholm meeting would lead them a step nearer this goal. For the kindly reference made by Professor Leche to the scientific achievements of dentists and the mention of himself (Professor Walkhoff) he desired to express his best thanks.

Dr. Brophy (America) said that as the representative of the National Dental Association of the United States he brought cordial greetings. Might he say that the association which he represented was the highest exponent of the art and science of dentistry in a country of 92 millions of people, with a profession numbering 40,000 practitioners? Yet he ventured to remark that the profession in America was not numerous enough to supply more than 30 per cent. of the people with their requirements in dentistry, and to care for them in a professional way. He was glad to say that America was also represented by Mr. Horace Fletcher, the distinguished advocate of proper living, who had perhaps contributed as much to building up the health of the people as a large part of the medical and dental professions combined. Mr. Fletcher had taught the medical profession how to avoid the use of drugs, and he had taught the dental profession the importance of their vocation. Though he was referring to America's foremost citizen in oral hygiene, he knew that he spoke also in the presence of Dr. Jessen, the great exponent of oral hygiene and oral prophylaxis, whose early days were spent in discouragement, but who now saw his reward in the great wave of oral prophylaxis that had swept over the world. Meeting again in Stockholm brought many pleasant recollections of 1902, yet there was a feeling of sadness as they remembered the lives of Frank, Miller, and Harlan, who had passed away since. They bowed in reverence on recalling the names of men who gave of their best for the uplifting of the profession, and whose rich inheritance was theirs. The American Dental Association recognized in the F. D. I. the foremost power for the advancement of the science and art of dentistry. America was loyal to the F. D. I., and wished to show this in a substantial manner when the Federation would visit them. America would contribute its best in carrying on the work of the F. D. I. to an even higher plane.

Dr. W. Guy (Great Britain) said it was a matter for regret that only a few representatives from the little island on the other side of the North Sea could be present, but it took a stout heart and a stouter stomach to brave the terrors of the sea passage. Those attending had an ample recompense in the hospitable and cordial reception accorded them, and in the interesting program. He knew of no country in which a Briton found himself more at home than in Sweden, with which England had an unbroken record of friendship. To his mind, Sweden afforded at the present day a very close parallel to ancient Greece in its palmy days, for in no other country had the cult of physical beauty—because health was physical beauty—been carried to such a high point. In that respect their country offered an example to the whole civilized world. While he believed that the trend of modern legislation would be in the direction of improving the public health, he held further that it was to the achievements of Sweden in this field that other nations in the world would be chiefly indebted, and to Sweden they would look for guidance in their legislative proposals. On behalf of the British dental representation he expressed their feelings of joy and satisfaction at being once more in Stockholm. Such meetings strengthened the bonds of friendship already existing between nations, and also strengthened the hands of statesmen in the most important of all tasks—the maintenance of international amity.

Dr. Gabriel Wolf (Austria) offered greetings on behalf of the Hygiene Committee of Austria and the Austrian School Dental Hygiene Society, the establishment of which was due to the F. D. I. He would have the honor of reporting at the Hygiene Commission on progress made in school dental treatment in Austria.

Dr. E. Rosenthal (Belgium) said that thanks to the energy and perseverance of dentists belonging to the National Belgian Federation, the first Belgian dental school would shortly be opened. This result was certainly due in part to the influence and moral support of the F. D. I. Left to themselves the dentists of Belgium would have been unable to shake off the torpor in which they slumbered, but the F. D. I. evoked their *amour propre* and encouraged them in the course now adopted. The example of unity for the common good set by the F. D. I. had also silenced all internal dissensions. The great movement of altruism which had characterized the labors of the F. D. I., and the study devoted by it to programs of professional training, had inspired the evolution of this scheme, and the F. D. I. had supplied the guidance for laying its foundations. Their ambition was to achieve as perfect a result as possible. From both a scientific and a practical standpoint they intended to maintain the level of instruction reached abroad, and he hoped next year to report on the results accomplished. The F. D. I. could certainly be congratulated upon having gained such an important position in the world, and especially upon the ambition to advance in dental progress that it aroused in civilized nations.

Dr. Valenzuela (Chile) said he had the honor to be commissioned by the government of his country to represent it at the annual meeting of the F. D. I. Chile had today a modern dental school in a building specially erected and completely equipped, in which instruction was given to 100 students. He was happy to have the opportunity of meeting the *savants* and masters of odontological science, and to be able to communicate to Chile the latest information as to their specialty, which was becoming more important every day.

Dr. Christensen (Denmark) offered salutations on behalf of the dental profession in Denmark.

Dr. Aguilar said Spain appreciated the work of the F. D. I., from which they were deriving so much good. Last year he reported that they had recognized their system of teaching dentistry on lines recommended by the F. D. I. He was glad to report that they were now organizing a dental hygiene movement, and at Barcelona a few months ago 3000 children assembled to receive prizes for the care of the teeth. He wished to congratulate the dentists of Sweden, who had, he believed, the oldest dental society in Europe. Further, he was authorized to invite the F. D. I. to visit Spain and meet in Madrid or Barcelona, if they did not go to America, in 1913.

M. Roy (France) said that there was current in France a proverb, "On revient toujours à ses premiers amours," and in coming again to Stockholm it seemed that the F. D. I. acted upon it. Two years ago the Federation returned to Paris, its birthplace, to celebrate the tenth anniversary of its foundation. Last year they were in London, ten years after the London-Cambridge meeting, which they all remembered. This year they returned to Stockholm, ten years after the 1902 meeting which took place with such *éclat*. In the name of France he brought cordial salutations to the F. D. I. and to the Swedish *confrères,* who offered such charming hospitality. He must express the sincere regrets of the honorary president, Dr. Godon, who for the first time was prevented from attending an F. D. I. meeting, owing to domestic affliction, and also owing to the obligations involved by his appointment as maire-adjoint of the eighth arrondissement of Paris. He knew that Dr. Godon had their deep sympathy in his grief. During the past year France had completed the organization of the curriculum for dental mechanics (*prothèse*), prescribed by the new regulations for dental studies, and the first examinations were held in July. In France they had realized the program of studies elaborated by the F. D. I.—not the minimum program but the ideal program—and they were glad to rely upon the resolutions of the F. D. I. in securing this result. In hygiene they had endeavored to develop the various fields of school and military dental hygiene. Special attention had been given to dental inspection of schools. A bill was being prepared to reorganize medical inspection of schools; they had endeavored to get dental inspection included, and hoped to obtain a satisfactory result; there, again, the work of the F. D. I. had been of powerful assistance. It was with pleasure they came again to Stockholm, feeling sure that they would accomplish more sound and good work for the greatest benefit of odontology and of humanity.

Dr. V. Guerini (Italy) said: After ten years' absence I am very happy to be once more in the beautiful Swedish capital, and to offer my cordial greetings to our valued and esteemed Swedish colleagues.

It is my duty to call the attention of the International Dental Federation to an important event that has lately taken place in Italy. The Italian Parliament has now definitely passed a law obliging all those intending to exercise the dental profession to be duly provided with the degree of Doctor of Medicine. It is, of course, understood that the present surgeon-dentists will preserve intact all their existing rights. The law provides that all persons who have practiced dental surgery for eight years without a diploma shall be admitted within the space of one year from the promulgation of the law to a practical examination, on passing which they shall be qualified to continue in the practice of the dental art. The law also establishes that those dentists who have exercised the profession without any diploma during a period of fifteen years, may obtain authorization to continue practice, provided they can produce documents or other attestations of their capability, to be submitted to the judgment of a special commission and ratified by the sanitary board of their respective provinces.

I should also mention that by disposition of the new law, Art. 2, courses of odontology and dental prosthesis will be gradually instituted in all the medical faculties of the kingdom.

I now wish to say a few words on the subject of the International Exhibition of Social Hygiene and of the Congress for Combating Tuberculosis, both recently held in Rome. At the International Exhibition of Social Hygiene there was one section of especial interest, devoted to dental art and its history. This section was the object of great attention and much admiration on the part of the public and of their Majesties the King and Queen of Italy. Amongst other things I exhibited a collection of documents by which I have been enabled to demonstrate that the invention of mineral teeth with platina pins was due to an Italian dentist named Guiseppe Angelo F. Fonzi.

With reference to the Congress on Tuberculosis, it is my duty to tell you that I was charged by Professor Jessen to make a communication on the importance of buccal hygiene in combating tuberculosis. I endeavored to put in strong relief all the various aspects of this very important question, and I am pleased to know that many Italian newspapers have published my paper.

I was also charged by Professor Jessen to take steps to obtain the patronage of her Majesty the Queen of Italy for the Hygiene Commission of the International Dental Federation, and I have taken the initiatory steps in this business in conjunction with my colleague Dr. Piperno. I have reason to hope that the end desired will be reached.

Dr. C. Van der Hoeven (Holland): As delegate of the two national societies of Holland (Het Nederlandsch Tandheelkundeg Genootschap and the Nederlandsche Tandartsen Vereenigung), my first and most pleasant duty is to bring you the hearty greetings of my Dutch *confrères* and to thank the Swedish dental societies for their cordial reception in their splendid city of Stockholm—the Venice of the North. The teaching of dentistry in Holland has made progress by the appointment of another lecturer, so that there are now in the Dental Institute of Utrecht University five lecturers and several assistants under the directorship of our esteemed friend, Dr. Grevers. The only thing we still want is a more thorough theoretical instruction in the auxiliary branches of the science of dentistry. I hope to be able to announce next year that the bill will be passed, regulating also this part of the dental curriculum according to the views of the F. D. I. The hygiene movement makes but slow progress in Holland. We have not yet succeeded in getting a school dental clinic, but as we are convinced that dental aid to the poor is the most difficult and also the noblest problem for us to solve, the dental profession in Holland will continue to devote all its energy until success is achieved.

Dr. Ottesen (Norway) said: As representative of Norway, I desire to offer hearty greetings to the F. D. I. from the Norwegian Dental Association. We are deeply indebted to the F. D. I. for the impulse it has given to the work of developing our dental education and for forming the Norwegian Dental Hygiene Association. I am glad to say that this association is progressing well; it is a good sign of its popularity that it has received a yearly grant from the Norwegian Parliament. There is no doubt about the good influence of the F. D. I. in inspiring and spreading progressive ideas among the different national dental associations, and I wish the Federation a prosperous future.

Dr. Shmamine (Japan) said: This is the first time that a representative of my native land has spoken at an F. D. I. meeting, and I rejoice to have the honor of being that representative. As in all departments of industry, art, and science, dentistry has now its share in the modernizing of life in Japan. Strictly speaking, I cannot speak of modernizing in reference to dentistry in Japan, because forty years ago, the period of our great revolution, we did not possess, in the literal meaning of the term, a science of dentistry at all. Of course, bare necessity compelled some treatment of painful conditions of the teeth in earlier times, yet means and ways were far from complying with the most modest requirements of a scientific nature. Cataplasms and blistering were employed from time immemorial as remedies for dental trouble. In the lower strata of the people a kind of magic-suggestion was practiced. If nothing can be said of our ancient dentistry in the modern sense, nevertheless, hygiene of the mouth and the teeth is perhaps older in Japan than in any other civilized country. This has its foundation less in the recognition of the importance of mouth hygiene for the body than in old-standing religious ideas and obligations which have gained such a firm hold of the sentiment of the whole people that no one needs to be compelled by special admonition to practice a certain amount of mouth hygiene. Every family without exception has its home-altar, usually two, one Shinto and one Buddhist. When the Japanese rises in the morning his first act is to rinse his mouth and clean his teeth automatically with his forefinger and salt. His second act is then to go before the altar and say his prayers, for he may not utter a prayer to his god without a clean mouth. That is the religious obligation. Among the well-to-do and better educated classes a primitive tooth-brush in the form of a short stick with a frayed end was used for many centuries, but its place is taken today by the modern tooth-brush. In popular use are now tooth-brushes, costing less than a farthing, which are replaced by new ones after a few weeks' use. The poorest working-man's family possesses such tooth-brushes, and each member of the family has his own. An old Japanese proverb says:

Otoko kro kare
Ha shro kare.
(Let the man be brown, but his teeth must be white.)

People were surprised that in the Russian-Japanese war every Japanese soldier possessed a tooth-brush and tooth powder. But with us that is a matter of course, and no military regulation exists for it. The beginning of modern dentistry in Japan proceeded from America, after our great revolution, when American dentists came across to us. By degrees, however, we have established our own dental schools, and we intend constantly to improve their equipment in a modern sense. Thus Japan may now be entitled to join the circle of civilized nations in the province of dentistry, and for me it is a great honor to be the first Japanese representative at the annual meeting of the F. D. I.

Professor JESSEN, president of the Hygiene Commission, said: The care of the teeth in the schools constitutes the foundation of health. You may think these words are exaggerated and pretentious. But if you consider the oral cavity as the gateway of the body you will be convinced of the probability, the truth, and the accuracy of the statement. The air which we breathe must be pure, the nourishment we take must be free from harmful germs, and the mouth through which both are introduced must be clean. For the air and the food become contaminated during their passage through a diseased oral cavity, and infect subsequently the lungs, stomach, intestines, and the whole body to a degree more or less serious in proportion to the body's capacity for resistance.

The greatest danger is in childhood. Almost all children have diseased teeth; in the mouth they have the germs of illnesses which may infect the whole organism, prevent normal development, and condemn them to a condition of debilitated health or a premature death. Happily, the prognosis is not always so serious, or else most children would fall ill and die too soon. Nevertheless, we shall have a healthier race if we improve all the vital conditions, and take care that children have sound teeth. We cannot change everything, but this precaution is within our power.

In view of the fact that many countries have established school clinics, and that governments have recognized the necessity of dental treatment in schools, we are filled with hope, and we have the courage to proclaim anew that such methods are essential to combat infectious diseases, especially tuberculosis, and constitute the most economical prophylactic against this formidable enemy.

Professor Kirchner of Berlin says: "Bad dentition involves serious troubles in nutrition, favors the development of arterio-sclerosis, and lessens the resistance against infectious diseases, particularly tuberculosis, and thus tends to shorten life."

Youth is the greatest capital of a nation. Juvenile health represents wealth, but this is dissipated by illness and early death. Germany has 65 millions of inhabitants, but only 20 millions care for their teeth. This lack of dental care by 45 millions costs the German nation hundreds of millions of marks, which are paid by institutions, workmen, and employers. Dr. Volz has shown by statistics that 210 millions of marks at least could be saved annually if care of the teeth was in operation throughout Germany. The National Committee of Hygiene has a gigantic task in converting 45 millions of people to its ideas. In other countries the situation is no better, and thus one can understand that the International

Hygiene Commission sees itself overwhelmed by an immense undertaking, in which success can only be obtained by the united assistance of all the national committees. It is for them to employ all their energy, and to go forward boldly and tenaciously toward the splendid goal before us.

Mr. Huet, president of the Commission on Bibliography, gave a brief address.

The President, in conclusion, thanked Professor Leche for presiding.

The meeting then adjourned.

Executive Council.

The Executive Council met on Wednesday morning, August 28th, Mr. W. B. Paterson, president, in the chair.

There were present: F. Schaeffer-Stuckert, secretary-general; W. Guy and M. Roy, adjoint secretaries; E. Rosenthal, treasurer; F. Aguilar, M. Ayrapaa, T. W. Brophy, C. Christensen, W. Dieck, E. Förberg, V. Guerini, W. Harrison, Van der Hoeven, E. Huet, J. Shmamine, Valenzuela, O. Walkhoff.

The President regretted that Dr. Godon could not be present, owing to a family bereavement.

Dr. Aguilar said it was the first time that Dr. Godon had been absent, and they missed him very much. He proposed that a telegram of sympathy be sent.

This was agreed to.

Dentists with Commissioned Rank Appointed in U. S. Navy.

The President read a letter of congratulation from Dr. Williams Donnally, announcing the appointment in the United States of America of sixty commissioned naval dental officers.

Professor Brophy expressed his conviction that the influence of the International Dental Federation had been a potent factor in producing this result.

The President also announced that Sir Henry T. Butlin, who presided at the F. D. I. meeting in London, has since died. On behalf of the F. D. I. he attended the funeral and presented a wreath. He also wrote a letter of condolence to Lady Butlin, who replied very graciously, and said that the recollection of the meeting at the Royal College of Surgeons had been one of the greatest sources of comfort to her husband in his illness.

A Question of Ethics.

The President said he had received a letter from Mr. J. Howard Mummery, one of their vice-presidents, who was unable to be present, stating that he had been asked to contribute a paper to the International Medical Congress in London, in August 1913. Mr. Mummery wished to know whether the F. D. I. would give him permission to read a paper in the Stomatological Section of that congress. The President thought Mr. Mummery, who was medically qualified, was entitled to attend the Medical Congress, but though both Mr. Mummery and himself had been offered the position of president of the Stomatological Section, they had both refused to accept it, because they felt that the International Medical Congress had not treated the F. D. I. and the dental profession as their members would have desired. However, he hoped there would be no objection to Mr. Mummery's reading a scientific paper before the congress.

Dr. Schaeffer-Stuckert said he was very glad that Mr. Paterson and Mr. Mummery had not accepted a position in the Stomatological Section, after the refusal of the International Medical Congress to recognize dentists. In the time of Miller it was agreed that they should not attend the congress at all, and this was enforced upon German doctors who were also dentists. He thought the situation was not different now.

Dr. Aguilar said that, as the president said last year, he regarded it not as a divorce, but only a temporary separation of medicine from dentistry. It had originated with one man, and the Medical Congress had been influenced by the conflict in France between stomatologists and dentists, which reflected itself in the congress at Lisbon. He thought they should attend and show that they wanted nothing for themselves, but went solely in the cause of science. He was sorry that Mr. Paterson and Mr. Mummery did not accept the positions offered, as he knew they would be loyal to their ideas. They must reconquer the position occupied before by dentists.

Dr. Brophy was in favor of Mr. Mummery's presenting a paper, as he felt it would enlighten members of the medical profession on a subject not thoroughly taught in schools of medicine. A paper by a master in this field of knowledge would benefit the whole scientific world.

Professor Walkhoff said he had always refused to read a paper in the International Medical Congress, owing to the resolution of the F. D. I. on that point. He thought that if permission was given, it must be universal, but they would be very much surprised in Germany, because the Central Verein had decided that its members should not go to the congress.

Dr. Guy said they had taken a very strong stand in view of the fact that dentists, as such, were excluded from the Stomatological Section. Consequently, Mr. Paterson and Mr. Mummery had declined official honorary positions in the Stomatological Section. He made up his mind to abstain from any participation in their proceedings, because, if they attended in their capacity as medical men in this section, he thought they weakened seriously the position of the F. D. I. However, he did not consider it would be contrary to the interests of the F. D. I. if a member read a paper in the sections of Physiology, General Surgery, or Medicine. But he held that they should maintain their position and abstain from taking part in the proceedings of the Stomatological Section until such time as the International Medical Congress decided to admit dentists, as such, to that section.

Professor Walkhoff explained that they had no feeling of opposition to members of the Stomatological Section.

Dr. Roy said it was a delicate question, and he supported Dr. Guy's suggestion.

Dr. Christensen thought it was a personal question affecting Mr. Mummery.

The President: If you give permission to Mr. Mummery, you must give permission to all.

On the motion of Professor Walkhoff, seconded by Dr. Rosenthal, it was resolved:

"That, inasmuch as the International Medical Congress has refused the admission of dentists to the congress, the F. D. I. does not approve of its members contributing to the Section of Stomatology; but the F. D. I. has no objection to its members contributing papers or communications to other sections of the International Medical Congress."

The President said he would inform Mr. Mummery of this resolution.

Wednesday Afternoon.

At the meeting at 4 p.m., August 28th, Mr. Paterson again presided.

The following members were proposed and duly elected:

Dr. L. Frank, Stationsweg 35, Rotterdam; Dr. Harold Ramberg, 83 Arsenalsgatan, Stockholm; Dr. Sigurd Hendricksen, Lillehammer, Norway; Dr. R. H. Riethmueller, Lock Box 1615, Philadelphia, U. S. A.; Dr. M. Walling, Mathias, Maine, U. S. A.; Dr. A. Joachim, 17 rue de Dublin, Brussels.

The Secretary-general presented his report.

The Hon. Treasurer next submitted the accounts.

Messrs. Aguilar, Harrison, and Roy were appointed auditors.

Dr. Schaeffer-Stuckert, referring to the list of members, pointed out that there were members of the Hygiene Commission who were not members of the F. D. I. He thought that all such should be first members of the F. D. I., and pay their dues.

The Council agreed with this opinion.

Dr. ROSENTHAL brought forward the proposal to establish an International Code of Ethics, which, he said, was suggested by Messrs. Aguilar and Cunningham.

It was agreed to appoint a special committee (consisting of Messrs. Aguilar, Harrison, Rosenthal, and Schaeffer-Stuckert) to consider and report on the proposal. Dr. Rosenthal was appointed chairman of the committee.

The Council then considered the following proposals by Professor Walkhoff:

To form an International Directory of all dental societies and of all qualified dentists, to be published annually. The F. D. I. should state officially the number of qualified dentists of all countries, also the curriculum and the time necessary for the study of dentistry, and the conditions of the examination for a graduate dentist. The F. D. I. should state officially the number of persons practicing dentistry without qualifications, viz:

(*a*) Physicians practicing dentistry without having passed any dental examination.

(*b*) Persons practicing dentistry without any preliminary education, and without having passed any dental examination.

The PRESIDENT thought such an International Directory ideal, but described the carrying out of the three proposals as difficult. There were official registers of qualified dentists in Great Britain and Ireland, some States of America, Germany, and Belgium, which could be utilized, but he knew no means of ascertaining the number of physicians practicing dentistry, or the number of unregistered dental practitioners.

Dr. GUY moved that the proposals be referred to the Commission on Bibliography, with instructions to form a collection of all published directories and registers of qualified dentists, and also to communicate with the secretaries of all national dental societies, requesting information as to the membership and constitution of all dental societies in their respective countries. He thought they could not afford an annual publication.

Dr. SCHAEFFER-STUCKERT explained that Professor Walkhoff did not ask for a directory to be published.

Dr. BROPHY (Chicago) said it was impossible to state the number of irregular dental practitioners, or of physicians practicing dentistry in America.

Dr. ROSENTHAL pointed out the risk of legal proceedings.

Professor WALKHOFF (Munich) said that, when questions of dental laws and education came before parliaments, information might be asked for on these points. He wanted, if possible, authentic material and data in the F. D. I. archives to be supplied to governments who inquired, "How is it in other countries?"

Dr. ROSENTHAL observed that the exercise of the professions was free in Germany, but different conditions prevailed all over Europe.

M. ROY thought information concerning all dental societies would be more important and valuable to the F. D. I. than the compilation of statistics, which could hardly be accurate.

Dr. BROPHY seconded Dr. Guy's motion, which was carried.

The Council then considered a proposal to establish a complete bibliography of existing dental books and publications, and to assure the continuance of the information in the future through the agency of the Institute of Bibliography in Brussels.

M. HUET stated that the proposal to publish a complete dental bibliography was justified as much by the constant accumulation of material as by the impossibility of finding one's way among the mass of information given in books, treatises, medical journals with a dental section, and the 145 periodicals concerned solely with Odontology. But they must not lose sight of the fact that the *Concilium Bibliographicum,* of Zurich, made an abstract or list of articles on General and Dental Anatomy and Physiology, Dentition in Animal Species, etc. He must remind them that such an undertaking would involve a considerable amount of labor and expense for the F. D. I. For dental periodicals only, the yearly average of notices concerning original articles would be about 3500, equal to 1000 octavo pages printed on one side only. Moreover, their library was not yet supplied regularly enough with the materials to justify any useful examination of the question. He moved that it be adjourned.

Dr. ROSENTHAL said it was desirable to establish such a Bibliography, but it was impossible for the Institute of Bibliography in Brussels to make an index of dental books and publications every month, as ought to be done. He suggested that each national dental journal should have its index of bibliography published monthly.

The PRESIDENT said the proposal appeared to him to be "a counsel of perfection." For example: In England, the medical and dental journals were accustomed to publish an index at the end of the year, and although a monthly index might be made, it might be inconvenient to publish it. He imagined similar conditions prevailed in other countries.

No action was taken in the matter.

Invitation to America.

Dr. BROPHY, being obliged to leave for America that evening, asked for permission to submit a cordial invitation from the National Dental Association of the United States to the F. D. I. to hold its next meeting in America. He added that Dr. Kirk, himself, and others quite understood that the feeling of the London meeting was in favor of holding the F. D. I. meeting of 1913 in America.

The PRESIDENT thanked Dr. Brophy, and promised the question should receive careful consideration when it came up for discussion the next day.

(To be continued.)

THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY

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PHILADELPHIA, JANUARY 1913.

EDITORIAL DEPARTMENT.

"THE COURAGE OF IGNORANCE."

MUCH of the scientific work of dentistry has been done by workers who, though appreciating the value of the results everywhere attained by the scientific method of investigation, have nevertheless, in many instances, themselves lacked the discipline of a scientific training, and who have been handicapped by imperfect conceptions of the broader underlying generalizations of scientific thought which are the directive and often controlling agencies of successful scientific work in new fields. A lack of training in the fundamental principles of science is made painfully evident in the results from time to time reported of research work or investigation as pursued by observers and students thus disqualified for the task which they have undertaken. Erroneous conclusions and defective observations seem to bear a definite ratio to the elementary scientific educational lack. On the other hand, where the exact methods of science have been correctly applied to the solution of any of the important problems that concern us as dentists, the results have always been fruitful of precise knowledge in related degree.

The eternal warfare between truth and error is a record of the conflicts between knowledge and ignorance—conflicts that are oftentimes intensified by the inclusion of the personal element, leading to recriminations and emotionalism that further complicate the problem and overshadow the main issue until all recognition of its importance is lost. It is under these circumstances that questions of personal honesty, prejudice, or fairness are raised when any of the parties to a given controversy express their convictions and are apparently unwilling to change their point of view or modify their contention even in the face of what appears to be overwhelming evidence as to its erroneous character. Such situations are clearly the outgrowth of misunderstanding—*i.e.* not understanding, *i.e.* failure or inability to understand, *i.e.* ignorance of the nature and meaning of the data that are for the time being under consideration. It is not a question of honesty at all, but a plain case of "don't know," the pathetic thing about it all being that the party in the wrong either doesn't know that he is wrong, or, worse still, doesn't want to admit that he is wrong. But there is what might be called an important mitigating factor affecting the case of the man who doesn't know and who doesn't know that he doesn't know—the man who with the courage of his ignorance vehemently asserts that he does know; and that factor is the honesty of his belief in the evidence of what he calls his own experience, and his faith that what he has himself experienced cannot be wrong. It is, however, just that kind of faith that is earliest destroyed by systematic training in precise methods of scientific observation and reasoning, and which must be eliminated before observation and reasoning can be called scientific at all or have any real value as expressions of the truth. The well-known example of the apparent difference in temperature between a wooden surface such as a table-top and a metallic or mineral body in the same room, when tested by the sense of touch, and the contrary indication of the thermometer, is a familiar instance of the unreliability of untrained experience as a standard of scientific truth. The ignorant empiric would contend that the metallic body was colder than the wooden surface; the trained observer would abide by the decision of the thermometer, which shows, in spite of the evidence afforded by the experience of touch, that the temperature of both bodies under the same conditions is equal.

It is the most encouraging sign of the approach of a period of larger interest in the application of the scientific method to the solution of our professional problems that more and more students of these same problems are realizing the great practical difference that exists between empiricism and the empirical method on the one hand, and science and the scientific method on the other. The present issue of the Dental Cosmos furnishes a number of instances of the relative value of these two types of mental activity, besides, in at least one instance, a direct statement of the essential difference and respective utility of the two methods, by one who is himself an able exponent of the scientific method, which leaves little to be desired as to clearness and effectiveness.

We commend to our readers the careful and thoughtful consideration of the presentation which this issue contains of the subject of pyorrhea alveolaris and of the sulfocyanate question as related to dental caries, both of which furnish illuminating examples of the soundness and sanity as well as of the fruitfulness of the scientific as compared with the empirical method.

Bibliographical.

Surgery and Diseases of the Mouth and Jaws. By Vilray Papin Blair, A.M., M.D., Professor of Oral Surgery in the Washington University Dental School, and Associate in Surgery in the Washington University Medical School, St. Louis. Pp. 638, with 384 illustrations. St. Louis: C. V. Mosby Company, 1912.

In presenting this work the author has given us an excellent treatise on the regional surgery of the mouth and jaws, containing in great detail the knowledge required by the general surgeon in meeting conditions affecting these parts.

The tendency on the part of general surgeons to treat fractures of the lower jaw by wiring the bone is upheld, in spite of the certainty of converting a possibly simple fracture into an infected compound one, and in face of all evidence in favor of the metal mandibular or mandibulo-maxillary splint. The advantages of early operations for congenital cleft palate are well brought out, and the most suitable operation for each class of deformity is described very carefully.

In extracting teeth, the author shows a preference for the English type of forceps, of which he describes and illustrates several examples. Impacted teeth are not given as full discussion as their importance and frequency entitles them to, particularly in regard to causes, diagnosis, and local and remote effects.

In speaking of epulis, the author probably takes a too serious view of the prognosis of the majority of these growths, and urges too drastic operations in their treatment. Most of them, even the so-called giant-cell sarcomas, do not demand extensive removal of the surrounding tissues.

A large portion of the book is taken up with a consideration of tumors and other affections of the salivary glands, tongue, and pharynx, with detailed descriptions of the extensive operations required for their treatment. This matter is more within the scope of the general surgeon than of the dentist.

There is a good chapter on Tic Douloureux, with special reference to the diagnosis from neuralgia due to local causes. Treatment by alcohol injection of the divisions of the fifth nerve is clearly described, as well as the Gasserian ganglion operation.

Local Anesthesia is discussed at considerable length, with emphasis on the dangers of injections into inflamed tissues.

Only two pages are given to General Anesthesia, which in a text-book intended for students is not sufficient.

The book is well equipped with illustrations, chiefly original ones, though there are several from other sources, and is completed by a bibliography.

From the standpoint of a text-book for dental students, a large amount of material is presented that it is not necessary for them to know except in a very general way. The dentist is chiefly concerned in the recognition of such affections as carcinoma of the tongue, lips, and jaws, rather than in the details of major oper ations required for treatment of these conditions. For his benefit, however, the dental student will find several chapters devoted to elementary surgical principles and pathology.

As a treatise on the purely surgical affections of the mouth, jaws, and surrounding parts, the general surgeon will find in it a very valuable work of reference. R. H. I.

Review of Current Dental Literature.

[*Anatomischer Anzeiger*, Suppl. to Vol. 41, Berlin, 1912.]

THE STRUCTURE OF THE REPTILIAN DENTITION, AND ITS RELATIONSHIP TO THE MAMMALIAN DENTITION. By Dr. Bolk.

In the dentition of the two vertebrate classes, mammalia and reptilia, two fundamental distinctions are presented: (1) The dentition of the former is diphyodont, of the latter, polyphyodont. (2) In the former there has occurred a complication of the crowns.

The theories of differentiation (Cope-Osborn) and of concrescence (Röse) are practically agreed as to the significance, or rather, perhaps, lack of significance of the first item.

Bolk asks, Is there a genetic relationship between the diminution of mammalian tooth generations and the complication of their crown surfaces? And he answers in the affirmative at the conclusion of his paper.

Although the point of conflict of the two theories is over the manner in which the complication of crowns arose, this question of Bolk is *ipso facto* outside of consideration for any other than the disciples of the concrescence theory.

The author disregards the palatal and vomer dentition of the reptilia. He mentions the general characteristics of the reptilian dentition, such as can be found in any dependable systemic or odontographical work.

Bolk introduces a new terminology to facilitate the systematic discussion of certain anatomical relations of the vertebrate dentition, as follows: A monostichic dentition is one in which the teeth are set in the alveolar arch in a single row, *i.e.* the reptilian dentition apparently. In reality this dentition is distichic—two rows—an outer, exostichos, and an inner, endostichos. (Only secondarily does the reptilian dentition become monostichic.) He gives an account of his ontogenetic investigations in support of this. Even a third row of teeth, parastichos, is suggested, but is rudimentary and resorbed before eruption. Reptilian distichism is best shown in the premaxillary region. The exo- and endo-stichos are contemporaneous tooth "generations"—both functioning contemporaneously.

To quote Bolk: "We have recognized in the reptilia a dentition of three rows of teeth. The parastichos consists of only rudimentary elements, which never function, and disappear without successors. Two of the rows succeed in functioning, an 'outer' (labial), the *exostichos*, and an 'inner' (lingual), the *endostichos*. The elements, *i.e.* the individual teeth, of both rows are in the majority of reptiles replaced by succeeding generations." This tristichism has been inherited from the reptilian parent form of the mammalia. The two tooth "generations" of the mammalia do not deserve the dignity of that designation, but they are identical with the two rows of the reptilian dentition—*i.e.* the deciduous dentition with the exostichos and the permanent dentition with the endostichos; the prelacteal dentition of the mammalia answers to the parastichos of the reptilia.

In man there is a succession of the inner tooth row, the endostichos, into the place of the outer, the exostichos. In the reptilia the two rows continue to functionate throughout life, and the individual elements are replaced—*i.e.* there is a change or succession of the elements or units of the dentition. Therefore the diphyodontism of the mammalia is something of an essentially different character from the polyphyodontism of the reptilia.

What has become of the tooth generations of the reptilia? Each tooth in the primates has arisen from the concrescence of two tooth generations. It is to be remembered that "generation" is here used in its true phylogenetic sense, not in the local sense as usually applied to the mammalia. Each tooth has an external (buccal or labial) and an internal (lingual) division. Each division represents a generation of the reptilian dentition.

Bolk would derive the mammalia, on the grounds of skull and structure and tooth topography, from the reptilian Cynodontia. The complication of the teeth in longitudinal —mesio-distal—direction was initiated among the reptilia, and inherited by the mammalia. The complication of the crown in a transverse—bucco-lingual—direction is the result of the concrescence of two tooth generations, whereby the origin of the mammalian tooth from the reptilia was completed. By this concrescence, the multiplicity of the tooth generations was suppressed, *i.e.* polyphyodontism of the reptilia succumbed in the complication in a transverse direction of the tooth crown of mammals.

[*Schweizerische Vierteljahrsschrift fuer Zahnheilkunde*, Zurich, No. 2, 1912.]

TEETH AND MUSICAL INSTRUMENTALISTS. By Zahnarzt Th. Froelich, Baden.

When compared with the great publicity which has been given oral hygiene at home, in school, in the army and navy, and in all kinds of public institutions, little or nothing has been said about the importance of the teeth in the life of professional musicians, especially those playing a wind-instrument. The instruments in the playing of which the teeth play such an important rôle may be divided into four classes: (1) Instruments without mouthpieces, viz, various kinds of flutes. The sound is produced outside of the mouth, which is pointed and simply serves as outlet for the current of air, which is broken at the edge of the blow-hole. (2) Single-beating reed instruments, such as clarinets, etc., in which the lower lip is drawn over the lower teeth and the reed is held with the upper teeth. (3) Double-reed instruments, such as hautboys, bassoons, etc., in which the lower lip is retracted, and the reed is gently held with the upper lip. (4) Brass instruments, in which both lips are retracted, and the mouthpiece is pressed against them. The vibrating membrane is supplied by tension of the lips. In playing the French or hunting horn, the lower lip is retracted, and the mouthpiece is held so that the upper lip covers one half, the lower lip the other half, pressure being exerted especially on the lower teeth.

From this classification, the importance of good teeth becomes very apparent. Especially the anterior teeth serve partly as supports for the instrument, partly as resistance against the pressure of the cheek and lip muscles. In players of certain instruments, therefore, typical changes in the soft and hard tissues of the mouth are to be noted. Players of the clarinet, for instance, exhibit a thickening of the lower lip, horn players at times a retrusion of the lower teeth. In trumpet players, the central incisors play the chief rôle, while in players of larger brass instruments the laterals also play a part.

The lack of loss of individual molars, as a rule, are of no great consequence for the player, but the loss of several approximating molars may become serious for him. In playing the horn especially, the molars are of importance; in double-reed instruments, the canines, resisting the pressure of the cheek muscles. The lack of these teeth weakens the force of the tone, which becomes hollow and thin.

The question of prosthetic appliances is sometimes very difficult to solve. Fixed bridges are indicated, yet no open spaces must be allowed, as, in playing, the mucous membrane of the cheeks is pressed into them, thereby sometimes impairing the quality of the tone produced.

Partial vulcanite pieces are generally well tolerated, and do not affect the quality of the tone. The plate is held firmly by the tip of the tongue, which presses against the gum, especially in staccato play. Full upper dentures may become rather embarrassing, since the increased air-pressure renders even air-chambers ineffective.

The replacement of lower anterior teeth offers great difficulties, since the displacement of a lower plate, especially if the alveolar ridge has become greatly absorbed, is inevitable. The employment of springs is not only very inconvenient but also of little value, so that the preservation of the lower teeth is imperative. The dentist's great responsibility, therefore, in the treatment of musical instrumentalists is self-evident.

[*Journal of the American Medical Association*, Chicago, August 10, 1912.]

SPIROCHETES IN THE MOUTH. By A. A. Thibaudeau, M.B., Buffalo, N. Y.

The author reports that in the routine examination of smears from the mouth, as carried out by students in the classroom, a considerable number were found, which when stained by the Giemsa method showed spirochetes morphologically resembling spirochaeta pallida. As some observers have considered it possible to make a diagnosis of syphilis by the finding of spirochaeta pallida in smears from suspicious sores in the mouth and pharynx, it was thought desirable to examine the smears from a number of normal mouths. Smears were accordingly made from apparently healthy mouths, using the deposit at the junction of the gums with the teeth, and from the root of the tongue. After fixation in absolute alcohol they were stained by Giemsa's rapid method. Smears from each case were also stained by Loeffler's methylene blue or an aqueous solution of gentian violet. Three main types of spirochetes were found:

(1) The large *spirochaeta buccalis* with long flat curves, which is much thicker and wider than the other spiral forms found in the mouth, and which has fewer turns.

(2) A moderate-sized spirochete, probably the "medium" form of *spirochaeta dentium* described by Hoffmann and Prowazek. This organism stains a very faint purple by Giemsa. The coils of this spirochete, as found in mouth smears, are not so sharp or so regular as those of spirochaeta pallida, and the organism is thicker.

(3) A small, very delicate spirochete, with sharp coils fairly closely applied, was the form that most resembled spirochaeta pallida—probably the *spirochaeta microdentium* of Noguchi.

This organism very frequently exhibited irregularities in the arrangement of the coils, as seldom seen in the spirochaeta pallida, but specimens were found in which the coils were regular throughout the organism. The spirochaeta stained by Giemsa's rapid method showed a coloration from a rose-red to a light purple, depending apparently on the degree of heat used and the length of time that it was exposed to the stain. Typical organisms of this type showed pointed ends. It stained but poorly with Loeffler's methylene blue, and in about 30 per cent. of the cases, where present, could not be found in the control smears stained by this method. It is to be noted that while these organisms may not present all the characteristics of a typical spirochaeta pallida, there are usually in stained smears from definite syphilitic lesions, and in which typical spirochaeta pallida may be present, numbers of spirochetes, undoubtedly spirochaeta pallida, which are not typical in every respect, and which could not be distinguished in stained smears from this type of mouth spirochete.

The author has examined smears from 149 mouths; in sixty-one or 40.9 per cent. of these, spirochetes of the last type, which might be taken for spirochaeta pallida, have been found. In none of these cases did inquiry bring out a history of syphilitic infection. The possibility of these organisms causing a mistake in diagnosis in a non-syphilitic ulceration or other non-syphilitic lesion of the mouth seems self-evident.

[*Bulletin du Syndicat des Chirurgiens-Dentistes de France*, Paris, November 1912.]

INTERSTITIAL DENTAL CARIES. By R. Charlet, Rouen.

Interstitial caries—viz, caries of the approximal surfaces of the teeth—can be classed into two groups, according to its starting-point above or below the contact point. The second class—viz, cervical caries—pass often unnoticed until discoloration of the dental tissue occurs, while caries seated between the contact point and the crown surface of the tooth are readily noticeable. If the cervical portions of the mesial and distal surfaces of teeth are closely examined, a small spot of bluish shade which resists the explorer is frequently discovered in the enamel. Sometimes a milky white, translucid and non-circumscribed or a gray spot may be discovered, all of which indicate the presence of caries. If an effort is made to penetrate the enamel with a fine, sharp bur, the enamel behaves very much like a snow bridge over a glacier crevasse, that is, after some resistance it will break, allowing the bur to plunge into the softened dentin underlying it. Care is therefore required in guiding the bur in order to avoid severe pain or accidental pulp exposure. Careful differential diagnosis must be made between the enamel spots described and those due to calcarious concretions in the enamel, or to discoloration from an amalgam filling. The etiology of this form of caries is easily definable. Food débris lodged in the interstitial spaces undergoes fermentation and furnishes a most favorable medium for the bacteria whose toxins are responsible for caries, which, unless discovered and combated in time, will manifest its presence by pulpitis. The interstitial spaces, therefore, must always be subjected to a most rigorous examination by the dentist. Prophylaxis consists in painstaking oral hygiene, with a view to keeping the interstitial spaces free of food débris.

[*Journal of the American Medical Association*, Chicago, August 10, 1912.]

ACUTE OSTEOMYELITIS OF THE JAW. By Dr. W. Wayne Babcock, Philadelphia.

Babcock differentiates osteomyelitis of the jaw from the simpler infections and forms of necrosis by the following symptoms: Extensive involvement of the contents of the inferior dental canal, tendency to the widespread secondary destruction of the bone, and damage done to many or all of the lower teeth. Osteomyelitis in the young occurs in the lower jaw as well as in the long bones of the extremities, although at a somewhat later age. Its early diagnosis is to be based on the early severe systemic disturbances and the widespread involvement of the bone. The prophylactic treatment consists in drilling the bone under aseptic precautions. After the formation of pus, free drainage should be employed, which should be external if there be much necrosis. No teeth should be extracted, nor should teeth which merely hang from attached mucous membrane be removed. Dead portions of bone should not be removed until entirely detached or until new bone capable of maintaining the contour of the jaw is formed. Separated and loosened teeth with gum attachment usually become reimbedded and serviceable.

[*La Province Dentaire*, Lyons, No. 4, 1912.]

AVOIDANCE OF ACCIDENTS IN LOCAL ANESTHESIA BY A MIXTURE OF PEPTONE AND COCAIN, OR PEPTONE AND NOVOCAIN. By Dr. L. Fichot.

The increasing popularity of local anesthesia for dental operations, which, since the introduction of cocain substitutes or the modifications of cocain mixtures, has engaged so many researchers, is signally attested by Fichot's essay. Fichot, in collaboration with Billard, has made experiments showing that a solution of cocain mixed with a solution of from two to ten per cent. of Byla's peptone can be injected in guinea-pigs in large doses without producing death. While eight centigrams of cocain hydrochlorate is the lethal dose per one kilogram in guinea-pigs, the pepto-cocain solution is not lethal up to from eighteen to twenty centigrams. Billard has employed submucous injections of a 1:200 pepto-cocain mixture for dental operations in 172 cases, each dose injected containing from two to four centigrams of the alkaloid. The injections were painless, and full anesthesia was obtained as rapidly as usual, viz, within from four to five minutes. The anesthetizing power of the solution is the same as that of the alkaloid alone, as is also the duration of the anesthesia, viz, from fifteen to eighteen minutes. Cicatrization is rather accelerated than retarded, and no untoward symptoms have been observed in the 172 cases treated.

Solutions of one per cent. of pepto-novocain have been injected by Fichot in 248 cases. While novocain is usually injected in combination with adrenalin, the pepto-novocain mixture offers the following advantages: Its anesthetizing power is the same, also the duration of the anesthesia. The injection is painless and the maximum anesthesia is obtained within from four to five minutes as over against the ten to twelve minutes required with the novocain-adrenalin solution. Cicatrization is remarkably rapid as compared with the slowness of the healing process after novocain-adrenalin injection.

The cocain and peptone solutions must be made separately, and should never be mixed until just before the injection is made. A two per cent. peptone solution is usually sufficient.

[*Schweizerische Vierteljahrsschrift fuer Zahnheilkunde,* Zurich, No. 2, 1912.]

COMBATING DENTAL CARIES AMONG SWISS MILITARY CONSCRIPTS. By A. Brodtbeck, Frauenfeld.

DENTAL HYGIENE IN THE SWISS ARMY. By Dr. T. Montigel.

DENTAL TREATMENT IN THE ARMY. By H. Matter, D.D.S., Zurich.

The remarkable progress of oral hygiene abroad is evinced by the symposium held at the annual meeting of the Swiss Odontological Society, during which the above-mentioned three papers were read.

Basing his remarks on the motto that "Not as cheaply as possible, but as well as possible, should the life and health of the citizen bearing arms be cared for," Brodtbeck makes the following demands from the Swiss military authorities: Establishment of the greatest possible number of dental clinics for school children; clinical treatment of both sexes from the sixteenth to the twentieth year of age, such treatment to be given either in clinics or in private practices, with a federal subsidy of up to 50 per cent.; examination ot the mouth and teeth of military conscripts by licensed Swiss dentists; records of the results of such examinations; instruction of the recruits as to the necessity of having their teeth treated before entering upon active service. The teeth are to be treated at regular intervals, as long as a man is liable to service in the reserves; the cost of treatment of conscripts and soldiers is to be borne by the federal government, or, if desirable, up to 50 per cent. thereof may be borne by the cantons. A uniform schedule of fees is to be worked out, subject to approval by the Swiss Dental Society; compulsory care of the teeth in the army (if a soldier suffers with toothache during active service, he is to be referred to a licensed dentist for treatment); military physicians are to be obliged to take a course of instruction in extracting, and another in diagnosis and therapeutics of dental disease; a special course of instruction is to be given to military dental surgeons; uniform records of examinations before and after treatment are to be kept. Brodtbeck mentions that 98 per cent. of all Swiss soldiers suffer with dental caries, and that over 50 per cent. are unable to masticate properly, thereby reducing their force of resistance, predisposing themselves to all sorts of acute infectious diseases, and seriously jeoparding their efficiency.

Besides giving a few detail statistics in regard to dental treatment of soldiers, Montigel recommends essentially the same course of procedure as Brodtbeck, but adds the necessity of assigning dentists efficient in immediate prosthesis to the sanitary corps in case of warfare.

Dr. Matter makes suggestions as to the dental armamentarium indispensable in case of war, and vigorously protests against the tendency of the medical profession to belittle the importance of the oral hygiene movement in the army.

[*Deutsche Monatsschrift fuer Zahnheilkunde,* Berlin, June 1912.]

CONNECTION BETWEEN OCULAR DISEASES AND INFLAMMATORY CONDITIONS OF THE TEETH. By Dr. F. Seydel, Breslau.

The assumption that a close relationship exists between the organ of vision and the teeth is an old one, as evinced by the popular term "eye-tooth." The justification of this assumption, however, is based more upon popular imagination than upon clinical observation. A relationship between diseases of the teeth and those of the eyes may exist, however, either by direct transmission or by reflex processes. In the former cases, inflammations of the orbit play an important part. Pus in pericementitis and alveolitis, as well as septic processes within the alveoli, may proceed along the cheek in the form of lymphangitis or thrombophlebitis, or through the maxillary antrum to the inferior orbital wall. The germs of the permanent canines or first bicuspids may be wedged between the deciduous teeth and the orbital wall in such a manner that a direct communication between the alveoli and the orbital wall persists in form of a delicate vascular canal. In both these ways a purulent orbital osteitis and periosteitis may be induced, and after the pus has invaded the orbit, orbital phlegmon of a rather severe nature results. If recognized early, the prognosis of periosteitis is favorable, while the purulent infiltration of the cellular tissue of the orbit may involve the optic nerve or the brain. Sometimes the pathological process is arrested by the orbital septum, producing abscess or gangrene of the eyelid, or dental fistulas opening so high up as to simulate ocular disease. If these fistulas open near the distal corner of the lid, they may give rise to confusion with tuberculous caries of the orbital margin; if at the mesial corner, they may be mistaken for lacrimal fistulas.

Seydel rejects the assumption of ocular disease caused by way of reflex. He denies that phlyctenular ophthalmia has anything to do with the first, or parenchymatous corneitis with the second dentition, or that glaucoma stands in causal relationship to dental disease. These two affections, in his opinion, exist either simultaneously by accident, or they owe their origin to the same cause, or the cause is being confused with the effect. Dental disorders, at best, might influence an ocular disturbance by way of sympathy, as in severe pain in the case of glaucoma. He claims that trigeminal neuralgia, like every other psychic or physical pain, is able to produce conjunctivitis and dilatation of the pupil only by way of reflex.

Seydel reviews two cases reported by Dutoit in the *Archiv fuer Augenheilkunde*, vol. 68, 1909, p. 311, in which ocular disturbances of apparently reflex origin were due to anatomical conditions in the teeth or jaws.

[*L'Odontologie*, Paris, November 1912.]

THE NATIONAL BREAD OF SWEDEN.

By G. Lagerheim, Stockholm.

The influence of the various kinds of bread upon the condition of the teeth has been given a great deal of well-deserved attention recently by those engaged in the international combat which is being waged against dental caries. Each country has one or more characteristic forms of bread. In southern countries, bread is made from wheat, in northern countries from rye, and from barley in countries bordering the cereal limit. Not only the flour used, but also the manner of preparing the dough and of baking are different in different countries. In some countries fresh yeast is used to make the dough rise, in others a portion of already fermenting dough, the latter especially in districts where rye is employed, as in northern Germany. Rye bread, thus prepared, has a more or less sour taste, which is disagreeable to a great many persons, as it is productive of nausea and gas in the stomach, and unsuitable for dyspeptics. It is also productive of dental caries, and may indirectly produce gastric disturbances. It cannot be preserved very well, as it molds very readily. In Sweden, rye bread has been used for a long time, called Spisbrod or Knäckebrod, which is known in America as "health bread." This truly national bread of Sweden has a very agreeable taste; it is shaped into thick round and flat or into small oblong cakes, is made of coarse, unsifted rye flour, spice and yeast, and is allowed to dry and harden before being consumed. If preserved carefully, it does not mold or deteriorate, and by reason of its hardness and friability, must be completely masticated, which is of great importance for the preservation of the teeth. Soft bread can be swallowed after having been chewed but little; only a small quantity of saliva, therefore, is mixed with the bread before deglutition, and gases irritating to the stomach are formed. Health bread, on the other hand, must be carefully masticated, therefore a large quantity of saliva is mixed with it, and the digestion of the starch is facilitated. In Sweden experience has shown that health bread given to children is productive of solid bones and healthy white teeth.

Periscope.

Prophylaxis in Cocain Injections.—Since cocain in the doses generally employed for hypodermic injections acts upon the vasoconstrictor system, producing pallor of the face, coldness of the extremities, elevation of blood pressure, and finally syncope, two and one-half centigrams of extract of opium in an infusion of coffee are recommended. This prophylactic mixture, which has a vasodilator effect, should be administered thirty minutes before injection.—E. Gruey, *Revue de Stomatologie.*

Root=canal Filling Material.—The following mixture is recommended for filling root-canals: Creasote, from one to four drops; trioxymethylene 0.02 gm.; zinc oxid, enough to make a stiff paste. This paste is claimed to be more suitable than one containing liquid formol, the trioxymethylene apparently retaining its power to generate formaldehyd indefinitely. Care must be taken not to employ an excessive quantity of the trioxymethylene, as the formaldehyd might produce a pericementitis.—C. Bourgeois, *Revue Odontologique.*

Antipyrin as a Local Anesthetic.—Antipyrin has often been employed as a styptic in hemorrhage. Its astringent action renders it suitable also in painful inflammations, such as stomatitis, gingivitis, etc. While its action is not as strong as that of cocain, relief is more lasting and effective, because the process of inflammation is abated. Even in ulcerative carcinoma of the tongue, antipyrin is very effective in alleviating the glossitis complicating these ulcerations. For these local applications by painting, a simple aqueous solution of 1:10 is employed. For mouth-washes or gargles a 1:50 solution is used. The disagreeable taste of antipyrin can be considerably improved by the addition of glycerin. —A. F. Plicque, *L'Odontologie*, per *Deutsche Zahnaerztliche Zeitung.*

Nerves in the Tooth Structures.—The compact nature of the dentin and enamel of the teeth has made it difficult, if not technically impossible, to carry out any adequate examination of a possible innervation of these tooth structures. Many have regarded it as highly probable that there is a nerve supply to the dentin of the human teeth by which very acute sensation is transmitted from the periphery of this tissue as in other parts of the body. Mummery has apparently been successful in tracing the nervous structures by means of the more modern methods of histologic study. He regards it as fully evident that the dentin is richly supplied with nerves from the pulp, which do not terminate, as has been hitherto generally supposed, at the inner margin of the dentin, but enter the tubules of that tissue and traverse them to their peripheral terminations at the enamel and cementum margins. There is some consolation, therefore, in the thought that our teeth are no longer to be deprived of the privilege of a suitable path for the transmission of those unique sensations which we are reminded at times to refer to these highly important organs.—Editorial, *Journ. Amer. Med. Association.*

Crumb and Crust of Bread.—Lay discussion not infrequently turns upon the relative merits of the crust and crumb of bread, but it has come to our attention that the matter is often referred to the family medical adviser, generally in the form of a question as to which of the two is more digestible. Analysis shows very little difference in regard to the constituents of each, but crust, of course, contains much less moisture, and so is richer in solid constituents. The crumb contains on an average 43 per cent. moisture, while the crust contains only 20 per cent. One important dietetic difference between crust and crumb is the fact that the former contains an increased amount of soluble carbohydrates, owing to the action of intense heat which the crust receives compared with the crumb during baking. Moreover, the crust has a more pronounced "bready" flavor than the crumb, a flavor which is attractive and which stimulates the flow of digestive juices. That the digestion of crust in the mouth is much more likely to be complete than is the case with the crumb everyone has generally found out for himself, as the plasticity of the crumb, and especially that of new bread, prevents to some extent the salivary attack.

If new bread were as thoroughly masticated as dry stale bread is bound to be, there would be no reason why it should be less digestible, but it seldom receives the necessary treatment in the mouth.—*Lancet.*

Clasps for Partial Dentures.—The application of clasps to partial dentures demands not only accuracy in the model, but great skill in their construction and adaptation, and should be started with an accurate plan, both in the pattern from which they themselves are cut and also in attaching them to the plate; otherwise the clasp is a menace to the tooth which it surrounds, and ignorance or neglect of these precautions will undoubtedly result in the loss of the teeth supporting the denture.

All clasps should be made concave before any bending is done at all, and should be constructed of platinous gold of No. 24 gage, the only solder being used to attach it to the plate at a point determined by the location of the tooth to be clasped. The plate should be cut out at this point, allowing the part of the clasp to be soldered to extend through to the plaster model, so that the minimum amount of solder can be used to attach it firmly. Yet how often do we see a clasp made of coin or 18-karat gold attached to its point of support by a huge lump of solder, which is so unyielding that it holds everything rigidly, and stress on either side will rock or tilt the piece itself. These creations are either too thick and too narrow, or too wide and of too thin a gage, with no attempt to concave the surface or clasp the tooth properly.—N. S. Essig, *Items of Interest.*

Castings in Prosthetic Work.—In my experience with casting I have made the following observations: (1) That nearly all prosthetic castings should be made in combination with iridio-platinum or gold in wire or plate form as a means of reinforcement. (2) That iridio-platinum, on account of its great strength and freedom from oxidation, affords the best reinforcement. (3) That 24-karat gold reinforced with iridio-platinum is the best for inlay abutments. (4) That the reinforcement plan expedites as well as strengthens the work and obviates bulkiness, which is so essential in many instances. (5) That it is best not to heat any alloy of gold containing base metals to the point of oxidation when casting upon it. (6) That it is unnecessary and detrimental to heat a flask to a red heat or anywhere near it when burning-out wax. (7) That the elastic limit of scrap or junk gold is practically *nil*, and it should not be used where much strain will be brought to bear upon it. (8) That alloys of gold with platinum will become very brittle when cast a few times. This Dr. Taggart tells us is due to contamination with silica contained in the investment. (9) That the casting process makes possible the employment of almost any forms of porcelain teeth, and that provision should be made for cementation rather than casting directly on to the porcelain. (10) That nearly all inlay abutments, regardless of size and shape of cavity, should have some form of supplemental pin anchorage.—F. E. Roach, *Journ. of the Allied Societies.*

Requirements of a Crown.—We must bear in mind—(1) The artificial crown must not in any way encroach upon the soft tissues. (2) At no point of its gingival circumference shall the continuity between the artificial crown and the dental organ be broken. (3) The artificial crown must restore to the broken-down tooth all the means of exercising the functions which nature intended it for—viz, mastication, trituration, incision, and prehension. (4) Whether it be a posterior or an interior crown, its phonetic service to the vocal organs must not be diminished, interfered with, nor made doubtful. (5) It must be perfect in its occlusal relations to the teeth opposing it, and (6) must be perfect in its occlusal relations to the teeth abutting it on either side. (7) It must be in perfect harmony with the soft tissues of the buccal cavity, the cheeks, the lips, and the tongue. (8) It must be so contoured that, if divided into three parts, gingivo-morsally (horizontally), its greatest circumference must be at the gingival plane of the morsal third, and its smallest circumference at the gingival plane of the gingival third. (9) The preparation of a tooth for the reception of scientifically constructed artificial crown includes the denuding of all its walls so that they be left minus enamel. (10) The proper preparation of a tooth for the reception of a crown implies the extirpation of the pulp—if vital—under cataphoresis, pressure anesthesia, or nitrous oxid; the proper treatment and filling of the root-canals, and such dressing-down of its walls and morsal surface as will permit the placing of a hood upon it, the vertical lines of the walls of which are at right angles to the horizontal plane of the gingival third of the tooth, regardless of its relative occlusal position within the buccal cavity.—H. E. S. Chayes, *Dental Forum.*

Care of Dental Instruments.—Instruments should not be allowed to rattle against each other, especially those with cutting edges, for the simple reason that the edges are soon destroyed. Excavators, enamel chisels, scalers, and suchlike should each have a separate compartment. Many of the cabinets now made have the drawers fitted to give effect to this. If one wished, however, to fit an ordinary drawer in this way, the use of corrugated paper makes a very simple and effective arrangement. It is better to allow short portions of the instruments to project beyond one of the edges of the paper, so as to enable the operator to pick them up easily. If this corrugated paper is enameled white, it can be washed when necessary. White porcelain dishes are very useful. There are several sizes; the smaller ones are useful for clamps, matrix bands, separators, etc., also for holding brushes, stones, disks, and various other articles, while the larger dishes are excellent for handpieces, scissors, tweezers. There are special dishes for forceps. For holding gutta-percha pellets, points, pulp caps, and similar articles used directly in the process of filling teeth, glass boxes with lids are preferable, as they are dust-proof. Glass jars with loose-fitting lids are very good for holding saliva-ejector tubes, sponges for anesthetic work, and cotton rolls. A jar might be made for holding mouth-mirrors, which could stand with the mirror portion in some antiseptic.—H. M. STURROCK, *Dental Record.*

Smallpox Vaccination from a Dentist's Point of View.—From a specifically dental point of view we ought to do all we can to discourage vaccination. We know how any disorder, and especially the eruptive fevers, affect the teeth of the child, and undoubtedly vaccination, if it "takes," must seriously interfere with the development of the teeth. Vaccination is supposed to take place in the second to the fifth month after birth. At the eruption of the deciduous teeth, practically all the crowns of the centrals and laterals are calcified, two-thirds of the canine crown, one-half of the crown of the first molar, and one-third of the crown of the second molar, so that, if at this time an eruptive fever is induced, it interferes seriously with the calcification of the deciduous molars, which perhaps may itself account for the prevalence of caries in these teeth. But worse than that, even, is the effect on the first permanent molar, the calcification of which commences just after birth. May not vaccination have something to answer for in regard to the appalling number of first molars which are lost at an early age? We found that ninety-nine per cent. of the children at the James st. school suffered from caries, and is it not our duty, then, to discourage vaccination, as it must undoubtedly do harm in interrupting the development and calcification of the teeth, while the good is to some minds problematical, and to others entirely absent? There is far more harm arising in this country from defective teeth than is ever likely to arise from smallpox.—C. O. TEBBUTT, *Commonwealth Dental Review.*

Hints for the Avoidance of Sepsis of Dental Origin.—Dentists should realize the seriousness of the most frequent operation they perform, namely, that of devitalizing and extracting pulps, since infection and serious bone destruction originate from this cause.

Destruction of the bony floor of the antrum does not necessarily mean perforation of the membranous floor or infection.

An alveolar fistula leading into a cavity where a considerable portion of a tooth is exposed requires extraction of the tooth before complete recovery can be expected.

Persistent headaches and general reduction in health are frequently caused by very insidious alveolar abscesses.

In destruction of the mandible, requiring removal of bone, it is advisable to establish drainage through the chin, and approximate the gingival margins with sutures so as to shut off a pus cavity from the oral cavity.

Naso-oral fistulas may be closed by a membranous flap from the roof of the mouth.

In all suppurative conditions of the mouth tincture of iodin, U. S. P., should be used as a disinfectant.

Blood-clot organization is typified in the repair of the maxillary process after the extraction of teeth. Here we may extract many teeth, leaving holes of considerable size, which are immediately filled in with blood, and even the patient never hears of it again. Why not larger cavities?

The practice of packing sterile cavities with gauze at every dressing is wrong, since it breaks down and destroys blood-clots and valuable plastic material thrown out by nature to rebuild damaged tissues.

Extensive areas of bone may be stripped of the periosteum, and, if sterilized and adjusted to the original position, will re-adhere and revitalize the bone, and necrosis will not result.—S. L. MCCURDY, *Dental Summary.*

Gangrene of the Mouth Following Injection of Salvarsan.—Dritsaki reports the case of a physician who since the age of fifteen years suffered from malaria, which was treated with quinin and methylene blue without permanent result. He then decided to submit to salvarsan injection, which was made intravenously. Following the injection, a marked reaction took place, followed by enlargement of the liver and spleen and a gradually developing gangrene of the lips, cheeks, and tongue. The patient gradually grew weaker and died from exhaustion.—*Roussky Vratch*, per *N. Y. Med. Journal.*

Localized Gangrene Following the Use of Quinin and Urea Hydrochlorid.—Rightor reports an instructive case in which he had used the one per cent. solution of quinin and urea hydrochlorid, marketed in ampules, as a local anesthetic. Although the anesthetization and operation were completed without any untoward symptoms, a great deal of swelling and discoloration occurred, the lack of sensation lasting for several days. There was a very foul odor, and a well-marked localized gangrene extending exactly to the end of the line of infiltration, though no suppuration. A second operation became necessary to repair the damage, attributable undoubtedly to the untoward action of the local anesthetic employed.—*Journal of the Amer. Medical Association.*

Measures in Accidental Perforation of the Maxillary Antrum.—Accidental perforation of the maxillary antrum is not very serious, if immediately discovered and remedied. The perforation is best ascertained by pinching the patient's nose and requesting him to blow air through the nostrils. The air will then issue from the mouth with a characteristic noise, unless, of course, the aperture is already closed by granulations or swelling. This measure first confirms the diagnosis; second, any blood that may have entered the antrum is blown out; third, the injured and torn portions of the mucosa of the antrum are approximated, thereby forming a provisional though loose closure of the antrum, the aim being to cover the wound in such a manner that the mucosa of the antrum will heal undisturbedly. The simplest procedure of closing, as recommended by Partsch, consists in laying a tampon of iodoform gauze in front of the aperture, and fastening it in in such a way that it cannot drop into the oral cavity. If there are teeth in the proximity of the perforated spot, this tampon is held in place by a figure-of-8 ligature of wire or silk; if the jaw is edentulous, a prosthetic appliance, such as a celluloid plate, is necessary. In edentulous jaws, the mucous membrane of the mouth may be loosened, part of the jaw-bone resected, and the oral mucosa drawn together by a suture, thus obtaining closure of the perforation—the object of each of these measures being the complete closure of the antrum. Healing is usually complete in four days.—Prof. Williger, *Deutsche Monatsschrift fuer Zahnheilkunde.*

Tackiness in Rubber—Tackiness in rubber, says the *India Rubber Journal*, shows itself, in the mild form, as a sticky appearance on the surface of the rubber. In its more serious aspect, however, it may cause the rubber to become a syrupy liquid. The agents responsible for the phenomenon have been considered to be: (1) Bacteria; (2) sunlight; (3) heat, and (4) chemical substances. Isolation of tacky rubber, on the assumption that it is due to bacteria, has been claimed to bring about a reduction in the affection. Tacky rubber usually contains a high proportion of proteids, and support is given to the idea that bacteria play a part in producing it by the fact that the condition can spread by contact, and smoked rubber does not frequently become tacky—probably because of the action of antiseptic substances in the smoke. The trouble sometimes develops more quickly under the influence of sunlight, but the true explanation of the action is not forthcoming. That it has some influence is seen in the fact that many factories use ruby or orange-colored glass in order to exclude the chemical rays of light. With regard to heat, this is most likely to produce tackiness when the rubber is warmed in an atmosphere rich in organic matter, but heat alone has no effect in this direction. Chemical agents give rise to the condition directly, much in the same way as sunlight. Enzymes may be largely responsible, but there is no direct evidence to show that they are so. Weak solutions of acids, for instance, acetic acid, which may be produced by bacteria, have a strong effect, but so also has carbolic acid, and this would indicate that the action of bacteria is indirect in its nature. The actual cause of the trouble still remains to be discovered.—*British Dental Journal.*

Hints, Queries, and Comments.

HOW TO TAKE CARE OF ROOT-CANAL CLEANSERS.

Root-canal broaches are first immersed in boiling water for about ten minutes, after which any débris caught in the barbs can be removed by a stiff handbrush and water. They are then boiled again, and finally transferred to glass-stoppered bottles containing alcohol.

K. Paul Carson.

Minneapolis, Minn.

SOLDERING HINTS FOR CROWN AND BRIDGE AND ORTHODONTIA WORK.

Many dentists, particularly the younger practitioners, occasionally have great trouble in soldering bands or cusps to bands in crown work, and in soldering accessories to arches or bands in orthodontia work. These unfortunates usually attribute the "burning" of the gold or material used, and the apparent refusal of the solder to flow, to the solder itself.

Until recently I was one of those unfortunate individuals, and my failures have led me to thinking and eventually to experimenting; and, now, while realizing that I may not be the first to solve this common difficulty, but nevertheless desiring to enlighten those who have not found the way easy as yet in the matter of soldering, I am anxious to submit the following, which is my solution of the problem of successful soldering.

Let us take the soldering of a band for an example: It will be noticed that when an unsoldered band upon the well-approximated joint of which a small piece of solder is placed, is placed in the flame, the band becomes red or cherry-colored before the solder presents any change whatever, showing that the plate is affected by the heat easier and sooner than the solder. Of course the solder receives just as much heat, but it absorbs more heat. This was my cue.

Here is how I do my soldering now, and it has proved infallibly successful.

After the band turns to a cherry color, I remove it from the flame for a sufficient length of time to allow the band to cool. There is then more heat stored in the solder than in the plate. The band is nearly cool and the solder quite heated.

Then I repeat this performance. When the band has changed color the solder is almost ready to flow. When I put it in the flame the third time, I find that just when the band changes to a cherry-red color the solder will flow easily.

By using this method one lessens the possibilities of burning his gold by allowing a red-hot band to remain in the flame until the solder is heated up to the melting-point.

I trust others will try this method, and I am sure that if they do so they will meet with more successes and fewer failures.

Respectfully submitted,

S. I. Russakov.

Kenosha, Wis.

Society Notes and Announcements.

INSTITUTE OF DENTAL PEDAGOGICS.

The next annual meeting of the Institute of Dental Pedagogics will be held in Pittsburgh, Pa., January 28, 29, and 30, 1913. An unusually interesting program has been arranged, and no progressive dental teacher can afford to miss this meeting.

Fred W. Gethro, *Sec'y,*
Chicago, Ill.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

The regular meeting of the Academy of Stomatology of Philadelphia will be held on Monday, January 28, 1913, at the College of Physicians, Twenty-second above Chestnut st., Philadelphia, Pa., at 8 p.m. Dr. E. J. Greenfield of Wichita, Kan., will read a paper on "Implantation of Artificial Crown and Bridge Abutments." The American Circulating Dental Clinic will be on exhibit at this meeting.

All members of the dental profession are invited to be present.

N. L. Jameson, *Sec'y.*

MINNEAPOLIS DENTAL SOCIETY.

Change of Date of Meeting.

The annual midwinter meeting of the Minneapolis Dental Society will be held in the Masonic Temple, Minneapolis, Minn., Friday and Saturday, January 17 and 18, 1913.

Space has already been reserved for even a larger manufacturers' exhibit than was given last year. Clinics will be given by some of the best men in the profession, who will demonstrate all of the newest and most useful methods.

The entire meeting is to be conducted along unique and original lines—a new method of arranging the exhibits, a different and better way of classifying clinics, also many other new things which will add to the pleasure and profit of each visitor.

For information address

O. DeForest Davis, *Sec'y,*
404 Donaldson Bldg., Minneapolis, Minn.

MARQUETTE UNIVERSITY, DENTAL DEPARTMENT.

Alumni Association.

The seventh annual meeting of the Alumni Association of the Dental Department of Marquette University will be held at the Milwaukee Auditorium, January 23 and 24, 1913, to which all ethical dentists are invited.

C. T. Rosenbaum, *Sec'y.*

CHICAGO DENTAL SOCIETY.

The officers of the Chicago Dental Society are planning a large celebration for Friday and Saturday, January 31 and February 1, 1913. The program includes two days of clinics by selected men from all parts of the country, one evening of papers by men of international reputation, and concluding the two days' meeting with a testimonial banquet to our esteemed *confrère*, Dr. Truman W. Brophy of Chicago.

The dentists of Chicago will make every effort to see that the entire program will eclipse all former meetings. Any dentist who has a new or interesting clinic to give at this meeting is cordially invited to correspond with

Fred W. Gethro, *Ch'man of Clinic Committee,*
917 Marshall Field Bldg., Chicago, Ill.

CONNECTICUT STATE DENTAL ASSOCIATION.

The next annual meeting of the Connecticut State Dental Association will be held in Waterbury, April 15 and 16, 1913.

A. V. Prentis, *Sec'y,*
New London, Conn.

INDIANA STATE DENTAL ASSOCIATION.

The fifty-fifth annual session of the Indiana State Dental Association will be held at the Claypool Hotel, Indianapolis, May 20, 21, and 22, 1913.

The officers of the association recently met at Indianapolis and perfected plans for a three-day "post-graduate course." The very best instructors and specialists are being secured for each day. The course will be as follows: Tuesday—"Humanitarian Dentistry." Wednesday—"Preventive Dentistry." Thursday, A.M.—"Prosthodontia; P.M., a great table clinic. The clinic will also be held in the hotel.

No tuition fee for the members of the association, or visitors from outside the state who are in good standing in their state association, but all others desiring to take this course must arrange their tuition fees with the secretary.

Otto U. King, *Sec'y*,
Huntington, Ind.

ST. LOUIS DENTAL SOCIETY.

At the December meeting of the St. Louis Dental Society the following officers were elected for the ensuing year: Otto J. Fruth, president; Frank Rodgers, first vice-president; H. F. Hageman, second vice-president; G. B. Winter, secretary-treasurer; Virgil Loeb, librarian.

G. B. Winter, *Sec'y*.

NEW JERSEY STATE DENTAL SOCIETY.

At the forty-second annual meeting of the New Jersey State Dental Society, held at Cape May, N. J., July 17 to 19, 1912, the following officers were elected for 1912–13: Wm. I. Thompson, president; Wm. H. Gelston, vice-president; Chas. F. Jones, treasurer; Edwin W. Harlan, secretary; Wallace F. Naylor, assistant secretary. Executive Committee—Wm. H. Gelston (chairman), W. F. Barry, Henry Fowler, J. I. Woolverton, and C. P. Tuttle. Membership Committee—Joseph Kussy (chairman), Franklin Rightmire, A. S. Burton, J. F. Crandall, and Horace I. Beemer.

In addition to these, Dr. Vernon D. Rood, Morristown, N. J., was elected for a term of five years as a member of the State Board of Examiners to succeed Dr. B. F. Luckey of Paterson, N. J.

Edwin W. Harlan, *Sec'y*.

RUTLAND COUNTY (VT.) DENTAL SOCIETY.

A meeting of the Rutland County (Vt.) Dental Society was held in Rutland, Vt., October 29, 1912. The following officers were elected for the coming year: P. Mahoney, president; H. H. Yarrington, vice-president; G. E. Dailey, secretary and treasurer.

G. E. Dailey, *Sec'y*,
Rutland, Vt.

ARIZONA DENTAL SOCIETY.

At the fourth annual session of the Arizona Dental Society, in Phoenix, October 29–31, 1912, the following officers were elected: J. A. Messinger, Phoenix, president; L. W. Downs Douglas, vice-president; H. H. Wilson, Phoenix, secretary-treasurer. Board of Censors—L. B. Cary, T. S. Lewis, and J. D. Holcombe. Board of Directors—J. A. Messinger, H. H. Wilson, W. P. Sims, Eugene McGuire, and R. J. Roper. Committee on Public Dental Education—J. L. O'Connell, H. H. Wilson, and L. C. Shaw.

H. H. Wilson, *Sec'y*.

PRIZE COMPETITION
OF THE
Zentralverband der Oesterreichischen Stomatologen.

In view of the tenth anniversary of its organization, the Zentralverband offers a prize of K.500.00 ($100.00) for the best heretofore unpublished essay on any subject of stomatology. Only those papers which are submitted by medical men and dentists to the president of the association (Vienna I, Graben 31) between March 1, 1912, and February 28, 1913, will be admitted to the competition.

An essay cannot be withdrawn after once having been handed in.

The judges reserve the right to divide the prize into two equal parts, should two essays of equal value be submitted. If none of the essays is adjudged worthy of the prize, the competition may be kept open for a further period not exceeding two years.

The author agrees to place his work at the disposal of the *Oesterreichische Zeitschrift fuer Stomatologie* for original publication.

The essays must be handed in ready for publication, and will if possible appear within the period open for the competition. Every essay published will be paid for at the usual rate of K.80.00 ($16.00) per galley. The cost of printing, including the illustrations, will be borne by the journal.

For the Zentralverband der Oesterreichischen Stomatologen:

Dr. W. Herz-Fraenkl, *Pres.*,
Dr. Rudolf Bum, *Sec'y.*

IDAHO BOARD OF EXAMINERS.

The Idaho State Board of Dental Examiners will meet for the examination of candidates for license to practice dentistry in Idaho, on January 6, 1913, in Boise.

Albert A. Jessup, *Sec'y,*
513 Overland Bldg., Boise, Idaho.

NORTH DAKOTA BOARD OF EXAMINERS.

The next meeting of the North Dakota Board of Dental Examiners will be held at Bismarck, N. D., January 14, 1913, and continuing four days. All applications for examination must be in the hands of the secretary by January 4th. No other meeting will be held until July 8, 1913. For further information apply to

F. A. Bricker, *Sec'y,*
Fargo, N. D.

INDIANA BOARD OF EXAMINERS.

The next meeting of the Indiana State Board of Dental Examiners will be held in the State-house at Indianapolis, beginning Monday, January 13, 1913, and continuing four days. All applicants for registration in the state will be examined at this time. No other meeting will be held until June 1913. No temporary permits are issued.

For further information address

F. R. Henshaw, *Sec'y,*
508 K. of P. Bldg., Indianapolis, Ind.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending November 16, 1912:

Chas. E. Sherwood, act.d.s., November 4th, reports for temporary duty at Fort Baker, Cal.

Wm. A. Squires, act.d.s., November 6th, reported for temporary duty at Fort Meade, S. D.

First Lieut. Edwin P. Tignor, November 10th, returned to Fort Monroe, Va., from detached duty.

Relieved from duty at the station designated, and will proceed to the Philippine Islands for duty: John W. Scovel, Presidio of San Francisco, Cal.; Chas. B. Seely, Jr., Fort Sam Houston, Texas, and Wm. A. Squires, Fort D. A. Russell, Wyo.

Relieved from duty in the Philippines Division, and will proceed to the United States for further orders: First Lieut. Ed. P. R. Ryan and Frank L. K. Laflamme.

For the week ending November 23d:

Chas. B. Seely, act.d.s., November 15th, reported for temporary duty at Fort Logan H. Roots, Ark.

First Lieut. F. L. K. Laflamme granted two months' leave of absence.

Relieved from duty in the Philippines Division, and will proceed to the United States: First Lieuts. Rex H. Rhoades and John R. Ames.

The following assignments of acting dental surgeons, recently appointed, are ordered: Edwin M. Kennedy, Fort Robinson, Nebr.; Lester C. Ogg, Letterman General Hospital, San Francisco, Cal.; Herman S. Rush, Fort D. A. Russell, Wyo.; Jay W. Smith, Fort Sam Houston, Tex., and Benjamin C. Warfield, Madison Barracks, N. Y.

First Lieut. Geo. L. Mason, November 14th, reported at Fort Benjamin Harrison, Ind., for temporary duty.

Albert R. White, act.d.s., November 16th, returned to Fort Des Moines, Iowa, from temporary duty at Fort Crook, Nebr.

First. Lieut. Franklin F. Wing is relieved from duty at Fort D. A. Russell, Wyo., and James F. Feely, act.d.s., is relieved from duty at Fort Hamilton, N. Y., and will proceed at the proper time to San Francisco, Cal., and take the transport to sail from that place on or about March 5, 1913, for the Philippine Islands, and upon arrival at Manila will report to the commanding general Philippines Division for assignment to duty.

For the week ending November 30th:

First Lieut. Frank P. Stone, November 24th, reports for temporary duty at Madison Barracks, N. Y.

James F. Feely, ACT.D.S., November 27th, left from temporary duty at Fort Hancock, N. J., *en route* to Fort Totten, N. Y., for temporary duty.

For the week ending December 7th:

Wm. A. Squires, ACT.D.S., November 26th, reported at Fort Mackenzie, Wyo., for temporary duty.

C. B. Seely, Jr., ACT.D.S., November 27th, returned to Fort Sam Houston, Texas, from duty at Fort Logan H. Roots, Ark.

Jay W. Smith, ACT.D.S., November 28th, reported for duty at Fort Sam Houston, Texas.

Lester C. Ogg, ACT.D.S., November 29th, *en route* from Mt. Vernon, Ohio, to take station at Letterman General Hospital, San Francisco, Cal.

Herman S. Rush, ACT.D.S., November 29th, reported for duty at Fort D. A. Russell, Wyo.

First Lieut. R. E. Ingalls, November 26th, from temporary duty at Fort Flagler for temporary duty at Fort Worden, Wash.

B. C. Warfield, ACT.D.S., December 2d, reported for duty at Madison Barracks, N. Y.

E. M. Kennedy, ACT.D.S., November 30th, reported for duty at Fort Robinson, Nebr.

A. T. Knoderer, ACT.D.S., December 2d, returned to Fort Oglethorpe, Ga., from temporary duty.

First Lieut. R. E. Ingalls, November 26th, reports for temporary duty at Fort Worden, Wash.

First Lieut. Geo. L. Mason, December 2d, returned to Fort Snelling, Minn., from temporary duty at Fort Benjamin Harrison, Ind.

United States Patents

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING NOVEMBER 1912.

November 5.

No. 1,043,284, to ROBERT E. ZELLERS. Dental apparatus.

November 19.

No. 1,044,614, to ELMER E. WIGHTMAN. Impression tray.

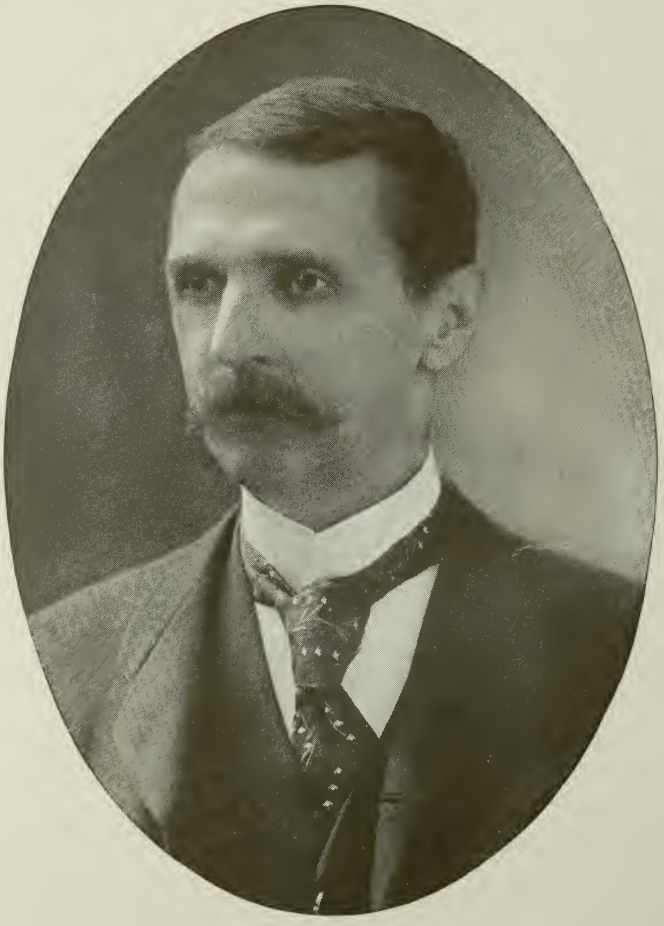
No. 1,044,764, to MATTHEW N. FEDERSPIEL. Orthodontia appliance.

No. 1,044,892, to RALPH LAMB. Swaging device.

November 26.

No. 1,045,552, to ABRAHAM L. HOLTZMAN. Tooth-brush.

No. 1,045,586, to THEODORE H. MONTAGUE. Articulator.



DR. WILBUR F. LITCH.

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ORIGINAL COMMUNICATIONS.

THE DEVELOPMENT OF THE TEETH AND OCCLUSION AS FACTORS IN THE DEVELOPMENT OF THE FACIAL BONES.

By FREDERICK BOGUE NOYES, B.A., D.D.S., Chicago, Ill.

(Read before the American Laryngological, Rhinological, and Otological Society, Philadelphia, Pa., May 14, 1912.)

THE object of preparing this paper is to present ideas that are constructively helpful both to the rhinologist and the orthodontist. To the rhinologist, because he is interested in securing normal conditions in the respiratory passages and the sinuses which communicate with them—and normal development is necessary for proper ventilation of those spaces, and ventilation is a prime requisite for normal conditions of the mucous membrane. To the orthodontist, because he is not simply concerned with the correction of crooked and irregular teeth, but with the development of a normally proportioned face and balanced and harmonious features.

It seems unnecessary to emphasize the importance to either profession of clear ideas of development and growth of the jaws and bones of the face forming the walls of the nasal cavity and sinuses, for without them it would seem impossible to avoid mistakes both of diagnosis and treatment.

It will be my endeavor to express as clearly as possible my own conception of the manner of growth and the changes occurring in development, and the interdependence of various factors upon which the normal process is dependent. The time is too short to make any attempt to present the work that has led to these conceptions, which have crystallized gradually in fifteen years of study of these tissues and their development, but the consideration of some fundamental principles is necessary.

RECENT LIGHT ON THE CHEMISTRY OF VITAL PROCESSES.

It is only through the brilliant work of Emil Fischer and others on the constitution of the proteid molecule and the discovery of the linking of amido-acids that any thinkable conception of the chemistry of vital processes has been arrived at. In the linking of amido-acid derivatives in ring form, with infinite possibilities of complication and extension in side chain, we have a basis for the consideration of metabolism; and only by gaining some conception of the relation and interdependence of the surrounding medium, the cytoplasm, and the nucleus in metabolism can we obtain any idea of the relation of cellular and intercellular substances in the organism. From a consideration of the physical character of living matter it is evident that no highly organized creature would be possible without the formation of substances possessing different physical character to furnish support and protection to the living matter. All living tissues are made up of cells and intercellular substances which have been produced by the cells and are dependent upon them for the maintenance of their chemical identity and proportion. The formation of these intercellular substances is in response to physical and mechanical conditions, and is a phase of adaptation. In the higher forms certain tissues have been specialized with reference to support and connection, and have been called the connective or supporting tissues. It is necessary to suppose that the cells of these tissues have been specialized to respond to physical and mechanical environment, with the formation of intercellular substances adapted to the conditions. To illustrate: In the evolution of the sense of sight certain cells of the epithelium have been specialized to respond to light stimuli by metabolic reaction of a special kind. In a similar way connective tissue cells have become specialized to respond to mechanical environment by metabolic reactions producing intercellular substances adapted to the conditions.

A study of the embryology of connective tissues strengthens these ideas, the nature and arrangement of the intercellular substance being often clearly the result of the mechanical conditions to which the tissue is subjected. For instance, we say the fibers of the peridental membrane are beautifully arranged to support the stresses to which the tooth is subjected; but they are so arranged because they have been produced in response to these mechanical conditions. In the development of fibrous tissue from embryonal tissue the cells are arranged with reference to the forces or stresses which it sustains, and the fibers appear in a corresponding arrangement. One of the most striking characteristics of the connective tissue is its adaptation and ability to transform itself from one variety to another better suited to a changed condition.

BONE AS A PLASTIC TISSUE.

Because of the fact that these tissues are largely made up of intercellular substances, which are the last to decompose after death, they are often thought of as unchanging, and it is very hard for us to get the idea that bone is a plastic tissue. Men are continually reasoning from experiments upon skulls or skeletons, forgetting that they represent only the remains of the intercellular substance and that even this is not in the same condition as during life. Not long ago a prominent scientist, whose name would be recognized by many, showed me a device of his invention for my opinion as to its surgical value. After looking it over I told him there was just one thing the matter—that he was experimenting with dead bone, which is not the same as living bone. Many men have commented upon the fact that nature never allows the bony framework of a creature to be either too heavy or too light, and this will perhaps be understood better if we come to realize that throughout life almost continual changes are going on. In studying bone-growth or bone-formation everyone is impressed with the alternation of formation and destruction, so that many have spoken of the process as wasteful. Viewed from another standpoint it would be seen that this is nature's method of adaptation—that the cells respond to the demands of increase of strength and rigidity by the production of more bone, that this proceeds until the weight and bulk is greater than necessary, which causes absorption, which proceeds until the tissue is too light for the stress, and so by oscillating a condition of balance is maintained.

BONE AS REGARDED FROM THE HISTOLOGICAL STANDPOINT.

It is true from one standpoint that a bone of the skeleton, whether a long, a flat, or an irregular bone, can be regarded as an organ of support and rigidity; but it is still more important to remember that it is only a portion of the connective tissue framework which, because of definite mechanical environment, has been made rigid by the formation of calcified tissue. This aspect we shall find particularly important to bear in mind when considering such questions as the opening of the maxillary suture. This attitude is difficult for one who has studied bone wholly or chiefly from the anatomical standpoint rather than from the histological or microscopic, but it becomes more and more strongly impressed by the study of bone-growth and the development of the jaws. In the formation of the membrane bones of the head and the face, calcification begins at points or centers in the connective tissue and spreads by the formation of spicules radiating from the center. The ossified portions gradually take on the form of the respective bones, but remain separated by more or less of the connective tissue on the line of the sutures for a long time. The presence of connective tissues in the sutures is an important factor in growth.

THE VARIETIES OF BONE.

Bone may be defined as a connective tissue whose intercellular substance is calcified and arranged in layers, or lamellæ, around nutrient canals or spaces. The cells are placed in spaces, lacunæ, between the layers, and receive nourishment through minute channels, canaliculi, which penetrate the layers. By the arrangement of the structural elements three varieties of bone are recognized.

Subperiosteal bone. In this form of bone the lamellæ are arranged parallel with the surface under a formative membrane or periosteum. This variety must always be considered a formative and more or less transient arrangement. It is never allowed to become very thick, but is partially removed and rebuilt into Haversian-system bone.

Haversian-system bone. This is often called true bone; it constitutes the greater part of the compact bone in the shafts of the long bones and the plates of flat and irregular bone. In this variety the lamellæ are arranged concentrically around canals cntaining bloodvessels, nerve, lymphatics, and embryonal connective tissue. A study of either ground or decalcified sections shows that this kind of bone is capable of and more or less constantly undergoes internal transformation by absorptions and rebuildings occurring in the canals.

Cancellous or spongy bone. This is composed of delicate irregular spicules composed of a few lamellæ arranged around large irregular spaces filled with embryonal connective tissue and containing bloodvessels, nerve, and lymphatics. There is no sharp line of demarcation between Haversian-system and cancellous bone, and we find all grades, between the most dense with the smallest Haversian canals and the most cancellous with the largest spaces, and the narrow cavities of long bones must be considered as enormous cancellous spaces.

TRANSFORMATIONS OF BONE.

In growth, bone is continually being transformed from one variety to another, and this occurs in a more or less oscillating fashion. In fact, these transformations continue throughout life and occur in either direction. We find subperiosteal bone being laid down within a periosteum, this being absorbed from the walls of the penetrating canals and converted into Haversian-system bone, and, after a sufficient thickness has been produced, absorptions and rebuildings in the Haversian canals convert them into cancellous spaces. In the opposite way, lamellæ may be laid down around large cancellous spaces, converting cancellous into Haversian-system bone, then absorptions under the periosteum may cut deep into the Haversian-system bone and rebuild a few layers of subperiosteal bone to smooth the surface. No proper conceptions of the growth of bone and the formation of the face with its inclosed sinuses can be had till these transformations are clearly understood.

Every detail of the minute structural bone is found to be most perfectly related to the stress and strain to which the bone as an organ of support is subjected. Or, as it should rather be stated, every detail of minute structure is formed in response to mechanical environment and conditions of nutrition, and as conditions change they are rebuilt in response to balanced forces. It may be said that both phylogenetically and ontogenetically bone has been developed in the species and is formed in the individual in response to mechanical stimuli and in adaptation to mechanical environment.

Phylogenetically, the teeth originated as appendages of the skin, and had no relation to the bone. Originally the teeth had only fibrous connective tissue support, and later in evolution, with the development of the teeth, bone was produced in response to mechanical environment, rendering them more useful to the individual. In the development of the individual, also, the formation of the teeth precedes the formation of the bone which is produced for their support.

RELATION OF THE TEETH TO FACIAL BONE DEVELOPMENT.

With these fundamental considerations in mind we may proceed to the consideration of the relation of the teeth and occlusion to the development of the bones of the face. This naturally presents three phases for consideration:

(1) The relation of the growth of the teeth to the formation of bone in the maxillæ.

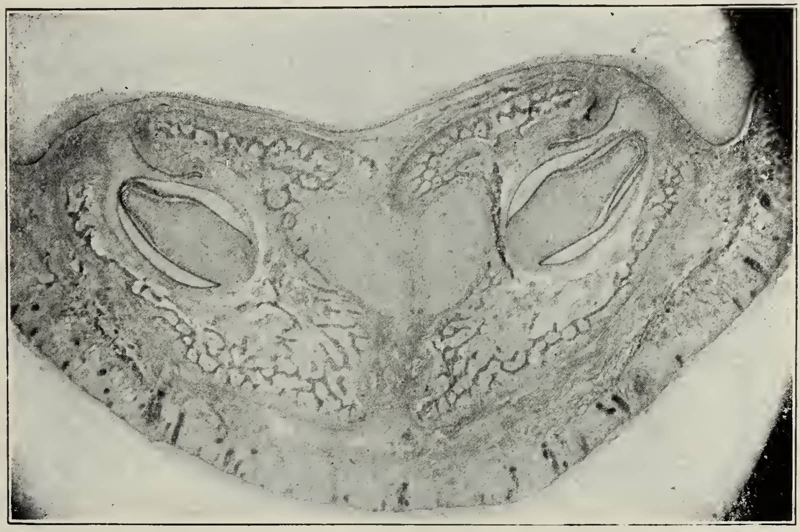
(2) The relation of the use of the teeth in function to the growth of the bones of the face; for it must be borne in mind that in the normal individual the bones of the face are the result of the sum total of the mechanical conditions to which they are subjected, distributed in perfect balance and harmony through the mechanism of normal occlusion.

(3) The interrelation of the growth of the teeth themselves and the distribution of functional forces by occlusion.

FORMATION OF BONE IN THE MAXILLÆ.

As soon as the maxillary arches are complete, and while the only supporting framework of the mandible is Meckel's cartilage, the formation of the tooth germs for the temporary teeth begins. By the time these have taken on their characteristic form, the formation of spicules of bone begins in the mesodermic tissue in the region of Meckel's cartilage. This continues to spread until it incloses the cartilage and extends upon the buccal and lingual of the developing germs. In this section through the mandible of an embryo pig (Fig. 1) the bone is already taking form, and a periosteum is seen on its surface. From this time onward growth will proceed by the formation of bone under the periosteum, and in the articular cartilage its transformation within. Somewhere between the seventh and the ninth month after birth (Fig. 2) the growth of the incisors within their crypts causes absorption of the bony covering, and the teeth move occlusally, the bone from the margin of the crypt growing up to support them. The roots are not fully formed, and the multiplication of cells on the conical remains of the dental papillæ is a factor in this movement. At about one year (Fig. 3) the incisors have appeared. Notice the relation of the unerupted teeth in their crypts. The roots of the centrals and laterals are not completed, and each successively distal tooth lies deeper in the bone, so that their development transmits pressures which cause the already unerupted teeth to continue to move upward, forward, and outward in the lower jaw, and downward, forward, and outward in the upper. The crypt walls are continuous at their occlusal border with the dense cortical plates, and so in a sense are swung from the upper border of the bone; but the growth of the tooth germ exerts pressure which pushes the crypt walls through the cancellous bone until the resistance below is greater than the resistance above. The relation of the lower wall of the crypt of the temporary molars to the canal of the inferior dental nerve is worthy of notice in relation to the nervous phenomena so often accompanying the eruption of these teeth. (Fig. 4.) As soon as the teeth erupt, they and in fact the entire surface of the gums are subjected to pressures which are the result of the growth

FIG. 1.



Section through the lower jaw of a pig embryo, showing germs of two incisors.

FIG. 2.

Maxillæ at about eight months after birth, showing unerupted teeth.

Fig. 3.

Maxillæ at about one year.

Fig. 4.

Maxillæ in the second year.

FIG. 5.

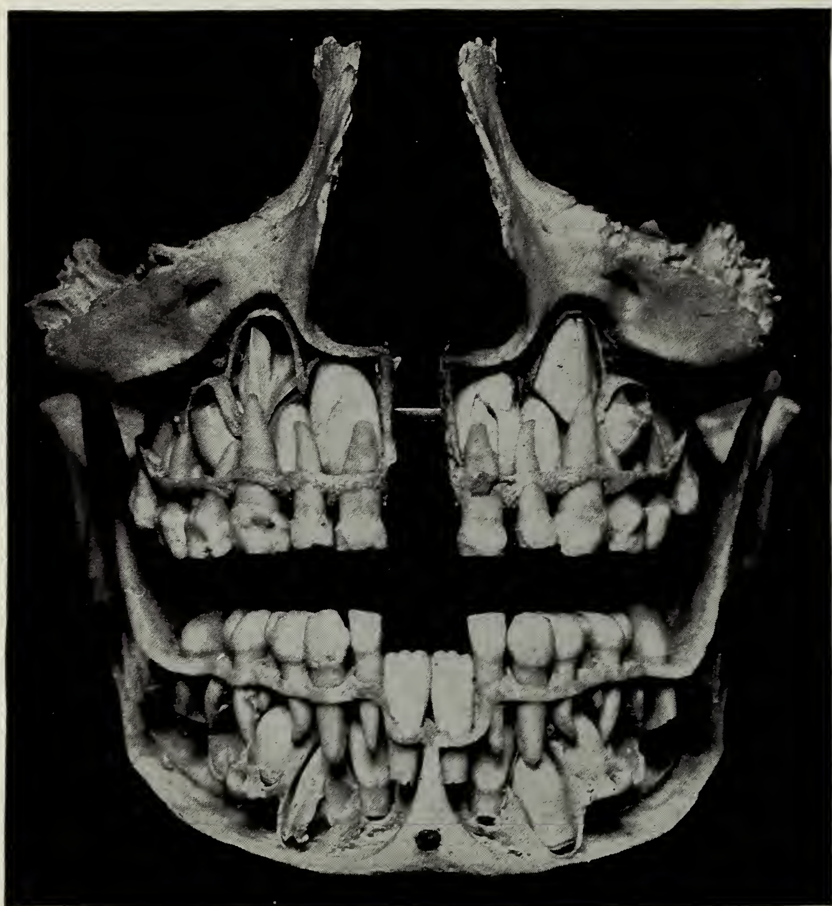
Complete temporary dentition; about three years.

FIG. 6.

Complete temporary dentition and the first permanent molar, in the seventh year.

of the inclosed organs, and to stresses produced by the action of muscles attached to the periosteum and in constant use in function. We must picture the bone, not as the solid and unyielding structure it presents in a dried skeleton, but as an extremely active tissue very rich in blood supply and made up of millions and millions of cells all of which are very busy. The result of the growth and eruption of the temporary teeth one after another is the development of the maxillæ in an occlusal and outward direction, increasing the size of its arch and its thickness from above downward. (Fig. 5.) When all of the temporary teeth have taken their positions and are in full occlusion, growth continues in the same directions under the influence and function and development of the first permanent molars. At about six years the four first molars erupt and take their position in the arch. (Fig. 6.) The importance of these teeth and their normal relations to each other cannot possibly be overestimated. They are the largest and strongest teeth of the permanent set, and during the period in which the temporary teeth are being replaced by the permanent ones they not only do the chief

Fig. 7.



Front view of Fig. 6.

work of mastication, but maintain the proper relation of the maxillæ and distribute the forces of function. The mesio-buccal cusp of the upper molar should lock between the buccal cusps of the lower, but it often happens—usually, apparently, because of perversions of the functions of respiration and deglutition —that they lock with the disto-buccal cusps of the upper teeth between the buccal cusps of the lower, throwing the entire mandible half the width of the molar distal to its normal position. The locking of the cusps retains it permanently in this position, and not only disturbs the relation of each permanent tooth as it erupts, but entirely changes the distribution of functional forces upon the bone. During this period the first molar must be considered as the point upon which the action of the muscles which are attached to the condyle and ramus and those which are attached to the anterior portion of the jaw are balanced, and the change in the relation of the first molar profoundly alters the direction of forces upon the growing bones.

Fig. 8.

Dentition in the eighth year.

DENTAL FUNCTION IN RELATION TO FACIAL GROWTH.

During the entire period of the function of the temporary teeth they continue to move through three dimensions of growth of the permanent incisors and canines is very instrumental. (Fig. 7.) Between six and seven years of age the crowns of these teeth have been fully formed and occupy most of the space between the nasal floor and the roots of the

FIG. 9.

Dentition in the eleventh year.

space in an occlusal and outward direction under the influence of the development of the permanent teeth. This growth is at first chiefly in the anterior region, or from the symphysis to the mental foramen in the mandible and from the suture to the canine region in the maxillæ. In this development the teeth in the upper, and the inferior border of the mandible and the roots of the teeth in the lower. Growth of the canine has pushed its crypt wall through the cancellous bone until it is braced against the solid structure at the base of the malar process. (Fig. 8.) The lower canine has obtained its firm rest against the lower cortical plate of the mandible. The teeth lie to the lingual of the roots of the temporary teeth, and are arranged in phalanx, the lateral braced against the central, the canine against the lateral, and both canines against the cortical means of this arrangement the upper temporary incisors should be forced apart and stand widely separated before they are lost, and when at seven years this has not occurred we know that the development is below normal.

Fig. 10.

Maxillæ from young adult, about fifteen years.

plate. A similar arrangement is seen in the maxillæ. At about this time only the crowns of the canines have been developed, and as their long roots are formed, all of the previously erupting teeth are carried in the occlusal and outward direction. (Fig. 9.) It will be seen that normal proximal contact is necessary for the carrying out of this mechanism. By

From nine to fourteen years, growth is largely from the mental foramen to the ramus and in the corresponding portions of the mandible, and is brought about by development of the bicuspids under the temporary molars and of the second molars to the distal of the first. (Fig. 9.) When, at thirteen or fourteen (Fig. 10), all of the permanent teeth except the molars are in occlusion, the growth in an occlusal and outward direction should continue until development is complete. If the vitality of the cells in the bone has been maintained by the mechanical stimuli of full normal function, the development of the third molars behind the seconds, together with functional pressure, should be sufficient to continue this occlusal outward movement. (Fig. 11.) Notice the relation of the apices of the incisor roots to the floor of the nose and the inferior border of the mandible in the skull of a child of fifteen years and in the normal adult. (Figs. 10 and 11.) Unfortunately too often, the tissues are not sufficiently vigorous or the necessary mechanical stimuli are lacking to carry out this development, and the third molars remain unerupted. In the development described the transformations of bone are continually going on. Bone is formed on the surface by the periosteum and the pericementum at the alveolar border and the articular cartilage, and is rebuilt and transformed within. The periosteum molds the surface by absorption, cutting deep into the part already formed, and then re-forms a few layers on the surface. A study of decalcified sections give a record of these changes in the arrangement and character of the lamellæ.

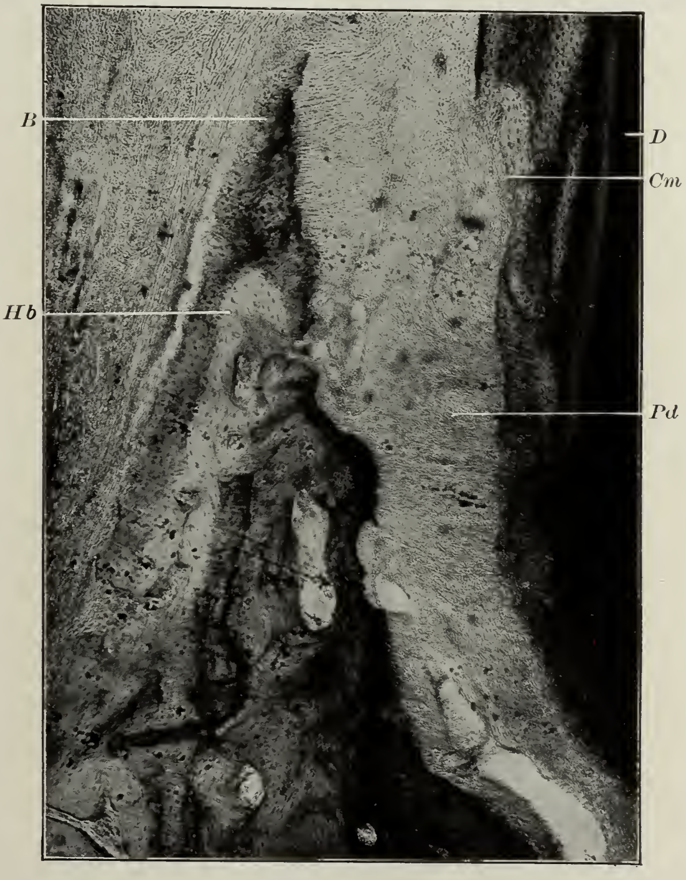
Fig. 11.

Adult.

MUTATIONS OF BONE EXEMPLIFIED IN THE MANDIBLE.

The tissue changes in the mandible furnish a good example of the mutations of bone in growth. A section through the alveolar process of a temporary tooth shows the connective tissue at the border of the process being converted into subperiosteal and subperidental bone, which is absorbed from within and rebuilt in Haversian systems. The process around the temporary tooth about to be shed appears as a regular patchwork. (Fig. 12.)

FIG. 12.



Longitudinal section through the tip of the alveolar process of a temporary tooth about ready to be lost. *D*, dentin; *Cm*, cementum, showing absorption and rebuilding; *Pd*, peridental membrane; *B*, bone growing occlusally at the border of the process; *Hb*, rebuilt Haversian-system bone.

In the buccal cortical plate of the mandible the formation under the periosteum, the transformation into Haversian-system, and the change to the cancellous variety may be seen in one field. (Fig. 13.) In connection with the advocacy of the operation of opening the maxillary suture for the increase of nasal space, many statements have been made as to the character of the suture and its function in the growth of the bone, but none of these that I have seen is based upon the study of the tissue, or shows any photomicrographs of the tissue. In general, I think the statement can be made that the connective tissue in the line of the suture is not important as an osteogenetic structure; that the formations of bone that occur are rather mutations like those going on elsewhere within the tissue. In other words, the maxillæ are not pushed apart by formation of bone in the median suture, and the direction of growth is not in that direction. On the other hand, the sutures are important as allowing the changes of adjoining bones to each other during the growth of inclosed organs or surrounding parts, and sutures do not ossify until inclosed structures have obtained their full development.

Fig. 13.

Bone from the buccal plate of the mandible, showing the transformations of bone.

Some years ago I received through the kindness of Dr. A. H. Ketcham of Denver a portion of bone removed by Dr. Carmody in an operation for carcinoma, and containing the intermaxillary suture in the incisal region. I cut sections at right angles to the alveoli of the incisors, and as nearly as possible parallel with the floor of the nose. Six photomicrographs of the tissue accompany this article. (Figs. 14–19.) The bone was somewhat broken by the manner of removal, but is in fair condition. The character of the tissue in the suture is found to be much more densely fibrous than that of the cancellous spaces and is not of the same embryonal character. It does not show the appearance of the osteogenic layer of the periosteum. There is no indication of bone formation as there is under the periosteum, especially in the region of the nasal spine, and only slight indications of rebuilding as occurs in cancellous bone.

DISTRIBUTION OF FUNCTIONAL FORCES BY OCCLUSION.

In the preceding description of the relations of the growth of the teeth to the formation of the maxillæ, reference was

Fig. 14.

Figs. 14–19 inclusive: Photomicrographs of bone in the region of the interpremaxillary suture.

Fig. 15.

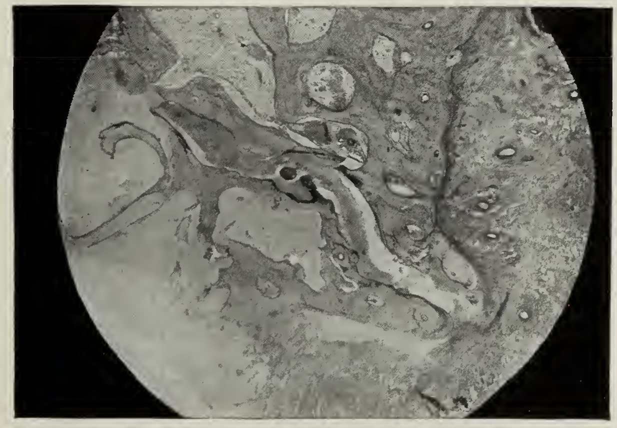


Fig. 16.

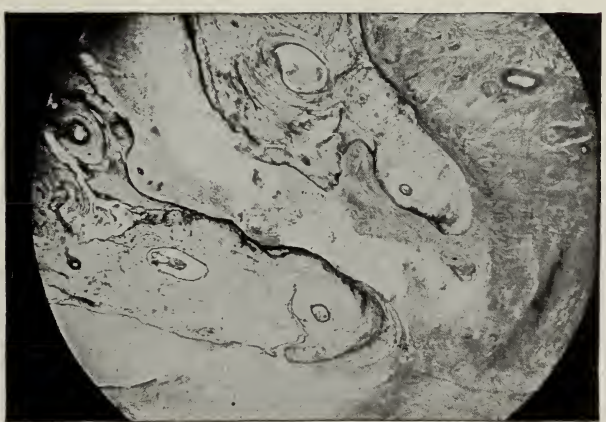


Fig. 17.

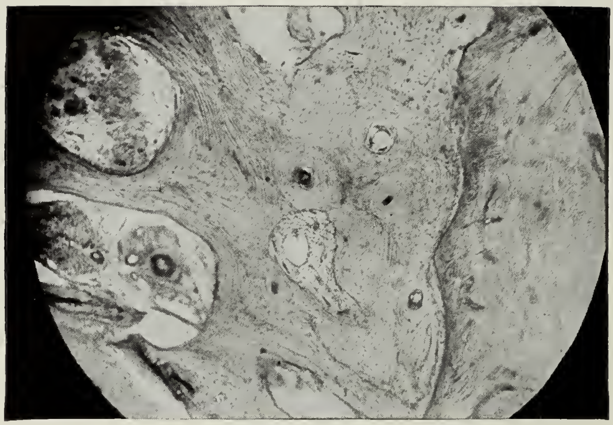


Fig. 18.

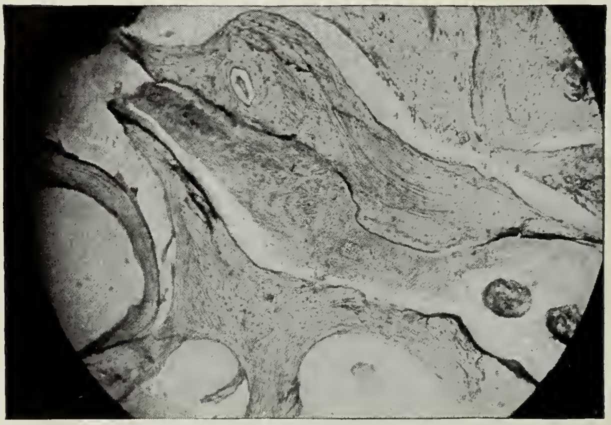
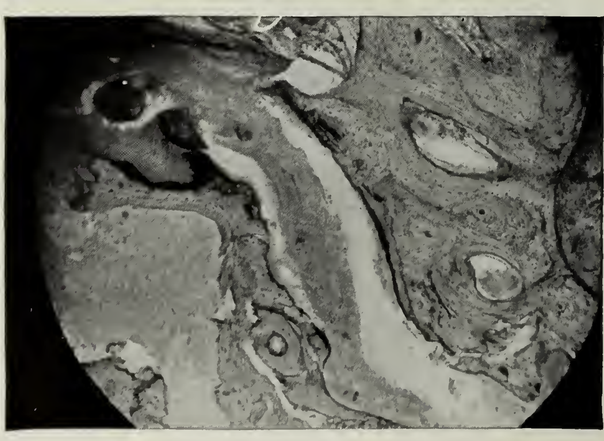
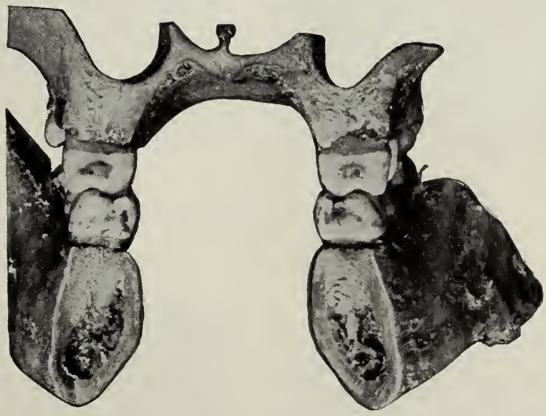


Fig. 19.



several times made to functional forces which exert an influence in producing mechanical stimuli. These forces are exerted to a considerable extent upon the surfaces of the bone through muscular contraction and through the attachment of muscles to the periosteum covering them, but their most important means of distribution is through the teeth and their interlocking inclined planes in occlusion. Dr. E. H. Angle deserves the greatest credit for having discovered in the occlusion of the teeth a mechanism through which forces are distributed and upon which the normal development of the face is dependent. The locking of the buccal cusps of the lower teeth between the cusps of the upper causes the movements of the teeth in mastication to mold the form of the arch. In the lateral grinding movements the buccal slopes of the cusps of the lower teeth press against the lingual slopes of the uppers and exert a powerful influence in widening and rounding the arch. This can be appreciated by closing the jaw firmly and grinding the teeth, when the lateral pressure will be felt, or by examining a vertical section of the skull in the molar region. (Fig. 20.) If the jaws are used chiefly with an up-and-down motion and from front to back, as in the chopping and crushing of meat fiber, the arch will be longer and narrower, and if there is no vigorous use of the teeth in mastication the bones will be under-developed and the respiratory spaces consequently narrowed.

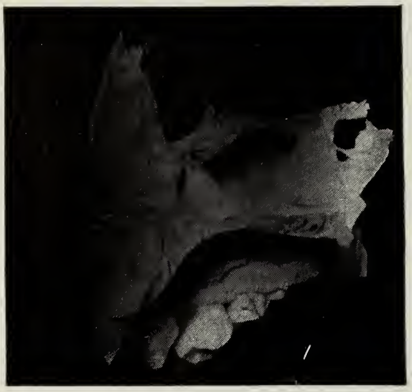
Fig. 20.



Section of the skull in the molar region. (Dr. Cryer.)

Normal respiration during the developmental period exerts the greatest influence upon the growth of the bones. With the mouth closed the lips are pressed against the labial surfaces of the incisors, the lower lip covering about one-third of the upper incisors. The tongue fills the vault of the palate and pushes against the lingual surfaces of the teeth and bone. The air being partially exhausted by the soft palate lying against the base of the tongue, there is a downward pressure on the floor of the nose. With every vigorous inspiration there is a depression of the hyoid bone and consequent pull upon all the muscles extending from it to the mandible and tongue; this increases the pressure on the lingual surfaces of the teeth and the downward pressure on the palate. If breathing is carried on with the mouth open all of these influences are lacking, and the result is shown in the typical deformities of class I, division 1. Unless the incisors are in normal relation the closing of the lips in normal relation is impossible, and consequently, whatever the condition of the respiratory passages, normal breathing is impossible. If the first molars have locked their cusps in abnormal relation, the relation of the incisors cannot be normal, consequently operations for adenoids in children of seven years or older has seldom much effect alone in the cure of mouth-breathing. The function of deglutition is quite as important as that of breathing, and is seldom if ever normal in abnormal breathers. The normal individual swallows about once in two minutes night and day. With each deglutition the teeth are pressed firmly together by the contraction of the elevators of the mandible; this produces the greatest pressure upon the lingual cusps of the upper teeth and the buccal cusps of the lowers, and is an important factor in the development of normal nasal space, for it carries the apices of the roots buccally. At the same time the hyoid bone is elevated and the tongue flattened, pressing on the lingual surfaces of the teeth and pulling upon the roof of the mouth. In the intervals

Fig. 21.



Maxilla from the median line at two years.

Fig. 22.

The same at three years.

Fig. 23.

The same at twelve years.

Fig. 24.

The same at adult years.

the exhaustion of air partially sustains the weight of the mandible. If the lips do not close normally the whole mechanism fails.

Fig. 25.

Fig. 26.

Figs. 25–32 are front views of the series of skulls, photographed with the same arrangements of the camera so as to preserve relative proportions and illustrating the development of the bones of the face.

Fig. 27.

Fig. 28.

CONCLUSION.

Enough has been said to show that throughout growth the nasal cavity increases in depth and width, by the distribution of functional forces through the bone by means of the occlusion of the teeth. The changes in the bone in growth may be best illustrated by viewing the maxillæ from the median line. The four bones were photographed with the same

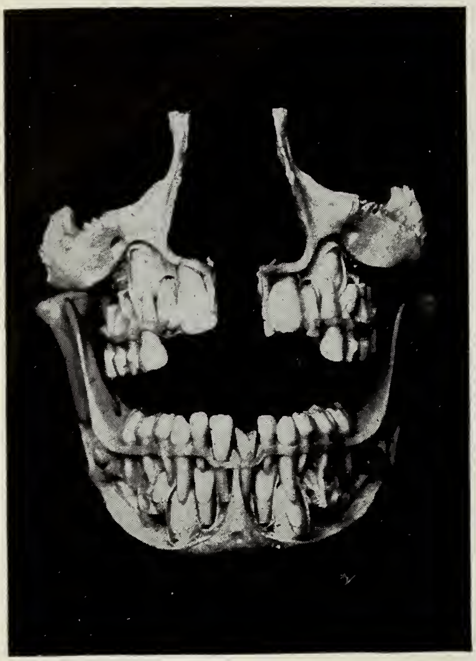


Fig. 29.

Fig. 30.

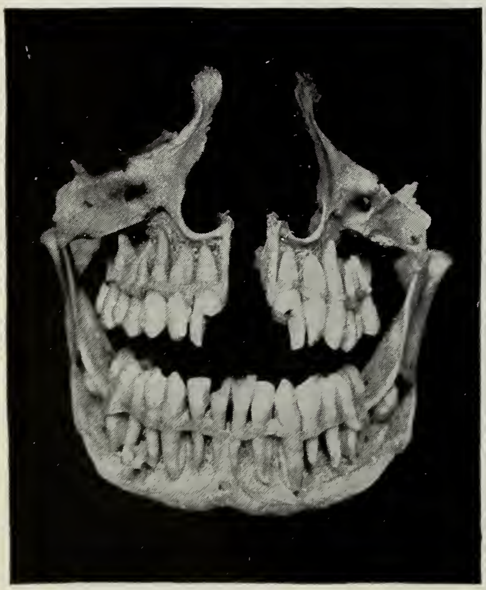


Fig. 31.

Fig. 32.

lens and bellows length, so as to preserve the relative size. (Figs. 21–24.)

In closing, let me repeat that in the development from the infant to the adult the bones are growing under the influence of mechanical stimuli, and for full normal development vigorous normal function is necessary. It is useless to establish normal occlusion of the teeth if normal functional stimuli are not distributed by it, and it is equally useless to clear out obstructions from nasal passages if malocclusion renders normal function impossible. The direction of growth is downward, forward, and outward, increasing the distance from the floor of the nose and the floor of the orbit to the incisal edges of the teeth, and increasing the depth and width of the nasal cavities. We may follow the process in a series of photographs from skulls in the museum of the Northwestern University Dental School, made of the same relative size to show the direction of growth. (Figs. 25–32.)

REMOVABLE AND STATIONARY CROWN AND BRIDGE WORK.

By ALBERT W. JARMAN, D.D.S., Philadelphia, Pa.

(Read before the Cleveland Dental Association, at its monthly meeting, at Cleveland, Ohio, October 7, 1912.)

OVER a year ago I gave a clinic in your city, at the annual meeting of the National Dental Association, on "Removable Bridge Work," and was much gratified with the manner in which the subject was received. The invitation to me to come to your city in order to read a paper on this occasion convinces me that the dental profession of Cleveland is interested in advancing crown and bridge work of a thorough and substantial character.

INDIVIDUALIZATION A REQUISITE IN CROWN AND BRIDGE WORK.

We have in dentistry successful bridge work and unsuccessful bridge work—one a blessing, the other a curse. We cannot reach perfection in all our operations; we are working upon human beings, therefore the success of our work is sometimes hampered by conditions which may develop afterward and over which we have no control.

To obtain success in bridge work, as in everything else, we must have ideals toward which to strive, and scientific principles which must be observed; we must think as well as work. The most interesting feature of bridge work is the fact that each case requires individual consideration and treatment; each case is a rule to itself. Many failures in bridge work are due to lack of consideration of this fact.

THOUGHTFUL CALCULATION OF CROWN AND BRIDGE WORK REQUIRED.

Let us consider bridge work with a view toward the ideal. First, the abutments must be thoroughly and carefully prepared, making each one suitable for its duty of serving as an anchorage for a bridge, in which capacity the tooth or root must sometimes assume the duty of performing double or triple the amount of work which a normal tooth is required to perform, all of which is readily accomplished when the proper preparation and mechanical construction of the bridge has been observed.

Crown and bridge work, well executed

from the beginning of the preparation of the abutment until it reaches the stage of completion of the bridge or crown, should represent thoughtful work. The kind of attachment to be used for joining the bridge to the abutments should also be chosen with due consideration of the mechanical stress exacted. Work constructed upon these principles is not only pleasing to the dentist, but will also be a blessing and a comfort to the patient by its efficiency in restoring the much-needed mastication.

SOURCES OF FAILURE.

Inadequate time for construction. Owing to the many shortcomings existing among dentists, bridge work is sometimes unsuccessful. Fighting against time, on the part of the patient, is somewhat to blame; the patient wants a bridge or crown placed quickly, which means lack of thoroughness in preparing the abutments, as well as poor laboratory construction. Failures are also due to lack of consideration on the part of the dentist who does not take the time required to study thoroughly the needs of the case which is under his care. If a patient is unreasonable regarding the allowance of reasonable time to the dentist for the construction of crown and bridge work, or asks him to perform that which cannot be successfully accomplished, the latter will not lose by his refusing to do the work. *Never attempt the impossible* in bridge work, or failure will be your reward!

Commercialism. Another case for unsuccessful crown and bridge work lies in the commercial side of dentistry, viz, the advertiser with his "teeth without plates" (whatever that may be), the man who welcomes the opportunity afforded him in crown and bridge work for robbing the patient. This work is preyed upon by these people perhaps more than any other specialty of dentistry, as it is a field from which they reap a great harvest.

Ready-made crowns. Many dentists who desire to save time use ready-made crowns regardless of fit. They likewise construct crowns and bridges of all varieties with but one object in view—that of placing something in the mouth that will look like a crown or bridge. To get the money seems to be their goal.

Lack of mechanical skill. Unsuccessful crown and bridge work is not confined to the advertiser. Work of this class is turned out by the practitioner who thinks he is a conscientious worker, but who unfortunately has had no mechanical training. He lacks the mechanical ability to construct the bridge work that will be best suited for his patient, although he may be successful in other departments of dentistry.

SYSTEM REQUIRED IN THE CONSTRUCTION OF CROWN AND BRIDGE WORK.

Crown and bridge work is such an important subject that one paper can never do it justice; books could be written without even touching all the conditions that will arise and explaining how to remedy them. Therefore, to avoid a long paper, I will try to outline as briefly as possible what constitutes, to my idea, a somewhat systematic way of treating the many cases for bridge work as they present themselves in the practice of dentistry. I think the origin of a great many errors lies in the fact that crown and bridge work is pursued without a system, and therefore let us here devote a little time to a systematic way of studying and constructing crown and bridge work.

In some branches of dentistry there seems to be a system laid down for us to follow. To Dr. Black we all owe a debt of gratitude for the system upon which he has placed operative dentistry, as well as for the many other services he has rendered the dental profession. Dr. Angle did much in giving the dentist a system to follow in orthodontia. Let us, therefore, consider the examples these men have set, and try in our own humble way to give consideration to the systematic development in crown and bridge work, applying any principles that may be of service to us.

In crown and bridge work, more than in any other specialty of dentistry, the opportunity is offered of gathering various mechanical principles and using them to further the work. The crown and bridge worker who will not accept new methods which are better than the antiquated ones he is using, is standing in his own light. All of us should be willing to welcome new ideas in dentistry, and gladly give to them the consideration they deserve. The importance of study of our cases cannot be too strongly emphasized; therefore, let us begin our system with a method of studying our cases.

Preliminary study casts of individual cases. In orthodontia, the dentist's first procedure is to procure an impression in plaster, from which he pours casts representing the condition of the patient's teeth in articulated casts of plaster of Paris. These casts he studies carefully preparatory to undertaking the task of regulating teeth. In crown and bridge work the dentist seldom proceeds in that manner. He usually allows a patient to hold a mirror in one hand so that he can see, while he looks hastily over the mouth —considering simply the general condition and the spaces for bridges, without properly taking into account articulation, mechanical stress involved, length of bite, and many other features. This places the dentist sometimes in the awkward position that, after a few visits of the patient, he is forced to change his mind, because he has too hastily jumped at conclusions; he has told the patient that he will make a certain kind of bridge, when he finds upon a later visit that a different kind is required.

In addition, he often makes one bridge, when later on he finds that another bridge in the mouth should have been made first, which would have borne the stress of the bite and thus would have enabled him to construct the second bridge in a more thorough manner. He is also liable to other errors in bridge construction, as one can readily understand when he considers the importance of studying the articulation or bite preparatory to such work. The better way is to make study casts of each individual case. This is not nearly as troublesome as it may seem at first sight, and it will prove a time-saver after all. We do not need plaster impressions to make study casts; a modeling composition impression will serve the purpose very well. If, however, one should desire to use plaster of Paris for these study casts, there is certainly no objection other than that offered by the patient.

FIG. 1.

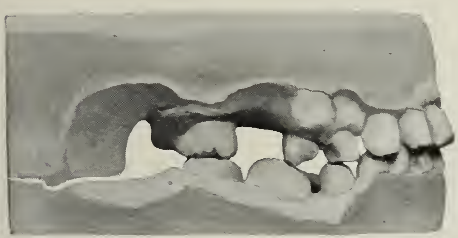


FIG. 2.

The orthodontist must use plaster for impressions, as he has irregular teeth to deal with, and it is necessary that the irregularities be brought out in the impression in their true light. He also desires to construct appliances upon his casts, therefore they must be accurate.

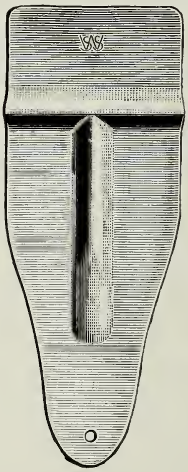
The crown and bridge study casts present to us most clearly the spaces due to missing teeth (Figs. 1 and 2); they also show the length of the bite, which is a very important factor. We can further observe the number of teeth and the mechanical stress which they must withstand if used as abutments. The occlusion must be carefully studied, with a view toward restoring the missing teeth.

Taking impressions. If a patient desires bridge work, the operator should explain exactly the number of bridges required, their construction, and all other details. How much better it is to tell the patient that he will be required to bite into some modeling compound, which can be quickly prepared with hot water, than to give him a mirror and hastily examine the teeth.

To obtain the modeling compound impression, a large piece of compound is softened properly, rolled into a roll, bent into U shape, and placed in the mouth; then the patient is directed to close the mouth, the operator observing that this is done in a proper manner. This whole operation requires but a few minutes. An appointment is made with the patient with instructions for the next visit, on which occasion the kinds of bridges that will be required, and the reasons for the decision, can be fully explained.

Pouring casts. In the interval between these two first visits, the operator has the

Fig. 3.



opportunity to pour the articulating casts in plaster of Paris, after the following manner: The lower cast is poured first, and an articulating plate is placed upon it (Fig. 3). After the plaster has hardened, the articulating plate is removed, and the impression made by the plate is sandaracked. Then the upper cast is poured, and both casts are trimmed in a thorough manner, when the operator will have nicely trimmed articulating casts of the patient's upper and lower jaws. These casts are separated by using hot water to soften the modeling compound, and, by trimming with a sharp knife, are made presentable. These casts having been studied thoroughly, the operator will then be able to decide upon the bridge work which he thinks most suitable for the patient. Having arrived at his conclusions, he can make notes directly on the casts, if desired, as to just what is intended to be done. When the patient returns, he can be shown the casts and told what will be done. Anyone who has never tried this method will be surprised to see the lively interest manifested by the patient, and furthermore, how much the case is simplified by the study casts.

This procedure is also a great timesaver, and time spent in the laboratory is not so valuable as time wasted in trying to study directly from the mouth of the patient.

DECIDING THE CHARACTER OF BRIDGE WORK WITH THE PATIENT.

Shall we educate our patients as to the kind of bridge work we are going to construct for them, or is it best to look wise, and try to practice the mysterious?

In this day of general education, when the public press is discussing various subjects pertaining to professional knowledge, people hear a great deal about different methods pursued in different professions; it is therefore not surprising to note the amount of interest which patients display in professional topics. Casts of their mouths will always interest rather than annoy our patients, and they will even be startled by the limited masticating surface apparent from an examination of the casts of their mouths.

Let us contrast this procedure with the direct examination by the dentist. The patient is looking at his mouth by the aid of a mirror, and not only does he fail to understand, but often the dentist himself fails to discover, the real necessity as to articulating surfaces; in fact, he cannot realize his patient's need for so much bridge work unless he has made articulated study casts. (See Figs. 1 and 2.)

Granting that our examination has been profitable, let us consider the construction of bridges, and the restoration of the deficiencies in mastication which the study casts have shown to exist.

RESTORATION OF NORMAL MASTICATION IMPERATIVE.

Too often dentists complain that they would like to do a certain class of bridge work, but that the patients do not permit it, or that they would like to place bridges in the posterior part of the mouth as well as in the anterior, but the patient fails to understand the need therefor.

This condition, I feel, is largely due to failure on the part of the dentist to educate patients to understand the great need of high-class dental work, which in such cases would constitute a true restoration, or as near a restoration of the natural organs as is within the power of dentists to make. I have never seen a patient who did not thoroughly appreciate the improvement in the conditions from which he had long been suffering. Most patients who ask to have bridge work inserted apply for restoration of anterior teeth, but give practically no consideration whatever to the restoration of lost bicuspids and molars. If a patient loses an anterior tooth, he is anxious to have a bridge or crown, regardless of any other restoration of masticating surface, unless we educate him to the contrary.

In the models which I will show later. I shall endeavor to accentuate the importance of molar and bicuspid restoration in bridge work. (Figs. 4 and 5.) I have called attention to the fact that neither dentists nor patients realize the importance of molar and bicuspid occlusion; dentists are to blame, oftentimes, as much as patients, for some of the smash-ups we have in crown and bridge work.

As members of the dental profession we must proclaim that we will no longer submit to the dictation of patients, nor should we consider it a *bona fide* excuse when a dentist says: "I wanted to make a certain kind of restoration, but the patient would not permit it." In making a bridge as ordered by the patient, but which in his own mind he knows will be very shortlived at best, the dentist commits error in cold blood.

Our first consideration in studying the casts is the molar and bicuspid occlusion. How often we find a mouth that looks fairly well, but in observing our study casts (see Fig. 2) we are brought face to face with the fact that the patient has occlusion only in the six or eight anterior teeth. The majority of cases examined for bridge work show a very limited articulating surface in the posterior part of the mouth. In other cases we find about the same condition, with the feeble assistance of a distal cusp of an inclined molar on each side. Often we note in a mouth lower right or left bicuspids and molars with very few teeth to occlude with in the upper jaw, or upper molars and bicuspids with few or no teeth to occlude with in the lower jaw.

A look at the study casts emphasizes the need of bridge work in such cases, and reveals another important condition —namely, elongated teeth without antagonists, of which condition I will speak later.

What brings patients to us for bridge work? They come principally on account of the loss of anterior teeth, or else on account of their looseness or projecting. The wearing down of the anterior teeth is also very common in these cases.

CROWN AND BRIDGE WORK IN CONNECTION WITH FILLING OPERATIONS.

Often we find operative dentists applying excellent contour fillings in the six or eight anterior teeth, only to have these fillings worn down, together with the retentive tooth structure which contains them; the fillings thus weakened in their retention, drop out. The patient says that "Dr. X's fillings do not stay in," while the real fault lies in the fact that the dentist has not assisted his operative dentistry by using good crown and bridge work to restore the molar and bicuspid occlusion. We must not allow the stress of mastication to be borne by the anterior teeth, which were especially designed for the purpose of incising food. In many patients the faulty occlusion observed could be restored by bridges or crowns, thereby relieving the stress which is threatening the remaining normal teeth with destruction. (See Figs. 4 and 5.)

Let us consider what happens when undue stress is thrown upon the anterior teeth, compelling them to perform the function of mastication.

RESULT OF UNDUE STRESS UPON THE ANTERIOR TEETH.

In a healthy person, sometimes, the anterior teeth remain firm, but are worn down by abrasion until they become sensitive. In some cases the sensitiveness is avoided, by the gradual recession of the pulp, and the incisors are thus worn down to nearly the gum line. In other patients the anterior teeth will spread outward, causing ugly spaces and also protrusion, which is most disfiguring.

FIG. 4.

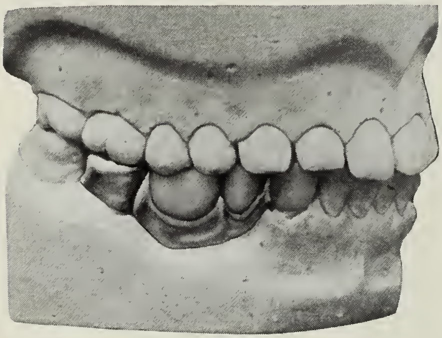


FIG. 5.

If a patient is in a condition of reduced vitality, or has some systemic disease, these teeth loosen, and the pericementum becomes necrotic, and this is due entirely to the excessive work exacted from them. Good bridge work, therefore, which restores the molar and bicuspid occlusion, is often a cure for pyorrhea. Does not a careful study of these conditions prove that it is our duty to place bridges in the posterior part of the mouth, where they will bear the force of the bite, before we make anterior restorations? The patient will often demand to have only the anterior teeth restored, but the dentist must not yield. Such work is sure to result in failure, and give the dentist the reputation among the patient's friends that his bridge work will not last.

THE DENTIST, NOT THE PATIENT, TO DETERMINE THE KIND OF WORK.

I once knew a German whose specialty was framing pictures, which work he executed in a most pleasing manner. If you went into his store to have a picture framed, and the style of frame suggested by you was not appropriate, according to his idea of how the picture should be framed, he would come out very strongly in his denunciation, and then, if you still insisted upon having it framed your way, he would refuse to do it. I asked him one time for his reason for taking this attitude, and his reply was that, if he were to frame pictures in the way that people sometimes wanted them framed, it would sometime be asked, "Who made that hideous frame?" and the customer would disclose his name, but would not think of saying, "I told him to frame it that way."

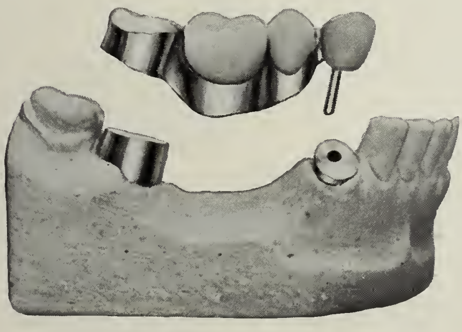
Now, if the honest German could hold to his principles in framing pictures, it seems to me that our professional advice should be followed by our patients, not only for the reason that our stamp is upon our work, or that the patient would not say that he himself insisted on the dentist's doing the work in that way, but also because, if dentistry means anything, and our knowledge of crown and bridge work is based upon scientific facts, we must insist upon work being done in the way which we consider most suitable for the case, or refuse to do it at all.

Let us now adopt a few fixed rules which we may safely follow in constructing crown and bridge work.

SEQUENCE IN CONSTRUCTION OF UPPER OR LOWER BRIDGES.

In cases where both upper and lower bridges are to be made, the lower bridge should always be made first. (Fig. 6.)

Fig. 6.



The anatomical articulation must be restored as nearly as possible by arranging the cusps of the lower bridge to form the curve for the occlusion, and then, when the upper bridge is being constructed, it is adjusted to conform to the lower.

If the upper molars and bicuspids are left on one side, and consequently only a lower bridge is required on that side, while on the other side of the mouth both upper and lower bridges are required, it would be the rule first to make the lower bridge on the side first mentioned, for receiving the stress of the bite. The other side of the mouth can then be bridged by making the lower bridge first, obtaining the proper curve for occlusion, and then constructing the upper bridge last. In large bridges it will be found advantageous to use the anatomical articulator, but in smaller bridges I prefer small articulated plaster casts.

TREATMENT OF ELONGATED TEETH.

We have spoken of the importance of obtaining the proper curve for the occlusion of our teeth, or of imitating as nearly as possible the curve found in normal occlusion. When teeth have been extracted, and the corresponding teeth in the opposite jaw are elongated, it is necessary to shorten these natural teeth rather than to make a dip-down in the masticating surface of the bridge with which they are to occlude.

Bridge work is often made on straight lines in the molar and bicuspid region without any attempt whatever at restoring the natural curve. Elongated teeth must not be allowed to dip down into the masticating surface of any bridge, as it will only lock the occlusion and interfere with normal mastication.

In addition to this, the elongated tooth will have so much leverage thrust upon it owing to the movement of the jaws that, in a short time, it will loosen and be of no value to the patient. Such a tooth, or series of teeth, is therefore ground off, and if the elongation is so pronounced that grinding leaves the teeth sensitive, we must devitalize these teeth, and in some cases crown them.

We often hear patients say that they do not want a tooth sacrificed. Often, when we are obliged to grind a cusp off an elongated tooth, the patient will complain, and say that he does not want this tooth sacrificed, and frequently the dentist will take the same view. A tooth, however, is more often sacrificed by not grinding than by grinding, as, if allowed to remain in an elongated state it will but loosen, owing to the prizing motion to which it is subjected. The dentist, therefore, is fully justified in devitalizing and crowning such a tooth if necessary. Normal occlusion must always be restored as nearly as possible.

REMOVABLE VS. FIXED BRIDGE WORK.

Removable and fixed bridge work both have their use in dentistry. If the bite be long and the abutments strong, removable bridge work is generally the more advisable. All large cases of bridge work should be removable.

A few years ago it was necessary to explain what removable bridge work meant, for there were many plates on the market which were fastened with clasps, also many appliances with various kinds of patent attachments to vulcanite plates, all of which passed under the name of removable bridge work.

The establishing of a recognized system, practical in every way, has given crown and bridge work the highest place in dental prosthesis, which it certainly deserves. Removable bridge work is made possible by using telescope caps, tube and split-pins, and many forms of attachment for abutments. (See Fig. 6.) These are made in a manner and of such material as to withstand the wear caused by the force of mastication without altering their adjustment.

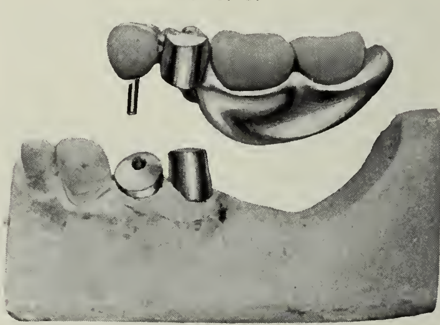
FIG. 7.

Removable bridge work, however, is not always indicated where bridge work is required, and for that reason we must consider stationary bridge work also, so that, with an unbiased knowledge of both, the dentist can see for himself the kind of work suitable for each particular case.

It is needless to say that all crowns are made stationary, there being no advantage in having single crowns removable. Stationary work is positively indicated in cases where the abutment teeth are loose. In these cases a stationary piece well made, of light construction, will act as a permanent splint to the abutments, and thus prolong the life of the teeth. They are not to be used, however, when pus is present, upon teeth which do not respond to treatment. Stationary work can also be used in very small cases of bridge work, depending upon the dentist's judgment.

In many cases of loose abutment teeth carrying removable bridge work, the taking off and inserting of the bridge shortens the life of the already crippled abutment teeth, whereas, under a properly made fixed piece they will often grow firm again. This is particularly true in cases where the looseness of these teeth has been caused by too much leverage being thrown upon them owing to improper articulation.

FIG. 8.



Again, if on two abutments one of which is solid and the other loose a removable bridge were placed, the tight abutment might become loose owing to the strain imposed upon it by the lack of support from the other abutment which is loose and allows the bridge to move when taken off or replaced in the mouth by the patient; in such cases, therefore, stationary bridges should be used.

SADDLE BRIDGES.

Saddle work is a very necessary branch of removable bridge work, and one notable feature contributing to its importance is the fact that it assists the abutments by throwing the strain upon the alveolar ridge. Saddles also restore lingual and buccal contour, and do away with the unpleasant spaces existing under ordinary bridge work. It is of great advantage in the lower jaw to have the lingual contour restored, thereby avoiding all interference with the movements of the tongue.

Restoration of the lingual and buccal contour is, moreover, of great assistance to the patient from its relation to articulate speech.

There are saddles which are continuous between two abutments, and which we call auxiliary saddles, their purpose being to help support, in long bridges, the strain that is imposed upon the bridge by mastication, and also to restore lingual contour. (See Fig. 6.) Another form is the extension saddle, which unites two abutments which are close together. (Fig. 7.) If, for instance, in the lower jaw two abutments consist of the two bicuspids, no molars being present on that side, a saddle should be used extending toward the posterior part of the mouth and supplying the missing molars. (Fig. 8.)

The materials used in crown and bridge work should be the best obtainable, enabling us, with the aid of good and conscientious workmanship, to construct for our patients durable and esthetic work.

My object in presenting this paper was to emphasize some of the points which I find many dentists do not stop to consider, and I trust that a strict attention to the explanations given will assist them in constructing better crown and bridge work.

CASE OF SEVERE, LONG-STANDING TRIFACIAL NEURALGIA CURED BY AVULSION OF THE INFRA-ORBITAL NERVE.

By HENRY GLOVER LANGWORTHY, M.D., Dubuque, Iowa.

THE following case is of considerable interest to stomatologists, first as illustrating that comparatively simple operations on the nerve branches themselves constitute the best treatment in many of these conditions, and second, for the reason that sufficient time has already elapsed to demonstrate that the result achieved in the case under consideration may rightfully be classified as a genuine cure.

CASE HISTORY.

On November 5, 1909, a young farmer, thirty years of age, who had worked on the farm all his life, consulted me in regard to paroxysms of severe pain originating about the right upper lip and about the right cheek. He had first noticed these facial pains some twelve years before, and could assign no reason for their origin. The pain originally began with a small pricking or jerking sensation starting along the right ala of the nostril, and rarely lasted more than a few seconds. During the first seven years of the time mentioned, the intermittent neuralgic attacks on the right side steadily continued, with increasing severity, often lasting from three to seven days. The painful area was limited to a small region on the right cheek, the right side of the nose, and the upper lip—superior maxillary nerve distribution. The pain during this period arose mostly at night. During the past four years the paroxysms of facial pain have continued as before, averaging from five to seven attacks a year, which were so painful that the right eye would water and the upper lip become puffy and exquisitely tender, often remaining so for long periods of time. The patient was treated medicinally by various physicians, with but little benefit. Surgical treatment had been limited to the removal of nasal turbinal tissue in the right nostril and the probing of the lacrimal duct. His teeth had been examined and treated repeatedly by competent dentists, with practically no benefit. As the agony of pain had lately become so acute, the patient pleaded for any operation which would give him some hope of permanent relief. He had spent a thousand dollars, a large sum for him, in trying to obtain some freedom from pain, but never had obtained complete relief.

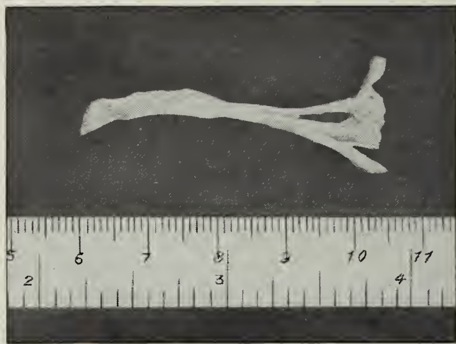
EXAMINATION.

On examination, the region of the upper right half of the lip, the right side of the nose, and a small area over the right cheek proved tender to the touch. Manipulation of the skin over this region was sufficient to start pains. Eating was also said to cause pain at times.

As the area of pain was distinctly limited to the region of a half circle corresponding to the distribution of the infra-orbital nerve, the only treatment recommended was peripheral exposure and avulsion of the entire infra-orbital nerve and its branches. Medicinal palliative treatment was instituted for two weeks, until the patient could adjust some business affairs and return for the operation.

OPERATION.

The operation was performed on December 10, 1909, under chloroform anesthesia. A small incision was made along the lower bony orbital rim, one inch in length, rather close to the nose and above the notch containing the infra-orbital nerve. The infra-orbital nerve was well exposed at its exit from the bony foramen on the face. No special landmarks are here necessary to follow, as the nerve is not difficult to find. Ordinarily, the location of the foramen, while not really palpable in this case, "lies about one-third of an inch below the infra-orbital bony margin and on a line from the supra-orbital foramen to a point between the two bicuspids in both jaws." The nerve with its radiating branches was picked up with a stout hook, and its branches were followed for a short distance out into the tissues of the cheek, and downward toward the nose and lip. A heavy suture was then passed around the main trunk, and all peripheral branches were divided with scissors. Although a fairly careful search was made for the infra-orbital artery and vein, they were not found,



owing to trauma necessary in exposing the nerve. A strong pair of hemostats was used to grasp the nerve, and by slow traction and winding the trunk around the forceps the entire nerve was torn out from its connections posteriorly, and a long piece of the nerve avulsed (see figure). As a matter of fact, the entire length of the infra-orbital nerve was drawn out, and all of the posterior dental branches were probably torn across in their bony canals. Hemorrhage was brisk for a moment after the avulsion of the nerve, but subsided immediately upon introduction of a temporary plug, which was withdrawn in three minutes. The foramen in this case was quite large. The wound was closed with a single subcutaneous stitch of silk braid, and a small pressure bandage was applied.

The length of the operation was about twenty minutes. Quick recovery from the anesthetic was made.

REMARKS.

No post-operative hemorrhage or oozing or untoward accident of any kind occurred. The night of the operation the patient was resting easily, without any of the pain experienced during the hours before the operation. The upper lip, the side of the nose, and the immediate region of the cheek the following day felt numb, but nothing more. There was no special soreness of the teeth. A slight puffiness of the upper lip on the right side gradually disappeared.

Four days after the operation the patient was discharged, primary union of the operative wound having taken place. He left the hospital with the remark that he had the feeling that the "seat of his pain has been removed."

A short time ago, in reply to my request as to how he was getting on, the patient informed me that he has not felt any of the old trouble since the operation, and is grateful for the benefit received.

The only observation of interest that I have to make further is the fact that for the past few years there has been a persistent slight anesthesia of the lip and cheek, and an occasional soreness of the inside of the nose. If the patient should ever develop a similar neuralgia in any one of the other accessible branches of the fifth nerve, I should not hesitate to follow the same procedure.

A WARNING AGAINST THE INDISCRIMINATE USE OF FORMALDEHYD PREPARATIONS.

By CARL J. GROVE, LL.B., Ph.G., D.D.S., St. Paul, Minn.

In common with most scientific branches of learning, the laboratory has rendered a valuable service in the upbuilding of dental medicine. The aid of the laboratory is very important, and the application of this method is indispensable to the advance of dental medicine.

LIMITATIONS OF LABORATORY EVIDENCE.

I fear, however, that the prevailing impression gained by the student of today is that, unless they rest on laboratory confirmation, all diagnosis is doubtful and all therapeutics unscientific.

The laboratory, like all other methods of research, has its limitations. This fact does not mean that the test tube, the culture tube, and the microscope are not of great value. Owing to the great advance achieved through these means of investigation, there is manifested an increasing, perhaps an unconscious tendency to place too much reliance upon laboratory tests at the expense of careful clinical observation.

Laboratory methods of research, to which we owe so much, should be regarded as a supplementary aid upon which to base conclusions, and not as the only means for solving the problems encountered in a practice.

The therapeutic qualities of many of the remedies offered to the dentist today are based only upon laboratory results. Many of the things said and written regarding the action of formaldehyd, when employed in the treatment of septic root-canals, are conclusions derived from these methods.

INJURIOUS EFFECTS OF FORMALDEHYD.

The view held by Dr. Buckley maintaining that a chemical action occurs has been accepted by some as being a correct explanation. But since the presentation of this theory much evidence has been offered which proves its incorrectness.

In June 1910, Dr. J. A. Vuilleumier read a paper before the Massachusetts State Dental Society, published in the *Items of Interest*,* which contains conclusive evidence to show that the chemical theory is erroneous.

It is not my intention to enter into a discussion of the hypothesis at this time, as I have at a previous writing endeavored to show that the conclusions were based upon laboratory experiments unlike the conditions found in a putrescent pulp-chamber. (See December 1911 issue of the DENTAL COSMOS.) The prime object of this paper is rather to show the injurious effect following the use of formaldehyd, and why, as a therapeutic agent, it should be employed with more discretion. That formaldehyd has properties of a very irritating nature, including the power of producing inflammation, is a matter of general knowledge. In view of these facts, it can hardly be expected that formaldehyd can hold its place among the remedies of better therapeutic methods.

The results which appear to be of a curative effect are often of uncertain duration. It is, however, impossible to acquire an adequate conception of the frequency with which pathological conditions are produced by the action of formaldehyd, if we rely for our information upon what is contained in the dental literature on this subject. But as time goes on, I believe formaldehyd will be known as a contributor at least to the production of many incipient pathological conditions. The beliefs contained in this discussion are based upon clinical evidence derived from experience in the use of formaldehyd for a period of years, with experimental proof to confirm these observations. Owing to its gaseous condition, formaldehyd passes through the open apical foramen, coming in direct contact with vital tissue, exerting its influence in the production of inflammation. If the vitality of the tissue is impaired to a considerable extent, a destruction of the affected parts may take place.

No matter whether or not the irritation is sufficient to cause extended destruction of the tissue, there are some very important facts established regarding the action of formaldehyd which must be acknowledged by all:

(1) That formaldehyd has irritating properties.

(2) That it has the property of producing inflammation, and it is well known that, when inflammation is produced, there occurs an alteration of the tissue, and a fluid exudate with a high proportion of albumin is poured out.

(3) That formaldehyd is capable of hardening albuminous tissue, consequently this extravasated fluid resulting from inflammation becomes an insoluble mass, which is not conducive to healthy tissue.

(4) That proteid tissue is hardened by the action of formaldehyd.

These are significant facts, which should not be regarded lightly, or disregarded, when considering this question.

EFFECT OF FORMALDEHYD GAS PASSING THROUGH THE APICAL FORAMEN.

I am of the opinion that it is possible for formaldehyd gas to pass through the dental tubuli and cause serious irritation if not a destruction of the pericemental membrane.

Knowing that the albuminous fluid mentioned is a product of inflammation, it can safely be assumed that whenever formaldehyd is used in the treatment of teeth when soreness exists, whether inflammation follows its use or not, the gas will escape through the root, converting the fluid present to an insoluble elastic mass, unless, perchance, some obstruction has closed the apical foramen. Such a condition may result in suppuration or absorption of the adjacent tissue may occur, ultimately resulting in suppuration. Because no marked disturbance immediately follows the treatment, naturally formaldehyd has not been regarded as

* See *Items of Interest* for September 1910, vol. xxxii, p. 720.

being the specific offender in these conditions. Rather than make a search for the real cause, we allow ourselves to believe that the affliction is due to some condition making perfect root-filling impossible, but fully realize that these sad experiences may be the result of negligence or ignorance.

The investigations which have been made regarding root-fillings show that a large per cent. of these operations are faulty, and while I am of the opinion that a slight imperfection in a root-filling might exert some influence in the production of these disturbances, I am inclined to believe that the method of treatment employed previous to filling the canals is more often the important factor.

True it is that one cannot consistently contend that formaldehyd does not possess much therapeutic virtue, if viewed by laboratory tests, yet, as I have already stated, scientific laboratory deductions cannot be taken as final, for clinical proof is required from that complex laboratory—the human body—to establish its true worth, and often we err in the interpretation of these results.

I do not mean to imply, however, that the result following the use of formaldehyd is always a complete failure, but I am fully convinced that whenever formaldehyd preparations are employed where contraindicated, much harm will follow.

Some assert that, because many of these treated conditions do not immediately reveal serious disturbances, no abnormal condition is produced by the use of these remedies. Conclusions based upon such reasoning are illogical; for experience has shown that often an abscessed condition of the teeth exists, without any discomfort being manifested. Similar conditions are undoubtedly produced by the action of formaldehyd, as I shall endeavor to show.

EXPLANATION OF ILLUSTRATIONS.

Fig. 1 shows what occurs if only a small amount of the albuminous product of inflammation is present, and in direct contact with the apical end, after formaldehyd has converted the substance into an insoluble mass.

Fig. 2 shows the condition produced by formaldehyd if the fluid has entered the root-canal. If the coagulated substance is not sufficient to cause much irritation, it can readily be seen that no further treatment of the affected tissue existing in that region would be permitted.

Fig. 3 shows the condition which undoubtedly follows the action of formaldehyd where some destruction of the tissue surrounding the root has taken place when being supplied by albuminous fluid.

Fig. 1.

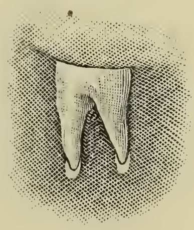


Fig. 2.

Fig. 3.

These drawings are made from results obtained by experiments as shown in Fig. 3. In the mouth of the bottle containing albumin, the root of the tooth was inserted, sealed to prevent the liquid from escaping. Formocresol was sealed in the pulp-chamber. In a short period of time the formaldehyd contained in the formocresol mixture escaped through the root, producing the above results.

DR. BUCKLEY REFUTED.

Dr. Buckley recognizes the dangerous irritating properties of formaldehyd, but maintains that if formaldehyd is diluted with cresol, the irritating properties of the gas are altered by the anodyne action of cresol.

It is rather difficult to accept this statement, in view of the fact that formaldehyd is a gas which would undoubtedly immediately escape from the cresol, thus reaching the tissues undiluted. Even though it could be shown that such an action was exerted, would it not be a dangerous procedure to render the tissue insensible even to the slightest degree to prevent irritation?

It seems needless to enter into further discussion or offer further evidence to show that formaldehyd possesses properties which make its use unsafe in the treatment of pathological conditions resulting from decomposed pulps.

Suffice it to say that, when there are other methods for the correction of these conditions equally satisfactory as, and free from the dangerous properties of, formaldehyd, one is hardly justified in the indiscriminate use of formaldehyd preparations.

The writer wishes to acknowledge his indebtedness to Dr. C. H. Goodrich for the drawings included in this paper.

CHRONIC ALVEOLAR OSTEOMYELITIS (PYORRHEA ALVEOLARIS) —ITS CAUSES, AND TREATMENT WITH VACCINES:

With a Bacteriological Study and Report of 115 Cases.

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(Read before the National Dental Association, Section I, at its sixteenth annual meeting, Washington, D. C., September 11, 1912.)

(Continued from page 36.)

GROUP III: *Far Advanced Stage* (85 *cases*).

Description. The cases under this heading were the advanced cases with marked suppuration, the symptomatic picture of which is well known to you all. The lesions varied from looseness of a few teeth, with marked recession, sponginess, suppuration, and deep-seated sinus formation of the affected teeth, to conditions in which all the teeth were found affected. In some of the cases there were also present necrosis, destruction of the alveolar process, and displacement of the teeth. In a few cases the disease was marked by a series of acute exacerbations in individual teeth, with marked swelling and excruciating pain, coming on all of a sudden and continuing until the affected tooth was removed. Such patients lost three to five teeth in that way before they were referred for vaccine treatment. The majority of the cases in this group, however, were of the slow, insidious, chronic type, with little pain except on mastication. All of the cases had systemic disturbances of one form or another.

Bacteriological findings. The findings of the direct smears of the pus have been described elsewhere. The cultural findings are—

	Cases.
Pneumo. (strepto. lanceolatus pneumoniæ)	18
Staphylo.	1
Pneumo. and staphylo.	49
" " strepto.	3
" staphylo., and strepto.	10
" and M. catarrhalis	1
" and mucos. capsul.	1
Staphylo. and M. catarrhalis	2
Total	85

By far the most frequent organism according to this table is the pneumo. in chains, either alone or in combination with the staphylo. The combination of the pneumo., staphylo., and strepto. is next in frequency. The other organisms appeared only rarely.

Opsonic findings. The opsonic index test was made in 49 of the 85 cases, with the following results:

Opsonic index.

	Below normal.	Above normal.	Normal.	Not tested.	Total.
Pneumo.	39	2	7	1	49
Staphylo.	25	1	20	3	49
Strepto.	4	—	32	13	49
Colon (B. coli) .	18	3	12	16	49

The opsonic findings in this group, as in the preceding groups, were found, with very few exceptions, to corroborate the cultural findings.

Treatment. The average number of treatments of those that were cured in this group was 17, with a maximum of 38 and a minimum of 3, at intervals of from four to seven days in the beginning up to two to four weeks or longer later, according to the local amelioration of the disease. The *duration* of treatment in the cured cases was on an average four and three-quarter months, with a maximum duration of nine months and a minimum of five weeks.*

* One case (No. 65, H.H.) in this group is recorded as cured at the end of one week, after receiving three treatments. She had an acute osteomyelitis of the socket of the lower left third molar. The tooth was removed, and the socket curetted. She was brought to me by her physician for vaccine treatment three weeks after the operation. She had a high temperature and felt very sick all over. Locally there was a big hole discharging pus at the place where the tooth had been removed. All the other teeth were loose, and pus present around several of them. The gums as a whole were markedly inflamed. At the end of three treatments the whole condition of the gums subsided and the operated socket made an uneventful recovery. When she was last seen, nineteen months later (July 10, 1912) the gums were found in healthy condition and no looseness of teeth was present.

Results. In this group of 85 cases, 37 were cured, 40 were markedly benefited, 4 unimproved, and 3 dropped out. One was treated by his dentist and no record obtained from him of the case.

Of the cured cases, 5 remained cured for from thirty to thirty-six months, 11 from twenty-six to twenty-nine months, 8 from twenty to twenty-four months, 9 from fifteen to nineteen months, and 5 from five to twelve months. The improved cases remained improved for several months or years, some getting progressively better even after discontinuing treatment, while others remained stationary.

The permanence of cure in this group is, of course, as would be expected, smaller than in the earlier groups—43 per cent. as compared with 91 per cent. in the former two. However, the dentists who, following a prolonged local treatment, sent those cases to me have assured me that practically all these far advanced cases would have gone on progressively from bad to worse, until all the teeth would have been lost. Under such circumstances 43 per cent. of cured and 47 per cent. markedly improved is, I believe, very encouraging.

Systemic disorders. Of the 85 cases, 45 suffered from rheumatism, 42 had gastro-intestinal disturbances, 3 had chronic furunculosis, 4 post-nasal catarrh and chronic sore throat, 2 had diabetes, and 3 nephritis; besides, 4 had eczema, 3 urticaria, and 1 purpura hemorrhagica. Most of the patients had a combination of two or more of the above systemic troubles.

The cases with rheumatism in this group were of the most advanced types of polyarthritis, arthritis deformans, or severe general muscular rheumatism. The severity of the rheumatic symptoms seemed to be in direct relation to the severity and chronicity of the alveolar osteomyelitic condition, and the improvement of the two were also in direct relation to each other. Of these rheumatic cases, 23 were cured or relieved, 11 were improved, 1 showed no improvement, and 1 was slightly improved. The others either discontinued treatment against

TABLE III.—FAR

No.	Initials.	Sex and age.	Date.	Teeth affected.	Treatments.	Duration of treatments.
31	W. L. A.	M. 40	11-10	All.	?	?
32	F. A.	M. 66	5-16-11	Looseness of teeth. Marked recession.	7	3 months.
33	W. B.	F. 46	8-18-10	All.	13	4 months.
34	M. F. B.	F. 54	6-29-11	Cuspids + bicuspids markedly. Others slightly.	3	2 weeks.
35	A. F. B.	F. 63	1-12-11	1 upper + 2 lower teeth.	6	4 weeks.
36	A. A. B.	F. 55	2-25-11	Upper + lower incisors markedly.	11	3 months.
37	E. B.	F. 28	9-14-10	Lower molars.	3	11 days.
38	J. P. B.	M. 57	7-21-11	Lower incisors. One bicuspid.	?	2 months.
39	J. B. B.	M. 47	12-23-11	Almost all.	?	....
40	A. H. B.	M. 46	4-30-10	Lower molar markedly. Others slightly.	8	1 month.
41	M. B.	F. 26	11-1-09	Marked recession.	12	2 months.
42	J. H. B.	F. 49	10-30-09	All.	11	6 months.
43	L. A. B.	F. 43	11-12-09	Several teeth. General recession.	14	3 months.
44	S. E. C.	F. 72	10-26-11	General recession. Several teeth.	11	8 weeks.
45	F. C.	F. 55	6-16-10	All. Very marked recession.	12	2 months.
46	H. S. C.	F. 56	4-22-10	All.	34	8 months.
47	R. F. D.	M. 60	8-19-10	All.	?	?
48	A. M. D.	F. 34	11-30-09	Several teeth. Marked recession.	26	5 months.
49	C. T. D.	M. 55	4-13-11	Lower incisors markedly. Others slightly.	8	6 weeks.
50	C. J. D.	M. 38	2-17-10	Several teeth.	28	5 months.
51	J. D.	M. 44	11-11-10	All, very badly.	13	3 months.
52	A. E.	F. 51	1-9-11	Lower front.	33	5 months.
53	A. W. F.	M. 53	4-22-09	Several teeth.	7 (irreg.)	11 months.
54	M. F.	M. 51	10-25-11	Several teeth.	6	5 weeks.
55	A. F.	F. 34	7-21-10	Lower rt. incisor.	29	9 months.
56	L. A. G.	M. 50	3-31-10	All.	12	10 weeks.
57	H. G.	M. 28	4-23-10	Several teeth.	?	?
58	H. F. G.	F. 35	7-8-10	All.	?	?
59	G. A. H.	M. 37	3-6-12	First upper molar. Lower left incisor.	6	5 weeks.
60	R. H.	M. 42	3-21-12	14 lost from looseness. 2 very bad now.	27	3 months.
61	W. W. H.	M. 40	6-23-09	All upper teeth. Lower incisors.	6	5 weeks.
62	A. S. H.	M. 52	9-9-10	Right lower molar.	?	3 months.
63	F. E. H.	M. 59	4-4-11	3 teeth.	No record.	?
64	C. F. H.	F. 50	10-1-10	All.	8	2 months.
65	H. H.	F. 33	11-12-10	All (acute case).	3	1 week.
66	S. E. J.	F. 30	1-10-10	All.	18	6 months.
67	P. A. J.	M. 36	1-12-10	4 teeth.	19	5½ months.

Advanced Cases.

Bacteriological findings.	Opsonic indices. Pn.	staph.	strep.	col.	Results.	Other symptoms.
Pneumo. + strepto.					Marked imp. at first. Later neglected treatment. Became worse again.	
Pneumo. Some staphylo.					Markedly imp.	Rheumatism. Urticaria.
Pneumo. Some staphylo.					Cured. 20 months.	Chronic constipation + headaches.
Pneumo. + staphylo.					Imp.	Intestinal flatulence. Rheumatism.
Strepto. Pneumo. Few staphylo.	.69	.94		.68	Markedly imp. 19 months.	Intestinal flatulence. Rheumatism.
Pneumo. in chains. Strepto.	.53	.57		.80	Cured. 15 months.	Pyelitis and cystitis.
Pneumo. Staphylo. Few macro.					Imp.	
Pneumo. Many long + thick bacilli.	.69	1.20	.92		Cured.	
Pneumo. in chains. Staphylo.					Is still under treatment. Imp.	Chronic furunculosis.
Pneumo. + staphylo.	1.10	.72	.90		Markedly imp. 27 months.	Polyarthritis.
Strepto. Pneumo. A few staphylo.	.52		1.22	.68	Cured. 32 months.	Chronic constipation + chr. headache.
Pneumo. + staphylo.	.65	.71		.69	Cured. 28 months.	Intestinal flatulence.
Pneumo.	.70	.55	.97	.50	Cured. 31 months.	Acne. Muscular rheumatism.
Pneumo. + staphylo. Few chains of strepto.					Markedly imp.	Advanced rheumatoid arthritis. Sub-acute inflammatory rheumatism.
Pneumo. + staphylo.	.82	1.17		.68	Cured. 24 months.	General rheumatism.
Staphylo. Some bacilli. Few chains of diplo.					Cured. 21 months.	Rheumatism.
Pneumo.					Imp.	Rheumatism.
Pneumo. Few bacilli + staphylo.	.82	.64	1.09		Imp.	Intestinal flatulence.
Staphylo. Pneumo. in chains. Few strepto.	.77	.58	.96	1.32	Markedly imp.	Intestinal flatulence. Rheumatism.
Pneumo. Strepto.	.58	.90	.93	.66	Cured. 26 months.	Lupus erythematosus. Intestinal flatulence.
Chains of pneumo. Staphylo. + bacilli.	.70	.47		.52	Cured. 17 months.	Gastritis. Rheumatism.
Chains of pneumo. Some macro.	.57	1.38	1.08	.76	Cured. 15 months.	Advanced atrophic arthritis. Arthritis deformans of all joints. Intestinal flatulence.
Principally pneumo. Few staphylo. Few strepto.	.51	.60	.88		Imp.	Intestinal flatulence.
Pneumo. predominating. Few staphylo.					Markedly imp.	Gastritis.
Staphylo.					Cured. 15 months.	Purpura hemorrhagica.
Pneumo. predominating. Some staphylo.	.70	.69	.84	.65	Markedly imp.	Intestinal flatulence. Rheumatism.
Pneumo. Staphylo. Some bacilli.	.74	.85	1.01	.88	Very little imp.	
Pneumo. Staphylo.					No imp.	Intestinal flatulence. Rheumatism.
Pneumo. Staphylo.					Cured. 5 months.	Chronic furunculosis. Intestinal flatulence.
Staphylo. + pneumo.					Markedly imp.	Carbuncle. Diabetes. Intestinal flatulence.
Principally pneumo. Few staphylo. Few chains of strepto.	.74	.61	.89		Markedly imp.	Rheumatism. Intestinal flatulence.
Pneumo. Staphylo. Strepto.	.50	.73	.85		Cured.	Rheumatism. Chronic head colds.
Pneumo. Staphylo. Macro.					No record obtained.	
Pneumo. predominating. Some staphylo.					Cured. 21 months.	Rheumatism. Eczema.
Many long + short bacilli. M. catarrhalis. Few staphylo.					Cured. 21 months.	Subacute pharyngitis + laryngitis.
Pneumo.	.49		.83		Cured. 26 months.	Intestinal flatulence.
Pneumo.	1.34	.73	.90		Cured. 26 months.	

TABLE III.—FAR

No.	Initials.	Sex and age.	Date.	Teeth affected.	Treatments.	Duration of treatments.
68	J. T. J.	F. 36	11-17-08	4 teeth.	6	4 weeks.
69	M. A. K.	F. 53	3-3-11	All.	9	4 months.
70	C. A. L.	F. 64	10-19-09	All.	13	4 months.
71	W. S. L.	F. 59	12-11-10	Several teeth.	2	1 week.
72	M. S. L.	M. 52	2-24-11	All.	3	2 weeks.
73	T. R. McG.	F. 36	8-19-09	Lower molar.	22	4 months.
74	A. J. McK.	F. 46	2-9-10	Right lower incisor.	9	10 weeks.
75	E. B. McL.	F. 38	1-17-10	All.	?	5 months.
76	H. V. McL.	M. 48	1-12-11	All.	15	6 wks. reg. 5 mos. irreg.
77	J. J. M.	M. 44	2-24-12	3 teeth.	11	2 months.
78	F. M.	F. 36	7-31-11	Upper + lower incisors. 2 bicuspids. 1 molar.	14	4 months.
79	C. H. M.	M. 43	3-29-10	Lower incisors. Upper molars.	28	8 months.
80	C. M.	F. 39	11-17-09	Left lower incisor. All right upper teeth.	35	7 months.
81	F. M.	F. 50	12-31-09	All.	19	6 months.
82	R. N.	M. 45	1-19-10	Lower incisors + lower molars.	27	9 months.
83	H. N.	F. 47	2-8-12	Molars + bicuspids.	15	5 months.
84	W. J. N.	F. 50	3-12-11	All.	11	3 months.
85	E. O. O.	F. 42	6-21-09	All back teeth.	18	3 months.
86	S. L. P.	F. 64	5-29-11	Almost all.	?	4 months.
87	C. C. P.	M. 52	3-19-12	All.	1	....
88	W. J. P.	M. 40	1-27-11	Several teeth.	2	2 weeks.
89	M. P.	M. 56	11-28-11	All.	16	5 months.
90	G. A. R.	M. 49	11-1-11	General recession.	6	2 months.
91	D. P. R.	M. 34	9-29-10	Upper incisors.	1	....
92	J. C. R.	M. 43	1-12-10	Front teeth.	?	6 months.
93	G. W. R.	M. 41	12-15-11	All.	12	3 months.
94	S. J. R.	F. 43	12-2-09	All.	5	3 weeks.
95	D. P. R.	M. 41	6-24-10	3 molars.	20	5 months.
96	F. R. R.	M. 57	6-5-11	Upper + lower. Cuspids. molars, incisors.	13	5 months.
97	A. W. R.	M. 61	1-26-10	All.	7	2 months.
98	C. H. R.	F. 37	12-19-11	Several teeth.	5	1 month.
99	M. F. S.	F. 59	10-19-09	All molars.	33	8 months.
100	L. T. S.	F. 34	1-28-10	All.	38	12 mos. irreg.
101	R. S.	F. 37	9-9-10	Several teeth.	1	....
102	K. J. S.	F. 42	4-14-12	Several teeth.	3	3 weeks.
103	W. H. S.	F. 60	4-4-12	All.	3	10 days.
104	J. H. S.	M. 53	2-28-11	All.	?	4 months.
105	M. S.	M. 40	3-30-09	Several teeth.	25	5 months.
106	F. M. S.	F. 49	9-28-10	All.	22	7 months.
107	G. S.	F. 50	1-22-10	Left lower molars. Right upper molars.	12	2 months.

ADVANCED CASES (*Continued*).

Bacteriological findings.	Opsonic indices. Pn.	staph.	strep.	col.	Results.	Other symptoms.
Predominating pneumo. in chains. Few staphylo.	.52	.68	.88	.84	Markedly imp.	Rheumatism. Colon cystitis.
Pneumo. Staphylo.	.61	.81			Markedly imp.	Rheumatism. Intestinal flatulence.
Pneumo. predominating. Few bacilli.	.66	.77		.74	Markedly imp.	Rheumatism. Intestinal flatulence.
Pneumo.	.83	.68		.74	Markedly imp.	Rheumatism. Intestinal flatulence.
Staphylo. M. catarrhalis. Many fusif. bacilli.	.81	.67		.73	Slightly imp.	
Principally pneumo. in chains. M. catarrhalis.	.61	.42	1.13	.74	Cured. 33 months.	Rheumatism. Intestinal flatulence.
Pneumo. in chains. Few bacilli.	.51	1.06	1.00	1.02	Cured. 28 months.	Rheumatism.
Staphylo. + pneumo.	.62	.85	1.09		Cured. 27 months.	Chronic laryngitis + pharyngitis. Intestinal flatulence.
Staphylo. + pneumo.	.78	1.02	.79	.84	Markedly imp.	Intestinal flatulence.
Pneumo. predominating. Few staphylo.	....				Cured. 5 months.	Chronic furunculosis. Chr. bronchitis. Intestinal flatulence. Rheumatism.
Pneumo. + staphylo.	....				Markedly imp.	Intestinal flatulence.
Pneumo. + staphylo.	.78	.85	1.04	.68	Markedly imp.	Rheumatism. Eczema.
Pneumo. predominating. Staphylo.	.68	.72	1.05	.72	Cured. 28 months.	Chr. bronchitis. Post-nasal catarrh. Intestinal flatulence.
Pneumo. in chains. Diplo.	....				Cured. 20 months.	Rheumatism. Intestinal flatulence.
Pneumo.	.68	1.11	1.07		Cured. 22 months.	Gas + stomach distress. Rheumatism.
Pneumo. predominating. Some staphylo.	....				Markedly imp.	Rheumatism. Stomach distress.
Pneumo. Macrodiplo.	1.00	1.10	.70	1.04	Markedly imp.	Hay fever.
Pneumo. predominating. Few staphylo.	....				Imp.	Eczema. Rheumatism. Intestinal flatulence.
Pneumo. Groups of yeast fungi.	.69	.87	1.03	.85	No imp.	Chronic rheumatoid arthritis. Intestinal fermentation.
Pneumo. predominating. Staphylo. A rare bacillus.	....				Dropped out after 1 treatment.	Catarrh. Obesity.
Pneumo. Yeast fungi.	.52	.55	.85	.76	Imp.	Marked intestinal flatulence.
Strepto. predominating. Staphylo. Pneumo. in chain + diplo. forms.	.66	.80	.82		Markedly imp.	Abscess formation. Stomach distress.
Staphylo. Pneumo.	....				No imp.	Intestinal distress.
Pneumo. in chains + diplo. Some staphylo.	.52	.80	1.13	.67	Dropped out after 1 treatment.	Psoriasis. Marked intestinal flatulence.
Pneumo.	.48	.57	.93		Cured. 26 months.	Diabetes. Indigestion.
Staphylo. Pneumo.	....				Markedly imp.	Intestinal flatulence.
Pneumo. Few staphylo.	.65	1.06	.76	.60	Imp.	Rheumatism. Intestinal flatulence.
Pneumo. Staphylo.	....				Cured. 21 months.	Chronic sore throat.
Pneumo. Some staphylo.	....				Markedly imp. 9 months.	Intestinal flatulence.
Pneumo. Staphylo.	.73	.70	.42	1.28	Cured. 29 months.	Rheumatism. Fistula in ano.
Pneumo. Staphylo.	.80	.96		.90	Cured. 8 months.	Intestinal flatulence.
Pneumo. in chains + diplo. forms.	.37	.78	.94	.84	Cured. 28 months.	Rheumatoid arthritis. Intestinal flatulence.
Pneumo. Staphylo.	.56	.72	.97		Markedly imp.	Urticaria.
Pneumo.	....				Dropped out after 1 treatment.	Chronic rheumatism.
Staphylo. Pneumo. Spirillæ.	....				Markedly imp.	Intestinal flatulence. Rheumatism. Chronic urticaria.
Pneumo. predominating. Some staphylo.	....				Markedly imp.	Marked intestinal flatulence.
Many staphylo. Pneumo. Few chains of strepto.	.60	.82	1.02	1.19	Cured. 16 months.	Stomach distress.
Pneumo. Staphylo.		.59	1.03		Cured. 36 months.	Intestinal flatulence.
Pneumo. Staphylo.	....				Cured. 15 months.	Rheumatism. Eczema.
Pneumo. Staphylo.	.71	.69	1.04	.83	Markedly imp.	Rheumatism. Intestinal flatulence.

Table III.—Far

No.	Initials.	Sex and age.	Date.	Teeth affected.	Treatments.	Duration of treatments.
108	W. P. S.	M. 52	6-8-11	All.	27	8 months.
109	A. B. S.	F. 41	8-18-10	Several teeth.	14	3 months.
110	L. S.	F. 35	9-8-10	Upper + lower centrals. Bicuspids + molars.	16	4 months.
111	G. M. T.	F. 45	6-4-11	Lower incisors + cuspids. Upper and lower molars.	26	7 months.
112	C. A. V.	M. 72	1-23-11	Left lower molars.	8	2 months.
113	L. W.	F. 45	10-22-11	Several teeth.	6	2 months.
114	F. B. W.	M. 49	10-12-11	Several teeth.	7	2 months.
115	F. H. W.	F. 42	3-2-11	All.	9	3 months.

advice or were beyond any hope at the beginning of the treatment.

Almost all of those suffering from gastro-intestinal disturbances were relieved or cured by diet, lactic acid milk, and vaccine. The same was true of the eczema, chronic urticaria, and chronic furunculosis cases. (See Table III.) Only 6 of the 85 cases showed no general symptoms.

Urinalysis. The urine was examined in 53 of the 85 cases. Of these, 44 were found acid in reaction, 7 alkaline, and 2 neutral. In 27 of the 85 cases marked indicanuria was present; 3 of the cases showed albumin, and 2 sugar.

Feces examination. The feces were examined bacteriologically in 52 of the 85 cases, with the following results:

B. coli (colon)	39	cases.
" and diplo.	11	"
" " strepto.	2	"

In this group we find in addition to the presence of pneumo. in the feces, also two cases with strepto. It is difficult to determine what these findings actually mean, but, as said before, it may be supposed that they are an extension of the infection due to the swallowing of the pus.

The feces were examined chemically in 30 of these cases: 19 showed an excess of undigested meat remains; the other 11 showed an excess of undigested starch remains. The fermentation test in 11 of the 19 cases that showed an excess of undigested meat showed putrefactive changes, while the remaining 8 showed a carbohydrate fermentation with marked gas formation. All those 11 cases that had an excess of undigested starch remains also showed a typical picture of carbohydrate fermentation, with very marked gas formation.

These findings again seem to indicate, as in the preceding groups, the tendency to an improper digestion of meat in the majority of cases—63 per cent. On the other hand, it also shows the presence in the lower part of the bowels in the majority of cases of an excessive flora capable of fermenting carbohydrates with the production of gas, which is responsible for the flatulence complained of by so many patients.

General Summary.

The causes of the disease, as we said, are mechanical and infectious. Under mechanical causes I called attention to tartar and calculi, which are by far the most important. To these may be added the careless use of the tooth-brush and infected instruments.

The important infectious agents, we said, are the pus-producing bacteria, such as pneumo., staphylo., strepto., and M. catarrhalis. As stated, the disease is not

ADVANCED CASES (*Continued*).

Bacteriological findings.	Opsonic indices. Pn.	staph.	strep.	col.	Results.	Other symptoms.
Pneumo. Few chains of strepto. Staphylo. Many long bacilli.	1.36	.94		1.13	Markedly imp.	Rheumatism. Intestinal flatulence.
Pneumo. predominating. Staphylo. in groups.	......				Cured. 2½ years.	Rheumatism. Dermatitis exfoliativa.
Many chains of pneumo. Some staphylo. Few macro.	......				Cured. 19 months.	Rheumatism.
Pneumo. + Muc. capsul.	......				Cured. 9 months.	Rheumatism. Intestinal fermentation.
Pneumo. Diplomacro.	.65	1.03		1.24	Cured. 1½ years.	Rheumatism. Intestinal flatulence.
Pneumo. Staphylo.	......				Imp.	Severe rheumatism.
Pneumo. Staphylo.	......				Imp.	Rheumatism. Intestinal flatulence.
Some diplomacrococci. Pneumo. Staphylo.	.64	1.18			Cured. 15 months.	Rheumatism. Intestinal flatulence.

in all cases due to one and the same organism, but to a variety of organisms capable of causing infection. The bacteria are responsible for keeping up the disease, though mechanical injuries are responsible for starting it. The same is true of the systemic disorders, which may play only a secondary part (lowered resistance) in starting this local disease, while after it is once established the systemic diseases certainly play an important part in keeping it up.

The results obtained in this series of 115 cases treated with vaccines are (A):

The number and duration of treatments of this series were—(see B).

Thus, according to the above figures, the number of cures, the duration of treatment, and the number of treatments are in direct relation to the chronicity and severity of the disease, particularly the former, as would be expected.

The frequency with which the most important systemic disorders occurred in the whole series is—(see C).

The rheumatic disturbances are apparently in direct relation to the severity of this disease. They increase both in

(A)

Stage.	Percentage— Cured.	Impr.	No impr.	No. of cases— Cured.	Impr.	No impr.
Incipient (Group I)	92	8	—	13	1	—
Mod. advanced (" II)	93	7	—	15	1	—
Far advanced (" III)	43	47	5	37	40	4

(Of the far advanced, 3 dropped out and of 1 no record was obtained.)

(B)

Stage.	No. of treatments. Average.	Max.	Min.	Duration. Average.	Max.	Min.
Incipient (Group I)	6	11	2	6½ wk.	12	3 wk.
Mod. advanced (" II)	12	22	3	3½ mo.	7	2 "
Far advanced (" III)	17	38	3	4¾ "	9	5 "

(C)

Stage.	Percentage— Rheumatism.	Gastro-intest.	Skin affections.	Chronic catarrh.
Incipient (Group I)	35	50	14	7
Mod. advanced (" II)	38	50	12	6
Far advanced (" III)	53	50	13	5

frequency and severity as the disease goes on. The other important complaints are the gastro-intestinal disturbances and neuralgic pains, so called. All the patients seemed to be particularly susceptible to acute coryzas, or "colds," which were at times sufficiently severe to lay them up in bed.

Various other affections were met with, such as asthma, diabetes (2 cases), nephritis (3 cases), purpura hemorrhagica (1 case); but I feel from their rarity that they were not necessarily related to the chronic alveolar osteomyelitis.

The systemic affections accompanying this disease are of great importance, as shown by the above figures, and are to be taken into consideration by the dentist, who at the present day and for many days to come will be the only one to tell the physician of the existence of this disease and make him acquainted with its consequences. These systemic diseases are all ordinarily treated merely symptomatically, while no attention is paid to the local trouble. There is a crying need to get the medical profession awakened to the consequences of this disease, and to consider no physical examination complete without the routine examination of the gums.

Conclusions.

(1) Pyorrhea alveolaris, so called, is in reality a *chronic alveolar osteomyelitis*. It should be known and treated as such.

(2) The sockets are enlarged medullary spaces of the maxillary bones, while the so-called "peridental membrane" is in reality a ligament which keeps the tooth suspended in the alveolar cavity.

(3) The mechanical causes are responsible for starting the disease, while the pyogenic bacteria are responsible for keeping it up—pneumococcus, staphylococcus, streptococcus, and M. catarrhalis.

(4) Chronic alveolar osteomyelitis is a specific disease, though not in the sense that it is always due to one and the same organism; it is due to a variety of organisms, already enumerated.

(5) Systemic diseases play only a secondary part in starting the disease, but may be caused by it, and in turn become responsible for keeping up the local condition.

(6) A great many rheumatic diseases, so called, also a great many gastro-intestinal affections, are, in my opinion, directly related to chronic alveolar osteomyelitis—"Riggs' disease."

(7) The vaccine treatment of this disease, together with the proper attention to diet, cures or relieves the systemic diseases, especially the rheumatic affections.

(8) Vaccine treatment (immuno-therapy), together with local mechanical treatment, yields by far the best results in this intractable disease — CHRONIC ALVEOLAR OSTEOMYELITIS.

Case Reports.

GROUP I: *Incipient Stage* (14 *cases*).

[All the cases were treated with autogenous vaccine in combination with the corresponding stock vaccines (pneumo. and staphylo. stock vaccines usually.]

(1) C. O. B. July 22, 1911. Female, 48 yrs. Gums swollen, bleed easily, receded over left lateral incisors. Continuous menorrhagia with marked secondary anemia; intestinal flatulence. Treated 1 mo. (2 tr.). Gums improved; good in color, no bleeding. General symptoms improved. A year later, gums still in good condition.

(2) L. H. B. May 8, 1912. Male, 30 yrs. General recession of gums, inflamed at margins. Cultures showed pneumo. and staphylo. Chronic constipation; skin of hands cracked and dry (hypothyroidism). Treated 2 mo. (8 tr.). Gums cured. Other symptoms relieved by thyroid. No recurrence.

(3) E. C. Aug. 18, 1910. Female, 35 yrs. Recession of gums, boggy and inflamed at margins. Cultures showed pneumo., staphylo., and macrococci. Rheumatism, intestinal flatulence, chronic constipation, general debility. Treated 2 mo. (7 tr.). Gums healthy and firm. Other symptoms relieved. No recurrence, 22 mo.

(4) G. L. D. Mar. 25, 1912. Female, 44 yrs. Recession and slight inflammation of gums; visible pus present in two sockets. Cultures showed staphylo. and some pneumo. Articular rheumatism, general adiposity (hypothyroidism?), intestinal flatulence. Treated 10 weeks (9 tr.). Gums healthy, no pus. Rheumatism relieved. Lost 28 pounds by diet and thyroid.

(5) S. W. D. Feb. 10, 1912. Male, 29 yrs. General recession of gums, pale and inflamed at margins. Cultures showed pneumo. and staphylo. Intestinal fermentation, rheumatic pains

(muscular) and lameness; psychasthenia. Treated 4 weeks (4 tr.). Gums healthy in color; no inflammation. Feeling well otherwise.

(6) R. E. May 9, 1911. Female, 25 yrs. Recession of gums; bleed easily, inflamed at margins: little visible pus present in three sockets. Cultures showed pneumo. Pustular acne, intestinal flatulence, and chronic constipation. Treated 7 weeks (9 tr.). Gums healthy, no bleeding nor pus. No recurrence. Acne improved.

(7) H. H. Apr. 30, 1910. Female, 35 yrs. Recession, tenderness, and inflammation of gums of five years' duration. Bad taste in mouth. Cultures showed staphylo. and chains of pneumo. Indigestion, chronic constipation, rheumatic pains. Treated 5 weeks (5 tr.). Gums not inflamed, and feels well. Other symptoms relieved. No recurrence.

(8) C. M. K. Dec. 13, 1910. Female, 28 yrs. Recession of gums increasing gradually for seven years. Cultures sterile. General malaise, severe neuralgic headaches. Treated 5 weeks (3 tr.). Recession checked, 20 mo. Other symptoms relieved.

(9) H. K. Sept. 11, 1911. Male, 32 yrs. Gums receded, boggy and inflamed at margins. Cultures showed pneumo. and few staphylo. Marked gastro-intestinal disorders. Treated 6 weeks (2 tr.). Gums firm and healthy. No recurrence. Other symptoms improved.

(10) S. W. M. Sept. 21, 1911. Male, 60 yrs. Recession and slight inflammation of gums. Cultures showed staphylo. and strepto. Chronic empyema of left antrum; facial eczema. Treated 6 weeks (4 tr.). Gums healthy, recession checked. Antral trouble improved; skin well. (Continuing vaccine treatment for antrum by family physician.)

(11) G. H. M. Oct. 21, 1911. Female, 40 yrs. Recession, sponginess, and bleeding of gums. Cultures showed pneumo. and staphylo. Chronic bronchitis, "continuous colds," general malaise, constipated. Treated 2 mo. (8 tr.). Gums firm, no bleeding. Bronchitis and "colds" relieved. No recurrence.

(12) M. M. Sept. 14, 1910. Female, 43 yrs. Recession, bleeding and bogginess of gums; little visible pus present. Cultures showed pneumo. and staphylo. Asthma, rheumatism. Treated 3 mo. (11 tr.). Gums firm, no pus, looking healthy. Other symptoms relieved. No recurrence, 21 mo.

(13) K. W. M. Sept. 19, 1910. Female, 29 yrs. Gums receded and inflamed, bleed easily, tender; gumboils present. Cultures showed pneumo., staphylo., and macro. Stomach and intestinal distress and gas. Treated 1 mo. (7 tr.). Gums in good condition. Other symptoms somewhat relieved. (Left town.)

(14) E. M. P. Oct. 13, 1911. Male, 35 yrs. Recession around a few teeth; one tooth slightly loose. Chronic pustular acne, distress in stomach, and intestinal fermentation. Cultures showed pneumo. and staphylo. Treated 6 weeks (4 tr.). Gums in good condition; tooth firm. Acne improved (is still being treated for it); otherwise well.

Group II: *Moderately Advanced Stage* (16 *cases*).

(15) A. A. Apr. 1, 1911. Male, 45 yrs. General recession and bleeding of gums with some visible pus around lower bicuspid. Cultures showed pneumo. and macro. Psychasthenia. Treated 4 weeks (7 tr.). Recession checked; no pus or tenderness. Other symptoms improved. No recurrence, 17 mo.

(16) W. B. B. Aug. 19, 1910. Male, 50 yrs. Gums receded and inflamed; pus present round few molars for several years; lost one molar. Pain on mastication. Cultures showed pneumo. and staphylo. Rheumatic pains; general debility. Treated 7 mo. (19 tr.). Gums healthy; no tenderness or pus. No recurrence, 18 mo. Other symptoms relieved.

(17) F. C. B. Feb. 17, 1910. Male, 29 yrs. Marked recession of gums; bleeding; pus in socket of right third molar. Cultures showed pneumo. in chains and staphylo. Treated 9 weeks (12 tr.). Marked improvement after second treatment. Gums in good condition, 2½ yrs.

(18) L. B. July 9, 1910. Male, 47 yrs. Receded, boggy, and inflamed gums; some pus visible; few teeth slightly loose. Cultures showed staphylo. and pneumo. Marked rheumatic pains, intestinal flatulence, chronic constipation. Treated 6 mo. (17 tr.). Teeth firm at 8 weeks. Continued treatment for rheumatism, of which he was finally relieved. Gums healthy in color, no pus. No recurrence.

(19) J. B. Mar. 24, 1910. Female, 43 yrs. Marked recession; pus visible; teeth slightly loose. Cultures showed pneumo. and staphylo. Muscular rheumatism, chronic constipation, general debility. Treated 7 mo. (22 tr.). Teeth firm; recession checked. No recurrence, 2 yrs. Other symptoms relieved.

(20) D. J. C. Oct. 7, 1910. Male, 44 yrs. Gums inflamed and receded; pus present in several sockets. Cultures showed pneumo. in chains and groups, and staphylo. Muscular rheumatism, intestinal flatulence, and constipation. Treated 4 weeks (8 tr.). Inflammation subsided. Recession checked. No recurrence, 2 yrs. Other symptoms improved.

(21) C. F. C. Sept. 27, 1909. Female, 41 yrs. Gums receded and anemic, tender, and bleed; front teeth "too long." Cultures showed pneumo. Intestinal flatulence, chronic constipation. Treated 5 mo. (15 tr.). Gums in good condition, 36 mo. Other symptoms relieved.

(22) S. G. Nov. 27, 1910. Female, 42 yrs. Recession and bleeding of gums; very little pus present. Cultures sterile. Rheumatism, gastritis, intestinal flatulence. Treated 7 weeks (8 tr.). Recession checked. No recurrence, 19 mo. Other symptoms improved.

(23) F. R. K. June 7, 1911. Male, 49 yrs. Gums receded, inflamed, and boggy; several teeth loose; visible pus. Cultures showed pneumo., yeast fungi, and many long, thin bacilli. Chronic furunculosis, intestinal flatulence. Treated 1 mo. (6 tr.). Gums looked healthy;

teeth firm; recession checked. No recurrence, 14 mo. Other symptoms relieved. Furunculosis cured.

(24) F. E. K. July 19, 1910. Female, 33 yrs. Marked recession; pus present in sockets of upper bicuspids and molars and lower molars. Seven years' duration. Cultures showed pneumo. General adiposity, intestinal flatulence. Treated 6 mo. (15 tr.). Gums harder and good color; recession checked; no pus. No recurrence. Other symptoms relieved.

(25) P. L. July 26, 1910. Male, 42 yrs. Gums receded, tender, and bleed easily; three teeth loose; pus in sockets of several teeth. Cultures showed pneumo., staphylo., and macrococci. Marked intestinal fermentation, stomach distress, general malaise. Treated 2 mo. (7 tr.). Gums seem healthy; teeth firm; no pus. No recurrence, 12 mo. Other symptoms relieved.

(26) J. M. Feb. 4, 1910. Male, 33 yrs. General recession; gums tender; pus in several sockets. Cultures showed pure staphylo. aur. Treated 6 mo. (22 tr.). Gums in healthy condition; no pus. No recurrence, 24 mo. Other symptoms relieved.

(27) H. F. S. Feb. 13, 1910. Male, 30 yrs. Gums boggy and inflamed, bleed easily, receded in places; pus in several sockets. Pneumo. and staphylo. on cultures. Constipation, chronic tonsillitis. Treated 5 mo. (18 tr.). Gums in healthy condition. No recurrence, 24 mo. Other symptoms improved.

(28) E. S. Oct. 4, 1910. Female, 66 yrs. Gums spongy and inflamed. Root with crown on, loose, pus around it. Cultures showed pneumo. and many macrococci. Indigestion, gas in stomach and bowels, rheumatism. Was advised to have root removed. Treated 2 weeks (3 tr.). Gums healthy. No recurrence. Other symptoms relieved.

(29) G. N. T. Oct. 20, 1911. Male, 46 yrs. Marked recession; gums tender, bleed easily; pus present in a few sockets. Cultures showed staphylo. and pneumo. Intestinal flatulence, general malaise. Treated 9 weeks (9 tr.). Gums in healthy condition. No recurrence, 8 mo. Other symptoms improved.

(30) S. L. May 14, 1911. Male, 40 yrs. Recession of gums; a little visible pus; teeth slightly loose. Pneumo. on cultures. Stomach distress, asthma, intestinal flatulence. Treated 5 weeks (4 tr.). Gums improved. (Discontinued treatment against advice.)

Group III: *Far Advanced Stage* (85 cases).

(31) F. A. May 16, 1911. Male, 66 yrs. Marked recession and looseness of all teeth; profuse suppuration. Pneumo. and staphylo. on cultures. Rheumatism, intestinal flatulence, and urticaria. Treated 3 mo. (7 tr.). Gums markedly improved; teeth firmer; very little pus. Feeling generally better.

(32) W. B. B. Aug. 19, 1910. Female, 46 yrs. Marked recession. Gums painful and sensitive; one tooth very loose, others slightly loose. Much pus. Pneumo. and staphylo. on cultures. Chronic constipation, headaches, general malaise. Treated 4 mo. (13 tr.). Gums in healthy condition; no pus; loose teeth tightened up. No recurrence, 21 mo. Other symptoms relieved.

(33) M. F. B. June 29, 1911. Female, 54 yrs. Bleeding and soreness of gums; several teeth loose; lost one tooth from looseness. Eczema and intestinal flatulence. Treated 2 weeks (3 tr.). Gums improved. Other symptoms benefited. (Discontinued treatment.)

(34) W. A. Nov. 1910. Male, 45 yrs., traveling salesman. Marked recession; all teeth loose; marked suppuration; severe pain on mastication. Treated irregularly for several months. Gums slowly improved. (Became discouraged at slow progress; had all teeth removed against advice, and artificial dentures put in.)

(35) A. F. B. Jan. 12, 1911. Female, 63 yrs. Marked recession and tenderness; two teeth very loose; lost two teeth from looseness; considerable pus. Strepto., pneumo., and staphylo. on cultures. Rheumatism, chronic constipation. Treated 4 weeks (6 tr.). Gums markedly improved and feel comfortable; teeth firmer. (Discontinued treatment against advice.)

(36) A. A. B. Feb. 25, 1911. Female, 55 yrs. Gums markedly receded; several teeth very loose; pus in many sockets. Cultures showed pneumo. in chains and strepto. Colon cystitis and pyelitis of 20 years' standing. Treated with B. coli (autogenous) of urine, and autogenous vaccine of gum pus for 3 mo. (11 tr.). Gums healthy; teeth firm; no pus. Other symptoms relieved. No recurrence, 16 mo.

(37) E. B. Sept. 14, 1910. Female, 28 yrs. Gums boggy and inflamed; several teeth loose; abundant pus. Pneumo. and staphylo. on cultures. Convalescing from abdominal operation. Treated 11 days (3 tr.). Gums looked better. (Discontinued treatment against advice.)

(38) J. P. B. Mar. 4, 1911. Male, 57 yrs. Lower incisors and one bicuspid loose; pus in sockets of loose teeth; general recession of gums. Pneumo. and many long, thick bacilli on cultures. Treated irregularly 6 weeks. Gums improved; teeth firmer. General health improved.

(39) J. B. B. Dec. 23, 1911. Male, 47 yrs. Several teeth loose, several lost from looseness. Abundant pus. Cultures showed staphylo. and pneumo. Chronic furunculosis, chronic constipation. Still under treatment (by dentist). Gums markedly improved; teeth firmer. Other symptoms relieved.

(40) A. H. B. Apr. 30, 1910. Male, 46 yrs. Lost six teeth from looseness; one tooth very loose, several slightly. Profuse pus. Pneumo. and staphylo. on cultures. Polyarthritis, general debility. Treated 1 mo. (8 tr.). All but the very loose tooth tightened up; pus greatly diminished; mouth looked better generally. Obliged to discontinue treatment. Heard from 30 mo. later: Very loose tooth dropped out; other teeth well; gums in healthy condition.

(41) M. B. Nov. 1, 1909. Female, 26 yrs. Gums show general recession, are sensitive, discolored, and boggy. Little pus. Cultures showed strepto., pneumo., and staphylo. aur. Chronic constipation, headaches, general malaise. Treated

2 mo. (12 tr.). Gums healthy. No recurrence, 32 mo.

(42) J. H. B. Oct. 30, 1909. Female, 49 yrs. Lost all upper and several lower teeth from looseness, all remaining teeth loose; gums tender, receded, painful on mastication. Cultures showed pneumo. and staphylo. Indigestion, flatulence, headaches, and general malaise. Treated 6 mo. (11 tr.). Gums well; no pus; no tenderness on chewing; teeth firmer. General health improved.

(43) L. A. B. Nov. 12, 1909. Female, 43 yrs. Gums tender, bleed easily; several teeth slightly loose; pus present in sockets. Pustular acne, muscular rheumatism. Treated 3 mo. (14 tr.). Teeth firm; no tenderness of gums. Other symptoms relieved. No recurrence, 21 mo.

(44) S. E. G. Oct. 26, 1911. Female, 72 yrs. Gums receded, tender, and inflamed, three loose teeth, several lost from looseness. Pus in sockets. Staphylo., pneumo. in chains, and strepto. on cultures. Advanced rheumatoid arthritis, intestinal flatulence, and gastritis. Treated 8 weeks (11 tr.). Teeth firmer; little pus. Other symptoms slightly improved. (Discontinued treatment; had to leave town.)

(45) F. C. June 16, 1910. Female, 55 yrs. Gums markedly receded, boggy, tender, and inflamed; several teeth loose; pus in a few sockets. Staphylo. and diplo. on cultures. Rheumatism, articular and muscular. Treated 2 mo. (12 tr.). Teeth firm; gums look healthy. No recurrence, 24 mo. Rheumatism improved.

(46) H. S. C. Apr. 22, 1910. Female, 56 yrs. Gums receded, inflamed, and bleed easily; several teeth loose; pus in a few sockets. Staphylo., a few diplo. chains and bacilli on cultures. Rheumatism, general malaise. Treated 8 mo. (24 tr.). Teeth firm, recession checked; no pus. Other symptoms disappeared. No recurrence, 21 mo.

(47) R. F. D. Aug. 19, 1910. Male, 60 yrs. Physician. General recession and tenderness of gums; one tooth very loose, others slightly; pus in several sockets. Cultures showed pneumo. and staphylo. Muscular rheumatism. Treated irregularly for 8 weeks. Gums improved.

(48) A. M. D. Nov. 30, 1909. Female, 34 yrs. Gums markedly receded, tender, and bleed easily; two teeth very loose; pus in several sockets. Cultures showed staphylo., pneumo., and bacilli. Rheumatic pain in leg, intestinal flatulence. Treated 5 mo. (26 tr.). Teeth firmer; no pus; gums healthy. Other symptoms relieved.

(49) C. T. D. Apr. 13, 1911. Male, 55 yrs. Gums markedly receded, swollen, boggy, and inflamed; one tooth very loose, others slightly; pus in several sockets. Pneumo. in chains, staphylo, and strepto. on cultures. Rheumatism. gas in stomach and bowels. Treated 6 weeks (8 tr.). Gums markedly improved; teeth firmer; no pus. Feels well generally.

(50) C. J. D. Feb. 17, 1910. Male, 38 yrs. Gums receded, painful and bleed easily; several teeth loose; great deal of pus. Cultures showed pneumo. and strepto. Lupus erythematus, intestinal flatulence. Treated 5 mo. (28 tr.). Gums in healthy condition; no pus; teeth firmer. No recurrence, 26 mo. Skin trouble improved; other symptoms relieved.

(51) J. D. Nov. 11, 1910. Male, 44 yrs. Gums very sore, bleed easily, boggy, swollen, and painful; all teeth loose; considerable pus surrounding each tooth, lost eight teeth from looseness. Pneumo. in chains, staphylo., and bacilli on cultures. Gastritis, chronic diarrhea, rheumatism. Gums too tender for instrumentation. After third injection gums sufficiently improved for local dental treatment. Treated with vaccine 3 mo. (13 tr.). Gums in healthy condition; teeth firm; no pus; comfortable on mastication. Other symptoms relieved. Has prophylactic treatment every 3 or 4 mo.

(52) A. E. Jan. 9, 1911. Female, 51 yrs. Gums markedly receded and inflamed; several teeth loose; little pus; lost one tooth from looseness. Cultures showed pneumo. in chains and macrococci. Atrophic arthritis, arthritis deformans of all joints, intestinal flatulence. Treated 5 mo. (33 tr.). Loose teeth firmer; gums look healthier; mouth feels better. Rheumatism slightly improved; other symptoms markedly improved.

(53) A. W. F. Apr. 22, 1909. Male, physician. Several teeth loose; marked recession, tenderness, and marked suppuration of gums. Cultures showed pneumo., staphylo., and a few strepto. Intestinal flatulence. Treated irregularly for several months (7 tr.). Gums felt better; less pus. (Felt comfortable. Too busy to attend to it.)

(54) M. F. Oct. 25, 1911. Male, 51 yrs. Gums receded and inflamed. Painful on mastication; two teeth very loose, two lost from looseness. Great deal of pus present. Cultures showed pneumo. and strepto. Gastritis, intestinal flatulence. Treated 5 weeks (6 tr.). Pus diminished; teeth firmer. (Felt comfortable. Discontinued treatment against advice.)

(55) A F. July 21, 1910. Female, 34 yrs. Gums receded and inflamed, bleed easily; one tooth very loose; little pus. Cultures showed staphylo. Purpura hemorrhagica of lower part of body, 2½ yrs'. duration. Treated 9 mo. (29 tr.). Gums healthy; tooth firm; no tenderness or bleeding. No recurrence, 15 mo. Purpura relieved by thyroid and diet.

(56) L. A. G. Mar. 31, 1910. Male, 50 yrs. General recession; all teeth loose; pus discharging freely from sockets. Cultures showed pneumo. and staphylo. Rheumatism, stomach distress, intestinal flatulence, and general malaise. Treated 10 weeks (12 tr.). Teeth firm; no pus; gums healthy. Other symptoms improved. No recurrence, 27 mo.

(57) H. G. Apr. 23, 1910. Male, 28 yrs. Gums receded; two teeth very loose; pus in sockets of loose teeth. Cultures showed pneumo., staphylo., and bacilli. General malaise. Treated by family physician for 8 weeks. Very little improvement.

(58) A. F. G. July 8, 1910. Female, 35 yrs. All teeth loose, and profuse discharge of pus; lost three teeth from looseness. Pneumo. and staphylo. on cultures. Muscular rheumatism, chronic diarrhea, dyspepsia. Vaccines sent to

her dentist to follow out treatment. No improvement.

(59) G. A. H. Mar. 6, 1912. Male, 37 yrs. Gums receded and inflamed, tender on mastication; lost two teeth from looseness, several teeth loose, pus present around them. Pneumo. and staphylo. on cultures. Chronic furunculosis, intestinal flatulence. Treated 5 weeks (6 tr.). Gums in healthy condition; no pus; teeth firm. Other symptoms relieved.

(60) A. S. H. Sept. 9, 1910. Male, 52 yrs. Gums receded, boggy, and tender; several teeth loose; one very loose· pus in sockets of loose teeth. Cultures showed pneumo., staphylo., and strepto. Rheumatism, continuous "colds," cough. Treated 2 mo. by his family physician. Gums healthy; very loose tooth tighter, others tight; no pus. Feeling well generally. No recurrence, 21 mo.

(61) Mar. 21, 1912. Male, 42 yrs. Two very loose teeth, discharging pus freely; lost fourteen teeth from looseness; marked general recession of gums. Staphylo. and pneumo. on cultures. Bad carbuncle on neck; diabetes. Treated 3 months (27 tr.), primarily for carbuncle. Gums improved; no pus; teeth firmer. Carbuncle cured.

(62) W. W. H. June 23, 1909. Male, 40 yrs. Very marked recession; four loose teeth; profuse pus; difficulty in chewing. Cultures showed pneumo., staphylo., and strepto. Intestinal flatulence, rheumatism. Treated 5 weeks (6 tr.). Gums improved; little pus; teeth firmer; no tenderness. Other symptoms relieved.

(63) F. E. H. Apr. 4, 1911. Male, 59 yrs. Gums receded and inflamed; three teeth loose; profuse pus. Cultures showed pneumo., staphylo., and macro. Chronic naso-pharyngitis, rheumatism. Treated by dentist. No report received.

(64) C. F. H. Oct. 1, 1910. Female, 50 yrs. Gums receded, tender on chewing, and bleed easily; one tooth very loose; pus. Cultures showed pneumo. and staphylo. Rheumatism, eczema, gas in stomach and bowels. Treated 2 mo. (8 tr.). Gums in healthy condition, tooth firm; no pus. No recurrence, 21 mo. Other symptoms relieved.

(65) H. H. Nov. 12, 1910. Female, 33 yrs. Acute general inflammation of gums. All teeth loose, profuse pus. Left lower third molar removed, socket curetted, and some necrotic bone removed, three weeks before she was brought to me by her physician. Wound slow in healing. Cultures showed diplo., staphylo., and long and short bacilli. Subacute pharyngitis and laryngitis. Treated 1 week (3 tr.). Marked improvement in gums; acute inflammation and suppuration subsided; wound healing rapidly; teeth firmer. Discontinued treatment. Seen 19 mo. later: Gums healthy. Feeling well generally.

(66) S. E. J. Jan. 10, 1910. Female, 30 yrs. Gums very markedly receded, painful, tender, and inflamed; four teeth lost from looseness, the rest remaining loose, two very loose; pus in many sockets. Cultures showed pneumo. Intestinal flatulence and chronic constipation. Treated 6 mo. (18 tr.). Gums looked healthy; all teeth firm except the two that were very loose; no soreness or pus. Feeling "unusually well."

(67) P. A. J. Jan. 12, 1910. Male, 36 yrs. Marked recession; lost two teeth from looseness, four teeth loose, one very loose; profuse pus. Was advised to have very loose tooth removed. Pneumo. on cultures. Gas in stomach and bowels, severe headaches. Treated 5½ mo. (19 tr.). Gums in good condition; very loose tooth removed, others firm; no pus. No recurrence, 26 mo. Other symptoms relieved.

(68) J. T. J. Nov. 17, 1908. Female, 36 yrs. Gums receded, painful, and bleed easily; four teeth loose; pus in sockets of loose teeth. Cultures showed pneumo. and staphylo. aur. Rheumatism, colon cystitis. Treated 4 weeks (6 tr.). Teeth firmer; little pus present; gums felt comfortable. (Discontinued treatment.)

(69) M. A. K. Mar. 3, 1911. Female, 53 yrs. Marked recession and inflammation of gums; one tooth very loose, lost four teeth from looseness; considerable pus in socket of loose tooth. Cultures showed pneumo. and staphylo. Rheumatism, intestinal flatulence. Treated 4 mo. (9 tr.). Gums improved; tooth firmer. Other symptoms relieved. Seen a year later. Gums in healthy condition.

(70) C. A. L. Oct. 19, 1909. Female, 64 yrs. Gums receded and anemic; lost all upper teeth and eight lower, remaining teeth loose; profuse pus. Cultures showed pneumo. and a few bacilli. Gastro-intestinal disturbances, rheumatism, general debility. Treated 4 mo. (13 tr.). Gums markedly improved; teeth firm; very little pus present. Other symptoms relieved.

(71) W. S. L. Dec. 11, 1910. Female, 59 yrs. General recession; several teeth loose and pus around them. Cultures showed pneumo. Stomach and intestinal flatulence, rheumatism. Treated 1 week (2 tr.). Obliged to leave town. Gums felt better; little improvement as to pus and looseness.

(72) M. S. L. Feb. 24, 1911. Male, 52 yrs. Gums receded; lost one tooth from looseness, several teeth loose; profuse pus. Cultures showed staphylo., M. catarrhalis, and fusiform bacilli. Treated 2 weeks (3 tr.). Gums slightly improved; pus lessened. Felt comfortable. (Discontinued treatment against advice.)

(73) T. R. M. Aug. 19, 1909. Female, 36 yrs. Gums inflamed and boggy, receded in places; mastication painful, one tooth very loose; pus in socket. Cultures showed pneumo. in chains and M. catarrhalis. Rheumatism, constipation, intestinal flatulence. Very loose tooth removed. Treated 4 mo. (22 tr.). Gums in good condition. Felt well generally. No recurrence, 33 mo.

(74) A. J. M. Feb. 9, 1910. Female, 46 yrs. Gums receded, congested, bleed easily; one loose tooth; pus in socket. Cultures showed pneumo. in chains and a bacillus. Rheumatism, chronic constipation. Treated 10 weeks (9 tr.). Reces-

sion checked; no bleeding or tenderness; tooth firm. No recurrence, 28 mo. Other symptoms relieved.

(75) H. V. M. Jan. 12, 1911. Male, 48 yrs. Gums receded, tender on chewing; lost two teeth from looseness, all others loose. Pneumo. on cultures. Stomach and intestinal flatulence, general malaise. Treated irregularly for 6 mo. (15 tr.). Gums felt better. Other symptoms improved. (Too busy to continue treatment.)

(76) E. B. M. Jan. 17, 1910. Female, 38 yrs. Gums receded and tender; lost two teeth, all others loose; profuse pus. Cultures showed staphylo. and pneumo. Chronic naso-pharyngitis and laryngitis, intestinal fermentation. Treated 5 mo. (by family physician). Gums healthy; teeth firm. Other symptoms relieved.

(77) J. M. Feb. 24, 1912. Male, 44 yrs. Gums receded, boggy, and tender; three teeth loose; pus in sockets. Cultures showed pneumo. and staphylo. Chronic furunculosis, bronchitis, rheumatism, and intestinal flatulence. Treated 2 mo. (11 tr.). Gums in good condition; teeth firm; no pus. Feels comfortable. Other symptoms relieved.

(78) F. M. July 31, 1911. Female, 36 yrs. Gums very spongy, inflamed, and tender on chewing; one tooth very loose, four other teeth lost from looseness. Profuse pus. Cultures showed pneumo. and staphylo. Stomach and intestinal flatulence, headaches. Treated 4 mo. (14 tr.). Tooth firm; gums in healthy condition. No recurrence, 11 mo. Other symptoms relieved.

(79) C. H. M. Mar. 29, 1910. Male, 43 yrs. Gums markedly receded and inflamed; has difficulty in talking; three teeth very loose, had two of them removed; profuse pus. Cultures showed pneumo. and staphylo. Rheumatism, intestinal fermentation, eczema. Treated 8 mo. (28 tr.). Gums in good condition. Other symptoms relieved.

(80) C. M. Nov. 17, 1909. Female, 39 yrs. Gums receded, inflamed, boggy, and very sensitive; several teeth loose; pus in sockets. Cultures showed pneumo. and staphylo. Chronic bronchitis, postnasal catarrh. Treated 7 mo. (35 tr.). Gums look healthy; teeth tight. No recurrence, 28 mo. Other symptoms improved.

(81) F. M. Dec. 31, 1909. Female, 50 yrs. Gums markedly receded and inflamed, tender on chewing; one tooth very loose, others slightly; lost two teeth from looseness. Pus cultures showed pneumo. in chains and diplo. Rheumatism, gas in stomach and bowels. Treated 2 mo. Felt comfortable. Discontinued treatment against advice; returned later. Treated 4 mo. (19 tr. altogether). Gums healthy; tooth firm. Other symptoms relieved.

(82) R. N. Jan. 19, 1910. Male, 45 yrs. Gums receded, spongy, and painful on mastication; several teeth loose. Profuse pus from sockets. Cultures showed pneumo. Stomach and bowel distress, rheumatism. Treated 9 mo. (27 tr.). Gums in good condition; teeth firm. No recurrence, 22 mo. Other symptoms relieved.

(83) H. N. Feb. 8, 1912. Female, 47 yrs. Gums receded, sore, spongy; lost two teeth from looseness, all teeth slightly loose; little pus. Cultures showed pneumo. and staphylo. Stomach distress and gas, articular rheumatism. Treated 5 mo. (15 tr.). Gums healthy; teeth firm; no pus. Other symptoms relieved.

(84) W. J. N. Mar. 12, 1911. Female, 50 yrs. Gums tender, receded, boggy, and inflamed; three teeth very loose, all slightly, lost 6. Profuse pus. Cultures showed pneumo. Intestinal fermentation, hay fever. Treated 3 mo. (11 tr.). Gums markedly improved; teeth firmer; no pus. No recurrence. Was free from hay fever the following year.

(85) E. C. O. June 21, 1909. Female, 42 yrs. Gums sore, very boggy and inflamed; several teeth very loose; profuse pus. Cultures showed pneumo. and staphylo. Treated 3 mo. (18 tr.). Gums improved; little pus; no soreness; teeth firmer. (Discontinued treatment against advice.)

(86) S. L. P. May 29, 1911. Female, 64 yrs. Gums markedly receded; lost several teeth, several very loose now; profuse pus. Cultures showed pneumo. and yeast fungi. Chronic rheumatoid arthritis, intestinal fermentation. Treated 4 mo. by family physician. No apparent improvement.

(87) C. C. P. Mar. 19, 1912. Male, 52 yrs. Gums receded and spongy; all teeth affected and slightly loose; pus. Cultures showed pneumo. and staphylo. Had 1 treatment and dropped out. (Of value for cultural findings.)

(88) W. J. P. Jan. 27, 1911. Male, 40 yrs. Marked recession and inflammation of gums; several teeth loose; little pus present. Pneumo. and yeast fungi on cultures. Stomach and bowel distress, marked flatulence. Treated 2 weeks (2 tr.). Gums looked better. Felt comfortable. (Discontinued treatment.)

(89) M. P. Nov. 28, 1911. Male, 56 yrs., physician. Very marked recession; all teeth loose; acute abscess formation and inflammation; profuse pus. Cultures showed strepto., pneumo., and staphylo. Stomach and bowel distress. Marked gas formation. Treated 5 mo. (16 tr.). Gums markedly improved; no pus; teeth firmer. Other symptoms improved.

(90) G. A. R. Nov. 1, 1911. Male, 49 yrs. Gums receded and inflamed; lost four teeth from looseness; little pus. Cultures showed staphylo. and pneumo. Stomach and intestinal distress, neuralgic pains of face, general malaise. Treated 2 mo. (6 tr.). Marked improvement of gums. Other symptoms relieved.

(91) D. P. R. Sept. 29, 1910. Male, 34 yrs. Gums markedly receded and boggy; difficulty in chewing; all teeth loose. Pus cultures showed pneumo. and staphylo. Psoriasis, marked intestinal flatulence. (Had 1 treatment; objected to diet. Discontinued treatment.)

(92) J. C. R. Jan. 12, 1910. Male, 43 yrs. Gums swollen, sore; two teeth loose, lost one from looseness. Profuse pus. Cultures showed pneumo. Diabetes, indigestion, general debility. Treated with vaccine by dentist for 6 months. Gums healthy; no tenderness; teeth firm; no pus. Other symptoms relieved. No recurrence, 26 mo.

(93) G. W. R. Dec. 15, 1911. Male, 41 yrs.

Gums very receded and inflamed; six teeth very loose, lost three from looseness; pus in one socket. Cultures showed pneumo. and staphylo. Stomach and intestinal flatulence, general malaise. Treated 3 mo. (12 tr.). Gums healthy; teeth firm; no pus. Other symptoms relieved.

(94) S. J. R. Dec. 2, 1909. Female, 43 yrs. Gums tender and receded; lost several teeth from looseness, all teeth affected, two very loose; profuse pus. Cultures showed pneumo. and staphylo. Rheumatism, stomach and intestinal disturbances. Treated 3 weeks (5 tr.). Gums improved; less pus; teeth firmer. General condition better. (Left town.)

(95) D. P. R. June 24, 1910. Male, 41 yrs. Gums very sore and receded; three teeth loose; pus. Cultures showed pneumo. and staphylo. Chronic sore throat. Treated 5 mo. (20 tr.). "Gums fine." Teeth firm. No recurrence, 21 mo. Other symptoms improved.

(96) F. R. R. June 5, 1911. Male, 57 yrs. Gums receded and tender on chewing; teeth slightly loose; little pus. Pneumo. and staphylo. on cultures. Stomach and intestinal flatulence, constipation. Treated 5 mo. (13 tr.). Gums healthy; teeth firm. No recurrence, 9 mo. Other symptoms relieved.

(97) A. W. R. Jan. 26, 1910. Male, 61 yrs. Gums receded, boggy; lost all teeth but six, those present loose; profuse pus in sockets; artificial dentures troublesome. Cultures showed pneumo. and staphylo. Chronic rheumatism, fistula in ano for thirty years with strepto. infection (operated upon three times unsuccessfully). Treated 2 mo. (7 tr. with autogenous gum and autogenous strepto. vaccine from fistula). Gums improved; teeth firmer; no pus. Fistula operated upon successfully by Dr. T. C. Hill. Other symptoms relieved. No recurrence, 29 mo.

(98) C. H. R. Dec. 19, 1911. Female, 37 yrs. Gums spongy and receded, fifteen years' duration; teeth sore, several loose teeth now; lost four teeth; pus in sockets. Cultures showed pneumo. and staphylo. General debility, stomach and intestinal disturbances. Treated 1 mo. (5 tr.). Gums not sore; look healthy; no pus. "Feeling fine." No recurrence, 8 mo. (Serumal deposits on roots would cause an acute purulent inflammation with unbearable pain. Teeth would loosen rapidly and have to be removed. No salivary deposits. Lost four teeth that way.)

(99) M. F. S. Oct. 19, 1909. Female, 59 yrs. General recession; several loose teeth, two very loose. Profuse pus. Cultures showed pneumo. in chains and diplo. forms. Rheumatoid arthritis with severe pain in muscles and joints, stomach and bowel distress. Treated 8 mo. (33 tr.). One very loose tooth removed. Gums in good condition; other teeth firm. Arthritis previously treated unsuccessfully by able orthopedic surgeon cured while under vaccine treatment for gums. Other symptoms relieved. No recurrence, 28 mo.

(100) L. T. S. Jan. 28, 1910. Female, 34 yrs. Gums very spongy and painful; lost six teeth from looseness, all remaining teeth loose; submaxillary gland swollen; pus. Pneumo. and staphylo. on cultures. Urticaria, indigestion, chronic constipation. Treated 4 mo. regularly and 8 mo. irregularly (38 tr.). Gums in good condition; teeth firmer; swollen gland normal. Feeling well otherwise.

(101) R. S. Sept. 9, 1910. Female, 37 yrs. Gums boggy and receded; several teeth loose; pus. Cultures showed pneumo. Rheumatism, indigestion, stomach distress. (Had 1 treatment. Dropped out.)

(102) K. J. S. Apr. 14, 1912. Female, 42 yrs. Gums boggy and receded in places; several teeth loose; pus. Cultures showed staphylo., pneumo., and spirilli. Rheumatism, intestinal flatulence, chronic urticaria. Treated 1 mo. (3 tr.). Pus diminished; teeth firmer. Other symptoms improved. Felt comfortable. (Discontinued treatment.)

(103) W. H. S. Apr. 4, 1912. Female, 60 yrs. Gums receded, bleed easily; several teeth loose, lost five from looseness; pus. Cultures showed pneumo. and staphylo. Stomach and intestinal flatulence, general malaise. Treated 10 days (3 tr.). Gums improved; teeth firmer; little pus. Comfortable generally. (Obliged to leave town. Discontinued treatment.)

(104) J. H. S. Feb. 28, 1911. Male, 53 yrs. Gums markedly receded; one tooth very loose, all others slightly, had lost three; pus. Cultures showed pneumo., strepto., and staphylo. Marked intestinal fermentation. Treated with vaccine by dentist for 6 weeks: Gums in good condition; teeth firm. Other symptoms relieved.

(105) M. S. Mar. 30, 1909. Male, 40 yrs. Gums receded and very painful on mastication; two teeth very loose, dentist advised removal; pus in sockets of loose teeth. Cultures showed pneumo. and staphylo. Intestinal flatulence, severe headaches (neuralgic?) Treated 5 mo. (25 tr.). Gums healthy; teeth firm; no pus. Other symptoms relieved. No recurrence, 36 mo.

(106) F. M. S. Sept. 28, 1910. Female, 49 yrs. Gums markedly receded, spongy, and inflamed; three teeth very loose, all others affected, lost two teeth from looseness; profuse pus. Cultures showed pneumo. and staphylo. Rheumatism, indigestion, gas, constipation, eczema. Treated 7 mo. (22 tr.). Gums in good condition; teeth firmer; no pus. Other symptoms relieved. No recurrence, 15 mo.

(107) G. S. Jan. 22, 1910. Female, 50 yrs. Gums painful, receded (fifteen years' duration); six teeth loose, lost five others from looseness; pus in sockets. Cultures showed pneumo. and staphylo. Rheumatism, intestinal fermentation. Treated 2 mo. (12 tr.). Gums markedly improved; all but very loose tooth firm. Comfortable on chewing. Other symptoms improved.

(108) W. P. S. June 8, 1911. Male, 52 yrs. Gums receded and very tender, spongy; lost six molars from looseness, all other teeth loose; difficulty in talking and chewing; profuse pus. Cultures showed pneumo., strepto., and staphylo., and many long bacilli. Rheumatism, stomach and intestinal flatulence. Treated 8 mo. (27 tr.). Gums fine in color and firm; no pus, no bleeding or tenderness; teeth firm. Feeling well generally. Seen one year later: Gums still in good condition.

(109) A. B. S. Aug. 16, 1910. Female, 41 yrs. Gums receded, boggy, and painful, bleed easily; several teeth loose, lost two from looseness; pus in sockets of loose teeth. Cultures showed pneumo. in chains and staphylo. Rheumatism, dermatitis exfoliativa. Treated 3 mo. (14 tr.). Gums in good condition; teeth firm. No recurrence, 22 mo. Other symptoms improved.

(110) L. S. Sept. 8, 1910. Female, 35 yrs. Gums receded and inflamed (fifteen years' duration); lost five teeth from looseness, three teeth very loose, all others loose; pus in sockets. Cultures showed pneumo. in chains, staphylo., and macrococci. Rheumatism. Treated 4 mo. (16 tr.). Gums in good condition; two teeth still slightly loose, all others firm. No recurrence, 21 mo. Other symptoms relieved.

(111) G. N. T. June 4, 1911. Female, 45 yrs. Gums very spongy, bleed profusely; teeth slightly loose; pus in several sockets. Cultures showed pneumo. and mucosus capsulatus. Rheumatism, intestinal fermentation, general malaise. Treated 7 mo. (26 tr.). Gums in good condition; teeth firm; no pus; no bleeding. Other symptoms relieved.

(112) C. A. V. Jan. 23, 1911. Male, 72 yrs. Gums anemic, flabby, and markedly receded; three teeth loose, lost several from looseness; pus in sockets of loose teeth. Cultures showed pneumo. Rheumatism, intestinal fermentation. Treated 2 mo. (2 tr.). Gums well; teeth firm. Other symptoms relieved. No recurrence, 18 mo.

(113) L. W. Oct. 22, 1911. Female, 45 yrs. Gums spongy, sore, and markedly receded; teeth slightly loose; pus in sockets of loose teeth. Cultures showed pneumo. and staphylo. Severe backache, walking very painful, chronic constipation. Treated 2 mo. (6 tr.). Gums improved; teeth firmer; no bleeding or pain. Pain in back remained about the same.

(114) F. B. W. Oct. 12, 1911. Male, 49 yrs. Gums receded, bleed easily; difficulty in chewing; several teeth loose, lost two teeth from looseness; pus in sockets of loose teeth. Cultures showed pneumo. and staphylo. Rheumatism, stomach and intestinal fermentation. Treated 2 mo. (7 tr.). Gums improved; teeth firmer; no pus. Felt generally well.

(115) F. H. W. Mar. 2, 1911. Female, 42 yrs. Gums markedly receded, sore, and bleed easily; one tooth very loose, nearly all others slightly; pus present around loose tooth. Cultures showed pneumo., staphylo., and some macrococci. Rheumatism, stomach and intestinal distress, periodic headaches. Treated 3 mo. (9 tr.). Gums looked healthy; no pus; teeth firm. No recurrence, 15 mo. Other symptoms improved

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ACCESSORIES OF NITROUS OXID AND OXYGEN.

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(Read before the Academy of Stomatology, Philadelphia, Pa., October 22, 1912.)

YOUR presence here tonight is an assurance that you are interested in the methods of relieving pain in dental operations. It is not my object to compare the relative value of methods, but to explain the accessories for the gas-oxygen treatments.

CONFIDENCE REQUIRED BY OPERATOR AND PATIENT.

There is a fear to be overcome both in the operator and the patient, and to be replaced by confidence. One of the prime essentials is the confidence of the operator, viz, his intimate acquaintance with physical symptoms which will remove the stage fright that every operator probably experiences when he finds that he has produced unconsciousness in his first patient. This awe of the inexperienced operator when he finds himself alone with the unknown, this lonesomeness when he sees for the first time the conscious self tied, by his request and by agents used by him, is overcome in a day or two, when he becomes familiar with the process. Then he begins to feel some of that confidence which he must impart to his patients.

The technique of operating on the anesthetized patient must be mastered. I have seen experienced hands shake and usually skilfully manipulated instruments break owing to the fear and anxiety of the operator, who was unable to perform the operation which under other conditions would be so easy.

When administering the gas to the patient, the operator should always speak of it as nitrous oxid and oxygen, disregarding the old term "laughing gas."

Each operator has his own way of instructing his patients, and telling of the advantages of this anesthetic mixture; but with a patient who presents an exposed pulp or cervical cavities, a very short talk will be convincing.

METAL SALIVA EJECTOR.

A metal saliva ejector must be used, for even under the most careful observation a patient may lose consciousness, and close the mouth slowly, but most tightly. The breaking of a glass tube in the mouth at this time would be a serious and inexcusable accident. The fragments of glass when swallowed might not do any harm, but they would at least cause the operator two sleepless nights.

MOUTH-PROPS, MOUTH-WEDGE, AND TONGUE FORCEPS.

All operating rooms are provided with mouth-props of rubber or metal covered with rubber in the parts which come in contact with the teeth. I always keep in readiness a small wooden wedge with ratchets. This wedge can be forced between the teeth without injuring them, if the mouth is so tightly closed that the ordinary mouth-opener is useless. Opening the mouth is necessary when the prop inserted in the beginning has been misplaced. In my anesthesia practice, extending over eleven years, I have used this wedge three times, but in these cases it was worth its weight in gold each time. Of equal importance is the tongue forceps. I have never used this instrument, and trust that it will never be necessary for me to do so, but I would not think of operating without having this wedge and forceps at hand. Even in analgesic work the readiness-to-hand of these instruments seems necessary to me.

It is always possible for the patient to drift into profound anesthesia, and the operator should therefore be equipped to confront the dangers that may arise in this condition.

GAS-OXYGEN MIXERS.

There are nineteen or twenty mixers for gas-oxygen on the market today, all of which have some good points to recommend them. The mixer is not a thing of importance; it is only necessary that each operator should use the one which seems the most convenient to him.

For dental practice in the tropics, it is always recommendable to use a heater, as the patients have never breathed air of the snowstorm variety, which is the condition of that which comes from an ordinary nitrous-oxid cylinder. It is generally agreed that heated gas is always more readily absorbed than cold gas.

The ideal mixer has not yet been designed. Such an ideal mixer must take care of the expired nitrous oxid and carbon dioxid gases, collecting them in a separate bag, and passing them through a chemical bath and filters, thereby removing the waste products of exhalation from these gases. When we consider the benefits to respiration of carbon dioxid inhalation, the necessity of this kind of mixer becomes evident. By such an appliance the exhaled nitrous oxid would be stored and could be rebreathed, and an abundant quantity of carbon dioxid supplied, which may become necessary at any time for stimulating respiration.

In administering the gas-oxygen mixture, there must be some contrivance for controlling the pressure of the gas. One of the best means for this purpose was the gasometer, consisting of a closed cylinder over a water-bath, which furnished an excellent automatic vapor-warmer, as the water was at room temperature and soon absorbed the cold of the gas. If one of these gasometers were connected with the nitrous oxid and one with the oxygen, and these in turn were connected with a modern mixer, an excellent means of controlling the pressure would be afforded.

The regulating gage has taken the place of the gasometer, and it is indeed one of the most essential portions of the modern outfit. By its application equal pressure can be obtained in either bag, and the percentage given can be calculated accurately.

A whistle may be attached to the nitrous-oxid cylinder. If the gas is turned on, an increased noise is heard, due to the increase of gas caused by the contraction of the frozen gage; at other times it will sputter and stop, showing that it is frozen by the escaping gas. If this whistle is attached to a larger cylinder with a regulating gage, a little noise is heard, showing the constant flow of the gas. By its use the flow is controlled with great ease.

For the preparation of cavities or the grinding of teeth for crowns, little pressure, viz, a just perceptible flow, is required. For anesthesia, however, a pressure of fifteen pounds or more is required, many operators preferring a pressure of fifty pounds.

THE BLOOD.

The blood absorbs the forty-five volumes of nitrous oxid necessary for anesthesia. The gas is held by the blood in some loose union which is difficult to understand. The corpuscles are believed to remain unchanged. There is, however, a change in the color, producing the condition of blueness which is the sign of approaching danger.

The blood pressure is raised from 20 to 25 millimeters of mercury, and the sphygmomanometer should always be kept in readiness on the operating table. If there is a blood pressure of from 25 to 35 points above normal, and by the administration of nitrous oxid this pressure is raised another 25 or 35 points, rupture of a sclerotic artery might be caused, giving rise to a very serious condition. The increase in blood pressure is the most marked physical change, and should be watched with care.

A practical demonstration of a nitrous oxid and oxygen analgesia is more instructive than words. Who can understand the sensations of the eye or the ear, unless he has himself been subjected to analgesia? The first movement toward unconsciousness, manifested by closing the mouth, must be seen to be appreciated. The cyanosis in the lips or the fingers, which is so readily controlled by an increase in oxygen, is readily recognized by any operator who has seen it a dozen times.

Gas-oxygen analgesia is a fact which every operator must recognize if he wishes to relieve pain; it is a solution of dental difficulties.

PROLONGED NITROUS OXID AND OXYGEN ANESTHESIA FOR SURGICAL OPERATIONS.

A short time ago it was my pleasure to see Dr. A. E. Smith administer gas-oxygen for three surgical operations. The first operation consisted in colotomy for the removal of gall-stones. Four minutes after the first inhalation, the incision was made. The gas in the oxygen bag was kept at some pressure, and the indicator was placed at from five to six points most of the time. There was rebreathing after the first five minutes. A slight lividity was observed, but never a marked cyanosis. When the surgeon lifted out the liver, and began to manipulate it to determine if gall-stones were present, the patient seemed to lose the respiratory power, and this was evident whenever any traction was made on the internal viscera. This was a beautiful operation from the anesthetist's standpoint, lasting one hour and five minutes. The relaxation was good and satisfactory to the surgeon.

The second operation was an appendectomy lasting forty-five minutes. Constant lividity was observed, though no real blueness, and a marked flinching on the first incision, which often occurs and is claimed to be due purely to reflexes. The same hesitancy in respiration was noted when movements of the omentum or intestines were made.

The third operation was undertaken on the tibia, and lasted thirty minutes. In each of these three cases, the patients were practically conscious in five minutes. In the third case, the patient had nausea for a short period on recovery; the others were entirely free from it. It seems remarkable that this combination which dentists fear so much can be made to do such wonderful things.

In these cases the patients lived for the time during which anesthesia lasted on nitrous oxid, oxygen, and the carbon dioxid of rebreathing, for the greatest care was taken to exclude the air. Nitrous oxid and air have never been friends of anesthesia, but it must be remembered that nitrous oxid, air, and oxygen are requisites of analgesia.

ALBUMINURIA.

A patient was given the gas for cavity preparation, the analgesia lasting twelve minutes. He had had an attack of nephritis twelve weeks before, and there was a marked albuminuria, which was increased after giving the gas. This does not prove anything. The patient was acquainted with the condition, and did not wish to take the gas until he would be free from albumin. After three weeks, a cavity was prepared under analgesia lasting fifteen minutes. Analysis showed no increase of albumin. Another analysis was made for a patient who had no albumin before, and none following forty minutes of analgesia.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

LOCAL ANESTHESIA IN DENTISTRY, WITH SPECIAL CONSIDERATION OF NOVOCAIN.

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IT is a fact which even the most enthusiastic advocate of, or specialist in, general anesthesia cannot dispute, that every general anesthesia represents a serious intoxication of the central nervous system. Yet the operations called for in the oral cavity, which are so extremely painful as compared with operative interventions in other parts of the human body, have from the very beginning of surgical history prompted a special desire to diminish or to abolish entirely the sensitivity of the teeth and neighboring tissues; and this solicitude has become all the more justified since the general enervation of dental patients, accruing from the wear and tear of the modern struggle for existence, is daily increasing.

DENTAL CARIES AND ANESTHESIA.

We are indeed living in a nervous age, and our patients become daily less fit to tolerate pain which their ancestors bore with ease; our hypermodern, hypersensitive, not to say effeminate culture demands imperatively from us the abolition of pain in dental operations, if we would conscientiously heed the cry that has gone forth so loudly over the civilized world within the last decade: "Save the human teeth!" For who would deny that the destruction of these most essential, most vital organs in the human economy has assumed most alarming proportions, and that we dentists, if we really wish to live up to the importance of our profession in regard to social economy, must have recourse to all possible means to inhibit this universal disease.

Thus the plea for efficient dentistry becomes identical with that for humanitarian dentistry. Indeed, the advent of painless dentistry, which by ethical dentists has been timidly yearned for as an ideal most devoutly to be cherished, and by the dental quack has been impudently heralded as an accomplished fact, is close at hand, and although some minor imperfections in the agents and methods for dental anesthesia are still to be overcome, it behooves the ethical dentist to make his operations painless by a mastery of anesthetic technique, thereby competing successfully with the most unfair competitors mentioned, saving his patients' altogether-too-much-imposed-upon nerves, incidentally also his own, and banishing forever that dread and fear of the dental office which seems to inhere almost ineradicably in the vast majority of patients, and which is in a large measure responsible for the appalling ravages of dental caries in all classes of civilized society.

LOCAL VS. GENERAL ANESTHESIA.

While it is not the writer's intention to weigh the relative merits of local versus general anesthesia, one can hardly refrain from conjecture as to how much the general adoption of the safe and efficient methods of local anesthesia in dentistry about to be described would contribute to an armistice in the bitter conflict that is being waged in some countries between the medical and the dental professions over the medico-legal question of the right to, and the responsibility in, the administration of general anesthetics by physicians or dentists respectively, and what beneficent effect such adoption would have upon the status of dentistry as an independent profession.

HISTORY OF LOCAL ANESTHESIA BY HYPODERMIC INJECTION.

The efforts in the field of local anesthesia are synchronous with and even antedate those toward general anesthesia, and an historical review of these efforts from antiquity to modern times, such as is given by most text-books on anesthesia, notably by G. Fischer in his "Local Anesthesia in Dentistry," and by Hermann Prinz in an essay on "A Rational Method of Producing Local Anesthesia," published in DENTAL COSMOS for September 1908, makes most instructive and interesting reading. Suffice it to say here that the method of general medication by means of hypodermic injection, introduced in 1853 by Alexander Wood, inspired a long series of unsatisfactory experiments with morphin, tincture of opium, and other drugs, for the purpose of local anesthesia, which culminated in Koller's demonstration of the remarkable anesthetizing power of cocain at the Congress of Ophthalmology held in Heidelberg in 1884. Great havoc was wrought, however, by the sudden popularity and injudicious application of this drug before more satisfactory methods of its application had been devised, and the frequency of untoward results due to the high toxicity of cocain caused a regrettable setback to the progress of local anesthesia, until Schleich and Reclus introduced their method of infiltration anesthesia by means of considerably smaller doses. Conductive or regional anesthesia, which in its present perfection is being so successfully employed, was first suggested in 1885, by Halstedt, who dispensed with injecting cocain in the vicinity of a tooth, but injected within the mouth in the vicinity of the trunk of the inferior dental nerve. Braun's suggestion of the addition of the extract of the suprarenal capsule to the injecting solution marked such a signal advance in the cause of local anesthesia that it earned for him the title of "Father of modern local anesthesia."

SUBSTITUTES FOR COCAIN.

An army of notable investigators and reputable drug firms has combined during the last decade or two in efforts to do away with the toxic effects of cocain, and innumerable substitutes have been offered, such as eucain, neurocain, akoin, holokain, tropacocain, orthoform, nirvanin, anesthesin, stovain, alypin, Wilson's anesthetic, adralgin, subcain, andolin, udrenin, perinephrin, orthonal, aneson, subcutin, dolantin, etc.; of these, stovain and alypin have found some noteworthy advocates, although the toxicity of these two anesthetics is only twice or three times less than that of cocain. A great many of the other cocain substitutes contain admixtures of highly toxic drugs, they have other untoward properties, and generally produce hemolysis of the human blood corpuscles. Moreover, the large majority of these drugs are proprietary preparations, and should therefore be shunned, for that if for no other reason, by any practitioner who respects the scientific standard of his profession. From a merely practical point of view it should be remembered that the price of these proprietaries is too high in comparison to their efficiency, and the mystery in which the manufacturers shroud the composition of their products puts the operator at a great disadvantage medico-legally in case of suit for damage following any accident. Novocain alone of these substitutes for cocain involves none of the disadvantages mentioned, and the great popularity—almost to the exclusion of all other anesthetizing agents—which this local anesthetic has gained abroad, especially in France and Germany, where the pioneer work of perfecting the methods of injection and determining the most suitable dosage has been carried out, is bound to be emulated in this country.

QUININ AND UREA HYDROCHLORID.

Certain quinin compounds have, within recent years, been successfully employed for the production of local anesthesia in general surgery, and the combination of quinin and urea hydrochlorid has received quite some discussion in dental literature. A great many untoward sequelæ, however, have been produced by its use hypodermically. (See DENTAL COSMOS, February 1911, p. 253; [*ibid.*, January 1913, p. 111].) Hermann Prinz, in a paper entitled "The Anesthetic Value of Quinin and Urea Hydrochlorid in Dental Operations" (published in DENTAL COSMOS, January 1911, p. 31) scrutinizes the value of this anesthetic compound, and reaches the following damaging conclusions: While it is true that quinin and urea hydrochlorid is not poisonous in the doses in which it is injected for local anesthesia purposes, yet, since it reacts strongly acid, it severely damages the tissues in the injected area, edema and induration being the usual sequelæ. The injection is more or less painful, and the mixture interferes with the progress of wound-healing. The excessive length of duration of the anesthesia, and the paralysis persisting from several hours to several days, is most disagreeable and often alarming to the patient. If applied in concentrated solution to the mucous surfaces, this compound is only sparingly absorbed, and very little anesthesia is produced. Besides, its most persistent bitter taste renders its use undesirable for this purpose.

REQUIREMENTS FOR AN IDEAL LOCAL ANESTHETIC.

The classical researches of Braun have established the following as the principles which must be required from, and fulfilled by, the ideal local anesthetic to be used for hypodermic injection: (1) While equally effective, equal doses of the ideal local anesthetic must be less toxic than cocain. (2) The ideal anesthetic must be absolutely indifferent toward the tissues, and must not in the least interfere with the healing process in wounds. (3) It must be readily soluble in water, must be stable, and must permit of reliable sterilization by simple means. (4) It must allow of the addition of adrenalin or suprarenin without interfering with the vaso-constrictor power of the latter drugs. (5) When applied to mucous membrane, it must possess ready penetration.

Cocain. This list represents a severe condemnation of cocain, the toxicity of which needs no further comment, since any practitioner who has used it extensively without experiencing more or less severe accidents ought to consider himself exceptionally well favored by luck. For while the toxic dose of cocain according to the German Pharmacopeia is 0.05 gm., according to the American Pharmacopeia only 0.03 gm., such a small dose as 0.01 gm. is known to have produced death. The symptoms of cocain intoxication in cases of idiosyncrasy are truly formidable, the effects of this drug on the heart, the nerves, and the kidneys are very undesirable, and the contra-indications in diseases of these organs, as well as in general debility, old age, convalescence, anemia, chlorosis, neurasthenia, and nephritis demand the taking of careful heed, since cocain is a decided protoplasmic poison, acting upon the vasomotor center and inhibiting diapedesis of the leucocytes. Moreover cocain cannot be sterilized, as it is quickly decomposed by heat, and is very perishable, especially when combined with adrenalin or suprarenin.

NOVOCAIN THE ANESTHETIC OF PREDILECTION IN MINOR AND MAJOR SURGERY.

On the other hand, all the above-cited requirements are fulfilled by novocain, which was discovered by Einhorn in 1904—being para-amino-benzoyl-diethyl-amino-ethanol hydrochlorid—and with phenomenal rapidity has conquered the European medical and dental worlds. After this drug has been employed in a good half-million cases of minor and major surgery without any serious accidents from the action of the drug itself, it may be safely said to have passed the experimental stage. In fact, general surgery in Europe has adopted local anesthesia by novocain suprarenin for cranial and cerebral operations, skull trepanations, suppurations in the frontal and ethmoidal sinuses, extirpation of the tongue, tumors, and glands, removal of bone fragments, in carcinoma, etc. To cite only one report (by Braun):

> The course of operation under local novocain-suprarenin anesthesia is very different from that under general anesthesia. No interruption of the operation for the sake of continuance of the general anesthesia is required, and the operation can be completed in a minimum of time. Owing to the anemia from the suprarenin, the continual flooding of the field of operation with blood is avoided, and any slightly oozing vessels can be quickly compressed. The unimpededness of the operative area permits of operating exactly and neatly. If blood flows into the pharynx, the patient is always able to prevent its aspiration, since all reflexes are maintained. The patient can also co-operate in making minor changes in position. The patients' condition after the operation is most favorable; they leave the operating table perfectly well, and rarely have to be put to bed. If given a very small dose hypodermically of scopolamin they frequently have little or no reminiscence of the operation. It is not too much to say that, with the application of novocain-suprarenin anesthesia, resection of the maxillæ has lost all its terrors. Local anesthesia is not equivalent to general anesthesia, but is far superior to it.

A review of the early and surprisingly favorable results obtained abroad by novocain-suprarenin anesthesia in dentistry was published by the writer in the August 1908 issue of the DENTAL COSMOS under the title of "Recent Studies on Novocain." This was followed in the September issue of the COSMOS of the same year by an enthusiastic article by no less an authority than Dr. Hermann Prinz, entitled "A Rational Method of Producing Local Anesthesia," and in the August 1910 COSMOS by a paper from Dr. B. H. Masselink's pen—who confidently heralded "The Advent of Painless Dentistry"—and in the February 1911 COSMOS by an epitome of "Local Anesthesia in Dentistry," by Dr. Guido Fischer, whose text-book on this subject has since appeared in an English translation.* A great many articles and reports of thousands of practical cases have appeared in close sequence in other American dental journals, and especially in the special literature of foreign countries, notably Germany, where a lively and in several instances even acrimonious exchange of opinion between the advocates of general and local anesthesia is taking place, quite apparently in favor of the latter. From all this fruitful controversy it appears plain that novocain comes as close to being the coveted ideal local anesthetic as can reasonably be expected from a drug which by the very character of its physiologic action and purpose is a poison, no matter how mild.

Novocain is a white powder, readily soluble in water in the proportion of one to one, the solution giving a neutral reaction, and allowing of being heated up to 120° C. without undergoing decomposition. In animal experiments novocain has proved to be seven times less toxic than cocain, while from clinical evidence in man it may even be said to be ten times less toxic. The maximal dose for subcutaneous injection is variously stated as 0.5 gm. (Liebl), 0.75 gm. (Fischer), and 1.00 gm. (Fichot), which considering the fact that only from 1 to 2 per cent. solutions are used for injection, allows of an extremely wide margin of safety, especially when we consider that the largest single dose for dental purposes, viz, in conductive anesthesia of the mandibular half by way of the mandibular foramen, only 2 cc. of a 1.5 per cent. solution is injected. For major operations very much larger quan-

* "Local Anesthesia in Dentistry, with Special Reference to the Mucous and Conductive Methods. By Prof. Dr. Guido Fischer. Translated from the second German edition by Dr. Richard H. Riethmüller. Philadelphia and New York: Lea & Febiger, 1912." (See also review in COSMOS for October 1912, p. 1174.)

tities of novocain solution can be injected than is possible with cocain solutions. Dr. M. Wegner of Greifswald, for instance, has injected up to 24 cc. of the novocain solution without ill results to the patient for regional and terminal anesthesia in resection of the maxilla and mandible. In surgical clinics up to 125 cc. of a ½ per cent. novocain-suprarenin solution are injected, and Dr. G. Hesse of Jena reports a case in which for extirpation of one breast and curettage of the axilla for the removal of a carcinoma in a woman suffering with myocarditis and totally unfit for general anesthesia 250 cc. of a ½ per cent. novocain-suprarenin solution was injected, the patient making a good recovery.

Novocain when injected penetrates the tissue cells and the red blood corpuscles without producing any irritation, hence the injection itself is painless; it in no wise impairs the hemoglobin, and it permeates even the nerve substance itself, so that its full anesthetic power remains unchecked throughout. It produces a local anesthesia as profound as that obtained by cocain and of longer duration, though it requires a slightly longer time to exert its full anesthetic power than cocain. It is constant in its action, can be sterilized by boiling, consequently a solution can be kept and used for a great length of time; it can be administered immediately after food; it produces no shock, no cardiac or respiratory failure, no after-pain or sloughing of the gums. It can be safely applied in arterio-sclerosis, diabetes, nephritis, cardiac and pulmonary disorders, anemia, chlorosis, pregnancy, and lactation. It combines with suprarenin without interfering with the physiological action of the latter, this combination rather increasing the action peculiar to either drug, thus necessitating the injection of but a very small quantity of the mixture. It is readily absorbed by the mucous membrane. It most favorably influences and even hastens the process of wound-healing, if dusted in powder form or swabbed in 20 per cent. solution, at the same time doing away with pain. Fresh extraction wounds can be induced to heal quickly if flushed with a 3 per cent. hydrogen dioxid solution, and tamponed with gauze impregnated with iodoform—or preferably one of its modern substitutes without odor and of better taste—and dressed with novocain crystals. When combined with adrenalin or suprarenin the action of novocain is confined to a small area, thus its absorption is retarded, intoxication of the general system avoided, and deep anesthesia of the injected area insured, lasting, according to the quantities employed in dental operations, from twenty minutes to three hours. Novocain is not a secret preparation, but a drug of definitely known chemical composition, and is being sold in practical form by several American drug firms and dental depots; its price is lower than that of cocain, even; in its utilization by various methods no bulky or expensive apparatus is required, but simply that which is necessary to insure absolute sterility of the solution, and the instrumentarium, which calls for little more than a suitable hypodermic syringe and needles. It can be employed in weaker or stronger doses, according to the patient's age and general health, with the same perfect results. Last, not least, its general adoption will make the dentist appreciate the absolute necessity and great practical value of asepsis, which is so sadly neglected in routine practice.

SUPRARENIN AND ITS ACTION IN COMBINATION WITH NOVOCAIN.

Of the greatest importance for the development and perfection of local anesthesia by hypodermic injection was the discovery of the astringent action of suprarenal extract by Oliver and Schaefer in 1894. Suprarenin, the active principle of the suprarenal gland, preparations of which are offered under the trade names of epinephrin, suprarenalin, suprarenin, adrenalin, adrenin, paranephrin, renoform, hemostasin, and others, by its powerful vaso-constrictor action raises the arterial blood pressure and produces local anemia, thereby preventing a too rapid absorption of an injected local anesthetic by the circulation, and permitting of a considerable reduction in the quantity of anesthetic solution to be introduced. It is the most powerful of all chemical substances thus far known; its action is recognized even in a dilution of 1:100,000. A minute quantity suffices, therefore, to produce the effect desired for our purposes, the maximal dose being about 5 drops of a 1:1000 suprarenin solution.

The impurities and lack of stability inherent to the organic preparations derived from the suprarenal glands of sheep and oxen have been largely done away with through the synthetic preparation of suprarenin, which represents a triumph of chemical science due to the labors of Stolz and Flaecher. Synthetic suprarenin is fairly stable, and if put up in suitable vessels and kept under suitable conditions may, according to tests, be preserved as long as six months, without changing color to pink, red, and finally brown, with the formation of a flocculent precipitate, when the solution is no longer fit for use. While in itself suprarenin has no anesthetizing power, it markedly increases the anesthetizing effect of novocain, and by the anemia which it produces in the field of injection largely prevents the obstruction of the operative area by blood. The discussion of the physiologic action of suprarenin, further than has already been briefly summarized, would lead too far, and is ably discussed by Fischer and Prinz in the papers mentioned above.

THE INJECTING SOLUTION.

The preparation of a suitable novocain-suprarenin solution for routine practice is, of course, of the greatest practical interest to the dentist. To the painstaking efforts of Fischer, Buente, and Moral we owe the so-called normal solution, in which due consideration is given to isotonia, osmotic pressure, sterility, permeability of the tissues, etc. This normal solution was originally given as follows: Novocain, 1.5 gm.; sodium chlorid, chem. pure, 0.92 gm.; thymol, 0.025 gm.; distilled water, 100 gm. The small addition of thymol was originally recommended owing to its energetically antiseptic, antizymotic, and anesthetizing action. It has been abandoned, however, because thymol, while being a strong anesthetic, is painful upon introduction, is more or less cauterizing to the mucous membrane and the tissues closely underlying the same, and has been found to cause swelling following injection.

As the novocain solution is boiled before use, the demands of asepsis are satisfied without the addition of an antiseptic. Thus the "normal solution" most suitable for dental purposes may be prepared according to Prinz' formula, as follows: Novocain, 10 grains; sodium chlorid, 4 grains; distilled water, 1 fl. ounce. Boil. To every thirty minims of this solution, viz, to each syringeful, two drops of suprarenin solution (1:1000) are added immediately before use, the drops to be measured with a tested Standard pipet, as designed by Dr. Schoenbeck of Leipzig, or with a Whitall-Tatum Co.'s dropping bottle.

ISOTONIA OF ANESTHETIC SOLUTIONS.

The advantages of the isotonia of the injected solution are apparent, in consideration of the absence of osmotic pressure and consequent irritation in the tissue cells, which may assume the form of edema or even necrosis of the tissue. The non-isotonic character of a great many of the proprietary anesthetics offered in the market is another strong argument against them, in addition to those already mentioned, and Buente and Moral have shown that quite a few of these proprietaries induce the formation of methemoglobin and hemolysis, with the untoward sequelæ. For those operators who for busy private or clinical practice prefer to make their own solutions from the novocain powder, it is recommended to keep a stock of isotonic salt solution made after the following formula: Chemically pure sodium chlorid, 2 parts; one-tenth dilute hydrochloric acid, a trace; aqua destillata, 300 parts.

SUGGESTIONS FOR THE PREPARATION AND PRESERVATION OF NOVOCAIN-SUPRARENIN SOLUTIONS.

Owing to the unstable character of suprarenin, viz, its decomposition through the presence of the slightest traces of alkali, by light, air, and heat, a few details in the preparation and preservation of our injecting solutions must be rigidly observed. It is a fact known to every chemist that glass, which is more or less strongly of an alkaline nature, is dissolved by cold and hot water, and these traces of alkali, however minute, seriously affect the stability of suprarenal preparations. Some operators for this reason employ only the scientifically manufactured brown non-alkaline glassware of the Jena glass works. How sensitive to alkalis the suprarenal preparations are is strikingly illustrated by a report of Dr. E. Paul in the *Deutsche Zahnaerztliche Wochenschrift* of February 10, 1912; he found that, four weeks after purchase, the contents of an unopened bottle of suprarenin manufactured by a reputable drug firm had become turbid. For this reason, most drug firms date every bottle of suprarenin, and in case of decomposition exchange it for an equal quantity of the drug freshly manufactured. It is advisable, therefore, to purchase only the smallest quantity of suprarenin required, and in the smallest containers possible; also, a bottle after once having been opened should be used up as quickly as possible, since the oxygen from the air, and the nascent oxygen from the water with which the suprarenin is diluted, is also detrimental to the drug. If kept in a cool, dark place, preferably in a purchased or home-made thermostat, the life of the suprarenal solution can be materially prolonged. Williger distributes his stock solution in several sterile brown glass bottles with ground glass stoppers which have been previously boiled in hydrochloric acid to render the glass as free from alkaline traces as possible, and uses a bottle up as quickly as feasible, thus incidentally preventing the introduction of bacteria from the air, which is always more or less contaminated with dust and minutely distributed saliva globules from the exhaled air. A reliable test for the purity of suprarenin is the following: It must give a clear solution in dilute hydrochloric acid, and 0.1 gm. must leave no residue if evaporated in a platinum dish placed over a flame. Brown discoloration is a certain sign that a suprarenin solution is unfit for use. In order to insure the sterility of the anesthetic solutions, it has become customary with many operators to add one drop of one-tenth dilute hydrochloric acid to the normal novocain solution, to admix the suprarenin to this solution, and boil the whole, which can be done without jeoparding the action of the suprarenin.

It goes without saying that only aqua destillata should be used in making up a solution. Boiled water is by no means sterile, moreover it may contain quantities of alkalis, these varying in different districts, which detrimentally affect the solution, as will be indicated by a pink or rose discoloration. Even the aqua destillata as bought in pharmacies is by no means reliable, as everyone familiar with the slipshod methods by which it is made—usually in the darkest spare corner, and frequently by none too careful or skilled clerks—knows very well. It frequently contains bacteria that have been introduced from the air or the dust collected on the large bottle in which it is kept, and on close scrutiny is often found to have particles of dust, filter paper, or even hair, suspended in it. The acquisition of a small filter apparatus will therefore prove a boon to the conscientious operator, and in a busy and clean practice will soon pay for the initial investment, especially since aqua destillata must be employed for the sterilization of the instrumentarium employed in connection with local anesthesia, as we shall see immediately.

For reasons similar to those given in favor of the preparation of aqua destillata by the operator himself, the purchase of official physiologic salt solution is undesirable. The purchased product often contains impure or incorrect dosage of sodium chlorid and slight traces of soda. A purchased salt solution should always be tested for alkaline traces; if present, the alkalis must be neutralized by the addition of dilute hydrochloric acid, which, as has been said, compensates at the same time for the alkalinity of the glass containers and prevents the catalysis of oxygen in the anesthetic solution, either of which unfavorably influences the suprarenin.

Stock solutions of novocain are best preserved in small brown glass bottles with ground glass stoppers previously sterilized by steam. If kept in large bottles with wide opening, the solution becomes easily contaminated with microorganisms from the air. These microorganisms are rendered innocuous by vigorous and prolonged boiling of the solution before use; still it is preferable to use up a once-opened bottle in a short time, thus guaranteeing unimpaired action of the anesthetic. If solutions of different strengths are kept, the stock bottles must be carefully marked, in order to avoid accidents by mistakes in selection.

AMPULES CONTAINING READY-MADE SOLUTIONS VS. TABLETS.

Considerable discussion has arisen as to the most practical method of obtaining a novocain-suprarenin solution. For a large hospital practice with a well-trained staff and a reliable pharmaceutical department, the daily preparation of a novocain solution from the powder, and the addition of the suprarenin to this solution as the cases present, is surely most economic. For private dental practice, ready-made novocain-suprarenin solutions of various strengths are marketed in ampules by various drug firms. The convenient form which seems to recommend these ampules is, however, largely a delusion, as it is not very easy to withdraw the full contents of the ampule with the syringe. Moreover, the price of the ampules is high, their contents are not always sterile, small openings being left in sealing the glass necks, and the stability of the solution in these containers is by no means unlimited. The tablet form, therefore, predominates in favor, and pure novocain and novocain-suprarenin tablets containing an admixture of sodium chlorid to yield an isotonic solution when mixed with a stated quantity of aqua destillata are being marketed by several reliable American drug houses. The price of these tablets is lower than that of ampules, the preparation of the solution from the pure novocain tablets is simpler than if the powder form is used, the operator may vary in the concentration and quantity of solution at his discretion, and if novocain-suprarenin tablets are used, need not trouble about making a correct isotonic solution nor adding the proper amount of suprarenin from a pipet. Besides, suprarenin in tablets is less perishable than in solution, and as after dissolving the tablet in distilled water the solution is boiled, sterility is fully insured. Brown discoloration of the novocain-suprarenin tablets indicates that they are no longer suitable for use, while pure novocain tablets remain unchanged for an unlimited time. In normal adult cases the novocain-suprarenin tablets are undoubtedly the most practical; yet for the sake of variation in the concentration of the novocain and in the admixture of suprarenin, in children, nervous, debilitated, and convalescent persons, in arterio-sclerotics and the aged, pure novocain tablets and suprarenin solution should be kept in stock.

STERILIZATION OF THE SOLUTION.

The amount of aqua destillata to be used for dissolving a tablet is measured in a graduate that has previously, for the sake of sterilization, been boiled in plain water and rinsed in a 3 per cent. solution of boric acid to counteract any alkali from the water or the glass. The solution is then boiled in an ordinary sterile test tube which has been rinsed in a one-tenth dilute solution of hydrochloric acid to compensate for the alkalinity of the glass. The sealed end of the test tube is held in the flame by the aid of a tightly folded strip of sterilized gauze wound around the upper portion of the tube. The most practical means, however, for boiling the solution and drawing it into the syringe, which is not so easy when a test tube is used for the boiling, consists of a small silver beaker, gold-plated and graduated inside, as designed by Dr. Muehlhaeusler, and manufactured by the Hoechst Farbwerke. This beaker is set in a suitable wire frame with handle, so that the solution can be sterilized, and the contents of the beaker withdrawn to the last drop without the fingers coming in contact with the vessel or the solution. As soon as the solution has cooled to about blood temperature it is drawn into the syringe and injected. It is readily appreciated that this is the optimum temperature for painless injection, quick penetration, and non-irritating effect of the solution.

INSTRUMENTARIUM.

While Fischer has designed and compiled an almost ideally complete instrumentarium, this is by no means a *sine qua non* for success, and the selection of an outfit can be left to the operator's discretion as long as the demands of serviceableness and asepsis are fully complied with. The syringe selected must, of course, be so constructed as to allow of sterilization by boiling after each use; the piston must be tightly fitting, so as to render regurgitation of the solution under pressure impossible, and the form and weight must be such as to permit of easy and delicate manipulation. Fischer's glass-and-metal syringe combines all these advantages with the controllability of the quantity of solution contained in the graduated glass barrel. Still, an Imperial syringe or Parke, Davis & Co.'s Dental Hypodermic syringe, both of which are all-metal and bear graduation marks on the piston, are fully satisfactory. It is best to keep several syringes ready for use, so that for every injection an absolutely sterile needle and syringe are on hand, and the operator is not handicapped by waiting for the re-sterilization of his only syringe if contaminated accidentally, as by being dropped, etc. The Schimmel steel needles seem to enjoy general favor, and their low price permits of using a new one for each case. Pure platinum needles are too soft, and those of iridio-platinum soon lose the sharpness of the point. Any needle that is used more than once must be carefully sterilized by boiling, preferably in a 2 per cent. lysol solution, dried with hot air, and preserved in a sterile glass bottle or in alcohol.

Straight hubs, for both long and short needles, will be required most frequently; for posterior teeth, however, a bayonet-shaped hub may prove very serviceable.

The syringes, with hub and needle attached, are best kept suspended in an upright glass jar filled with absolute alcohol and fitted with a German silver stand to prevent dulling of the needle point by resting on the bottom of the vessel. Such a stand can be shaped-up and soldered quickly by any mechanic. The jar is covered with a flat glass cover with ground edge, which is vaselined, and this cover is kept tightly on the jar over night by binding it down with strips of adhesive plaster to prevent evaporation of the alcohol. The flat cover is preferable to a ground glass stopper, which sometimes is very difficult to remove. Alcohol of 70 per cent. has been found more strongly bactericidal than absolute alcohol; still, absolute alcohol may be preferably used as it soon absorbs enough water from the atmosphere to approximate it to that alleged optimum percentage. In the Bardet syringe sterilizer, which is used by some operators, only the needle is kept sterile by immersion in lysol, while the greater portion of the barrel and piston are exposed to undesirable contamination with micro-organisms from the air.

A graduate, a pipet or dropping bottle, a bottle for keeping the needles, preferably one with ground-glass stopper and bell cover, and a large glass tray for the reception of a lysol, cresol, or alcohol solution in which the syringe, a pair of pincers, a wrench for the syringe, and hubs, all previously sterilized by boiling, can be kept temporarily, complete the outfit. The Evans (of San Francisco) syringe tray seems the most practical.

STERILIZATION OF INSTRUMENTARIUM.

The syringe and the rest of the instrumentarium must be boiled after each use in water without soda, better still in distilled water, and kept sterile until its next using. On removing the syringe from its alcohol bath, some of the alcohol is drawn through the needle and barrel, pressed out and burnt off by passing through a flame.

After the alcohol is burnt off, hot water is drawn into the syringe, as any trace of alcohol which is not thus removed would produce anesthesia lasting several days, as is appreciated by anyone familiar with the treatment of trifacial neuralgia by alcohol injections. The hot water also heats the syringe, and prevents the anesthetic solution from cooling below blood temperature. A Koch's steamer, or an S. S. White electric sterilizer is excellently suited for sterilizing the entire instrumentarium, which should be boiled for an hour or more to destroy all spores.

TECHNIQUE OF INJECTION.

It would lead too far to go into the details of the technique of injection, which may be made in four ways:

First: We may inhibit the function of the peripheral sensory nerves in a circumscribed area, viz, apply terminal, or mucous, or subperiosteal anesthesia for rendering one or several teeth and their surrounding tissues insensitive to pain. For this form of anesthesia an intimate knowledge of the greatest vulnerability of the alveolar bone, viz, the distribution of cancellated areas, which allow a rapid penetration and diffusion of the injected liquid, is imperative. The distribution of these places of preference is very well shown by Fischer's anatomic specimens illustrating the structures of the osseous frame of the maxillæ and alveolar process.

Second: We may anesthetize a whole group of teeth by blocking the conductivity of the sensory nerve trunks supplying these teeth at their exits from their respective foramina, thus inducing conductive or perineurial anesthesia, the technique of which has been greatly perfected by Braun, Fischer, and Friteau.

Third: Single roots of teeth, or those affected with pyorrhea, may be conveniently and quickly anesthetized by injecting directly into the peridental membrane—peridental anesthesia, as described by Prinz in the January, February, and April issues of the *Dental Summary*, 1912.

Fourth: In order to hasten the diffusion of the anesthetic, Otté, in 1896, recommended opening into the superficially anesthetized gingival tissue, and the bone on the buccal side, with a fine spear-shaped or Gates-Glidden drill, and inserting a suitable hypodermic needle into this opening, thereby rapidly producing anesthesia by intra-osseous injection. This method, which has its evident disadvantages, is fully described by B. H. Masselink in the August 1910 issue of the DENTAL COSMOS.

PREPARING THE FIELD OF OPERATION.

Before making an injection in the mucous membrane, the mouth must be put into sanitary condition by removing any tartar present from all the teeth, or at least from those in the vicinity of the field of operation. A mouth-wash of neutral or slightly acid reaction is then given. The area around the prospective point or points of insertion of the needle is swabbed vigorously with a mild solution of iodin and aconite by means of cotton wrapped around a sterile glass rod, wooden tooth-pick, or skewer, thus cleansing the mucosa and binding all bacteria. Instead of iodin-aconite, the application of one drop of carbolic acid is recommended in persons subject to iodism. Both the iodin and the carbolic acid mark the point of insertion by discoloration, and the anesthetizing action of both drugs renders the first insertion of the needle, which is feared the most by patients, absolutely painless.

A FEW PRECAUTIONS.

If all requirements of asepsis in connection with the anesthetic solution, the instrumentarium, and the field of operation have been satisfied, no untoward sequelæ of any kind will follow the injection, if it has been made into healthy tissue. Injection in close proximity to a purulent center must be avoided in all cases, since virulent bacteria may be carried into deeper layers. In case of severe inflammation or abscess, conductive anesthesia must be resorted to. In terminal or subperiosteal anesthesia the needle should be very gradually advanced through the soft tissue, slowly discharging minute quantities of the solution as the needle proceeds, and, after the bone has been reached by the shortest route, the needle is kept in close contact with the bone, thereby avoiding puncture of a bloodvessel and so producing a hematoma, which, especially if occurring on the floor of the mouth, is painful and may cause complications should putrefaction set in. This danger is fortunately a remote one, as the bloodvessels are hard to puncture and have a tendency to avoid the needle. After the contents of the syringe have been discharged at the desired spot, the needle is withdrawn and the area of injection gently massaged with a finger in order to facilitate the diffusion of the anesthetic. Sufficient time must be allowed for the establishment of complete anesthesia, which can be ascertained by the whiteness of the area injected, and numbness upon touch, or by slow institution of the initial steps of the operation. The establishment of complete anesthesia varies in time in different individuals and according to the method of injection employed, the extremes in either direction lying between one and twenty minutes. If two injections are made in close sequence, *i.e.* labially and lingually, the same needle should not be used for both injections, as the first needle may have become contaminated by streptococci from the saliva. Breaking of the needle is not to be anticipated, but, if it does occur, is not dangerous. The needle should be immediately extracted under local anesthesia, and, if not found, left to be taken care of by nature, and encysted, which will occur if the needle has been sterile.

The presence of a third person, viz, an assistant or office girl in the operating room is a precautionary measure which should never be disregarded for social reasons, if for no others.

PROPHYLACTIC TREATMENT OF PATIENTS.

To insure uniformly successful results even in timid, nervous, or obstinate patients and in children, one or two tablets of bromural should be given internally from twenty to thirty minutes before injection. Bromural, which is alphabromisovaleryl-urea, is manufactured in tablet form by Knoll & Co., and is being largely used in Germany in preparing patients for local or general anesthesia. It has a slight odor of valerian, readily disintegrates in water, and is tolerated even in very large doses without any unfavorable reaction. Its agreeable sedative and hypnotic effect is greatly appreciated by the timid in everyday dental operations, even though these may involve nothing more than nervous strain. (See DENTAL COSMOS, July 1909, p. 844, and May 1910, p. 602.) In combination with aspirin, pyramidon, or trigemin, bromural is very useful in headache, of which male patients are wont to complain after overindulgence in alcoholics, and in after-pain. Bromural is more easily tolerated and absolutely harmless as compared with quinin, chloral hydrate or morphin-hyoscin, as recommended by Fischer for prophylactic sedative treatment. The twilight slumber which frequently follows the internal administration of bromural greatly enhances the ease with which our injections can be made.

Scopolamin, to be administered hypodermically by a Pravaz syringe, also has a place in our medicinal equipment, and is especially serviceable in preparing alcoholics for local anesthesia. Very stubborn or neurasthenic patients, or those in whom deep general anesthesia is absolutely contra-indicated, may be induced to submit to local anesthesia by being given a few inhalations of ethyl bromid or nitrous oxid and oxygen, if available, the mask being held at a distance from the face until superficial twilight slumber has set in.

In all such cases the operator's reassuring personality, individual discrimination, and a certain amount of personal hypnotism which can be acquired by training of the will power, is a valuable asset which may prove more effective than even drugs.

CONTRA-INDICATIONS AND SEQUELÆ.

Local anesthesia by novocain-suprarenin solution is contra-indicated in patients who absolutely refuse to submit to an injection on account of sad experiences they have had previously with cocain injections, and in ill-behaved children who are likely to gesticulate, also in ankylosis, extended phlegmonous conditions, in the status lymphaticus, grave anemia, tuberculosis, and infectious or metabolic diseases through which the power of resistance of the tissues has been lowered. In such cases edema may result without the dentist's fault, owing to tissue reactions that are as yet unexplained.

Cases of idiosyncrasy must be watched for, by taking an accurate history of the patient, in the use of novocain as well as in that of cocain. A few cases of idiosyncratic sequelæ following novocain injection have been reported, yet they are less numerous than with cocain, and the symptoms are considerably less severe and alarming. Even these seem to be on a fair way to be done away with entirely by the employment of mixtures of Byla's peptone and novocain, with which Fichot and Billard have made extensive experiments.*

In order to counteract shock or collapse in their light forms, such as palpitation, rapid pulse, pallor, cold perspiration and trembling, a decoction of strong black coffee, which should be kept in stock, or from five to seven drops of camphorated validol in a little water, are given internally, and placing the patient's head in a recumbent position. In more serious affections the heart is stimulated by the inhalation of a few drops of amyl nitrite applied on a napkin, by cold cloths applied to the chest, or a hypodermic injection of oil of camphor. If the patient's individual case has been duly considered in regard to concentration and quantity of solution injected, and all aseptic precautions have been taken in the preparation of the solution and the instrumentarium, no after-pain will set in. Pain from secondary infection, due to faulty oral hygiene, must not be charged against local anesthesia.

* [See COSMOS, January 1913, p. 105.]

PRESSURE ANESTHESIA FOR PULP EXTIRPATION.

For pressure anesthesia, small rods, containing 0.01 gm. novocain and 0.0002 gm. suprarenin are in the market. These rods are applied in the same way as the cocain rods sold for this purpose. The anemia produced by the suprarenin allows of a cleaner operation with less danger of subsequent discoloration of the tooth, and is especially appreciated in children's teeth with large apical foramina. These rods produce perfect results even in advanced stages of pulpitis and in cases of pulp-stones, in which the familiar procedure may have to be repeated once or twice. The great advantage of these novocain-suprarenin rods over cocain or arsenous oxid lies in the absence of pericementitis following pulp extirpation.

RANGE OF USEFULNESS OF NOVOCAIN-SUPRARENIN.

In all operations of a surgical nature in the oral cavity, in the now so popular resection of diseased root apices, extraction of teeth, removal of roots, bone fragments, impacted teeth, cyst operations, resections or scarification of the maxillæ, etc., the methods of local anesthesia indicated are of inestimable value. Numerous minor operations, such as the grinding down of sound teeth, and the preparation of roots for bridges, the separating of teeth, or the wiring of fractured jaws, can be made painless and comfortable for both patient and operator by judiciously applied anesthesia. Scheff, after careful experimentation, has found that in all these cases the injection of novocain-suprarenin in no wise affects the vitality of the anesthetized tooth or its neighbors, if the pulps have been healthy before the injection. By rubbing a pellet of novocain-suprarenin into sensitive dentin with a moistened ball burnisher, excavation can be rendered tolerable, and the gums can be desensitized by rubbing the anesthetic tablet into them with an instrument or the finger, or by painting on them a solution of 20 to 30 per cent., for the fitting and adjusting of crowns, bridges, and orthodontia appliances, and similar painful procedures. It should, however, always be remembered that pain is very often the dentist's most valuable assistant in obtaining a correct diagnosis, especially in the treatment of pulpal and pericemental conditions.

CONCLUSIONS.

Local anesthesia by novocain-suprarenin injection surely deserves a thorough trial by every dentist, and it will prove a boon if the precautions mentioned are observed and the technique of injection is mastered. Considering the present state of perfection of local anesthesia, its possibility should always be first considered before resorting to general anesthesia—not *vice versa*, as unfortunately is still the case with many dentists. In ambulatory dental practices, or in districts where no nitrous oxid and oxygen tanks, no hospital or skilled anesthetist, are easily available, local anesthesia alone is practicable in the office as well as in the patient's home. The production of general anesthesia under difficult conditions or in unsuitable surroundings involves infinite disadvantages and risks, and its final success against such odds is altogether too dearly bought when we know that for dental operations local novocain anesthesia can be obtained so satisfactorily. Medico-legally, also, the application of local anesthesia gives the operator the advantage. To cite a medico-legal authority (Kupfer): "After extensive observations I do not hesitate to maintain that general anesthesia, with the few exceptions enumerated, is unnecessary in operations in the oral cavity, and that, as a medico-legal expert, I should be unable to protect an operator from indictment in case of fatal accident from general anesthesia." Dental colleges would surely raise the efficiency of their graduates, and more forcibly instil into them the necessity of aseptic methods of operating, and the importance of an intimate knowledge of the anatomy of the head, by including a short practical course in local anesthesia in their curriculum. General surgery is rapidly adopting local anesthesia for a great many major operations, and it behooves the dental profession, whose special field by its very nature calls for local intervention, not to lag behind, but unhesitatingly to keep abreast of the foremost modern and efficient methods available.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

HINTS FOR READERS OF DENTAL SOCIETY PAPERS.

By FRANK W. SAGE, D.D.S., Cincinnati, Ohio.

HAVE the typist double-space your paper, so that you may more easily keep your place while reading. Many readers bend their faces forward over their paper, evidently fearful of losing the lines, thus cramping themselves so that they have no ease in speaking. Wider spacing allows one to hold the paper down and the chin up, while facing the audience, the voice thus being allowed to pass over the paper, instead of being muffled behind it.

MANAGEMENT OF THE VOICE.

The management of the voice, however, is the important thing. It often happens that the acoustic properties of the hall are poor, so that unpracticed speakers fail to reach with their voices those even forty or fifty feet distant. At the meeting of the Ohio State Dental Society, in Cincinnati, in December 1912, several readers of papers, as well as those discussing them, spoke in tones so feeble that they were heard only by those near the stage. So it often is in dental meetings.

The dentist may easily learn to expand and project his voice. A few minutes' practicing, before reading, will be found to help wonderfully. A United States senator gives the following instructions to speakers about to ascend the platform: "Stand with the weight resting easily on one leg, the other being slightly advanced, if you prefer. Fill the lungs to their utmost tension, repeatedly, until you feel exhilarated. *Work the abdominal muscles* while exercising your voice, drawing it, as it were, from the depths of the stomach," etc.

Three or four minutes thus spent before reading will help the weakest-voiced speaker surprisingly. Try it, especially the working of the abdominal muscles. Also try projecting your voice as if over an audience. Speak from the throat, not from the roof of your mouth.

A touch of catarrh often hinders the free use of the voice. Public speakers and vocalists sometimes have a rhinologist blow out the nasal passages some hours before ascending the stage. You may do this very well yourself, using some cleansing throat-wash or gargle.

Often, while waiting to be called upon to read or speak, one may, while seated, silently practice the deep breathing and the abdominal exercising. The importance of the latter is hardly to be overestimated. A brisk walk before speaking tones up the voice, especially if accompanied with deep breathing.

STAGE TIMIDITY.

Frequently the young speaker finds his voice cramped and constricted through sheer nervousness. To overcome this timidity, as soon as you mount the stage raise your eyes, and boldly and calmly look your audience over. Don't be in a hurry; glance here and there, to the limits of your audience. You may be surprised at the sudden return of confidence this gives you. You have a feeling of having mastered your audience in the start, instead of being mastered and awed by it. This is a simple, effective trick. Try it next time.

If dentists would pay more attention to the manner of presenting their thoughts to an assembly, our dental meetings would be greatly improved.

ON DISCUSSING PAPERS.

Another matter. Years ago we had more offhand discussions of papers than today. Speakers were not afraid of making "bad breaks," but went ahead, regardless of stumbling; got up after a tumble, and pushed ahead. Some of us older men think the old way the best. I would make this suggestion: Let the debater prepare his paper, then lay it aside, depending on his familiarity with the subject, through his having written it up. A few notes held in the hand should suffice to keep him on the track. If then he finds himself dissatisfied with his extemporaneous effort, he may ask the stenographer to cross off his verbatim report, and use his manuscript instead. Take this, however, from the writer, who has reported in many dental meetings: The offhand speech, if halfway good, will attract more readers in the dental journal than the written one. If not letter-perfect, the reporter who understands his job should be able to dress it up acceptably. That is what he is for, and that is what he does even for United States senators' (probably United States presidents') speeches!

It has become customary for discussors of papers to present written discussions as long as the paper itself. A second and even a third written discussion may follow, the several papers occupying often three hours' time. This dampens interest, and drives scores of wearied members out to entertain themselves examining exhibits. Moreover, happening usually on the opening day of the convention, it has a depressing effect on the later discussions. Few care to sit three hours listening to papers.

By all means let us return to the former way! Members will stay and listen to men talking offhand, because usually there is real enthusiasm such as pertains not to reading. And what they like best to hear on the floor of a dental convention, they like best to read in the dental journal.

CORRESPONDENCE.

THE N. D. A. RELIEF FUND:

An Open Letter to the Dental Profession of America.

[THE following appeal by the N. D. A. Relief Fund Committee has been received for publication, and is cordially commended to all our readers. (See Editorial in our December 1911 issue, vol. liii, p. 1450, "A Dental Benevolent Fund.")—ED. COSMOS.]

An Open Letter to the Dental Profession of America.

Dear Doctor,—Are you acquainted with the effort of the National Dental Association to establish a fund for the relief of its aged and unfortunate members?

Are you in full sympathy with that movement?

If familiar with the scheme thus far, you are aware that the first step was the endeavor during the present year to carry out the plan indorsed by the National Dental Association at Cleveland in 1911. That plan was to ask each state society to increase its annual dues one dollar per member, and set aside the sum thus obtained for the Relief Fund. The committee appointed at Cleveland endeavored to get the question before all the state societies at their last annual meetings, but, coming at the same time that we were asking them to increase their dues for the purpose of entering the National Dental Association under the reorganization, we met with much opposition.

The question was not put to a vote in a number of instances because it was feared we would hinder the reorganization movement. We were received with words of encouragement everywhere, but thus far we have only two states committed to our plan; namely, Tennessee and Colorado. Several of the other states are almost persuaded, and we hope they will vote the measure at their next meetings; therefore we shall keep up our efforts to carry out the original plan. We have been assured that this plan will not carry in some states, for various and sundry reasons, and many opposed to it have asked to be allowed to make voluntary annual contributions instead. Some few noble spirits have already set the example by sending on to the committee their first assessment. This encourages us to come to you, and we ask you to join this generous few, and agree to give annually a small sum to the Relief Fund. This is not to be something "thrown away, never to be heard of again," but it is going to create a fund to insure our members against want in sickness and old age. You may yourself become a beneficiary, or may live to see it help some dear professional friend in time of distress.

Will you, then, send us your name and the sum you are willing to contribute? or will you not save time and correspondence by inclosing your check at once for the first annual payment?

Make your check payable to H. B. McFadden of Philadelphia, treasurer of the National Dental Association. You may rest assured that the distribution of the Relief Fund will be in the hands of those who will thoroughly investigate all applications for help. Every precaution will be taken to guard the funds and utilize them for no other purpose than the relief of worthy dentists.

Will you not ask your professional friends to join you in this movement? Will you not lend us your aid and influence to get our original plan adopted by your state society? Will you not call upon the members of the profession to contribute what they can? Will you not advise us, giving names of those you call upon who feel they cannot contribute—saving us further correspondence and them future annoyance?

Fraternally yours,

L. G. Noel,
Edward S. Gaylord,
W. T. Chambers,
National Relief Committee.

Proceedings of Societies.

NATIONAL DENTAL ASSOCIATION.

Sixteenth Annual Meeting, held at Washington, D. C., September 10 to 13, 1912.

SECTION I: Prostheticic Dentistry, Crown and Bridge Work, Orthodontia, Metallurgy, Chemistry, and Allied Subjects.

Chairman—WESTON A. PRICE, Cleveland, Ohio.
Vice-chairman—HARRY E. KELSEY, Baltimore, Md.
Secretary—MARCUS L. WARD, Ann Arbor, Mich.

(Continued from page 66.)

WEDNESDAY—*Afternoon Session.*

(Continued.)

The next order of business was the reading of a paper by Dr. L. S. MEDALIA, Boston, Mass., entitled "Chronic Alveolar Osteomyelitis (Pyorrhea Alveolaris—Its Causes, and Treatment with Vaccines: With a Bacteriological Study and Report of 115 Cases."

[The first portion of this paper was printed at page 24 of the January issue of the COSMOS; the second part will be found at page 150 of the present issue.]

The next paper was one by Dr. GEORGE B. HARRIS, Detroit, Mich., entitled "Pyorrhea: Its Treatment by Bacterial Vaccines and Results of Animal Experimentation," which was read following Dr. Medalia's paper, the two papers being discussed together.

Discussion of the papers of Dr. Medalia and Dr. Harris.

Dr. G. D. LAYMON, Indianapolis, Ind. I wish to congratulate the essayists upon their most excellent papers. Each of them has thoroughly covered his subject. From practical experience, I know some of the possibilities of vaccine therapy, which I have employed for almost three years in the treatment of dental diseases.

Vaccine therapy has had a great struggle, like every other great issue, but justice and right must prevail. The victory is being won, the curtain of ignorance, prejudice, narrowness, and personal selfishness is being cast aside, and the truth is being laid bare. While I believe that vaccine therapy is still in its infancy, yet sufficient proofs of its merits as a therapeutic agent have been furnished to warrant its judicious use.

Vaccine therapy is not a new mode of treatment, as the principles involved have been applied to disease for centuries. It has gradually grown with the development of bacteriology. Before the application of bacterial vaccines as a therapeutic agent in the treatment of disease, bacteriology was of little or no use to the surgeon. The procedure was just the same, regardless of the kind of organisms present. The mode of treatment was designated by symptoms, and not by bacteriological examinations.

Vaccine therapy has done more than

all else in medicine to make it an exact science. Every year the field of application broadens; its possibilities are unlimited. Pasteur said: "It is possible to eradicate every infectious disease from the face of the earth." Since the marvelous development of vaccine therapy this statement is being realized; there is much yet to learn, but the horizon is gradually being cleared of fear and ignorance.

I am certainly glad to see the dental profession entering this field of experimental medicine. Dentists have come into disrepute in the minds of many intelligent persons simply because they were able to do but little for the common diseases of the mouth, such as pyorrhea alveolaris. I believe that vaccine therapy affords us one of the most powerful weapons with which to combat this dreaded disease.

The study of nature's immunizing apparatus teaches us how to take advantage of this process and produce artificial immunity by the use of immune sera or vaccines. When an immune serum is used, we inject under the skin a highly immunized serum, which contains immune substances to aid the individual in overcoming infection. This is known as a passive artificial immunity. When a vaccine is employed, we inject beneath the skin the dead carcases of previously sterilized pathogenic bacteria suspended in a normal salt solution. The immunity thus produced is known as an active artificial immunity.

A great stride was made when an antidiphtheria serum was introduced as a therapeutic agent in the treatment of diphtheria. Investigation with immune serum in other infections has not as yet yielded satisfactory results. The attention and endeavor of investigators have therefore been turned toward the channel of active immunization. Now we possess a vaccine for a great number of infections.

At first, it was thought that a specific organism was necessary in order to combat disease by this method. Early investigations were made mostly with smallpox and tuberculosis; these diseases were treated by a specific organism, and brilliant results have been reported.

It is best to use a specific vaccine in the treatment of disease where a specific micro-organism can be demonstrated. However, there are a great many infections in which a specific organism has not been demonstrated, some of which are furunculosis, carbunculosis, abscesses, infected wounds, empyema of the chest, antrum, etc., middle-ear disease, pharyngitis, bronchitis, tonsillitis, appendicitis, white swelling, scrofula, some cases of consumption, and chronic alveolar osteomyelitis.

The principal organisms of these infections belong either to the staphylococcus or streptococcus group, and these infections may be combated successfully with an autogenous vaccine composed of these organisms. This statement is true, according to the reports of medical men.

Pyorrhea alveolaris to my mind is caused chiefly by the staphylococcus, this being the principal organism found in almost every case.

My investigations have been directed not so much toward the isolation of a specific organism in this infection, as to the employment of certain vaccines in its treatment. While I am certain that there are a great many bacteria present in pyorrhea cases, I believe that the majority of them are merely harmless saprophytes. The same pus-producing organisms are found in pyorrhea cases as you will find in suppurating lesions in other parts of the body.

The mouth is rendered immune principally by the process of phagocytosis. However, there are two other factors which are active in producing this immunity.

The normal functional activity of the mouth causes desquamation of the epithelial cells with adherent bacteria, and these are destroyed by the gastric juice. The epithelial cells of the oral cavity are constantly being replaced, this desquamation being especially active during active mastication. Although the epithelial cells do not possess phagocytic properties, nevertheless they are lined on the surface and also to a certain extent penetrated by scattered bacteria. The result is that the cells are dislodged by the saliva, and carried away to the stomach to be destroyed.

Another factor to be considered in connection with the immunity of the oral cavity to infection may be antagonism of organisms to one another, the organisms not common to the mouth succumbing to those normally present.

The experiment carried out by Miller on himself throws light on this question. He thoroughly rinsed his mouth with a bouillon culture of bacillus prodigiosus containing over 2,000,000,000 bacilli. The number of bacilli in a loop of his saliva was ascertained at the beginning of the experiment. His mouth at the end of three hours was practically free from the organisms.*

The treatment of pyorrhea by vaccine therapy does not interfere in the least with other modes of treatment. Vaccines are not a panacea for mouth infections, but, if used judiciously, they will prove to be an invaluable aid in the treatment of pyorrhea cases.

In regard to animal experimentation, I have had very little personal experience, but wish to give some reports of prominent investigators.

Geo. T. Carpenter, in a paper read before the American Medical Association, mentioned some very interesting experiments. By infecting a fresh wound in the gums of rabbits with pyorrhea and other pus, he found the parts would remain infected only from two to five days. In other rabbits, a rubber band was placed around the teeth and pressed under the gums until an inflammation resulted. When the parts were infected with pyorrhea and the pus from a chronic ulcer, a pus infection resulted. Like experiments were made in the human mouth on gums which had been neglected, as well as on healthy gums, with similar results. These experiments tend to show that, when animals and man are healthy, the tissues resist infection, but when they are diseased, infection results.

Eugene S. Talbot has carried on a number of experiments in dogs. A dog was provided from a veterinary hospital whose gums and outer alveolar process were almost entirely absorbed, with pus exudate. Forty-six street dogs were selected for inoculation. They were of all breeds and conditions; some were well fed, others very thin. No dog was used whose gums and alveolar process had become infected, or whose tissues were absorbed. Thirty-nine cases which were inoculated by pyorrhea pus healed in eight days. In these, the gum tissues were healthy. The pus had no effect, and the wounds healed as rapidly as any wounds possibly could. In seven, the gums were inflamed, and infection occurred. Suppuration was slight in four, and considerable in three.

The pathogenic findings in these cases were not unlike inflammation and infection in other tissues. All experiments point to the fact that no one organism is responsible for pyorrhea, but, as I have said before, this infection is due to the common pus-producing organisms found in other suppurative lesions of the body.

I have made a microscopical examination of a great number of pyorrhea cases. Slides were smeared with the pus taken from the pus pockets and stained with Jenner's blood stain. Cultures were made by inoculating nutrient agar-agar and glycerin agar-agar. This was accomplished in the following manner: The mouth was sprayed with a mild antiseptic. A suitable pus pocket was selected, preferably on the upper gum, because this portion is freest from saliva. The pus pockets were washed out with sterile warm water, then massaged so as to get pus from the deepest portion. With a previously sterilized platinum loop wire, a small portion of pus was obtained and smeared over the surface of the culture media previously mentioned. These cultures were incubated until a sufficient growth was obtained to be plated; isolation was then made in the ordinary way. These organisms were carefully examined culturally and microscopically. I wish to report the following results, mentioning only the pathogenic organisms: Micrococcus catarrhalis, found in ten cases; streptococcus

* Quoted from J. F. Colyer, "Dental Surgery and Pathology," page 674.

brevis, found in twenty cases; streptococcus longus, found in fifteen cases; staphylococcus aureus, found in five cases; staphylococcus albus, found in every case; pneumococcus, found in twelve cases; bacillus fusiformis, invariably present.

As you see, the bacteriology of pyorrhea is not confined to any one group of bacteria, yet my experience has been that the principal pathogenic organism present belongs to the staphylococcus family, either the albus or a modification of the aureus and albus. These organisms give a characteristic growth upon nutrient agar-agar, having the appearance of a number of small beads. The cell wall is very tough, and the clumps are very difficult to emulsify. The cultural characteristics are very much unlike the growth of staphylococcus taken from other suppurative lesions of the body. I feel that we could safely name this organism staphylococcus pyogenes pyorrhea. I have treated over one hundred and fifty cases of pyorrhea by vaccine therapy—all with autogenous vaccine. The results have been invariably positive, so much so as to warrant the use of vaccine in dentistry.

I believe that vaccine therapy is not practical for the general practitioner, but belongs to the specialist, just as much as orthodontia, extracting, or anesthesia. I am certain that results are being obtained in pyorrhea by men in our profession who are not practicing vaccine therapy, as is shown by their many reports, but surely the course of treatment of this disease can be greatly shortened, and immunity greatly prolonged, by the judicious employment of an autogenous vaccine. This treatment should, however, be administered only by a thoroughly qualified operator.

I wish to add a few remarks concerning the dangers of the improper use of vaccine. When Koch announced his discovery of the tubercle bacillus, and tuberculin was placed upon the market as a therapeutic agent to be used in the treatment of tuberculosis, a great many physicians went wild over the possibilities of this agent. Dr. X knew of a patient who was suffering from tuberculosis, and he immediately decided to give Mrs. Jones an injection of tuberculin, without knowing the dangers of its improper use. The early administration of tuberculin by ignorant and inexperienced physicians did more harm than good. The result was that the use of tuberculin came into disrepute, and its employment for a time was discarded. Its use is being revived, however, and with a broader knowledge of its application in connection with autogenous vaccines. It has been found to be best to treat such cases first with an autogenous vaccine composed of the common pus-producing organisms, thus producing an immunity against these bacteria, and then follow this treatment with tuberculin. By the employment of such methods, vaccine therapy has been given a new life.

The fear of the use of vaccine in dentistry may be attributed, I think, to a lack of training in this particular field. Vaccine therapy has been given a black-eye, owing to the same experiences which I have previously mentioned in connection with tuberculin. The proper administration of vaccines is no more to be dreaded than the use of many drugs found in our materia medica.

Incidentally I may say that there are two kinds of vaccines, stock vaccines and autogenous vaccines.

Stock vaccines are prepared and placed upon the market by certain drug manufacturers. These vaccines are composed of sterilized bacteria which have been artificially cultivated, and are kept by constant replantation and inoculation of different culture media.

Autogenous vaccines are made from the pus taken directly from each individual case to be treated.

The relative value of these vaccines is apparent. Autogenous vaccines contain the organism or organisms in their respective number and virulence. This is a decided advantage, owing to the fact that, in one case, a certain organism may cause swelling, inflammation, and purulency, while the same organism microscopically and culturally in another case may not even be noticed. In one infection the staphylococcus aureus, in another the staphylococcus albus, may be the predominating organism.

Stock vaccines do not presuppose any definite knowledge of their manufacture —anyone using them depends upon the directions printed upon the label. In my opinion, an operator would be far more competent to employ vaccine therapy if he prepared his own vaccine. There is no excuse for the employment of stock vaccines in the treatment of diseases which are met by dentists.

Dr. M. C. SMITH, Lynn, Mass. My experience with vaccines extends over a period of three and a half years, during which my results have been so uniformly successful that I am more thoroughly convinced today of the benefits to be derived from vaccines than ever before.

My experience has been a little different from that of Dr. Laymon, and the more I use vaccines the more I am in favor of stock vaccines. In my opinion we can depend on good stock vaccines made by reliable manufacturers. In some cases, however, I prefer the autogenous vaccines, when I have time to have the vaccines made without endangering the patient.

The question of the use of vaccines in dentistry seems to me a quite important one, since we have a very wide field for their application outside of pyorrhea. I would use vaccines in cases of necrosis of the facial bones, as the beneficial results are very marked. In comminuted fractures of the face or jaws, even before washing out the cavity of the mouth, I invariably administer a large dose of vaccine. I generally use stock vaccines in these cases, giving five minims of pneumococci and two of streptococci vaccines. I depend more on the pneumococci than any other. If the patient is doing well, I may wait four days, and then make another administration. Cervical adenitis is another disease in which markedly good results can be obtained with vaccines. In cases of alveolar abscess extending under the superficial fascia of the neck and discharging a very foul-smelling pus, it is surprising what one or two injections of vaccines will do in cleaning out and drying up the abscess. In all cases with a marked discharge of pus I would advise the use of vaccines. If upon examination of the urine, a large amount of sugar is found, the patient has to be deprived of the ordinary foods and placed on a strict diet. For a time such patients may get on nicely, but then have a relapse, from no apparent cause. I had a case of this kind not long ago, and after a close examination of the systemic condition of the patient, I found that he was not getting sufficient nourishment because he had been forbidden to take carbohydrate foods. As soon as he began to feel better, he began to overwork himself. The systemic condition of the patient, therefore, must be closely watched while giving vaccine treatment.

Dr. T. B. HARTZELL, Minneapolis, Minn. I am very greatly interested in Dr. Medalia's work, which I have been observing for some years by reading his results in various journals, and endeavoring to correlate his work with my experiences in my own special field.

I do not wish to discuss vaccine therapy, but will say that the estimation of the opsonic index is falling into disuse here in the United States, because it is possible to get any sort of an index, if one counts often enough. The Germans, especially, no longer depend upon it. This means that the men who first began to estimate the opsonic index in order to determine the relative value or importance of bacteria found in certain pathological conditions have given up this method, which is no longer being used to the same extent as it was two years ago, although it may be of great value.

In regard to the use of vaccines in cases of pyorrhea or other mouth infections, a search of the literature shows that there are almost as many different opinions about bacterial vaccines for oral cases as there are writers. Dr. Leary, with whom Dr. Medalia was associated for a time, in the DENTAL COSMOS for January 1910 advances the opinion that the fusiform bacillus is the organism we must oppose. Dr. Medalia recommends vaccines containing both staphylococci and diplococci, and others are experimenting with still other bacteria—which would seem to show that, if we are to depend on vaccines for the betterment of these pathological conditions, we will have to employ a good many different kinds of vaccines. The method of the injection of shotgun prescriptions of dead bacteria does not appeal to me as being rational in the average case, though I do not wish to discourage vaccine investigation. Dentists are skilful technicians, and there is doubtless not one here who is not sufficiently skilful in the surgical treatment of the roots of teeth to gain excellent results. Therefore, what is the use of treating patients with vaccines if we can obtain good results without them?

I have used stock as well as autogenous vaccines prepared by Dr. Ulrich of Minneapolis, and I must say that my successes have been fewer than my failures. If the root-treatment that Dr. Medalia referred to in his paper, and which he says should be carried out along with the vaccine treatment, were eliminated, his successes with vaccines would be fewer. Of course, from a combination of good surgical work and the use of vaccines, it is logical to expect good results. Let us use vaccine sparingly and with a certain amount of good horse sense, and only in those cases where we feel that it will be an aid to the surgical treatment.

Dr. T. Sydney Smith, Palo Alto, Cal. I am before you under unfavorable circumstances. It is the close of the day, you are very tired, and the time allotted me is not sufficient to do justice to such an important subject.

Our attitude in the past toward so-called pyorrhea alveolaris has been one of shameful neglect, and many of the methods we employed in treating it could not help being followed by failure. We have lifted the mystery which surrounded this disease, and we are now using rational, scientific methods. These not only prevent and cure pyorrhea, but also prevent at least ninety-five per cent. of cavities, so that our patients can retain their teeth to extreme old age. To emphasize this thought, I shall divide the evolution of dentistry into four eras: First, that of primitive dentistry, the removal of teeth; second, the mechanical era, the invention of artificial substitutes; third, operative dentistry, the repair of teeth, and fourth, that of today, preventive dentistry. And it is from this last viewpoint that the subject deserves most consideration.

Let us first consider the laws which govern healing, that we may apply them correctly to pyorrheal pockets. To use an illustration: If the bifurcation of two fingers were extended through the palm of the hand and the parts kept separate, each surface would heal; then, no matter how they were sterilized and bound together, they could not reunite until both surfaces were surgically freshened and held together in surgical rest.

In applying these principles of healing to pyorrheal pockets, we must first correct the teaching regarding denuded cementum. Our eminent men have believed it to be dead. Even Dr. G. V. Black* told us about a year ago that the vitality of denuded cementum must be brief. As time will not permit me to go deeply into this matter, I will simply state that it cannot die while supported by a vital pulp and dentin. This makes it imperative to keep the pulp vital if possible. We must, therefore, not only remove all deposits from the cementum, but also expose the minute living cells by light, judicious scraping. How unreasonable, then, seems the old practice of applying severe germicides, acids, and pumice, which actually kill the cell life of these newly-exposed wound surfaces. Judicious scraping leaves the fresh blood in the wound to sterilize it and to form the matrix which connects the tissues. This blood-clot method is called "healing by first intention."

This brings us to the point where we must consider the septic condition of pyorrheal pockets, and view the vaccine treatment in a proper light.

Cultures made from exudates of these pockets reveal the fact that they do not

* *Items of Interest*, June 1911.

always contain micro-organisms of the same group. We may find in the same pocket such pathogenic organisms as streptococci, staphylococci, pneumococci, besides the more harmless flora of the mouth. But we must remember that these organisms have lived for months and years in close contact with an abundant blood and lymph supply; their presence has stimulated the blood into the production of such bacteriolysins, precipitins, agglutinins, etc., as would fortify it against them. There can be no better proof of this than the fact that such pathogenic organisms as streptococci have been held in check for years. Again, if we employ this new method of surgical treatment, these pockets heal readily when left to nature's forces, showing thereby conclusively that anti-bodies are present, sufficient in kind and number to destroy the remnant of infection which our surgical work may not remove.

There is no doubt that autogenous vaccines do produce an increase of these specific anti-bodies, but in the treatment of pyorrheal pockets the tissues cannot reunite without the aid of the surgery which we have described, even if the anti-bodies were increased one hundredfold; and since, without the aid of vaccines, we find them in sufficient strength to permit a rapid healing, I ask why we should employ these vaccines.

We cannot intelligently use stock vaccines, because pyorrheal pockets do not always contain the same group of pathogenic organisms. And if we could include all organisms in any given case, such a vaccine would not be suited to their specific degree of virulence. We will understand more clearly the extreme specificity that is required of anti-bodies if we study hemolysis occurring from the infusion of the erythrocytes of one animal's blood into the veins of one of another species.

If we should take some of the normal serum of a rabbit and introduce the erythrocytes of a horse, it would have but little injurious effect upon the cells of the horse. But should we infuse some of the horse's erythrocytes into the veins of the rabbit, there would soon be a substance developed in the serum of the rabbit which would destroy the erythrocytes of the horse. The rabbit's serum would then contain an hemolysin which would quickly dissolve the hemoglobin from the stroma of the horse's erythrocytes. The specificity of this hemolysin is so pronounced that it would have no effect upon the erythrocytes of another species of animal so far removed from the horse as a dog, but it would have some effect upon the erythrocytes of the zebra or mule. This specificity is so accurate that the test would show the biological relation of these animals to the horse.

The rabbit's serum could contain several specific hemolysins at the same time, if it were stimulated by the erythrocytes of different species of animals.

This makes it very clear that if we use vaccines at all, they must be autogenous; only those prepared from the patient's own infection would be likely to include all of the organisms and to meet their particular degree of virulence. We can also see that the bactericidal agents developed within the body are beyond the power of man to imitate, and are the only bactericidal agents which do not interfere with the reconstructive properties of the blood, for they are normal to it.

Dr. Medalia (closing the discussion). I do not think it will be of any use for me to attempt to discuss in detail the statements that have been made by the various speakers. A great many of these statements would have been anticipated, had I been allowed the time to read my paper in full. The published paper will therefore explain several of the points here raised.

The fact that Dr. Laymon found staphylococcus aureus in five cases, and staphylococcus albus in all the other cases of pyorrhea does not, in my mind, justify him in considering the staphylococcus as the one and only organism responsible for pyorrhea, because we all know how harmless an organism the staphylococcus albus is, and how frequently it is present as a contaminating bacterium. Again, the fact that he obtained good results in those cases with autogenous vaccine does not mean that the results were due to the staphylococcus vaccine only, since he told me that he did not isolate the staphylococcus in making up the autogenous vaccine, but made use of all the bacteria found in the cultures.

In reply to Dr. Hartzell, if I had time to read my paper to the end, I would have said, so far as the opsonic index is concerned, that owing to the difficulties encountered in making this test it had to be abandoned as a test for clinical purposes. It is used, however, as an index of immunity in laboratory work on animals. The results obtained with vaccine treatment in bacterial infections is recognized today to be entirely independent of the opsonic index. With regard to his claim that the vaccine treatment is not feasible because of the difference of opinion among bacteriologists as to the real causative bacterial agent of this disease, I will simply say that, if Dr. Hartzell were more familiar with vaccine treatment and the preparation of vaccines, he would know that it makes little difference whether certain bacteria found culturally in this disease are called by one man a streptococcus and by another a pneumococcus in chains, since the autogenous vaccines used include whatever organisms are found culturally. Call them what you may, the name will not alter the contents of the vaccine nor its results.

With regard to the fusiform bacillus and the spirochæta dentium mentioned by Dr. Hartzell: The latter is an organism cultivated under great difficulties, and has been ignored by almost all investigators. The successful results obtained with vaccines not containing this organism is, in my mind, another criterion showing that the spirochæta dentium is not a causative factor in this disease.

The whole subject sums itself up in the simple question whether dentists, "who are pre-eminently technicians," as Dr. Hartzell says, are willing to remain tooth artizans and mechanics, or whether they wish to be dental surgeons and dental physicians. If they would be dental surgeons and physicians, they must do everything for the patient that will help him, and not limit themselves to mechanical treatment.

Dr. Hartzell says that he has treated successfully this disease by local measures alone. If that is the case, why, pray, is pyorrhea the "bugbear" of the dental profession? I would like to ask Dr. Hartzell to make a record of every case and follow it to a successful issue, and then present the results before us. If he already has such records, I could not discover them in the articles published by him.

In answer to the point raised by Dr. M. C. Smith with regard to the use of stock vaccine, I will say that I found the autogenous vaccine mixed with stock vaccine to yield the better results. Stock vaccines have to be used in incipient cases where there is no pus present and the cultures are found sterile. The stock vaccine, however, should be made up from bacteria isolated from cases suffering with alveolar osteomyelitis—pyorrhea—if good results are to be obtained, and not merely from cultures obtained indiscriminately from any source. Autogenous vaccine is preferred by all other investigators.

For a more explicit and comprehensive explanation to all the questions raised by the various men who took part in the discussion I shall have to refer you to my paper, which will be published *in toto*.

The chairman appointed the following committee on the question of the study of amalgams, pursuant to the motion made by Dr. Lundy at a previous session: Dr. T. P. Hinman, Dr. W. A. Price, and Dr. C. M. McCauley.

There being no further business before the section, Dr. Price, the chairman, declared Section I adjourned *sine die*.

(To be continued.)

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

Regular Monthly Meeting, held October 22, 1912.

The regular monthly meeting of the Academy of Stomatology of Philadelphia was called to order by the president, Dr. Otto E. Inglis, in the lecture hall of the College of Physicians and Surgeons, Tuesday evening, October 22, 1912, at 8.30 o'clock.

After the transaction of some routine business, the President announced as the first paper for the evening that by Dr. R. H. Riethmüller, Philadelphia, entitled "Local Anesthesia in Dentistry, with Special Consideration of Novocain."

[This paper is printed in full at page 169 of the present issue of the Cosmos.]

The President announced that, as the next paper was also on the subject of anesthesia, it would be now read, and the two papers would be discussed together—the next paper being one by Dr. T. D. Casto, Philadelphia, entitled "Accessories of Nitrous Oxid and Oxygen."

[This paper is printed in full at page 166 of the present issue of the Cosmos.]

After the reading of the papers, Dr. E. R. Sausser gave a practical demonstration of the use of novocain, and explained in detail the technique to be followed in the injection of this anesthetic. Dr. A. E. Bassett also gave a practical demonstration of the method of producing analgesia by means of nitrous oxid and oxygen, in a patient with extremely sensitive dentin. The demonstration proved very successful, and while the patient was under the influence of the anesthetic, cavities in two teeth were excavated.

Discussion.

Dr. Edward C. Kirk. I think pretty nearly everything has been said that should be said in discussion of the subject, but while listening to these papers, particularly that regarding the phase of anesthesia now called analgesia, my mind has gone back a number of years to a period when on one occasion a young man, a clerk in a pharmacy in our neighborhood, came into the office of my stepfather—who was a surgeon—and asked if something could be done for a felon on his finger. After looking at his finger the surgeon said there was only one thing to do, and that was to lance it thoroughly. The young man replied that he could not stand that, but something had to be done. Whereupon the surgeon said: "If you will follow my directions, I can give you ether in such a way that it will not destroy consciousness but you will not feel the pain from the operation." He then directed the young man to inhale small quantities of ether, and then told him to test for himself the reaction to the irritation of rubbing his fingers together until the sensation had gone from his finger. After tapping his finger on the table for a few moments with increasing vigor, he said, "I do not feel it very much now, so I guess you can cut it," and then turned his hand over to the surgeon, who made an incision to the bone and immediately asked the boy if it hurt him. He answered, "No, it did not hurt, but I heard it crack." He had heard the peculiar sound that cutting of the flesh under these conditions makes, and the patient's condition I suppose was what is now called analgesia. I have seen ether administered in many cases in that way, and it is possible with any anesthetic. The question of the anesthetic zone in nitrous oxid administration has long been generally recognized. Dr. J. D.

Thomas published a paper on that point in the DENTAL COSMOS.*

There are some things that are new about the subject, or rather they are being brought more definitely to our attention; first, the general recognition being accorded to the scientific fact that the condition of peripheral anesthesia can be practically utilized, and the other, the perfection of the technique for achieving this very valuable stage of anesthesia. It is not analgesia, but peripheral anesthesia without loss of consciousness. The recognition of the availability of that phase of anesthesia for such practical work as we are doing in dentistry is a very interesting aspect of the matter, and there is no reason why there should not be, with improved technique, an extension of this blessing of anesthesia for the mitigation of the type of human suffering we have been causing by our dental operations, and in the enduring of which we have produced a tremendous wear and tear on the nervous systems of our patients, simply because we have not availed ourselves of this possibility that we can now utilize without difficulty.

Dr. J. D. THOMAS. Unquestionably, as Dr. Kirk says, the analgesic condition produced by nitrous oxid and oxygen has been known for a long time. We have recognized it, I know, in our practice. We establish a certain stage of analgesia or peripheral anesthesia, so that a knife can be drawn across the patient's hand without his feeling it, as in the case described by Dr. Kirk. The first effect of nitrous oxid anesthesia is peripheral paralysis, while cerebral paralysis occurs last. Vision and hearing are the last senses that are paralyzed in the progress of progressive anesthesia, consequently, before the stage of unconsciousness arrives, a numbness can be observed in the peripheral nerve-endings all over the body, and yet the patient is conscious enough to know what is going on. This is an effect that can be readily utilized, and should become a matter of great value in dentistry in various ways.

The principal drawback in nitrous oxid anesthesia is the accompanying asphyxia. I think in years past we have been asphyxiating the patients, and many of them were no doubt operated on under conditions of asphyxia. Some patients are asphyxiated more readily than they are anesthetized. I remember the first major operation which to my knowledge was performed with nitrous oxid. It was an operation performed at the Pennsylvania Hospital by Dr. Morton, who amputated a leg at the thigh. I administered the anesthetic, and the patient was kept under it for twelve minutes. In this case ether was very much contra-indicated, and Dr. Morton was asked to try nitrous oxid. In the first stages of the administration, there was a rapid approach to asphyxia, so I simply raised the facepiece, and allowed the patient to get a little air, which relieved the condition. The patient recovered consciousness a couple of minutes after the administration. That was the first recogniton of the ideal condition of nitrous oxid anesthesia. After that it became more or less general to obtain relief from asphyxial condition by raising the mouthpiece and allowing air to get in. In this way a perfectly good color can be maintained during the anesthesia, which is a very important feature in prolonged operations where profound anesthesia is desirable. In an operation, however, such as has been shown us tonight, in which profound anesthesia is not necessary, there is no reason why a condition of peripheral anesthesia should not be kept up indefinitely, if regulated properly, without carrying the patient to profound anesthesia. I see no objection to this method of procedure; in fact, I think, it will prove of great benefit to the patient as well as to the dentist in excavating sensitive dentin and extirpating pulps.

Dr. W. A. BORDEN. I am very much pleased to have seen this demonstration tonight. I have been using oxygen in combination with gas in operations for five years, and I have derived

* See COSMOS for June 1893, vol. xxxv, p. 442.

great benefit therefrom. I began using nitrous oxid in 1886. The first person I ever saw administer gas was Dr. Darby, in a clinic given at the University of Pennsylvania, and the patient happened to be a classmate of mine—now Professor Goodspeed, of the University of Pennsylvania. Dr Darby extracted several teeth for him, which would have been a painful operation without the use of an anesthetic. Knowing Goodspeed very well, I questioned him about the operation afterward, and he said that he did not feel anything at all, but was having a fine time. I was graduated soon after that, and began making a specialty of extracting with nitrous oxid, at Columbia, Pa., after Dr. Darby's example, viz, giving it without the admission of atmospheric air. The benefit of atmospheric air was not thought of at that time, the object being to keep the air out as much as possible. After a while, operators began to allow the patient to inhale a little air, and they obtained about the same results as with oxygen, except in the case of certain people—as those with deficiency in quantity or quality of the blood, anemic persons, alcoholics and persons addicted to smoking cigarets to excess—as they would become asphyxiated before they were anesthetized. With oxygen, however, we do away with that effect, and produce anesthesia more effectively.

I have a gasometer to furnish the pressure, and by keeping the temperature of the room at seventy degrees, I always have an even temperature of the oxygen and nitrous oxid, and get about the same result as we have seen here. The nosepiece and the mouthpiece I use are different from that which has been shown here, which I think is an improvement over mine. If I were using the analgesia method with every patient, I would use the apparatus shown. For my purposes, viz, extracting, I should not like to have an apparatus of this kind in view (I believe the seeing it would make timid patients more nervous), and inasmuch as I do not use nitrous oxid and oxygen in all cases, and for prolonged anesthesia only in special cases. I think the method shown tonight is a great benefit to patients who have extremely sensitive cavities to be excavated, and who need to have pulps extracted without pain.

Dr. J. H. Gaskill. I do not wish to discuss the papers particularly, but I have one or two questions to ask.

The earlier writers who used nitrous oxid speak of the possibility of kidney troubles following the administration of nitrous oxid, and Dr. Casto spoke of a case in which there was an increase of albumin after its use. I would like to ask if he can state whether or not it was caused by the nitrous oxid, or whether it was a coincidence. I have not seen any further reports on this subject, and I have been wondering whether or not, by keeping the patient under the influence of nitrous oxid for such a length of time as has been demonstrated, the effect which some of the earlier writers spoke of as following the use of nitrous oxid and oxygen would be produced.

I would also like to ask if, by bringing novocain in contact with the pericementum, there is danger of causing necrosis by interference with the normal conditions in the region of the bone.

Dr. Kirk. We have used novocain in the dental clinic at the University of Pennsylvania quite extensively, and it has come to us through two sources; first, the insistence of Dr. Prinz upon its use as an anesthetic, and the large number of students who come to us from Europe and have been quite accustomed to use novocain in the hospitals in Europe, have insisted upon using it in our clinic in preference to cocain. Our experience with it bears out the reports of Dr. Riethmüller on the European experience with it. The very diminished toxicity of novocain as compared with that of cocain is probably true—at least we have found it to be true in our experience; the features, too, of no aftereffects and the facility with which it can be sterilized by heat—all are definitely in its favor. While it is not as rapid in its anesthetic effect as cocain, if given a little time it will produce an anesthesia quite as profound and lasting or a little more so than cocain. We have come to regard it as a very great step in advance in the means for producing local anesthesia.

The question which Dr. Gaskill raised as to whether there is danger of necrosis is an important one. I do not apprehend on general principles that there would be any danger of producing necrosis of bony tissue with sloughing of the soft tissues by injections of novocain, providing the operation is done aseptically. That is to say, the toxicity of the drug is relatively so slight that I do not apprehend any serious necrotic effect from the poisonous character of the drug itself, and by using isotomic solutions any danger from the difference in specific gravity is eliminated. Statistics of operations thus far done, which cover now a record of half a million cases, as Dr. Riethmüller has cited, seem to indicate that we have in novocain a safe and reliable means of producing local anesthesia, and one which very certainly eliminates a number of the disadvantages of local anesthesia with cocain, especially the very great uncertainty as to what is the minimum safe physiological dose of cocain. We know the idiosyncratic relation of people to that drug, and that many will be almost alarmingly affected by a fair average dose. I do not mean psychologically alone, but that a definite physiological disturbance is produced in the circulation of such patients by even a minute dose of cocain, and that tricky quality does not seem to attach itself to novocain.

Dr. Gaskill. What prompted my question was a practical case which proved that the evidence of necrosis is sometimes slow in showing itself. This was a case in which the pulp of a right central incisor had been extirpated some twelve years previously, and the tooth crowned. A few weeks ago the patient presented complaining of pain in the region of the incisors. I applied all the well-known tests to the left central, in which there was a vital pulp, and I received no response from it other than normal. I tried local treatment, but could give the patient no relief. Finally I suspected pulp nodules, and extirpated the pulp of the left incisor under pressure anesthesia, without affording relief. I dismissed the patient, thinking that in the course of two or three days the pain would disappear, although there was some swelling about the tooth; but she failed to get relief. When I finally extracted the tooth, pus issued from the alveolus. I requested the patient to return in two or three days, thinking she would have relief, but on presentation she reported that there had been continual pain. I then used an explorer and found that a small spiculum of necrosed bone was being thrown off, and which undoubtedly came from the apical region of the right central incisor, on which a crown had been for twelve years, while the root of this tooth was apparently as solid as it ever had been.

Dr. Riethmüller (closing the discussion of his paper). There is very little danger from necrosis if, as Fischer has clearly pointed out, absolute asepsis is observed. I have only recently read a report by Professor Williger of Berlin on six cases of infection, in which novocain had been used carelessly in a public dental clinic by young operators. These cases were, however, immediately diagnosed by the X ray, and treated in time to prevent any really serious necrotic conditions.

In regard to the price of novocain, I have been informed by the director of a municipal public dental clinic of one of our largest cities that the annual item for nitrous oxid and oxygen has been very considerable, while if novocain had been used instead, the expense would be almost negligible, and not only as good but better results would be obtained, because nitrous oxid and oxygen analgesia, though it is suitable for the excavating of sensitive dentin, cannot be employed for the extirpation of dental pulps, as some of the gentlemen who discussed Dr. Casto's paper seem to believe. The nitrous oxid and oxygen analgesia is not sufficiently deep for this more radical operation, and the operator, if he wishes to employ nitrous oxid and oxygen for pulp extirpation has to produce general anesthesia, which, as I have said, in every case, no matter what anesthetic is used, means a general intoxication of the central nervous system. This, of course, can be overcome by patients enjoying full health, but, for practical and pathological reasons, I think the results obtained with novocain all over Europe and in the South American and English colonial countries, where local anesthesia seems to have been appreciated a great deal more, and where local anesthetics have been used for years, not only in the form of novocain but cocain, are more favorable. Whether this is due to greater care in sterilizing, or to racial and climatic conditions, I cannot say, but these factors have no doubt something to do with the uniformly favorable results obtained in local anesthesia by our foreign *confrères*. There is no doubt in my mind that racial and climatic conditions have to be reckoned with in the administration of both local and general anesthetics, because, as you know, it is certainly safer in Europe to administer chloroform than it is in this country, and to this day a great many minor operations are performed there under chloroform.

For practical reasons, novocain should at least be given a fair test by every operator, and he will find that he will save a great deal of time, expense, and anxiety, and incidentally will improve the esthetic appearance of his office. Bulky tanks, in my opinion, do not look confidence-inspiring to patients, and the noises produced by the escaping gases and the inhaler are not conducive to a nervous person's mental comfort. Give local anesthesia with novocain-suprarenin a fair trial, and it will be interesting to hear your reports of the results obtained.

Dr. HUGGINS. I have been requested to ask the difference in technique in the use of novocain and cocain in pressure anesthesia?

Dr. RIETHMÜLLER. The technique with novocain is practically the same as that in pressure anesthesia with cocain. For this purpose it is not necessary to have the novocain tablets combined with suprarenin or adrenalin. Pure novocain can be obtained in tablet form, and works as well as cocain, though perhaps not so rapidly, as Dr. Kirk has suggested. On the other hand, if you wish to make an immediate root-canal filling as practiced in Europe and often condemned in America, the astringent action of the suprarenin is useful; there is no hemorrhage, and no pericemental irritation, as is so frequently observed after pressure anesthesia with cocain.

In regard to the injection method, I would say that for terminal anesthesia of a small number of teeth anyone familiar with the injection of cocain can certainly be successful with novocain anesthesia, and he will always be on the safe side.

Dr. CASTO (closing the discussion of his paper). The paper which I read was a *résumé* of the accessories I consider necessary in nitrous oxid and oxygen analgesia and anesthesia. A great deal has been written in the last three years by surgeons and anesthetists of this country regarding the great benefits accruing from the use of nitrous oxid and oxygen as a general anesthetic. Operations lasting from thirty minutes to two hours and even longer have been performed under this anesthetic. Many men are conducting researches and tests concerning albuminuria, acidosis, the effect on blood pressure, the problem of rebreathing, etc., and a review of all of their practices and observations would surely prove to be interesting, although each man comes to a different conclusion. It is for this reason that I appeal to you tonight. If there are twenty men in Philadelphia interested in this practice, they should perfect it to the utmost, and determine the principles governing it. If albuminuria can possibly result from this method of anesthesia, and there are people laboring under the effects of it, we should know it. No one man can find that out. I have now a case of this kind under observation, but how many days may pass before I find another such case! If we had twenty men who could make observations on fifteen or twenty cases during a year, and report on them, we could reach valuable conclusions.

I am not here to compare the value of this method with that of other methods. That question is for the individual operator to consider. Dr. Gatch, in a review of the fatalities due to this anesthetic, reports only one fatal case in fifty thousand administrations, which shows that nitrous oxid and oxygen anesthesia must be comparatively safe. I appeal to those interested to labor together with me earnestly in this field of research, so that we may present useful results to our *confrères* in a not far distant future.

Motion was made and carried to extend a rising vote of thanks to the essayists for their interesting papers.

Motion was made and carried to adjourn until the next regular monthly meeting.

"F. D. I."

INTERNATIONAL DENTAL FEDERATION.

Summary of the Proceedings at the Annual Meeting held at Stockholm, August 28 and 29, 1912.

[Report furnished to the Dental Cosmos per courtesy of the *British Dental Journal.*]

(Continued from page 97.)

Executive Council.

Wednesday Afternoon.

(Continued.)

The Miller Prize.

The Council then considered the question of the award of the Miller Memorial prize, the President announcing that he was prepared to receive nominations of candidates.

Dr. Brophy said that when in Dresden the previous week he was visited by Dr. Jenkins, who asked him to present to the Council some books and papers on behalf of the candidature of Professor Carl Röse. He consented to do so, and one of his chief reasons was that when the last award was made to Dr. G. V. Black, the name of Dr. Röse received the second highest number of votes. He presented to the Council six volumes and a list of ninety-three publications representing the labors of Dr. Röse for the profession.

Dr. Aguilar seconded the nomination of Dr. Röse.

M. Roy said he was requested by the Fédération Dentaire Nationale of France to submit the candidature of their *confrère,* Dr. Godon.

Dr. Rosenthal seconded the nomination of Dr. Godon.

The President announced that he had received two other suggestions for the prize, but as the names were not proposed at the meeting, they would not be voted upon.

Dr. Brophy asked whether as a jury they were limited under the rules of the award to a candidate's literary and scientific contributions to dentistry.

The President said that the Executive Council was in no way limited, and, acting as a jury, would award the prize to the person who, in the terms of Article 2 (e), 3, "had rendered the most eminent services to dentistry."

A vote by ballot was then taken, and resulted in favor of Dr. Godon. On a show of hands the Council then made the vote unanimous, and amid applause the President declared the honor to have fallen to Dr. Godon.

M. Roy returned thanks for Dr. Godon, and said that France would be touched by the honor paid by the F. D. I. to one of its most eminent dental surgeons.

Dr. Aguilar presented the report of the "International Miller Prize Fund" Committee, and also the accounts, as follows:

Gentlemen,—Your Secretary begs to report as follows: At the presentation of my last report to you on August 1, 1911, the capital of the "International Miller Prize Fund" was represented by 49,626 francs. Since then we have received as new subscriptions from the United States 11,200 francs, collected by the American Committee through the initiative of our *confrère,* Dr. Brophy, who brought this sum to our last meeting in a cheque for £448 2s. 10d. Besides this sum the fund has received, as you will see by the appended balance sheet, from interest on its stocks, some 2389 francs, which brings the actual capital of the Miller Prize Fund to nearly 63,000 francs.

As decided at the last meeting of the board, and after previously taking the advice of two bankers, in the month of September last, 25,000 francs of the cash at the bank was invested in the purchase of Argentine bonds 6 per cent. Cédulas Hipotecarias, a safe stock that pays a good interest. Considering that we have still some 18,000 francs in current account at the bank without drawing interest, I would call your attention to the advisability of investing that sum in some securities, and would suggest the convenience of purchasing Japanese State 4½ per cent. bonds, or some other stock that would return 4 or 4½ per cent. interest.

This committee at the present meeting should also decide as to what sum of money shall be given in cash to the recipient of the Miller prize that is to be awarded this year, which sum, together with the expenses of the diploma and medal to Dr. G. V. Black for last year, should be deducted from our account of capital.

Your Treasurer's account for the last year—August 1, 1911, to August 1, 1912—is as follows:

Treasurer's Account—International "Miller Prize" Fund.

Dr.		*Fr.*	*Cr.*	*Fr.*
April 1.	Cash in Current Account at the Deutsche Bank, Mks. 22,334,50	27,917,50	Purchase of $11,000 nominal value of 6% Argentine State Cédulas Hipotecarias	24,466,40
" 1.	Cash in hand	2,546,28	To the Deutsche Bank, for safe keeping of Bonds	7,25
" 2.	Received from Dr. T. W. Brophy from subscriptions collected in the United States, a check for £448 2s. 10d.	11,200,00	Cash at the Deutsche Bank in Marks, 4,239,95	5.300,03
	Credited by the Deutsche Bank, Berlin, for collection of coupons of German State Bonds and Argentine Cédulas Hipotecarias, dates from November 14th to June 24th (Mks. 1,911,25)	2,389,78	Cash at the Deutsche Bank in Francs	14,279,88
	Fr.	44.053.56	Fr.	44,053,56

INVENTORY OF CAPITAL—INTERNATIONAL "MILLER PRIZE" FUND.

Our account of Capital at the Bank is as follows:

1912.		Fr.
August 1.	Value of 15,000 Marks nominal of German State 4% Bonds	19,162,50
	Value of $11,000 pesos nominal Argentine State—Cédulas Hipotecarias	24,216,40
	Deposited in Current Account in Marks, 4,239,95	5,300,05
	" " " " " Francs	14,279,88
	Fr.	62,958,83

FLORESTAN AGUILAR, *Hon. Secretary.*

The meeting of the Miller Prize Fund Trustees took place August 28th. Present, Dr. Brophy and Dr. Aguilar.

The minutes of the previous meeting were read and approved, and letters of Drs. Weiser, Godon, and Mummery were read, regretting their non-participation, owing to their inability to come to Stockholm.

The following business was transacted:

(1) The Secretary read the report published above.

(2) The report was accepted.

(3) It was decided that the remaining sum of money standing in current account at the bank be invested in some reliable state securities, preferably in U. S. A. bonds.

(4) It was decided that in consideration of the expenses involved in preparing and producing the first "Miller medal," awarded to Dr. Black in 1910, expenses which amount to about 5000 francs, this Board of Trustees will place at the disposal of the Executive Council of the F. D. I. the sum of 1500 francs for the expenses and medal of the Miller prize for 1912.

(5) After careful consideration it was decided that in conformity with the wishes expressed by different members of the F. D. I. at the meetings of 1910, 1911, and 1912, this Board of Trustees advises an alteration of the present regulations for the awarding of the Miller prize in the sense that the standing order to be added shall comprise the following points:

(*a*) That nominations of candidates for the prize may be made by any member of the F. D. I. or by any dental institution, society, university, or corporation invited to do so.

(*b*) That the nominations of candidates shall be presented in writing, stating the merits of the candidate and accompanied by copies of the books or writings of the candidate in any of the official languages of the Federation.

(*c*) That nominations are to be presented before January 1st, in the year of the award in the following August.

(*d*) That notice of the awarding of the prize and invitations to present nominations be sent to all members of the F. D. I. and to any professors, associations, universities, or corporations that the Council may approve.

FLORESTAN AGUILAR, *Sec'y,*
Internat. Miller Fund Committee.

Dr. SCHAEFFER-STUCKERT proposed that a duplicate of the Miller prize medal in bronze be provided for the new Dental Institute in Berlin, to be opened in October 1912.

Dr. AGUILAR suggested that a duplicate also be sent to the T. W. Evans Institute, to be opened in Philadelphia in October 1913.

Dr. BROPHY seconded both propositions, which were carried.

Dr. BROPHY, as a supplementary report, stated that America had not finished its contributions to the Miller Fund. Further, Dr. Reid, editor of the *Dental Journal* of Toronto, was getting the co-operation of Canadians, and he (Dr. Brophy) heard that they had raised over 1000 dollars, which would soon be forwarded to the Treasurer. As to the award of the prize, he regretted his misconception as to the rules. Dr. Godon was one of the best friends he had in the world, and though he (Dr. Brophy) had proposed another candidate, he was in no sense opposed to Dr. Godon's candidature. Indeed, he was in full accord with the decision, and he congratulated Dr. Godon, and also the F. D. I. on recognizing the eminent services of a great Frenchman.

The PRESIDENT thanked Dr. Brophy for his efforts in adding to the capital of the Miller Prize Fund, and stated that he would telegraph to Dr. Godon the Council's decision.

The session then concluded.

Hygiene Commission.

This Commission met on Thursday morning, August 29th.

The President (Prof. E. JESSEN), delivered the following address:

President's Address.

I heartily welcome you in the name of the Commission, in the hope that the session in Stockholm may bring success to our endeavors and lead us nearer to our aims. Our secretary, Mr. Lenhardtson, will give you full particulars of the activity of our national committees during the last year, and what has been attained. I have been charged by the Managing Committee to lay before you suggestions for approval, and to make some proposals.

The International Commission for Mouth Hygiene, with a general board of directors, is composed of committees from twenty different countries, whose names appear in section 4, pages 3 to 5, of the *Internationalen Archiv für Mundhygiene.* The commission is under the protection of his Majesty King Gustaf V of Sweden, and since its reorganization at the International Dental Congress in Berlin, 1909, through its national committees it has established a National Association for Mouth Hygiene in the following countries: Denmark, Sweden, Finland, Norway, Holland, Belgium, France, Switzerland, Italy, Austria, and Russia, as reported in the four numbers of the *Archiv.*

The German Central Committee for the care of teeth in the schools was formed in Berlin in 1909, independent of the International Hygiene Commission. Up to the present, through its efforts and the assistance of the preparatory work which had been done by the German dentists, 120 dental clinics have been established for the public schools in Germany. The governments of several countries take the greatest interest in these efforts to benefit the rising generation.

The greater the number of those who devote themselves to striving for the public welfare, the more successful will be our work. I therefore ask you to obtain still more new members, pointing out at the same time that, according to our statutes, we are not only able but we are under obligation to receive men and women of any profession who are interested in our cause—as thereby our commission will be enlarged, and, more and more extended, will continue to win new countries for the sphere of its endeavors, and be enabled to set before itself higher and higher aims. To its aims I desire to refer briefly.

All know that we want to spread among the people the knowledge of the importance of a sound and healthy mouth. We want to popularize dental hygiene by introducing it into all schools, the army, the navy, hospitals, and infirmaries, and by providing dental assistance for all those families which are in urgent need of such help, but are not in a position to pay for it.

It is to the interest of all governments and municipal administrations to advance such efforts even for purely material reasons; for, as I have had already the honor of stating to you in the opening session, great pecuniary gains are made in the national wealth by the systematic introduction of dental hygiene.

It is true that we have started successfully on the way toward a systematic introduction of dental hygiene, but we are still very far from the ultimate object. The influence of our commission is still relatively inconsiderable. We are not yet independent enough in a pecuniary sense to give to our exertions that weight which is necessary for the assertion of our claims within a sphere of action which extends over all the civilized world. To that end we are not only in need of sympathy, but more so of material help, as much on the part of political and municipal administrations as on that of rich philanthropists.

We need money to procure dental assistance and means for dental hygiene free of cost to the poor in all countries, to establish dental surgeries for school children everywhere, and to lend them expert and material help. For such a far-extending scheme, a central station is needed from which the work could be systematically conducted in all countries. Some philanthropic institution might enable us, here in Stockholm, our high Protector's capital city, to erect a building in which would be performed everything within the department of dental hygiene, and the results of which would then have to be carried out in general practice.

We are yet very far from achieving all these final aims, but if we look back upon the long distance we have already covered, it will be seen that we have pushed ahead in spite of everything, and then the conviction will grow in us that we shall continue to progress.

Secretary's Report.

Mr. ALBIN LENHARDTSON presented his report on the progress of public dental hygiene during the past year. He said that since the last meeting in London in 1911, the dental hygiene movement had taken more definite forms in several of the countries represented in the Hygiene Commission of the F. D. I. The number of new school dental clinics had increased, though perhaps not in the same proportion as during the previous period. The most important thing, however, was that the value of mouth hygiene for the nation was being increasingly recognized by public authorities, from the highest to the lowest. He thought it was perhaps advisable not to "force the pace" too much before they were able to obtain the requisite data from practical experience of working these clinics. Several difficulties had already appeared. In some countries, for instance, the municipal authorities had not given sufficient consideration to the question of salary; in other countries, unsuitable methods of treatment were adopted. "In Sweden we have tried to deal with the problem in a radical way. The Swedish National Association for the Promotion of Mouth Hygiene, and the Swedish Dental Federation, have applied to his Majesty for the nomination of experts to consider the best method of regulating the public dental service. This is the most noteworthy proposal yet made in any country, and the Swedish press have strongly supported it. The only objection has been made, strangely enough, by the Royal Board of Medicine. However, according to the latest information, there is every prospect that the government will appoint such a royal commission in the autumn; a more striking testimony as to what a strong position we have already gained in Sweden cannot be found."

As to progress in other countries he could not give a complete account, because he had received reports from only about ten countries represented in the Hygiene Commission.

In Germany there are now about 120 school clinics. In Bavaria an association for the promotion of dental hygiene in schools has been started, chiefly owing to the energetic work of Professor Walkhoff, who has educated public opinion by pamphlets and papers.

In the United States of America, efforts have been mainly concentrated upon the education of the public. The interest manifested by life insurance companies in mouth hygiene is also of importance. Professor Wallin published the results of his careful examination of the Marion school children, proving that children are seriously retarded in school work by dental disease and unclean mouths.

In Great Britain, steady progress is being made. Some large towns like Bradford, Norwich, Cambridge, and Sheffield have whole-time school dentists; other local authorities appoint dentists for part-time service, the fee for this being £1 per half-day of about three hours. (In Sweden, the Swedish Dental Federation has fixed a normal salary of 5s. 6d. per hour.) London has now seven school dental clinics in operation. In some rural districts, dental clinics are started by private generosity. The Birmingham Education Committee recently decided to appoint five dental surgeons for their scheme of school dental treatment. In his annual report, Sir George Newman (chief medical officer to the Board of Education) put great stress upon preventive dentistry. He laid down four general principles which should govern school dentistry in England, as follows: (1) All arrangements for each area should be under the supervision of the school medical officer, as the school dentist should be definitely and organically connected with the school medical service; (2) The inspection and selection of all cases should be carried out by the school dentist himself; (3) Conservative dentistry, both for inspection and treatment, should concentrate on a definite age period, namely, six to eight years; (4) Dental treatment should always be followed up by regular re-examination, and, if necessary, renewed treatment. It is gratifying to note that school dentistry has the sympathy of the medical authorities of the Board of Education in England.

Mr. Lenhardtson, referring to New Zealand, drew attention to Professor Pickerill's valuable book on the "Prevention of Dental Caries and Oral Sepsis," this being the Cartwright prize essay of the Royal College of Surgeons of England. A chapter in it was devoted to Public Dental Hygiene, and gave an able presentation of the subject. In Australia, the government of Queensland has already appointed a dental inspector for state schools, and intends to appoint two more.

Full information would be given by Dr. Gabriel Wolf, secretary of the Austrian Association for School Dentistry (which has received grants of £126 from the Vienna municipality, and £84 from the state), in his paper dealing with progress in Austria. Dr. Zilz had written a scientific work on "Tuberculosis and the Oral Cavity."

Dr. Bon, secretary of the Belgian Association, reported that the mouth hygiene movement was being organized.

In Denmark, King Christian has given his patronage to the Danish Association, which publishes a journal. School clinics are established in three towns, and systematic examination and treatment has been introduced in two educational institutions.

In Finland, the political situation handicapped the movement. The Finnish Association, however, was working chiefly in educating the people.

The French National Committee is engaged in organization, and aims at obtaining semestral examinations of school children's teeth.

In Holland, the Dutch Society is devoting attention to propaganda work for establishing school dental clinics.

In Italy, our colleague Dr. Guerini has done admirable work. Besides writing in the daily press with his well-known enthusiasm, he read an excellent paper before the International Anti-Tuberculosis Congress in Rome (April 1912), on "The Importance of Oral Hygiene in Combating Tuberculosis," which has been reproduced in over a hundred papers. School dentistry has been introduced in Rome, Milan, Genoa, and Turin, the latter town having one clinic for each of five districts.

The Norwegian Association has received contributions of 1000 kroner from the state and 500 from the Christiania municipality. The sums are not large, but they indicate official approval of our aims. A good idea of this association is to enter municipalities as members; in this way their interest in dental hygiene is maintained. A school dental clinic has been established in Bergen, a town of 75,000 inhabitants, which has made an annual grant of 17,000 kroner. Norway has six dental clinics in towns, and one in the rural district.

From Switzerland a report has been received as to the school dental clinic in Lucerne.

The Swedish Association has constituted three provincial branches, with the governors as presidents. Application has been made to the government for a grant toward publishing a popular pamphlet of 100,000 circulation. In eight or ten towns, schemes are in hand for starting school clinics. Sweden, with five and a half millions of people, has now twenty-five school clinics. The association proposes to publish a journal of its own in the autumn. The royal commission already mentioned will probably begin its work this autumn and will consider the regulation of the dental service in relation to schools, the army, hospitals, sanatoria, asylums, and prisons; state railway, post-office and customs services; government grant for public lectures in dental hygiene; appointment of a dental surgeon to the Royal Board of Medicine and the army medical administration. Eventually it is hoped to obtain a government subvention for studying the etiology of dental caries, but this is perhaps too theoretical a question to be pressed at present.

Mr. Lenhardtson announced that Dr. Steffen (of Cuxhaven), who had promised to read a paper on "Care of the Teeth of Soldiers and Sailors," was unable to be present.

The President read the following cablegram from Dr. Williams Donnally (Washington, U. S. A.): "Please greet Federation, and announce new law providing sixty commissioned naval dental officers with status and compensation identical with first-grade medical officers. The present authorized annual compensation of American army and navy dental surgeons approximates half a million dollars."

A letter was read from Dr. Jenkins (Dresden), who regretted he could not attend, and thanked the Hygiene Commission for electing him as honorary president. He added: "Please accept congratulations upon the progress already made and express my steadfast conviction that the Hygiene Commission of the F. D. I. is destined to be one of the most efficient factors in the great modern movement for the physical regeneration of the world."

The Russian National Committee, through its Moscow representative, sent greetings, and stated that they would do everything possible to promote the dental hygiene movement in Russia.

M. Decker, of Luxemburg, also wrote stating that he could not attend.

M. Roy, commenting on the Secretary's report, said the habits of childhood influenced the whole life, and once well begun, the care of the teeth was continued automatically. In France they had asked for dental inspection of school children by dental specialists to be included in the new law. The responsible minister was convinced of the necessity of this, but it was a question of money. At present, medical inspection cost two million francs and when reorganized it would cost eight millions. They must, however, insist on the economic benefits of school clinics for society as a whole, as demonstrated by Professor Jessen.

Dr. Wolf said the support of the state for school dentistry was becoming stronger in Austria. It was very necessary to impress the importance of mouth hygiene upon professors, specialists, and public health authorities. He proposed that the F. D. I. approach the different governments with the request to be officially recognized.

The minutes of the H. C. F. D. I. were read by Dr. Van der Hoeven.

The honorary members and national committees, therein named, were recommended for appointment, as follows:

Hon. Members and National Committees.

Honorary president—Dr. Elof Förberg, Stockholm.

Honorary members—Ministerial Director, Prof. Dr. Kirchner, Berlin; Dr. Paul Ritter, Berlin; Dr. S. C. Benson, Helsingfors.

Member of Committee—Excellency Lingner, Dresden.

Danish National Committee—Army Dentist Viggo Randböll, Copenhagen.

German National Committee—Dr. Pursche, Berlin.

Austrian National Committee—Professor Dr. Scheff, Prof. Dr. Weiser, Dr. Karolyi, and Dr. Gabriel Wolf, Vienna; Prof. Dr. Bönnecken, Prague.

Swiss National Committee—Dr. Eltner, Basle.

Finnish National Committee—Pehr Gadd and Gunnar Siven, Helsingfors.

Russian National Committee—Prof. Dr. Fr. Zwierschorsky and M. Minker, St. Petersburg; J. Otantschikoff and P. Dauge, Moscow; Dr. Rakowsky, Charkoff; Dr. A. Redalien, Odessa.

Philippines National Committee—Dr. L. Ottofy, J. L. Arbiza, and B. Arevalo, Manila.

Japanese National Committee—Dr. M. Chiwaki (director of the Dental School, Tokyo), Dr. S. I. Enomoto (president of the Japanese Dental Society), Dr. S. Shimura and Dr. T. Shmamine, of Tokyo.

It was proposed to alter the Rules by adding to Article 10: "The Executive Council shall be formed not only by fifty regularly nominated members, but also by adding the presidents and secretaries of the different commissions."

Referred to the Executive Council.

It was agreed, subject to the approval of the Executive Council, that "Copies of the *Internationalen Archiv für Mundhygiene* shall be at the disposal of each national committee in one of the four official languages, the expenses to be paid by the F. D. I."

It was agreed that Professor Walkhoff's brochure on Dental Hygiene be recommended to the national committees.

It was agreed to recommend the national committees to ask the school authorities to issue every half-year the statistics on mouth hygiene, according to the general scheme of Strassburg, with the alterations deemed necessary in each country.

The PRESIDENT proposed that the accounts of the Hygiene Commission should be revised annually by Dr. Rosenthal, the Treasurer of the F. D. I.

On the proposition of Professor Christensen, it was agreed to send telegrams of thanks and congratulations to the Queen Mother of Holland and the King of Denmark. The telegrams were signed: "Paterson, Jessen, Van der Hoeven."

PAPERS, ETC.

Dental Treatment for Private and Higher School Children.

Professor CHRISTENSEN then read his paper, entitled "Proposal for Systematic Treatment of Children in Higher-Grade Schools by Private Dentists," as follows:

In our earnest endeavors to promote dental hygiene among the children in "provided" (board) schools, we must not lose sight of the fact that in private schools there are a large number of children who also need our care and attention to a high degree. While we exert ourselves to provide rational dental treatment for the very poor, it would be absurd were we not at the same time to give a thought to the children of that class of the community who, in spite of their often limited incomes, manifest an honest desire to pay their way, and do not on every occasion make an appeal to public charity.

Most children attending private schools have very bad teeth, for which various factors are responsible. Few of the children have such well-to-do parents but that the dreaded dentist's account keeps them away as long as possible from seeking help from him, and the indulgent bringing-up and mode of life, the enervating absorption of all possible studies, society functions and diversions—all this contributes not alone to weaken the organism, and as a consequence the teeth, but renders it very difficult for them to find time for the care of the teeth or the visit to the dentist—unless hard necessity, in the guise of toothache absolutely forces them to it.

One could, if one would, make this a charge against parents of this type (it might, perhaps, be of advantage to do so), but this does not do away with the fact that the teeth of children in our private schools are bad, and are not properly looked after, and this is what we ought to find a remedy for.

Two years ago I had an opportunity in Strassburg of inspecting the results of Professor Jessen's work among children in "provided" schools, and as a result of the discipline in dental treatment which had been carried through, found children with clean mouths and healthy teeth everywhere, from the little ones in the "Kleinkinderschule" (infant school) upward. The thought struck me when I considered the defective state of the teeth among children in better positions in life whom I knew in private schools, how unreasonable it was not to attempt to bring about also an efficient, regular inspection of these children's teeth. It should certainly be feasible, by means of a sensible economic system, to get over the financial difficulty, which is otherwise the greatest obstacle we have to contend with.

The crux of the matter in the economic principle respecting dental clinics for school children is that the inspection of the teeth should take place so frequently that the disease is discovered in good time, and is therefore not permitted to spread so far that the treatment thereby becomes difficult and lengthy, *i.e.* EXPENSIVE.

Every dentist would therefore easily be able, without any pecuniary loss to himself, to establish comparatively cheap treatment of school children's teeth, if only an arrangement could be come to whereby parents were sufficiently trained to let their children attend at stated times. But, as every dentist who has had any experience knows, it is, generally speaking, impossible to maintain the rule as regards attendance, unless the arrangement can be backed up by special measures which will act as a hold upon the parents.

It is of no use whatever to work only by means of admonition and the indicating of reasons why it should be. We human beings are only human—with but few exceptions. But we can tempt parents by the suggestion of pecuniary advantage. Therefore cheap treatment on annual terms, but with payment in advance, is the best expedient: people are seldom willing to lose what they have once paid for.

In my own practice, I have personally tried to realize a plan of this sort, but insufficient time at my disposal has constrained me to abandon the idea, so that I am unable to communicate anything as to the outcome of my own experience in the working of such a scheme. But a Copenhagen colleague, Jörgen Höyer, who for several years has treated children's teeth upon yearly terms, has kindly informed me that he is very well satisfied with the experience he has had. But he only receives children upon an agreement extending over four years at least, and his fee of 10 kroner (11s.) annually has to be paid in advance. Under another form, Knud Lyngen, of Copenhagen, has recently endeavored to reach the same goal; he has established a special clinic for private schools, and here also payment is made in advance.

This payment in advance, with the loss of the right to receive further treatment if the times of attendance are not kept —without there being a reasonable excuse for such omission—is the most effective means for insuring accuracy in the keeping of the necessary appointments.

After a time there will probably be established more dental clinics upon this principle, but it cannot be regarded as sufficient that here and there should be found dentists who singly, each in his own sphere, seek to insure the care of the teeth among private school children. This matter must be taken up as a matter for the community, just as dental hygiene among children in provided schools has been. As the most natural and rational means of attaining this object I suggest the formation of "dental sick clubs for children," with free choice of dentist. Hereby would be most easily secured the pecuniary advantage for the parents and the necessary discipline for the children.

Here is a task for the heads of private schools to support the scheme by making it obligatory for the children attending schools to submit to regular treatment at the hands of a dentist.

I do not intend to place before you at present any ready-made scheme for the establishment of such "dental clubs." It would be useless to waste time upon it, as an idea must always have time to sink into the minds of people before we can cherish the hope of its being comprehended and adopted. I will therefore confine myself to sending forth the idea, whilst earnestly recommending it to the careful consideration of the Hygiene Commission.

Dr. Cunningham said that Professor Christensen had touched upon a subject of great importance, but which, however, was more theoretical than practical. He believed that Dr. Rosenthal had carried out a scheme for pupils of higher and private schools. But they wanted to know the results of experience on such matters, and he suggested the postponement of the discussion.

This was agreed to.

Care of the Teeth of School Children in Austria.

Dr. Gabriel Wolf (Vienna) then read a paper on "The Care of the Teeth of School Children in Austria."

He said that Dr. Hillischer directed attention to the subject at the International Hygiene Congress in 1887. In 1903 the Austrian Minister-president made an official pronouncement on the importance of public enlightenment as to the dangers of dental caries. Reports on school dental inspections increased, and state medical officers took cognizance of the matter. With the appointment of school doctors in teachers' training colleges, dental inspection became compulsory. Professors at the gymnasiums showed interest and induced parents and scholars to seek dental treatment; for example, the director of the state gymnasium at Linz within six years increased the proportion of pupils dentally treated from 28 to 93 per cent. The problem of finance hindered progress for some years toward the only practical means of combating caries—treatment in clinics. In 1907 the city of Brünn arranged with private dentists to treat poor children, but this was soon given up owing to the cost. Prague also arranged with private dentists to treat the children for an annual lump sum, but this system did not succeed, and a school dental clinic would this year take its place. In Vienna, private dentists had treated the children in the municipal orphan asylums since 1906. The university dental institutes in Graz and Innsbruck made certain provision for poor children. The Berlin International Dental Congress gave fresh impetus to the movement. At Berndorf, a town near Vienna, the first school dental clinic in Austria was established in 1909 through the initiative of Herr Krupp. A further advance was the formation of an Austrian Society for the Care of School Children's Teeth in March 1911. The public authorities manifested their interest by making grants, and many subscriptions were received. The society considered its chief task to provide for the 100,000 children in Vienna, and would next carry its propaganda into the provinces and form branches. The first result of the society's activity was the opening of the first Vienna school dental clinic in the autumn of 1911. The efforts of the society were also directed to awakening the interest of the teachers and securing the co-operation of the state. He was gratified to report that two state school dental clinics would shortly be opened in Vienna, and the city had provided for another clinic in a large school now being constructed. In the provinces a clinic was to be established at Baden, as also at Brünn and Prague. The support of the government's Health Department was assured by the fact that the society had its chief, Hofrat Dr. von Haberler, as president. In May 1912 the Austrian National Committee of the Hygiene Commission was constituted, and Regierungsrat Prof. Dr. Scheff was elected president. In conclusion, Dr. Wolf alluded to the difficulties yet to be solved—above all, the financial problem for state and municipal budgets. Yet while they admired the achievements in Sweden and Germany, they were satisfied to be able to point to good results obtained in Austria in a comparatively short time.

Swedish National Bread and its Value in Oral Health.

Prof. G. Lagerheim, of Stockholm, gave an address on "Swedish National Bread and its Value in Oral Health."

After an introduction to the subject of the dietetic value of starch as food in the animal economy, considered from the chemical and physiological points of view, the lecturer proceeded to discuss the preparation of bread. He said that from olden times there had always been baked in Sweden a sort of rye bread, called "Spisbrod," which was indispensable to the nation and was praised by foreigners. This bread was made of coarse unsifted rye meal, spices, and yeast, and was dried hard in large round flats. Owing to its hardness and brittleness, one was compelled to chew it thoroughly, which was of great importance for keeping good teeth. Through the quantity of saliva formed in chewing this bread, the digestion of the starch was furthered. In Sweden common experience taught that such bread was of great use as food for children, because it formed strong jaw-bones and healthy, white teeth.

The lecturer exhibited a variety of specimens of different Swedish breads, which members were invited to inspect and taste.

Raw Carrots as an Important Factor in Dental Hygiene.

Professor Christensen (Copenhagen) spoke on this subject, as follows:

Long experience has taught me that in the raw carrot we possess a food which is splendidly adapted to teach the rising generation the almost obsolete *art of chewing*. I think I am right in believing that I am not alone in having observed this, but as up to the present I have not seen that the subject has received the attention it merits, I have thought it opportune to bring the matter forward here. If the chewing of carrots were introduced in a systematic manner, it would constitute an important factor in the fight against the increasing degeneration of the masticatory organs of the people of civilized countries.

It is excellent teaching we dentists advocate—that children during their growing years shall learn to masticate thoroughly, so as to develop their organs of mastication; but it has unfortunately proved most difficult to carry this out in practice, as in our days there are but few articles of food which are suitable for thorough chewing while being at the same time of such a character that the tenderly nurtured children of our days find *pleasure* in doing so.

Tender meat, soft bread, chopped food or porridge simply require a kneading process which only by courtesy can be called *chewing*. And it does not assist our purpose much to prescribe for children, as a rule, thick, coarse bread with hard crusts. Especially is this so in the case of such children as require help most—those with weak teeth, undeveloped jaws and relaxed muscles; such children positively cannot endure chewing the "pedagogic" crusts, so they swallow them in a more or less unmasticated state.

If one would make any progress with children in the matter of thorough mastication, it is at the same time necessary to indicate to them a food which they will *enjoy* chewing, and in this connection I would remark that it would, therefore, be of the utmost importance for investigators who, like Röse and Kunert, are working to bring about a reform in the making of our bread, to lay stress upon the fact that the bread of the future should be pleasant to chew, or else it will only be the small eclectic or pedantic minority who will reap any benefit from the reform in question.

The raw carrot possesses just the characteristic that it gives the child a desire to use his chewing organs. It is pleasant to chew, sufficiently hard while being at the same time brittle enough, so that the child is anxious to overcome the resistance, and he soon learns to masticate it as he should, because his natural instinct induces him to chew it as small as possible, for by this means he obtains the fresh and juicy taste of the carrot to the full.

The same applies also to a few other fruits, *e.g.* apples, but many children cannot chew apples, because the subacid juice sets their teeth on edge, and at any rate in the countries of the north it is not everybody who can afford the comparatively dear apples as daily food for the children. Therefore, I recommend carrots as first and foremost. Let the children chew a raw carrot every day, and the benefit will soon be apparent. That is my advice.

But there is one drawback to the carrot: it is too plebeian in its origin. In the sybaritic days in which we live our school children would never dream of including such an ordinary and simple thing as a carrot among luxuries such as the "tuck shop" tempts them with. It will be difficult for the carrot to compete with sweets, toffee, caramels, liquorice, and the rest, which are bad things for the teeth, unless we can induce public opinion to take into favor the healthy delicacy which a sweet, juicy, raw carrot really is.

Dr. Cunningham's Cinematograph Demonstration.

This took place in a biograph theater in Stockholm, before a large audience, on August 29th.

Mr. Paterson briefly introduced Dr. Cunningham as the pioneer of the new movement for educating the public by cinematographic lectures in the important matter of the care of the teeth.

Dr. Cunningham stated that this movement originated in Sweden, for Stockholm was the first place where he spoke about children's teeth. The film he was going to show was, unfortunately, not complete, but it was prepared for educating those who were going to administer the laws of health, as well as for all intelligent people who were ready to do something for the children. It was only through the children they could save the coming race. It was very difficult to project a film like that, but he wished them to understand it as only a first trial, and as a Britisher he was proud to be able to attempt it for the first time. Giving a summary of five years' work at the Cambridge Children's Dental Institute, he said that in 1907 only 3 per cent. of the children had sound permanent teeth, but in 1912 over 70 per cent. had sound permanent teeth, and a clean mouth. What Cambridge had done, every other town, great or small, could do, and ought to do, and so they would really save the nation's teeth.

The film was divided into stages. In the first stage the anatomical appearances of the jaws and teeth were displayed. The eruption of the first molars was ingeniously shown. Caries of a tooth occupied another stage. The remainder of the film illustrated the treatment of children attending the Cambridge Borough Dental Institute.

Address by Mr. Horace Fletcher—"An Appreciation of the Dental Profession."

Before the Hygiene Commission on the afternoon of August 29th, Mr. Horace Fletcher (New York), president of the American Mouth Hygiene Association, delivered an address, entitled "An Appreciation of the Dental Profession."

He said he would speak as a business man in appreciation of dentistry.

Statistics showed that in America at least 90 per cent. of people required some amount of dental treatment. Mouth diseases were essentially diseases of civilization, with its hurry, rush, and excitement. In the last twelve or fifteen years he had been gradually convinced, as he studied the subject from the practical side, that the mouth was the gateway to health. He learned that at West Point military academy, 98 per cent. of the young men, who must be considered the flower of American manhood, came there with more or less defective mouths. He had visited the experimental school in Cleveland, where Dr. Ebersole demonstrated that children were improved 25 to 50 per cent. from a mental and moral standpoint after dental treatment and instruction as to thorough mastication. Abundant evidence could be gathered from all countries to show that a large percentage of mankind was more or less in an unfit condition owing to unsanitary mouths. This was both a cause and an effect, because insufficient mastication and insalivation brought about indigestion and a whole cycle of diseases springing from malnutrition. That being the case, it was not too much to say that the competent dentist was the man of the moment in preventive medicine. The Forsyth Brothers, Boston, had given two million dollars, and would give more if necessary, to found a dental infirmary for children between six to sixteen years, and to carry on a thorough campaign for the clean mouth. That was a business man's appreciation of dental science.

His own appreciation had been a growing one. Fifteen years ago he found himself in a condition of shattered health, and he knew it was the result of malnutrition. At that time he was able to retire from business, and realized that the most important thing was to put himself into a fit condition, for the insurance officers had refused to accept his life, and he knew their condemnation was true. He began to study the subject for himself, but found that the textbooks devoted only a few paragraphs to the first three inches of the alimentary canal, but some thousands of pages to guessing about what happened in the rest of it. The medical writers simply jumped from the vestibule of the subject into the dark. He investigated the question, and showed in his books that if people realized the potency of saliva, and paid attention to the treatment of food in the first three inches of the alimentary canal, the diseases on account of which he was condemned faded away. Within three months he was in better health than for twenty years, and on his fiftieth birthday he rode over thirty miles on his bicycle. That was thirteen years ago, and since then his course had been one of steady recuperation, so that he was better at sixty-three than at fifty, nor had he yet arrived at the summit of recuperation. He had probably had more dentists at work on his mouth than any man living. In his travels all over the world he had fifty dentists experimenting on his mouth, and he considered it quite as much a duty to pay frequent visits to a competent dentist as it was to take his food. He believed it to be the mission of what was known in America as "Fletcherism," to advocate the hygienic or clean mouth quite as much as proper mastication after it had been made clean. Just as a factory needed a repair shop for its tools, one was equally required for the mouths of the workers, and he had put this before large employers as a profitable business investment. If he had the care of competitors for the Olympic games, dental treatment would be the first thing.

At the meeting of the National Dental Association of the United States, he was elected president of the Mouth Hygiene Association, which had an executive committee composed of members of the dental profession. He was leaving that day to attend the first annual meeting, and he hoped to assist in the advocacy of mouth hygiene as a measure of preventive medicine.

In his contact with dentists, he had found them to be an exceedingly unselfish set of men, for he knew men, whose time was worth 12 to 20 dollars an hour, give up a day or half a day a week for attending the poor in the dental infirmaries. Though the profession was not well paid, that showed it had caliber of superior quality. For that reason, if he had time and strength, he had decided to become their advertiser, and in this way express to the world his high appreciation of dentistry.

Executive Council.

THURSDAY MORNING.

At the meeting on the morning of Thursday, August 29th, Mr. Paterson, president, was in the chair.

The PRESIDENT announced apologies for absence received from Dr. Godon (Paris), Dr. Kirk (Philadelphia), Dr. Daubry (St. Petersburg), and Dr. Weiser (Vienna); Dr. Rojo (Mexico); Messrs. G. G. Campion (Manchester) and J. H. Mummery (London).

Report of the Hygiene Commission.

Certain honorary members were elected, and Dr. Förberg was elected an honorary president of the Commission; Dr. Guido Fischer (Marburg) was elected a member of the F. D. I.

The Council considered the proposal from the Hygiene Commission to use as the official journal of the F. D. I. the *Internationalen Archiv für Mundhygiene.*

Dr. AGUILAR (Madrid) proposed that the question be postponed until the next meeting.

Dr. ROSENTHAL seconded.

Dr. VAN DER HOEVEN (Hague) said there were three reasons against adopting the proposal of the Hygiene Commission. First, he thought it was illogical for the Transactions of the F. D. I. to be published, not by itself but by one of its subcommittees. Secondly, the *Internationalen Archiv* was not seen by many dentists as yet. Thirdly, the Hygiene Commission did not explain how to get the money for publishing the Transactions in four languages. He did not know of any other way of getting the money except by his own proposal, namely, of contributions from all national dental associations.

M. ROY (Paris) supported Dr. Van der Hoeven's observations.

Dr. VAN DER HOEVEN explained that he was giving his personal opinion, and not speaking as honorary secretary of the Hygiene Commission.

Dr. ROSENTHAL (Brussels) said the first thing was to know how much it would cost to publish the Transactions in four languages. When that question was settled, they could then discuss how much money they should ask from each national association. He thought it would cost a great deal of money.

The PRESIDENT thought that, after the views expressed by the present and past treasurers of the F. D. I., the question should be adjourned for further consideration.

This was agreed to.

Dr. VAN DER HOEVEN proposed—

(1) That the national dental associations of the various countries represented in the F. D. I. should contribute an annual subscription to the funds of the F. D. I. proportionate to their membership.

(2) That in the event of an official organ of the F. D. I. being established, free copies be sent to such national dental associations in numbers proportionate to their membership.

He said his object was to arrive at the publishing of an official journal of the F. D. I. in its four languages, and to make its work more known throughout the world by sending a free copy of the Transactions to every member of a national dental association contributing to the F. D. I. The proposal of the Hygiene Commission concerning the *Internationalen Archiv* did not meet the requirements, and he therefore opposed it. He knew no way of getting the money for publishing the Transactions except by inviting the different national associations to give an annual subscription to the F. D. I. funds. He did not think the contribution need be very high, because there were a great many associations which would be glad to pay something when they secured copies of the Transactions for their members. As their work was for the benefit of dentistry throughout the world, every reputable dentist ought to know about it. They were only a consultative body, and their whole power lay in getting their ideas impregnated in the minds of *confrères,* and their work made more popular among dentists all over the world.

The PRESIDENT said the proposer's aims were admirable, and asked if he had formed any idea as to how much the national dental association would be likely to contribute?

Dr. Van der Hoeven replied that it was impossible to say until a committee had inquired.

Dr. Schaeffer-Stuckert (Frankfort) said they could not expect any money from Germany, where dentists already supported thirty-five societies.

M. Roy (Paris) thought the views of Dr. Van der Hoeven were very logical, but the money difficulty was great. He proposed that the F. D. I. make inquiries.

Professor Dieck (Berlin) differed from Dr. Schaeffer-Stuckert, and thought the Central-Verein, which has 1100 members, or the Vereinsbund, would contribute.

Dr. Aguilar pointed out that the F. D. I. already received from some countries a contribution for the fees of its Council's representatives. He thought that the first proposition was not practicable, and besides it was not necessary, because they should have a surplus next year to hand over to the organizers of the International Dental Congress of 1914. For the present, therefore, they did not need money. As to the second proposition, it would be too expensive to publish the Transactions in four languages. He thought their president merited a most enthusiastic vote of thanks for his efforts in publishing the 1911 Transactions in such an excellent and economical way. He moved that he and the assistant secretary, Dr. Guy, be asked to continue this work.

The President suggested that the matter be left to the general secretary, the treasurer, Dr. Guy, and himself. They would endeavor to supply as economically as possible copies of Transactions, not only to every member, but also to affiliated societies of the F. D. I.

Dr. Van der Hoeven said he appreciated very much what had been done, and agreed to the President's suggestion. He accordingly withdrew his proposals.

Dr. Aguilar moved a vote of thanks to the president, Dr. Schaeffer-Stuckert, and Dr. Guy for the pains and skill with which they had carried out the publication of the Transactions of 1911.

Dr. Van der Hoeven seconded the motion, and it was cordially passed.

Thursday Afternoon.

The Executive Council met on Thursday afternoon, August 29th, to receive reports and to adopt resolutions. Mr. Paterson (president) was in the chair.

Dr. Van der Hoeven submitted the recommendations of the Hygiene Commission, including names of honorary members, and the minutes.

M. Roy proposed, and Dr. Rosenthal seconded, that Dr. Förberg be elected honorary president of the Hygiene Commission. This was passed unanimously.

Dr. Rosenthal proposed the election of Mr. Sedley Taylor, Fellow of Trinity College, Cambridge, and Mr. Brooks, editor of the *Cambridge Daily News,* as honorary members of the Hygiene Commission. He added that he thought it important that all those belonging to the Hygiene Commission who were dentists should be members of the F. D. I. and pay their dues as such. Of course, lay members would not be asked to pay.

Dr. Schaeffer-Stuckert said he would advise the enforcement of their resolution, that for the future in the election of dentists to the Hygiene Commission, only those whom they were assured would accept membership of the F. D. I. should be elected.

Dr. Van der Hoeven then proposed the election of the gentlemen mentioned in the Hygiene Commission's list to be members of the F. D. I. as well as of the Hygiene Commission.

The elections of honorary members and ordinary members of the Hygiene Commission were agreed to.

Dr. Van der Hoeven said he would put on the table, for consideration next year, a proposal to alter Article 10 (*a*) so as to include, among members of the Executive Council, the presidents and honorary secretaries of the different commissions.

The President pointed out that the Articles of the F. D. I. could not be altered until the next Congress in 1914.

Dr. GUY said there was a great advantage in the membership of the Executive Council being fixed at fifty. As a matter of fact, most of the presidents and honorary secretaries of the commissions had been and always would be chosen to be members of the Executive Council. At the last Congress they were only empowered to add one member to the Executive Council for a fresh adherent country. It was much better to have a definite number.

The PRESIDENT said it was always possible for the presidents and honorary secretaries of commissions to be consulted by the Executive Council on their own or the Council's initiative. In such consultation work, of course, they would have no vote, otherwise the proportional balance of national representation would be upset.

Dr. VAN DER HOEVEN, after consulting Drs. Jessen and Lenhardtson, said that he would withdraw the proposition.

The proposal to recommend Professor Walkhoff's brochure to the national committees was next considered.

Professor WALKHOFF explained that the pamphlet was written at the request of an association of physicians with 20,000 members. It was really intended for the information of doctors and professors who were interested in dental hygiene.

Dr. SCHAEFFER-STUCKERT said he would recommend every country to issue a similar booklet, or have Professor Walkhoff's translated. He proposed that the motion be adopted.

Dr. ROSENTHAL seconded, and it was carried.

The PRESIDENT hoped that in Great Britain the brochure would receive favorable notices in the medical press, and so be recommended to doctors generally.

Dr. VAN DER HOEVEN then proposed that the Council adopt the statutes of the International Hygiene Commission, as published in No. 3 of *Internationalen Archiv für Mundhygiene,* with the alterations approved in Berlin.

Dr. ROSENTHAL said this was a sequel to the important discussion at the last meeting in London, when the proposal that the F. D. I. should undertake indirectly the sale of tooth-powder and brushes was rejected. Consequently, new regulations were framed for the Hygiene Commission, in which the F. D. I. would not be mentioned.

Dr. JESSEN said the new statutes would only apply to certain countries like Germany, Denmark, and Holland, whose national committees agreed with his method of raising funds.

Dr. SCHAEFFER-STUCKERT said the change of statutes would enable the International Hygiene Commission to do what it chose on its own responsibility.

The PRESIDENT said he could not see any reason why one commission, because it was made a permanent commission by special resolution of the last congress, should be supplied with fresh statutes and regulations any more than other commissions—*e.g.* Education, Bibliography, etc.

Professor JESSEN replied that the Hygiene Commission had quite different duties. Its sphere was more practical and less theoretical.

The PRESIDENT hoped their commissions might be trusted to do what was right and ethical, whether their duties were practical or theoretical, without special regulations and statutes to that end.

Dr. VAN DER HOEVEN thought, as a result of the discussion in London, it was necessary to have special statutes.

M. ROY said the London Meeting left the question to be decided by each national committee in its own country.

Mr. LENHARDTSON said the Hygiene Commission wished certain stipulations made so that no trouble should arise. They were working practically, and on different lines from other commissions.

Dr. ROSENTHAL objected to the proposed regulations because they were in direct contradiction to what was passed in London.

Dr. GUY observed that it was impossible to come to any conclusion, as the new regulations were printed only in German.

Professor JESSEN withdrew the proposition, and undertook to issue the proposed regulations in English, French, and German, to members of the Council, before the next meeting.

This was agreed to.

The Council approved the recommendation to national committees to request the school authorities to issue every half-year their statistics on mouth hygiene, according to the general scheme of Strassburg, with the alterations deemed necessary in each country.

Governments' Recognition of the F. D. I.

The recommendation, "That the F. D. I. be officially recognized by the governments of the different states," was next considered.

The President said such official recognition was doubtless very desirable, and he thought the best way to gain it was through the merits and character of their public work becoming known. In Sweden, the King was impressed by the value of the work of the F. D. I., as some of those present had witnessed at the royal reception on the preceding day, and that was without any request having been made for official recognition on their part; and so it would be with other governments.

Dr. Van der Hoeven agreed, but thought that when the F. D. I. made recommendations to governments, official recognition would assist.

Dr. Schaeffer-Stuckert explained that until the International Dental Congress of 1909 they had not seen official representatives of governments at their meetings, but they hoped to see them from all states in the Congress of 1914.

Dr. Rosenthal thought the Transactions of the F. D. I. should be sent officially by each national committee to the government of its country.

M. Roy considered it would be well to endeavor always to obtain the attendance of government delegates at F. D. I. meetings.

Dr. Guy agreed with Dr. Rosenthal's suggestion, but thought the F. D. I. gradually established relations with governments in their different countries where they met. In addition, they might request national committees to do their best to get in touch with ministers and governments, and when possible, induce them to extend official recognition to their meetings.

On the motion of M. Roy, seconded by Dr. Rosenthal, it was agreed to forward copies of Transactions to governments, and urge members to endeavor to obtain from their respective countries an official delegation to the F. D. I.

A letter in Spanish was read from Dr. Rojo of Mexico, stating that a permanent Mexican National Committee had been formed in union with the F. D. I. He sent fraternal greetings and regrets for absence owing to the great distance.

The Accounts.

The auditors reported that the accounts were in order. They suggested that a balance-sheet be published and sent with the program of the meeting to the members of the Executive Council.

M. Roy, speaking as one of the auditors, proposed a hearty vote of thanks to Dr. Rosenthal, the treasurer, and acknowledged his kindness in bearing the expense of changing checks from different countries.

Mr. Harrison, speaking also as an auditor, seconded, and said the accounts were very clearly and accurately kept.

The accounts were passed.

MILLER PRIZE FUND ACCOUNTS.

Dr. Aguilar presented the accounts, and said the income was estimated at £100 to £150 per annum. They expected to be able to award every two years a prize of £200, or 5000 francs. As instructed, the trustees had completed their suggested new regulations, as given above in the minutes. They had considered the recommendations by Professor Walkhoff and Dr. Kirk, and these would be compared with the conditions for the Nobel prize. The regulations would be printed in English, French, and German, and come before the Council next year.

The President said they were very

much indebted to Dr. Aguilar and Dr. Brophy for their valuable report. He anticipated that the total funds of 63,-000 francs would be still further increased as a result of Dr. Aguilar's forthcoming visit to America.

On the motion of Dr. ROSENTHAL, seconded by M. Roy, a cordial vote of thanks was passed to Dr. Aguilar for his services as honorary secretary to the Miller Prize Fund Commission.

M. ROY suggested that the Miller medal and diploma should be presented ceremonially at the opening session of the F. D. I.

Dr. GUERINI said statistics showed that dentists were short-lived, and to award the Miller prize every two years was not often enough. They should award it annually, like the Nobel prize.

The PRESIDENT pointed out that the rules could not be altered until the next Congress.

Place of Meeting for 1913.

The PRESIDENT said the last item on the agenda was the decision to be taken as to the place of meeting of the F. D. I. in 1913. He had promised Dr. Brophy, who had left to attend a meeting in Washington, to submit to the Council the invitation from the American National Dental Association.

Dr. AGUILAR said he was authorized by his colleagues to invite the F. D. I. to meet in Spain. At the same time he had promised Dr. Brophy that he would vote for going to America.

Dr. ROSENTHAL proposed that the F. D. I. go to America, as he understood was tacitly agreed in London last year.

Dr. SCHAEFFER-STUCKERT suggested The Hague for 1913, and America for 1915.

Dr. VAN DER HOEVEN promised to do his best to make the meeting a success if they came to Holland, but he thought they could hardly reject a second invitation from America.

Professor DIECK pointed out that there were 40,000 dentists in America, and since the Berlin Congress the relations of the F. D. I. with America had become very good. He favored accepting the American invitation.

Dr. GUY said the discussion was important in view of the holding of the next International Dental Congress in London. An enormous amount of work would have to be done. The most important work of the next meeting should be the organization of the London Congress, but if they met in America possibly only one or but few British representatives could attend. He moved that they accept the invitation from Spain.

Professor WALKHOFF suggested holding a special meeting to complete arrangements six months before the 1914 Congress in London.

The PRESIDENT considered that would be too late.

M. ROY thought they must consider the highest interests of the F. D. I. It would be a serious matter if American members abstained from taking part in the congress.

The PRESIDENT said he was sorry to introduce a personal note, but neither he nor the general secretary, Dr. Schaeffer-Stuckert, nor the assistant secretary, Dr. Guy, would be able to go to America, and he was afraid that only a small number of the F. D. I. generally would attend. Under such circumstances, would America be more disappointed at receiving a small number of F. D. I. visitors, than at having its invitation declined until after the congress in London?

A ballot was taken, and resulted as follows: America, 9 votes; Holland, 3; Spain, 2.

Dr. AGUILAR suggested that the F. D. I. should meet in America in connection with the National Dental Association's meeting.

Mr. PATERSON said the Executive could arrange that. He gathered from the observations made that members favored a meeting-place on the Atlantic coast, and the month of August as a convenient time. And as Dr. Aguilar was going immediately to Washington to attend the meeting of the American National Dental Association, he would ask him to explain the situation to their American *confrères.*

At the conclusion, Professor LECHE proposed a hearty vote of thanks to the President, and this was carried with cheers.

SOCIAL FUNCTIONS.

Royal Reception.

His Majesty King Gustaf held a special *levée* at the Palace, at 2.30 P.M. on Wednesday, August 28th, when the following members of the Federation were commanded to attend: The president, Dr. Förberg, Professor Walkhoff, Dr. Schaeffer-Stuckert, Dr. Rosenthal, Professor Jessen, Dr. Cunningham, Dr. Brophy, Dr. Aguilar, Dr. Guy, M. Roy, and Mr. Lenhardtson.

His Majesty conversed with all, and expressed his hope for a successful meeting.

The Annual Banquet.

The annual banquet of the F. D. I. was held on August 28th, in the beautiful dining-hall at Hasselbacken, a fashionable pleasure resort of Stockholm, and it was a brilliant and successful function.

Mr. Paterson presided, and was supported by Mr. Hultgren (president of the Swedish Dental Society), Dr. Förberg, Professor Sonnberg, and Mr. Dahlen (president of the Swedish Dental Federation).

After the loyal toast, Dr. Förberg communicated a gracious message from his Majesty, who assured the members of his great interest in the work and aims of the Federation. His Majesty was pleased to be Protector of the Hygiene Commission of the F. D. I. and sent his greetings and best wishes for a successful meeting.

Dr. SCHAEFFER-STUCKERT proposed the toast of "Swedish colleagues," acknowledging their hearty welcome and generous hospitality. He made special reference to the valuable services of Dr. Förberg and Mr. Lenhardtson in making such successful arrangements.

Mr. HULTGREN replied, and said that many strangers had recently visited Stockholm to take part in the Olympic games and strive in physical competition to win honor and glory for their native countries. Members of the F. D. I. did not, however, meet to compete against each other, as it was a matter of indifference which country reached first the goal set before them and accomplished the task of successfully combating a great evil. They could all vie with one another in friendly rivalry to attain results which should contribute to forming the laurel wreath of victory to be worn some day by the F. D. I. He proposed with all cordiality the toast of "The F. D. I.," which was drunk with appropriate Swedish honors.

Dr. AGUILAR, replying, recalled his visit to Stockholm ten years before, and said he was proud to be among them again, because Sweden, apart from possessing the oldest dental society in Europe, could be looked upon as a model of good ethics, and its practitioners were men of the highest moral standard. He knew the interest King Gustaf took in the work of the F. D. I., thus acting upon the Latin maxim: *Salus populi suprema lex.* He wished all success to the Swedish societies, and with all his heart said "Skol!"

Dr. W. GUY proposed the toast of "The Miller Prizeman." He said he did not know what greater honor the dental profession offered to its votaries than the Miller prize. Some of them were wearing decorations—well earned, he doubted not—and for many of them he believed there were decorations in store. What might be called the blue ribbon of the profession, the Miller prize, had been bestowed upon Dr. Charles Godon, who was known to all of them as the "Father of the F. D. I." Dr. Godon had watched over the development of the F. D. I. from its earliest days, and no trouble was ever too great for him so long as it helped to forward what they all had at heart—the welfare of the F. D. I. The work which Dr. Godon had done, not only for the F. D. I., but also for national dental associations in France, and for the cause of dental education, would be long remembered. But that which, above all things, would confer the laurel of immortality upon their friend was the fact that he had been chosen by the most eminent jury of his *confrères,* the Executive Council of the F. D. I., to receive the Miller prize. They sympathized with him in the great affliction which had lately befallen him. Of Dr. Godon's good qualities it could be said, in brief, that he exemplified every virtue for which his country was distinguished. They congratulated Dr. Godon on receiving this signal honor.

Dr. GUERINI proposed "The ladies," in a happy and humorous speech.

During the banquet the Miller prize medal was handed round for inspection. The inscription on one side was "*Præmium Milleri*—G. V. Black, 1910—*Pro meritis excelsis doctissimo,*" and on the other, "W. D. Miller, 1853—1907."

The evening concluded with music and dancing.

Banquet at the Grand Hotel Royal.

Dr. and Mrs. Förberg had invited the members and ladies to an evening yachting excursion to the Villa Förberg at Djhursholm on August 29th, but, owing to the uncertain weather, they decided instead to give a dinner at the Grand Hotel Royal, where their splendid hospitality provided a memorable evening's enjoyment.

There were brief and witty speeches, and at intervals a party of male glee-singers contributed delightful vocal harmony.

Dr. Godon sent the following telegram: "Thank my colleagues for their manifestations of sympathy in my bereavement, which keeps me away from the meeting, and assure them of my constant devotion to our dear F. D. I."

Professor JESSEN said they were happy to be guests of Dr. Förberg, who took a leading part in founding the Hygiene Commission at Stockholm ten years ago, and whose name was honored in the dental world for his zeal in the cause of school children. He announced that Dr. Förberg had that day been elected honorary president of the Hygiene Commission, and they hoped to have his help and support for many years to come. Dr. Jessen also referred to the presence of Dr. C. S. Bensow, the veteran Stockholm dentist, who started the great Scandinavian Dental Society for Sweden, Norway, Denmark, and Finland, which meets every four years.

Dr. FÖRBERG acknowledged the distinction conferred upon him, and then proposed the toast of "Absent friends."

Mr. PATERSON, following Swedish custom, returned thanks for "meat and drink," and expressed the warm thanks of the guests to Dr. and Mrs. Förberg for their brilliant hospitality. His speech was indorsed by loud cheers and musical honors.

Swedish Dental Societies' Banquet.

On the evening of August 30th, members of the F. D. I. were the guests of the Swedish Dental Society and Federation at the Grand Restaurant, Saltsjöbaden, a seaside resort and yachting center near Stockholm. Mr. Hultgren presided, and among the large company were several Swedish lady dentists. Among the guests were the Minister of Education and Professor Leche.

The MINISTER proposed the toast of "The Swedish dental societies," and expressed, on behalf of the government, its best wishes for the success of their meeting, and also the assurance of its high esteem for their services to the public health.

Mr. DAHLEN replied.

Mr. HULTGREN, speaking in French, eulogized the work of the F. D. I., and said they were proud that the King of Sweden was High Protector of the Hygiene Commission. He hoped the members would have pleasant recollections of their visit.

The PRESIDENT of the F. D. I., in reply, made a happy speech in Swedish.

At the request of the President, Dr. GUY said that, in furtherance of F. D. I. work, the President and himself had visited many countries and traveled thousands of miles. They would not have undertaken those journeys if they had not been inspired by the thought that in years to come that work would prove fruitful, and would help materially in the progress of humanity to a better life. The realization of those ideals would be their best reward. They would never forget the signal honor conferred by his Majesty King Gustaf in receiving them in audience. They had a sense of great gratitude, too, in the knowledge that the work of the F. D. I. received the appreciation and recognition of the government.

Mr. Lenhardtson proposed the healths of Professor Leche and Dr. C. S. Bensow, which were honored with enthusiasm.

M. Roy recalled the old friendship between France and Sweden, remarking that he was proud to know there was French blood in the veins of the first sovereign who had publicly recognized the F. D. I.

Mr. Boström and others also spoke before the conclusion of a very convivial gathering.

Commission on Education.

Report of the President of the Commission for 1912.

To the Officers and Members of the Education Commission of the International Dental Federation:

Honored Colleagues,—The deliberations of the Education Commission at its London meeting in August of last year were crystallized in the substance of three resolutions, two of which embodied the conclusions of the commission with regard to two fundamental pedagogical questions in dental education.

The first resolution deals with the gradual disappearance of the preceptorial system, *i.e.* private pupilage as a recognized method of preparation for dental practice, and places the commission definitely on record as favoring the general adoption of the technical method, *i.e.* dental school mechanical training.

The second resolution expresses the belief of the Education Commission that the technical method, *i.e.* dental school mechanical training, can be utilized so as to develop the artistic sense as well as the manipulative skill, and that it is the duty of the dental school authorities to endeavor to arrange and elaborate their method of instruction in such a manner as to secure this end.

The third resolution provides for the creation of a subcommittee on Pedagogical Methods to undertake detailed consideration of teaching methods in vogue in the several countries, to consider the proportionate degree of didactic teaching which should be associated with the technical method of training, and to report thereon at a subsequent meeting.

In furtherance of the third resolution, M. George Villain, Paris; Mr. Wm. Guy, Edinburgh; Mr. W. H. Gilmour, Liverpool, and Dr. Wm. Bebb, California, were constituted the subcommittee on Pedagogical Methods, with the president of the commission as chairman.

As set forth in my report at the London meeting, the development of the work of the Education Commission had brought us to the point where, at the Brussels meeting in 1908, it was possible to adopt the report of the subcommittee upon the maximum and minimum program of studies, and to definitely recommend the proposed program as the curriculum for students by the dental schools.

As the logical sequence of the adoption of the report of the Committee on Curriculum at Brussels, dealing with the nature and extent of the curriculum, the underlying question of how to most efficiently train dental students in the subjects of the curriculum came prominently to the front for consideration. In short, the pedagogical aspect of the question as a factor inseparably connected with the extent and character of the curriculum was definitely presented for settlement, or, as stated by the president, Dr. Sauvez, in his opening address at the Brussels meeting, it became necessary for the commission to express its views upon "the value of various methods of training."

In furtherance of that purpose, I had

the honor to invite your attention to the consideration of two questions which were deliberated by your honorable body at the meeting last year in London; the first question being the relative value of the preceptorial system of private pupilage as compared with the system of training students in regularly organized dental schools by professors and instructors who are assumably trained specialists in dental educational methods.

The result of your deliberations upon that question are embodied in the first resolution which I have quoted, and in which the commission records its opinion as favorable to the gradual abandonment of the plan of teaching by private pupilage, and the relegation of dental education to the care of those who are specialists in the teaching of dental professional subjects in regularly organized dental schools.

The second proposition that the commission was invited to consider is the possibility of utilizing the manual training or objective method of laboratory teaching for the development not only of manual dexterity, but for the education of the artistic sense as well; and by its second resolution the commission has also recorded its opinion affirmatively on that proposition. For the further development of our knowledge, and the recording of our views upon the pedagogical phase of the standard curriculum which we have recommended, the subcommittee on Pedagogical Methods was appointed.

It is with deep regret that I am compelled, through force of circumstances, not only to be unable to attend the present meeting, but to report indifferent progress in the work for which the committee was assigned—unusual conditions having since the last meeting arisen which have rendered it physically impossible for your chairman to give the consecutive attention to the collection of the mass of data required, or the time needed for the proper collaboration and digestion of the data obtained. I am, therefore, compelled to ask your indulgence, and request further time for the preparation and presentation of a more detailed report on the work of the committee.

From a study of the report of the deliberation of this commission upon the fundamental questions propounded in my report at the London meeting, it is quite evident that any attempt at the unification of pedagogical methods in the training of dental students must necessarily meet with criticism, not to say objection, arising from the variety of opinions and experiences of those engaged in dental educational work in its various phases. For example, in England, where the preceptorial method still holds a recognized status as an educational method, it would hardly be possible to arrange for the immediate abolition of the preceptorial system and to substitute wholly therefor the system of training exclusively in the dental schools. On the other hand, in America, where the manual training or laboratory method of instruction has in some respects been developed and applied to an extreme degree, there is an evident demand for return in somewhat larger measure to the plan of didactic instruction; this tendency arising from an increased recognition of the importance of inculcating into the minds of students a more comprehensive understanding of the underlying scientific principles of his work. So that when we come to consider the application of pedagogical methods to the standard maximum and minimum curricula which as a commission we have recommended to all schools, we are confronted with the fundamental difficulty arising out of the indeterminate proportions which the purely didactic work ought to bear to the technical or laboratory aspects of our standard curricula; and still further difficulty arises from our lack of a specific definition of the meaning of didactic instruction in contradistinction to laboratory or technical instruction.

If we mean by didactic instruction only such instruction as is presented in a formal lecture, and if we include in our definition of laboratory or technical instruction all of the explanatory teaching that should properly accompany the demonstrative teaching of the laboratory, then for the sake of convenience we may apply the term didactic teaching only to such formal exposition of underlying scientific principles, or historic presentation of the subject-matter of the course, as may be given in the usual formal discourse from the lecture platform of the school. Such a division of the teaching work of the curriculum must, however, be purely an arbitrary division, rather for convenience of description than for the practical education of the student; for in the larger conception of what has been actually designated as the manual training method, the central idea suggested by the phrase manual training, that it is a system of hand-training exclusively, has been altogether overshadowed by the recognition of the fact that the manual training idea in its essence is primarily a system of mind training through the medium of the hand as a perceptive organ, and that in the larger and more general understanding of the principles which it involves, manual training is an objective system of education which utilizes all of the perceptive faculties in the educating of the mind.

In such a view the didactic system and the laboratory, or objective, system become correlative and interdependent; for while on the one hand no method of laboratory training can be of practical value unless accompanied by intelligent didactic explanation by the instructor in charge, so also didactic instruction by the formal lecture in any department of physical or biological science requires the material aid of objective demonstrations to enhance its teaching value by direct appeal to the other perceptive faculties in addition to that of hearing. Therefore, as I have said, the distinction between didactic instruction and laboratory technique training must remain an arbitrary division, and the principles which apply to education as a whole must be brought to bear in the laboratory as well as upon the lecture platform for the attainment of the best educational results.

The whole question then resolves itself into a study and application of the problems of pedagogy as related to the needs of dental education; and at the basis of pedagogy lies that young but vigorously growing science, psychology.

It may be conceded that there are occasional instances where teachers, like poets, are born, not made, yet on the whole, in view of the problems which the great field of education presents, it is scarcely more hopeful for us to depend for our supply of efficient teachers in dentistry, or in any other department of biological science, upon those occasional, sporadic, special pedagogical creations than it would be for the world to depend upon the same source of supply for its needed quota of skilled chemists, engineers, or astronomers, etc.

The demand for good teachers so far exceeds the supply of those naturally born to the work, that the supply must be created, and like any other high efficiency product, must not be created empirically or in a haphazard way, but through skilful and intelligently directed methods of training. Dentistry has thus far depended for its teachers upon a more or less self-selected body of men whose tastes, inclinations, or ambitions have led them to adopt teaching as an avocation, a side issue as it were to their vocation as practitioners of dentistry; but a very small proportion of our teachers have elected to devote themselves exclusively to teaching work and have specially prepared themselves for their work by training in the pedagogical principles which are fundamental to all educational methods.

The increasing demand for skilled practitioners of dentistry arising out of the rapidly growing demand for dental service as a public necessity is bringing us rapidly to the point where it will be necessary for us as a profession to give more earnest consideration to the thorough training of men for the special life-work of dental teaching, in order that the general level of education of the coming generation of dental practitioners may be brought up to the standard which a reasonable public expectation clearly demands. In order to achieve such an object as is here suggested, it will be necessary that the training of dental teachers shall become a part of the recognized business of dental education, either ultimately by the establishment of separate schools of dental pedagogy or by the inauguration of courses within already established dental schools for the definite purpose of training men in the science and art of dental teaching. The creation of courses in dental pedagogy within already established dental schools and the admission of selected qualified men to such courses would tend not only to focus the attention of existing dental teachers upon the scientific principles which are at the foundation of dental teaching, but would dignify the calling of the dental teacher to a degree that would attract good men to the teaching profession, and above all would tend to improve our teaching methods in such a way as to eliminate largely the empirical and haphazard methods now in vogue, and put our educational system upon a more rational and scientific basis.

It is my opinion that this commission should give serious consideration to the matter of harmonizing our teaching methods upon the basis of the pedagogical principles which are fundamental to all educational methods, and use its influence in the stimulation of the study of dental teaching as a professional specialty before undertaking to discuss in detail the best methods of teaching to the student the countless technical procedures which constitute the various subjects of study in the dental curriculum.

The operative and mechanical procedures which constitute the material data of our craft are constantly changing, new ones are arising, and older methods are becoming obsolete. The variation in manual dexterity required to perform these varied operations is a dexterity which when acquired through experience in a limited variety of operations is readily applicable to all, but the power to impart the intelligent conception of the underlying principles, the directing power that will enable the student to best utilize his manipulative skill and successfully apply it to the varying conditions necessitated by new operations, is a function of the teacher.

In the consideration of our educational problem in dentistry, it would seem that we have laid too much stress upon the data of the curriculum, and not enough stress upon the teaching of the teacher to teach. I propose, therefore, for your consideration, the desirability of recommending that each school of dentistry, as a part of its educational work, take steps toward the preparation of a course of instruction in dental pedagogy for the benefit of its own corps of instructors, and to afford facilities and opportunity for those interested who wish to prepare themselves for the vocation of dental teacher as a life-work.

I request that this may be accepted as a report of progress, and that the commission will, under the circumstances, grant a further period of time, in order that the subcommittee on Pedagogical Methods may submit a more detailed report upon the subjects which your honorable body has referred to it.

Respectfully submitted,
EDWARD C. KIRK,
President Committee on Education.

Commission on Bibliography and Documentation.

As stated in the last report, presented in London, the commission asked every society affiliated to the F. D. I. to collect books, treatises, dissertations, etc., for the Federation Library. The results did not answer our expectations. However, we have the pleasure to thank Dr. Sebastian Carrasquillo of Bogotá, Republic of Colombia; Dr. Manuel Arteza of Bogotá; Prof. T. Cancela of San Paulo, Brazil; Albert Patino, director of *Odontología Columbiana;* Dr. Aguilar of Madrid; Alfred Lichtwitz of Güben (Germany); the Dental Faculty of Bogotá; The S. S. White Co., and also some anonymous donors.

Recognizing the influence of the press, the commission this year sent to the 108 dental publications of which the address was known, a notice as follows:

Dear Sir,—I would feel obliged if you would insert the following communication in your paper. I beg also to call your attention to the advantage and importance of sending your publication to the Commission of Bibliography and Documentation of the "Fédération Dentaire Internationale." A complete collection of all that has been published finds its place there, and could be consulted by the dentists of the whole world.

This commission of the F. D. I. is established at 3*bis* Rue de la Régence, Brussels, Belgium (Palais des Beaux Arts), and all books, newspapers, pamphlets, catalogs, engravings, or photographs relative to the dental art should be sent to this address.

Many papers inserted this communication, and the thirty-two following journals undertook at once to send copies regularly to the library:

Archiv für Zahnheilkunde (Dresden) *Deutsche Zahnärztliche Zeitung* (Berlin), *Deutsche Zahnärztliche Wochenschrift* (Berlin), *Journal für Zahnheilkunde und Zahntechnik* (Berlin), *Zahnärztliche Rundschau* (Berlin), *Zeitschrift für Zahnärztliche Orthopedie* (Berlin), *Internationalen Archiv für offentliche Mundhygiene* (Strassburg), *Odontologische Revue* (Prague).

Dental Cosmos (Philadelphia), *Items of Interest* (New York), *Dental Digest* (New York), *Dental Review* (Chicago), *Dental Summary* (Toledo, Ohio), *Oral Hygiene* (Pittsburgh).

British Dental Journal (London), *Dental Record* (London), *Dental Surgeon* (London), *Edinburgh Dental Student* (Edinburgh).

Journal Odontologique de France (Paris), *Le Laboratoire et le Progrès dentaire* (Paris), *Le Monde dentaire* (Paris), *L'Odontologie* (Paris), *Revue générale d'Art dentaire et Revue odontologique* (Paris).

La Odontología (Madrid).

Le Journal Dentaire Belge (Brussels), *Le Progrès Médical Belge* (Brussels).

Tydschrift voor Tandheelkunde (Amsterdam).

Revista Italiana de Odontojatria (Naples).

Praktijeskoe Zubowratschennais (Odessa).

Boletin mensual de la Sociedad Odontologica del Uruguay (Montevideo).

La Odontología Colombiana (Bogotá).

Revista Dental (Havana).

Besides the *Archiv für Zahnheilkunde*, of Dresden, the *Internationalen Archiv für offentliche Mundhygiene*, of Strassburg, sent us a complete set of their publications, and the *Revista Italiana di Odontojatria*, of Naples, has promised the same. Consequently our library is from this moment well furnished with periodicals, and the F. D. I. may congratulate itself upon this brilliant *début*. In its name I heartily thank the editors of these publications. These collections will offer to us an always increasing interest, for you know how difficult it is to obtain complete sets after some years.

The commission intends to make another appeal to the press, and will keep itself informed of new periodicals, and thus hope to be able to furnish next year a complete return as to dental journals issued in the whole world.

The commission has associated itself with the Commission Centrale de l'Union des Associations Internationales, to which 132 organizations belong. It has been shown necessary to centralize the international movement and so endeavor by every means to extend the relations and common action between all associations which represent this movement, each in its own sphere. Its first duty is to discover means to bring about co-operation and agreement on questions of unification and standardization in nomenclature, terminology, and documentation, and also in international publications.

In order to extend its services the commission asked the official representatives of the F. D. I. to appoint in each country a member to participate in its work. Messrs. E. C. Kirk (Philadelphia), J.

Ottesen (Christiania), C. van der Hoeven (The Hague), and Elof Förberg (Stockholm) have kindly offered their assistance, and we are personally grateful to them. We beg to propose as members of the Bibliographical and Documentary Commission of the F. D. I.:

Harald Ramberg, Arsenalsgatan, 8B, Stockholm, recommended by Elof Förberg.

L. Frank, Stationsweg 35, Rotterdam, recommended by C. van der Hoeven.

A. Joachim, 17 Rue de Dublin, Brussels, recommended by E. Huet.

Sigurd Henrichsen, Lillehammer (Norway), recommended by E. Ottesen.

R. H. Riethmüller, Lock Box 1615, Philadelphia, recommended by E. C. Kirk.

We await the answers of the following countries: Argentine, Australia, Brazil, Canada, Chile, Colombia, Cuba, Denmark, England, Finland, Italy, Japan, Mexico, Russia, Spain, Switzerland, Uruguay.

Emile Huet,
Pres. Commission on Bibliography and Documentation.

THE DENTAL COSMOS

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Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S., Sc.D.

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PHILADELPHIA, FEBRUARY 1913.

EDITORIAL DEPARTMENT.

DENTISTRY AS A DEPARTMENT OF THE PUBLIC HEALTH SERVICE.

WE have received through reliable sources information that the Board of Aldermen of New York City has recently taken official action placing dental service directly in line with the various other public health activities of the great metropolis. We are informed that—

> On recommendation of Dr. E. J. Lederle, Health Commissioner of New York City, the Board of Estimate and Apportionment has appropriated the necessary funds to employ ten (10) dentists by the Department of Health in the division of Child Hygiene, and one (1) dentist in the division of Communicable Diseases. The Board of Aldermen has also passed this and it has been approved by Mayor Gaynor.
>
> In the division of Child Hygiene, nine (9) of the dentists will receive $1200 and one (1) will receive $1500. The one in the division of Communicable Diseases is to be attached to the Otisville Home for Tubercular Diseases, which is under the management of the New York City Department of Health, and will receive $1200.

There was asked for supplies $12,000, and it is probable that this sum has been appropriated, but as the appropriations are made in such a way that some of the items go together in the division of Child Hygiene, the experts who are going over the budget are as yet unable to make a report as to whether this is the exact sum or not.

The appointments have been made from a civil service list, the same as is done in the case of the appointment of physicians for the Department of Health.

This action on the part of the health authorities of New York City marks another and decided step toward what we believe must ultimately be the disposition of the relationship of dentistry to the public health service, viz, by making dentistry a regular and official factor in the work of municipal and state departments of public health. In its pioneer stages the public health service of dentistry necessarily depended upon volunteer organizations of dental practitioners to carry on the work, but each instance of the official recognition of the importance of dental treatment in the public health service becomes a valuable precedent which greatly simplifies the matter of extending such service until all health boards shall have practically included dentistry as a part of their legitimate work.

Philadelphia, we believe, was the first municipality of importance to take the step. The work inaugurated in that city in 1908 has, under the fostering care of the municipal health department, constantly grown, until there are now, besides the central City Hall clinic, three branch clinics held at various localities in the city, utilizing the services of twelve salaried operators, with an increasing demand for the further extension of the free dental service. Wherever the city authorities have established a municipal dental service the demand for its extension has naturally followed. Dependence upon voluntary effort for the efficient maintenance of public dental clinics must always constitute a factor of uncertainty. The only guarantee of permanence is the incorporation of dentistry as a part of the organized health service.

Moreover, the official recognition of the value of dental service which is clearly implied in its connection with the organized health work of the municipality and state tends to give to dental service its proper status as a health measure, and to its representatives a professional standing to which, by the very nature of their work, they are justly entitled, but which has previously failed of recognition for the simple reason that its importance has not been either generally understood or recognized by the medical profession as a whole. That such recognition has now been achieved is made evident by the action which we here report upon the part of the New York board of aldermen, and that by the United States government in the passage of the laws creating a commissioned dental service in both army and navy, and by the general demand for skilled dental service growing out of a popular knowledge of the fact that the human mouth is a breeding-ground of pathogenic germs and that it is the principal avenue for the infection of the body.

THE NATIONAL RELIEF FUND.

We call attention to the circular letter of the Relief Committee of the National Dental Association which appears at page 183, this issue. Doubtless individuals can be found—doubtless will be found—who will object to the plan, the methods, even the objects, of the committee's activities. Such are to be found in connection with any suggestion or movement which has not ingrafted itself firmly as a part of the social order. Nevertheless we doubt not that the dental profession as a whole will approve of the purpose which the committee has in hand. Its object is to give needed relief to worthy practitioners of dentistry who are lacking the means to help themselves at a time and under circumstances when their ability to help themselves is a rapidly vanishing quantity.

It is all very well and comparatively easy for any of us to take the ground that had these unfortunate members of our profession been more frugal, or had they not wasted their substance in various ways which those who are wiser may deem foolish, their lot would not have been so unfortunate. On the other hand, we are dealing with a condition, not a theory in such cases, and a theory will not provide clothing, food, or shelter in the same practical way that the necessary current coin of the nation will produce. It is naturally difficult to realize that the need of the needy is of very much importance when we do not happen to have a personal acquaintance with the needy ones. When, however, we view the question from the standpoint of the individual involved, or when we have him at very close range, he is a different-looking proposition. He then constitutes not only a direct appeal to our sympathy and generosity, but in a very definite sense his relief becomes a professional duty.

It might be interesting for the dental profession as a whole to consider what an imposing bulk of sustenance would be represented by one, five, or ten per cent. of the money value of the food annually consumed at professional banquets, having little other usefulness than the securing of a so-called "good time" to the participants. If ten per cent. of the total amount annually expended by the dental profession in America for food thus consumed, and the necessary expenses incident thereto, were diverted to the sustenance fund of the National Relief Committee whose appeal we have here referred to, it would probably take care of all of the indigent and superannuated members of our profession for the balance of their lives. A few per cents. of well-selected self-sacrifice upon the part of the major portion of the dental profession, who can well afford to make it, is all that is necessary to eliminate the discomforts of the indigent of our profession. Why not do it?

BIBLIOGRAPHICAL.

A MANUAL OF CHEMISTRY. A Guide to Lectures and Laboratory Work for Beginners in Chemistry. A Text-book specially adapted for Students of Medicine, Pharmacy, and Dentistry. By W. SIMON, Ph.D., M.D., Professor of Chemistry, Coll. of Physicians and Surgeons, Baltimore, and Baltimore College of Dental Surgery; Emeritus Professor, Maryland College of Pharmacy; and DANIEL BASE, Ph.D., Professor of Chemistry, Univ. Maryland. New (10th) Edition, enlarged and thoroughly revised. Octavo, 774 pages, with 82 engravings and 9 colored plates illustrating 64 chemical tests. Cloth, $3.00, net. Philadelphia and New York: Lea & Febiger, 1912.

On the appearance of the eighth edition of this work, in 1905, we said concerning it that "It is a book for students by a teacher who in his particular field fully measures up to the requirement of that designation. The ground covered is no more than ought to be well traversed by every student of medicine, pharmacy, or dentistry whose knowledge of chemistry is intended to be part of his working professional equipment and not a mere pretense. A careful examination of the work suggests the thought that no one thing or influence could contribute more to the solid advancement of the dental profession than that each of its members should make the contents of this book a part of his intellectual equipment and attain the same facility in the use of its contained information as he makes of his knowledge of technical dentistry. We are of opinion that the crying need of dentistry today is a better and more thorough training in the data and science of chemistry. Simon's book is a means to that end."

Our favorable opinion as above expressed in 1905 is strengthened and further borne out by the improved and revised edition before us. Much interesting, valuable, and important matter has been added to the tenth edition. In a new chapter on the Theory of Electrolytic Dissociation are considered the later developments of thought regarding the philosophy of chemical action, the theory of ionic equilibrium, the ionization of acids, bases and salts, reactions on the ionic basis, activity of acids and bases, hydrolysis of salts, neutralization, electrolysis and Faraday's laws, etc., electrolytic solution, tension of metals, principle of the storage battery and ionic explanation of the action of indicators. Articles also appear upon exothermic and endothermic reactions, reversible reactions and chemical equilibrium, thermo-chemistry, the solution of gases and Henry's law, freezing-points, boiling-points, Raoult's law, and the laws of osmotic pressure.

After a careful and critical examination of the text, we believe that the work has been brought thoroughly up to date and is fully in accord with the latest advancements of chemical science. The authors state it as their object—"to furnish to the student in concise form a clear presentation of the science, an intelligent discussion of those substances which are of interest to him, and a trustworthy guide to his work in the laboratory." We know of no work of the same scope that so fully accomplishes these desirable purposes.

Text-book of Human Physiology, including a Section on Physiologic Apparatus. By Albert P. Brubaker, A.M., M.D. Fourth Edition, revised and enlarged. Price, cloth, $3.00. Philadelphia: P. Blakiston's Son & Co., 1912.

The subject-matter included under the general term Physiology is so extensive in amount and so broad in its relationships that the task of preparing a comprehensive presentation of it for the instruction of students and practitioners of medicine is by no means an easy one. The author of the present work fully recognizes this difficulty, but his long experience as a teacher of the subject has eminently fitted him for producing what he has accomplished in the present work—a practical exposition of physiology from the point of view of the needs of the student and the practitioner of medicine, the kind of physiologic knowledge which, when possessed by the practitioner, enables him to better understand and to more intelligently solve the disease problems with which he is confronted in the regular routine of his practice. Furthermore, the author has succeeded in accomplishing a condensation of the enormous mass of data at his disposal, not merely for the purpose of a concise rendering, but to produce a practically useful work by careful selection of the essential and more important parts of the subject and the elimination of special and more abstruse matters which more fittingly constitute the field of study of the physiological specialist.

The book is an acceptable presentation of its topic that will be appreciated by all who wish to acquire a knowledge of the essentials of physiology.

Hints, Queries, and Comments.

ORTHODONTIC REGULATION IN COMBINATION WITH TREATMENT FOR PYORRHEA ALVEOLARIS.

To the Editor of the Dental Cosmos:

Sir,—I am forwarding some photographs, which are interesting in that they show the results of an operation which may be made to accomplish a double purpose—first, to cure a pyorrheal condition, and second, as an orthodontic measure.

In the case illustrated the upper right central had both extruded and protruded, and the left central and lateral had separated as the result of a pyorrheal inflammation. The relative positions of the teeth referred to are shown previous to operation in Figs. 1 and 2. The left central and lateral were brought in correct alignment with ligatures. The right central was then extracted, the root-socket deepened, and after thorough preparation of the tooth for replantation in the usual way—with the exception that nothing stronger than bathing with normal salt solution was used for antiseptic purposes—the

Fig. 1.

Fig. 2.

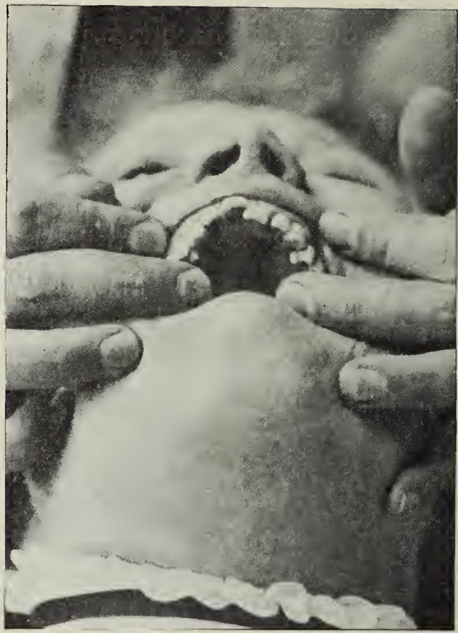


Fig. 3.

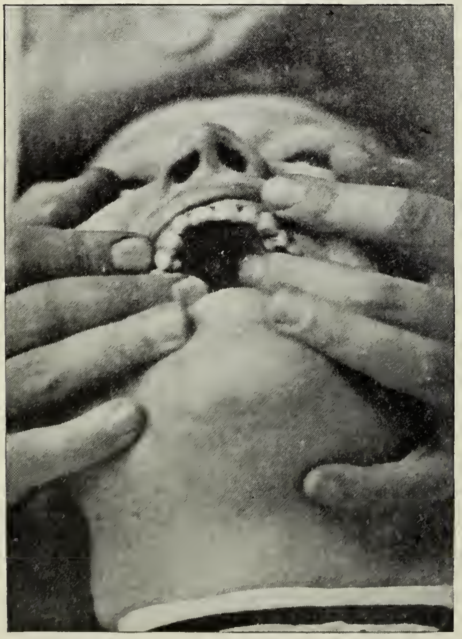


Fig. 4.

tooth was replaced, and retained in position by ligatures until complete fixation ensued as the result of healing of the tissues after the operation. (See Figs. 3 and 4.)

Dr. Emeis, a dentist of Logan, Utah, and son of the patient, informs me now, ten years after the operation, that the tooth is in perfect position and condition. I have done quite a number of these operations successfully.

When, for some reason or other, an incisor begins to extrude and protrude, which frequently occurs when there are no other indications of pyorrhea in the mouth, I feel that it is a better operative procedure to adopt the replantation method than to mutilate sound approximal teeth in an effort to adjust a permanent splint for the purpose of retention.

I thought that possibly the report of this operation, illustrating a practical method of dealing with these annoying cases, might be of interest to the profession at large, for, while I have heard frequently of replantation for the sake of curing pyorrhea, I have seen no records indicating that the operation has been used also as an orthodontic measure.

W. Leon Ellerbeck, D.D.S.

Salt Lake City, Utah.

GUM SECTIONS "HARD ON THE GUM."

One objection to the use of gum sections is the great thickness of the plate under the upper lip, which renders them unsuitable for use in many cases.

By the use of the rigid strengthener behind the six upper anterior teeth as advocated by me in Dental Cosmos for April 1912, in a communication entitled "How to Prevent Fracture of Gum Sections," this objection can be obviated. The six anterior teeth are fitted closely to the gum, that is, without vulcanite behind or over them. Previously, the joint betwen the incisors opened and appeared very unsightly, owing to the warping rubber, and it is with the purpose of preventing this that vulcanite is built up behind and above the facings. But the strengthener attains the same aim, and permits of dispensing with the vulcanite, if desired.

In setting up the teeth the front of the model is cut away or deeply scraped, and when the case is fitted in the mouth, any surplus rubber which has flowed behind the front sections is cut away with burs, and any portion of the plate where the porcelain presses too hard—as can be seen by the blanching of the gums—is relieved by a carborundum stone.

That portion of the strengthener referred to, which is to lie behind the six anterior teeth, is made of No. 11 platinoid wire, thinner wire being soldered to its ends, behind the bicuspids.

The above method is applicable only for upper plates.

J. L. Elphinstone, D.D.S., L.D.S.

Aberdeen, Scotland.

THE USE OF MODELING COMPOUND.

Granted that the operator knows how to soften modeling compound properly, and how to fill the tray therewith, before inserting the filled tray in the mouth, the surface of the softened compound is coated lightly with vaselin. Then the inverted tray is held over an alcohol lamp, moving it quickly about so that the compound does not become blistered from the heat.

This coating of vaselin serves a double purpose: First, it seems to make the surface of the material softer, and second, it prevents the impression from sticking to the teeth and becoming distorted in being removed from the mouth. The best white vaselin should be used for this purpose. It is melted by placing the bottle containing it in warm water, when a few drops of oil of wintergreen or oil of peppermint are added. This will be found to improve the taste of the compound, which the patient will appreciate.

After the impression has been removed from the mouth and thoroughly cooled in cold water it should be washed with soap and water, to remove all traces of mucus and saliva. A round paintbrush will be found useful for getting into all the depressions of the impression.

After washing, the impression should be immersed in a 1:500 solution of mercuric chlorid, for ten minutes. As the compound is contaminated only on the surface, this solution will thoroughly sterilize it, and it may safely be used again. Before pouring the cast the impression is placed in running water for a short time, in order to remove all traces of the mercuric chlorid.

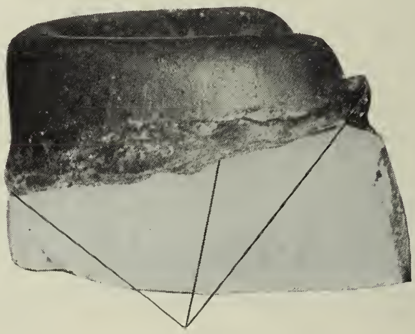
After the poured cast has thoroughly hardened, any compound which may overlap the tray is cut off, and the tray is cooled with cold water. By gently tapping on the handle, the tray can be removed from the impression as clean as before it was used.

We now have the model in the compound impression (Fig. 1), and now is the time to trim the model to the desired form, as there is no danger of damaging the teeth so long as they are covered with the modeling compound. After the model has been trimmed to the desired form (Fig. 2), a groove (Fig. 2, *a*,) is cut under the edge of the impression material. This removes the sharp edge of plaster, which will otherwise break off and mix with the compound when the latter is removed from the model.

We are now ready to separate the model from the impression. The whole is placed in warm water, and when the compound is warmed through, it can be removed from the cast, clean, free from bits of plaster, and sterilized. All that remains to be done is to mold it into cakes for further use. If the operator starts with clean, unscratched trays, all the future polishing necessary can be done with a woolen cloth.

Fig. 1.

Fig. 2.



The operator should study the compound which he is using, note its behavior and the temperature at which it works best, and learn the proper amount to use for a given case. If he does not obtain good results, the compound may be at fault, but the chances are equal that he is himself to blame.

C. M. Torrance, D.M.D.

Frankfurt a/M.

Review of Current Dental Literature.

[*Revue Trimestrielle Belge de Stomatologie,* Antwerp, September 1912.]

THERMO-STERILIZATION OF ROOT-CANALS. A METHOD OF STERILIZATION WITH SODIUM DIOXID, PERMITTING OF FILLING AT ONE SITTING. By Dr. H. Mainguy, Nantes.

At the French Congress of Stomatology of 1911, Zsigmondy of Vienna described his method of enlarging root-canals with the aid of sodium dioxid, which was reviewed at length in Dental Cosmos, January 1912, p. 126. His procedure was based on the decomposition of sodium dioxid in the presence of water, resulting in the formation of sodium hydrate, which dissolves the organic matter in the dentin around the root-canal.

Mainguy starts from the observation that if hot air is blown upon sodium dioxid powder mixed with glycerin, or if this mixture is touched with a red-hot metal point, it ignites with the production of heat and vapors. He puts the tooth under rubber dam, carefully protects the patient's neck and chest with napkins, and then prepares the tooth so that easy access can be obtained to the root-canal. If in the apical region of the tooth vital pulp fibers are left, they are to be anesthetized with novocain and removed. The instrumentarium for the sterilization of the root-canal consists of a glass or agate slab, a firmly closed dropping bottle, half filled with glycerin, barbed root-canal broaches and reamers, a lead bottle containing the sodium dioxid, a hot-air and a water syringe. A broach dipped in a paste made of glycerin and sodium dioxid is introduced into the root-canal or canals of the tooth, and the root-canal is thus disinfected by a combination of thermal action, dehydration, and the production of nascent oxygen. The canals are then washed with alcohol, dried, and filled by one of the approved methods. If no serious pericemental lesions are produced by this deflagration of sodium dioxid, as we are inclined to believe will occur, this method seems as feasible as the potassium and sodium method of Schreier.

[*Journal of the American Medical Association,* Chicago, May 4, 1912, and June 22, 1912.]

THE PREPARATION OF MANUSCRIPTS FOR PUBLICATION. [Editorial.]

WHY SOME MANUSCRIPTS ARE RETURNED. [Editorial.]

The *Journal's* frank editorial suggestions in regard to authorship and preparation of a paper contain so much truth and valuable information for active and prospective authors that their reprint in a dental journal cannot be but of benefit to authors and publishers alike.

The preparation for publication of the many papers read in annual meetings, not to mention the volunteer contributions, is a more formidable task than many imagine. It is not probable that even authors who are extremely careful in the preparation of their manuscripts realize the amount of editorial work required on them before they are ready for the printer. With a little care and attention to a few simple suggestions, this labor could be greatly lessened, while no more work would be imposed on the writers of papers. It would, of course, require too much space here to mention all the points to which author's may profitably give special care. Attention, however, may be called to two or three points. It is almost needless to say that in this day manuscripts should be typewritten; in fact, nearly all of them are so prepared. But many are written in whole or in part with single spacing—an inexcusable fault, since double or triple spacing, which gives more room for adding subheads, directions to printer, etc., is just as easy. A third matter to which attention should be called concerns references to other papers or authors. It is better to treat bibliographic references as footnotes; and all footnotes, bibliographic or not, should be numbered consecutively in a single series from the beginning to the end of the paper. This may seem trivial, but is really important. If the author wishes to refer, further on in his article, to an author and publication already cited in precisely the same manner, he need not repeat the footnote, but should merely use the reference number already assigned to that particular footnote. In the manuscript the footnotes may be placed at the bottom of the pages or at the end of the paper. Care in following these few simple directions and in reading manuscripts over after they have been copied will earn the undying gratitude of manuscript editors, compositors, and proofreaders, not to mention the "ultimate" readers. It will also repay the author with the consciousness of having produced a creditable piece of work.

The sorrow of an author whose manuscript is returned—deep though it be—cannot be compared to that of the manuscript editor who, without the "justified" enthusiasm of the author, guided merely by the cruel spirit of analysis, stumbles over a "sentence" of this character:

"It is indeed true that in the height of the inflammatory process, during the moist stage Staphylococci are found in the secretion and it is also possible by some trifling traumatism to allow the penetration of Staphylococci into the limp spaces of the cutest and there owing to disintegration of the bacterial body antitoxins are set free."

The article from which the above was quoted also contained the following remarkable examples of orthography: "Persistent skin" (resistent skin); "accatete" (acetate); "a two edge sword"; "antipruric"; "suborrhic"; "a leader" (liter) of water; "Sophlicoccus"; "pussular condition." And yet some authors wonder why their manuscripts are returned!

The foregoing is gratifying evidence that not only dental journals have their trials.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, September 1912.]

THE THERAPY OF PULP DISEASES. By PROFESSOR BOENNECKEN, PRAGUE.

Starting from the opinion that every pulp extirpation is really only a pulp amputation, owing to the fine ramifications of the dental pulp, especially at the apical foramen, as Fischer and others have proved convincingly (see DENTAL COSMOS, June 1912, p. 722), Boennecken demands that every root-canal, after the pulp has been devitalized with a paste of arsenous oxid and cocain equal parts, and eugenol, and extirpated as far as possible with a Donaldson root-canal broach, shall be sealed with a paste which will reliably sterilize and mummify the remnants of infected pulp tissue, which are sure to be present, especially after pulpitis. For removing the necrotic pulp tissue he employs aqua regia in all accessible root-canals, claiming the following advantages for this method: This strong acid decalcifies the microscopically minute lime concrements which are present in every diseased pulp, thus rendering even the buccal canals of upper molars and the mesial canals of lower molars passable for a fine broach—barring abrupt deviation of the root from normal direction, pulp-stones attached to the root-canal wall, and canals entirely blocked by secondary dentin, as found in old age. Aqua regia devitalizes the remnants of vital pulp tissue left at the apical foramen or in very narrow root-canals after attempted total extirpation, and prevents the recurrence of pulpitis after root-canal treatment. Aqua regia in its disinfectant power is surpassed only by thymol. After devitalization, the pulp-chamber is opened with a sharp rosehead bur, the débris is flushed away with warm water, the tooth is put under rubber dam, and all pulp tissue that can be reached is extirpated with Donaldson broaches. A few drops of aqua regia are then introduced into the root-canal in the jaws of fine tweezers, capillary attraction aiding in the introduction in upper teeth, and the aqua regia is pumped to the apex with fine smooth Donaldson broaches, which, in larger canals, may be wrapped with a very small strand of cotton. After all pulp débris has been thus carbonized, and not the slightest sensation is left in the root-canal, sodium hydroxid in powder form is introduced into the canal by means of a moistened smooth broach, thereby neutralizing the two acids in the aqua regia, dissolving the albuminates and saponifying the fats. The canals are then dried with thymol-alcohol, thymol paste is introduced, and the canal filled with paraffin. (See H. Prinz, "Filling Root-canals with an Improved Paraffin Compound," DENTAL COSMOS, October 1912, p. 1081.) The experiments carried out by Boennecken in order to determine the absolute and lasting sterility of a root-canal treated in the manner described are very encouraging, and his method seems to offer the advantages of simplicity and saving in time over other much-recommended methods. In a series of 243 experiments in teeth with gangrenous pulps, thymol proved to be the strongest disinfectant, eugenol the weakest. With concentrated alcoholic solution of thymol it was possible to sterilize within thirty seconds a gangrenous and exceedingly putrid root so completely that a bouillon culture remained clear for eight days, showing that all spores even within the dentinal tubuli had been killed. Aqua regia stands second in disinfecting power, with 40 per cent. formalin next. Putrescent pulps which had been removed in their entirety from extracted teeth were completely sterilized within sixty seconds by thymol, aqua regia, and formalin alike. Far inferior to these three antiseptics are tricresol-formalin and caustic soda, which are about equal in their disinfectant power, and are closely followed by carbolic acid, chloral hydrate, and balsam of Peru, and at a considerable distance by the much weaker eugenol. From all this it appears that thymol and aqua regia deserve a place of preference in the treatment of infections of the pulp.

[*Sud-Est Dentaire*, Marseilles, October 1912.]

INSUFFLATION OF IODIN VAPOR IN DENTAL THERAPEUTICS. BY PAUL BERNARD.

A simple apparatus for the insufflation of medicated vapors, which method has always enjoyed great popularity among our French *confrères*, is described by Bernard as follows: A single-bulb glass tube with two open ends is mounted at one end with a rubber hose of convenient length ending in a rubber bulb, at the other end with one in which a short glass rod is inserted, the point of which can be molded over a Bunsen burner to any desirable shape and fineness of lumen. The bulb is charged with iodin crystals, then heated on a convenient stand over the flame of an alcohol lamp or a Bunsen burner, and as soon as the beautiful violet vapors of the iodin begin to develop, the point of the applicator tube is inserted in the cavity of the tooth to be treated, and the vapors are forced into the cavity by exerting pressure on the rubber bulb at the other end. If the mouth of the applicator tube is stopped up owing to precipitation of the iodin vapors, it can be cleaned by holding it over a flame, or by passing a broach or explorer into it. The writer reports a number of cases in which the pain incident to pericementitis and the sensation of elongation of the tooth disappeared a few hours after this iodin treatment. In deeply carious deciduous teeth and putrescent root-canals, this form of treatment seems to offer great advantages.

[*Lancet-Clinic*, Cincinnati, June 1 and 8, 1912.]

SOCIOLOGICAL DENTISTRY. BY S. J. RAUH, D.D.S.

RELATION OF THE CHARITIES AND CORRECTIONS DEPARTMENT TO THE DENTAL MOVEMENT. BY O. P. GEIER, M.D.

RELATION OF EDUCATION TO THE DENTAL MOVEMENT. BY DR. F. B. DYER.

RELATION OF THE SCHOOL TO THE DENTAL MOVEMENT. BY J. S. HAUER.

ATTITUDE OF THE MEDICAL PROFESSION TO THE DENTAL MOVEMENT BY W. D. PORTER, M.D.

RELATION OF THE ANTI-TUBERCULOSIS MOVEMENT TO THE DENTAL MOVEMENT. BY S. IGLAUER, M.D.

RELATION OF THE WAGE-EARNER TO THE DENTAL MOVEMENT. BY M. E. CAMPBELL.

RELATION OF CITY HEALTH TO THE DENTAL MOVEMENT. BY J. H. LANDIS, M.D.

The recognition which the oral hygiene movement has found in the medical, educational, and administrative camps is signally attested by the liberal space allotted by this medical journal to the oral hygiene symposium arranged by the Cincinnati Dental Society on April 26, 1912. The first author, chairman of the meeting, defines the oral hygiene movement as consisting of three main divisions: Educational work such as public lectures, tooth-brush drills, etc.; dental inspections, and the free clinic, which, in his opinion, should be taken over by the municipality, this policy being cheaper in the end than the child's failure of promotion in the public school.

Dr. Geier, director of charities and corrections, expresses himself as fully appreciating the helpfulness and need of dental work in the house of refuge, the first purpose of which is to restore the children to a normal physical condition.

Dr. Dyer, superintendent of public schools, is of the belief that the oral hygiene movement in schools has been the most important one for the profession as well as the children, that has transpired in the history of the dental profession. He reports that, in 1909, nine hundred and twenty children in one of the schools under him were examined, of whom less than ten had had dental attention. An examination in the same school in 1910 showed that 25 per cent., viz, two hundred and fifty children, had received dental treatment, which speaks loudly for the awakening of the people.

Mr. Hauer, school principal, testifies to the effect that the dental work done in his school has proved to be mentally, morally, and physically beneficial to the pupils, whose parents in a four-fifths majority cannot afford to pay for dental work.

Dr. Porter cites the appalling statistics revealed by dental examinations of school children, and comments upon the dispatch with which the dental profession has overcome the initial skepticism of the medical profession toward this movement. He recommends free dental treatment of children even before they have reached school age, and considers that at present there are no philanthropic movements that offer greater opportunities than this plan of looking after the physically deficient children who otherwise would be neglected. It is infinitely better to give these children a fair chance to grow up into useful, independent citizens than to organize charities for them after they have reached a state of partial or entire dependence, as a result of ailments that could have been corrected in childhood. We hear much of the awful danger of race suicide, but instead of weeping over hypothetical children, we will do much better to devote ourselves to the welfare of the actual flesh-and-blood children with which we are surrounded.

Dr. Iglauer, president of the Cincinnati Anti-Tuberculosis League, complains that the dental and anti-tuberculosis movements are greatly handicapped, because both are directed against diseases so widespread throughout the world and so insidious in their onset. The diseases which both movements seek to overcome have been with us so long, and society has become so accustomed to their presence, that by some they are regarded as almost inevitable. Familiarity with disease often breeds contempt for the same, so that preventive dentistry and medicine have to encounter the ignorance, superstition, and inertia of a public unmindful of its own best interests. Propaganda must therefore be made through lectures, the press, public clinics, and above all through the public schools, to enlighten the young and prospective adult generation of citizens and voters, because the solution and control of all movements for the public health must finally rest with the state. The formation of a national bureau of health, so long delayed but now in prospect of consummation, is a great step in the right direction, but the state and the city also have an important part to perform in this great work toward final victory over preventable diseases.

M. Edith Campbell, of the Cincinnati board of education, states that one of the most difficult tasks of her office is to convince the wage-earning girl that her health is her capital. Since all methods of reform, and attempts at class legislation toward producing the efficient, well-developed human being have failed so far, we are forced to the old wearying way—the way of the individual. The individual must be taught that only through the perfect care, conservation, and development of his physical and mental resources can he compel life to disclose its secret richness to him, and can he conquer its exigencies and rise above its sordid struggle. In such a training of the individual the dental work in public schools will be a most potent force.

Dr. Landis, health officer of Cincinnati, emphasizes the untoward influence of unhealthy oral conditions on the entire organism, and points out that defective teeth and unclean mouths mean a great financial loss to a community, because it requires children thus affected at least six months longer to complete the eight common-school grades than it does those without defective teeth. The expense incurred by public dental school clinics, therefore, is a real economy, and the oral hygiene movement will bring about more perfect physical development, greater freedom from preventable disease, a shorter average period in school, and a wider dissemination of information concerning hygiene.

[*Le Journal Dentaire Belge*, Brussels, No. 2, 1912.]

CLASSIFICATION OF DENTAL CARIES. By Dr. B. Nevrezé.

[*Revue Trimestrielle Belge de Stomatologie*, Antwerp, September 1912.]

TOXICO-PATHOGENESIS OF DENTAL CARIES OF TUBERCULOUS ORIGIN. By Dr. B. Nevrezé.

These essays represent painstaking contributions to the classification of dental caries, in which the French dental profession has always taken an active interest. The author's suggestions are as follows:

Dental caries of toxico-systemic origin is due to infantile diseases, viz, to a series of lesions which evolve during two distinct periods: First, a toxic period in which toxins in the blood play the principal rôle. Second, a parasitic period, in which the saprophytic microbes of the mouth complete the destructive process. In the first period, up to the fourteenth year, the tooth is hypocalcified, owing to toxic infections producing symmetrical lacunar lesions in the form of vacuoles in the dentin, standing in fixed and definite relationship to the process of calcification in regard to chronology and topography. Such a lacunar tooth may remain intact in appearance for a long time, if the toxins are eliminated from the organism. Generally, however, the toxins reach the blood circulation, and arrest the secreting functions of the odontoblasts, as well as impair the calcific material already secreted. During the second period, the saprophytic micro-organisms in the mouth determine the destructive process, since the already demineralized tooth falls an easy prey to these micro-organisms.

Following up this theory, dental caries of toxico-systemic origin is defined by the writer as a disease of the tooth characterized by two distinct phases: A first one, in which the toxins diminish the vitality of the odontoblasts, probably by a paralyzing dynamic action upon these cells, perhaps even by actual demineralization, and a second period in which the microbes, having become hypervirulent owing to lack of resistance, destroy the enamel, dentin, and pulp. This definition points out the mode of treatment in caries of tuberculous origin, viz, therapy by tuberculin, which embraces three stages—drainage of the toxins, immunization by tuberculin, and recalcification, thus assigning to the dentist the task of immunization, instead of mere mechanical repair.

[*Correspondenz-Blatt fuer Zahnaerzte*, Berlin, October 1912.]

REASONS FOR THE DISCOUNTENANCING OF COWPER'S OPERATION IN THE TREATMENT OF CHRONIC EMPYEMA OF THE MAXILLARY ANTRUM. By Dr. Becker, Berlin.

Cowper's operation consists in establishing a communication between the oral cavity and the maxillary antrum through the alveolus, this artificial fistula to be kept open by means of a prosthetic appliance, until healing has been induced by irrigations. Although a great many stomatologists have in recent dental literature expressed themselves as being strongly in favor of this operation, Becker strongly discountenances it, for the following reasons: The establishment of a communication between the oral cavity and the maxillary sinus is impractical, as it is always liable to permit of a reinfection. The small aperture created does not permit of a thorough removal of all granulations. The wearing of a prosthetic appliance is fraught with all sorts of inconvenience and untoward effects upon the oral tissues. Moreover, at least one tooth must be sacrificed, and the treatment is an unduly prolonged one. For these reasons a radical operation is strongly indicated, as it allows of easy examination of the entire antrum, and, if necessary, of the ethmoid bone, which is frequently also affected. The Luc-Caldwell operation offers the best advantages in this respect. Still, radical operations should not be undertaken until medicinal treatment and endo-nasal operation have proved to be failures.

[*Le Laboratoire et le Progrès Dentaire*, Paris, December 1, 1912.]

DIATORIC CROWN WITH PIVOT FOR BICUSPIDS. By Dr. J. E. Boitel, Neuchâtel.

The root is prepared, and a platinum ferrule adjusted of one-tenth millimeter thickness and from four to five millimeters height, which is trimmed down on the labial surface. A plaster impression is then taken, and an articulating model poured. A diatoric bicuspid tooth is then ground to an approximate fit upon the root, leaving, however, enough space for a metal base. The tooth is then articulated by grinding its base, tried in the mouth, and invested in plaster together with the ferrule, with its masticating surface down. A platinum base of one-tenth millimeter thickness is then fitted in the ferrule against the base of the tooth, and fastened with wax. Both base and ferrule are removed from the plaster, invested in investment material, and soldered together with pure gold. A hole is then punched in the base, corresponding to the direction of the root-canal, a small platinum tube is adjusted in the hole, the lumen of this tube corresponding to the countersunk aperture in the diatoric tooth, and the tube is soldered to the base with 20-karat gold. Ferrule and tooth are then tried once more on the root, the tooth is removed, and a pivot inserted through the base in the root-canal, fastened to the platinum tube with wax, removed together with the cap, invested and soldered. In this way a ferrule, base, pivot, and tube are obtained in one piece, insuring ample root-protection and stability of the cap as well as the diatoric after both have been cemented in place on the root.

[*Zahnaerztliche Rundschau*, Berlin, Nov. 21, 1912.]

PYORRHEA ALVEOLARIS AMONG THE NATIVES OF EGYPT, AND TREATMENT. By Dr. J. Bauer, Cairo.

The author reports of his experiences extending over ten years among the Arabic, Coptic, and Sudanese population of Egypt, who exhibit a remarkable prevalence of alveolar and gingival diseases. These people are chiefly vegetarians, and eat a great deal of raw vegetables, rarely meat, and then only mutton and poultry, and abstain from alcoholic beverages. Despite this apparently rational mode of life, Bauer has observed pyorrhea alveolaris due to gout or diabetes in 80 per cent. of his adult native patients. The application of pyocyanase* was followed soon by recurrences of the disease, and was therefore given up. Mild cases were treated by scaling off any salivary or serumal calculus present, and introducing aromatic sulfuric acid into the pockets until the flow of pus ceased. In advanced cases the gingiva can be cut, and all necrotic parts removed. This, however, requires subsequent suturing of the gingival flaps, and is impracticable in posterior teeth, especially on the buccal side. A more practical method of treatment is as follows: A fine and long platinum loop is fitted to a galvano-cautery, and inserted under the anesthetized gingiva, until the end of the loop has reached the alveolar process. After a little practice, necrotic portions of the alveolar process are easily recognized by the touch, and the infected portions are cauterized by turning on the current. The pain is insignificant, provided the cauterizing is done at repeated short intervals. If a few days after the cauterization minute globules of pus can still be expressed, the pockets are treated with aromatic sulfuric acid. If the patient pays strict attention to oral hygiene, and all diseased portions of the alveolus have been thoroughly cauterized, a complete cure is effected, provided that, from the very beginning of treatment, all loose teeth have been immobilized.

If, for instance, two teeth are loose, two adjoining teeth on each side are put under the rubber dam with well-waxed silk ligatures applied high up on the cervices. The isolated teeth are then cleansed of fatty adhesions by benzin, dried with cold air, washed with alcohol to make sure that no impurities remain on the teeth, and then dried with hot air. Starting with a firm tooth, the isolated teeth are then carefully and firmly wrapped with from three to five windings of continuous surgical silk ligature, the interproximal space is filled with tightly drawn knots, leaving enough space between the gingival papilla and

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* For literature on pyocyanase in dentistry, see Dental Cosmos, November 1909, p. 1344; February 1910, p. 243; July 1910, p. 806.

the crown to allow of convenient cleansing of the interproximal space and approximal surfaces, and a strong continuous splint ligature uniting all the isolated teeth is thus obtained. After drying the teeth and the continuous ligature described with hot air once more, the ligatures and teeth are covered with a coat of transparent celluloid dissolved in acetone to a syrup-like consistence, and applied with a pointed orange-wood stick. After from fifteen to twenty minutes this solution is sufficiently hardened to permit of removal of the rubber dam, which is effected by first cutting the cervical silk ligatures and then slitting the rubber dam away from the teeth. These silk-celluloid immobilizing ligatures keep for a very long time, present an esthetic appearance, can be easily repaired, and are very much cheaper than swaged or cast gold splints.

A report of several cases from practice concludes this attractive communication.

PERISCOPE.

Protecting Patient's Cheek in Applying Rubber Dam.—Most patients appreciate having their face protected while the rubber dam is in position by placing small pieces of cottonoid between the holder and the cheek. —G. MUNROE, *Dental Review.*

How to Steady the Engine Handpiece.—About three inches of rubber tubing, such as is used for fountain syringes, is stretched over the handpiece, leaving about one-half inch of space between the tubing and the point where the burs are inserted. This rubber can be cleaned easily with a wet cloth and a little soap.—C. H. WACHTER, *Dental Review.*

Removing a Shell Crown Without Mutilating.—A small hole is drilled bucally just below the occlusal surface of the shell crown, and an old instrument with a slightly curved point is inserted into the hole. By using the surface of the root as a fulcrum, it is surprisingly easy to remove the crown from the root. The hole in the shell crown can easily be repaired.—H. R. S. TAYLOR, *New Zealand Dental Journal.*

Enlarging Narrow and Tortuous Root-canals.—If there is a sharp turn in a root, and a reamer is forced beyond this curve and twisted, it is liable to break. In order to avoid this accident, it is good practice to ream out the first two-thirds of the canal only by means of a Kerr broach, and depend on ordinary barbed or plain broaches for clearing the apical third of the canal. —C. E. FELLMAN, *Dental Digest.*

Pouring Perfect Dies of Melotte's Metal.—In pouring dies of Melotte's metal the metal is often either too hot or too cold, or the bismuth has been burnt from the metal, all these factors producing imperfections in the dies. In order to obtain a sharp die, the metal should be poured into a rubber ring, and just before it hardens pressed on firmly with a glass pestle of about the size of the rubber ring. A die made in this way will be smooth and free from bubbles. —L. C. HOLLAND, *Dental Summary.*

Schiller's Skull.—Professor Froriep, the anatomist, has succeeded in identifying the skull of the poet Schiller among a confused mass of bones in the crowded Weimar Cemetery, principally by means of his teeth, of which he is known to have lost only one, a lower left bicuspid. The flawless strength, beauty, and regularity of the teeth is remarkable, especially so when one remembers that Schiller was "ailing" for the greater part of his life, and that his last years were overcrowded by persistent ill-health.—*Archiv für Zahnheilkunde,* per *Dental Record.*

Oxygen Poisoning.—Bornstein has been experimenting with animals to determine the conditions permitting life in an atmosphere of hydrogen. He knows of only one case of actual oxygen poisoning in man, and this was on himself while he was studying the subject. The oxygen seemed to affect the lungs exclusively in his experiments; the alveoli were filled with effusion. The experiences reported justify the conclusion that man can stand oxygen at a pressure of two atmospheres for twenty or thirty minutes without harm, which is of interest in connection with general anesthesia.—*Deutsche Med. Wochenschrift* per *Journal of Amer. Med. Association.*

Protecting Gum Margins in Crown Work.—To protect the gum margins around a root prepared for a cast Davis crown between sittings, a small piece of gutta-percha is warmed sufficiently to make it plastic. The root is dried thoroughly, and the gutta-percha is molded to place. To insure the permanence of this covering until the next sitting, a very small tack can be used. The tack is warmed in a flame, pressed through the gutta-percha, and inserted in the root-canal, thus holding the gutta-percha firmly in place.—A. E. De Riemer, *Dental Review.*

Care of the Head-rest of Dental Chairs.—The head-rest should be given most careful attention. No patient likes to rest his or her head on a soiled head-rest, or on one that has been used by another person. Clean linen should be placed on the head-rest after each patient. The writer has found the use of hygienic head-rest pads made of paper equally good. These paper pads are made of heavy crepe paper, one hundred sheets making up one pad. If the sheet that has been used is torn off the pad in the patient's presence, a most pleasing impression is made upon the patient.—J. P., *Western Dental Brief.*

Prophylactic Treatment of Hemophiliacs.—The extractor must know what to do when given a history of predisposition to hemorrhage, in order that when he extracts he may feel assured that everything has been done that could have been done. In these cases extraction should be avoided if possible, but if the removal of the tooth be absolutely necessary we must proceed with a prophylactic method of treatment for about seven days prior to the operation.

This should consist of the administration of calcium lactate in doses of 10 to 15 grs. The operation should be performed in the morning, thus giving the whole day for treatment should hemorrhage occur, the wound to be immediately plugged as a preventive, coupled with the administration of some hemostatic such as the continuance of the lactate, for it is obviously easier to prevent hemorrhage occurring than to arrest it when once it has commenced. The subsequent treatment consists in the continuance of the hemostatic.—W. A. S. Hills, *Dental Record.*

Suggestions on Bridge Work.—The clinician's method does not differ from the ordinary procedure until the abutments are made and mounted. Then the space to be bridged is filled with wax; the opposing teeth, which are mounted on the articulator are closed, and the cusps carved up. The Steele's backings and facings are then mounted in proper relation, the investment is removed, the wax boiled out and crystal gold packed in its place. The investment is then dried out carefully, and sufficient solder sweated in to fill the crystal gold, and to secure attachment to the abutments. The bridge is removed from the investment and polished, and the facings are cemented to place.—J. N. Stewart, *Dental Practice.*

Melting Platinum.—Lime has been found the best material for crucibles for melting platinum. It is about the only material that will stand the high heat of the oxyhydrogen blowpipe. Pieces of burned lime are selected as free from fissures and foreign matter as possible; a cavity is cut in a selected piece to hold the platinum, which is melted in the cavity by an oxyhydrogen blowpipe, and then allowed to cool. The button of platinum is hammered until it is thin enough to enter a pair of rolls to be rolled into sheet. Since the general introduction of the electric current the electric arc has been used for melting platinum, a carbon crucible being used. Objection has been made to this method on account of a tendency in the platinum to take up carbon at an intense heat, and thereby become somewhat brittle.—W. H. Trueman, *Dental Brief.*

Iodin in Mouth-washes.—Carles advocates the use of iodin as a mouth-wash, especially in cases of foul breath due to dental caries. One gram of potassium iodid should be added to 20 grams of iodin tincture, and of this mixture from one to three drops should be thrown into a quarter of a glass of warm water. With this solution the mouth should be carefully rinsed. The hotter the water the more drops it will carry. If iodin tincture is used alone, the iodin is separated out by the water, and clinging to the mucous membrane causes a lasting and disagreeable taste. Potassium iodid keeps the iodin in solution, and the taste becomes mild and pleasant. The drug penetrates to all the crevices of the mouth, and acts as a deodorant and an antiseptic. The lotion is to be recommended as a prophylactic to those with sound teeth, and the writer is convinced that by employing it regularly, especially at bedtime, caries can be prevented. The teeth are not permanently stained by the dilution mentioned.—*Gaz. Hebd. des Sciences Méd.* per *British Dental Journal.*

Bar Upper Partial Dentures.—Bar upper partial plates are made of a saddle of vulcanite or metal and joined together by a bar across the roof of the mouth as far back on the hard palate as possible. The bar is placed about the thickness of cardboard from the roof of the mouth, except over hard spots, when it is placed about twice that distance away. The saddles cover the ridge and project far enough down to give the plate good support. If the saddles are made of metal, the bar should be soldered to the saddle, but if vulcanite is used the bar should be flattened and notched or have holes put through it, so that it will be held tightly into the vulcanite.

A good wide clasp is about the best attachment for holding these plates, although any kind of modern attachment, *i.e.* Roach, Gilmore, and Bennet, may be used. The attachments give best service when placed on opposite angles of the case.

I have used a great many of these dentures, and can highly recommend their use whenever it is possible to use them. The patients like them because they leave the roof of the mouth practically free, interfering with neither taste nor speech. If you try them, I am sure you will be more than pleased with the results.—J. A. Bothwell, *Dominion Dental Journal.*

Cysts at the Roots of Teeth, in Origin Tuberculous.—Zilz reports four cases of cysts at the roots of teeth in which bacteriologic investigation revealed the presence of Much's granula, which he defines as the non-acid-fast form of the tuberculosis germ. The findings are profusely illustrated, and the questions discussed why it is so difficult to detect acid-fast, Gram-staining bacilli in the gangrenous pulp, and why primary tuberculosis starting in carious teeth is not of more common occurrence. He regards Much's granula as merely ordinary acid-fast tubercle bacilli which have lost their acid-fast properties; hence the organic fluids are able to disintegrate them, and the vital centers, the granula, escape into the surrounding medium. When conditions become more favorable to the bacilli, they may become impregnated again with acid-fast substance, and the acid-fast form thus develop again, which in turn may break up anew into granula. His plates show the process distinctly, the granula causing no tuberculous changes in the dental cyst. The bacilli probably found their way through the blood into the cyst, and while there remained latent, but regained their virulence when conveyed farther to lymph-nodes or lungs. Inoculation of animals with the granula always gave positive results.—I. Zilz, *Beitrage zur Klinik der Tuberkulose,* per *Journ. of Am. Med. Association.*

The Teeth of Workers in Lead.—Viktor Hinze has made observations on a large number of lead-workers in an accumulator factory. He noticed that the gums and teeth of the men who were suffering from plumbism were in a bad condition. The former were swollen, hyperemic, and infiltrated. Tartar incrusted the edges of the teeth. It occurred to him that the removal of the tartar and active care of the teeth and gums might lead to a limitation of the poison within the body. He therefore started by scraping the teeth and collecting the tartar, which he subjected to a careful chemical examination. In one case, that of a man who showed anemia, atrophy of the extensor muscles of the left hand, etc., 0.329 gram of tartar was removed, which contained 0.48 per cent. of metallic lead. In this case the seventeen teeth which the man still possessed were extracted, and thus both the tartar and the teeth could be examined chemically. The examination of the teeth showed that the crowns contained 0.038 per cent., and the roots 0.033 per cent. of metallic lead. It is therefore evident that a deposit of lead is present which suffices to keep the symptoms of lead intoxication going. On removing the tartar from the teeth of other workers in the factory, he succeeded in curing the hyperemia, tendency to bleeding, cyanosis, and boggy swelling of the gums; and several obstinate cases of gingivitis soon cleared up.—*Berlin. Klin. Woch.* per *British Dental Journal.*

The "New" in Dentistry So Old.—In the cullings from the Dental Cosmos of fifty years ago, many instructive and amusing features may be found; also one is impressed with the fact that in some of our procedures we have not advanced so much as our imagination has led us to believe was the case. Of course, as far as instrumentation is concerned, and the ease to our patients as well as to us, there are radical changes, but not always as regards results.

It is questionable whether today as large a percentage of good gold workers can be found as existed fifty years ago, and notwithstanding all the scientific theories pertaining to occlusion, lines of beauty, etc., existing today, it is doubtful if one can obtain a better-looking, better-fitting, and more artistic and useful plate than our forefathers made; in fact, plates are generally not as good, for two reasons: First, because we make comparatively few, and second, it is almost the universal custom to use plain teeth instead of gum sections.

The papers and discussions published in the volumes mentioned bring out the fact that the so-called Black cavity preparation was advocated before Dr. Black began to practice. Prophylaxis was advocated and was called "prophylactic treatment" the same as today, also was opposed then as it is now. Fee bills were advocated and condemned. The constitutional causes of caries were a favorite topic for discussion, which resulted in as much enlightenment as it does now. The dentists regretted that dental journals published so much trash simply to fill space; the same regret exists today. And last, but not least, there was an organized effort made to reorganize the National Dental Association; the same effort is being feebly made now.—*Western Dental Journal.*

OBITUARY.

DR. WILBUR F. LITCH.

Died, at his home in Ardmore, Pa., December 25, 1912, Wilbur Fisk Litch, D.D.S., M.D., in the seventy-second year of his age.

He had been in poor health following an attack of grippe in the early autumn, later developing symptoms of valvular heart trouble which became critical and alarming, so that grave concern was felt as to the outcome of his malady, but, as he subsequently rallied, hopes were entertained of his ultimate recovery. He, however, suffered a relapse, which terminated fatally on the date above stated.

Wilbur Fisk Litch was born September 18, 1840, in Eastham, Mass., of Scotch-English ancestry, his forebears being among the pioneer settlers in Plymouth colony. His father was Josiah Litch, a minister in the Methodist Episcopal Church. In consequence of the removal of his father and family to Philadelphia, Dr. Litch from early childhood was a resident of that city, and there received his education.

In 1858 he entered as a student the office of his uncle, Dr. J. M. Barstow, a practicing dentist, one of Philadelphia's most expert carvers of porcelain block teeth, under whom he had a thorough training in office and laboratory work. In 1859 he matriculated in the Pennsylvania College of Dental Surgery, from which he was graduated with the degree of D.D.S. in 1861. For three years he was a student in the private anatomical school and dissecting room of the celebrated anatomist and surgeon, Prof. D. Hayes Agnew. After being graduated in dentistry he entered upon the study of medicine in the Jefferson Medical College, and was graduated with the degree of M.D. with the class of 1864–65.

After several years of service in the medical department of the United States army, his last assignment being that of post surgeon at Fort Yuma, Cal., he returned to civil life, and in 1871 entered upon active dental practice in Philadelphia.

In 1878 he was appointed professor of materia medica, therapeutics, and principles of prosthetic dentistry in the Pennsylvania College of Dental Surgery, and in 1899 was made dean of the college. These positions he continued to occupy until the Pennsylvania College of Dental Surgery ceased its educational work at the close of the session of 1909.

Dr. Litch was a member and ex-president of the Pennsylvania State Dental Society, of the Pennsylvania Association of Dental Surgeons, and of the National Association of Dental Faculties; a member of the National Dental Association, and its vice-president for the East in 1907–08, an honorary member of the American Academy of Dental Science, a member of the Philadelphia County Medical Society, and of the American Medical Association, and for over thirty years was dentist to Girard College of Philadelphia.

To dental literature Dr. Litch's chief contribution was the "American System of Dentistry," published in 1887–88 in three volumes. Of this work, which occupied some five years in preparation for the press, he was the editor, and to it he contributed the chapters on "Anesthesia and Anesthetics," "Crown and Bridge Work," and "Metallic Facings for Carious Crowns."

The publication of the "American System of Dentistry" marked a decided epoch in the history of dental literature by gathering together in a single publication the more important developments of dental science and art which had taken place up to that time in all departments. The work was so fundamentally and so thoroughly done that with but slight alteration much of it would be considered standard at the present time. The "American System of Dentistry" produced a distinctly forward impulse toward the more rational practice of dental art, and was productive of that result largely because of the intelligence, foresight, and wisdom of its editor, Dr. Litch, in the selection of his corps of contributors, and in his editorial shaping of the character and quality of their contributions to the text of this monumental work.

In 1881 Dr. Litch read before the Pennsylvania State Dental Society a paper on "Antiseptics in Dentistry," published in the DENTAL COSMOS for February 1882, in which the value of iodin and other of the halogens as disinfectants, dependent upon their power of not only destroying germs but of decomposing putrescent gases in root-canals, was emphasized and, probably for the first time, explained in connection with dental therapeutics.

One of his practical contributions to dentistry was the half-band crown for upper incisors and canines, first employed by him in 1876, prior to the introduction of the Richmond full-band crown, and described and illustrated under the title "The Collar Crown," in the DENTAL COSMOS for September 1883.

In 1899 Dr. Litch became editor of the *Dental Brief*, in which office he continued until his death.

Dr. Litch was a thorough teacher. He possessed that characteristic which, for the lack of a better designation, is called the teaching instinct—a quality based upon keen insight into the needs and difficulties of the student mind, and the adaptation of his mode of teaching to meet those conditions in his teaching work. He was a man of high professional ideals, one who consistently lived his professional life upon the high plane that he sought to impress upon those about him, and particularly those in his educational charge. In his bearing toward his patients, his colleagues, his students, indeed toward everyone, he was always the dignified and kindly gentleman. Those who knew him but superficially often mistook his dignity and reserve of manner as evidence of a certain austerity of character, whereas, on the contrary, those who really knew and understood him were well aware of the gentleness and kindliness of his disposition, the simplicity of his character, the warmth of his regard for his friends, and his keen appreciation of all that is good and noble in life. He was markedly artistic in his tastes and temperament, a great lover of music and an intelligent musical critic, particularly in its interpretative aspects. To attend a high-class musical presentation with Dr. Litch and to listen to his comments upon the performance was not only a delight, but a real education in itself.

Measured by the best standards, the professional life of Wilbur F. Litch was a conspicuous success. It is impossible to estimate the value and importance to the profession in which he was so prominent a figure, of the effect of his direct teaching and the equally important impression which the example of his own professional life exerted upon it. There can be no difference of opinion among the very large number of men who have benefited by his influence as to the fact that the status of dentistry has been elevated to a higher plane of usefulness and a broader and more intelligent scope of activity through the career of Wilbur F. Litch. His most enduring monument will always be the continuing influence of his professional life-work.

Dr. Litch leaves a childless widow.

The funeral services were held at his home in Ardmore, Pa., on December 28th, and were largely attended by his friends and colleagues of the dental profession. The interment was private.

Brief Necrology.

Dr. I. T. MORFORD of Spencer, W. Va., on November 2, 1912, of typhoid fever, in his fifty-sixth year.

Dr. CHARLES J. COOPER of Brooklyn, N. Y., on November 18, 1912, of typhoid fever, in his sixty-fifth year.

Dr. WELLINGTON D. PIERSOLL of Philadelphia, Pa., on December 2, 1912. Deceased was a graduate of the Philadelphia Dental College.

Dr. HENRY M. CLIFFORD of Boston, Mass., on November 4, 1912, of heart trouble. Deceased was a graduate of the Harvard University Dental School.

Dr. MORGAN A. YULE of Mendota, Ill., on November 12, 1912, of stomach disease. Deceased was a graduate of the Northwestern University Dental School.

Dr. FRANCIS J. KELLY of Buffalo, N. Y., on October 30, 1912, in his thirty-seventh year. Deceased was a graduate of the Dental Department of the University of Buffalo.

Dr. EDWARD SHACKELFORD of Prattsville, Ala., on October 27, 1912, in his seventy-fifth year of age. Deceased was a graduate of the Dental Department of the Medical College of Virginia.

Dr. HOWARD SPENCER DOYLE of Louisville, Ky., on November 4, 1912, of cerebral hemorrhage. Deceased was a graduate of the Louisville College of Dentistry, and a member of the Jefferson County Dental Club and the Kentucky Dental Association.

Dr. ALBERT H. FULLER of St. Louis, Mo., on October 22, 1912, in his seventy-first year. Deceased was a graduate of the St. Louis Medical College and the Missouri Dental College, emeritus professor of operative dentistry and formerly dean of the faculty of the Washington University Dental School, member and ex-treasurer of the National Dental Association, member and ex-president of the Missouri State Dental Association, ex-president of the St. Louis Dental Society and the Society of Dental Science of St. Louis, and a veteran of the civil war.

SOCIETY NOTES AND ANNOUNCEMENTS.

NOTICE OF CIVIL SERVICE EXAMINATIONS.

City of Philadelphia.

FOR CHIEF OF DENTAL DISPENSARY, ALSO FOR ASSISTANT DENTIST.

February 20, 1913, 9.30 A.M.: Chief of Dental Dispensary, Bureau of Health, Department of Public Health and Charities. Salary $2500 per year. Duties are to take charge of the city's dispensaries. Work supervisory rather than operative. Whole time required.

February 20, 1913, 9.30 A.M.: Assistant Dentist, Bureau of Health, Department of Public Health and Charities. Salary $700 per year. Half-days' service required. Both men and women eligible.

For further information, call on or address the Civil Service Commission, Room 875, City Hall, Philadelphia, Pa.

THE PANAMA PACIFIC DENTAL CONGRESS.

As one of the attractions of the Panama Pacific International Exposition, a dental congress, international in character, to be known as the Panama Pacific Dental Congress, is to be held in San Francisco, California, beginning on the last Monday in August 1915, and continuing for ten days.

A Committee of Organization has been perfected, including representatives from the Pacific Coast states—California, Oregon, Washington, Utah, Idaho, Colorado, and Arizona.

This committee is now actively engaged in perfecting the work of organization, including the establishment of executive committees in every state of the United States and in every foreign country where dental organizations are known to exist, which will be empowered to promote the business of the congress by bringing it to the attention of their national, state, and local societies, and securing memberships and contributions to the program.

The American Society of Orthodontists and the National Dental Association, of the United States of America, have already made arrangements to meet in San Francisco in 1915 as parts of the congress, and invitations will be extended to other dental societies to take similar action.

The Panama Pacific Dental Congress is the first organization to apply to the Exposition management for space for exhibits, and to ask that a definite time be set aside for its meeting.

Manufacturers of dental goods have signified their intention to maintain during the congress the greatest exhibition of dental supplies ever held. Ample space for this purpose has already been promised by the Exposition authorities, and we are assured of their hearty co-operation in all things pertaining to the success of the congress.

The membership fee has been fixed at ten dollars, and the finances of the congress are being cared for by a corporation, formed within the Committee of Organization, and known as the "Pacific Dental Congress Commission of 1915."

Over $8000 has already been subscribed for promotion purposes by the dentists and dental societies of the Pacific Coast states, and this fund will be increased by many thousands of dollars before the congress meets.

Ample funds for promotion of the congress are assured, and in due time Committees on Local Arrangements, Transportation, Exhibits, Clinics, Program, etc., will be appointed, and everything possible will be done to insure the success of the congress and make it in attendance and scientific and professional interest the greatest dental congress ever held.

The whole world is coming to San Francisco in 1915 to participate in and enjoy the Panama Pacific International Exposition, which will commemorate the completion of the world's engineering masterpiece, the Panama Canal.

Never in the history of the profession has there been so auspicious a time for holding a great dental congress, and the Panama Pacific International Exposition Company and the Committee of Organization of the Panama Pacific Dental Congress unite in a cordial invitation to the members of the dental profession to come to San Francisco in 1915 to attend the congress and view the wonders of the Exposition and the Pacific Coast of the United States of America.

Frank L. Platt, *Ch'man,*
Committee of Organization.

AMERICAN DENTAL SOCIETY OF EUROPE.

The fortieth annual meeting of the American Dental Society of Europe will be held at Easter, in Florence, Italy. All members of the profession are cordially invited to be present. Florence is one of the most interesting cities of Europe, and Easter is the most favorable time of the year for seeing Italy.

George H. Watson, *Sec'y,*
Pariser Platz 7, Berlin, Germany.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

The regular meeting of the Academy of Stomatology of Philadelphia will be held on Tuesday, February 25, 1913, at the College of Physicians, Twenty-second st. above Chestnut, Philadelphia, Pa., at 8 P.M. Dr. John Bethune Stein of New York will read a paper on "Hypoplasia of the Teeth, of Syphilitic Origin," illustrated with lantern slides.

All members of the dental profession are invited to be present.

Norman L. Jameson, *Sec'y.*

DENTAL FACULTIES ASSOCIATION OF AMERICAN UNIVERSITIES.

The next annual meeting of the Dental Faculties Association of American Universities will be held at Harvard Dental School, Longwood ave., Boston, Mass., April 22 and 23, 1913. The meeting will be called to order on the morning of April 22d, at 11 o'clock.

Edward C. Kirk, *Sec'y-Treasurer.*

UNIVERSITY OF BUFFALO.

Dental Alumni Association.

The fourteenth annual meeting and clinic of the Alumni Association of the Dental Department of the University of Buffalo will be held in the college building, on February 14 and 15, 1913. An excellent program of essays and clinics has been arranged. Class reunions, fraternity banquets, and a general good time is assured. Ethical practitioners are invited to attend.

M. B. Eschelman, *President*,
D. H. McCoy, *Sec'y*.

CONNECTICUT STATE DENTAL ASSOCIATION.

The next annual meeting of the Connecticut State Dental Association will be held in Waterbury, April 15 and 16, 1913.

A. V. Prentis, *Sec'y*,
New London, Conn.

NEBRASKA STATE DENTAL SOCIETY.

The Nebraska State Dental Society will hold its thirty-seventh annual meeting at Omaha, Nebr., May 12, 13, 14, and 15, 1913. Several special men have been secured from without the state, besides the usual array of home talent.

E. H. Bruening, *President*,
Wm. A. McHenry, *Sec'y*.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

The forty-fifth annual meeting of the Dental Society of the State of New York will be held at Albany, N. Y., Thursday, Friday, and Saturday, May 8, 9, and 10, 1913. There will be the usual reduced railroad rates on the certificate plan.

The first session will open on Thursday at 10.30 A.M. The literary program of the meeting will be rendered in the auditorium of the Educational Building. Headquarters will be at the Hotel Ten Eyck, where the exhibits and clinics will be held.

A cordial invitation is extended to all ethical dentists in New York and sister states. Exhibitors wishing to engage space please address Dr. O. J. Gross, Schenectady, N. Y.

A. P. Burkhart, *Sec'y*,
52 Genesee st., Auburn, N. Y.

IOWA STATE DENTAL SOCIETY.

The fifty-first annual meeting of the Iowa State Dental Society will convene at Davenport, Iowa, May 6, 7, and 8, 1913, beginning Tuesday, May 6th, at 9 A.M. Elaborate clinics and lectures and a large exhibit will be presented.

Further information will be furnished upon request from ethical practitioners of other states contemplating a visit to the meeting, to whom we extend a cordial invitation.

Exhibitors desiring space should apply to Dr. Wm. Finn, Cedar Rapids, Iowa.

C. M. Kennedy, *Sec'y*,
Des Moines, Iowa.

INDIANA STATE DENTAL ASSOCIATION.

The fifty-fifth annual session of the Indiana State Dental Association will be held at the Claypool Hotel, Indianapolis, May 20, 21, and 22, 1913.

The officers of the association recently met at Indianapolis and perfected plans for a three-day "Postgraduate Course." The very best instructors and specialists are being secured for each day. The course will be as follows: Tuesday—"Humanitarian Dentistry." Wednesday—"Preventive Dentistry." Thursday, A.M.—"Prosthodontia"; P.M., a great table clinic. The clinic will also be held in the hotel.

No tuition fee for the members of the association, or visitors from outside the state who are in good standing in their state associations, but all others desiring to take this course must arrange their tuition fees with the secretary.

Otto U. King, *Sec'y*,
Huntington, Ind.

CHICAGO DENTAL SOCIETY.

Election of Officers.

At the annual meeting of the Chicago Dental Society, held at 31 W. Lake st., Chicago, Ill., the election of officers resulted as follows: Geo. N. West, president; P. G. Puterbaugh, vice-president; T. L. Grisamore, secretary; F. E. Roach, treasurer; E. D. Coolidge, librarian. Board of Directors—Wm. H. G. Logan and F. W. Gethro. Board of Censors—P. B. D. Idler, H. C. Peisch, and A. M. Hewett.

T. L. Grisamore, *Sec'y*.

ARMY DENTAL SURGEONS.

MEMORANDA OF CHANGES.

For the week ending December 14, 1912:

James F. Feely, ACT.D.S., December 3d, reports arrival at Fort Terry, N. Y., for temporary duty.

First Lieut. Frank P. Stone, December 8th, reported for temporary duty at Fort Ontario, N. Y.

Lester C. Ogg, ACT.D.S., December 5th, reported for duty at Letterman General Hospital, San Francisco, Cal.

James F. Feely, ACT.D.S., December 11th, granted twenty-five days' leave of absence.

For the week ending December 28th:

Mortimer Sanderson, ACT.D.S., relieved from duty at Fort Slocum, N. Y., and will proceed to the Philippine Islands for duty on transport sailing from San Francisco, Cal., April 5, 1913.

William A. Squires, ACT.D.S., December 19th, reported for temporary duty at Fort Lincoln, N. D.

Itineraries: Each of the following dental surgeons, with enlisted assistant, will proceed at the proper time to the posts named, and report to the commanding officers for temporary duty for the purpose of rendering dental service during the periods indicated.

First Lieut. Frank P. Stone: Ft. Ethan Allen, Vt., Jan. 2d to 27th. Ft. Williams, Me. [incl. Ft. McKinley, Me.], Jan. 28th to March 10th. Ft. Constitution, N. H., March 11th to 17th. Ft. Banks, Mass. [incl. Fts. Warren, Andrews, and Strong, Mass.], March 18th to April 29th. Ft. Rodman, Mass., April 30th to May 6th. Ft. Adams, R. I. [incl. Ft. Greble, R. I.], May 7th to June 4th. Plattsburg Bks., N. Y., June 5th to 30th.

Upon completion of this duty, Lieut. Stone and his assistant will return to Fort Ethan Allen, Vt.

Benjamin C. Warfield, ACT.D.S.: Ft. H. G. Wright, N. Y., Jan. 2d to 22d. Ft. Terry, N. Y., Jan. 23d to Feb. 12th. Ft. Totten, N. Y., Feb. 13th to Mar. 8th. Ft. Jay, N. Y., Mar. 10th to 19th. Ft. Wood, N. Y., Mar. 20th to 26th. Ft. Hancock, N. J., Mar. 27th to Apr. 17th. Ft. Wadsworth, N. Y., Apr. 18th to 24th. Ft. Hamilton, N. Y., Apr. 25th to May 12th. Ft. Porter, N. Y., May 15th to 23d. Ft. Niagara, N. Y., May 24th to June 3d. Ft. Ontario, N. Y., June 4th to June 12th. Madison Bks., N. Y., June 13th to June 30th.

First Lieut. E. P. Tignor: Ft. Dupont, Del. [incl. Ft. Mott, N. J.], Jan. 2d to 29th. Ft. Howard, Md., Jan. 30th to Feb. 13th. Washington Bks., D. C., Feb. 14th to March 10th. Ft. Myer, Va., March 11th to April 8th. Ft. Washington, Md. [incl. Ft. Hunt, Va.], Apr. 9th to May 1st. Ft. Caswell, N. C., May 3d to 14th. Ft. Monroe, Va., May 16th to June 30th.

Arthur T. Knoderer, ACT.D.S.: Ft. Thomas, Ky., Jan. 2d to 14th. Ft. Crockett, Tex., Jan. 17th to 24th. Jackson Bks., La. [incl. Ft. St. Philip, La.], Jan. 25th to Feb. 1st. Ft. Morgan, Ala., Feb. 3d to 18th. Ft. Barrancas, Fla., Feb. 19th to Mar. 10th. Ft. Dade, Fla., Mar. 12th to 19th. Key West Bks., Fla., Mar. 21st to 27th., Ft. Screven, Ga., Mar. 29th to Apr. 14th. Ft. Moultrie, S. C., Apr. 15th to 30th. Ft. McPherson, Ga., May 1st to 31st. Ft. Oglethorpe, Ga., June 2d to 30th.

For the week ending January 4, 1913:

William A. Squires, ACT.D.S., December 28th, left Fort Lincoln, N. D. on ten days' leave.

John A. Snapp, ACT.D.S., December 30th, ordered to San Juan and Henry Barracks, P. R., for temporary duty.

First. Lieut. J. J. Reddy, December 31st, reported for temporary duty at Fort Hancock, N. J.

A. T. Knoderer, ACT.D.S., January 1st, left Fort Oglethorpe, Ga., *en route* to Fort Thomas, Ky., for temporary duty.

Benjamin C. Warfield, ACT.D.S., January 1st, left Madison Barracks, N. Y., for temporary duty at Fort H. G. Wright, N. Y.

For the week ending January 11th:

First Lieut. Frank P. Stone, January 2d, returned to Fort Ethan Allen, Vt., from temporary duty.

Benjamin C. Warfield, ACT.D.S., January 2d, reported for temporary duty at Fort H. G. Wright, N. Y.

First Lieut. Edwin P. Tignor, January 2d, reported for temporary duty at Fort Du Pont, Delaware.

EXAMINATION OF DENTISTS FOR THE U. S. ARMY.

THE Surgeon-general of the army announces that examinations for the appointment of acting dental surgeons will be held at Fort Slocum, N. Y.; Columbus Barracks, Ohio; Jefferson Barracks, Mo.; Fort Logan, Colo., and Fort McDowell, Cal., on Monday, April 7, 1913.

Application blanks and full information concerning these examinations can be procured by addressing the Surgeon-general, U. S. Army, Washington, D. C.

The essential requirements to securing an invitation are that the applicant shall be a citizen of the United States, shall be between twenty-one and twenty-seven years of age, a graduate of a dental school legally authorized to confer the degree of D.D.S, and shall be of good moral character and habits.

Acting dental surgeons are employed under a three years' contract, at the rate of $150 per month. They are entitled to traveling allowances in obeying their first orders, in changing stations, and in returning to their homes at termination of service. They also have the privilege of purchasing certain supplies at the army commissary. After three years' service, if found qualified, they are promoted to the grade of dental surgeon, with the rank of first lieutenant, and receive thereafter the pay and allowances appertaining to that rank.

In order to perfect all necessary arrangements for examination, applications must be in the possession of the Surgeon-general at least two weeks before the date of examination. Early attention is therefore enjoined upon all intending applicants. There are at present a large number of vacancies to be filled.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING DECEMBER 1912.

December 3.

No. 1,045,920, to RAYMOND J. WENKER. Dental form.

No. 1,046,113, to HEINRICH SCHWEITZER. Pressure tool for dental castings.

No. 1,046,114, to HEINRICH SCHWEITZER. Preparation of molds for dental castings.

No. 1,046,166, to JAMES P. FLAHERTY. Dental apparatus.

December 10.

No. 1,046,560, to DAVID E. COULSON. Dental instrument.

No. 1,046,976, to ASA F. COGSWELL. Inlay and bridge casting machine.

December 17.

No. 1,047,299, to CLARENCE F. RODGERS. Dental and surgical lamp.

December 24.

No. 1,048,382, to CHARLES C. ALLEN. Anatomical model.

December 31.

No. 1,048,740, to JULES J. SARRAZIN. Toothbrush.

No. 1,048,972, to JAMES W. IVORY. Tooth separator.

No. 1,048,982, to DAVID S. MACKENZIE. Apparatus for making dental fillings, bridges, etc.

No. 1,049,207, to ALBERT C. CLARK. Dental cuspidor.

No. 1,049,290, to ALBERT C. CLARK. Combined cuspidor and washbasin.

THE

DENTAL COSMOS.

VOL. LV. MARCH 1913. No. 3.

ORIGINAL COMMUNICATIONS.

DEMONSTRATION OF METHODS IN THE TREATMENT OF SIMPLE AND COMPLICATED FRACTURES OF THE JAW.

By H. J. KAUFFER, D.D.S., New York, N. Y.,
CONSULTING DENTIST AT HARLEM HOSPITAL.

(Read before the New York Academy of Medicine, Surgical Section, at its regular meeting, November 1, 1912.)

THERE is probably no branch of the healing art in which the operator is called upon to display more inventive genius, mechanical skill, and manipulative dexterity than in caring for a fracture of the mandible. Here each case presents an individuality, and conditions without precedent are constantly met. The surgical requirements are the same as the cardinal principles in the care of fractures of all long bones, with one exception—extension here is neither wise or necessary. Approximation and fixation, however, must be secured, and sanitation maintained; herein the mechanical and inventive ingenuity of the operator is often taxed to the limit.

No set method of splinting can be adopted. One of the recognized interdental splints with slight modifications to meet the requirements of the case in hand will usually suffice, but occasionally conditions are such that an entirely original device must be constructed, if the comfort and welfare of the patient are to be considered.

As the writer intends this paper to be wholly an original contribution, he will not go into the history of the treatment of fractures of the jaw, nor review other operators' methods, or interdental splints with which you are all familiar, but will proceed to present cases which he has selected from the great number which have come under his observation, with a view to covering entirely this branch of oral surgery.

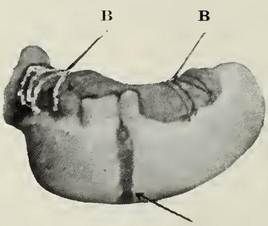
CAST ALUMINUM CAP SPLINT IN MANDIBULAR FRACTURES.

The cast aluminum cap splint adopted by your essayist (Fig. 1) is one which can be used in nearly all fractures of the mandible where the fracture extends anteriorly to the last remaining tooth in the jaw. With this splint, fixation can be maintained without immobilizing the temporo-maxillary articulation.

To make this splint, the operator should obtain a good impression of the teeth of the upper and lower jaw. It is not necessary to attempt to reduce the displacement at this time—or, in fact, until the operator is ready to insert the splint.

Plaster-of-Paris casts are made from the impressions. The cast of the mandible is fractured by sawing through at a point corresponding to the fracture or fractures. The fractured pieces are then trimmed so that they can be waxed together with the teeth in proper occlusal relationship to the teeth on the cast of the upper jaw. (See Fig. 1, A.)

FIG. 1.



When this is done, tin foil is burnished over the cast of the fractured jaw as far as it is desired for the splint to extend. The next step is to pour wax over the tin foil to a thickness determined by the strength required of the splint. Additional strength can be obtained by embedding a platinoid bar in the lingual saddle of the splint. A slight imprint of the occluding teeth is made in the wax, which is then trimmed and cast in the usual manner. Gold or silver may be used; aluminum, however, is preferred by the essayist. This splint can be made if necessary in less than three hours, and has many advantages over vulcanite.

One important feature about the author's splint to which he wishes to draw special attention is that the saddle is discontinued on the labial or buccal surface for a space of several teeth on each side of the fracture. This space enables the operator to see that, when in place, the teeth set well up into the splint as intended, and at no time can the slightest displacement occur without the operator's knowledge.

The splint is made fast by cementing and wiring. The author uses oxyphosphate of copper cement; for wiring, Angle's ligature wire is employed. Two pieces of wire from six to eight inches long are twisted together about three inches from one end; the long ends are then passed on each side of a tooth from the lingual to the buccal side close to the gingival margin, and the wire is twisted until the tooth is held firmly in the wire loop. The ends of the wire are brought from each side up over the top of the splint, twisted together, and cut off just short enough to permit the ends to be turned under the splint and out of the way. In this manner the splint is secured to the teeth in much the same way as one often sees a cork tied into a bottle. Several teeth should be used, and it is well to twist the wire from the lingual side of one tooth to the wire from the buccal side of another. (See Fig. 1, B.)

IMMOBILIZATION BY WIRING.

When the fracture is in the body of the mandible posterior to the last remaining tooth, in the ramus, condyle, or coronoid process, it becomes necessary to immobilize the temporo-maxillary articulation. For such cases the author knows of no better method than interwiring the teeth—that is, binding the upper and lower jaws together by passing the wire around the necks of enough teeth, upper and lower, and interlacing, as seen in the radiograph in Fig. 12. I have employed this method with excellent results for a number of years, and it is gratifying to note that a large number of my colleagues are adopting it. The only advantage the interdental splint has over this method is the small feeding-space left in the splint. However, as the jaws are fixed and the patient is confined to a liquid diet, this counts for very little, whereas, with the interwiring, the operator can see that the teeth occlude, and therefore knows that the fracture is held in apposition. With an interdental splint the jaws are held apart, and notwithstanding that a radiograph taken after the splint is inserted shows the fracture to be in apposition, the body of the bone is held down by the splint, the muscular traction on the ramus and portion of bone distal to the fracture being constantly upward; some time during the period of cicatrization the fractured ends of the bone are apt to ride, and the operator is not apprized of a deformity until union has taken place and the splint has been removed. The parts can be kept just as clean with the one method as with the other; with the wiring, however, the patient can go about without displaying any deformity.

If, for any reason, an interdental splint of this type is preferred, I caution the operator to have a radiograph taken each week, until provisional callus has formed.

TEMPORARY BANDAGE FOR MANDIBULAR FRACTURES.

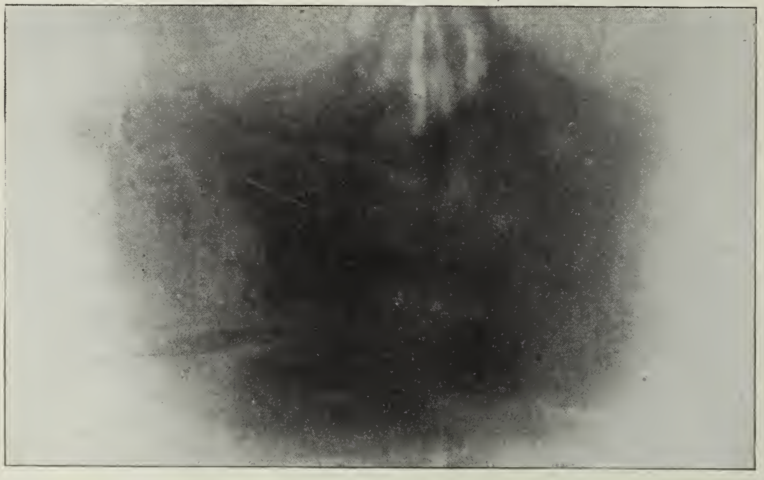
In fractures of the mandible the author employs only a bandage for the first few days after the injury has been received, always removing this bandage the day after the splint has been inserted or the jaws have been interwired, unless there is considerable contusion or deep laceration of the soft tissues. A most secure bandage, which may be classified as a Barton bandage greatly modified, is made by passing a two-inch bandage —linen or gauze—around over the top

FIG. 2.

Radiograph. Taken with right side on the plate.

of the head from under the chin, then from the forehead around the back of the head. Strips of adhesive plaster are placed over the bandage to strengthen it and prevent it from slipping. To complete the hood, a piece of adhesive plaster should be brought from the back of the bandage up over the head, to be attached to the bandage over the forehead. To keep the plaster from sticking to the head, gauze is placed under it except where it passes over the top of the bandage. A four-tail bandage is very effective, and is made by tearing a piece of three-inch bandage—about three feet long—down to within three inches of the middle on each side. The six inches of untorn bandage are placed under the chin, partly extending over the front of the chin. The tails from under the chin are tied up over the top of the head, while the tails from the front of the chin are tied behind the head.

FIG. 3.



Antero-posterior radiograph taken after operation, showing that the lead seen in Fig. 2 has been removed.

A COMPLICATED PRACTICAL CASE OF GUNSHOT FRACTURE.

Case 1. This case was one of a gunshot wound, received by an Italian, age twenty-four years. The bullet entered in the region of the temporo-malar canal on the right side, passed through the head and out through the left cheek, at a place which can be described by a circle, the diameter extending from the distal border of the canine to the maxillary tuberosity. The bullet, being one of large caliber, mushroomed out as it passed, and deposited numerous splinters of lead throughout its entire tract. (See radiograph, Fig. 2, B.)

At the point of entrance (see Fig. 2, A) the bullet destroyed about one-third of the right malar bone, fracturing its orbital and maxillary processes. It then passed through the right superior maxillary bone, removing the first molar and about one-third of the osseous tissue of that bone, including more than half of the palate process. The fracture extended through all the walls of the antrum excepting the orbital. From the socket of the first molar, the fracture extended back through the maxillary tuberosity on a line about parallel with the upper border of the attachment of the buccinator muscle, and forward through the inferior meatus, the anterior point reaching as high as the crest of the inferior turbinate (Fig. 2, C).

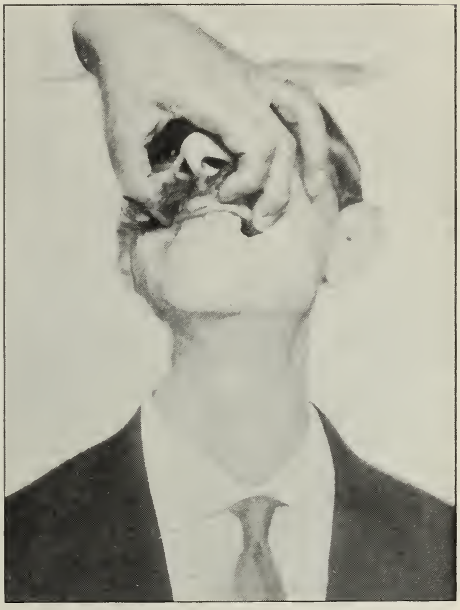
The fracture in the left superior maxillary bone was about the same as in the right, except that considerably more bone was destroyed, including all tissue from the third molar to the canine, and as high as the infraorbital foramen. All the walls excepting the orbital in the antrum of this bone were completely shattered. The patient was brought to the Harlem Hospital, where the author,

Fig. 4.

Roof of mouth. Teeth on the right side and molar on the left shown. The lip hides the left incisors.

as consulting oral surgeon, was called on to operate upon him on November 20, 1910, and successfully removed all fragments of lead (Fig. 3), as well as all segments of bone which were denuded of healthy periosteum, and such soft tissue as showed signs of slough. By plastic surgery at this operation the perforation through the cheek was completely closed. This, however, was not so easy to accomplish on the roof of the mouth, where fully two-thirds of the hard palate had been destroyed by the bullet. A small muco-periosteal flap was

Fig. 5.



Shows articulation.

Fig. 6.

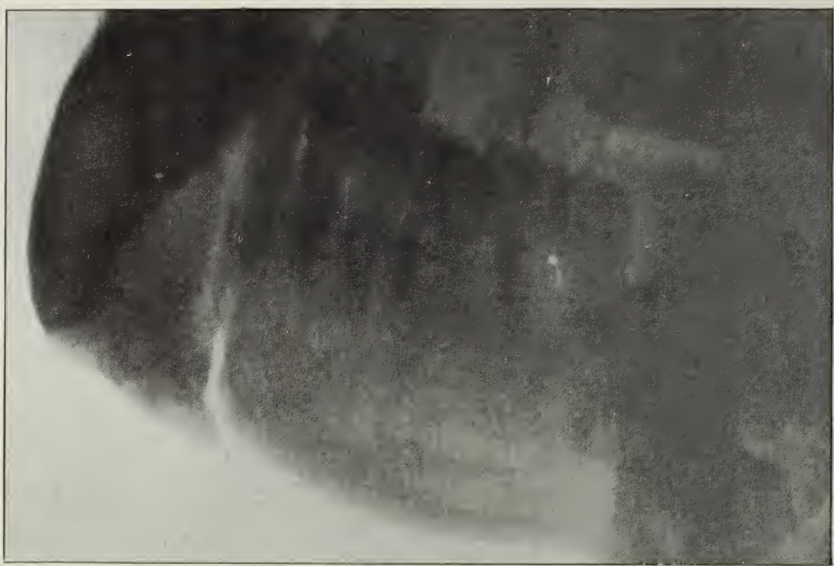
Recent photograph. Scars are hardly perceptible.

obtained from the anterior part of the hard palate, which partly closed the aperture and healed nicely. Other flaps were obtained from the cheek, the result being shown in Fig. 4.

The splinting of the fracture now became a serious consideration. There was no segment of bone with a solid facial attachment in the upper jaw to use as an abutment for the splint, and there was such a considerable loss of osseous tissue that one could not reasonably expect there would be sufficient osteogenesis to establish a good bony union for several months. It was absolutely necessary to devise some method of splinting which would not interfere with the function of the mouth or embarrass the patient from an esthetic standpoint. To accomplish this I employed an Angle's arch, to which were wired all the teeth remaining in the upper jaw, in the proper cusp relation to the teeth of the lower jaw. This made one segment of all the fractures, including the molars, which can be seen, in the radiograph in Fig. 2, D, suspended by soft tissue in the roof of the mouth. These molars, as seen in Fig. 4, are sound and firmly embedded in healthy bony tissue today.

To overcome the displacement, which tended to draw the face inward, I used a modification of the Stanton collar. This collar was made by fitting a silver collar around the lower right first molar and left second bicuspid respectively. From the occlusal edge of these collars was extended upward for about one centimeter a silver shoulder, which intercepted the distal border of the upper left canine and right second bicuspid respectively, when the jaws articulated. In this manner the fracture was held in splint whenever the jaw was at rest. (See final result in Fig. 5.)

Fig. 7.



Mandibular fracture between left canine and lateral incisor.

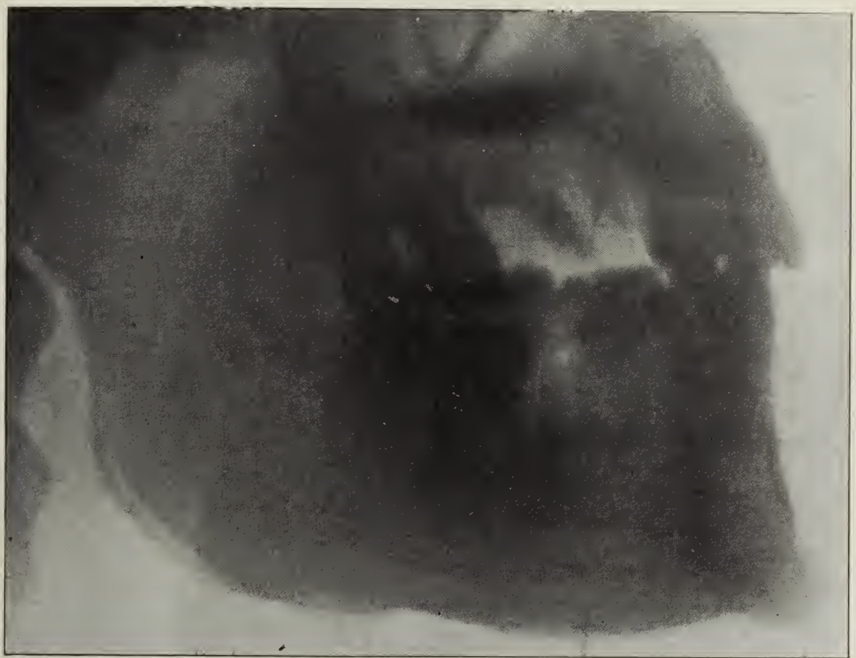
The patient was kept on a semifluid diet during the period of cicatrization, which extended over five months. He was able to attend to his business every day after the second week, and was not at any time embarrassed by having to wear any exterior bandage or anything which would indicate his affliction.

Fig. 6 is reproduced from a recent

photograph of the patient. It shows that, notwithstanding the large amount of tissue destroyed by the bullet, as seen in the radiograph in Fig. 2, the final result displays little sign of the great amount of injury, the scar tissue being hardly perceptible, and the contour of the face well preserved.

cap splint, such as is illustrated in Fig. 1. It should be noticed that the saddle of the splint is discontinued over the labial surface of several teeth on each side of the fracture, also that the left canine approximates the right central incisor in this case. This splint was cemented and wired in place according to the author's method. The temporo-maxillary articulation not being interfered with, the patient was able to enjoy a semisolid diet. Bony union took place in twenty-four days. The radiograph in Fig. 8 shows the union, with the teeth in good occlusion.

Fig. 8.



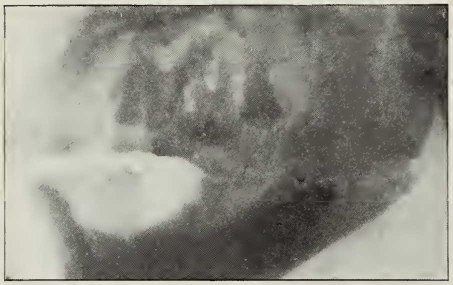
Shows union. ↑

CASES OF MANDIBULAR FRACTURE.

Case 2. The patient, an American, thirty-four years of age, had been thrown from the box of a wagon while driving. He received a fracture of the mandible between the left canine and lateral incisor. A section of bone of the width of and including two incisors was torn away from the body of the mandible. (See Fig. 7.) This sequestrum, being denuded of periosteum, had to be removed in order to prevent sloughing. The fractured ends of the bone were curetted and approximated. They were held in apposition by an aluminum interdental

Case 3. The patient, a girl of American parentage, four years of age, had fallen and fractured the mandible through the mental foramen on the left side. Crepitus was appreciable, but there was no displacement. The periosteum, being only slightly torn, held the fracture in apposition. No splint was necessary. Bony union took place in twenty-one days without any surgical interference. The patient presented later with an induration in the chin, and the X ray disclosed the curious fact that the germ of a permanent incisor, which had become dislodged at the time of fracture, was growing in the soft tissue of the chin.

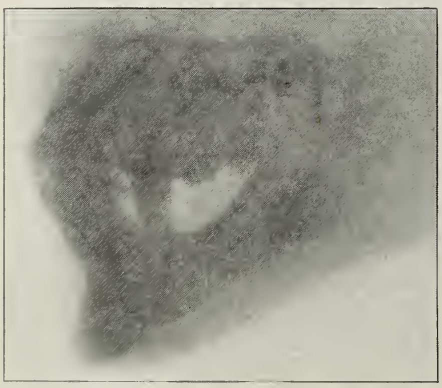
FIG. 9.



Fracture at the angle.

Case 4. The patient, an American, fifty-four years of age, presented a fracture through the angle of the mandible. (See Fig. 9.) In order to secure fixation in this class of fracture, it becomes necessary to immobilize the temporo-maxillary articulation. The author therefore employed interwiring. Several of the upper incisors were wired to the lower ones, thereby overcoming the traction of the hyoid muscles. A good bony union was obtained, with the teeth in normal occlusion. (See Fig. 10.)

FIG. 10.



Shows union.

Case 5. The patient, an Englishman, thirty-one years of age, had received a blow on the jaw. He presented a multiple fracture of the mandible. (See Fig. 11, A, A.) One fracture extended through the angle, the other between the first bicuspid and canine. The radiograph showed perfect occlusion of the teeth, the fractures through the bone being barely appreciable. The method of interwiring was used, and good bony union obtained.

FIG. 11.

A, A, Points of fracture.

Case 6. The patient, an Italian, had received a blow on the jaw, and presented a multiple fracture of the mandible, one fracture extending between the first and second molars and another through the angle of the jaw. The method of interwiring was used. The radiograph (see Fig. 12) shows apposition of the fractures, as well as normal occlusal relationship of the teeth of the upper and lower jaws. Good bony union was obtained.

Case 7. The patient, an American boy of six years of age, while skating, had fallen on a picket of an iron fence and sustained deep laceration under the chin and a fracture of the mandible. (See Fig.

13.) A general surgeon controlled the fracture by intrasuturing, using a kangaroo suture. The entire portion of bone under the suture was necrosed. The author, when called to treat the case, found considerable suppuration, the sinus draining through the wound under the chin. An interdental splint was in-

FIG. 12.

Multiple fracture. Jaw interwired.

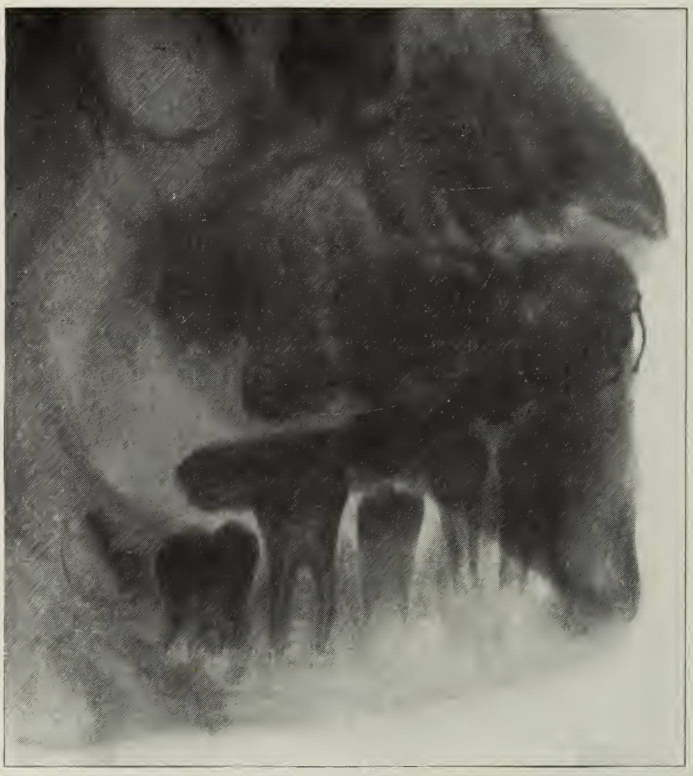
FIG. 13.

Fractured mandible.

serted. The radiograph in Fig. 14 shows that the splint is holding the fractured bone in apposition; it also discloses the large amount of necrosis. This necrosed bone the author removed. Suppuration ceased, and the case progressed to a favorable termination. The interdental splint was worn for six weeks. Considerable provisional callus formed, however, owing to the large amount of periosteum destroyed. It is questionable, in the author's opinion, whether the portion involved will not always constitute a weak spot in the patient's jaw. This case demonstrates the advantages of the interdental splint, and shows the danger of intrasuturing.

Case 8. The patient, an Irishwoman of forty-two years of age, had fallen down stairs, sustaining a multiple fracture of both the upper and the lower jaw. There were seven fractures in the mandible and four in the maxilla. (See Figs. 15 and 16. Fig. 15 was taken with the left side of the face on the plate; Fig. 16 with the right side of the face on the plate.) The lower incisors, with the alveoli, were wrenched entirely away from the body of the bone. A fracture extended through the symphysis; there were two distinct fractures in the region of the lower second molar, and one through the angle on the right side—this is best seen in Fig. 16. On the left side of the mandible there were two fractures, one through the angle, the other extending from the center of the sigmoid notch down obliquely and distally through two-thirds of the ramus. This fracture separated the condyle from the

FIG. 14.



Cap splint. Note loss of bone due to necrosis.

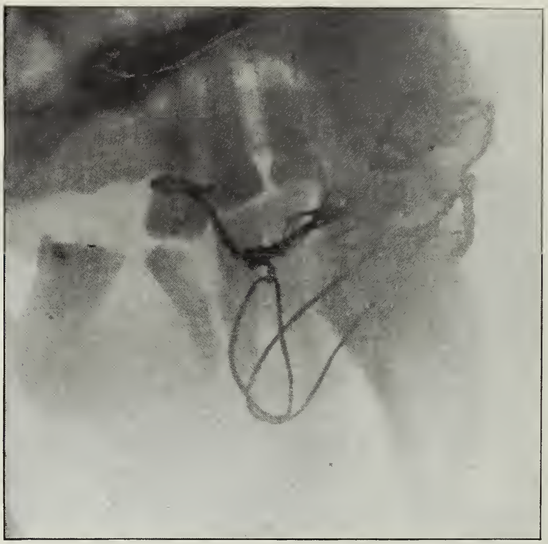
ramus, and permitted of a dislocation of the temporo-maxillary articulation on this, the left side. (See Fig. 15.) In the maxilla, the bones were fractured just distally to the canine eminence through the anterior palatine canal, the displacement being forward and upward. (See Fig. 15.) The essayist was called to care for this case during the second week after the accident. On seeing the radiograph (Fig. 15) I decided that by intra-wiring I could best control the fracture.

Fig. 15.

Taken before operation. Left side on the radiographic plate. Multiple fracture of upper and lower jaws.

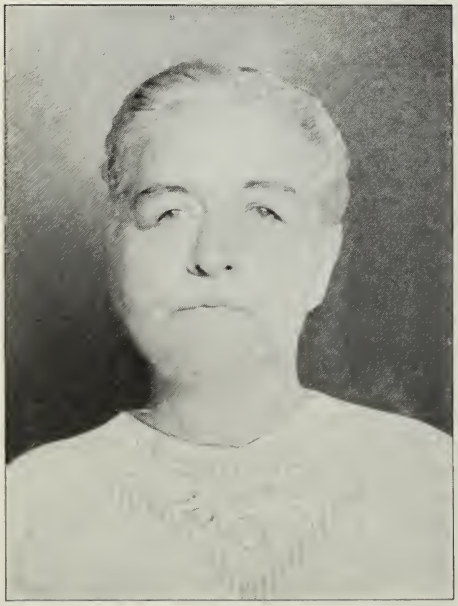
The patient was placed upon the operating table under ether. I dissected the mucosa from the mandible as far down as the attachment of the depressor labii inferioris muscle, just forward of the mental foramen. On the right side I drilled a hole through the bone, and passing two silver wires through, brought them up, passed them between the first bicuspid and canine on each side, and twisted them to the respective wires extending from the drill hole on the labial side, thus making two loops around the segment of bone, including the lower incisors, and so holding this segment in apposition to the body of the bone. One end of the wire on each side, after making the loop, was brought up and laced around an upper bicuspid on its respective sides; the other end was attached to the upper lateral tooth on the opposite side. This simple procedure brought all the numerous fractures into apposition. (See Fig. 16.)

FIG. 16.



Right side on the plate, after operation. Jaw interwired.

FIG. 17.



Recent photograph of patient.

The pterygoid muscles took care of the fractured condyle as soon as the temporo-maxillary articulation was immobilized.

The radiograph Fig. 16, which was taken shortly after the operation, showed a small sequestrum of bone just below the second bicuspid, near the lower edge of the mandible. This, as well as the root of the third molar, was removed.

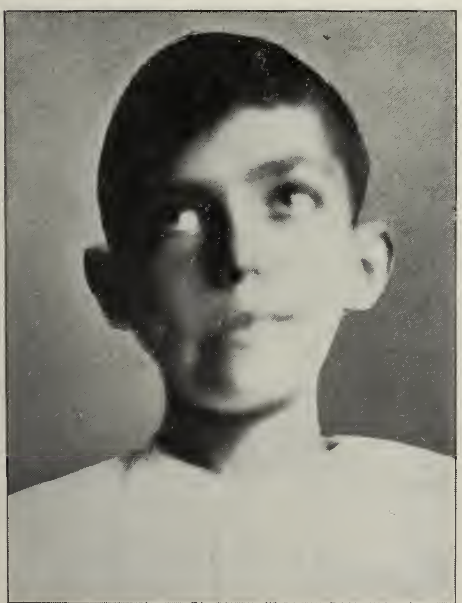
The patient was discharged thirty-two days after the operation with a good bony union of all fractures, and without any deformity. (See Fig. 17, which photograph was taken about two months after the operation.)

Case 9. The patient, an American boy, twelve years of age, had been run over by an ice-wagon, and sustained deep laceration of the right cheek, severing the malar and infraorbital branches of the temporo-facial division of the facial nerve. A fracture of the mandible was present on the right side between the first bicuspid and the canine. An interdental splint was inserted, and the patient was placed on a full diet. The splint was removed in twenty-one days. Union took place with the fracture in apposition. (See Fig. 18, A.) There is a scratch on the radiograph plate just distally to the point of union. This scratch

FIG. 18.

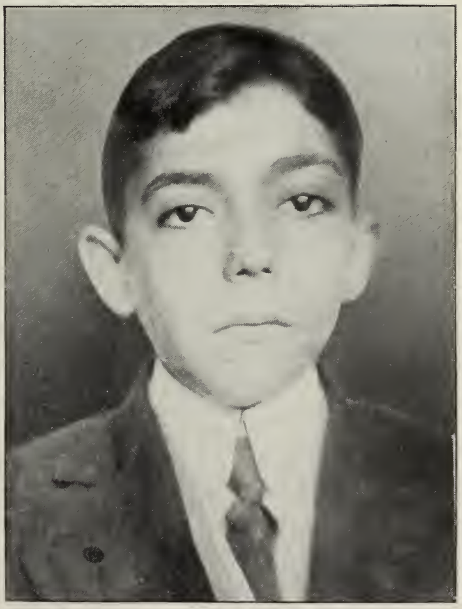
A, Point of union.

FIG. 19.



Shows paralysis.

FIG. 20.



Shows cure.

shows in the picture, and may confuse a casual observer. Note that the teeth are in normal occlusion.

In caring for the lacerated cheek, the author, not wishing to have suture scars, instituted treatment according to his method. Strips of tape were saturated with collodion and placed on each side close up to the lips of the wound. When the collodion had hardened, the sutures were made through the tape, and the lips of the wound drawn together. In order to assist in holding the wound closed, and to relieve the traction of the buccinator muscle, a semicircle of spring wire was placed on the cheek, and held fast by means of tape saturated with collodion. The wound healed with very little appreciable cicatricial tissue. The deep laceration and extensive traumatism, however, caused the loss of all motor-nerve impulse to the muscles supplied by the malar and infraorbital nerves. Consequently, facial paralysis ensued. (See Fig. 19, which photograph was taken eight weeks after the accident.) To overcome this paralysis, the author employed the ultra-violet rays. With occasional omission, the patient was exposed to the rays from five to ten minutes every second day. After continuing this treatment for two months, a second photograph of the patient was taken. (See Fig. 20.) The illustrations speak for themselves; apparently an anastomosis of the nerves has taken place, and the paralysis is fast disappearing.

I wish to express my thanks to Dr. W. H. Stewart, to whom I am indebted for the radiographs, which have been a considerable factor in my work, and have enabled me to depict my methods of treatment.

Discussion.

Dr. Willy Meyer. It has been my pleasure to know Dr. Kauffer for several years. I have watched his work with keen interest. There may be others who are doing good work in this field of surgery, but surely what Dr. Kauffer has shown us tonight—the many difficult cases controlled by such simple methods—is convincing that the care of these patients belongs to a skilled dentist. We as surgeons are often called upon to care for these cases in our hospital work; they are the meanest kind of cases we have to treat. When we wire the jaw it means a scar, and, if the patient is a woman, this is a pity. I am therefore glad to know someone who can take such good care of these unfortunates.

Dr. W. H. Luckett. Since Dr. Kauffer has been connected with the Harlem Hospital, whenever a case of this class presents it has become a habit with the surgeons to instruct the house surgeon to call up Dr. Kauffer, and the reason therefor has been amply illustrated.

Dr. Charles Goodman. I wish to thank Dr. Kauffer for the opportunity of hearing his excellent paper. It has proved to me that the treatment of fractured jaws is work for a dentist.

SUPPURATIVE CONDITIONS OF THE ALVEOLAR PROCESS.

By W. LOUIS CHAPMAN, M.D., Providence, R. I.,
PATHOLOGIST AND ASSISTANT SURGEON, ST. JOSEPH'S HOSPITAL, PROVIDENCE.

IT is the purpose of this paper to urge on physicians and surgeons the great importance of suppurative conditions of the mouth, to show both usual and unique radiographic findings in such cases, to suggest therapeutic measures to practitioners, and to offer suggestions regarding operative procedures.

SERIOUS SEQUELÆ OF NEGLECT OF PATHOLOGICAL CONDITIONS IN THE MOUTH.

In the writer's opinion, it is high time that our knowledge of the microbiology of the mouth were put to some practical use. For many years it has been thought that carious teeth were an important source of auto-infection, and that apical abscesses might contribute infectious particles to the glandular and circulatory systems. But it is not until now that an active propaganda has been instituted, and at the present time the work is being pushed with only a portion of the vigor it deserves.

The writer has for some time urged the need of cleaning up the mouths of children who were in need of tonsil and adenoid operations, and has seen many cases dismissed from the hospitals after such operations with coated tongues, physical signs in the chest, a mouth full of carious teeth, and with suppurative conditions of the alveolar process. The nose-and-throat department had done its work, but no directions were given to the anxious parents regarding hygiene and the need of care of the mouth. Prescriptions for indigestion are of but little value if there are foul cavities in the teeth, and for these reasons such cases should have bad teeth removed at the time of the tonsil and adenoid operation. If it is not convenient to have a dentist in attendance, then the operator should do the extraction. A surgeon who is unable to do the ordinary operation of extracting teeth should take with him an associate who has that talent. In cases where there is doubt whether a tooth should be left, whether it is a deciduous or a permanent tooth —and often a radiograph is necessary to determine this important point—the tooth should be left, and later removed if necessary.

It is impossible to calculate how many persons acquire cardiac, renal, arthritic, digestive, and nerve lesions owing to the distribution to the circulatory and lymphatic systems from chronic suppurative foci in the alveolar process. The mechanical activity of the mouth prevents the surrounding of pus-chambers by an impermeable pyogenic membrane such as may be found in soft and nonmotile parts, and the constant friction of spicula of bone favors extensions of small round-celled and bacterial infiltration.

It must not be supposed, however, that all persons with carious teeth, apical abscesses, interstitial gingivitis, and palatal necrosis suffer from a considerable impairment of the general health. Instances are numerous in which patients suffer from any or all of these and still seem perfectly well. On the other hand, in a case of impaired health there may be other contributing causes—such as a dilated and dependent stomach, chronic catarrhal enteritis, or a cardiac valvulitis with consequent congestion of the abdominal viscera—whereby the digestion, than which there is no more important function in the body, is made imperfect, and all of the other dependent functions suffer also.

The progressive steps toward actual destruction of tissue are gingivitis, focal precipitations, caries of the teeth, alveolitis, alveolar osteomyelitis with sequestra.

CONDITIONS CONCOMITANT WITH GINGIVITIS AND TREATMENT.

Attacks of gingivitis which are accompanied or followed by focal precipitations are frequently a part only of a clinical syndrome with the following features: Malaise, mental depression, rheumatic pains over the sacrum, severe facial neuralgia, anorexia, fugitive pains all over the body, frequent urinations, and occasionally rise of temperature of one or two degrees. The gingivitis usually comes last, and either persists to a stage of suppuration or else subsides in three or more days. The gums are swollen, bleed easily, and are relieved by the bleeding. The treatment is medicinal—generous catharsis and antilithemic preparations; surgical—compound tincture of iodin locally* and later the scaling of the teeth; dietetic elimination of foods rich in the purin bodies.

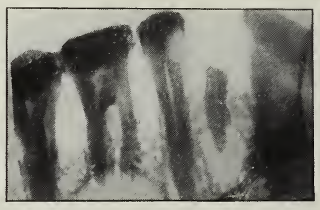
* The writer has found that scarifying the gum prior to the application of the tinctura iodi, Churchill, N. F., will often help where the simple application fails.

FIG. 1.

DIAGNOSTIC IMPORTANCE OF THE RADIOGRAPH.

We have in the X ray a diagnostic means of the greatest significance in the solution of these important problems. Without good radiographs the dentist often works in the dark, inflicts needless suffering on his patient, and frequently attacks his problem from the wrong angle and with the wrong instruments. A good dental radiograph should show the detail of the part, the granular structure of the alveolar process, the peridental membrane, the pulp chamber, and the root-canals. The radiographer should have sufficient knowledge of dental pathology and sufficient experience with dental radiology to be able to interpret the film to the dentist, unless the latter be familiar with radiographs. Some considerable experience in dental work is necessary before a radiographer is able to give opinions of value in obscure cases, and for that reason there should be in every community a surgeon capable of doing oral work, to co-operate with dentists and to share the responsibility in cases of importance.

FIG. 2.



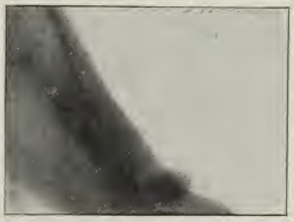
PRACTICAL CASES.

Carious alveolitis. Figs. 1 and 2 illustrate very well the condition of carious alveolitis, with corresponding X-ray film, and teach the great need of thorough operation in such cases, not only for cosmetic results, but as a means of depriving the system of continuous bacterial auto-infection.

Fistula in edentulous mandible. In

the case illustrated in Fig. 3 the problem was to find the cause of a fistulous opening at the site of the lower second molar, all the teeth of the lower jaw having been lost, with complete physiological absorption of the alveolar process. It is often quite difficult to take radiographs of the lower jaw in the

FIG. 3.



region of the first, second, and third molars, on account of reflex gagging and vomiting, and the radiograph was taken in the face of this obstacle.

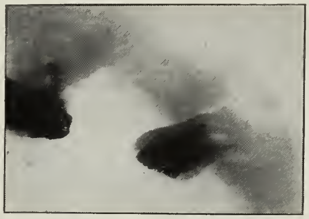
Globular swelling at angle of mandible. The radiograph in Fig. 4 was taken in a woman of sixty, with a globular swelling at the angle of the mandible. All teeth had been extracted many years before. When one recollects that the

FIG. 4.

mandible is the strongest bone of the face, and if one will operate on the mandible of a skeleton and then imagine the presence of the other structures which prevent easy access, the great difficulty of operating on a case like this becomes apparent.

Abscess pointing to the outside. The patient in whom the radiograph in Fig. 5 was taken had consulted numerous dentists and surgeons for a "salivary fistula." The face was enormously swollen and there was obviously a fluctuating sac of pus, ready to rupture ex-

FIG. 5.

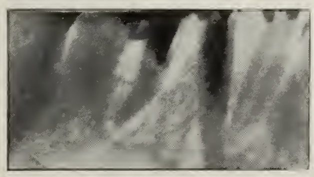


ternally. This was not incised, but punctured by an aspirating needle, and drained away as much as possible. Then, when the swelling was reduced and it

FIG. 6.

became possible to insert a small film, the above condition was found, viz, a much-filled rudimentary third molar with suppuration around and almost complete

FIG. 7.



absorption of the roots. Extraction of this was of course easy. There is left only a tiny dimple on the cheek, the patient's ill health ceased, and the fistula was cured. The writer recommends this procedure in cases where an abscess is ready to rupture, as it is often efficacious, there is no unsightly scar, and no structures of importance are cut.

Neuralgia, pus, and rarefaction of alveolar process due to root-canal perforation. In the case illustrated in Fig. 6 there were obscure neuralgic pains, and pain about and discharge from the roots of the upper left first molar. The film showed rarefaction of the alveolar process at the apex of the second bicuspid and the first molar. It will be readily seen that the cause of the suppurative process is the drilling through the roots outside of the proper root-canals, and the filling of the canals thus made subsequently.

Fistulæ of alveolar process. The interesting case shown in Fig. 7 is illustrative of a number of important features. The patient, a woman of forty-six, has had fistulæ of the alveolar process for ten years. She now has fistulous openings of the anterior palatine fossa, of the upper right lateral incisor, canine, and first bicuspid, and of the upper left second bicuspid. The patient is very nervous, and it was difficult to secure her co-operation in taking radiographs. Her dentist, curiously enough, is interested in but one of the fistulous openings. Note here the difference between the surgeon's and the odontologist's conception of the case! The surgeon, appreciating the importance of focal infections as nidi for the distribution of infectious particles to the system, would doubtless advise the extraction of all doubtful teeth and a surgical clearing up of the alveolar process. The dentist thinks of the cosmetic result, and, if he advised extraction, it is quite probable that the patient would seek other treatment.

Fig. 8.

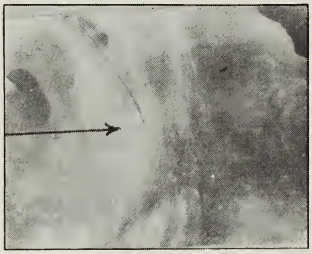


Fig. 9.

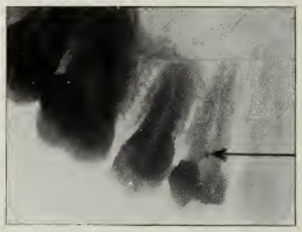


Fig. 10.

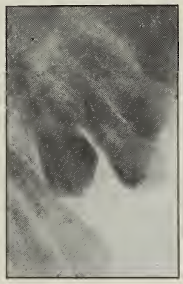
Fig. 11.

The radiograph (Fig. 7) is not a good one; it does not show as it should the finer structure of the alveolar process, but it does show absorption of the pericemental membrane and the cause of the fistulous opening.

FOREIGN BODIES.

The Roentgen ray is the only reliable means of finding foreign bodies in the root-canals, and a few examples are shown in Figs. 8 to 11. The more the body penetrates the alveolar process, the more trouble it causes. By radiographs we find the cause of fistulæ which otherwise would go undiscovered. Any case which does not respond readily to treatment should be radiographed, not only to find out conditions, but also to spare the patient unnecessary suffering and

Fig. 12.



septic infection incident to exploratory procedures.

RETENTION OF DECIDUOUS TEETH A CAUSE OF SUPPURATION.

Retained deciduous teeth are found at almost any age, and can be readily diag-

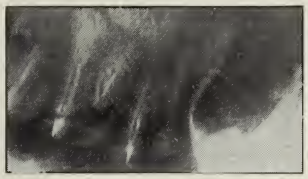
Fig. 14.

nosed as such by the radiograph. The appearance of such radiographs, showing the impacted condition of the permanent tooth below the retained deciduous tooth, is familiar to every dentist. They are frequently the cause of suppuration until removed, and when crowned or made the support of artificial dentures are examples of the well-known adage—"Uneasy lies the tooth that wears the crown."

MALPOSITION OF TEETH A CAUSE OF SUPPURATIVE ALVEOLITIS.

Malposition is a very common cause of suppurative alveolitis, and the follow-

Fig. 13.



ing cases, with illustrations, are offered: One case was referred to me by Dr. Forrest Eddy. The patient, a boy of fourteen, had been treated without success for headaches of the greatest severity. A radiograph of the centrals and laterals showed the condition illustrated in Fig. 12. This did not seem to furnish sufficient grounds for such severe manifestations, and the condition of the third molars was investigated, with the result shown in Fig. 13. The extraction

Fig. 15.

of the second molar, for the purpose of allowing the eruption of the third molar, was followed by the cessation of the headache, but one attack occurring after the extraction.

Another case of particular interest to the writer, because it occurred in his

Fig. 16.

own mouth, is illustrated in Fig. 14. Obscure headaches, neuralgic pains, etc., the well-known symptom complex, were relieved by the extraction of the offend-

Fig. 18.

ing tooth. The tooth was shaped exactly as shown in the illustration.

Fig. 15 shows an interesting combination of a malposed tooth, together with suppurative alveolitis around the second bicuspid. In such a case the radiograph shows clearly the cause of the fistulous opening and suggests the only practical remedy.

Figs. 16 and 17 are instructive specimens of radiographs of a class of cases

Fig. 17.

in which a correct idea of the condition could be obtained only by a radiograph.

ABSORPTION OF ALVEOLAR ARCH.

The radiograph in Fig. 18 is illustrative of absorption of the alveolar arch in the neighborhood of the anterior palatine canal, the foramina of Stenson, and the foramina of Scarpa. In such a

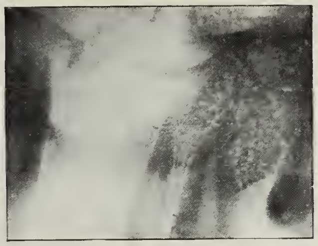
Fig. 19.

case the osseous tissue is of the consistence of paper, the mucous membrane is thickened, and in some cases a pyogenic membrane has formed which contributes pus to the buccal cavity by one or more fistulous openings.

Fig. 19 shows a more advanced condition. There is more complete destruction and absorption of the alveolar process, and two teeth have been deprived of their support.

Fig. 20 shows a similar case which was operated on by the writer. Although considerable tissue was removed by cutting instruments to be described later, the process of repair was so complete that the patient had no difficulty in wearing a plate.

Fig. 20.



TECHNIQUE OF OPERATION IN ABSORPTION OF ALVEOLAR PROCESS.

In cases presenting such a radiographic appearance, the operator should remove all friable tissue. The patient should be etherized; such operations should not be undertaken under local anesthesia. The mouth should be made as aseptic as possible. All sponges and instruments should be sterilized, and the operator should wear rubber gloves. This latter measure is of the greatest importance as a protection to the operator, for such cases are often of syphilitic etiology; furthermore, a very little experience in the use of bone-cutting instruments makes one familiar with the "feel" of sound and diseased process.

The writer has devised a number of bone-cutting instruments which he has found to be of considerable use in operating on the alveolar process, on the palatal arch, between teeth, and behind the first and second molars. Although no great originality can be claimed for them, they are very useful in such operations, and were devised for the purpose after a thorough search of numerous instrument shops and catalogs.

Fig. 21 shows a right-angle bone curet which is useful for both the palatal arch and behind the first, second, or even the third molar. It is almost impossible properly to curet these localities with the usual straight curet without injuring the soft parts. These curets should be made in several sizes for use in narrow spaces, as in the case of the extraction of an incisor or bicuspid.

Fig. 22 shows bone-cutting forceps which are very useful for removing carious portions of the process after extraction. The beaks are thin and strong, and may be readily inserted between the process and the gum, thereby saving considerable time in the granulation process. The more thorough the removal of the fragments of the process, the less annoyance the patient experiences of having small spiny portions come away in the mouth from time to time, and the more remote the possibility of obstinate or permanent fistulæ. This forceps removes as well as cuts off the fragments.

Fig. 21.

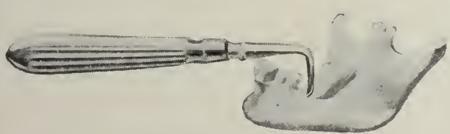
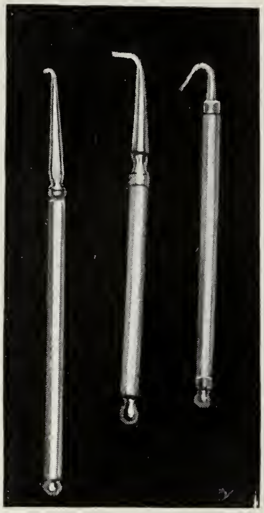


Fig. 22.

Fig. 23 shows three reversed chisels which supplement the work of the curet and the bone-cutting forceps. They are used with a drawing instead of a pushing motion, and for that reason are much more easily controlled and not likely to slip.

Fig. 23.



The after-care of oral operations is of more than ordinary importance as regards the surgical result, the period of repair, and the comfort of the patient. While it is true that with the removal of diseased tissue, the extraction of suppurating teeth, and the suitable drainage of suppurating foci, regeneration is usually rapid, it is equally true that the process of repair is materially hastened by frequent cleansings of the denuded areas, by forced feeding with liquids, and by the local application of iodin. Mouth-washes act largely by their mechanical cleansing, and mild astringents add to the comfort of the patient. The tincture of iodin applied to the denuded area after careful drying is a positive antiseptic, and although somewhat painful at first, is anodyne in its later action.

For the proper after-care of inflammatory and suppurative states following the extraction of second and third molars it is absolutely necessary to have the denuded areas cleansed with antiseptic medication at frequent intervals. Argyrol 20 per cent. should be used every four hours until the symptoms are improved, and when the patient cannot open the mouth, as is often the case, it is necessary to have suitable dressing forceps with the beaks at right angles, to be used like the author's right-angle curet already described. If the submaxillary and parotid glands are enlarged, ice-caps must be applied over the entire area, and if the infection tends to become general, cultures from the suppurative area and even from the blood must be taken, that autogenous vaccines may be made and the patient given the benefit of this well-proved method of treating septic infections. Without suitable dressing forceps it is absolutely impossible to properly cleanse alveoli. Enlarged glands should be incised only when the operator is absolutely sure they contain pus by exploration with a fine hypodermic needle.

CONCLUSION.

In conclusion, the writer urges the more frequent and careful inspection of the mouth by physicians and surgeons, the application of the principles of asepsis and antisepsis in oral operations by both surgeons and dentists, more thorough and complete operations for the best results in alveolar suppuration, and a better appreciation of the importance of suppurative conditions of the alveolar process as factors in the contribution of septic particles to the system.

SOME PHASES OF PROSTHETIC ESTHETICS.

By GEORGE H. WILSON, D.D.S., Cleveland, Ohio.

(Read before the Academy of Stomatology of Philadelphia, at its monthly meeting, November 26, 1912.)

DENTAL prosthetics is defined as the science, art, and esthetics of restoring a lost dental organ or organs with an artificial substitute. However important the science of the materials used may be deemed, and however essential the method for retention of an artificial denture may be considered, it is equally essential that attention should be given to the esthetics involved. That the esthetics of prosthesis is entirely ignored by a large proportion of the members of our profession is only too apparent, when cognizance is taken of the fact that many dentists are sending their patients, needing prosthetic appliances, to specialists; or that, desiring to retain the patient, they take an impression, a bite, and shade number, and send these to a laboratory and demand a completed denture. To say the least possible of the dentist who thus avoids the responsibility of prosthetic esthetics, it may be said that he is depriving himself of a valuable means of self-cultivation and a pleasant study.

ESTHETIC DENTAL PROSTHESIS.

Esthetics is all that constitutes prosthesis a profession. Prosthesis devoid of esthetics is a trade. Esthetics is ideality —it is a product of mentality, and when made to dominate the mechanical art it lifts the product of mechanics and makes of it a creation, something superior to a manufactured article, therefore a profession. It must be manifest to all that a workman in a laboratory detached from the operating room can use no mentality in the making of the dental appliance sent to him for construction, other than as a mechanic; hence he is a mechanical dentist, and his business is a trade. A truly prosthetic dentist is one who restores the lost anatomical portions of the lower third of the face in an harmonious manner. His business is a profession, because he combines with the science of materials and methods the art of a skilled workman and the esthetics which conceals the artificial.

If we concede the relative importance of esthetics as an essential part of dental prosthetics, then we may well spend this evening in considering that which constitutes its fundamental principles. We may well interrogate the recognized principles as to their truth and value. If these recognized fundamental principles underlying the teaching of dental esthetics are untrue, wholly or in part, we cannot too soon recognize the fact and endeavor to correct the fault. If they are true and adequate to the needs of the profession, their investigation can do no harm, but must tend to establish their truth and importance in the dental curriculum.

It is with considerable trepidation that I come to this city, the cradle of dental education—and, I believe, the birthplace of dental esthetics—to question the efficiency of applied esthetics. Nevertheless, feeling my own deficiency in the practice of the esthetics of prosthesis, and recognizing the ignorance of the subject among the laity or the profession, I appeal to you for more enlightenment; therefore, in presenting the subject as it appears to my conception, it is with a desire for intelligent discussion.

FACIAL HARMONY.

In a word, *What is esthetic dental prosthesis?*

It is the making harmonious, in a greater or lesser degree, the lower third with the upper two-thirds of the face, in comparison with an accepted standard.

What is harmony of the face?

It is a balance of the features and of the expression of any individual face. It is the sum and substance of the factors seen and desired for the best appearance of the patient.

How do we know what constitutes harmony of the features of the face?

By systematic study of faces, which consists of, first, learning what is to be looked for, and second, how to see that which is desired.

What is to be looked for in a face?

Types or classes. As it is a logical procedure in any study to begin with the simple and advance toward the complex, so in the study of the face, the student should first consider the simple generalities and then work toward the complexities of the individual.

RACE AND NATIONALITY.

The first classification to be observed is that of race and nationality. If the person under study is of a pure racial and national type, then all further consideration must be founded upon the recognized basis of the race as modified by the national characteristics of that type. If, however, the subject is a blend, then he must be studied from the dominating, and an estimate be made of the modifying influence. Because of the heterogeneous nature of our population, we dentists in America have perhaps a greater field for the study of faces than any profession in any part of the world. Therefore with our boasted American aggressiveness, we, as a profession, should not shirk the responsibility placed upon us. As time is necessarily limited I shall not further consider this phase of esthetics, but invite only a discussion of the facial characteristics of the Caucasian race.

TONE OF COLOR OF FACE.

The second classification concerns tone of color, whether light or dark, blond or brunette. Either extreme of tone of color is easily recognized, and suggests certain facial characteristics to the least observant mind; but as the person of a perfect blend of the two types of the second classification is approached, a more diversified classification is made necessary.

CONTOUR OF FACE.

The third classification concerns contour. The face should be studied in full-face and profile. The full-face may be subdivided into forms such as square, parallelogram, circle, oval, and triangle. The profile may be divided into straight, convex, and concave. These various contour types will each have a certain characteristic which, if prevailing through the entire anatomy of the face, will convey the sense of harmony. Thus in an edentulous person with a convex profile, the lower third of the face will be concave, and the inharmony of the face will be apparent at a glance. If in another type of face with circular form, teeth of the triangular type (nervous temperament) are inserted, the expression of that face will not only be incongruous, but hideous.

LIPS.

The fourth classification comprises the lips. The preceding classification concerns the face as a whole, but the lips are so important as to require especial consideration, for their contour gives much of the expression and beauty to the face. The lips should first be studied together, the proportion of one to the other, whether they are well proportioned, or whether one is too large or the other too small. Their occlusion may be straight or curved, and the angles elevated or depressed. The red of the lips may be but a line, or it may be excessive; it may be straight, or curved and beautiful. The lips may be refined or coarse, they may be closed firmly or loosely, and may be compressed or relaxed.

The lips should also be studied separately. The median perpendicular line of each lip is first observed, and will be found to vary between long, short, straight, concave, or convex, and between very thick and very thin. The tuberculum and philtrum may be pronounced or absent. The lips at and near the angles of the mouth may be thin or thick even to coarseness. The linea naso-labialis should be carefully considered, because there is no line of the face more expressive than this. The naso-bucco-labial triangle requires especial attention in restoring the features with an artificial denture, as no portion of the face is more indicative of the lost dental organs. The sulcus mento-labialis may be marked, excessive, or almost obliterated.

TEMPERAMENTS, AND THEIR CLASSIFICATIONS.

The fifth and last classification is concerned with temperaments. Tempering means modifying or mixing in due proportion. Hence the term "temperament" has been used since the days of Hippocrates, who observed the differences of bodily organization, functional activity and their accompanying mental peculiarities. The temperaments according to Hippocrates' theory depended upon what were then known as the four primary fluids of the body—the blood, the phlegm, the yellow bile, and the black bile. The temperaments were called the sanguine, phlegmatic, choleric, and melancholic. Dr. Gregory added a fifth, which he called the nervous temperament. Cullen reduced the temperaments to two, and called them the sanguine and melancholic. Dr. Spurzheim, in the early part of the nineteenth century, classified the temperaments as lymphatic, sanguine, bilious, and nervous. Dr. Jacques in his book on "Temperaments" published in 1904, says that—"It remained for the later phrenologists to eliminate from the old systems all of the abnormal conditions and place the doctrine of the temperaments on a strictly anatomical and physiological basis, and to adopt the simple classification which includes them all under the three heads of the motive, vital, and mental temperaments. Each of these temperaments is determined by the preponderance of the class of organs from which it takes its name. The first is marked by a superior development of the osseous and muscular systems, forming the locomotive apparatus; in the second the vital organs, the principal seat of which is in the trunk, give the tone to the organization; while in the third the brain and nervous system exert the controlling power."

Dr. Jacques defines temperament as—"A state of the body depending upon certain combinations of the various systems and organs and certain functional conditions affecting them."

Dr. Jacques further says of the modern normal classification that a balance of the temperaments implies that the three systems of organs or temperaments are so well blended that no one of the three can be said to predominate; that in compounding the names of the temperaments, the predominating one should be named first, and the modifying ones in the order of their influence. Also, that two of the temperaments may be strongly marked, while the third is almost negligible, when they can be compounded, for practical purposes, as—Motive-vital, motive-mental, vital-motive, vital-mental, mental-motive, and mental-vital.

Thus the normal anatomical classification comprises three primary temperaments, a balance of temperaments, and six compound temperaments; while the older pathological anatomical classification consists of four primary temperaments, a *temperamentum temperatum,* and twelve binary temperaments.

It is now a quarter of a century since the Doctors Flagg compiled the dental classification of temperaments, based upon the four primary temperaments as described by Spurzheim. Their work has been of much value to our profession because it has directed attention to some facts and many ideas, presented in a compact and convenient form for study. But are we as practitioners and teachers satisfied to require the rising generation of dental students to accept and to learn by heart this cumbersome classification of a few facts and many ideas; or, shall we not present the few facts and ideas that have stood the test of time in a more concrete form? Has the dental classification of the temperaments proved an infallible guide? Let us investigate.

In the "American System of Dentistry" the binary temperaments are arranged with the modifying temperament used as a prefix to the predominating one, as "nervo-sanguine," meaning that the nervous temperament modifies the strongly marked sanguine temperament. The text-book does not state that this is the method, but your essayist cannot comprehend the classification otherwise. Dr. Gustavus North, who has written quite extensively of the temperaments, explicitly states that this is the method of forming the compound name. In the "American Text-book of Prosthetic Dentistry," Dr. Thompson has rearranged the classification of the Flaggs, and has added a division which he calls "basis." Thus, under the heading Nervo-sanguine and division Basis, he states: "Nervous and sanguine elements, the nervous predominating," and then proceeds to detail the same description of the nervo-sanguine temperament as found in the "American System of Dentistry." This incongruity appears throughout the whole classification.

So it seems that we as a profession tacitly accept the temperamental classification as the only way by which esthetic artificial dentures can be constructed, and are equally successful with whatever classification we follow. Does this not imply that the dental classification of temperaments is too finely spun? Why should we consider temperaments as more than a quasi-science? All writers on temperaments acknowledge that the primary temperaments are ideals, and practically do not exist. Why have an elaborate detailed classification? I believe, however, that the four basal temperaments of the older classification and the three of the modern classification are valuable, and should be taught as ideals with which the patient should be compared, as an aid in arriving at an opinion of that which will produce harmony of the features of the face.

FACTORS IN FACIAL HARMONY TO BE OBSERVED.

In recapitulation: What, then, is to be looked for in a face? We should keep in mind five factors: (1) Race and nationality. (2) Tone of color. (3) Contour. (4) Lips. (5) Temperaments.

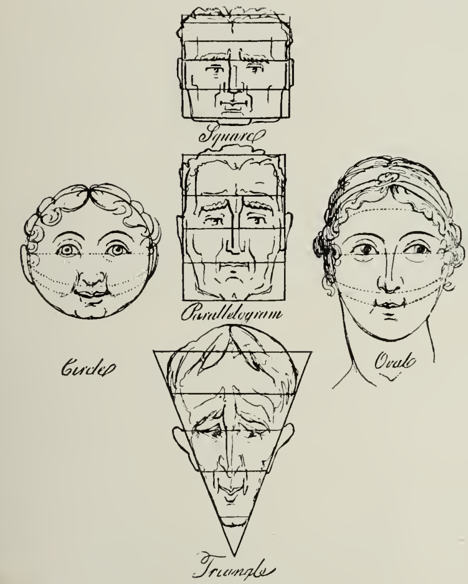
How to see the face? By observation and reflection—both by individual work and the recorded work of others. It would indeed be tedious work to educate oneself in the esthetics of the human face by individual effort; however, the literature upon the subject is quite extensive, so that one may quickly and pleasantly equip oneself with a fair working knowledge. The various text-books upon dental prosthetics and orthodontia contain chapters upon facial art which serve very well as a *résumé,* but a comprehensive study of physiognomy and expression will necessitate the reading of such authors as Lavater, Bell, Darwin, and Mantegazza. Also, much information may be obtained in reading any of the many works on phrenology, as Spurzheim, Jacques, Sizer, Drayton, and Stanton. However, such works should be used for a specific purpose—that is, a comprehensive understanding of the features, for developing harmony in dental restorations; therefore much of the text of such books may with profit be skipped by the dental student.

Illustrations. How to see the face by observation and reflection can best be presented by illustration. The first classification is not illustrated, because we have excluded it from further study in the paper, and the second classification is not an appropriate one for stereopticon demonstration, therefore the illustrations begin with the third classification.

ILLUSTRATION OF FACIAL CONTOUR.

Fig. 1 is taken from an English work on the "Theory of Beauty," by Mme.

Fig. 1.



Schimmelpenninck, published in 1815, and is valuable as an analysis of "contour," which comprises our third classification. It is apparent that the geometrical figures grossly describe all forms of faces and heads, and that harmony in any individual case will require that the component features shall be of the form of its type. Thus a face of the square type would require short, square, angular teeth arranged in a square dental arch; the parallelogram would be of the same angularity with added length; the circular type would be short, flat, and round; the triangular type would require long teeth narrow at the neck, broad at the occlusal edges and surfaces, with well-defined cusps and conformity in arch; and the oval will be marked by easy, graceful curves.

Fig. 2 is taken from Sizer and Drayton, and is a study of contours in profiles. These faces are numbered from 1 to 11 from left to right, with the name of each subject underneath and in order. Numbers 1, 3, 7, and 8 are straight profiles, 2, 5, 6, and 9 are convex profiles, while it is questionable whether 4 and 10 should be classed as straight or concave profiles. No. 11 is of a race not included in this study.

Profile may be described as the relation of five points of the face to a perpendicular line, and its class is determined by the relation of the nose and lips to a straight line drawn between the extreme points, namely, the frontal and mental eminences. The straight profile has the lower lip and middle of the wing of the nose touching the line, while the upper lip slightly protrudes over the line. The three points named being either in protrusion or retrusion determines the convexity or concavity of the face. The straight and convex classes are types, but it is questionable whether the concave class should or should not be ranked as a type, or whether it should

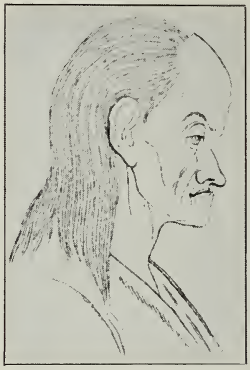
Fig. 2.

be considered only as a perversion of the straight profile.

Fig. 3.

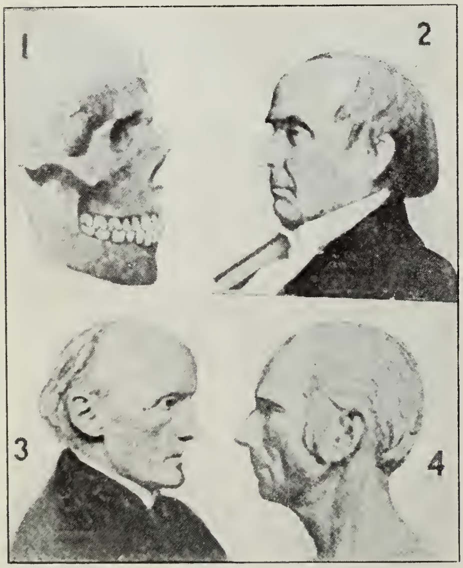
Fig. 4.

Fig. 5.



Figs. 3, 4, and 5 illustrate the three profiles. The intellectual and harmonious straight profile upon the left, Fig. 3,

Fig. 6.



Portraits: 2, Webster. 3, Newman. 4, Clay.

is that of Jane Addams; the convex profile, Fig. 4, that of a capable attorney of New York City; and the concave profile, Fig. 5, is a drawing by Lavater representing melancholia.

Fig. 6 represents Dr. Cigrand's illustrations of the three profiles. Webster and Clay represent the types, but it is questionable if Cardinal Newman should not be classed with the straight profile

Fig. 7.

Fig. 8.

type with a slight enlargement of the mental eminence.

Figs. 7 and 8 are a pronounced concave

profile, but cannot be classed as a type, because the concavity is mostly owing to an abnormally developed mandible. However, it is possible that the middle third of the face is slightly undeveloped.

ILLUSTRATIONS OF LIPS.

The fourth classification—viz, the lips—should be carefully studied, for their conformation very largely determines the contour of the dental arches and gum restoration, especially of the anterior teeth.

Fig. 2 presents an excellent opportunity for study and comparison of the lips. No. 2 presents a well-proportioned and balanced convex profile. Were this an edentulous patient under our professional care, it would be necessary, in restoring the contour of the lips, to take into account the balance of the two lips; the amount of red showing and thickness would indicate fulness, convexity. No. 3 is an harmonious straight profile, has medium thin lips, with only a moderate amount of red showing. They show that they are well supported by dentures, and in harmony with the rest of the face. No. 4 has short lips, which are medium thick and probably quite pliable. The picture gives an impression that there is deficient dental support; to determine this factor, however, it would be necessary to study the face in action. No. 5 has a straight immobile upper lip, probably thick, although the red is narrow, indicating that the teeth cannot be prominent. No. 6 shows George Eliot, who certainly did not have a beautiful mouth, if she looked like the picture. The lower lip is very thick and overlarge for the upper one. Either the lower lip is deformed, or there is an extrusion and protrusion of the lower incisors. No. 7 has a stiff, longitudinally convex, thick upper lip, which would require an artificial denture to be nicely contoured in the vicinity of the incisive fossæ; otherwise this feature would be exaggerated. No. 8 shows a thin, short, and depressed upper lip. Apparently Professor Bush needed a new artificial upper denture, or the maxillæ were underdeveloped as a result of early extractions. No. 9 shows a straight, firm, immobile upper lip, and a pliable

CLASSIFICATION OF TEMPERAMENTS.

(*Dr. Prothero.*)

Basal Temperaments.	Eyes.	Hair.	Teeth.	
			Color.	Shape.
Lymphatic	Pale blue or gray.	Fine and silky, but without luster.	Pallid, opaque, or muddy yellow.	Poorly shaped, broad and flat.
Sanguine	Blue, brilliant, and expressive.	Blond-red or chestnut, seldom dark or black.	Cream-yellow, darker at neck.	Well proportioned, curved and rounded.
Nervous	Light gray or blue, restless, often morbidly brilliant.	Fine, light, and soft.	Pearl-gray, or blue tinge.	Long, conical, and rounded.
Bilious	Black or brown, small and piercing.	Coarse, dark, often black, and abundant.	Strong, bronze yellow.	Conical, long, and angular.

lower lip supported by an underdeveloped mandible, which probably would give very poor support to an artificial denture. The mouth of No. 10 stands in almost direct contrast to No. 9.

ILLUSTRATIONS OF TEMPERAMENTS.

The fifth classification is well represented in the tabulation by Dr. Prothero, and it seems to your essayist that it comprises the essentials in a terse, concise, and easily learned form [preceding page].

The student should, however, be thoroughly impressed with the fact that the so-called temperaments are ideals—simply a representation of ideas valuable in the study of the physiognomy of men. Is it reasonable to assert that the millions of people belonging to the Caucasian race, having no two individuals alike, can be placed into sixteen groups, and made to answer to as many set descriptions? If this is logical, it is still more logical to place them in a much smaller number of groups, because their description is that much more generalized and farther away from an attempt at a predetermined individual description.

Figs. 9 and 10 show two types of the lymphatic temperament. The one can as well be taken to typify the ideal lymphatic temperament as the other, yet one is parallelogram in form, while the other is circular-oval. In youth the one was of strongly bilious, the other of strongly sanguine temperament, and probably the lymphatic temperament was not apparent in either. If artificial teeth were to be selected for each of the subjects, what should the form of teeth be? Should they have the temperamental form of youth or that of old age? The

FIG. 9.

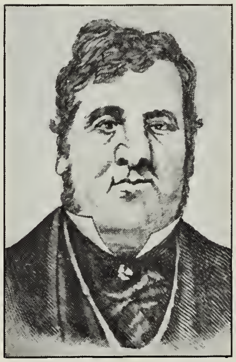


FIG. 10.

FIG. 11.

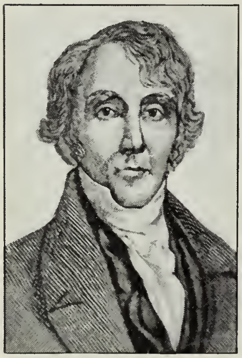


FIG. 12.

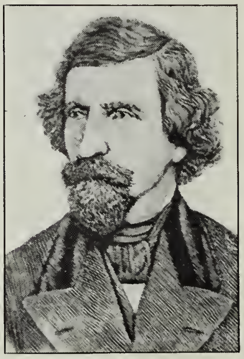


FIG. 13.

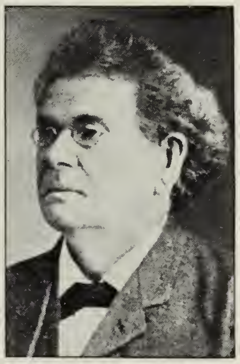
author's desire is to impress the fact that the form of teeth is to be selected by the typal form of the individual rather than by the form associated with the temperament. Harmony will be produced by selecting the form of the teeth by the typal form of the individual, which does not change, rather than by the temperament, which may change with age and environment.

Figs. 11, 12, and 13 show the sanguine, bilious, and nervous temperaments respectively, representing the oval, square, and triangular forms.

Fig. 14.

Fig. 14 shows the Apollo Belvedere, representing the Greek ideal, considered by artists as perfect in contour, proportion, and harmony. Notice should be taken of the thirds of the face, the relation of the chin, lips, nose, and forehead to the perpendicular line. Lavater, in 1775, wrote: "However famous and extolled the forehead of the Vatican Apollo may be, and however it may deserve its fame, I cannot discover its greatness and perfection. It may be answered, 'It is the head of a god'—and so be it; but nothing is, in my opinion, divine which has no similitude to the human. We cannot here discover whether it is the forehead of man, woman, or deity; or, rather, we know it is neither, nor can be either." In another place he says: "I maintain that nothing resembling it can be found in nature. We know no forehead, no nose, much less can we imagine such, in ideal patterns of perfection, in which the outline is, for the thousandth part of an inch, rectilinear. Such a forehead may domineer, pursue goddesses, persecute enemies—may, in comparison with a thousand feeble ones, be called royal; yet it is not true, cannot think—and the forehead which does not think, can as

Fig. 15.



little be called true or beautiful as an eye which does not, cannot see."

This quotation has been given to show that one of the best of observers and students of the human face accepted the Apollo only as an ideal, and that we should use it only as an ideal, with which to compare faces of the straight profile class; but in no case should we attempt to force the features of the patient to the contour of the ideal, as exemplified in the Apollo, further than to produce ease and grace of poise.

The well-known face seen in Fig. 15 is a fine example of that which is found in practice—that is, contour and proportions that are anything but ideal. The lower third of the face is much longer than the middle third. By the rules of art, the ear should be the length of the nose, but in this instance it is the length of the lower third. Here we see a portion of the face, the upper two-thirds, to be of the square type, while the lower third is of the parallelogram type. What, then, should be the form of the teeth suitable for this complex physiognomy? The square type of tooth would produce a more harmonious face than the longer tooth suitable for the parellelogram type, because it would reduce to a limited extent the exaggerated length of the lower third of the face.

SELECTION OF ARTIFICIAL TEETH.

Form and color in teeth for artificial dentures are two of the most troublesome factors for the dental prosthetist, and it is for the determination of these two factors that the dental temperamental classification was designed. I submit to you the proposition that the typal form and the tone of color of the individual better meet the requirement.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

THE TREATMENT AND FILLING OF ROOT-CANALS.

By J. J. MOFFITT, D.D.S., Harrisburg, Pa.

(Read before Section II of the National Dental Association, at its sixteenth annual meeting, Washington, D. C., September 11, 1912.)

THE subject of root-canal treatment and filling seems to be as important as any within the field of dentistry, because the stability and continued usefulness of the teeth depend on the condition of their supporting roots.

A tooth with a vital pulp is more stable and durable than one in which the functions of the pulp have ceased, and therefore it is our stringent duty to see to it that it never, through negligence on the part of either the patient or the dentist, becomes so afflicted;—but this does not come within the scope of the subject we are considering. Neither can we, in this limited time, take up a history of the treatment and filling of roots and the evolution that has brought us to our present knowledge of this branch of our profession, interesting though it be.

VALUE OF NATURAL TEETH IN THE PRESERVATION OF HEALTH.

We all know the ancient stories of worms in the teeth, and of incantations for odontalgia, with other evidences of ignorance concerning the dental structures that do not antedate us by so many years. We know also that the turnkey and the forceps were invented and employed long before excavators and broaches, from which we may conclude that the world's best thought has been given to other sciences—such as law, art, music, philosophy, etc., for a thousand years, and the men of learning engaged in these sciences have been dying, prematurely spent, because none of them gave attention to the science of supplying their bodies with nourishment. The mass of the people today, and the majority of physicians and dentists, do not appreciate the incalculable value of the natural teeth as factors in the nourishment and preservation of the individual. When a permanent tooth is gone, it is gone for good;—so much surface for grinding is lost every time the jaw is closed in mastication; so much area for pushing saliva through the food is lost every time the teeth are brought together; so much more unconverted starch and imperfectly masticated food is conveyed to the stomach to be disposed of; so much earlier the perfectly adjusted mechanism of the economy is broken up. Who can determine the value of a tooth, when upon it depend not only personal appearance, facility of expression, and healthfulness, but length of life itself?

ENCAPSULATION OF ROOT-APEX THE OBJECT OF ROOT-CANAL FILLING.

When we undertake the filling of a root we must have in mind, first, a certain object to be attained; and second, a definite course of procedure to be employed during the operation. The first of these, the object to be attained, is the *encapsulation of the apex of the root** under consideration, so that any portion of it that is not in vital relation with the surrounding tissue may be separated from and rendered unirritating to the surrounding parts. Then the repair process will go on uninterruptedly, and the stability of the root be assured.

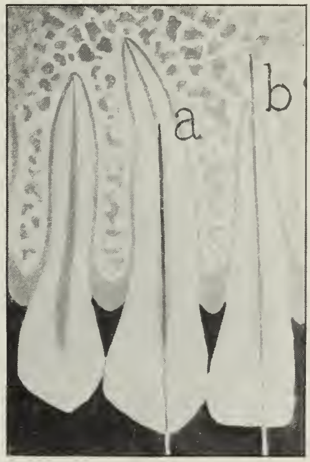
Encapsulation of the apex explains the durability of certain cotton root-fillings, long after the virtue of their medication had departed; of suppurated roots that give no trouble as long as gases find other exit and do not force the capsule; of teeth devitalized by concussion that cause no discomfort, and of the permanent success of surgically correct treatment and filling of root-canals.

Radiographs are indispensable in expert root-canal treatment and filling. They can be completed in less than ten minutes (see DENTAL COSMOS, August 1912, p. 868), and save many hours. The operator should not attempt to discover the length of the root by prodding the apical tissue with a broach to see if he can feel the end of the root or produce sensation outside the foramen.

Sometimes a little pulp tissue left in a long root (see Fig. 1, a) reacts like the tissue outside an apex; sometimes in a short root (see Fig. 1, b) with a large foramen the tissue outside reacts like remaining pulp.

No instrument should ever be used for work about the apex of a root of which the operator could not be certain that it would give a negative result in a control culture.

FIG. 1.



CONDITIONS INTERFERING WITH THE ENCAPSULATION OF A ROOT.

There are five conditions that may interfere with the encapsulation of a root, which for the convenience of consideration in this paper have been divided as follows:

(A) Infections from unsterilized instruments, or from instruments that have been sterilized but have touched the bracket, the lips, or adjacent teeth before being inserted into the root-canal, or that have passed through the septic matter remaining in the root-canal or from proliferation, and growth through the apex, of germs remaining in the root-canal.

(B) Pressure necrosis from gases forming in the pulp chamber that have not sufficient external exit.

(C) Eschars from too strong drugs having been forced through the apical foramen by too tight dressing or by compressed air under the temporary filling.

(D) Too short a root-filling, permit-

* See DENTAL COSMOS, December 1911, vol. liii, p. 1418.

ting serum to enter the apex and decompose within the root-canal.

(E) Too long a root-filling, a broken-off instrument point, or other projection, causing irritation of the parts outside the apical foramen and permanent interference with the formation of the capsule.

CONDITIONS DETERMINING METHODS OF TREATMENT.

Having in mind the object to be attained and these five conditions that may interfere with it, we will next determine the course of procedure to be employed during the operation. There are five conditions here also that determine the differences that should be made in the methods of treatment. This is not a complete classification, and like the former simply serves for the present consideration:

Class I. Exposed pulp with no infection.

Class II. Exposed pulp with infection not reaching the apex.

Class III. Root infection extending beyond the apex, with the pericementum not involved. This class has three subdivisions to be mentioned later.

Class IV. Root infection with destruction of the pericementum about the apex.

Class V. Puncture of the pulp chamber or root.

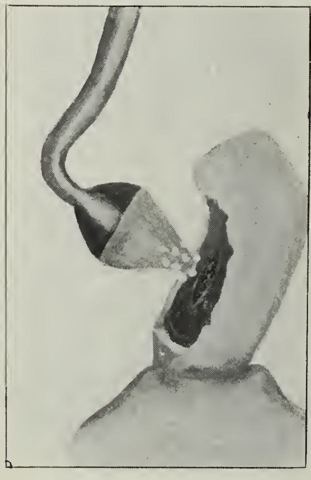
When a tooth is presented to us for treatment, we may determine, first, which of these classes (as denoted by numbers) it comes under; then we follow the course of procedure indicated in this class for inducing the formation of the retention capsule, bearing in mind and avoiding the five conditions (as denoted by letters) that interfere with this process.

We will now consider in turn the variations in treatment determined by these different conditions, our purpose being to induce encapsulation of the apex, and our technique being devised to guard against the five errors that would defeat this object.

I. EXPOSED PULP WITH NO INFECTION.

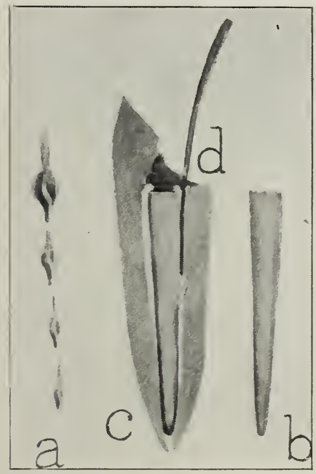
Since the addition to our resources of the hollow inlays, pulp capping has been more successful than previously. It belongs logically to this first class, but will not be discussed in this paper. Assuming from the patient's history, or because we need anchorage for a bridge, or for some other reason, that the pulp under consideration must be removed: First, a radiograph of the case is made in order

Fig. 2.



that full knowledge of the shape and number and length of the roots, or of any other condition bearing upon the operation which the radiograph may disclose, may be obtained by the operator. All necessary instruments are in readiness. An assistant or attendant marks all bristles and broaches with the length of the root. Nitrous oxid and oxygen are administered nasally by an assistant. In order to avoid dropping the cocain or loss of time in placing it, a cone-shaped piece of gutta-percha previously fitted to an instrument and shaped so as conveniently to reach the exposure is warmed in such a manner that the point alone is softened. With this some cocain crystals are picked up (see Fig. 2) and pressed quickly against the exposed pulp, the bulk of gutta-percha of the cone preventing leakage and insuring pressure. This is done just as the analgesia stage is reached, twenty to forty seconds after beginning the administration; the nitrous oxid is shut off, and a few inhalations of oxygen are allowed, during which the broach is inserted and the pulp removed. It is best to drill the root-canal to the size desired for a filling at once, using the largest drill first so that

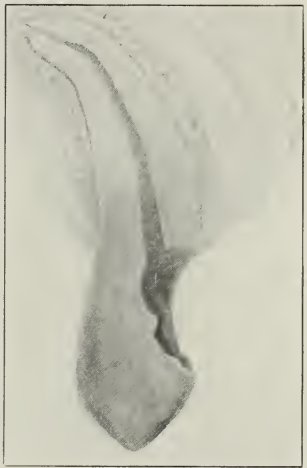
Fig. 3.



The space between root-filling and apex is exaggerated to show how the cold end of the gutta-percha prevents pressure on the zinc oxid paste with which the space is filled. Encapsulation then seals the apical end of the root, the other end being sealed by the process described.

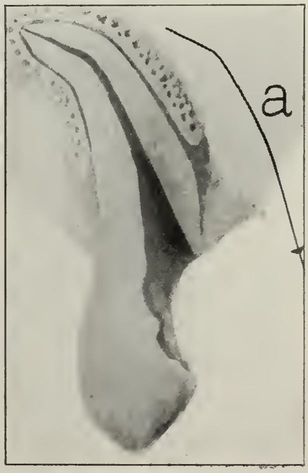
more room is available for the work, then the drill next in size, then the third largest, and finally the fourth (see Fig. 3, a). The drills used should be round-pointed, so that the walls of the canal may not be cut into (for absolute smoothness is necessary), and flexible for following the curves, and the operator's touch must be light and skilful, for the technique of successful root-canal treatment and filling is as exacting and should be as expertly performed as a similar proceeding in any science where a moment of indifference may cause failure in result. Any portion of the root that cannot be safely reached with a drill is cleansed with a broach.

Fig. 4.



By using each one of the four drills in the order mentioned for about one-fourth the length of the root, a uniform

Fig. 5.

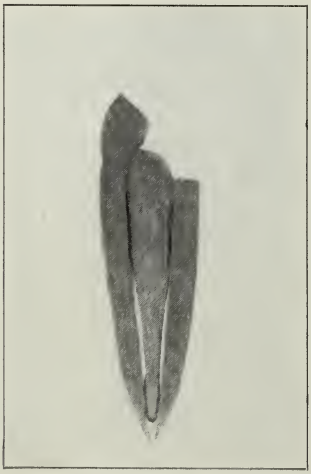


taper is given to the canal, and furthermore the membranes and loose tissues that impede the progress of drugs toward the apex, and which also lessen their efficiency, are thus early removed. When the curve in a root as disclosed by the radiograph (see Fig. 4) makes access

FIG. 6.

to the apex impossible through the ordinary opening, the tooth should be cut in such a direction that access may be

FIG. 7.



gained (see Fig. 5). If the curve in the root is so great that the apex cannot be reached when the opening has been brought to the gingival line, the remaining portion of the root beyond the curve must be treated by means of a steel bristle bent by aid of the radiograph (see Fig. 5, a) or a fine silver probe, together with the adhesive property of certain medicaments. The root-canal is next treated with an oxidizing or bleaching agent until all organic matter is removed. It is then washed out and dried. A gutta-percha root-canal filling (see Fig. 3, b) has meantime been prepared by the assistant, the length of which is

FIG. 8.

In this case restoration is completed by baking a reinforced occlusal edge to a facing, fitting it to the broken tooth with wax, and casting the wax support in gold. The facing had an imitation porcelain inlay on its mesial surface, and the appearance of a gold filling distally, done with china paints.

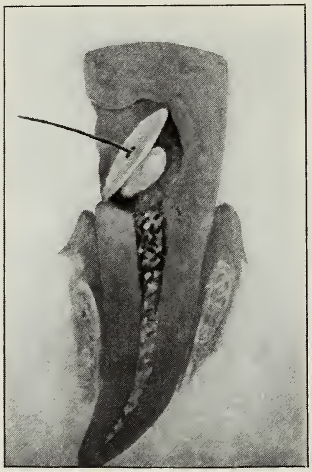
determined by the radiograph, and the diameter by the drills that have been used. This gutta-percha point, after having been fitted fairly accurately to the root-canal, is immersed in 70 per cent. alcohol and dried. A paste is then made of medicated zinc oxid (or a commercial preparation called "pustolene"), which, having been brought to the proper consistence, is pumped into the tooth to the apex by means of a *measured* and *marked* broach. An assistant having coated the gutta-percha point with the same paste, the root-filling is pushed into place cold (see Fig. 3, c) in such a manner that the excess of paste comes out around it. A fine silver root-canal drier is placed in the root and pushed up between the gutta-percha and the side of the root-canal about half the length of the root, and the current is turned into it until the outer half of the gutta-percha point is softened (see Fig. 3, d). The outer part of the gutta-percha point being thus softened is pressed tightly into place and the root is sealed. Warm air from the syringe is also frequently employed, care being taken not to soften the entire point, as the cold end at the apex serves as a stopper to prevent pressure through the foramen. The excess of zinc oxid (see Fig. 6) is wiped out, and all traces of it within the pulp chamber are removed with alcohol. An additional piece of gutta-percha may then be added to the root-canal filling if desired (see Fig. 7). Restoration of the remainder of the tooth is completed according to the requirements of the case (see Fig. 8).

Applying to this procedure the five conditions that may prevent encapsulation of the apex, we have avoided the infections that may occur under A. Division B is not applicable to this class, there having been no gas formation in the pulp. Regarding division C, we have, by noting measurements of the root as shown by the radiograph, carried no drugs beyond the apex, and have avoided such pressure as would force them through the foramen, thus avoid- an eschar outside the root. Regarding divisions D and E: By placing the cold gutta-percha point in the root with an exact knowledge of the length of the root and the point, we know that there has neither been a discrepancy in the length of the filling nor a projection of the filling outside the root. Having thus systematically and scientifically completed our operation, we have the satisfaction of knowing that we have not relied upon chance or experiment or the healthy organic nature of the patient, but have accomplished a scientific operation of assured success even in patients of low vitality.

II. EXPOSED PULP WITH INFECTION NOT REACHING THE APEX.

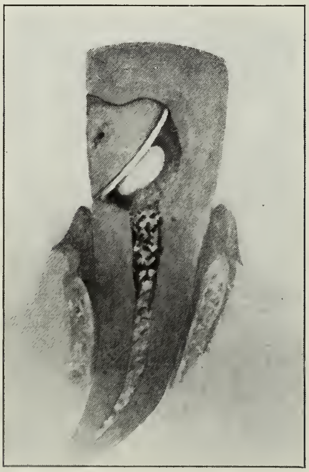
The second condition determining the method of procedure in the treatment and filling of root-canals involves cases where the pulp is exposed and infected, the infection having not reached the apex (see Fig. 9). A growth of micro-organisms, the presence of their products, the disintegration of the pulp tissues, and the attendant congestion of the bloodvessels, all unite to prevent the absorption of cocain, so that an attempt at pressure anesthesia may be extremely painful. A radiograph is first made of the case to disclose the necessary conditions and measurements, as mentioned in class I. In this class anesthesia with nitrous oxid and oxygen is carried just to the point of unconsciousness. The five conditions (represented by the lettered divisions) unfavorable to encapsulation being carefully observed by the operator throughout the operation, the pulp is removed just as complete anesthesia is reached; the attendant at the same time turns on the oxygen. The removal of the pulp is in this manner accomplished with no pain or inconvenience to the patient, and with no danger of forcing the infection to the apical area—which is sometimes the case when pressure anesthesia is used. The most important of the five conditions to be guarded against in this class is found in the first, or division A, viz, the danger of carrying the infection in the pulp to the apex by means of the instruments used in removing the pulp and in subsequently preparing the root-canal. This is guarded against by having the assistant make limit marks on all the broaches and bristles with the aid of the radiograph before the patient is anesthetized, thus enabling the operator to so control them that they will always fall short of the apex. As soon as the pulp is removed, the root-canal is sterilized to the apex so that any remaining infection is destroyed. It is even better in this class, when the condition permits delay, to prepare the tooth the day before the operation is made, by placing a cotton pellet containing a penetrating germicide—that is, one that will not cause coagulation of the tissue—loosely against

FIG. 9.



the exposure. This cotton pellet containing the antiseptic should be protected from pressure with a piece of thin

FIG. 10.



metal plate sealed in with gutta-percha. A hole is punched in the plate and a bristle inserted touching the cotton pellet (see Fig. 9), around which the gutta-percha is packed, so that, when the bristle is withdrawn (see Fig. 10), an escape for any gases from the pulp is afforded, while any infection entering from the mouth is rendered harmless by the sterilizing agent on the cotton pellet. Thus the conditions listed under B and C are avoided. In the few cases of this class not taking kindly to nasal inhalation, either owing to chronic mouth breathing or nervousness, the pulps may be devitalized with one of the preparations of arsenic, always under protection of a metal plate to prevent pressure. When the pulp is removed and the canal sterilized, the operation of root-filling is completed as described in class I.

III. ROOT INFECTIONS EXTENDING BEYOND THE APEX WITH THE PERICEMENTUM NOT INVOLVED.

This class is divided into three subdivisions: The first, with no pus present; the second, with the formation of pus begun; the third, with the presence of pus with fistulous opening.

Subdivision 1: *No pus present.* The pulp being destroyed by bacterial action, there is no need of an anesthetic in any subdivision of this class. A radiograph is first made. The canal is cleansed with no attempt to pass beyond the apex, and every precaution is taken to avoid carrying any of the matter within the tooth through the apical foramen. When the root is thoroughly cleansed, a cotton dressing twisted on a bristle is made, and, being saturated with a non-coagulating and sufficiently permanent antiseptic, is inserted so that it will reach as close to the apex as possible. This dressing must not be packed in, but lie loosely along the root-canal, thus avoiding the danger listed in division C, of eschars from too strong drugs being forced through the apex. A pellet of loose cotton is next placed in the pulp chamber, touching the end of the root-canal dressing and taking up any of the excess antiseptic that may have flowed down from it. The cotton is then touched with a little more of the antiseptic, until it is just moistened, leaving no excess. A valve is then made with thin metal plate as described in class II (similar to the valve in Fig. 10), permitting any pressure from within to escape, but no infection from the mouth to enter. This dressing is allowed to remain for a week or more, when it is removed and the root is washed with alcohol. The root may then be enlarged and prepared for filling, with no danger of adding to the infection beyond the apex—which will usually have been removed by the blood, since the source of its activity is gone—and the filling is inserted as before described.

Subdivision 2: *Pus present.* When pus is present the root is sterilized and an opening made at once through the apex. Sterilizing agents or strong antiseptics are contra-indicated in the cancellated structure outside the apex. The pus tract, after having been evacuated, is washed with an antiseptic just strong enough to temporarily inhibit bacterial proliferation. A root-dressing is then made, similar to the one described in subdivision 1, but containing the mild antiseptic just mentioned for washing out the pus tract. The pellet of cotton in the pulp chamber beneath the valve may be saturated with a stronger antiseptic to destroy any infection entering from the mouth. This dressing must be changed every day for the first week, and for the remaining two weeks should be changed according to the indications given by the drainage on the cotton dressing. It takes about three weeks for the destroyed area outside the apex to be filled up with fibrous tissue, in which ossification afterward may or may not occur. If the root is hermetically sealed, the drainage from the process of repair will back up and prevent its progress. When there is no further need of drainage, the root-filling is inserted as described before.

Subdivision 3: *Involvement of the tissue beyond the apex with fistulous opening.* All traces of septic matter must first be removed from the root-canal, and the canal thoroughly sterilized: the apex is then opened, and the tract well flushed with a mild antiseptic. This is best accomplished by drying the tooth and packing the metallic point of an abscess syringe into it with gutta-percha, the point having been bent in such a manner that the syringe may be refilled with a medicine dropper. Sometimes the syringe may be refilled, and pressure supplied with the compressed-air spray. The tract should be washed out twice a day, and in the meantime a cotton dressing containing the mild antiseptic solution should be inserted, with a provision for drainage as before described. This antiseptic solution should be no stronger than 70 per cent. alcohol, as that is the greatest strength of the ordinary antiseptic solutions that will not interfere with penetration by causing coagulation. The dressing inserted in the root permits drainage of the abscess tract so that the fistula and the abscess tract both heal up at nearly the same time, and when the fistula has entirely disappeared, and the dressings within the root indicate no further need for drainage, the root-canal is filled, particular care being taken (with the aid of the radiograph measurements) to have the end of the gutta-percha root-canal filling fill the enlarged foramen completely and without protruding.

IV. ROOT INFECTION WITH DESTRUCTION OF THE PERICEMENTUM ABOUT THE APEX.

This condition is disclosed by the radiograph (see Fig. 11). No matter whether there is a fistulous opening or not, in nearly all cases amputation of the apex must be resorted to before the abscess can be healed, except perhaps that autogenous vaccine treatment may be resorted to—which, however, is as yet too little known. In amputation of the apex, the root-canal filling is always inserted prior to the operation (see Fig. 11). The root, having been first thoroughly sterilized, is treated as in other classes. The opening for the amputation and the amount of apex to be amputated are determined with the object of establishing unobstructed drainage (see Fig. 12), the measurements for which are made with the radiograph. Any necessary curetting

Fig. 11.

of the bone is done with a large round bur that is properly sterilized. The tract is then washed out with a mild anti-

Fig. 12.

Incision so sloped that serum will not stagnate about apex.

septic solution, and drainage is maintained by cotton or gauze containing the same solution, which will not prevent the formation of reconstruction tissues, but is inhibitory to bacterial action. This dressing should for several days be changed twice a day and the patient be instructed to sleep so that drainage will be facilitated.

V. PUNCTURE OF THE WALL OF THE ROOT-CANAL.

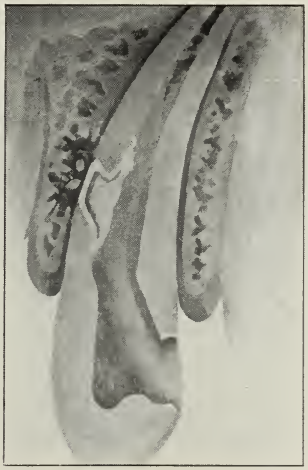
This condition may have two subdivisions—the first (see Fig. 13, a) being abscesses caused by a puncture or by drugs or instruments passing through

Fig. 13.

the puncture; the second subdivision (see Fig. 13, b) being abscesses at the apex of the punctured root due to putrescent matter that was not removed from the part beyond the puncture. In subdivision 1 the apex of the root has already been encapsulated, and no trouble can occur from it. The fistula is usually present in each of these subdivisions. In subdivision 1 the fistulous tract is washed out and the puncture closed, either by making a wax impression of the interior of the root, which is then cast in gold and is inserted with chloro-percha, or by placing a little cement at the side of the puncture (see Fig. 14), after having dried the root thoroughly, and inserting in this the edge of a piece of platinum foil cut sufficiently larger than the puncture. When the cement is set, the platinum and the adjoining root-canal are thoroughly sterilized with 70 per cent. alcohol and then dried with warm air; then the platinum is burnished down over the opening and sealed in with a layer of cement (see Fig. 15). When the cement has hardened, access to the apical portion must be obtained with the aid of the radiograph, and the treatment carried on as in class II, care being taken not to puncture the encapsulation which was permitted to form, because there was always drainage through the puncture. When this is accomplished, the root-canal filling may be inserted, and the condition will soon heal up and the fistula will disappear.

FIG. 14.

FIG. 15.



In subdivision 2, where the abscess is due to putrescent matter remaining in the part beyond the puncture (see Fig. 13, b), access must be obtained to this apical portion with the aid of the radiograph, and the treatment carried on as in class III. Entrance to this apical portion of the root is more or less difficult, because instruments have been passing through the puncture and will have a tendency to continue doing so. The old root-canal filling will sometimes be found outside of the puncture, having been placed there with the supposition that it was in the root. This mistake is made by using too strong drugs in the root-canal, the puncture having been accidentally caused at the portion where the root has a sudden curve, and too strong medicaments used in the root-canal and passed out through the puncture. By their escharotic action these drugs have destroyed the sensitivity of the tissue outside, and have led the operator to believe that he was working inside the root-canal (see August 1912 DENTAL COSMOS, p. 873, Fig. 15). Inserting a filling in this tract outside the root-canal caused inflammation, and the need of drainage established a fistulous opening, so that, in treating these cases, the remaining pieces of the misplaced filling must be sought for by the aid of the radiograph and removed.

When the upper end of the root is finished, the apical portion is filled. The puncture is closed afterward as before described, for the presence of the cement, if platinum is used, or of the gold casting, if this method of closure be employed, will prevent ease of access for the treatments sometimes necessary in class III. After the apical portion is filled and the puncture closed, the remainder of the root is filled. Fistulous openings caused by either of these subdivisions will close up at once when the condition is corrected. A very large puncture in the pulp chamber should be covered for several weeks with platinum foil held in place with gutta-percha, until the tissue has grown firmly against the platinum and established a membranous layer that will not bleed. This must be done with all antiseptic precautions. After about three weeks the gutta-percha and platinum foil may be carefully removed and a soft wax impression made of the punctured

FIG. 16.

portion, which when cast with pure gold makes an efficient covering. The root-canal openings must, of course, be preserved in the gold. Great care must be taken not to push cement or chloro-percha into the membranous covering of the tissues outside of the root, or an irritation will be set up which will defeat the operation.

When a puncture in a root is inaccessible for closing, and the remaining portion of the root is too difficult of entrance for treatment, the root is filled to the puncture with the root-canal filling previously described in cases for amputation. and is amputated at the puncture.

COMPLICATED CASES AND TREATMENT.

There is an additional condition that may be encountered in any class when a badly broken down tooth is involved with suppuration of long standing in the canals, with a bad history, or in certain other difficulties (see Fig. 16). A radiograph may not be available, or an infection beyond the apex may not have progressed sufficiently to be discernible, or there may be so tortuous a root that a satisfactory root-filling is impossible with every aid. We cannot be sure that our treatment is successful, and we hesitate to fill such a tooth at once for fear of future trouble. Temporary fillings with so large a masticating surface pack down, and sometimes exert force through the apex, causing pressure necrosis, or eschars from drugs, and they sometimes fracture the tooth or destroy the attachment of the gingival tissues, and add to the liability of inflammation or food impaction. All this may be avoided, and all hesitation about filling such a tooth may be ended by the following method:

Preparation for a gold casting restoring the original contour of the tooth is made. When the wax form for this is hollowed out with the suction carver and in readiness for investing, a hole is made in its occlusal surface, through which the roots can readily be treated. After casting, an impression of this hole is obtained and a casting made to fit it. This plug is put in place in the filling, and the combination articulated and polished, after which the plug is fastened into the filling with base-plate gutta-percha. The root is then filled as before described, the zinc oxid being inserted as near the apex as possible with a fine silver probe. The contoured gold filling is completed and set with cement (see Fig. 17). If trouble occurs, a little heat will remove the core (see Fig. 18), and access to the root-filling may be had without destroying the contour of the tooth. This form of root-filling, too, is readily removable, is the best kind of dressing that can be put into a root, and becomes a permanent root-filling whenever the apex is encapsulated.

In my opinion root-canal fillings made in the manner described in this paper are preferable to any other form, although success is just as certain with other methods in the hands of careful and skilful practitioners.

ADVANTAGES OF GUTTA-PERCHA.

Gutta-percha treated with solvents loses considerable of its toughness, and when dried is somewhat weakened in structural quality; and, though strength is not needed in a root-canal filling, to my mind gutta-percha softened by heat in the manner described and then pushed into place and carefully sealed is impervious to any deleterious conditions that may arise. Furthermore there is no danger of pushing any of the root-canal filling through the apical foramen if the gutta-percha be inserted cold, having the apical end solid and of known length, so that when it stops at the apex we know it has gone no farther than was intended. There can be no danger of the filling either falling short of the apex or protruding beyond it. Root-canal fillings that cannot be removed at will should never be inserted in roots, as there are times when it is necessary to remove them, and it not only is less difficult and less painful, but also it cannot endanger the future of the tooth, if the fillings are constructed in the beginning with the provision that such a necessity may arise.

VACCINE TREATMENT.

It is well known to bacteriologists that in the kind of infections with which we have to deal, to insure complete success autogenous vaccines should be used—for vaccines made from germs obtained from other sources will not give as successful results as those made from the germs taken from the individual case to be treated, even though the variety of germs in each case be the same. Some germs found in the teeth cannot be grown as yet in artificial media. Conditions occurring from them can have no autogenous treatment; nevertheless, since I have seen stubborn and obstinate cases of abscess in the antrum that were originally caused by diseased teeth, cured by the autogenous method after twelve years' resistance to all other methods of treatment, it is probable that this treatment will be of great service to us in the near future.

Fig. 17.

Fig. 18.

CONCLUSION.

The theory on which this method is based is that we must restore artificially only the parts that cannot be restored by nature (dentin and pulp), and cause no impediment to the natural processes nature is equipped to employ in the restoration of the surrounding tissues.

The illustrations are made from colored charts and are not so descriptive in black-and-white. They are designed to show the conditions described, and are not supposed to be anatomically correct.

No drugs or medicaments are mentioned, but each operator, judging by the conditions and requirements presented, may choose them from his own knowledge of materia medica and therapeutics, which is the only way in which medicaments should be employed.

Painstaking care is of the utmost importance in the treatment and filling of the root-canals of teeth. When a tooth has arrived at the stage where it needs such treatment, it is in danger of being lost. Its crown, in which its actual usefulness is located, is more or less damaged and in need of careful restoration by large fillings or an artificial crown, or must be preserved in order to serve as an abutment supporting a bridge. These restorations are of the utmost importance for the patient in retaining the efficiency of his masticatory surfaces, and they can be made only with untiring and skilful labor on the part of the operator. Therefore the supports to which they are attached, the foundations of their usefulness, must be of certain and lasting durability in order that our painstaking labor may not be in vain, and in order that our patients may be served to our utmost capabilities in the preserving of their appearance, facility of expression, comfort, healthfulness, and even length of life.

IS OPERATIVE DENTISTRY DEGENERATING?—EXTENSION FOR PREVENTION *VS.* PINHEAD METHODS.

By Dr. W. R. CLACK, Mason City, Iowa.

(Read before Section II of the National Dental Association, at its annual meeting, Washington, D. C., September 10, 1912.)

IN 1891 Dr. Black first gave to the public the result of his researches concerning recurrence of dental caries at enamel margins, and the tendency to be dislodged by the stress of occlusion of fillings made in the proximal surfaces of molars and bicuspids and retained only by pits or parallel grooves. At the same time he indicated a method whereby these difficulties might be overcome. Since that time there have been many differences of opinion as to what those methods were, and as to what he really did or did not say concerning those principles.

THE ATTITUDE OF THE DENTAL PROFESSION TOWARD DR. BLACK'S PRINCIPLE OF EXTENSION FOR PREVENTION.

Many men who had access to Dr. Black's operating room at Jacksonville, Ill., and who were granted the benefit of his personal instructions, were able to grasp his ideas at once and apply them in practice, with benefit to themselves and their patients. But the larger number tried to learn from articles in the dental journals, with the result that comes to the majority who try to learn operative dentistry from print. Some of these operations were "fearfully and wonderfully made," and nearly as many teeth were ruined by the misapplication of the Black principles as were lost under the old pinhead methods; but these men profited by their mistakes and sought by every means in their power to obtain a better understanding of what Dr. Black intended to teach under the head of extension for prevention, and eventually won out.

Others never took the trouble to investigate the principles taught by Dr. Black, but opposed them for various reasons. First of all was the objection that these "revolutionary methods" were propounded by a man living west of the Alleghanies, and as all dental knowledge —as knowledge—was known to exist only on the eastern slopes of these mountains, and as the expounder was not a shining light in the dental atmosphere of the "older sections," but had actually sprung from the common people of the West, it was thought best to ignore this fanatic and his teachings.

Secondly, to admit the truth of his contention would necessitate a change in the methods that had been taught since "Washington crossed the Delaware," and that was not to be thought of, so the word went out to ignore as far as possible and to treat with silent contempt these methods that were incorrect simply because they were opposed to the teachings of the "fathers."

But study clubs were formed all over the central West, and either Dr. Black or some of the men who had studied with him would act as censors, correct the errors, and teach in their stead the true gospel of saving the teeth.

The club which is perhaps best known to the dental world is the G. V. Black Club of St. Paul, Minn., organized on May 20, 1898, and incorporated on December 10, 1902. Dr. E. K. Wedelstaedt of St. Paul has been the censor of operative dentistry since the organization of this club. Monthly meetings were held, and as soon as a sufficient number of operators were able to demonstrate these methods, annual midwinter clinics were given, at which Dr. G. V. Black always appeared in person, and all questions of operative procedure were referred to him, and his opinion was final as far as the teachings of that club were concerned. From this club and others in Iowa, Illinois, and Missouri, went out the men who were mainly responsible for the spread of the doctrine of extension for prevention.

I have explained at length the origin and spread of extension for prevention, and the make-up of its sponsors, because the class of detractors spoken of have seen fit to convey the idea that extension for prevention is a sort of "catch-colt" indigenous to that region which a century ago was the home of the buffalo and wild horse, and without either legitimate parentage or godfathers.

It is a source of great sorrow to the dwellers of the western prairies to learn that "their originality has been a shock to the old civilization" east of the Alleghanies. But the truth was this: These unfilial children had tired of waiting for the fathers to evolve a method which would do away with the necessity of remaking every two or three years the pinhead fillings that had failed owing to recurrent caries.

They wanted a method by which they could make a filling in a cavity of the first or second class that would be permanent. Twenty-one years ago Dr. Black began his teachings of extension for prevention. The suggestions he made have been thoroughly tried out; in some cases they have been modified, and in some intensified, but the original principles still stand as they were given out. A very large percentage of the dentists of the middle West have proved to themselves and to those who have given the matter careful attention that those methods when intelligently carried out will save the human teeth.

It makes no difference, as a matter of fact, if the opponents of extension for prevention yell themselves black in the face crying—"In the end it is a failure." Too many thousands of dentists have tried its merits, and know for themselves.

Extension for prevention prevails today in the central West. It has strong advocates in every state west of the Mississippi, and is being taught in greater or lesser degree in nearly all the dental colleges from Pittsburgh and Buffalo to San Francisco.

It is being taught in Tufts Dental School and in Harvard—the "Athens of America"; New York City has its Conzett Club; Wedelstaedt and Searl clubs abound in the western states, and there is even one in far-away New Zealand.

The latter club has at different times sent delegates to spend from three to six months at a time with the different members of the Black Club, learning their methods and carrying them back to the islands of the South Pacific.

If the principles of extension for prevention are wrong, and its advocates, as has been asserted, have written little upon this subject, why is it that it has obtained such a hold upon the dental world? Is it not a calamity that the select coterie of standpatters sat so snugly in their mandarin coats of conservatism and let this evil spread over the country? Why did they not arise in their might, and, like Mrs. Partington, attempt to sweep back the tide, before it overwhelmed the world?

RULES FOR CAVITY PREPARATION BY THE BLACK METHODS.

In the preparation of cavities in the human teeth according to the Black methods, certain rules are laid down, some of them relating to extension for prevention, some to retention, and some to interior preparation.

RULE 1. Extend the cavity margins in all directions until sound enamel is reached.

RULE 2—Seat. The seat must be flat or in steps (which is equivalent), and at right angles to the long axis of the tooth or the direction of the stress.

RULE 3—Preparation of the margins. Cut the enamel to such a point that the surface of the filling may be so formed that the enamel margin will be self-cleansing, or be protected by the gum margin.

RULE 4. Do not leave an enamel margin in such a position as to leave a small portion between it and one of the developmental grooves.

RULE 5. The lingual, buccal, and axial walls of all cavities exposed to stress should be parallel to each other and to the line of stress.

RULE 6. Leave no enamel unsupported by dentin, except on the labial surfaces of the upper anterior teeth.

RULE 7. A fissured, sulcate, or angular developmental groove should be cut out in its entire length.

PROXIMAL CAVITIES AND FILLINGS.

Cavities of decay in proximal surfaces of teeth—and this is where extension for prevention applies chiefly—are seldom presented to the dentist until a smaller or larger quantity of the enamel rods have fallen out. When this is the case it would be poor practice to fill only a pinhead-size cavity, because there would be recurrence of decay if the patient lives. The gingival margin of the cavity should be carried beneath the free margin of the gum. This free margin is not so far rootward as the men who have opposed this method without knowing the details of the work would have us believe.

Though it is not a part of extension for prevention, all students of Black are taught to restore the normal interproximal space, and to preserve it by tight contact points in all fillings made in the proximal surfaces of the human teeth. When this is done, the gum will return to its normal position and securely cover and protect the gingival margin of the filling without this filling being carried "to the dentin of the root, cutting away the cementum and pericementum and dangerously encroaching on the pulp—and, in any event, subjecting that organ to thermal shock that in due course of time will arouse an inflammation there and ultimate devitalization, with pathological sequelæ not pleasant to contemplate."

What a vivid imagination! If all this terrible trouble arises from polishing a filling just under the free margin of the gum, what unheard-of horrors will follow a pyorrhea treatment where the root is "scraped clean" to the very apex!

We are taught that every particle of deposit on the cementum of the root must be removed. In that case, what becomes of the pericementum that originally covered the root? I am not advocating the needless destruction of a particle of the tissues in the interproximal space, but am at a loss to know why, if we can trust nature to repair the damage caused by the deposit thought to be responsible for pyorrhea, and by the removal of this deposit, it is necessary to go into hysteria because someone makes the gum bleed a little in finishing a filling. Not that such a result is any more necessary where extension for prevention is practiced than where it is ignored.

If the standpatters could spend a few golden hours at the chairs of some of the progressives of the land of the buffalo and wild horse, and see how quickly the gum will cuddle down behind one of those contact points, and fill the whole interproximal space with healthy gum tissue beneath which bacterial plaques do not form, they would see that the slight irritation caused by the finishing of the filling at the gingival margin does not bring about all the disastrous consequences so pathetically painted by those word-artists of a past age.

If we may not place and finish the margin of a filling under the free margin of the gum without subsequent loss of the tooth, what, may I ask, do these ultra-conservatives do when a patient presents himself with a cavity of decay in the proximal surface of a tooth in which, from backward decay, the cavity extends under the gum and often into the concavity of the tooth?

This is one of the teeth that "need saving." The advocate of extension for prevention saves these teeth, because he makes a filling there, and finishes it smoothly so that it will have no overhang and irritate the gum; then he makes a contact point to protect it, and trusts to the same power that made the tissues in the interproximal space in the first place to restore it to normal condition.

I had the honor of showing to this association at Buffalo, seven years ago, casts of cases in which such restoration of the gingival tissue had taken place. Some of the men who saw them acknowledged that the restoration had taken place, but asserted that it would not be permanent. I have here today some of the identical casts which I showed at Buffalo—they will no doubt be recognized by many who saw them there—and I have casts made from impressions taken from the same cases within the last two weeks, which show that the gum septa are as perfect today as they were seven years ago. The teeth show a slight shortening from seven years' wear, but the fillings, contact points, and gums remain the same. In one case a third molar has been erupted.

In each of these cases, the first molar had been lost several years, the teeth had drifted apart, and food pockets had formed so that caries had affected the concavity of some of them. I was obliged to remove some of the alveolar process in order to make my restorations. The casts will prove more eloquently than words how perfectly nature restored the lost tissue after I had made it possible for her to do so.

PREPARATION OF CAVITIES IN OCCLUSAL SURFACES OF MOLARS.

The simplest form of cavity is one in the occlusal surface of a molar. As this surface is usually self-cleansing, little extension is required when gold is used. All margins must be carried to smooth surfaces in order that they may be properly finished, and all imperfect developmental grooves must be included in the preparation. No enamel should be left unsupported by dentin.

The walls are made parallel to each other and at right angles to the pulpal wall or seat of the cavity. This seat should be flat. All enamel margins are beveled when gold is to be used; about fifteen degrees is a safe rule. To these rules, however, I make two exceptions. The first one comes under the head of extension for convenience. When operating on lower second and third molars, and sometimes upper third molars, the mesial wall of the cavity must be beveled at an angle of forty-five degrees to nearly one-third of its depth, else the gold will not be condensed against that wall, as the line of force of the plugger will be faulty, and the gold will be driven away from that wall; but with a heavily beveled margin, the difficulty will be overcome.

This rule does not apply to cavity preparation for an amalgam filling. For amalgam, the margins are not beveled, but planed smoothly so that there are no overhanging margins or short enamel rods. *Care must be taken, however, in placing the margins.*

The mesio-lingual cusp of many upper first and second molars is often of such a shape that, if it occludes on the margin of an amalgam filling in the central pit of a lower molar, that margin is in great danger of fracture. If that margin is extended so that the point of the cusp does not strike it, the life of that filling is greatly lengthened. This is precautionary extension.

PREPARATION OF CAVITIES IN PROXIMAL SURFACES OF ANTERIOR TEETH.

We will next take up cavities in the proximal surfaces of the anterior teeth, using the mesial surface of an upper central incisor for an example. These cavities almost invariably start just gingivally of the contact point, owing to the inability or neglect of the patient to keep that surface properly cleaned.

First, all overhanging enamel is cut away, then the cavity margins are extended under the free margin of the gum gingivally and labially until the margin of gold will reflect the light. This procedure will put the margin where it will be constantly cleansed.

The lingual margin should be extended to the crest of the mesio-lingual line angle or mesial margin ridge. If there is lack of sound dentin to support the enamel, cutting must be continued until the enamel is so supported. The margin is extended incisally just past the contact point.

No half-moon should be cut in the labial surface. If the dentin in the linguo-axio-gingival and labio-axio-gingival angles and in the incisal angle is squared out, ample retention will be afforded.

If an angle in an anterior tooth has been lost, the cavity is prepared in practically the same way gingivally as the one last described, but the preparation of the incisal third differs very radically. Take for illustration an upper central incisor with a cavity in the distal surface involving the incisal angle. For retention and protection from occlusion we resort to a step, cut in the incisal portion, but mostly at the expense of the lingual surface.

A step is ground in the labio-incisal angle deep enough to permit of sufficient gold being packed there to protect the labial plate of enamel from the stress of occlusion. This step is deepened on the lingual surface sufficiently to permit of cutting a groove in the dentin between the lingual and labial walls. This groove should end in a small pit just before or just beyond the opposite developmental groove. If there is sufficient dentin, the groove may be slightly widened near the end, and the small pit dispensed with. The angle formed by the union of the step with the axial wall is slightly rounded.

PREPARATION OF CAVITIES IN THE PROXIMAL SURFACES OF BICUSPIDS AND MOLARS.

All cavities in the proximal surfaces of bicuspids and molars are prepared on the same general plan, varying slightly as the positions of these teeth in the dental arch may vary, the principles applied being the same.

Caries in these surfaces is the result of habitual uncleanliness, and it is essential that the buccal, lingual, and gingival margins be extended to self-cleansing areas, if we wish to avoid recurrence. The lingual, buccal, and axial walls must be made parallel to each other and at right angles to the gingival wall. Where this is done, the lateral walls are too weak to permit of grooves for retention, so that we are compelled to resort to a step in the occlusal surface. This step should be cut just through the enamel, and should include all the imperfections to be found in that surface.

The pulpal wall—or floor—of this step must be flat, and the surrounding walls at right angles to it. The angle formed by its junction with the axial wall should be slightly rounded.

Formerly, the lingual and buccal walls were cut to diverge as they approached the gingival border, with a view to better retention, but now many operators cut these walls parallel so that the same cavity may be used without change either for a gold filling or an inlay.

Dr. Conzett and I have given many clinics on this subject.

DEPTH OF CUTTING.

But this is merely an interior detail and does not necessarily come under the head of extension for prevention, but I have spoken of it to show that the very deep cutting with which the pinhead cavity conservatives charge the advocates of extension for prevention exists only in the imagination of the former. Unless caries has already penetrated more deeply pulpward, we seldom cut as deeply as the retaining pits made by the pinhead cavity men. On hearing some of them talk, one would think that they anchored their fillings in the enamel, but such is not always the case.

I will pass around for inspection a tooth extracted by the patient's physician because of incessant pain. In this tooth the pulp-chamber was penetrated by one of these retaining pits. I prepared a cavity in the same surface of the tooth, going a trifle deeper than would have been necessary in the first place, in order to square out the axial wall to the depth already cut, and, as will be seen, there are two of these retaining pits remaining, much deeper than the so-called "ruthless sacrificer of human teeth" ever thinks of going.

STEP AND DOVETAIL ANCHORAGES.

The one great argument in favor of the step anchorage—both occlusal and incisal—is that it places the resistance at the point at which the dislodging force or stress is applied.

There is another form of anchorage which is sometimes used for fillings in the anterior teeth, where the angle is involved, and which is more esthetic than that described, and successful if no stress is brought to bear on the filling.

This method consists in cutting a dovetailed slot in the lingual surface of the incisor or cuspid, and anchoring the filling in that. Stress, however, is a factor that must always be reckoned with. Stress is difficult enough to overcome when we are opposing it on even terms, but in this case we are giving it the long end of the lever.

In many cases the curvature of the gingival line is so great that by cutting squarely across the tooth for the gingival seat either that margin would be left exposed at the linguo-gingival and labio-gingival angles, or we would cut too deeply toward the gingival line at the middle third. To obviate this, the seat may be cut on a curve from labial to lingual, which will afford the same stability of the seat and avoid cutting into the gingival line. But the seat must be flat from the axial wall to the beginning of the cavo-surface angle.

TERMINOLOGY.

In this connection I would digress a moment in an effort to make clear the difference between the gingival *line* and the gingival *margin*.

Gingival line. The line around the neck of the teeth at which the gingiva is attached, the line of junction of enamel and cementum.

Gingival margin. The portion of the tooth next to the gingival line.

Gingiva. That portion of the gum tissue enveloping the necks of the teeth crownwise from the attachment at the gingival line. The free margin of the gum.

Gingival curvature. The deviation of the gingival line from the horizontal in its course around the neck of the tooth.

EXTENSION OF CAVITY MARGIN UNDER THE GUM MARGIN.

Carrying the seat or wall under the gum margin is good practice, and insures freedom from recurrence of caries. This is taught and practiced by the followers of Black.

Carrying the gingival wall or seat

under the gingival line is malpractice, and is not now, and never has been, taught by the followers of Black. But it has been persistently taught by the opponents of extension for prevention, as witness the following quotation from an article on page 414, of the DENTAL COSMOS for April 1912. The author of this article states that—"It is not the writer's purpose to answer Dr. Clack or to defend Dr. McCullough's paper. His aim principally is to *give his own views* on this much neglected subject."

He then proceeds to tell us how a cavity is prepared under extension for prevention rules, and, when he has arrived at the making of the gingival wall or seat, he says: "To proceed with the illustration, the pinhead cavity is then carried down below the gingival border. To accomplish this the said cavity must be extended to the dentin of the root, cutting away the cementum and pericementum, and dangerously encroaching on the pulp."

The making of such an extension is not now taught by Black's followers and never has been taught by them. Those who have never investigated extension for prevention fail to differentiate between placing the gingival margin of the filling under the gingival margin of the gum, and placing it under the gingival line, and I challenge any man to show me a word written by a man acknowledged to be a Black disciple advocating the cutting below the gingival line, and into the dentin of the root. "This is all an hallucination of the man who is opposed to extension for prevention."

EXPERIENCES WITH PINHEAD CAVITY METHODS.

No doubt many of you will be disappointed because I do not deliver myself of a tirade against the pinhead cavity and its followers, but I have it not in my heart to do so. Why should I? Was I not one of them myself for fifteen years? My old preceptor from Rome, N. Y., taught me to make those pinhead fillings in the proximal surfaces of the teeth. Not only did he teach me to make them that way, but he taught me to make all cavity preparations with hand instruments. He never used a dental engine, and I practiced a year without one myself. I have gone through all these "throw-away-your-pluggers" sieges, and still have all my pluggers. I have the old ivory-handled hand drill and pluggers with which I prepared cavities and filled them thirty-nine years ago, and it would be a mistake to think that I cannot use them today.

The ability to manipulate gold is like the ability to swim; the man who once masters the art, never forgets it. I am not ashamed that I was once a pinhead operator. I was one because I was taught so, and knew no other method. I was honest in my efforts to save teeth, and was probably no better and no worse than the men who practice that way today. But during those years I had so many patients who had "soft teeth." It was remarkable how the enamel margins melted away around those "concealed" fillings in two or three years. Then I had to fill those cavities again, telling the victim—"If I can only keep your teeth until you become immune, you will be all right yet," and it was a remarkable coincidence that by the time recurrence of caries had extended the margins of the cavities to self-cleansing areas, the "period of immunity" came for these teeth, and there was no recurrence of caries. I was a wonderful operator! I had saved those "soft teeth," and I could save the rest of the patient's teeth just as soon as the margins had extended to lines of immunity.

A CONVERSION TO EXTENSION FOR PREVENTION METHODS.

I was particularly impressed with these observations in the late eighties, when I had been in practice at Clear Lake for ten years, and I remember telling other dentists that my large fillings lasted the best, but I could not see why, after the patient had reached the age of immunity, the pinhead fillings in his teeth should continue to fail in the same manner. In this way I stumbled along in the dark until, in 1891, I read Dr. Black's articles on "The Management of Enamel Margins" published in the DENTAL COSMOS. Then I knew why the margins I have spoken of were immune. I read more of his writings and thought him an extremist, but I followed him—a long way off—and tried to make a compromise between the method I had been taught and the method I imagined him to be teaching. But soon it was my good fortune to meet Dr. Black, and hear from his lips the principles of extension for prevention. Then began ten years of monthly trips to the G. V. Black Club of St. Paul, where, under the teachings of Dr. E. K. Wedelstaedt and Dr. A. C. Searl, I became soundly converted to extension for prevention. I believe in it, I practice it, I preach it, I teach it, I dream it, and, if occasion requires, I fight for it. And my own experience has been the experience of hundreds of other dentists who are now unqualified advocates of extension for prevention.

This fact, of course I realize, does not necessarily make our claims true, but just as we may judge a tree by its fruit, so extension for prevention has certainly borne fruit that a Burbank might well be proud of.

A trial of twenty-one years has demonstrated that the principles of extension for prevention, if intelligently carried out, will prevent recurrence of caries for ten, fifteen, and twenty years. What more can we ask, and what other method can show like results? I am aware that there are men who, by misstating methods of procedure and attempting to ridicule the West because it is not the East, can convince themselves that extension for prevention is a failure, just as conclusively as the medieval Italian philosophers proved (?) that the theory held by Galileo that the earth revolves on its axis was incorrect. Think of it! Only a few hundred years ago a man was imprisoned, was tortured and excommunicated for believing that the earth revolved. To save his life a man of seventy was obliged to kneel once a week for three years and recant his belief. But it is reported that old Galileo, on arising from his knees, would stamp on the ground and exclaim, "E pur si muove!" (It still moves!) So methinks it has often been with "Galileo" Black. When treated with silent contempt, hissed, ridiculed, misrepresented, and maligned, he has smiled his quiet smile and affirmed—"Extension for prevention still prevents."

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

INLAYS.

By H. H. JOHNSON, D.D.S., Macon, Ga.

(Read before Section II of the National Dental Association, at its annual meeting, Washington, D. C., September 10, 1912.)

SINCE the days of pioneer dentistry, with its crude equipment and forceful methods, an ever-increasing demand has been made by reluctant victims for more humane time-saving processes.

NECESSITY FOR TIME AND NERVE-SAVING DEVICES IN MODERN DENTISTRY.

In compliance with this demand we have, step by step, made repeated advances. But as we have progressed toward more humane methods, the advance of civilization, with its rapid pace and ever-increasing grind, has continued to raise the nerve tension of mankind to a point where men are less able to stand punishment and have less endurance. Thus each improvement has been felt as a necessity to meet ever-growing conditions, and each has been hailed with delight by both operator and patient.

But even with all these modern helps and conveniences, most of us have found it necessary at times to test the endurance of patients to the limit with rubber dam and long-continued malleting, to insert, piece by piece, a large cohesive gold filling.

Many of our expert gold-builders have had their vital force weakened or destroyed in the very prime of life—for example, the late lamented Marshall H. Webb and others. We therefore owe a debt of gratitude to our gifted collaborators who, conscious of this necessity and their own overtaxed strength, have applied their minds at various periods to devise ways and means of shortening these taxing operations by accomplishing like results with less expenditure of nerve and vital power.

THE EVOLUTION OF THE GOLD INLAY METHOD.

Thus, by a kind of evolution, the inlay has been brought up to such a degree of perfection that it can successfully take the place of large-contour, cohesive gold fillings. As is the case with many other improvements, no one person may take full credit for these valuable ideas, for many, even more than can be mentioned, have had a hand in its development.

Dr. G. V. I. Brown reported methods of gold work of this nature in the *Dental Review* of June 15, 1891. More strictly speaking, these were "outlay" fillings, made after the burnishing method, and consisting in an outer plate only, cemented with gutta-percha. Dr. Brown at this time reported that he had successful pieces of this work under observation which had been made eight years previously.

In 1894, at Old Point Comfort, Dr. S. W. Foster of Georgia read a short paper describing a successful method of making what he termed "laboratory fillings." These were gold inlays made by flowing solder on a burnished platinum matrix. He reported that he had cases two years old which were still doing good service. (See DENTAL COSMOS for September 1894, page 720.)

Dr. C. L. Alexander also—"the wizard of North Carolina"—endeavored for a long time to perfect his method of gold inlay and hood work so that he might present it to the profession in a high state of development. At Asheville, N. C., before the Southern Dental Association, on July 28, 1896, he presented a paper, elaborately illustrated (see DEN-

TAL COSMOS, October 1896, p. 850), describing the most valuable and perfect system of gold inlay and hood work that had ever been read before a society up to that date, and probably up to the present time.

Many of us in the South took private instruction of Dr. Alexander in his burnishing methods of hood and cast work, and have been wonderfully rewarded by the durability of the fillings and the strength and esthetic effect of the hoods in supporting anterior ends of bridges. Others have developed methods of burnished work supported, as his was, by staples or pins, but the records give Dr. Alexander priority for his original and perfect system, and the members of the dental profession owe him a debt of gratitude.

About 1896 the late Dr. W. G. Browne of Georgia demonstrated before some of the southern state societies what might be termed "hollow gold inlays," but which he named "outlay gold fillings," as they consisted in a shell of gold covering a filling of cement. The system had advantages and did its part in developing the inlay system.

A joke is told of the only original R. C. Young of Alabama that he accidentally discovered an inlay system. While giving a clinic before a class of students in contour cohesive gold work, just as he was hammering home the last few pieces to complete the filling the instrument slipped, and he accidentallly displaced the filling. Quickly turning to his audience, he said, "Now I have come to the idea in this work which I wished to show you." Removing the filling intact, he quickly mixed some cement, filled the cavity with it, and forced the inlay back into place. Finding this idea good, he has since made many inlays in this way.

While these methods of inlay work are good and practical, its development did not stop here. Before the Odontological Society of New York, January 1907, Dr. W. H. Taggart of Illinois read a paper, published in the DENTAL COSMOS for November 1907, p. 1117, describing the wax molding method of casting gold inlays. No method that had previously been suggested was so quickly and universally adopted; that it was a valuable and practical idea was apparent from the very beginning, and Dr. Taggart certainly deserves the thanks of the profession for his method of applying this idea to inlay work.

It was quickly adopted because of the seeming simplicity and novelty of the process, and because the practicability of inlay work in saving teeth had been previously fully established, first by the porcelain inlay, and later by the Alexander methods.

LIMITATIONS OF THE WAX MOLDING METHOD OF CASTING GOLD INLAYS.

Time, experience, and scientific investigation are beginning to show that the simplicity of the Taggart system is somewhat of a delusion. It has been shown by various scientists that the working qualities of the materials involved render it difficult to obtain perfect results. No one can deny, however, that by this wax molding method inlays can be made which either fit well enough for practical purposes or can be trimmed to such a fit by using burs and wheels for a sufficient time. It will be a difficult problem to perfect the method beyond its present state of development, because the shrinkage and expansion of the bolus of metal, as well as the waxes and investments, can hardly ever be entirely overcome. The larger the cavity the more necessary and desirable it is to make a cast filling, and the larger the bulk of metal the more shrinkage and expansion take place.

Dr. W. A. Price, in a very scientific article, published in the DENTAL COSMOS for March 1911, p. 265, covering the shrinkage and expansion of waxes, investments, and golds, as affecting the perfect casting of inlays, gives the following factors of error: (1) Decreased size of the gold reproduction due to its own contraction; (2) change in the dimensions of the wax pattern by the cooling when removing; (3) change in the dimensions of the wax pattern by changes in temperature while investing; (4) changes in dimensions of the investing medium in the process of heating and cooling; (5) in casting over right-angle corners, the passing of the fluid gold over the sharp corners has the effect of brushing some of the investment away; (6) air-bubbles at the marginal groove through error in investing.

Other writers, as Lane and Van Horn (see DENTAL COSMOS, May 1909, p. 546; August 1910, p. 873; June 1911, p. 664; October 1911, p. 1109; August 1912, p. 890; September 1912, p. 973), have elaborated on methods of overcoming shrinkage and expansion, thus admitting the imperfections of the system. Indeed, one has but to make a few castings of saddle fillings in bicuspids and molars to note that this shrinkage is a factor to be reckoned with from a practical standpoint. Such fillings may be made to approximate a fit by careful grinding and burring, but they can seldom be made to seat without these changes.

THE ALEXANDER PLASTIC INLAY GOLD METHOD.

The more recent experiments of Dr. Alexander have effectually overcome all of these objections, and given us a method that is absolutely freed from shrinkage, expansion, or warpage. The Alexander plastic inlay gold can be molded directly into the cavity and invested in a small bolus of investing material, the shrinkage and expansion of which has no appreciable effect on the filling. The porous mass of gold is then solidified by flowing 22-karat solder into it. The result is a perfectly fitting inlay that has sufficient hardness to withstand mastication thoroughly.

If a higher karat is desired than would be obtained with plastic gold, moss fibre or Corona gold may be used. By using cotton rolls to protect the parts from moisture, the mold of the cavity may be made with these golds unannealed, building in and condensing large pieces until the desired fulness and contour have been obtained. The gold mold may be removed by inserting an exploring point into its surface at a point away from the margins, and lifting it out. The mold is invested in a bolus of investing material leaving some portion of the occluding surface exposed. The mass is then completely solidified by melting 22-karat solder into its surface. The solidity of the condensed mold will prevent its taking up very much solder, and will therefore represent a high karat as well as a hardened mass.

In many, not to say the majority of cases, it has been found that a matrix of thin gold greatly facilitates the process of molding the gold directly into the cavity. The matrices are best made of either No. 30 rolled gold, No. 60 gold foil, or Tatham mesh gold. A piece considerably larger than the cavity is cut out, annealed, and placed over the opening. It is so soft and pliable that it may be partially swaged to an approximation with a pledget of cotton in the foil pliers. After this either the Alexander plastic inlay gold, moss fibre, or Corona may be packed into the matrix with sufficient force to adapt its surface to the walls of the cavity. When the cavity has been filled with the gold, the matrix containing the gold mold may be carefully removed from the cavity and the surplus overlapping parts of the matrix cut away with a pair of embroidery scissors, when the filling may be returned to the cavity for a final burnishing and adaptation of occlusion. The matrix and gold mold or unsolidified filling may then be removed for investment. The investment is preferably made with S. S. White investment compound No. 4. This material has a coarse-grained consistence, so that it may be dried rapidly without cracking, and its composition eliminates contraction and expansion. The investment is made by mixing a small quantity of the material with water to the consistence of model plaster. A quantity of the size of a small marble is placed on a piece of paper, and the gold mold is dropped into it with the cavity side down. The mold is tamped down into the investment, and the material worked up over the margins until all is covered except a small opening in the center of the occlusal surface.

The investment may be placed at once upon a wire frame over a Bunsen flame for heating up. The necessary quantity of 22-karat solder, well boraxed, is laid over the opening leading into the filling, the blowpipe is applied from beneath, and heating is continued until the solder melts, when it will literally drop into the porous mass of gold beneath, filling in the interstices and solidifying it. The operation is so simple that little time need be consumed in the process. The thin gold matrix does not affect the fit, as it can readily and perfectly be adapted to every cavity surface, and is a decided advantage in many cases, as it assists in removing the mold of gold from the cavity without distortion, attracts the solder, and tends to pull it down through the mass of gold above. Emphasis is placed upon the impracticability of using thin platinum as a matrix instead of thin 24-karat gold. Platinum is too harsh and unyielding, and should never be used.

Fillings made after this method need no cutting or grinding to adapt them to the cavity, as there is no shrinkage or warpage from expansion or contraction of metals or investment. Every step is direct, there is no transferring from an impression to a mold, and no wax to shrink or expand.

I would emphasize the fact that it is easier to make a perfect mold of the cavity with plastic inlay gold than with wax, and the adaptation is much more certain. It is also easier to make a mold with plastic gold than with moss fibre or any of the fiber golds.

Plastic gold is applicable for occlusal surfaces of crowns, backings of porcelain facings, the mounting of Logan crowns, etc. The certainty of a fit, the time saved in adjusting, to say nothing of the time lost in burning out wax molds, as required in the Taggart process, is well worthy of consideration.

SUGGESTIONS FOR MAKING ALEXANDER GOLD HOODS.

Before closing, it might be of interest to call attention to Price's artificial stone as a help in making the Alexander hoods. After the tooth is prepared and the staple or the pins used are in place, an impression of the tooth is taken with Dr. Price's special wax. The pins or staple will come away in the impression. A model of the tooth is made in "artificial stone." The thin 40-gage, 24-karat gold may now be burnished over the stone model, and, to facilitate burnishing the gold may be soldered to the pins or staple with a tiny piece of 22-karat solder to form an attachment to hold the unfinished hood in place. All annealing and soldering can be done on the stone model, as it stands the heat perfectly. When the adaptation is complete, solder may be flowed over the surface of the gold to the thickness desired, thus completing the hood.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

WHAT IS MEANT BY DRUG STANDARDIZATION?

By F. E. STEWART, Ph.G., M.D., Philadelphia, Pa.

(Read before Section II of the National Dental Association, at its annual meeting, Washington, D. C., September 10, 1912.)

A VISITING physician of one of the large Philadelphia hospitals called me up by telephone for information regarding the failure of fluid extract of apocynum to relieve dropsy in three patients under his care. Finding that he did not know whether or not the fluid extract had been standardized, I suggested the use of a standard preparation. Three or four days afterward my medical friend again called me up to report that the standardized fluid extract procured at my suggestion was promptly effectual, and said: "If standardization means so much for other drugs, it is about time for the medical profession to awaken to its importance."

IMPORTANCE OF DRUG STANDARDIZATION.

A prominent Canadian physician, to whom I was demonstrating the modern methods for drug standardization in the laboratory, said: "The medical profession knows in a general way that drugs vary in strength, but only few physicians are aware of the wide variations in such important drugs as digitalis, strophanthus, and apocynum demonstrated here today. We know that some bicarbonate of sodium is pure, and other lots are purer. This is about my limit of knowledge, but that digitalis fluid extracts on the market may vary 300 per cent. in active constituents, and strophanthus fluid extracts show a variation of 6000 per cent., is an eye-opener to me."

The importance of drug standardization is so great that all intelligent persons, laymen as well as members of the medical and pharmaceutical professions, should be informed of its value. For without this knowledge physicians do not realize the necessity of discriminating in favor of standardized products when prescribing, pharmacists do not appreciate the necessity of standardizing their products, or purchasing their supplies from manufacturing houses engaged in standardization work; and people ignorant of the fact that preparations of the same name may differ so widely as to be dangerous to life, take prescriptions to drug stores where they can get them compounded at the cheapest price, without regard to the character, quality, and strength of the ingredients that enter into them.

NOMENCLATURE.

One of the first factors of importance in the consideration of drug standardization is nomenclature. To every drug a name must be given by which it may be invariably known and dealt in. The Latin language is generally employed, because it is a dead language and is not liable to change, as is the case with a living language.

The name adopted must belong to the common language of science, and not be commercially controlled. So-called trade-mark names or trade names do not meet the requirements of science. If the product is not provided with a scientific proper name, standardization demands that the scientific societies should name it, or the government might well do so in connection with the enforcement of the pure food and drug law. As for the trade names, text-books are adopting them as generic appellations or synonyms without protest from the manufacturers, who therefore cannot justly complain if competitors adopt them for describing identical products.

METHODS OF STANDARDIZATION.

Botanical standardization is absolutely necessary in establishing the identity of vegetable drugs. *Capsicum fastigiatum* is the botanical name for the variety of capsicum designated by the U. S. Pharmacopeia. *Capsicum* indicates the genus, *fastigiatum* the species, to which the plant belongs. In relation to medicinal chemicals the U. S. P. gives in the "purity rubric" the amount of permissible innocuous impurities in each case. More than this amount the substance must not contain to comply with the U. S. P. standard.

Preparations of chemical drugs are standardized by chemical assay. The same applies to preparations of vegetable drugs containing active principles susceptible to assay chemically. But there are a number of important preparations of drugs which cannot be satisfactorily standardized in this manner. I refer to the preparations of digitalis, aconite, cannabis indica, convallaria, ergot, gelsemium, lobelia, squill, strophanthus, and veratrum. These preparations are standardized physiologically by tests on animals.

Physiological or pharmacodynamic standardization is likewise employed for standardization of adrenal glands, thyroid glands, etc.

Antitoxin and curative sera are also standardized physiologically; bacterins (bacterial vaccines) are standardized by bacterial count. The strength of old tuberculin is approximately determined by clinical tests, and the same applies to smallpox vaccine, while the newer tuberculins, "T. R." and "B. E.," are standardized by determining the content in solid substance.

LEGISLATIVE REGULATIONS.

The Food and Drug Act of June 30, 1905, made the United States Pharmacopeia and the National Formulary official standards for interstate commerce in drugs and medicines. Most of the states have enacted similar legislation. Consequently drugs and preparations sold under the U. S. P. and N. F. names, must be made in accordance with the standards laid down by these authorities, or they are misbranded and are liable to seizure by the government. Manufacturers and dealers who do not follow these standards are amendable to the law. The national law and the laws of most of the states permit the sale of products differing from these standards, if the differences are plainly stated on the labels. Some of the state laws are more strict and permit no deviation.

EXAMPLE SHOWING THE ABSOLUTE NECESSITY OF STANDARDIZATION: APOCYNUM.

By way of illustration let us consider the method of physiologically standardizing fluid extract of apocynum. Apocynum belongs to the group of so-called heart tonics, of which digitalis is the chief exponent. I have two reasons for considering apocynum first. One is that it permits a continuance of my story relating to the use of this drug in the treatment of dropsy in the clinical service of my medical friend; and the other is the opportunity of pointing out the advantage of physiologic tests for a drug not properly standardized botanically.

"Fluid extract of apocynum" is the U. S. P. name for a preparation of the "dried rhizome and roots of *Apocynum cannabinum,* or of closely allied species of apocynum," and is made by percolating the dried and powdered drug with a mixture of alcohol, water, and glycerin. The Pharmacopeia directs that each cubic centimeter of a fluid extract shall contain the active constituents of one gram of the drug from which it is prepared. Fluid extract of apocynum should therefore represent the drug volume by weight. In other words, one minim (drop) should approximately represent in activity one grain of the dried and powdered drug.

Apocynum is commonly known as Canadian hemp, or black Indian hemp, and is also called incorrectly "Indian hemp." It belongs to the *Apocynaceæ,* or dogbane family. This remarkable family of plants consists of about 130 genera, including more than a thousand species, growing abundantly in most tropical countries, thence decreasing to rarity in temperate regions. The plants are trees or erect climbing shrubs, rarely perennial herbs, and are among the handsomest and many of them among the most fragrant in the vegetable kingdom, and are largely used for decoration. Otherwise, except for a few edible fruits, and the rubber-yielding species (African rubber is chiefly the product of this family), this species is interesting chiefly from its medicinal and poisonous properties. So numerous and abundant are these plants, and so generally and intensely poisonous are they, that their appearance should be noted by everyone, to be avoided. A botanical description would exceed our space limit.

The active constituents of the plants are alkaloids and glucosids, which may be encountered in any of the plant parts, but are especially common and abundant in the bark and seeds. Among savages these are very common agents of criminal, military ordeal, and legal poisoning, and accidental poisoning by them is not infrequent. Some of the most powerful arrow poisons are derived from this family.

We are in complete ignorance as to the species of apocynum which should yield this drug. Up to a very recent period, five or more distinct species were included under the name *Apocynum cannabinum,* even in our standard botanical works, and the plants themselves are not distinguished. It is therefore impossible to ascertain which species should yield the drugs whose actions have been reported under that name. This fact doubtless explains, in great part, the conflicting testimony regarding the medicinal activity of the drug.

The drug as it appears on the market is of indefinite length, one-eighth to one-third of an inch thick, cylindrical, wrinkled, fissured, orange brown, becoming gray brown on keeping, almost inodorous, and in taste starchy, afterward becoming bitter and somewhat acrid. The active constituents are the bitter glucosids, apocynin and apocynein. Its effects are similar to digitalis (common name "foxglove"). Apocynum is usually given in the form of fluid extract, the average dose of which is 5 minims.

From the foregoing it must be very apparent to any thinking person that fluid extract of apocynum, when prepared from a drug not properly standardized botanically, is a very uncertain preparation. As already stated, we are in complete ignorance as to the species of apocynum which should yield this drug; so we are not sure when purchasing it that we have the species containing the glucosids to which its medicinal value is due. No way is provided by the Pharmacopeia for determining whether and in what quantity these constituents are present. Even though an assayed drug should be employed, no directions are given to ascertain whether the finished preparation contains them in proper amount. Unless the finished fluid extract is subjected to standardization, the dose of five minims may be too large, or, on the other hand, the preparation may be inert.

Is it any wonder under such circumstances that the hospital physician who called me up did not obtain satisfactory results from fluid extract of apocynum in the treatment of dropsy? But a very different report followed the substitution of a standardized fluid extract. The dropsy which threatened the patient's life commenced at once to yield, and the heart and kidneys to resume their functions. Let us therefore consider how fluid extract of apocynum is standardized.

Apocynum belongs to the so-called "digitalis series," which includes digitalis, or "foxglove," apocynum, convallaria (commonly known as "lily of the valley"), squill, and strophanthus. The drugs of this group have the peculiar power of stimulating the heart, and are of enormous value in the treatment of certain diseases of the heart and kidneys. When given in medicinal doses, they cause the heart to contract and empty itself with greater force, thus restoring the circulation of the blood to the kidneys and other organs in case of heart weakness.

This property of strengthening the heart's action is invaluable in dropsy, in which impaired circulation is a prominent factor. By their action on the heart and arterial system—which is, in fact, a continuation of the heart, by reason of its muscular walls with their contractile power aiding the circulation—such drugs as apocynum, digitalis, and strophanthus also act as diuretics. Forcing more blood through the kidneys, they aid in purifying the blood of urea—the ash of tissue waste—and so preventing death from uremic poisoning. By their use the most severe forms of dropsy may often be quickly relieved, the weak and dilated heart restored to normal action, and the patient at death's door returned to fairly good health and continued many years in a life of usefulness.

STEPS IN STANDARDIZING.

The first step in standardizing preparations of drugs is to assay the crude drugs before purchasing. The manufacturer of standardized drug preparations would soon find himself out of pocket if he neglected this precaution. Drugs are of value in direct proportion to the active principles they contain, and these constituents vary in different lots.

The next step consists in assaying finished products and adjusting the amount of active principles present to fixed standards. This is accomplished either by chemical assay, or by physiological tests on animals, or by both methods, one being used as a control for checking results obtained by the other.

STANDARDIZING BY THE "LETHAL DOSE" METHOD.

A number of physiological methods for standardizing the digitalis series of drugs are in use, among which is the so-called "lethal dose" method of Reed and Vanderkleed. The first step in this method consists in determining the lethal dose; this is accomplished in the following manner: A series of guinea-pigs is selected, each weighing approximately 250 grams. The preparation to be tested, if a tincture or fluid extract, is then freed from the greater part of alcohol by evaporation, and diluted with water to the desired quantity. Into a series of four of the guinea-pigs this dilution is now injected in amounts equal to 9/10, 10/10, 11/10, and 12/10 of the standard lethal dose. The animals are then placed in cages and allowed to remain for twenty-four hours, when they are examined, and a note is made of those which are living and those which are dead.

The result of this preliminary test, in which the range of dosage is quite wide, enables the investigator to form some idea as to the strength of the preparation. Basing the dosage upon these results, other series of guinea-pigs are injected with progressively increasing or decreasing doses, as the case may be, still further diminishing the variations between doses, until the smallest amount is found which will prove fatal within twenty-four hours. The probable minimum lethal (toxic) dose of the preparation, unless it deviates considerably from that of the standard, is generally obtained by one or two series of injections.

In order to express the percentage results, it is necessary to adopt for each drug or preparation assayed a standard minimum lethal dose (m. l. d.) with which the preparation being tested may be compared. For example, the m. l. d. of fluid extract of digitalis is 0.1 cc.; that of fluid extract of strophanthus, 0.0025 cc.; that of tincture of strophanthus, 0.025 cc.; that of fluid extract of apocynum, 0.075 cc. After comparing the preparation to be standardized with the standard m. l. d., it is diluted or concentrated, if necessary, to bring it down or up, as the case may be.

As already stated, digitalis fluid extract on the market may vary 300 per cent. in strength. This fact was stated in Bulletin No. 48, issued by the U. S. Bureau of Hygiene, Washington, D. C. Later researches show the variation to be from 30 per cent. to 400 per cent.

FATAL RESULTS OF SLIPSHOD METHODS.

Now, as digitalis is one of the most important drugs in the treatment of diseases of the heart and kidneys, and conditions often arise in practice when the patient's life is entirely dependent upon its prompt and decided action, accuracy in dosage is essential. Unless the dose is large enough to produce the required effect upon the heart and circulation, failure results. If the dose is too large, the patient dies of digitalis poisoning. Imagine the danger resulting from neglect to use standardized digitalis preparations: The patient takes the prescription to the druggist, who secured his pharmaceutical education before the advent of the modern drug standardization, and obtains a fluid extract or tincture below standard. The dose prescribed fails to relieve the patient, and is therefore increased. We will assume that the tincture is prescribed in 15-drop doses. This dose failing to relieve, 20-drop doses are given, to be rapidly and progressively increased for effect until 60 drops are used per dose, and the same administered three times a day. After a week or more the phial is emptied, and the patient sends to the drug store for renewal of the prescription. In the meantime the druggist has purchased a fresh supply of tincture of digitalis which happens to be three times as strong as the weak preparation first used. The patient goes on with the 60-drop dose as before. But now he is taking three times as much drug at a dose, or an amount equal to 180 drops. The toxic action of the drug soon manifests itself, the patient grows worse and worse, and finally dies in convulsions which are ascribed to uremia—when they were, in fact, due to digitalis poisoning.

"How careless the doctor!—how careless the druggist!" say you. Nay; rather say, "How ignorant and negligent are both of the importance of drug standardization!"

Or, the physician, fearing to give larger doses of digitalis than that laid down in the text-books as a maximum, goes on with his ineffectual dosing, and the patient finally dies in uremic convulsions. In either case death is the result, and the cause is the same—namely, want of standardization of the digitalis preparation employed.

CENTRAL BOARD OF CONTROL ADVOCATED.

It may be asked why not separate the active constituents and use them for medication instead of trusting to the uncertain fluid preparations of the drug? There are insurmountable difficulties in this matter; in the first place, the active principles of digitalis are only partially known, and the isolation of those with which we are acquainted is attended with considerable difficulty. There appear to be at least four glucosids in digitalis which possess the characteristic action on the heart and circulation, and these are accompanied by one or more glucosids decidedly different in their effect. The therapeutic action is composite and is due to the combination of a number of principles which act and react on one another to produce the characteristic effects of digitalis as a therapeutic agent; therefore, the only way to be sure of obtaining the desired effect is to use a physiologically standardized preparation of digitalis itself.

Therapeutic standardization by the coöperative investigations and impartial discussions of competent observers are necessary. Progress in scientific materia medica is dependent upon it, and public welfare demands it. How can we as physicians meet our obligations in this regard when new products are controlled commercially and introduced by advertising? Until some plan is adopted for the protection of professional interests, impartial discussion is impracticable. If reports concerning advertised products are adverse, there is a danger of lawsuits;

if they are favorable, there are suspicions of purchase. A strong central board of control representing commercial as well as professional interests is urgently needed, to prevent dishonest exploitation of common interests by selfishness.

DETERIORATION OF DRUGS BY THE ACTION OF THE AIR.

One of the problems of standardization is to prevent the finished product from deterioration on account of the action of the air. Preparations of ergot, digitalis, strophanthus, aconite, and several other important drugs soon lose their strength on this account. It has never been realized until lately that most of the deterioration going on in fluids owing to the action of the air, is due to the air held in the fluid rather than to the air in contact with the fluid in the container. For example, a container may be completely filled with a fluid and then hermetically sealed, yet the oxygen of the air in the fluid will continue to act and cause its deterioration.

Researches were made in the Mulford laboratories by Pittinger and Vanderkleed to determine the influence on deterioration of exhausting the air from fluids, and then sealing them hermetically under vacuum. Fluid extract of ergot was chosen for the experiment. First of all, the fluid extract was tested by injection into dogs, and gave an immediate rise of blood-pressure represented by 44.8 mm. of mercury. The total assay for alkaloids by the process of Meller gave a percentage of 0.163. This fluid extract of ergot was then divided into four portions, as follows:

A: The first portion was put up in vacuum in tubes specially designed and made for this purpose.

B: The second portion was filled into bottles which were tightly corked, and allowed to remain for one year unopened.

C: The third portion was filled into bottles which were kept loosely corked for one year, this being obtained by boring a small hole in the cork.

D: The fourth portion was tightly corked, but opened occasionally throughout the year.

These four samples were tested upon dogs at the end of twelve months, with the result that, with A, no loss of blood-pressure-raising power was sustained; this was also true of the percentage of total alkaloids. Of the other samples, the tightly corked sample, B, deteriorated the least (about 35 per cent.). A greater deterioration was noted in C, while D (bottles tightly corked, but opened occasionally, under which conditions the preparation is commonly kept) showed the most marked deterioration (67 per cent.).

These investigations would indicate that, with complete exhaustion and exclusion of the air from the container and its contents, practical permanence may be secured.

CONCLUSION.

I hope my paper has proved of sufficient interest to excite your desire to investigate the subject of standardization more deeply, and I am sure, if you do so, that many astonishing revelations await you. Among other things you will discover one of the causes of therapeutic nihilism, and you may find out that drugs possess powers undreamed-of, that can only be revealed by drug standardization.

ARISTOCRACY IN DENTAL EDUCATION.

By B. HOLLY SMITH, M.D., D.D.S., Baltimore, Md.

(Read before Section II of the National Dental Association, at its annual meeting, Washington, D. C., September 10, 1912.)

CARLYLE says in his "French Revolution"—"Aristocratism rolls in its carriage, while patriotism cannot trail its cannon."

Those who are disposed to reflect upon the growth and progress of dentistry, to recognize its vast scope of usefulness to the human race, are bound to con over in their minds the causes of that growth, and to estimate whether the forces which have influenced it have been as effective as they should. As a prominent factor in that development, the dental college has, from time to time, come in for a great deal of criticism, much of which was just and helpful, but some of which, your essayist thinks, was neither fair nor well intended.

EDUCATIONAL PRINCIPLES OF EARLY DENTAL COLLEGES.

The beginning of the dental college was, fortunately, in the hands of men who held in high esteem, and promulgated, a system of ethics which at once became the foundation of the new profession. From that time to the present there has been a gradual growth in appreciation of our services on the part of the people, and a corresponding development, on our part, of a keen sense of our responsibility to them. Associate and affiliate as much as we will with men of other professions or specialties, we are unwilling to have that growth of appreciation abridged or that responsibility divided.

In the organization of the dental college, the founders recognized the importance of having the strictly medical branches of the dental curriculum taught by medical men, so that physiology, anatomy, chemistry, and allied branches were always so taught; but these courses were always supplemented by dental instruction of a special character. For instance, to the course of chemistry was added metallurgy; to anatomy and surgery, special or oral surgery, to materia medica dental materia medica and therapeutics. In other words, the instruction was so shaped as to create a broad-minded specialist, equipped by training that could not be gotten in mere medical courses.

While in the early days of dental education the names of Baxley and Bond were associated in high esteem with those of Harris and Hayden, all the Bonds and Baxleys from that day to this have not and could not have made a dentist. This unique product is the result of the special training which alone could produce it.

MODERN TENDENCIES IN DENTAL EDUCATION.

It was the work done by these specialists, graduates of dental colleges, which caused medical schools and universities to consider it of sufficient importance to establish departments of dentistry in their institutions. These departments have done good educational work in a field where such work was needed, and where, but for them, it could not otherwise have been accomplished, and it is not the purpose of your essayist to criticize the results of that work. He does, however, deprecate a "holier than thou" attitude of mind which has recently grown up among them toward that class of education which existed before they entered the field.

Some of these special pleaders, without establishing their claim to authority and with no proof of superiority, have advocated the abolition of all dental colleges—strictly speaking—have charged against these institutions abuses and deficiencies which do not exist, and have fomented opposition and antagonism until some of their boldest followers are advocating doing away altogether with the degree of Doctor of Dental Surgery. They are barnstorming about at dental meetings crying—"Down with the D. D. S.!" "Come and take a ride in the university aeroplane!"

Not only have such advocates no respect for precedent, no veneration for the heroic deeds of their forebears, but they entertain a very mistaken notion of the needs of the hour. They exhibit a boastfulness and vanity never an accompaniment of the truly great. They would besmirch a title which great men have been proud to honor; they insult the flag under which the pioneers and leaders of our calling have so ably and successfully fought.

I never hear these theorists—and who attends meetings of our specialty that does not hear them?—without being reminded of words of wisdom (?) which emanated from a dear departed old bachelor friend on the subject of the proper bringing up of children. He denounced mothers in general as imbeciles or idiots, because they did not compel their children to wear tight-fitting caps which came well down over their ears, so that those appendages might be trained to sit flat against the side of the head and not stick obnoxiously out at an angle. The quotation "Little pitchers have big ears" aroused my bachelor friend to scorn, and the youthful chap who could hear from the distant meadow the cry of the plover, or from the deep tanglewood the sharp sweet song of the cardinal, possessed no advantage in his eyes.

THE LARGE UNIVERSITY DENTAL DEPARTMENT VS. THE SMALL DENTAL COLLEGE.

Dental education in the United States has made very satisfactory progress in the past seventy years. Since the organization of the Baltimore College of Dental Surgery in 1839, there has been a general and steady improvement in the methods of training, the preliminary requirements exacted, and the time occupied; until today the dental student must present for admission a diploma from a recognized high school or its equivalent; must spend three years of seven months each in attending upon lectures and demonstrations, and has the opportunity to spend the intervening time between sessions in the infirmary in the actual practice of dentistry. The equipment of the average dental college is ample; besides this, the institution becomes in any community a center of training, not only by the regularly authorized teachers, but by clinicians who are not connected with the school, but who by inventions or demonstrations of skill become prominent.

The almost inevitable output of these institutions should be prepared to meet the requirements of the most exacting; and yet we know that they do not invariably exhibit satisfactory evidence of proficiency. Much of the delinquency is due to personal characteristics or habits, and perhaps could not be weeded out by any system, but unquestionably much can and should be done to prevent the advancement to graduation of an inattentive or delinquent pupil. This, in the judgment of your essayist, can be done only by establishing a closer personal contact between pupil and teacher. In many of our professional schools the student is a free lance; if he makes good with the attendance officer and passes his examinations, nothing more is required of him. There is little effort made to discover and direct unusual outcroppings of genius or skill, or to better by advice or encouragement lapses of discipline or breaches of good habits. The pupil is left too much to his own resources, and many of his efforts are not well directed. He is more like a careless gleaner than one of a well-organized company of reapers. In the Baltimore College of Dental Surgery the students are divided into sections of eight, with a section captain and a section quiz. The section captain keeps in touch with his eight men, and reports to the teachers as to their progress and behavior. In this way, when a man is found to be falling behind, he is sought out, and an effort is made to start him over or help him up. Many times these men are simply involved in unfortunate companionship or are discouraged or homesick. In professional schools where the classes run into hundreds, individual neglect is almost unavoidable. Frequent examinations, it is true, help to keep the whole class in line and at work, but many students need and should have the constant supervision and friendly advice of the teacher. During the seven years that I acted in the capacity of demonstrator, I can recall with great pleasure the wonderful unfolding of cleverness in the young dental operator, after a little straightening out by friendly advice and demonstration, whereas with pain I recall the blunderings of my own student days, when, for lack of these helps I often arrived by some circuitous and difficult route.

The problems of dental education, in the judgment of your essayist, will not be solved by any syndicate of universities with enormous classes a considerable proportion of which speak and can understand only a foreign tongue, but who, by the use of their quiz compends and other helps, move on with the army of students from promotion to promotion, and emerge finally by graduation without having a sufficient knowledge of the language to enable them to comprehend intelligently the lectures which they attended. No one would be so stupid as to deny that equipment is essential both to the individual and the institution, but no amount of equipment can take the place of the personal skill and ability of the operator or teacher. The latter must not only be well-informed in his subject and its corollaries, but he must be able to impart a knowledge of these to the student, and this he cannot do so successfully at a distance as he can when he is in close contact with that student. In the schools where the classes are smaller, the opportunities for this close personal supervision are greater, and the student is more than compensated for lack of volume in the "rah-rahs" of his class yell by the inspiration he gets from his close association with his experienced teacher.

NECESSITY OF POSTGRADUATE COURSES IN UNIVERSITY DENTAL SCHOOLS.

The value of this intimate relation is fully appreciated by everyone of experience. Who but can recall the wonderful influence upon operative procedure of such men as Robert Arthur, Varney, Webb, Bonwill, Palmer, Brown, and others? These men taught as clinicians, and their demonstrations were followed at the chair by as many as could see—those in the outer circle reaped practically no benefit. Postgraduate courses are today almost necessary to the students, because special training in small sections has not been carried out in the regular course. It certainly does not seem fair that, for this postgraduate instruction, the student is expected to pay a special fee to the very man whom the college circular advertises as its specialist upon that branch. If the student can be made more proficient by this method of teaching in small classes, then the method should prevail invariably, and not be a matter of selection by the student who can pay the price. If the advertised fee of the institution is not sufficient properly to compensate the teacher for teaching the whole class in the most effective way, then the fee should be raised, and so advertised. No one who is employed as a teacher in an institution should be allowed to accept a special fee from a student of that institution, and his services should be as free to one as the other. His ambition should be to send out only prepared men, and to this end he should be willing to spend his time and effort freely with those who need it. If there is a place in the world for altruism, it is in the heart of the teacher. Everywhere we find him overworked and underpaid, and so, perhaps, it will always be, but the teacher has other compensations which count for more than money. No man who has really taught can cast a scornful glance at his past effort. He knows he must live on and on, in the execution by his pupil of the principles which he imparted.

DRAWBACKS IN THE DENTAL STUDENT'S ATTENDANCE ON MEDICAL COURSES.

In line with the argument for a closer contact between the teacher and pupil, I cannot avoid what I think is a just comment on medical schools and universities having dental departments, which, for economical reasons, compel their dental students to take many of their branches of study with the students of medicine. In many cases they form but a small minority of a very large class, but are compelled to spend their time in attendance upon lectures where the professors too often are poorly informed as to the principles in the science and art of dentistry. They are either ignored as to any special training in the subject or are treated as an ever-present source of pleasantry and amusement, both by the professor and their associates of the medical classes, not only in the lectures but also in the examinations. "Oh, you are only a dental student," not infrequently follows identification. Can anyone tell me that this is a wholesome atmosphere in which to build respect and love for one's calling? Does the makeshift hold his head higher under such identification? Is the time of the dental student most advantageously spent in picking up crumbs that fall from the medico's table, following, often at great distance, in the labyrinthine excursions through the domain of therapeutics and materia medica? If that medical professor were informed as to the necessities of the dental practitioner and condescended to lead him by the hand, well and good; but to make him a rank outsider, as is too often the case, involves both the institution and the student in a fraudulent transaction.

DURATION OF COURSE OF INSTRUCTION.

A knowledge of medicine is of unquestioned advantage to the dental practitioner, but any greater knowledge than is gained in the regular course of dental instruction should be acquired in other time than that which is allotted to obtaining a dental degree. In some of our universities, the D.D.S. and the M.D. degree have both been awarded after four years, the same time which is demanded for the acquirement of the M.D. degree alone. Certainly, an injustice on one of these degrees must have been perpetrated. Three years is short enough time to prepare the most earnest student for the practice of dentistry, and the Association of Medical Colleges has declared that four years is not too long to prepare the medical student to become a practitioner of medicine. Railroading students into both of these degrees in four years cannot be looked upon with favor.

THE TEACHER AS THE MOST IMPORTANT FACTOR IN DENTAL EDUCATION.

The most important factor in dental education is the teacher. Our schools must involve in their work the co-operation of men of broad minds—men who are students, and who possess the rare quality of being able to impart information; men who can inspire the pupil with a desire to be a credit to his calling, who can persuade him to make the sacrifices required, and impress upon him the fact that college work is only the beginning, a training that will fit him for study which will yield greater results when experience is added to correct effort.

The Institute of Technology, which holds a yearly meeting of a few days, might readily hold a sort of summer chautauqua, where as many weeks could be profitably spent in demonstrating methods of teaching. It is safe to say that enthusiasm might be engendered and technique improved if, at some cool mountain resort, several of these meetings could be held in different sections of the country. The writer knows scores of men whom he would go a great way to sit under and hear explain the details of their work in the classroom—not all old men, either.

After all, the question is one of idealism, of unselfishness, of personal service; personality that will inspire, accompanied by the requisite knowledge and ability.

THE NECESSITY OF GREATER NUMBERS OF PRACTICING DENTISTS.

Statistics show that only ten per cent. of the people have any dental attention at all, that much over ninety per cent. are sorely in need of such attention. In almost every township and city in this country these facts are being impressed upon the authorities and people in general. A few municipalities are employing dentists to correct this evil, but the universal employment of such dentists seems to me the only solution of the effort to reclaim the teeth of the nation and restore their owners to health.

In the examination of the teeth of about a thousand children in the public schools of Baltimore, ninety-seven per cent. were found defective, and in many cases we were confronted with the statement that it was absolutely impossible for the parent to pay for dental attention. What are we going to do about these conditions, which probably prevail in most communities? If a laboring man, a father of five children, gets \$1.50 per day, how many amalgam fillings at \$2.00 per filling can he afford to pay for?

I do not want to cheapen dentistry, but I do wish to place needed dental attention within the reach of every man, woman, and child in this country. They need it for the protection of their lives, for the increase of their comfort and happiness, to augment their efficiency. It is our place to see that they get it. There should be thousands of young men and women working in municipal dental infirmaries for \$25 a week, and there will be. The time is not far distant when any community which has proper regard for the health and comfort of its citizens will make some such provision.

If I am right in this prophecy, what five universities can train the army who will be needed for this service? A few of them, I expect, will have to be trained at the dental colleges.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

Proceedings of Societies.

NATIONAL DENTAL ASSOCIATION.

Sixteenth Annual Meeting, held at Washington, D. C., September 10 to 13, 1912.

SECTION II: Operative Dentistry, Nomenclature, Literature, Dental Education, and Allied Subjects.

Chairman—F. O. Hetrick, Ottawa, Kans.
Vice-chairman—Joseph Head, Philadelphia, Pa.
Secretary—E. P. Dameron, St. Louis, Mo.

(Continued from page 192.)

Tuesday—*Evening Session.*

The first session of Section II was called to order on Tuesday evening, September 10, 1912, at 8 o'clock, by the chairman of the section, Dr. Hetrick.

The Chairman announced as the first order of business for Section II the reading of a paper by Dr. B. Holly Smith, Baltimore, Md., entitled "Aristocracy in Dental Education."

[This paper is printed in full at page 310 of the present issue of the Cosmos.]

Discussion.

Dr. H. L. Banzhaf, Milwaukee, Wis. The essayist has prepared a thoughtful paper—I may go farther than that, and say that I consider it a beautiful paper. His diction and the flow of his words, the arrangement and expression of his thoughts, elicits my admiration, and it occurred to me while listening to Dr. Smith that it is pleasant to know that we have men in the dental profession who can lead us into the green fields and by the side of running waters in literature.

I have no intention, in fact it is contrary to my policy, ever to affront any audience by offering an apology, but I am sorry, nevertheless, that time did not permit the preparation of an analysis of Dr. Smith's paper. I read the paper over, but did not have the time to prepare an analysis, and I fear, therefore, that I might not do justice to the subject. It seems to me that the crux of the proposition is whether the attitude of the so-called dental departments of the universities toward dental education and toward the so-called private dental colleges is an equitable one; whether there is the proper co-ordination, or whether there is the proper sympathy for dental education and for the purpose for which dental colleges were organized.

I do not know whether there is a holier-than-thou attitude in dental education; possibly such an occasional expression may have been misinterpreted as being the thought of one man. Possibly he is the executive head of a university dental school, but I am inclined to think that he does not represent the thought, conviction, and belief of the teaching force of that school. I believe the teachers in a dental school, if they have any justification for being teachers, do more to make for thoroughness than a dozen executive heads of schools put together.

I am inclined to believe that there is room for all dental schools that so wish to conduct themselves honestly. There never was any criticism of dental colleges to amount to anything until some years ago, when so many dental colleges sprang into existence. Then, by and by, the supply became too large, as it were, and it was discovered that some schools had no endowment, which is an important factor, and their income was so small that they could not be properly managed. I believe, however, that time is curing these conditions, and there is a place for the majority of schools at least, so that we need not quarrel about this particular.

The essayist has spoken of the personal contact between teachers and students that exists in schools that have small classes. It does not necessarily follow, however, that small schools and small classes make for the greatest efficiency. Endowed schools, provided they have the necessary number and the right kind of teachers, can do quite as well as the smaller schools, however much I appreciate the element of personal contact.

The essayist has touched upon the social side of dental service in a very sympathetic and beautiful manner. The National Dental Association started some years ago a great health movement, and I can well understand why it is vitally interested in the kind of men who are entering the dental ranks.

Despite the essayist's criticisms, I think it is still possible for dental education to make progress and be of service to humanity. To use Browning's words, which you probably remember—

Then welcome each rebuff that turns earth's smoothness rough,
Each sting that bids nor sit nor stand, but go!

Dr. H. E. Friesell, Pittsburgh, Pa. I am somewhat astonished to see two papers on dental education on the program of the National Dental Association for this meeting. It seems to me that there are subjects of enough importance that belong particularly to the National Dental Association's province to eliminate for the time being the problems of dental education. In the past it has been said by overworked executive committees in state and national societies that a hit at the dental colleges would always start up an interesting discussion, but I do not believe in hitting anybody, unless there is a principle involved and unless it is intended to carry the issue to a proper solution.

As to this particular paper, I personally do not comprehend its aims, therefore my ability to discuss it is particularly limited. We have among the dental associations three that exist principally to cover these questions of dental education, and I think these bodies are able to take care of this question. The national and state societies should therefore be left to look after subjects that pertain more particularly to the work of the profession itself. The bodies mentioned are the National Association of Dental Faculties, the Institute of Dental Pedagogics, and the Educational Council of America. The National Association of Dental Examiners and the National Dental Association are represented on the Educational Council, and it seems to me that subjects pertaining to dental education should in the future be very properly referred to the Dental Educational Council as a section of this body to consider educational methods.

One item in the paper appeals to me strongly, *i.e.* that in the dental departments of medical schools and in many university dental schools various subjects in the curriculum are being taught by teachers who are not dentists, and the dental students are mixed with the medical students—as a necessary but relatively unimportant portion of the class. Personally, as a dental school teacher, I do not believe in these methods. I believe that every subject in the dental curriculum should be taught by dentists. Unfortunately, however, up to this time very few of our dentists seem interested in such subjects as anatomy, pathology, materia medica, bacteriology, etc., but this is the fault of the members of our dental profession. If you will give the schools teachers who are dentists, we can have the medical subjects that belong to the dental curriculum taught better by dental teachers than can be done by medical teachers. The combining of medical and dental students in studying a given subject is pedagogically and professionally wrong.

Dr. R. L. Simpson, Richmond, Va. If you had been in Baltimore during the democratic convention and had seen and heard Dr. Smith singing that Wilson song, you would have known that he was a genuine progressive, but from his paper tonight you would surely think he was a standpatter, going to vote for Taft.

Dr. Smith has attained much of his reputation because of his progressive ideas in dentistry, and it is with a great deal of sorrow that I have heard this paper. We have no imaginary thing confronting us; we have a condition to meet, and we must meet it squarely and without fear and trembling on our part. We must consider only the usefulness of dentistry.

Drs. Hayden and Harris never originally intended that there should be a separate degree. They tried to get dental instruction incorporated in the medical course like other subjects, such as surgery and diseases of the eye, ear, nose, and throat. In taking the M.D. degree the student does not take simply the specialty he intends to practice, but he has a broad knowledge of all branches, so that he will know how far each branch extends into his work, and how intelligently to send patients to men who specialize in other lines. We need broader knowledge in dentistry, and when the essayist mentioned the names of Varney, Webb, and others, I could not help thinking how much more useful these men would have been if they had been more broadly educated. Dental education has been so narrow that we have hardly any D.D.S. who is capable of scientific research—we can point with almost unanimity to Dr. G. V. Black. The reason for this lamentable condition is that the D.D.S. degree has been given without a proper knowledge of the medical branches. It is a notorious fact that we dentists have been trying to deceive ourselves; we assure our patients that we receive an education in the fundamental medical branches, when we know that those fundamentals are largely abbreviated for the dental student. I cannot blame the medical men for saying, "Oh, you are just a dental student!"

WHAT IS OUR SALVATION?

In Virginia we have given an answer by passing a law, to go into effect January 1, 1914, requiring everyone who desires to practice dentistry to first secure the M.D. degree, and pass the Virginia medical board, and also pass two dental men attached to that board. We also have provided a way to prepare medical men to pass these dental examiners This law is not such a hardship; let me remind you that all colleges are increasing their entrance requirements, and we are getting into dentistry men who have better literary educations. Such men are demanding the right to transfer from one department to another —from dental to medical, or conversely. It is most embarrassing to dentistry when these men find they can transfer from medicine to dentistry with full credits, but not the other way, because their medical branches are abbreviated if taken in the dental course. This drives our best-prepared applicants into medicine, when they really would prefer dentistry. We find that more and more are state universities inclined to include in their B.S. degree some of the medical branches, such as bacteriology, chemistry, physiology, and others. Some of these days some state university will transfer such B.S. men to the medical or dental departments and graduate them in *two* additional years with the M.D. degree—*and they are not going to ask your permission either,* for the reason that these men enter the proper classes better prepared than you were when you entered them.*

Please excuse this rather lengthy explanation, but it is necessary.

Let me repeat my question, and answer it in a purely personal way. What is our salvation? The salvation of dentistry is the topheaviness of the medical degree. The colleges are not going to give a course longer than four years for this, but they are adding to this course until it is almost impossible to take it in four years. Medicine has already developed into specialties—surgery, general medicine, eye, ear, nose, and throat diseases, diagnosis, venereal diseases, orthopedic surgery, etc. They all receive the M.D. degree. To our shame, dentistry is the only branch of medicine with an abbreviated course and a separate degree. Medical education has always taken longer and cost more than dental. At the same time there has never been a lack of medical men to fill places in charity hospitals. The trouble at present is to keep men out of medicine.

In view of these facts, I believe the time is coming when something like the following plan must be adopted:

Let every student who desires to study any branch of medicine, including dentistry, study the fundamentals for two years. For these two years of work, let him receive the B.M., or Bachelor of Medicine degree. If he does not know what branch he would like best, these two years will enable him intelligently to decide. For two years more he studies his specialty and so much of the other courses as will best fit him for his lifework. On the completion of these four years, let him receive the M.D. degree. In order that the specialties may be of equal value, the Carnegie system of units can be used to balance them.

By means of this plan dentistry receives trained students, with fundamental education the same as the others, and when the dentist receives his M.D. degree he knows, and the other specialists and the public know, that his course is the equal of any. Thus will the stigma be removed from us.

There is a demand, and a growing demand, for better trained dentists. The public is demanding better dental service; state boards are demanding that colleges give more thorough courses. The statement that a school is the oldest or largest means less and less each year. The demand now is, Tell us how your students stand before the state examining boards! Some here are not connected with the Faculties Association or Examiners Association, and it is only necessary to tell you that the reports of the joint Tabulation Committee from these organizations in reference to state board examinations are most interesting reading. Many of us find figures there that make us ashamed of our schools; figures that are eloquent reasons why university schools should exist—I mean genuine state universities. Thank God, we now have a Wiley in dental college affairs!

In the days gone by, the dental and medical schools were conducted at a profit, and they need not be ashamed of it. The men who *lectured* in those schools received a most satisfactory compensation, but the men who *demonstrated* received very little. Medical education has already changed, and any medical school which desires to stand in class A must have at least six full-time demonstrators, and their pay must be satisfactory. Dental schools have just begun to wake up to this fact. It does no good for a lecturer to talk and draw on the blackboard unless he has an equally competent demonstrator in the laboratories to drill the facts into the students. Dental colleges are no longer going to tolerate conditions that have existed in the past. In other words, the didactic teacher, no matter how celebrated he may be, is of no greater importance than the demonstrator. These poorly paid demonstrators are going to demand as good salaries as they deserve. Dem

* [Since this statement was made, the University of Virginia has made its B.S. course so elective that a student for the B.S. degree may select the first two years of medicine as his last two years for his B.S. degree. This will enable him to secure both degrees in six years.—R. L. S.]

onstrators in pathology, in bacteriology, histology, chemistry, and physiological chemistry are also necessary; then the independent dental school will cease to be profitable to a few of the professors who own it. Thorough medical education costs more than the income from students, and this fact renders state aid and endowments absolutely necessary. In view of these facts, ladies and gentlemen, I believe the independent medical and dental school is doomed, and we may as well realize it now as later.

For fear you may think that I am ashamed of my D.D.S. degree, I wish to assure you that there is nothing I more esteem. God bless those men who have done what they could! I honor and revere them; they set the standards of the times, and they did splendid work, but they and their methods are no longer needed. The world progresses.

No, gentlemen, we do not need an aristocracy in dentistry; we need broader education, better education, and men in the profession who are willing to serve and sacrifice themselves as medical men have done, for the good of the public, and not for self alone.

Dr. George E. Hunt, Indianapolis, Ind. The paper seems to be a protest against some university schools' attitude toward some of those schools which are not parts of universities, and I cannot help but have a bit of sympathy, naturally, with the essayist's attitude. I believe all who are interested in the education of the incoming members of the profession are honest in their interest. We who are educating the youth of the land in dentistry all desire to do our best, and I believe there ought to be an aristocracy in dental education—but a real aristocracy, and not a pseudo-aristocracy or a mushroom aristocracy. I mean that there should be better teaching forces in the development of the education of the young men who are coming into our profession. All who are interested in the education of our young men are of the same belief, and since we are all working toward the same end, it is to be deprecated and deplored that there should be any dissension in the ranks of the educators. I trust that will be eradicated in the course of time, as other dissensions have been.

Dr. Smith (closing the discussion). Dr. Simpson said he was very sorry. I think the audience should agree with him. I, too, think he is very sorry.

The next order of business was the reading of a paper by F. E. Stewart, M.D., Philadelphia, Pa., and entitled "What is Meant by Drug Standardization?"

[This paper is printed in full at page 304 of the present issue of the Cosmos.]

Section II then adjourned until a later session.

Thursday—*Morning Session.*

Section II was then called to order on Thursday morning, September 12th, at 10 o'clock, by the chairman, Dr. F. O. Hetrick.

The first order of business for the morning session was the reading of a paper by Dr. H. H. Johnson, Macon, Ga., entitled "Inlays."

[This paper is printed in full at page 300 of the present issue of the Cosmos.]

Discussion.

Dr. D. J. McMillen, Kansas City, Mo. Although I have not had time to read the paper beforehand and digest it, there are a few points that I should like to touch upon.

First, in regard to the inlay as a time-saver, I am not prepared to say that it is the best possible means of restoration in every mouth and every tooth. The essayist does not maintain that, but there are many operators who believe that an inlay must be put in every tooth and in every cavity, and they have almost discarded their operative instruments and are making more inlays all the time. This, in my opinion, is a mistake. The inlay is a time- and a nerve-saver, and in its proper place is unexcelled.

The essayist tells us that in 1890 a dentist was doing this kind of work. In

1891 or '92 I went to the Texas state meeting in Waco, and at that time saw an inlay which was called a box filling. It was made by burnishing a layer of gold into the cavity and fitting it to the pulpal wall; over that matrix another piece of gold was fitted to approximate the tooth form, and the occlusion was obtained by the patient biting into the outside layer of gold. These two pieces of gold were soldered together, and fitted into the cavity. The whole was then removed, a hole bored through the outer layer, and the inside filled with solder. The inlay was then cemented into position and seemed to be a nice piece of work. This kind of work has been done for the past eighteen or twenty years. For many years I have, in a few instances, made inlays. My first one was made in a crude way. I burnished a piece of gold around on the outside of the cavity, soldered a loop on the under side, and thickened the metal on the outside. This was cemented back into the tooth, and the inlay burnished around the margins. Many ways have been suggested of doing this work. Dr. Simpson of Kansas has for many years employed various methods, such as burnishing gold into the cavity, sweating solder into the matrix and building the filling up, but after all is said and done, we might as well acknowledge the fact that the Taggart system is the first expedient system for doing this work.

Dr. F. W. STIFF, Richmond, Va. I am very much in the position of Dr. McMillen, in that I did not have the privilege of seeing this paper before it was presented. I have done considerable inlay work since Dr. Taggart perfected it, but I have found the same difficulties in my work that Dr. Johnson has so well explained, viz, shrinkage in large fillings, particularly saddle fillings in molars and bicuspids. I hail it as a boon to dentistry, notwithstanding what Dr. McMillen has said of the Taggart method, that Dr. Alexander has discovered a method which to my mind is better.

I helped Dr. Alexander in Birmingham to demonstrate his method, and I was convinced that it was superior for making large fillings. The trouble that I had in my work, however, was that I could not obtain the same accuracy of fit as Dr. Alexander. He has, however, improved his method since; he did not at that time use plastic gold.

I have no criticism to make of the paper. It covered the ground and was particularly beneficial to me in that the minutiæ of Dr. Alexander's method were explained.

Dr. L. L. BARBER, Toledo, Ohio. By way of explanation, I will say, as all other speakers have done, that I did not know that I would be called upon to discuss this paper until three or four minutes before Dr. Johnson read it. I have used Alexander's plastic gold for some years; before that I used to take ordinary plastic gold and put small bits of wax on the top of it, heat the wax with a burnisher, and allow it to flow into the gold. With this material I made fillings, compressing it to produce contour, allowing the patient to bite to ascertain the occlusion, investing it, and flowing solder into it to make a solid filling.

Dr. Johnson started to tell us how simple the Alexander method is, but I noticed that he used Price's artificial stone.

Dr. JOHNSON. Not in making inlays, but for hoods.

Dr. BARBER. At any rate he uses Price's artificial stone, making a matrix from that and packing the gold into that. To certain people almost any method is simple and easy, but after all, it is a matter of absolute technique. The essayist said that, in making a wax model and a casting from it, the sharp edges were likely to be destroyed by the molten gold wearing off the investment, which might hold air-bubbles. He might well have said that the cervical margin of the filling would quite likely not be a good fit, among other things. I believe that most of these failures are due to carelessness of the operator. It is wrong for an operator to think that he can take a piece of wax at any temperature, warm it a little, put it into a cavity, simply jam it down, make the patient bite on it, take it out of the mouth, carve it a little, invest, and then obtain a casting that will fit. I have made good inlays, and I have made my share of poor ones. I suppose I made one or two hundred inlays in my laboratory, before I attempted to make one in a tooth in the mouth, and even so I have made my share of poor ones. I can, however, almost invariably trace my failure to careless technique. It is not an easy matter to take a piece of inlay wax, no matter by whom it is manufactured, heat it to the proper temperature, and obtain a good accurate impression of an approximal cavity. I have seen operators prize or pull the wax from the cervical part of the cavity, and the defects in their wax patterns were hardly noticeable, and yet the cast inlay made from such a pattern was very defective. Air-bubbles, as you know, will make little globules of gold on the cavity side of the inlay, but such imperfections can be very largely overcome. I have made many cast fillings and have inserted them into the cavity without having to retouch them—but I have also made many others. I have used Dr. Alexander's gold, and I think it is admirable.

Dr. Barnes of Cleveland, with whom I have worked for many years, has a method quite as simple, which in his hands is the best universal method that I have seen demonstrated anywhere. He simply takes No. 4 soft foil, presses it into the cavity with orange-wood sticks, obtains the occlusion, takes the gold matrix out and lays it on a charcoal block, and instead of flowing, just sweats small pieces of 22-karat gold into it with the aid of a blowpipe, thereby obtaining the most beautiful fillings I have ever seen. After all, it is a matter of each operator getting down to a method and studying it until he knows it from A to Z.

Dr. Spalding of Detroit also has a splendid method, involving the use of Detroit modeling compound, which is obtainable in sticks of about the size of a finger. He prepares the cavity, takes an impression with this modeling compound, makes a model of the cavity with alloy mixed quite thinly, allows this to stand over night, and then makes his filling in that model. After this he takes the bite in wax, and can then finish the filling on the amalgam model, so that it is ready to be placed in the tooth when the patient returns. In this way, the making of a compound filling for a molar is considerably simplified. If the cast filling draws a little, it is put back on the model and pinched together with a pair of pincers. Dr. Spalding does this work so well that his inlays cannot be distinguished from malleted fillings. After all, no matter what method is used, it depends upon the dexterity and the care with which the technique is carried out.

Dr. Johnson has covered the ground very well in his paper, and I have no criticism to make, except that I wanted to emphasize that no method has been discovered so far that anyone can say is easy. That is what we are all looking for, of course, but with all the easy methods in dental work that we have heard of, the fact remains that if we would do our work well, we must follow every step with care, and in this way we will succeed, or at least come a good deal nearer perfection.

Dr. Johnson (closing the discussion). I have very little to say in closing the discussion. I wish, however, to refer to the amalgam method which Dr. Barber has mentioned. It seems to me that this method, consisting in taking an impression of a cavity, making a model from that, and then the wax mold, involves so many factors of error that we would simply get a rough casting of gold. One might in that way become an expert carver in fitting the cavity of the amalgam model; still, an imperfect impression of the cavity to start with remains as the source of probable error, and we have to fit the inlay, after all, to the cavity in the tooth. It seems to me that this method is a roundabout way. By the Alexander method the filling is done directly in the cavity with the gold itself. There is no transferring at all, no shrinkage or expansion, therefore the inlay must fit better. The making of the model requires no more time than that of a wax mold, and all the investing and drying out is saved, hence economy in time. Saving of time does not mean slighting the work. This method is simply a shorter one, and, if time can be saved by shortening an operation, at the same time doing the work perfectly, it is worth while to save this time, because for many busy operators time means money.

The next order of business as announced by the chairman was the reading of a paper by Dr. W. R. CLACK, Mason City, Iowa, entitled "Is Operative Dentistry Degenerating?—Extension for Prevention *vs.* Pinhead Methods."

[This paper is printed in full at page 292 of this issue of the COSMOS.]

Discussion.

Dr. C. V. VIGNES, New Orleans, La. Dentists seem to be divided into two classes, those who are in favor of extension for prevention, and those who are in favor of prevention by extension. I do not know to which class I belong; whether I am one of the extension kind or merely a little pinhead one. The extremist who practices extension for prevention is so decidedly "sot" in his ideas that he condemns anyone who should want to practice conservatism; while, on the other hand, the ultra-conservative dentist sees nothing in extension for prevention but a wanton destruction of tooth structure. The great trouble has been, is, and probably will be for a long while to come, that we are not willing to give our fellow man credit for being able to do that which we cannot do. Until all teeth are alike, and the conditions surrounding them are identical, no set rule can or should be adopted. We will have to continue, as I understand it, to prepare cavities with a little judgment, meeting the conditions as we find them.

Dr. E. T. DARBY, Philadelphia, Pa. I do not know why I have been called upon to discuss this paper, unless it be that I am an eastern man. I regret that Dr. Clack thinks there is antagonism between the East and the West in the matter of so-called extension for prevention. As far as I am aware, there are no eastern men who oppose it because the term "extension for prevention" came from the West, nor are they opposed to the principle. Dr. Black has a great many admirers in the East, and they are quite ready to express their admiration. I have long been familiar with the enthusiastic work done by Drs. Wedelstaedt, Searl, Clack, and other members of the G. V. Black Club, and I am confident that they have done great good by the thoroughgoing principles which they have taught.

I would not wish to detract in the least from the credit which Dr. Clack has given in his paper to Dr. Black and others, but I regret that he failed to mention Varney and Webb and Perry, who taught and practiced the same principles which he set forth in his paper. Dr. Varney was among the first to promulgate the belief that all approximal surfaces should be contoured to their original fulness, and that all cavity margins should be left in such position that they could be made self-cleansing. Dr. Webb advocated and practiced the same, and more than thirty years ago Dr. Perry read a paper upon the subject of the treatment of approximal surfaces in the bicuspids and molars, in which he advocated the same principles as laid down in Dr. Clack's paper.

If you ask me whether I indorse all that Dr. Clack has said in his paper, I would reply "Yes, I indorse all that he has said about the bicuspids and molars." It is what I teach and what I try to practice, perhaps with a little less perfection than the men of the Black Club. I teach it because I think it is correct treatment for those surfaces, but when it comes to the incisors, I fear I am not orthodox, if that means sacrificing the whole or nearly the whole of the approximal surface in order to fill a cavity of the size of a pinhead. But pinheads are of various sizes, and some would represent a large cavity. It seems to me that here is a good place to exercise judgment as to which teeth should be cut as extensively as indicated by Dr. Clack, and which shall be cut less. Those of us who have been in practice for forty-five years —and I see classmates of mine in this audience—know that many incisors with small cavities, which we filled forty or more years ago, are still being saved by those fillings. Of course, many such fillings have failed, but there are good and bad fillings, as there are good and bad teeth.

The chief objection to such general cutting is the display of so much gold, but since porcelain and silicate cements are promising so much, it is to be hoped that the anterior teeth can be saved without the necessity of displaying the filling, which under the most favorable conditions is objectionable.

Dr. Clack (closing the discussion). I am very much disappointed. I had thoroughly believed in the honesty and integrity of the men who have opposed extension for prevention, but when the gauntlet is thrown down, and these men are notified months in advance that this matter is to be discussed, and that it is to be discussed partially from statements that they have made, it seems to show a lack of courage on their part when they fail to stand up for their own convictions and fight for what they believe to be right. These men who will refuse and neglect to reply openly to criticisms of their methods, so that their arguments may be answered, and then take advantage of the pages of a dental journal and make their statements in such a way that they cannot be successfully controverted without a great deal of trouble—these men, I believe, from now on, are unworthy of notice. Many points in my paper were brought out because of the criticism that has been made in one of these articles. I have no animosity in my heart toward eastern men as such, as might appear at first sight from my remarks, which were so worded because of the article published in one of the journals by a man whom I respect very much, and who is one of the recognized leaders of the opponents of extension for prevention. It was the slighting manner in which he spoke of the West, and the youthfulness of the men in the West, and the ideas advocated by them, that led to my remarks.

I am very much gratified indeed by Dr. Darby's remarks, and I wish to explain shortly our position. No one for a moment attempts to claim that Dr. Black originated all there is in extension for prevention. The truths embodied in extension for prevention have always existed, and there have been many men who have taught these truths, but very few of these men have taught these truths in such a manner that they could be thoroughly understood. Dr. Darby has referred to the excellent operations made by these old masters, but these men did not arrive at a clear and concise method that governed all their operation. I have not the slightest doubt that the lamented Dr. Webb would in time have evolved a system; after him, Dr Black took up the work, and I believe you will bear me out in saying that he was the man who absolutely systematized that method. His investigations of thousands of teeth containing fillings made after the manner of Dr. Webb and his *confrères* proved that these teeth had resisted the ravages of caries for many years, while fillings made in the other way did not. He then began a systematic investigation of these conditions, and a surprisingly large percentage was found in favor of these restorations. It was through work of that kind that Dr. Black gained his ground. It was not given him to originate all these ideas or to originate the truth. As I said before, the truth concerning this has always existed, but it was revealed to him as a result of his years and days and nights of patient, painstaking investigation, and he noted the conditions found and condensed them to a system that he could teach us.

Nobody reveres the memory of the men we have spoken of more than I do, but we must give somebody the credit, and that is why we speak of the "Black method," because he advanced this system. That is all we contend for, and I have heard Dr. Black express himself to that effect many times; we do not wish to detract in the slightest degree from the honor due to these great men.

A great deal has been said about the terrible irritation of the gingival margin, but if the restorations are finished correctly, so as to prevent further irritation, pleasing results may be expected; while if ragged, overhanging edges are left, no such results can be expected. I have seen cases in which there was more filling material in the interproximal space and under the margin of the gum and pressed up into the concavity of the tooth than was used in the making of the filling. What can be expected from such conditions as that?

I would also emphasize that we do not make such extensive extensions as we are charged with. In an article published in the April COSMOS, it was stated that the advocates of Black's method cut away one-third of the tooth. No one who understands Dr. Black ever cut away in wholesale manner one-third of the tooth. Therefore that statement, I trust, was due to ignorance of the conditions, and was not a wilful misrepresentation.

There is little else to say in closing the discussion, except that I am sorry that I could not show the slides that I brought with me to illustrate the paper.

The next order of business was the reading of a paper by Dr. J. J. MOFFITT, Harrisburg, Pa., entitled "The Treatment and Filling of Root-canals."

[This paper is printed in full at page 280 of the present issue of the COSMOS.]

There being no further business before Section II, the chairman, Dr. Hetrick, declared the section adjourned *sine die*.

(To be continued.)

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

Regular Monthly Meeting, held November 26, 1912.

THE regular monthly meeting of the Academy of Stomatology of Philadelphia was called to order by the president, Dr. Otto E. Inglis, in the lecture hall of the College of Physicians and Surgeons, Tuesday evening, November 26th, at 8.30 o'clock.

The President introduced Dr. GEORGE H. WILSON, Cleveland, Ohio, who read the paper of the evening, entitled "Some Phases of Prosthetic Esthetics."

[This paper is printed in full at page 271 of the present issue of the COSMOS.]

Discussion.

Dr. CHARLES R. TURNER. I think that I have succeeded in imbibing the spirit of Dr. Wilson's paper, to which we have just listened with a great deal of interest, and I interpret it as a protest against the inadequacy of our more or less accepted temperamental classification of humanity. In that particular I am indeed most heartily in sympathy with his ideas, agreeing fully with his estimate of the inadequacy of that classification. Having been founded in mysticism, and, as he says, in quasi-science, it has persisted until now, and is utilized at this time in an entirely different sense from its original one. However, if we simply accept it as a classification of mankind according to groups of associated physical characters rather than as collections of the effects of the preponderance of certain bodily humors, I think that it still has some value. It is undoubtedly true, as Dr. Wilson says, that the so-called basal types are almost entirely ideal, and that the combined types are extremely difficult to diagnose. He has very properly called our attention to the fact that in this country, in which so many races have contributed to the population, it is perfectly surprising to see how many people seem to have a combination of the characteristics of all four temperaments, so that as an exact scientific basis of classification the temperamental method is not at all reliable. But I think I accord it a more useful place than he does, as giving us a certain kind of classification of man's physical characters, and I do so largely because we have thus far had nothing proposed which will satisfactorily take its place; and inadequate as it is, it seems to me that it is still useful, since it is the only comprehensive classification we have.

The problem that the prosthetist has to settle may be viewed from two standpoints: One in which the given patient has to have a part replaced by a certain rule—one only a little more elaborate than a rule of thumb—according to which, knowing the patient's type, we know at once the type of the missing part and are able to supply it. Dr. Wilson has, I think, emphatically and most properly come out against the use of this plan alone, as being too mechanical. The plan which he proposes, and which is according to the second viewpoint, is that each prosthetist shall cultivate that sense of harmony and contour which will enable him to supply a missing part, having as data his observation of the remaining physical characteristics of the individual so far as the face and physique are concerned. This latter plan is undoubtedly the method of the master; it is the method of one who has cultivated that nice discrimination of contour and that nice quality of discernment which enables him, almost without taking second thought, to pick out the exact shape of teeth which should go in a given mouth, for example, or to know what particular mold number would supply the proper form. For the most of us it is, I fear, not quite so simple a process. That skill which enables a prosthetist to make restorations by this method comes, probably, first from an innate artistic sense, an inborn sense of harmony and appreciation of proportion, coupled with which must go a large experience. However artistic one may be, unless one is familiar with the details of the field in which that particular artistic labor is done, he of course would not be able to measure up to the requirements of the case, and so observation and experience must certainly supplement that inborn artistic sense. I fear that this, although it be a most satisfactory method of doing prosthetic dentistry, is not the method which is available for the teaching of the greenhorn. He must have certain concrete facts, a certain amount of teaching—a certain amount of dogmatic teaching, in fact—as foundational to the development of his later judgment. We all recognize how very few men become skilled along this line, and yet there are a good many who, by fairly well following certain foundational principles, are able to accomplish better results than if we simply turned them loose with their own judgment. That is quite easily brought to view by reference to the fact that the average lay patient, if allowed to select teeth which were exactly like the ones he has lost, would invariably provide himself with pearly white, small teeth. That is perhaps an exaggerated view of the dental student's judgment, and indeed I am not subscribing to it fully. Nevertheless, I do feel, to conclude these remarks, that a certain amount of dogmatic teaching must be given to him as a basis for the judgment which he must eventually cultivate himself.

I feel sure that Dr. Wilson and I are perfectly in accord in our estimate of the desirability for some better classification of mankind than the temperamental one, and it is probable that in the field of anthropology some such classification may be worked out which will be available for our use.

I can only say in conclusion that, if Dr. Wilson will give us the recipe for producing the beautiful results which I have seen in his office and at other places as the products of his hand, and with which all of us are probably more or less familiar, by some method which will be available to us, we will acclaim him a little louder than we do now—and we certainly consider him now as one of the masters of his craft.

Dr. I. N. Broomell. It has been my pleasant privilege to follow the teachings and the work of Dr. Wilson for a good many years, and very long ago I regarded him in the light of his proper merits, viz, as one of the foremost contributors to prosthetic literature. Dr. Wilson appears to have the happy faculty of being able to describe and combine mechanics with science, and at the same time he has always been able to throw in just enough of the esthetic to make his writings very interesting, leaving his readers to believe that prosthetic dentistry is really a fine art rather than a trade or business. Considering these facts it seems to me almost out of order that I should be called upon to discuss this paper. The few remarks which I shall make, however, will concern the preservation of the facial contour and the failure of proper recognition of temperamental characteristics. I use the expression *preservation* of the facial contour in preference to *restoration,* because I think the former is much more important than the latter. It is very much simpler to preserve the facial contour than to attempt successfully to restore it after it has once been lost, and this can only be done by prompt prosthetic restoration. We all know the value of each tooth in the dental arch, and what the loss of one tooth means, viz, the beginning of the breaking down of the dental mechanism, and, if it were a practical possibility to introduce one tooth in the place of one which is lost, that would be the first step in the way of preserving the facial contour.

I may perhaps make myself clearer if I compare what is known as the permanent artificial denture with the temporary artificial denture. In former times—and not so very long ago—it was frequently suggested that patients go without teeth for a certain period of time, possibly a year, in order that absorption might fully take place. This I believe was a mistaken idea. Instead of doing that, many dentists would suggest a temporary denture, which is the right idea, and one favoring the preservation of the facial contour. I fully believe that many of the disfiguring facial lines which we see, most of which are attributed to approaching old age, are the result of loss of dental structure. I may, if you will pardon me, refer to my own case. While I am yet a young man, the wrinkles about my mouth would tend to make one think that I was rather old. I am free to admit that the result is due to the fact that my teeth have worn down so that the bite is perhaps one-eighth of an inch shorter than it was twenty-five years ago, and as a result these facial lines [demonstrating] are more prominently shown. If I had taken care of this gradual wear on the occlusal surfaces of the molars and at the same time the cutting edges of the incisors, I am sure that I would not appear quite so old as I now do. My plea, therefore, in this respect is one for preserving the natural organs, and replacing the lost parts just as soon as possible without deferring it for after-consideration.

I was pleased to hear Dr. Wilson speak of the characteristics of the lips, because these certainly must be taken into consideration in prosthetic work. Nothing is of more importance, and I fear that many times little attention is given to this factor. Dr. Wilson intimated that he thought too much stress was being laid on temperamental characteristics. I cannot agree with his argument in this respect. I do not believe, of course, that we can place all persons under these four basal temperaments, but I do believe that in a majority of instances much is gained by a consideration of this classification. Perhaps the question of tooth form and arch form are of greatest importance in this respect. I am sure that in my studies of students' mouths which I make every year, I can in nine out of ten cases tell very nearly the shape of the dental arch simply by looking at the student's face. I know by the contour of the face that there is a corresponding contour in the arch of the teeth, and it is for this reason particularly that I believe we should give full consideration to the temperamental characteristics.

Dr. Wilson has thrown on the screen a number of drawings which appear to me to be a description of the various temperaments. He has shown one which is characteristically nervous, another bilious, another lymphatic, and another sanguine, and I cannot understand why he is not fully in accord with the idea of using these as a basis of work; in fact, he does not claim that he is not in accord with this idea, but in a general way he seems to think that we should treat each subject individually.

With reference to functional worth in the arrangement of the artificial teeth, I should say that they should be arranged according to temperamental characteristics, according to the movements of the mandible, and I believe the movements of the mandible are controlled almost entirely by the shape of the teeth. I mean by this that in the nervous type, where we have the teeth interlocking, a pronounced overbite, and deeply penetrating cusps, we find a certain type of condyle. In that temperament the condyle is so shaped that the movements of the jaw are almost directly up and down. In the other extreme, where we have cusp formation almost wanting, we will find a condyle so shaped that there is a lateral or rotary motion. My argument, therefore, is this: If, in a mouth in which the chief movement of the mandible is lateral, we place teeth that lock every time they are brought into occlusion, the result will be a tendency to force the teeth out of position. On the other hand, if in a mouth where the bite is directly up and down we place teeth that do not lock, the results will not be so disastrous, but a smaller amount of functional worth will be obtained from teeth arranged in that way. I have here the last work of Dr. Bonwill. He came to my office a few evenings before he was stricken with his last illness, and there "ground up" —to use his own statement—a full upper and lower set of teeth. Dr. Bonwill never gave any thought to temperamental conditions, and ground all teeth alike. I took exception to this, saying that humanity was not alike in all cases. "Then we will make them all alike," he said, "simply by forcing the individual to wear teeth ground in this way."

Dr. S. H. Guilford. It has been my pleasure to be acquainted with Dr. Wilson for many years, and to know him intimately as a teacher, lecturer, and author, and his success in life has been shown better, probably, by the book he has published than in any other way. He has given us, I believe, the best book on dental prosthesis ever published for the dental profession. I say this not to flatter him or to compliment him at all, but because I believe this to be actually true, and because a great majority of those I have spoken to on this subject seem to be of the same opinion. I was very glad indeed to learn that he was to be our essayist tonight. I wanted to know what new ideas he had to present in regard to esthetics in prosthetic dentistry, and I must confess that I have been greatly edified. At the same time I cannot agree with him in some points, at least in the extent to which he carries the matter of classification of temperaments. We have taught this subject of temperaments for the last forty or fifty years as an aid to the proper selection of artificial teeth and facial restoration. Probably his classification is scientifically correct, yet I do not believe that we can follow it very closely, as the last speaker has said. We all need to know the various temperamental characteristics, yet at the same time the real way to learn esthetic prosthetic dentistry is by actual practice. The student comes to college with little idea on that subject, and he goes away with very little more of an idea on it, simply because we are not capable of teaching him what we would like to. We cannot teach him all that we have learned from practice, but, if we can lay the foundation and give him a little idea of what we want him to know, we expect him to build upon that. By talking of temperaments and laying down rules in regard to the way in which the student should make artificial dentures, we cannot possibly make our instructions so exact and so true that the individual student following them would get the results we desire him to obtain. We can only teach the merest outline of the fundamentals. Take, for instance, the student of art; he may know little when he begins and he must have definite rules and principles to follow during his student days, but these studies are simply intended to prepare him for future work. Nobody could hope, by teaching certain rules of art and drawing and the mixing of colors, to make a successful painter. After all, it is largely an education of the eye, and the one who becomes successful in art is the one who has the power of training the eye so that it will tell him what is accurate and harmonious and what is not. So it is with the practice of this branch of dentistry. The selection of the teeth, the grinding of the forms, etc., enter into it, but these factors alone will not suffice. We have to study the individual characteristics of the patient; that is to say, in addition to doing the best we can in the arrangement and selection of the teeth, we must see these teeth in the mouth and see their effect, and our sense of harmony must tell us whether or not what we have done is correct.

Dr. Wilson has spoken of the dentist who selects teeth, takes the bite, and then sends the case to the laboratory to be finished there. I think the most careful dentist today will do as much on a denture as he can in his office, and allow the prosthetic man to do as little as possible. After the teeth are arranged on the temporary base, they should be placed in the mouth and inspected by the dentist. He can better tell then than at any other time whether there is harmony or not. He can tell not only in regard to the size and shade of the teeth, the fulness of the lips, the removal of lines caused by the loss of tissue, but also the facial expression. So that in order to be an esthetic prosthetic dentist careful self-training on the part of the individual and the development of his talent in that direction are required. Some men have more talent in this direction than others.

I was sorry that Dr. Wilson did not say something about the other side of prosthetic dentistry—that is, its usefulness to the patient; but, of course, he could not cover the whole subject. For what he has told us I wish to thank him, and am only glad to have the opportunity of listening to his paper and receiving the inspiration which always emanates from an earnest seeker after truth.

Dr. Wilson (closing the discussion). I wish to thank the society for the courteous consideration accorded to my paper. I am very glad to know your mind regarding the extensive temperamental classification. I am convinced that you are not ready to discard the elaborate classification of our text-books, but as you think of it I am sure you will become imbued with the idea that it is wrong. I must confess that I am at the point where I cannot accept the elaborate classification of temperaments, because I cannot conceive of it as being founded upon truth.

We know that the latest classification of temperaments has drifted away from certain ideas of the old classification, and that the old classification was founded upon assumptions and not facts. In the early days of medicine, the temperaments were considered as expressions of the conditions brought about by four fluids of the body; later, two of these four conditions were found to be abnormal. Is it justifiable to assume that in a few hundred years the abnormal conditions of man will produce types of form and color of teeth that should be placed in the same category with the normal conformation? Then again, many of the later students of the subject will not accept this classification at all; they have a new one, which consists of the motive, vital, and mental temperaments, that they consider preferable to the old classification. In this they are possibly correct—at least I believe that the new classification is based upon a foundation better than the old for studying the individual. We have considered the vaults and arches as being the best indicators of the temperaments of the individuals. I wonder how many men who have given attention to orthodontia would be willing to accept the idea that either the vault or the arch having the appearance of the nervous temperament —that is, the triangular form—is normal! Would they not consider it the result of disease conditions, and say that the face had been distorted from its normal form? Orthodontists tell us that a very large percentage of mouths are not in normal condition so far as the shapes of the vault and arch are concerned. If that is the case, what value is the shape of the mouth in that respect to us in the study of temperaments? I feel that we are loading our students down with a lot of false material. We may teach the student that these names in the dental classification of temperaments represent the ideals that will aid in the study of the individual case.

I would like to call attention to the slides Dr. Broomell presented of the condyle and the glenoid fossa, because the dry bones are deceptive. In life there is a large amount of ligamentous tissue in the joint that in conjunction with the muscular action produces a very different movement from that produced by manipulating the dry bones.

There is another point to which I wish to call your attention, and which I think has been misrepresented, viz, in regard to the alignment of the teeth in the dental arch. We have been led to believe that the distal portion of the upper first molar is elevated. If you will study the specimens that were upon the screen and all well-arranged dentures you will find that the distal cusp of the upper first molar is in straight line with the mesial cusp and the cusps of the bicuspids and canine, and the compensating curve is found in the second and third molars only. Therefore the long curve as taught by Dr. Bonwill was neither anatomically nor mechanically correct. As force is exerted at right angles to the surface from which it emanates, it follows that, if the force of mastication is brought upon teeth in a horizontal position, artificial dentures will be more stable than if they are arranged on an inclined plane. Hence the inclination given to the second molar is intended for balancing purposes, and should be as slight as the individual case will permit.

The meeting then adjourned.

Annual Meeting.

THE annual meeting of the Academy of Stomatology was held on Tuesday, December 17, 1912, at the College of Physicians and Surgeons, Philadelphia, Pa., at 8 o'clock.

The first order of business for the session was the election of officers for the ensuing year, which resulted as follows: Dr. Joseph Huggins, president; Dr. J. V. Mershon, vice-president; Dr. Norman L. Jameson, secretary; Dr. A. E. Bassett, treasurer; Dr. W. A. Jaquette, librarian; Dr. F. R. Stathers, editor.

The literary feature of the evening was a discussion on Silicate Cements.

F. R. STATHERS, *Editor.*

THE DENTAL COSMOS

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Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S., Sc.D.

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EDITORIAL DEPARTMENT.

THE CHAPIN A. HARRIS MEMORIAL.

IN the DENTAL COSMOS for January 1912, a committee appointed by the Maryland State Dental Association for the purpose published an appeal for contributions to a fund to be utilized in the creation of a suitable memorial to Dr. Chapin A. Harris—"to commemorate in a suitable manner the sense of appreciation felt by the dental profession for the services rendered by this distinguished man in the effort to elevate the profession of dentistry." The appeal made by the Harris Memorial Committee has met with a financial response now aggregating about $1000, and this after one year's activity by the committee.

In his admirable history of Chapin A. Harris, Dr. Burton Lee Thorpe states that, shortly after the death of Dr. Harris, which occurred September 29, 1860, "A memorial meeting was called in New York, October 8, 1860, at which fifty prominent dentists attended, and a public subscription—known as the 'Harris Testimonial Fund'—was started for the relief of his family. A committee was appointed for this purpose, with Dr. Eleazar Parmly as treasurer of the fund. After canvassing the profession for some months, at much expense, the committee reported that nearly $1000 had been subscribed, but that about $900 had been expended in collecting it; the balance of $85 was sent, with a note from Dr. Parmly explaining it, to Mrs. Harris—Dr. E. Parmly Brown, then a young man, being the messenger, who says she read the note, and when handed the gold exclaimed, 'My God!—and is this the gratitude of the dental profession for Chapin A. Harris, who laid down his life in its behalf?'"

No student of dental history can read the account of the life-work of Chapin A. Harris without definitely realizing the fact that to him, more than any other single individual, the dental fraternity owes the largest debt for having lifted dentistry from the level of a mechanical art to that of an organized profession. It is quite true that other great leaders took part in the movement which eventuated in the establishment of the three principal factors which are the foundation stones upon which the dental profession rests—indeed upon which any profession must rest—viz, the school, the journal, the association; but, in the study of the activities which led to the practical establishment of these three fundamental factors, and great as were the men who were associated with Chapin A. Harris in the achievement, his activities stand out in such a way as to prominently mark him as the guiding genius, the seer whose intelligence, greatness of mind, and untiring energies brought the movement to a successful culmination. We should make no mistake in determining to whom the honor belongs in this connection, nor can we honestly shift the responsibility of paying our debt of gratitude to the memory of Harris by the unctuous excuse that if he had not done his great work someone else would have ultimately accomplished the same end. Assuming that to be true, then as a profession it would simply be the shifting of our debt of gratitude to another individual, but the debt would remain the same in either instance.

The words herein quoted from Mrs. Harris, whether a literally correct record of her utterance or not, are, nevertheless, unquestionably true as to the facts. Chapin A. Harris labored indefatigably and continuously for the cause in which his whole life's activities were engrossed—viz, the placing of dentistry upon a professional basis. He was, incidently, a citizen of Baltimore, Md., in which city the greater work of his later years was accomplished. He was born in Pompey, Onondago county, N. Y. He had traveled and practiced extensively over a large portion of the more populous area of the United States, and by reason not only of his extensive travels, but especially by reason of his successful labors in behalf of the whole dental profession, he cannot properly be claimed as belonging to any geographical location, but rather as belonging to the whole dental profession.

Various efforts have been made at various times to awaken a genuine sense of appreciation and gratitude upon the part of the members of the dental profession toward those who have been great in its service. Such efforts in the past have not met with a large material response. Volumes of oratory have been expended in extolling the virtues and achievements of those whom the profession "delights to honor," but it has been mainly oratory, much of it undertaken for the self-aggrandizement of the orators rather than as a sincere expression of gratitude upon the part of those who have participated therein. The kind of gratitude that is genuine and sincere is the gratitude that is willing to express itself in terms of sacrifice. An old deacon in the congregation of an eminent and learned Baptist divine, now deceased, once made the boast that in connection with a certain charity he could give as much as ten dollars and not feel it, whereupon the learned clergyman, knowing the somewhat miserly instincts of the deacon, replied, "Well, brother, if that is the case, just give twenty dollars and feel it." It is necessary, in order to be a measure of real gratitude, that our giving should be of such character and magnitude as to cause us to feel it.

According to the record, it appears that on a previous occasion prominent representatives of the dental profession expressed their emotion of gratitude on the one hand and of sorrow on the other for the almost destitute financial condition of the surviving family of Chapin A. Harris to the extent of about $85. That, according to the record, was in 1860, a time which according to other records was one of considerable general financial stress. It can hardly be considered otherwise than unfortunate that the representative memorial meeting at that time permitted such a record to be created.

In the more than half a century that has since elapsed, mighty changes have been wrought in the world's history, in the history of the dental profession, and in the altruistic attitude of man's mind toward this kind of manifest duty. The sum subscribed by the dentists of the world to create a memorial to the late Prof. Willoughby D. Miller has reached a total amount of which the dental profession may well feel proud, and the time has come and the occasion is ripe when the dental profession can wipe out the stain of its earlier effort to express what it thought was its gratitude to the memory of Chapin A. Harris on an $85 basis, and now do something commensurate with the bigness of the man himself and his great work for dentistry, and more in harmony with the broadmindedness and real generosity of the dental profession of today.

The chairman of the committee having in charge the Chapin A. Harris Memorial is Dr. W. G. Foster, 9 Franklin st., Baltimore, Md. It is proposed to erect a memorial that shall consist of a bronze statue of Dr. Harris, mounted upon a granite base, the whole to cost in the neighborhood of $8000. The city of Baltimore has agreed, through its governing officials, to donate an appropriate site for the erection of the memorial. It will require but a little earnest work, and a generous response to their request for contributions, to bring this professional privilege and duty to a successful issue.

Review of Current Dental Literature.

[*British Dental Journal*, London, September 16, 1912.]

IONIC MEDICATION IN ULCERATIONS OF THE ORAL CAVITY AND PYORRHEA ALVEOLARIS. By Dr. H. L. Jones, London.

Before the Section of Electro-Therapeutics and Radiology of the British Medical Society, at its annual meeting at Liverpool in July 1912, Dr. Jones spoke on ionic medication in ulcerations of the buccal cavity as follows: In a patient suffering from disseminated sclerosis, who had a chronic ulcer of the cheek and gum, he had observed rapid healing from zinc ionization, and in another case, with ulceration of the inside of the cheek of tuberculous nature, healing was obtained, though not very rapidly.

In pyorrhea alveolaris, some very satisfactory results have been obtained, the zinc ion being decidedly superior to the other ions tried. Success in the treatment of this disease needs a high grade of skill in dental work, as it is all-important to know the character of the suppurating pockets and the best means of bringing the zinc ions into all parts of these tiny sinuses. E. Sturridge had found zinc, copper, and iodin ions most effective in the treatment of pyorrhea alveolaris, many forms of gingivitis, and chronic alveolar abscesses. Bad cases of pyorrhea yielded almost immediately to treatment with zinc ions, which should be introduced into the affected pericemental membrane by passing a small spear-shaped electrode of zinc or platinum into the pockets and interstices of the teeth with a five per cent. solution of zinc chlorid. The strength of current necessary was from three to five milliampères, which most patients tolerated, and the penetration of ions with an electrode of such small area and cross-section was very great. Iodin ions introduced with a platinum cathode were also very effective in treating pyorrhea. This method has been used for a number of years, and has been found very reliable for curing the disease. It is not to be understood, however, that ionization alone would cure pyorrhea; there are many other details of treatment of purely dental nature which are just as essential.

[*New York Medical Journal*, New York, June 22, 1912.]

THE RELATIONS OF DENTISTRY TO MEDICINE: MISCELLANY.

The following article is an interesting comment on a question most vital to the dentist, though he may not fully coincide with the point of view taken:

A leading article in the June issue of the *Old Dominion Medical Journal*, edited by Dr. Beverley R. Tucker, reopens the discussion of the relations between dentistry and medicine which was begun in the April issue. The writer says: In our editorial in the April issue of the *Old Dominion Medical Journal*, we called attention to the close relationship, or the inseparableness, of medicine and dentistry. Since that writing several things have come to our notice which seem to us to strengthen our argument that dentistry should be placed upon a higher plane and made a part and parcel of medicine itself. We cannot but hope that the medical profession and the dental profession will take up this matter until it is pushed to a consummation that will amalgamate the two.

In the April issue of the *Archives of Internal Medicine*, than which no medical journal of higher standard is published in this country, we find an article by Thomas L. Gilmer, M.D., on "Chronic Oral Infection." Gilmer calls attention to the fact that in most mouths may be found tubercle bacilli among other dangerous bacteria. He also draws attention to the fact that deep pockets which harbor bacteria are found in the crowns and bridges made as substitutes for lost teeth, and to their faulty adjustment. He also states that he thinks it is a safe estimate to say that one-fourth of the human jaws have suppurating cavities, and quotes Odenthal, who found glandular swellings in ninety-nine per cent. of all children who suffered from badly decayed teeth; and he makes a strong insinuation that chronic alveolar abscess, though without the pain, swelling, rigors, or fever which are found in acute abscesses, is the more dangerous of the two. He calls attention to the marked general improvement in health which follows proper attention to the teeth in many cases, and quotes Osler as saying that in twenty cases of pernicious anemia, pyorrhea alveolaris was present in more than one-half. Certain types of nephritis are also believed to be due to oral infection.

In the same number of the same journal Frank Billings, M.D., of Chicago, in a paper entitled "Chronic Focal Infections and their Etiological Relations to Arthritis and Nephritis," states that abscesses of the gums and alveolar sockets, pyorrhea alveolaris, and septic types of gingivitis may cause systemic diseases of various types, and advises skilled attention in arthritic and nephritic cases.

In the May issue of the *Old Dominion Medical Journal*, La Roque has to say that Daland is very sure that the condition of the teeth and mouth among other things has immediate causative relation to gastro-enteric disorders, and quotes Osler as saying that more deaths are caused in the United States by unhealthy mouths than by alcohol.

Thus we are awakening to the importance of the mouth cavity as the cause of both medical and surgical disease, and the sooner we dignify the profession of dentistry, which treats these diseases primarily, the sooner we shall get better results in preventive medicine and in preventive surgery. We hope that this question of making dentistry a part of medicine will be actively taken up. We suggest that a committee from the American Medical Association confer with a committee from the National Dental Association with this end in view.

[*Deutsche Zahnaerztliche Zeitung*, Berlin, October 1912.]

PSYCHIC DISTURBANCES AFTER TOOTH EXTRACTIONS. By H. Woelke, Berlin.

Psychic disturbances are not necessarily caused by constitutional diseases or heredity; in fact, psychoses of the most serious nature are often due to apparently insignificant causes. While normal persons are able to tolerate pain of a most severe degree, or become unconscious when the pain is no longer bearable, nervous and especially hysteric persons perceive every impression, no matter how light, in a grossly exaggerated measure, and since the irritated condition of their nervous system will not permit of unconsciousness when pain becomes severe, a serious permanent psychic disturbance is created.

These contentions are borne out by the author's report of two practical cases. In the first of these the patient, a married woman, was anesthetized by her family physician with ethyl bromid for the extraction of several roots. During the anesthesia, she was tortured, according to her subsequent statements, by hideous dreams and dreadful mental anguish, and, although she seemed to recover fully after the operation, the memory of her agonies during the anesthesia was so vivid at times that she cried aloud, jumped up, and collapsed in a crying spasm. Her fear of people soon assumed the character of delusion of persecution, and she was obliged to undergo treatment in a sanatorium, and it was only two years after the extraction that her condition began to improve gradually.

In the second case, the patient, an elderly woman, had all the teeth remaining in her mouth extracted in one sitting without an anesthetic. The severe surgical insult impressed itself so indelibly upon her mind that she became subject to chronic spasms of fear, during which she uttered pitiful cries, and gradually became harmlessly, though hopelessly, insane.

The medico-legal aspect of such cases is of great practical interest. If all the usual precautions are taken in an extraction, it would be difficult for a patient to obtain a verdict for damages. On the other hand, the cases cited impress the necessity of great care in painful operations on nervous or hysterical patients.

[*British Dental Journal*, London, October 15, 1912.]

THE REMUNERATION OF SCHOOL DENTISTS. Editorial.

In view of the not infrequent attempts of local authorities to obtain school dentists at inadequate salaries, it is expedient to draw attention to what has been agreed upon by the British Dental Association and the School Dentists Society as reasonable minimum salaries for "part-time" and for "full-time" dentists respectively.

In the case of part-time officers, the sum in question is not less than £1 for each half-day's work, and it is highly important that members of our profession should bear this in mind, not only for their own benefit, but also for the benefit of their professional brethren.

In cases in which the work to be done has to be carried out in an institution far removed from the ordinary means of communication, it is well that dentists before accepting such appointments should see that due consideration is given to the amount of expense to be incurred in "going and returning," and also to bear in mind that, where no instruments or materials are provided, a proportionate allowance must be made to cover their cost.

There are cases in which a dentist has to make a journey of nearly two hours in order to reach a particular school, added to which the children may be epileptics or imbeciles, and as such specially trying when undergoing dental treatment, even at the hands of one possessed of the patience of Job.

With regard to "full-time" appointments, the salary to be offered should certainly not be less than £250 per annum to commence with, and it is well that education authorities should realize that it is more than likely that none but recently qualified and therefore comparatively inexperienced dentists would apply even at this standard of remuneration.

With regard to the insertion of advertisements of such appointments in our Journal, it may become necessary to follow the example of our medical contemporaries, the *British Medical Journal* and the *Lancet*, who decline to insert advertisements offering salaries of an inadequate character.

There is little doubt that if local authorities find their advertisements refused they will soon find it worth their while to offer adequate salaries, otherwise they will discover that the only applicants for their appointments come from the lower grades of the profession, and not from those public-spirited men who are willing to accept a moderate fee for the good of the rising generation of school children.

There is no branch of dentistry that calls for more tact, diplomacy, and patience than the treatment of the teeth of school children, and local authorities would be wise to see to it that the dentists they engage are such as are endowed with these qualities, and not merely persons who are ready to undersell their professional brethren.

[*Schweizerische Vierteljahrsschrift fuer Zahnheilkunde*, Zurich, No. 3, 1912.]

THE TRANSVERSE (COMPENSATING) BAR IN UPPER AND LOWER BRIDGE WORK, AND THE EFFECTS OF STRESS IN BRIDGE WORK. BY O. RIECHELMANN, STRASSBURG.

The author complains justly at the outset that in the construction of bridge work too much is based on pure empiricism and unscientific and unmethodical guesswork. In preparing the abutments a great many operators hesitate to devitalize or to grind the teeth sufficiently; others, again, allow themselves to be influenced by the patients' unreasonable wishes. After censuring a few mistakes that are frequently made in the construction of bridge work, the writer devotes special attention to the conditions of masticatory stresses and strains to be considered. His deductions are an amplification of Godon's theories on the same subject, although, considering the multiplicity of factors which enter into play in the act of incision or mastication, it seems entirely impractical to figure out in cold figures just how much strain or stress each portion of the bridge to be constructed will have to bear. Nevertheless, it is through such painstaking studies and experiments that greater clearness in regard to this important factor in bridge work will ultimately be brought about.

The author offers a generous number of examples of removable bridge work with transverse bars for the partial compensation of stress, explaining in each case the calculation, rationale, and technique for his procedure, and illustrating his theories regarding the distribution of stress, especially in large bridges.

Periscope.

A Serviceable Bench Block.—A door-bumper may be screwed into the laboratory bench. The rubber tip prevents the plate from slipping.—W. I. Prime, *Dental Digest.*

Making Gutta-percha Points More Rigid.—If difficulty is found in placing long, thin gutta-percha points in position because they are limber, they should be placed for a few moments in ice-water. Thus chilled they become more rigid.—A. J. Cottrell, *Dental Brief.*

Repairing Gum-section Dentures.—In repairing gum-section dentures in which one or more teeth are fractured, the porcelain is ground with a small engine stone for the insertion of single teeth, making a close joint. This saves a new block and time.—W. I. Prime, *Dental Digest.*

Cleaning Glass.—If the fountain cuspidor or other office glassware becomes coated with a white deposit from hard water, a few drops of nitric acid will dissolve the coating and leave the glass sparkling and bright. The acid may be easily applied with a pellet of cotton held in tweezers.—*Western Dental Journal.*

Staining Artificial Teeth to Match Natural Teeth in the Mouth.—A most artistic effect can be produced by painting thin lines of porcelain enamel, of suitable shade, longitudinally or transversely across the artificial tooth or teeth and baking in a small electric furnace. Such lines entirely remove the artificial appearance of the tooth or teeth, and from an esthetic point of view leave nothing to be desired.—*Ash's Monthly.*

Removing Gold from Arkansas Stones.—When Arkansas stones or points become covered with gold from reducing gold fillings, their cutting quality is much impaired. The gold may be quickly and effectively removed from the stones by taking a little moistened fine pumice between the finger and thumb of the left hand, and revolving the engine stones between them. The gold will at once be removed, and the stones be left clean.—G. C. Nicholson, *Commonwealth Dental Review.*

Protecting Metal Plates During Vulcanizing.—When a base-plate of aluminum or Watts metal, cast or swaged, is used in plate work, it may become tarnished by the sulfur escaping in vulcanizing, rendering it difficult to restore its luster. This may be avoided by painting the exposed metal surfaces with shellac or sandarac, which will protect the metal from the sulfur, and will greatly facilitate the polishing of the metal part.—M. L. Schmitz, *Dental Review.*

Advantages of Platinum Collars in Crowns.—One of the many advantages of platinum collars is that the thin platinum which almost entirely forms the edge of the collar admits of the most accurate and close adaptation to the cervix of a root or crown. This is due to the fact that platinum, being a very tenacious metal, can be trimmed down to form an extremely thin edge, which will not be destroyed by fusing in any subsequent part of the work.—G. Evans, *Items of Interest.*

Hints on Melting Zinc.—Zinc which has been fused repeatedly will be very slow in melting. This can be remedied by the addition of a trace of aluminum. Overheating of zinc is to be avoided. In order to gage the heat applied, a piece of dry pine wood is held into the molten metal. If the wood chars considerably, or even ignites, the cast should not be poured. Slight brown discoloration of the wood indicates the correct degree of heat of the metal.—*Archiv fuer Zahnheilkunde.*

Obtaining Correct Occlusion in Cast Gold Inlays in Occlusal Surfaces.—Gold inlays in occlusal surfaces of teeth, even if care be taken in regard to articulation, generally require some trimming after cementation. A good method for avoiding this consists in placing a piece of 60-gage tin foil between the wax pattern and the opposing tooth or teeth, and requesting the patient to bite. This method renders subsequent trimming or adjusting unnecessary.—H. C. Moxham, *Commonwealth Dental Review.*

Significance of Pus in the Maxillary Sinus.—When pus is found in the antrum, it can be accounted for in one of four ways: (1) It may be due to an extension of infectious material through the ostium from the middle meatus; (2) it may be due to infection reaching the cavity from the root of a diseased tooth; (3) it may be a secondary infection of a non-purulent accumulation of fluid, or (4) the antrum may be acting as a drip cup for the discharge from diseased areas higher up in the nose.—*Detroit Medical Journal* per *Amer. Journ. of Surgery.*

Sèvres Porcelain Teeth.—According to the Paris correspondent of the *Chemist and Druggist,* the well-known state porcelain factory at Sèvres, near Paris, appears to be in a fair way of adding a new and interesting branch to its business. It is announced that an inventor has obtained permission to make experiments in manufacturing artificial teeth with the ingredients of the famous Sèvres porcelain. The prospects are said to be promising, and if the dental branch proves satisfactory, the French government is likely to have a prominent place in the campaign for assisting in national dental aid.—*British Dental Journal.*

Lanolin for the Hands.—Lanolin is an excellent emollient for the hands. Its occasional use will keep the skin smooth and supple; for this purpose it is better than glycerin. Glycerin tends to draw the moisture from the skin, and at times it is irritating, while lanolin is soothing and healing. If scented with a delicate perfume and well rubbed into the skin after washing, it will keep the hands in good order. It is not at all expensive, and a little goes a long way. It is especially useful when the hands become chapped, and as a soothing application to the skin-cracks so annoying to some during frosty weather.—J. H. Grumm, *Dental Brief.*

Warnings in Regard to Bridge Abutments.—Do not place bridges upon abutments that have not been first made, through prophylactic measures, as healthy as it is possible to make them.

Do not place gold-shell crowns upon vital teeth unless thoroughly conversant with methods for removing enough of the enamel to straighten the sides.

Do not use unnecessary facings upon bridges used for masticatory purposes only.

Do not cement a bridge to place which draws or causes the teeth upon which they are placed to feel uncomfortable, because it is less trouble to saw it apart and place the parts in position and resolder than it is to lose a good patient and a couple of good teeth. —J. M. Thompson, *Dental Summary.*

Indications and Contra-indications for Bridge Work.—A careful choice of cases should be made for fixed bridges, bearing in mind the general health of the patient, and the special indications in the mouth. Not every gap which exists should be filled or spanned by a bridge. In mouths where chronic suppurative pericementitis exists, bridge work is contra-indicated. Probably the only crown by which marginal gingival irritation is entirely avoided is the bandless face-to-face crown, for in my mind the prevalence of gum diseases, especially of the type of chronic suppurative pericementitis, largely synchronizes with the too universal and indiscriminate employment of banded crowns and their multiple extension known as bridge work.—A. A. Forty, *British Dental Journal.*

To Prevent Porosity in Thick, Heavy Lower Vulcanite Dentures.—In making thick, heavy lower dentures, it is important, when flasking the case, to avoid using oil as a separating medium, as it has a detrimental effect upon the rubber during the vulcanizing process. Either a syrupy solution of soap or one of the many separating fluids which are sold for the purpose should be used —oil never.

Further, when packing the rubber in thick, heavy lower dentures, the center should be loaded with small pieces of old vulcanized rubber; then the temperature of the vulcanizer is raised very slowly to 315° F., and the case vulcanized for fully seventy-five minutes at this temperature, when a hard, dense vulcanite plate, entirely free from porosity, will be the result.—*Ash's Monthly.*

Bridge Attachment with the Aid of Accurately Cast Gold Inlays and Gold Mesh. —An accurately cast inlay to be used for an abutment for a bridge can best be obtained by reinforcing the wax pattern with gold mesh. Gold mesh, used as a framework and not as a matrix, controls both the shrinkage and warpage in the wax patterns in a vast majority of cases, and is a very distinct aid in making cast bases for crowns and in compound inlays for the bicuspid or molar. In bridge work it greatly facilitates the arrangement of the dummies, enabling the operator to carry the wax just where it is wanted, and lending strength to shallow wax patterns. In the casting of removable bases, it has been found a very great aid. In making bicuspid and molar crowns with cast cusps it is a splendid substance for placing the wax pattern upon, and in the mold it apparently fuses perfectly with molten gold.—G. F. Burke, *Dental Summary.*

A Simple and Definite Method of Marking Dental Instruments for Their Proper Arrangement and Placing.—By turning, at the extremity of the back end of an instrument, any special shape, such as a ball, or a cone, or an inverted cone, or a pear shape, etc., the instruments will be marked for their own drawer; that is, those terminating in a ball will belong in one drawer, while those terminating in a cone will belong in another drawer, and so on, each end-mark deciding the drawer in which the instrument belongs.

To mark the instrument so as to denote its place in the drawer, a narrow groove is turned around the back end of the instrument, cutting it on the first instrument close to its drawer mark, and cutting each instrument a trifle higher, so that when all the instruments in one drawer are laid down in their respective places these cuts or marks will form a diagonal line, thereby defining for each instrument its place in the drawer. By wider grooves cut around the handles in places where they do not interfere with the diagonal mark, the instruments can also be marked in pairs, each pair having either one, two, three, or more groves.—E. M. S. Fernandez, *Dental Brief.*

Changes in Leaf Metals as a Result of Surface Tensions During Heating.—The author has made experiments on the effect of heating leaf metals (0.087 to 2.9 microns in thickness) at temperatures up to 970° C. Gold leaf (97 per cent. Au, 3 per cent. Cu) becomes wrinkled at 350-400° C. and shrinks markedly between 440° and 500° C. The temperatures of the various changes increase with increasing thickness. In hydrogen and nitrogen the changes take place at much higher temperatures, but no powdering occurs even at 800° C. To explain these phenomena the existence of surface tensions in the crystal elements counteracting the forces of orientation is assumed. The latter forces diminish more rapidly as the temperature rises, with the result that they are ultimately overcome, when a deformation of thin metal layers is to be expected owing to contraction of the crystalline lamellæ. Experiments made with a view of determining the magnitude of the surface tension showed that the ultimate strength per square millimeter of thin sheets is less than that of thicker sheets, which can be partially traced to the fact that the effect of surface tension in thin foils manifests itself by reducing the strength. It is therefore maintained that in mechanically-deformed metals surface tensions are so concentrated as to bring about recrystallization in proportion to their magnitude.—H. Chattky, *Gescll. Wiss. Göttinger* per *British Dental Journal.*

Conservation of the Dental Pulp.—In filling operations we may take chances that are not advisable in crowning or extensive inlay operations, and especially not in the use of teeth as abutments for bridge work. In cases of extensive caries, verging on exposure of the pulp, the dentin, especially the portion overlying the pulp, if it is decayed or semi-decayed, should be sterilized. This is best done by placing and sealing sterilizing agents in the cavity, to remain at least two days. Non-coagulants are most suitable for this purpose, as they are more readily diffused through infected, decomposed, or semi-decomposed dentin. Ordinarily I use a saturated solution of aristol in oil of cloves, eucalyptus, or cassia. I prefer the clove solution when a sedative effect is desirable. When I desire to leave sterilizing agents in position for a considerable length of time, as in cases of pulpitis or where caries closely verges on exposure of the pulp, I place in the cavity a pellet of a paste made of chalk, carbolic acid, oil of cloves, and aristol, sealed in with a gutta-percha temporary filling.

In cases where I leave a portion of carious dentin over the pulp in order to avoid its exposure in excavation, I spread a thin layer of the paste over the carious portion, leaving it to remain permanently, and cover and partly fill the cavity with oxyphosphate cement.—G. Evans, *Journ. of the Allied Societies.*

Prevention of Dental Caries.—Food often sticks about the teeth after eating; it then decomposes and acts upon these organs, causing them to decay. It is the starchy and sugary foods that are the chief offenders. If food can be prevented from sticking to the teeth, there will be no caries. To prevent caries the following rules should be observed:

(1) As soon as an infant needs food other than milk (from eight to nine months), give it in a solid form requiring mastication, such as crusty bread, twice-baked bread, or crisp toast. In this way good teeth are likely to

grow, and good habits of mastication will be formed. Never give bread soaked in milk, or flour added to milk, or other soft starchy foods, such as most patent foods.

(2) As the child grows up, he should still be given most of his food in a hard form, compelling mastication. Food should rarely be taken in a liquid form, or soaked in liquid, or minced. Bread should not be eaten when fresh, and it should have plenty of firm crust.

(3) Drinking between each mouthful is very injurious; liquids should be taken principally at the end of a meal.

(4) Sweets should never be taken between meals, nor as the last course in a meal, but only along with food requiring mastication.

(5) A meal should always be finished with a cleansing food. It is very desirable that fresh fruit should be eaten freely, particularly at the end of a meal. This is most important with regard to the last meal of the day.

(6) Mouth-breathing in children should always be corrected, and, if it be persistent, medical advice should be obtained.—W. RUSHTON, *Dental Record.*

Porcelain Inlay Reinforced with Gold. —In incisors or canines, where a porcelain inlay coming to the occlusal edge might be broken, I have in a few cases performed successfully the operation of reinforcing with a gold tip, which furthermore helps to hold the inlay in place.

The inlay is inserted as ordinarily; then, after the end has been ground away somewhat, a gold filling is carried along the end of the tooth and malleted across the end of the inlay, serving as a buffer. This prevents the inlay from breaking, and if due care be observed so to grind the end of the inlay as to have the mass of gold toward the lingual surface, very little gold will show. The inlay is cemented in place before the operation with gold is begun.

This operation requires, of course, a degree of thickness of the end of the tooth to allow of grooving for the gold. The gold must be very carefully anchored, since no dependence for retention can be placed on the porcelain. If the porcelain be beveled slightly so as to allow the gold to exercise a retaining influence on it, so much the better.

It would seem hazardous to mallet gold upon an inlay, but I have found it unnecessary to use more than ordinary care.

The same operation may be employed, I presume, in a silicate cement filling. I have not tried it, but the five or six cases in which I have operated with porcelain as described, are, after from two to four years, apparently doing well.

The filling of gold may be replaced with a gold inlay, which, however, requires to be well anchored. I prefer filling after the usual way, as it affords better opportunity for firm anchorage.—F. W. SAGE, *Dental Summary.*

Regrettable Carelessness in Dental Nomenclature: "Ulcerated Teeth"; "Nerve."—"Ulcerated teeth" is an expression which our patients sometimes use. This is not a very serious mistake, but one which keeps our profession from being quite exact. Patients often try to get us to subscribe to their error by asking us the direct question after we have made an examination, "Doctor, is it ulcerated?" In almost all cases it may be answered truthfully, without giving offense, in something like the following language: "There is a condition here which is sometimes called 'ulcerated,' but not quite properly so; an 'abscess' is a better word for it." For when we consider the definition of an ulcer as "a suppurating surface," and an abscess as "a circumscribed cavity containing pus," we see at once that what they *usually* mean is an alveolar abscess. I say *usually*, for they sometimes mean a bad case of pyorrhea with the inner surface of the socket suppurating. Even then the tooth is not "ulcerated."

This is not written with the thought that the members of this association do not know better than to use the term "ulcerated tooth," but merely to remind us that our duty as teachers requires that we be a little more exact and take a little time to explain the difference between an abscess and an ulcer. When we hear physicians and sometimes even dentists using the term, we cannot blame the public from feeling encouraged—even justified—in using it also.

Another little error, which is not serious, is the habit some of us have of calling the "pulp" the "nerve." I can remember learning in the public school when quite young the different parts of a tooth as the enamel, dentin, cementum, and pulp. I did not learn the word "nerve" in this sense until years afterward. Then I learned it from a dentist, and several years later learned it to a greater extent in a dental school.

While the mistake is not a very serious one, it certainly seems to indicate a state of retrogression. It seems humiliating to the dental profession to know that seventh and eighth grade pupils in the public schools, or even pupils in the fifth and sixth grades, have a more exact word for anything pertaining to our profession than some of us put into common use every day.

We lack something of making dentistry an exact science when we allow a loose nomenclature.—V. W. LAUGHLIN, *Items of Interest.*

Welded Gold Bands in Crown and Bridge Work.—In crown work, welded gold bands have many advantages over the usual soldered bands which are so generally used, in that, when properly sweated, bands are much stronger at the seam than at any other part, and no matter how many times they are put through the fire, they never come undone. Also, when the ledge formed by the overlapping band is filed away, the usual line which would be present if solder were used is absent, as the karat is not lowered by the addition of solder, and the color is the same throughout.

By this method a whole crown may be made without the use of solder, provided perfect contact be obtained with cusp and band, and the cusp be filled with the same karat gold as the band. Twenty-two-karat gold will weld very nicely, but coin gold works very much more smoothly, and is better by far for this work, as the copper in the alloy helps its flowing qualities.

In welding a band, the two edges are not brought together as in soldering, but one edge overlaps the other a fraction of an inch, the under edge being sharply beveled, and perfect contact being obtained with a pair of pliers. A little liquid flux is now allowed to run the length of the joint, the band is placed upon a charcoal block, and the flame applied. At first the whole band is heated to a red glow; then the blue flame is centered at the lower edge—or the edge nearest the worker—and when this begins to fuse the flame is moved rapidly up the seam. This may be done several times, depending upon how heavy the welding is desired, or if the contact is affected by the heat. A brush flame does almost as well as the blue flame; operators, in fact, prefer it. As the flame is moved up the seam, a dark line may be seen to follow the seam; this indicates fusion. This is also a guide when sweating a crown.

The portion of the band burned where fusion starts may be filed out and used for the mesial or distal festoon.—R. L. WHELESS, *Texas Dental Journal.*

HINTS, QUERIES, AND COMMENTS.

SOLDER *VS.* SEPARATION.

THE value of the contact point has long been realized by the closely observant, and the attitude of the profession toward the question of oral hygiene has intensified interest therein. The cast inlay offers splendid inducements to seek perfection in its formation. It seems that most of those who endeavor to secure good contact resort to separation of the teeth to permit such forming of the wax model as will insure proper contact when the teeth have recovered from the separation.

In many instances the operator fails to judge, with precision, the extent of the separation, the resultant condition being either a failure to secure contact or a too extensive "contour," the former favoring the impaction of food and the latter causing derangement of the articulation. The evil consequences of such impaction and derangement are among the great lessons that are taught us by oral hygiene and orthodontia.

In those cases in which the teeth have not left their normal positions, the wax model should be made so that the finished inlay will present a flat facet at the position of the base of the eminence which is to constitute the contact point. In most cases, a piece of solder flowed over this surface will make a contact point, but there are some inlays in which the necessary building-out is too extensive to be readily done with solder. In such cases the facet is brightened by burnishing, and the contact point made by building out with plastic gold and flowing solder over this.

In those cases in which loss of structure has permitted the teeth to move toward each other, separation is necessary, of course, but its extent should be only sufficient to allow the teeth to return to their normal positions, after which the inlay may be made as indicated above. Thus may we make contact points and at the same time preserve or obtain normal articulation, with accuracy, ease, and dispatch.

J. H. Crossland, D.D.S.
Montgomery, Ala.

MAKING-OVER REFUSE WAX.

Refuse wax can be easily remade by the following mode:

Place the old wax in a bag made of two thicknesses of cheese-cloth—the finer the better—and tie the bag securely. Place the bag and wax in a metallic pail about two-thirds full of boiling water, which should be kept hot until the wax is melted. When melted, churn it with a metal rod—smooth at the end, so the bag will not be torn—and finally press the bag to the bottom of the pail, holding it with the rod, and allow to cool. Punch holes in the wax and allow the water to drain off. Heat the sides of the pail to loosen the wax, remove it from the pail, and take out the bag, which contains all the sediment, but no wax. Should, however, a small amount of wax remain in the bag, it can be peeled out and put into the wax-drawer to be used at the next melting.

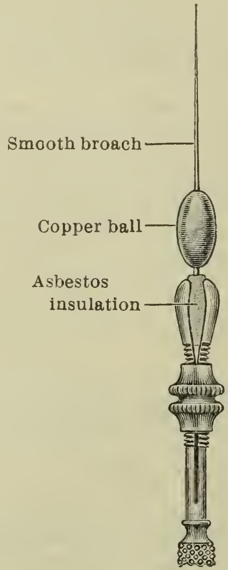
Re-heat the wax in the pail with water, and allow to cool almost to the congealing point. Have ready a slab of plaster of Paris about one-quarter inch thick dipped in cold water, and make the wax sheet, by dipping. Repeated dipping will make thicker sheets. When a sheet of sufficient thickness is attained, drag one edge and one end of the slab over the rim of the pail and place in cold water. The wax sheet will loosen, and the slab—now cooled—can be re-used. It is best to have two slabs, using one while the other is cooling.

To make the slabs, stretch a piece of rubber dam upon a flat board and pin it to place. Then, having ready four pieces of pine about one-quarter inch square, tack them to the rubber and pour in the plaster, stroking off the surplus with a straight-edge. When hard, remove from the board by loosening the pieces of wood.

Dr. James H. Beebee.
Rochester, N. Y.

A HOME-MADE INSTRUMENT FOR INSERTING PRINZ' PARAFFIN COMPOUND IN ROOT-CANAL FILLINGS.

The instrument suggested is devised for drying root-canals, which, according to Dr. H. Prinz, is the *sine qua non* of a successful paraffin root-canal filling (see "Filling Root-canals with an Improved Paraffin Compound,"



Dental Cosmos, October 1912, p. 1081), and for inserting the paraffin itself. The principle of its construction is that embodied in Dr. G. Evans' root-drier. A hole is drilled in an oval copper ball, and a tapering, smooth iridio-platinum broach is inserted into this hole and jammed fast. Enough of the broach is allowed to protrude at the shank to permit of its being wrapped with a double or triple layer of asbestos paper. This insulated end is then inserted in a pulp-broach-holder with wide jaws. Broaches of various sizes may be kept in stock. Instead of the iridio-platinum, silver or copper may be employed for these broaches.

Not every dentist has facilities for electrically heated and regulated points, which Dr. Prinz considers as the best, but the point of the instrument described, after the copper ball has been heated to a temperature slightly higher than that at which the paraffin compound will melt—viz, about 60° C. (140° F.)—will retain its heat for a considerable length of time, as the asbestos insulation prevents loss of heat by radiation into the handle of the instrument. It can be easily sterilized, and its convenient size, which allows of manipulation in the same way as a pulp-canal broach in its holder, greatly facilitates the correct introduction of the paraffin compound, which in every respect seems the best root-canal filling material thus far suggested.

RICHD. H. RIETHMÜLLER, Ph.D.Univ.Pa.

Philadelphia, Pa.

OBITUARY.

DR. EDWIN CHEW.

DIED, at his home in Salem, N. J., January 10, 1913, EDWIN CHEW, in his eighty-first year.

Dr. Chew and Dr. Charles S. Stockton, who died in September of last year, were the last two surviving charter members of the New Jersey State Dental Society. Dr. Chew had been failing in health for some time, though he continued in a measure in active practice until a week before his death, when he contracted grippe.

He was born in Salem, N. J., May 17, 1832, where he received his education. In 1858 he entered the office of Dr. Samuel C. Herbert as a student, and later bought the practice of his preceptor.

Dr. Chew belonged to a generation of dentists who, lacking the facilities of our modern supply houses, were often compelled to make both materials and implements.

In reference to the development of dentistry at that period, he writes in a letter of three years ago—"At that time it was very hard to find anyone that could carve teeth, but I seemed to have the talent for it, and, not being satisfied with that alone, wanted to learn all I could of the materials that went into the body enamels and frits. I still have quite a supply of porcelains I made, using Delaware spar, which I selected from the quarries, and silex that I found in a sand hole near my home."

Dr. Chew's skill as a dentist was recognized by a large *clientèle* as well as by the members of his profession. As a citizen, he was much respected, his high sense of honor commanding the admiration of all who knew him.

Four married daughters survive him.

"IN MEMORIAM" RESOLUTIONS.

Dr. Wilbur F. Litch.

AT a meeting of the Pennsylvania Association of Dental Surgeons, the following resolutions were adopted:

Whereas, it is our sad duty to record the death, December 25, 1912, of our fellow member, Dr. Wilbur F. Litch; and

Whereas, throughout his long, busy, and honorable life, Dr. Litch has ever been a patriotic citizen. His scholarly attainments, his ability as a writer, editor, and teacher, his skill as a practitioner, and his keen interest in professional affairs have placed him foremost among the eminent men who have graced the dental profession; therefore be it

RESOLVED, That we, the members of the Pennsylvania Association of Dental Surgeons, feeling deeply the loss we have sustained, hereby express our appreciation and our sorrow over the close of a noble career; and be it

RESOLVED, That these resolutions be spread upon our minutes, and a copy be sent to his widow and to the professional journals for publication.

WILLIAM H. TRUEMAN,
J. FREDERICK WESSELS,
J. CLARENCE SALVAS,
Committee.

At a meeting of the Eastern Dental Society of Philadelphia, the following resolutions on the death of Dr. Wilbur F. Litch were adopted:

Whereas, death has removed from our midst our beloved teacher and friend, Dr. Wilbur F. Litch; and

Whereas, the Eastern Dental Society of Philadelphia wishes to express its sorrow at the loss of an esteemed teacher and friend, under whose guidance most of the members have received their professional training; therefore be it

Resolved, That we, the members of the Eastern Dental Society, do express our deep sorrow at the death of Dr. Wilbur F. Litch, the loss of whom will be keenly felt by the dental profession, and whose loving, kind treatment and beneficent influence cannot be forgotten by those who were fortunate enough to come in contact with him; and be it further

Resolved, That a copy of these resolutions be spread upon the minutes of the society, and that copies be sent to the journals for publication.

Charles B. Shupack,
David Feldman,
Committee.

Legal Decisions.

STATE OF RHODE ISLAND *VS.* EVAN B. ROSENKRANS.

CONSTITUTIONALITY OF STATE DENTAL LAW PASSED UPON BY THE UNITED STATES SUPREME COURT.

By PERCY W. GARDNER, Esq.,
Of Wilson, Gardner & Churchill, General Counsel for the State Board of Registration in Dentistry of the State of Rhode Island.

[This is the first case to be passed upon by the Supreme Court of the United States determining the constitutionality of a law regulating the practice of dentistry.]

While a number of the final courts of appeal in the various states have held that a law regulating the practice of dentistry and creating a board of examiners in dentistry is constitutional, the first case to be passed upon by the Supreme Court of the United States is that of State *vs.* Rosenkrans, decided by the Supreme Court on June 7, 1912. This case, which had been fought through the courts of Rhode Island and in the federal courts for over three years, and in which almost every possible constitutional question concerning the practice of dentistry was raised, will be of interest both to the members of the dental profession and to counsel for boards of dentistry throughout the country.

On August 12, 1909, Harry L. Grant, secretary of the Board of Registration in Dentistry of the State of Rhode Island, swore out a complaint in the district court of the sixth judicial district of that state, against one Evan B. Rosenkrans, alleging that he did practice and attempt to practice dentistry without having first received a certificate from the Board of Registration in Dentistry that he had passed a satisfactory examination with reference to his knowledge and skill in dentistry. This complaint was brought by Dr. Grant upon the strength of the following statutes:

Section 4 of Chap. 181 of the General Laws of Rhode Island, 1909, which is an enactment of Public Laws 470, May 21, 1897, provides that all persons who hereafter intend to enter the practice of dentistry in this state shall appear before said board and be examined with reference to their knowledge and skill in dentistry, and to such as pass a satisfactory examination certificates to that effect signed by the president and secretary of the board shall be issued, and thereupon the names of such persons receiving certificates as aforesaid shall be registered with said board.

Section 7 of the same chapter makes the practicing without first obtaining such a certificate a misdemeanor.

Section 9 of this chapter permits members of the Board of Registration in Dentistry to swear out complaints.

The defendant was tried in the district court, convicted, and took an appeal to the Superior Court.

In the Superior Court the defendant filed, on October 12, 1909, a special plea in bar alleging that he had held a certificate from the State Board of Registration in Dentistry of the State of New Hampshire and a certificate from the State Dental Commissioners of the State of Connecticut, certifying that he was competent and fit to practice dentistry, which certificates he received from said boards several years before the time alleged in said complaint and warrant, and that he held licenses to practice dentistry in both of said states, and that he had further been in the continuous and successful practice of dentistry for the period of about twenty-six years prior to the bringing of the complaint; that evidence of the existence of such certificates and of the length of time that the defendant had practiced was presented to the State Board of Dentistry for the State of Rhode Island by the defendant in the form of a sworn petition, demanding a license, before said complaint was sworn out, and that he was practicing dentistry in Rhode Island before there was any legislation in the state regulating the practice of dentistry therein. To this special plea the complainant demurred on the ground that such pleas were not sufficient in law to preclude the complainant from having an action against the respondent. Upon argument this demurrer was sustained by the Superior Court.

The respondent was then permitted before trial to file certain constitutional questions, and which constitutional questions were certified under statutory powers to the Supreme Court for the State of Rhode Island, the court of last resort in that state, for determination. The seven questions thus raised and certified were in effect as follows:

Questions 1 and 2. Is this statute in conflict with Sect. 10 of Art. I of the Constitution of Rhode Island, and Sect. 1 of Art. IV of the Constitution of the United States, in that it deprives the defendant of the right to continue to practice dentistry in the state of Rhode Island, which right of property he enjoyed before the enactment of the statute?

Question 3. Whether this statute is in conflict with Sect. 2 of Art. IV of the state constitution vesting all legislative power in the general assembly, whereas the general assembly has granted legislative power to the examining board?

Question 4. Is this statute in conflict with Sect. 2 of Art. IV of the Constitution of the United States, in that it denies to citizens of another state coming into this state the privilege and immunities of citizens of this state?

Question 5. Is it in conflict with Sect. 1 of Art. XIV of the Constitution of the United States, in that the defendant is deprived of the privilege or immunity as a citizen of the United States which he enjoyed before the passage of this act?

Question 6. Is it in conflict with Sect. 1 of Art. IV of the Constitution of the United States, in that it denies to each and every state the full faith and credit required to be given to public acts of each state?

Question 7. This question was a restatement of Question 2.

In the opinion handed down March 9, 1910 (see 30 R. I. 374) written by Mr. Chief Justice Dubois, and which discusses each of these questions in a full and exhaustive manner, each of these questions was answered in the negative, thus sustaining the constitutionality of this statute as far as the state courts were concerned.

Pursuant to the decision on the constitutional questions, the case was remitted to the Superior Court for the State of Rhode Island for trial. The defendant was tried and found guilty. A motion for a new trial was made and denied.

The case was then taken to the Supreme Court on exceptions raised during the trial and exceptions to the denial of the motion for a new trial, all of which exceptions were overruled and the case remitted to the Superior Court for sentence.

The defendant then filed with the United

States Supreme Court a petition for writ of error, which petition was granted by Mr. Justice Holmes on June 5, 1911, and was served upon a justice of the Superior Court on the day on which the defendant was brought before the court for sentence. This writ of error carried the entire record of the case to the United States Supreme Court, and placed before that court the questions involving the constitutionality of the state statutes as far as they were in conflict with the Constitution of the United States.

The complainant's attorneys, during the October term, 1911, of the Supreme Court of the United States, filed a motion to dismiss the case for want of jurisdiction and to affirm the judgment of the state court. This motion raised two questions—namely, whether the writ of error was prematurely or improperly brought, and secondly, whether the federal questions involved were frivolous, and therefore the judgment of the state court should be affirmed without further hearing in the United States Supreme Court.

As above stated, this motion was granted by the United States Supreme Court on June 7th, thereby determining that the constitutional questions involved were frivolous and that the judgment of the lower court should be affirmed.

The opinion written by Mr. Chief Justice Dubois in the state court, analyzes with great care the entire statute, and all of the constitutional questions, and should form a valuable precedent for any state having a similar statute, where the constitutionality of the statute is raised, and, since the case was carried to the United States Supreme Court on the constitutional grounds above enumerated, the possibility of a successful appeal in any other state having a similar statute has been finally disposed of.

SOCIETY NOTES AND ANNOUNCEMENTS.

DENTAL SOCIETY MEETINGS: March, April, and May.

MARCH.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA. Philadelphia. March 25th.

AMERICAN DENTAL SOCIETY OF EUROPE. Florence, Italy. At Easter.

OKLAHOMA STATE DENTAL ASSOCIATION. Oklahoma City. Six days: March 24th to 29th.

APRIL.

ARKANSAS STATE DENTAL ASSOCIATION. Little Rock. Five days: April 7th to 11th.

CONNECTICUT STATE DENTAL ASSOCIATION. Waterbury. Two days: April 15th and 16th.

DENTAL FACULTIES ASSOCIATION OF AMERICAN UNIVERSITIES. Boston, Mass. Two days: April 22d and 23d.

FIFTH DISTRICT (N. Y.) DENTAL SOCIETY. Syracuse. Three days: April 3d to 5th.

MAY.

DENTAL SOCIETY OF THE STATE OF NEW YORK. Albany. Three days: May 8th to 10th.

INDIANA STATE DENTAL ASSOCIATION. Indianapolis. Three days: May 20th to 22d.

IOWA STATE DENTAL SOCIETY. Davenport. Three days: May 6th to 8th.

KENTUCKY STATE DENTAL ASSOCIATION. Lexington. Three days: May 26th to 28th.

LAKE ERIE (PA.) DENTAL ASSOCIATION. Cambridge Springs. Three days: May 15th to 17th.

MASSACHUSETTS DENTAL SOCIETY. Three days: May 8th to 10th.

NEBRASKA STATE DENTAL SOCIETY. Omaha. Four days: May 12th to 15th.

NORTH DAKOTA DENTAL ASSOCIATION. Fargo. Two days: May 13th and 14th.

TEXAS STATE DENTAL ASSOCIATION. Temple. Three days: May 15th to 17th.

VERMONT STATE DENTAL SOCIETY. Burlington. Three days: May 21st to 23d.

Examiners' Meetings.

ARKANSAS BOARD OF EXAMINERS. Little Rock. April 7th and 8th.

ILLINOIS BOARD OF EXAMINERS. Chicago. June 4th.

MASSACHUSETTS BOARD OF REGISTRATION. Boston. March 5th to 7th.

WASHINGTON STATE BOARD OF EXAMINERS. Seattle. May 22d.

READING (PA.) DENTAL SOCIETY—

Its Work in the Public Schools.

AT a recent meeting of the Reading Dental Society a copy of the appended resolutions, passed by a committee of the teachers of the public schools, was received, and on motion the secretary was instructed to send a copy to the DENTAL COSMOS for publication.

OTTO J. SPECKER, *Sec'y.*

Resolutions.

Whereas, the city of Reading and the school children of the city have been benefited beyond measure by the Reading Dental Society's gratuitous dental inspection of the children in the grades; and

Whereas, we, the teachers of the schools, knowing of the marvelous improvement in the health and physical development of these children through their magnanimity; therefore be it

RESOLVED, That we, the teachers of the city, in institute assembled, do express to the Reading Dental Society our sincere thanks, and in this way show our earnest appreciation and full realization of the great amount of good they have done; and be it further

RESOLVED, That a copy of these resolutions be sent to the secretary of the society.

[Signed] GEORGE BEGGS, *Chairman*, MARY H. MAYER, ESTHER M. EVANS, EMMA C. HOUDER, ELIZABETH PIPER, ANNA FINK, JOSEPHINE MURRAY, CARRIE LOTZ, MARTHA GOODENOUGH, MARGARET GOSSLER, *Committee on Resolutions.*

SOCIÉTÉ BELGE D'ODONTOLOGIE.

AT the annual meeting of the Société Belge d'Odontologie, held at Brussels on December 15, 1912, the following officers were newly elected: Dr. Pitot, president; Mr. Emile Huet, vice-president; Mr. Groth, librarian. No changes were made in the remaining offices.

DR. GEORGE FAY, *President.*

AMERICAN DENTAL SOCIETY OF EUROPE.

THE fortieth annual meeting of the American Dental Society of Europe will be held at Easter, in Florence, Italy. All members of the profession are cordially invited to be present. Florence is one of the most interesting cities of Europe, and Easter is the most favorable time of the year for seeing Italy.

GEORGE H. WATSON, *Sec'y,*
Pariser Platz 7, Berlin, Germany.

THE PANAMA PACIFIC DENTAL CONGRESS.

As one of the attractions of the Panama Pacific International Exposition, a dental congress, international in character, to be known as the Panama Pacific Dental Congress, is to be held in San Francisco, California, beginning on the last Monday in August 1915, and continuing for ten days.

A Committee of Organization has been perfected, including representatives from the Pacific Coast states—California, Oregon, Washington, Utah, Idaho, Colorado, and Arizona.

This committee is now actively engaged in perfecting the work of organization, including the establishment of executive committees in every state of the United States and in every foreign country where dental organizations are known to exist, which will be empowered to promote the business of the congress by bringing it to the attention of their national, state, and local societies, and securing memberships and contributions to the program.

The American Society of Orthodontists and the National Dental Association, of the United States of America, have already made arrangements to meet in San Francisco in 1915 as part of the congress, and invitations will be extended to other dental societies to take similar action.

The Panama Pacific Dental Congress is the first organization to apply to the Exposition management for space for exhibits, and to ask that a definite time be set aside for its meeting.

Manufacturers of dental goods have signified their intentions to maintain during the congress the greatest exhibition of dental supplies ever held. Ample space for this purpose has already been promised by the Exposition authorities, and we are assured of their hearty co-operation in all things pertaining to the success of the congress.

The membership fee has been fixed at ten dollars, and the finances of the congress are being cared for by a corporation, formed within the Committee of Organization, and known as the "Pacific Dental Congress Commission of 1915."

Over $8000 has already been subscribed for promotion purposes by the dentists and dental societies of the Pacific Coast states, and this fund will be increased by many thousands of dollars before the congress meets.

Ample funds for promotion of the congress are assured, and in due time Committees on Local Arrangements, Transportation, Exhibits, Clinics, Program, etc., will be appointed, and everything possible will be done to insure the success of the congress and make it in attendance and scientific and professional interest the greatest dental congress ever held.

The whole world is coming to San Francisco in 1915 to participate in and enjoy the Panama Pacific International Exposition, which will commemorate the completion of the world's engineering masterpiece, the Panama Canal.

Never in the history of the profession has there been so auspicious a time for holding a great dental congress, and the Panama Pacific International Exposition Company and the Committee of Organization of the Panama Pacific Dental Congress unite in a cordial invitation to the members of the dental profession to come to San Francisco in 1915 to attend the congress and view the wonders of the Exposition and the Pacific Coast of the United States of America.

Frank L. Platt, *Ch'man,*
Committee of Organization.

NEW SOUTH WALES DENTAL BOARD.

The following gentlemen have been reappointed members of the Dental Board of New South Wales: Mr. Donald Smith, president; Mr. P. A. Ash, D.D.S., Mr. A. Burne, D.D.S., Mr. A. W. Cleary, Dr. A. M. Gledden, and Dr. J. J. Kelly.

DENTAL FACULTIES ASSOCIATION OF AMERICAN UNIVERSITIES.

The next annual meeting of the Dental Faculties Association of American Universities will be held at Harvard Dental School, Longwood ave., Boston, Mass., April 22 and 23, 1913. The meeting will be called to order on the morning of April 22d, at 11 o'clock.

Edward C. Kirk, *Sec'y-Treasurer.*

INSTITUTE OF DENTAL PEDAGOGICS.

At the annual meeting of the Institute of Dental Pedagogics, held at Pittsburgh, Pa., January 28, 29, and 30, 1913, the following officers were elected for the ensuing year: D. H. Squire, Buffalo, N. Y., president; Fred W. Gethro, Chicago, Ill., vice-president; J. F. Biddle, 517 Arch st., N. S., Pittsburgh, Pa., secretary-treasurer. Executive Board—Dr. H. M. Semans, Columbus, Ohio, S. W. Bowles, Washington, D. C., and A. W. Thornton, Toronto, Canada.

The next annual meeting will be held in Buffalo, N. Y., during the last week of January 1914.

J. F. Biddle, *Sec'y.*

OKLAHOMA STATE DENTAL ASSOCIATION.

The Oklahoma State Dental Association will hold its sixth annual meeting in Oklahoma City, Okla., March 24 to 29, 1913, inclusive. Headquarters Skirvin Hotel; rates $1 to $2.50 per day.

This will be the second postgraduate course given by the society for the dentists of Oklahoma and adjoining states. The course will be conducted the same as last year, except that more suitable arrangements will be made for the clinics. Lecturers and demonstrators: Dr. Thos. P. Hinman, Atlanta, Ga.; Dr. J. V. Conzett, Dubuque, Iowa, and Dr. Martin Dewey, Kansas City, Mo.

The course will consist of about eighteen lectures and many practical demonstrations in operative dentistry, prosthetic dentistry, crown and bridge work and orthodontia. All ethical dentists are eligible to take the course, and dentists from other states are cordially invited to the meeting, but will be expected to pay a membership fee of five dollars. For any information address C. R. Lawrence, Enid, Okla.

The next issue of the *Bulletin* of the society will contain an outline of the program. A copy will be mailed to all out-of-state practitioners who will notify the undersigned that they desire same.

A. L. Walters, *Sec'y*,
Checotah, Okla.

FIFTH DISTRICT (N. Y.) DENTAL SOCIETY.

The forty-fifth annual meeting of the Fifth District Dental Society of the State of New York will be held at the Onondaga Hotel, Syracuse, N. Y., April 3, 4, and 5, 1913. Papers and clinics of unusual merit have been secured, and it is confidently expected that this will be the largest and most instructive meeting ever held by the society. A most cordial invitation is extended to all ethical practitioners.

J. N. Garlinghouse, *Sec'y*.

CONNECTICUT STATE DENTAL ASSOCIATION.

The next annual meeting of the Connecticut State Dental Association will be held in Waterbury, April 15 and 16, 1913.

A. V. Prentis, *Sec'y*,
New London, Conn.

ST. LOUIS DENTAL COLLEGE.

Mid-year Commencement.

The commencement exercises of the St. Louis Dental College (Dental Department of St. Louis University) were held in St. Louis, Mo., on January 30, 1913.

The commencement address was delivered by Dr. Martin Fischer, professor of physiology in the University of Cincinnati, Ohio.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Sylvester Baker, Missouri.
Louis J. Dicks, Missouri.
Charlie Gilliland, Missouri.
Nicholas T. Hoxmeier, Missouri.
Harry M. Stamm, Missouri.
George J. Vandas, Missouri.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

The regular meeting of the Academy of Stomatology of Philadelphia will be held on Tuesday, March 25, 1913, at the College of Physicians, Twenty-second st. above Chestnut, Philadelphia, Pa., at 8 P.M. Dr. Clarence J. Grieves of Baltimore, Md., will give a lantern talk on the "Comparative Vulnerability of Cavo-surface Margins in Contact Fillings and Inlays."

All members of the dental profession are invited to attend.

Norman L. Jameson, *Sec'y*.

ARKANSAS STATE DENTAL ASSOCIATION.

The Arkansas State Dental Association, instead of having papers and clinics by its own members as heretofore, will hold a post-graduate Course in Little Rock, Ark., April 7 to 11 inclusive, 1913.

This course will be under the direction of Drs. John P. Buckley, Hart J. Goslee, and J. H. Prothero of Chicago. All ethical dentists are eligible, and a membership fee will be charged.

For further information address

I. M. Sternberg, *Sec'y*,
Fort Smith, Ark.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

The forty-fifth annual meeting of the Dental Society of the State of New York will be held at Albany, N. Y., Thursday, Friday, and Saturday, May 8, 9, and 10, 1913. There will be the usual reduced railroad rates on the certificate plan.

The first session will open on Thursday at 10.30 A.M. The literary program of the meeting will be rendered in the auditorium of the Educational Building. Headquarters will be at the Hotel Ten Eyck, where the exhibits and clinics will be held.

A cordial invitation is extended to all ethical dentists in New York and sister states. Exhibitors wishing to engage space please address Dr. O. J. Gross, Schenectady, N. Y.

A. P. Burkhart, *Sec'y*,
52 Genesee st., Auburn, N. Y.

VERMONT STATE DENTAL SOCIETY.

The next meeting of the Vermont State Dental Society will be held in Burlington, Vt., May 21, 22, and 23, 1913.

P. M. Williams, *Sec'y*,
Rutland, Vt.

NORTH DAKOTA DENTAL ASSOCIATION.

The eighth annual meeting of the North Dakota Dental Association will be held at Fargo, N. D., May 13 and 14, 1913.

E. N. Hegge, *Sec'y*,
Hatton, N. D.

KENTUCKY STATE DENTAL ASSOCIATION.

The forty-fourth annual meeting of the Kentucky State Dental Association will be held at the Phoenix Hotel, in Lexington, Ky., on May 26, 27, and 28, 1913. All ethical dentists are invited to attend.

C. R. Shacklette, *Sec'y*.

LAKE ERIE (PA.) DENTAL ASSOCIATION.

The fiftieth annual meeting of the Lake Erie Dental Association will be held at Hotel Bartlett, Cambridge Springs, Pa., May 15, 16, and 17, 1913. This meeting celebrates the "golden anniversary" of this society, and the Program Committee have arranged for the best meeting ever held. Entertainment for the ladies; come, and bring them.

C. L. Mead, *Sec'y*,
Union City, Pa.

INDIANA STATE DENTAL ASSOCIATION.

The fifty-fifth annual session of the Indiana State Dental Association will be held at the Claypool Hotel, Indianapolis, May 20, 21, and 22, 1913.

The officers of the association recently met at Indianapolis and perfected plans for a three-day "Postgraduate Course." The very best instructors and specialists are being secured for each day. The course will be as follows: Tuesday—"Humanitarian Dentistry." Wednesday—"Preventive Dentistry." Thursday, A.M.—"Prosthodontia"; P.M., a great table clinic. The clinic will also be held in the hotel.

No tuition fee for the members of the association, or visitors from outside the state who are in good standing in their state associations, but all others desiring to take this course must arrange their tuition fees with the secretary.

Otto U. King, *Sec'y*,
Huntington, Ind.

NEBRASKA STATE DENTAL SOCIETY.

The Nebraska State Dental Society will hold its thirty-seventh annual meeting at Omaha, Nebr., May 12, 13, 14, and 15, 1913. Several special men have been secured from without the state, besides the usual array of home talent.

E. H. Bruening, *President*,
Wm. A McHenry, *Sec'y*.

IOWA STATE DENTAL SOCIETY.

The fifty-first annual meeting of the Iowa State Dental Society will convene at Davenport, Iowa, May 6, 7, and 8, 1913, beginning Tuesday, May 6th, at 9 A.M. Elaborate clinics and lectures and a large exhibit will be presented.

Further information will be furnished upon request from ethical practitioners of other states contemplating a visit to the meeting, to whom we extend a cordial invitation.

Exhibitors desiring space should apply to Dr. Wm. Finn, Cedar Rapids, Iowa.

C. M. Kennedy, *Sec'y*,
Des Moines, Iowa.

MISSISSIPPI DENTAL ASSOCIATION.

The thirty-eighth annual session of the Mississippi Dental Association will be held at the Great Southern Hotel, Meridian, Miss., June 24, 25, and 26, 1913.

A determined effort is being put forth to make this meeting our best. There will be a fine clinic, excellent papers, a banquet, and a fine exhibit.

L. B. Price, *Sec'y*,
Corinth, Miss.

TEXAS STATE DENTAL ASSOCIATION.

The thirty-third annual meeting of the Texas State Dental Association will be held at Temple, Texas, May 15, 16, and 17, 1913.

The clinics will be in charge of Dr. J. O. Hall, Waco, Texas, who will furnish any information relative to same. Exhibitors desiring space will please address Dr. J. M. Murphy, Temple, Texas. All ethical practitioners are cordially invited to attend the meeting.

Any other information will be cheerfully furnished by

J. G. Fife, *Sec'y*,
Dallas, Tex.

RHODE ISLAND DENTAL SOCIETY.

At the annual meeting of the Rhode Island Dental Society, held at Providence, R. I., on January 9, 1913, the following officers were elected: W. R. McIntire, president; T. F. McHale, vice-president; W. B. Rogers, secretary; D. J. Fisher, treasurer; F. P. Gleason, librarian. Executive Committee—C. N. Williams, chairman; F. P. Duffy, and A. G. Midgley.

W. B. Rogers, *Sec'y*.

EASTERN DENTAL SOCIETY OF THE CITY OF NEW YORK.

The January meeting of the Eastern Dental Society was held at Café Boulevard, 156 Second ave., New York City, the president, Dr. Wm. J. Lederer, presiding.

A paper—"What the General Practitioner Should Know About Orthodontia"—was read by Dr. Robert Elster of New York, and discussed. Study classes in crown and bridge, inlay, and casting work, for members in good standing, have been organized, to begin on January 15, 1913.

A. LeWitter, *Sec'y*.

WASHINGTON STATE BOARD OF EXAMINERS.

The Washington State Board of Dental Examiners will meet in Seattle, Wash., on May 22, 1913, for the purpose of holding the spring examination.

L. B. Manchester, *Sec'y*,
Wenatchee, Wash.

MASSACHUSETTS BOARD OF REGISTRATION.

A meeting of the Massachusetts Board of Registration in Dentistry for the examination of candidates will be held in Boston, Mass., March 5, 6, and 7, 1913. For application blanks and other information apply to

Dr. G. E. Mitchell, *Sec'y*,
14 Water st., Haverhill, Mass.

ARKANSAS BOARD OF EXAMINERS.

The next meeting of the Arkansas Board of Dental Examiners will be held in Little Rock, Ark., April 7 and 8, 1913. All applicants are required to pass an examination to obtain a certificate. Examination fee $15.

For application blanks apply to

E. H. Johnson, *Sec'y and Treas.*,
305 Citizen's Bank Bldg., Pine Bluff, Ark.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending January 18, 1913:

Wm. A. Squires, act.d.s., January 7th, returned to Fort D. A. Russell, Wyo., from leave.

For the week ending January 25th:

B. C. Warfield, act.d.s., left Fort H. G. Wright, N. Y., January 22d, for temporary duty at Fort Terry; arrived January 23d.

For the week ending February 1st:

A. T. Knoderer, act.d.s., arrived at Fort Crockett, Texas, January 17th, for temporary duty; arrived at Jackson Barracks, January 23d, for temporary duty.

First Lieut. E. P. Tignor left Fort Du Pont, Del., January 29th, for temporary duty at Fort Howard; arrived January 29th.

First Lieut. F. P. Stone arrived at Fort Williams, Me., January 29th, for temporary duty.

A. T. Knoderer, act.d.s., ordered to Fort Oglethorpe from temporary duty at Key West Barracks; granted leave of absence for twenty-two days about April 6th.

First Lieut. F. F. Wing left Fort D. A. Russell, January 25th, on leave of absence for one month.

J. F. Feely, act.d.s., left Fort Hamilton January 31st, on leave of absence.

For the week ending February 8th:

C. E. Sherwood, ACT.D.S., arrived at Fort Barry, Cal., January 28th, for temporary duty.

W. A. Squires, ACT.D.S., left Fort D. A. Russell, February 1st, *en route* to Philippine Islands; sailed February 5th.

A. T. Knoderer, ACT.D.S., left Jackson Barracks, La., February 1st, on temporary duty at Fort Morgan, Ala.

EXAMINATION OF DENTISTS FOR THE U. S. ARMY.

THE Surgeon-general of the army announces that examinations for the appointment of acting dental surgeons will be held at Fort Slocum, N. Y.; Columbus Barracks, Ohio; Jefferson Barracks, Mo.; Fort Logan, Colo., and Fort McDowell, Cal., on Monday, April 7, 1913.

Application blanks and full information concerning these examinations can be procured by addressing the Surgeon-general, U. S. Army, Washington, D. C.

The essential requirements to securing an invitation are that the applicant shall be a citizen of the United States, shall be between twenty-one and twenty-seven years of age, a graduate of a dental school legally authorized to confer the degree of D.D.S., and shall be of good moral character and habits.

Acting dental surgeons are employed under a three years' contract, at the rate of $150 per month. They are entitled to traveling allowances in obeying their first orders, in changing stations, and in returning to their homes at termination of service. They also have the privilege of purchasing certain supplies at the army commissary. After three years' service, if found qualified, they are promoted to the grade of dental surgeon, with the rank of first lieutenant, and receive thereafter the pay and allowances appertaining to that rank.

In order to perfect all necessary arrangements for examination, applications must be in the possession of the Surgeon-general at least two weeks before the date of examination. Early attention is therefore enjoined upon all intending applicants. There are at present a large number of vacancies to be filled.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JANUARY 1913.

January 7.

No. 1,049,654, to WILLIAM O. BLOOM. Sanitary tooth-brush holder.

January 14.

No. 1,050,178, to WESLEY L. SMITH. Antiseptic waste-cotton receiver.

No. 1,050,282, to HUGH T. LIPSCOMB. Rotary tooth-brush.

No. 1,050,469, to FOREST O. KIEFER. Dental appliance.

No. 1,050,560, to GEORGE MOORE. Dentifrice and floss dispenser.

No. 1,050,561, to JOHN MOORE. Pad for artificial teeth.

No. 1,050,620, to WILLIAM H. DE FORD. Mouth-inhaler.

No. 1,050,621, to WILLIAM H. DE FORD. Inhaler.

No. 1,050,672, to JAMES H. B. MACINTOSH. Dental wall bracket.

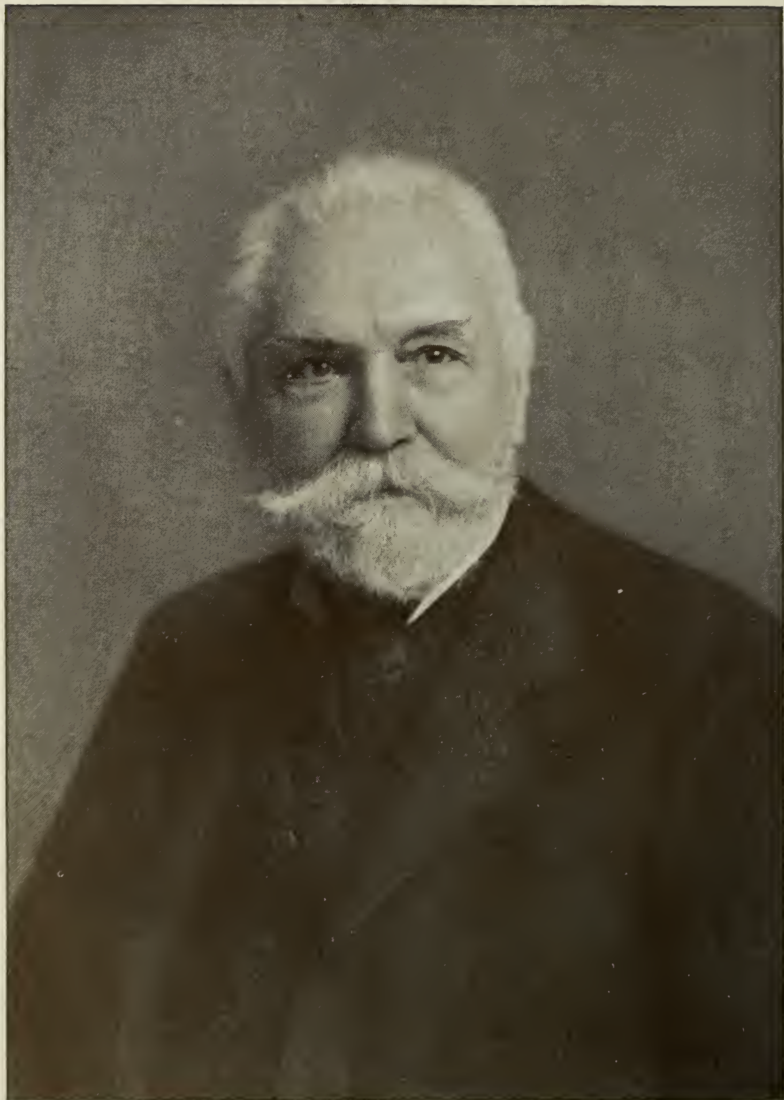
January 21.

No. 1,050,864, to WESLEY L. SMITH. Tooth-brush holder.

No. 1,050,933, to WILLIAM W. EVANS. Attachment for dental articulators.

January 28.

No. 1,051,433, to G. C. MOSELEY and A. C. CAMERON. Tooth-brush holder and sterilizer.



DR. NORMAN W. KINGSLEY.

THE

DENTAL COSMOS.

VOL. LV. APRIL 1913. No. 4.

ORIGINAL COMMUNICATIONS.

DIAGNOSIS AND TREATMENT OF IMPORTANT DISEASES OF THE DENTAL PULP.

By J. F. BIDDLE, D.D.S., Pittsburgh, Pa.

(Read before Section III of the National Dental Association, at its sixteenth annual meeting, Washington, D. C., September 11, 1912.)

THE rational diagnosis and treatment of pathological conditions of the dental pulp is one of the fundamental branches of modern dental practice. While the profession has had its several spasms of enthusiasm over various operative procedures in recent years, we must recognize the fact that the success of any of these operations is absolutely dependent upon the healthy condition of the tooth-root. In view of the marvelous strides that have been made in the restoration of tooth structure, operations which a few years ago would have been deemed impossible, it is apparent that more definite and exact methods of pulp treatment must be devised, if this important division of our work is to rank with the more purely mechanical.

From the pulp and its disorders arise many pathological conditions, due, no doubt, to the fact that the pulp is one of the few tissues in the body that have retained the original, embryonic form. It is soft and gelatinous, and therefore easily attacked by the micro-organisms of the oral cavity, which may be transmitted to it through the dentinal tubuli, the apical tissues, or by direct exposure. In order to diagnose and treat intelligently diseases of this delicate and important tissue, one cannot emphasize too strongly the value of a comprehensive knowledge of anatomy, physiology, histology, and pathology, and its conscientious application to each case that comes under our observation. How often one is prone to treat mechanically, rather than thoughtfully and logically, the individual needs of his patients.

The diseases of the dental pulp that we shall consider are hyperemia, inflammation of the pulp, suppuration, and chronic inflammation.

HYPEREMIA.

Hyperemia is divided into two classes, active and passive. The many circulatory and infective diseases of the pulp are attributable, no doubt, to its lack of lymphatics, and the peculiar character of its structure. For this reason any irritation of the pulp often produces hyperemia, with a distension of the arteries, capillaries, and veins, and if the apical foramen be small, the pressure of the enlarged arteries upon the weaker veins prevents the free circulation of the blood, thus resulting in a passive as well as an active hyperemia. Of the active hyperemic cases, such only will be considered as relate to the destruction of the pulp, as this paper deals with destruction, not conservation, of the dental pulp. In the diagnosis of such cases let us consider causes, viz—

Direct. The irritation of the pulp through thermal stimuli, due to defective enamel or dentin, or the presence of a large metallic filling in close proximity to the pulp.

Indirect. Injury or disease of the apical tissue. A blow or other injury to the teeth.

In cases where a sharp, acute pain is produced by contact with hot or cold substances, recurring only in response to direct stimuli, the symptoms are favorable under proper treatment. Paroxysms of sharp pain, varying from a few seconds to a few minutes, are indicative of a serious disturbance of the circulatory vessels of the pulp. The pain from a hyperemic pulp is not always referred to the affected tissue, but is often reflected to the ear, temple, infraorbital foramen, the malar prominence, the angle of the lower jaw, the side of the neck, or other remote part of the affected side. Cold water applied to the offending tooth will usually produce an aggravation of the reflex neuralgic pain, as well as pains in the affected tooth. For relief, the cavity is rinsed with warm water, the carious dentin, as far as possible, is removed, and an anodyne treatment of oil of cloves and chloroform, equal parts, applied for a few minutes, repeating if necessary. The pulp when exposed usually presents a purplish hue, and on account of the enlargement of its vessels immediately protrudes slightly through the opening. Phenol is now applied and the pulp is punctured with a sharp probe, permitting the escape of blood for some time, after which it is destroyed. In diagnosis of hyperemia, one must bear in mind that the severity of the disorder depends upon the vascular disturbance, hence is often simply a matter of differentiation, distinguished mainly by therapeutic tests, on account of which one must discriminate carefully between this disturbance and other pulp disorders. The location of a hyperemic pulp is not always indicative of its cause, as the following example will demonstrate: A partially impacted lower left third molar was removed from the jaw of a woman about thirty-two years of age. It was necessary to bur and chisel away the occlusal half of the process before attempting the extraction of the tooth, which was accomplished only after great difficulty. Two days later the patient returned, complaining of the condition of the first molar, which was highly sensitive to thermal changes. A careful examination revealed a hyperemia in this tooth, due to no apparent cause, except possibly to a reflex pain from the third molar region. The tooth was isolated, washed with alcohol, and received several coats of resinous varnish, usually used as a cavity lining. Next a loose-fitting band of exceedingly thin German silver, filled with gutta-percha to form a crown, was pushed into place, and the patient instructed to remove a partial upper plate which occluded with the offending tooth. The gutta-percha cap was removed after five days, during which time the socket that had contained the third molar was irrigated daily with warm, normal salt solution. Thermal tests were applied to the first molar, which was found to be in normal condition, the irrigation of the third molar socket having relieved the irritation due to the reflex action of its torn circulatory vessels.

INFLAMMATION OF THE PULP.

By its symptoms only, inflammation of the pulp cannot be differentiated, positively, from hyperemia, for the reason that inflammation usually involves hyperemic conditions, although in inflammation the pain is more lasting, frequently occurs without apparent cause, and is greater after exertion, mastication, and lying down. During the first stages of inflammation the pain is dull and heavy, with uneasiness about the jaws and inordinate response to thermal stimuli, particularly to heat; while in the latter stages the pain is of a severe, continuous nature, the pericemental membrane becomes somewhat hyperemic, and the tooth responds to percussion. Reflex pains also are noted. In making a diagnosis one must remember that there is seldom true inflammation of the pulp without its exposure, although extensive bacterial invasion may occur by the micro-organisms or their products through the dentinal tubuli. The causes should be carefully considered, whether they be extrinsic, such as are due to the pulp's exposure by decay, deep-seated cavities, the action of irritating drugs, large metal fillings, mechanical violence in the form of accidents or dental operations, an abscess on an approximating tooth, pyorrhea pockets, or impacted teeth. The intrinsic or direct causes may be pulp nodules, injury to the vessels at the apex of the root, thrombosis, etc. If there be any doubt regarding the identity of the affected tooth, each tooth of the affected side should be isolated and thoroughly tested. The electric mouth-lamp and the X ray are often valuable diagnostic aids. The prognosis in pulpitis is bad; invariably the pulp should be removed.

Treatment. Excavate the cavity of decay as thoroughly as possible. Apply an anodyne treatment, repeating if necessary, after which arsenic may be introduced. One must be sure pulpitis has subsided before the introduction of arsenic, otherwise it acts as an irritant instead of promptly devitalizing. If danger of further irritation seems imminent an opening should be made in another part of the tooth for the introduction of arsenic through healthy tissue for the pulp's devitalization. Simultaneously the pulp may be quieted by sedative applications in the cavity of decay. In inflammation without decided hyperemia, the pulp may become inflamed, and go on to suppuration and final destruction of the organ without producing any symptoms whatever of inflammation or of hyperemia. Occasionally such trouble cannot be dissipated by the anodyne treatment, nor will it be quieted by cocain or arsenic. The writer has in mind one case which would not yield to treatment, and it was necessary to give the patient an anesthetic in order to remove the pulp. Two years later he returned with another tooth in the same condition, and which would respond to no known treatment. This time nitrous oxid and oxygen were administered for the operation.

SUPPURATION.

Suppuration of the pulp usually occurs from infection through the dentin, but bacteria or their products may enter the pulp through the circulation, if the systemic resistance be lessened during a period of bacterial invasion of any other part of the body. In ulceration of the pulp there is usually little if any response to cold, the discomfort being a dull, gnawing pain if the cavity of decay be open, but if closed, so that the pus cannot escape, intense pain results. If the pulp chamber be opened, the probe may be passed in for some distance, depending upon the extent of suppuration, before any sensation be felt, unless it be a pulp abscess, when it may be necessary to pass a sharp, slender probe into the pulp tissue, resulting in a bead of pus and immediate relief. In pulp abscess the pain grows in intensity, and, in contrast to the other conditions of suppuration, is often relieved by a cold application. In most cases response to heat stimuli is very marked, while in others it may decrease to such an extent as to be almost imperceptible. In the latter stages of pulp suppuration the tooth may become sore, due to the action of bacterial products upon the pericementum. The symptoms of pericemental disturbance may assume proportions of incipient acute apical abscess, although considerably highly inflamed but vital apical tissue exists. The differential diagnosis of these two conditions is highly important with regard to the patient's comfort, particularly since the introduction of formocresol, the use of which over vital tissue will inaugurate excruciating pain. Many phases of this condition may exist, as will be demonstrated presently by radiographs. Case 1 is an instance of a mesial root of a lower molar containing an abscess with apical involvements plainly discernible; secondary dentin had completely severed the pulp, entirely filling the body of the pulp chamber, while the distal root contained a vital pulp.

CHRONIC INFLAMMATION.

Chronic inflammation may result either in a sclerosis or an hypertrophy of the pulp. The hypertrophy is often of much greater bulk than the original pulp, and is composed of an inferior type of granulated tissue, hence it bleeds readily, and the absence of nerves permits the easy removal of its bulbous portion, thus permitting confirmation of the diagnosis that it is pulp, rather than gum tissue grown in through a cavity or through a perforation. The importance of correct diagnosis is apparent when one considers the matter of devitalization.

Pulp nodules are usually found in the coronal portion, although they may be found in any part of the pulp tissue, and may produce either hyperemia or inflammation. In the majority of cases they can be detected by the X ray, but their pathological significance is not such that it is wise to devitalize the pulp without confirmatory diagnosis by other means.

EXTIRPATION OF THE PULP.

The *modus operandi* of destroying a pulp is dependent upon existing conditions. If the pulp be suppurative, devitalization by arsenic is preferable, as its use sterilizes the contents of the canal simultaneously with its destruction of the pulp; but if non-suppurative, cocain or some form of cocain extirpation should be employed. Clinical observations have shown that infections frequently follow pulp extirpations with cocain, and have led to the conclusion that the principal cause was the indiscriminate use of the extirpation method. If the operator be in doubt as to the reasonably healthy condition of the pulp, he should invariably use arsenic, the after-results of which have proved uniformly satisfactory. The methods employed in the use of cocain are too well known to receive more than passing notice. They are—

(1) Cocain pressure with base-plate gutta-percha, usually deemed best for cases of direct exposure.

(2) Cocain with high-pressure syringe where the tooth be sound or the pulp be covered with considerable dentin.

(3) The method of injecting through the gum tissue in close proximity to the periosteum and anesthetizing the apical tissue is sometimes used. This method is the least desirable.

DEVITALIZATION BY ARSENIC.

The greatest objection of most practitioners to the use of arsenic is its production of pain. While arsenic is recognized as an irritant of pulp tissue, the writer believes that the greater part of the pain produced is due to faulty technique in cavity preparation and in the application of the agent. Very satisfactory results may be obtained by the preparatory use of an anodyne treatment from five to fifteen minutes immediately preceding the insertion of the arsenical paste. In a record of more than fifty cases which has been carefully kept, four had slight, intermittent pain during the first few hours, and two had severe pain—not sufficient, however, to necessitate the removal of the application. The arsenic should be left from one to three days, where there is an exposure or nearly so, and will very rarely require removal on account of pain. Occasionally an obstinate case presents which will not respond to the anodyne treatment, or devitalization, or to the extirpation method, and can be removed only after resorting to the use of a general anesthetic.

It may be of interest to say a word here regarding the introduction of arsenic into teeth not fully formed. Recently such a case came to your essayist's notice. The patient was a boy fourteen years of age. The lower right first molar had been removed when the child was seven years of age, the second molar moving forward and occupying the exact position of the first molar. There was an exposure in an occlusal cavity, and the dentist, after a superficial examination of the supposed first molar, decided that the roots were sufficiently formed to insert arsenic with safety for forty-eight hours. Four days later the patient presented with the buccal and lingual sides of the gum showing a deep purplish color, the teeth exceedingly loose, the glands and side of the neck and face swollen. The tooth was immediately removed (Fig. 1), also the infected hard and soft tissue for a considerable distance; then the infected area was irrigated with normal salt solution and swabbed with 10 per cent. iodin. The patient was seen every day for a week. The glands and tissues returned quickly to normal condition with no further treatment except daily irrigation with warm, normal salt solution.

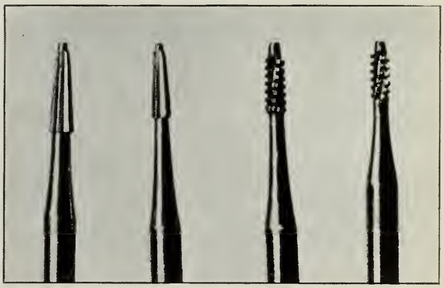
FIG. 1.

Lower second molar of boy of fourteen, in which arsenic has been used.

ROOT-CANAL TREATMENT.

For successful root-canal treatment it is essential that the pulp chamber be correctly opened in order to accomplish its thorough mechanical cleansing, observing the following rule: "The walls of the cavity, pulp chamber, and canals should be continuous, but not necessarily parallel or on the same plane." The pulp chamber is first opened with a round bur. The opening is enlarged with a small fissure bur, the end blades of which—and sometimes the edges of the side blades also—are removed, thus making it capable of enlarging the walls of the pulp chamber of a bicuspid or of a molar without marring the floor (Fig. 2) and changing the angle of approach of one wall of an incisor or of a cuspid without making pits in the opposite walls. In no case should the removal of the pulp be attempted until the cavity and the pulp chamber be thoroughly cleansed of all débris. The incisors and cuspids more frequently than the other teeth are insufficiently opened, their ideal opening being through the center of their lingual surfaces; but as their cavities are generally on the approximal surfaces, the canal is usually opened from that angle. To facilitate the removal of the pulp, the "orifice of the exposure should be extended to the gingival wall and the full breadth of the chamber," frequently cutting a lingual extension, which will admit of free access of a broach to the lingual of the incisal edge. For the extension of the canal the small specially prepared fissure bur (Fig. 2) previously mentioned is used. The canal is approached from the same direction as a broach would be introduced, passing the bur into the canal, where its lateral cutting broadens

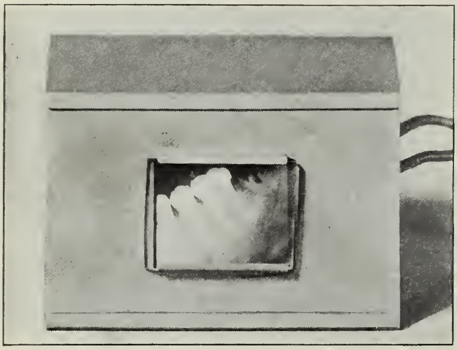
FIG. 2.



Specially prepared fissure burs for opening pulp chamber.

the canal in such a direction as will straighten its approach, using great care to prevent the cutting of the opposite wall and the consequent roughening—which would result in making the canal impassable to the broach. In bicuspids the orifice should be made through the center of the roof of the pulp chamber, and then broadened bucco-lingually to expose the horns of the pulp, which in these teeth diverge toward the points of the cusps. Their root-canals are given

FIG. 3.



Author's illuminating box in operation.

off from buccal and lingual extremities of the pulp chamber, hence the cutting must be sufficiently wide to permit the insertion of an instrument. The radiograph has been found to be one of the greatest aids in the treatment and enlargement of root-canals. In difficult cases the writer places the film in an illuminating box, and keeps it before him on the bracket table during the entire operation, so that it may be referred to at all times without handling. This box has a shield for both horizontal and vertical films. (See Figs. 3 and 4.)

SUMMARY OF ESSENTIALS OF ROOT-CANAL TREATMENT.

To sum up, the essentials of root-canal treatment are—

(1) To establish and maintain an aseptic field of operation.

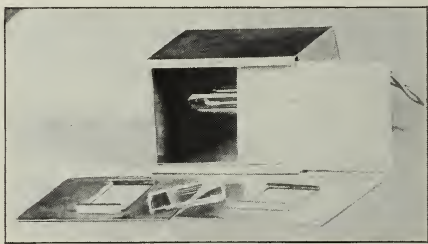
(2) Never to attempt the removal of a pulp until all cutting be done and débris removed.

(3) Instruments that have been used in the cavity of decay should never be used for the removal of the pulp.

(4) Instruments used in the canal of one tooth of a patient should never be used in the canal of another tooth of the same patient without their being sterilized.

(5) Instruments used in a canal of a multi-rooted, infected tooth should

FIG. 4.



Parts of author's illuminating box.

never be used in other canals of the same tooth.

(6) Burs and drills should never be used to open root-canals.

PRIME IMPORTANCE OF REMOVAL OF ALL PARTICLES OF PULP TISSUE.

Before the advent of the X ray it was taken for granted that in the filling of a root-canal, when the patient felt pressure at the end of the root, the ideal result had been accomplished. This pressure is analogous to the action of the hyperdermic syringe. If one's finger be placed over the orifice of the syringe and pressure be created on its piston, the compression of the air in the syringe will produce pressure on the finger covering the opening. The same result occurs in the root, the apical tissue corresponding to the finger and the gutta-percha or other filling material to the piston of the syringe. The X ray has revealed roots two-thirds filled, or less, the filling of which was attended with slight or in some cases acute apical pain.

The filling material introduced, matters little, provided all particles of pulp be removed and the canal rendered sterile to the apex of the root. Judging from experience with the radiograph, the writer believes that thorough cleansing of the canal is much more essential than the filling of the root to its apex, although one should of course endeavor to do this also. However, contrary to all that has been said on the subject, your essayist has as yet failed to radiograph a single case—wherein the removal of all organic matter had been accomplished

Fig. 5.

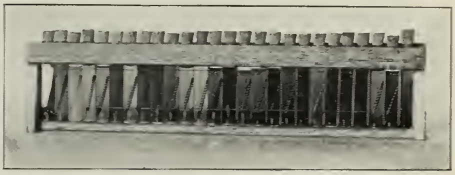
Author's sterilizing dish for root-canal instruments.

—that revealed any abscess, even though the roots had not been perfectly filled. But in cases where small quantities of organic matter remained, or where mummifying paste had been used, many blind abscesses were revealed.

STERILIZATION OF ROOT-CANAL INSTRUMENTS.

The testing and sterilization of all instruments entering a root-canal is one of the most important details in their treatment. For the purpose of sterilizing instruments, the writer uses a small glass dish divided lengthwise into three compartments. (See Fig. 5.) One of these parts is subdivided, thus making in all four compartments, two long and two short ones. Of the two longer compartments, one is used for smooth and barbed broaches and long-shanked reamers, the other for straight handpiece burs. One of the smaller compartments is used for right-angle burs and the other for short reamers with handles. This sterilizing dish is kept on the cabinet at all times. It has a dustproof, airtight cover, and does not permit the escape of the sterilizing agent, a 10 per cent. lysol solution, which is a saponified product of coal-tar. Lysol is a clear, brown, oily liquid containing 50 per cent. of comparatively pure cresols. Its effects are simi-

Fig. 6.



Lysol test as described in paper.

lar to phenol, but it is five times stronger and eight times less poisonous. Instruments will not rust or corrode in lysol solution from 2 per cent. up. The writer has made some lysol tests which have been standing since last December. (Fig. 6.) The first tube contains simply water, and shows considerable rust of the bur; the second tube holds 1 per cent. lysol, and there is very little rust; while in the remaining tubes, containing 2 to 25 per cent. lysol, no rust is present. The sediment in the tubes is due to the fact that unfiltered city water was used, thus causing the lime to be precipitated by the soap in the lysol. All instruments to be used in opening or penetrating the root-canals are placed in this sterilizing dish and allowed to remain until ready for use, when they are removed with pliers, placed in a watch-glass containing alcohol with which to rinse off the lysol, and then in a holder ready for use. After using them they are mechanically cleansed and replaced in the sterilizing dish, not to be removed until again needed.

USE OF THE X RAY IN DIAGNOSIS.

The X ray is of inestimable diagnostic value in dentistry, but in the past its use has been confined more to the discovery of chronic involvements of the apical tissue than to acute destructive conditions. While its value for these latter conditions has increased wonderfully, it still has decided limitations, and requires also a more exact technique, as the accompanying radiographs will illustrate.

Fig. 7.

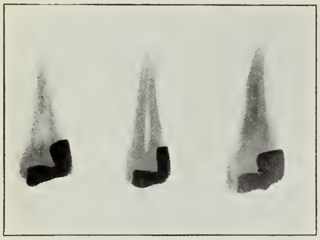


Fig. 8.

Fig. 9.

In Fig. 7 the radiograph in the center depicts the filling practically the same size as the original, while the ones on each side were taken with the tooth lying in exactly the same position, but the tube was moved first three and one-half inches to the right, then three and one-half inches to the left, respectively, of the original position, and focused so that the rays from the tube were oblique to the bucco-lingual axial plane, not parallel with it as in the first instance, hence the distortion of the filling.

In the next illustration (Fig. 8), will be noted the distortion of the length of the tooth; the central figure, where the focus was direct or perpendicular to the mesio-distal plane, reproduces the tooth of the same length as the original, while the oblique rays reproduce a distortion in the length of the tooth similar to that noticed in the filling.

Fig. 9 shows the correct opening of the canal of the cuspid, the easy insertion of a broach, and the canal filled.

Some of the most important uses of the X ray in this field of dentistry are found in the diagnosis of the following:

(1) Diseases of the pulp due to the presence of large metallic fillings.

(2) The presence of invisible cavities.

(3) The presence of pulp nodules.

(4) Diseases of the pulp due to the presence of impacted teeth.

(5) Deposits of secondary dentin.

(6) Abscesses on one root of a tooth, with vital pulp in others.

(7) To locate the number, position, and curvature of the canals of a tooth.

(8) To show the length of roots.

(9) To show success or failure of an operation in insertion of a root-filling.

Besides the foregoing, the X ray has at least fifty other uses in dentistry, the enumeration of which, time and the subject of this paper will not permit.

Fig. 10.

PRACTICAL CASES.

There will be thrown upon the screen a number of views illustrative of cases mentioned.

Case 1. The patient, a woman, fifty-five years of age, with a lower left first molar which exhibited slight soreness upon occlusion, also an occasional discomfort which the patient could not describe as pain but simply as an "uneasiness." Upon the removal of a large amalgam filling, it was found that the body of the pulp chamber was filled with secondary dentin, the removal of which, followed by the insertion of a broach in the distal canal, brought forth a protest from the patient, and a drop of pus from the mesial canals. A radiograph (Fig. 10) revealed an apical abscess on the mesial root of the first molar, a pericemental abscess on the vital bicuspid, also partially filled roots of the second molar with resorption of the apical portion of the root.

Case 2. The patient, a man of thirty-five years of age, ten years before presenting had had a crown with a facing attached to it placed on the bicuspid. Seven years later, the patient noticed that the central and lateral responded to thermal stimuli. His dentist advised him that this condition would pass away, which it eventually did, but the result is apparent. About a month prior to the time when the radiograph was taken, a slight swelling appeared. An examination revealed a sinus between the first bicuspid and lateral incisor on the labial surface (Fig. 11, *a* and *b*). A radiograph was taken, after which the central, lateral, and impacted cuspid, with surrounding structure, were removed. Had the case been correctly diagnosed at the beginning of the hyperemic condition, doubtless both incisors could have been saved.

Case 3. The patient, a young woman of twenty, was suffering with spasmodic pains of about an hour's duration once

FIG. 11.

a

b

FIG. 12.

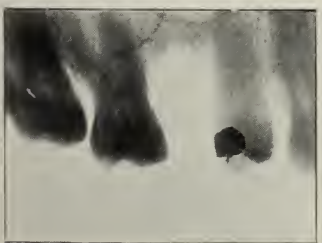


FIG. 13.

FIG. 14.

or twice every twenty-four hours. The second bicuspid was badly broken down and was removed, but the pain continued. Thinking that possibly there might be some loose bone in the socket, as the process was splintered in the extraction of the tooth, the case was referred for a radiograph. The film (Fig. 12) reveals pulp nodules in both molars. With this discovery as a clue, the thermal tests were applied, with just sufficient response to confine the diagnosis to the first molar.

Fig. 15.

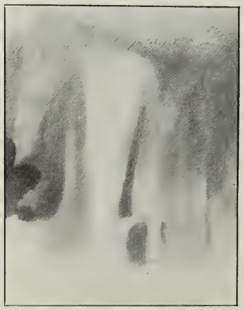
Fig. 16.

Fig. 17.

a

b

Fig. 18.



a

b

Case 4. The patient, a man of

twenty-eight, had a chronic abscess on the central and lateral incisors, with inflammation of the lateral, which is not surprising when one considers the extent of the abscess tract. (Fig. 13.)

Case 5. The radiograph shown in Fig. 14, which was taken in a woman of twenty-six, is of peculiar interest, owing to the fact that it shows a deciduous molar with deposits of calculus (only the occlusal surface is visible through the gum); also an exposed, inflamed pulp, which the dentist was unable to locate, attributing the trouble to the supposedly partly erupted first permanent molar.

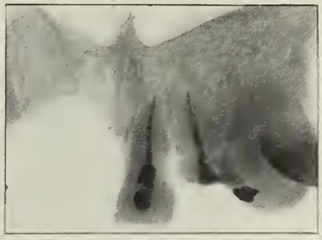
Case 6. The patient, a man thirty-five years of age, with an inflammation of the lower molars. The second molar contained a large contour amalgam filling of some years' standing; the third molar, a large approximo-occlusal cavity. Both teeth gave equal response to tests. The radiograph (Fig. 15) revealed the trouble to be due to the amalgam filling, which was removed. The pulp was devitalized and the root and tooth filled.

Case 7. The only manifestation of trouble in this patient, a woman of thirty-eight, was a swelling of the left side of the upper lip and the lower portion of the nose, which an examination showed to be due to a large deposit of bone. The X ray (Fig. 16) revealed the cause to be an abscess involving the central and lateral incisors, which when opened were found to contain cotton root-canal fillings.

The next two cases are instances in which it was necessary to resect the roots in order to save the teeth.

Case 8. This case, that of a woman of forty, involved abscesses on both centrals, as well as the left lateral and left supernumerary, there being also three sinuses. The centrals were treated successfully with quick response, then the X ray (Fig. 17, *a*) revealed the condition of the lateral. The results ten months later are noted also (Fig. 17, *b*); the cavity was then filled with bony tissue, with the exception of a small particle of bismuth, which is not as yet absorbed.

FIG. 19.



Case 9. This shows the longest section of root that the writer has ever removed with the hope that the tooth will eventually recover. The band surrounding the crown is so placed as to hold the tooth firmly until the cavity in the bone is filled, and the tissues (Fig. 18, *a* and *b*) are readjusted.

Case 10. This is illustrative of the proper root-filling of a central and a lateral incisor. (Fig. 19.)

Some of these examples are not within the scope of this paper, yet are indicative of the grave results of careless diagnosis and treatment of the dental pulp, hence should serve as an incentive to more careful and rational methods of investigation and diagnosis.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

IMPLANTATION OF ARTIFICIAL CROWN AND BRIDGE ABUTMENTS.

By E. J. GREENFIELD, D.D.S., Wichita, Kans.

(Read before the Academy of Stomatology of Philadelphia, at its monthly meeting, Tuesday, January 28, 1913.)

IN this age of achievement and progress, when it is not at all uncommon for the miraculous to become the actual, when people no longer gasp at the definite accomplishment of ideas which at first glance or consideration are seemingly impossible, it is not at all surprising that prosthetic dentistry should keep pace with the notable achievements in other fields of science.

This great and vitally useful branch of our profession, which is concerned with the mechanical restoration of the organs of mastication, has been both the producing agent and the beneficiary of wonderful developments during the last few years. Consequently our study of the implantation of artificial roots should be considered of the utmost importance by all dentists who are anxious to keep abreast of the times, and should be of intense interest to all who wish to be in the van of progress—in short, to each and every man who desires to be a leader in his particular vocation in his community.

IMPERFECTIONS OF NATURAL TOOTH IMPLANTATION.

For several years the countless attempts to replace natural teeth after extraction have met with only a fair measure of success. Every practicing oral surgeon has probably implanted quite a number of natural teeth, and knows how unsatisfactory this operation is. He finds that five years is a long life for the majority of implanted natural teeth. It is a matter of rather general experience that the implanted natural root fails, viz, simply disappears, because nature absorbs it, just as she does the deciduous tooth.

Like all my brothers in the profession, I have continually been confronted with the very serious problem of just what to do for patients with one tooth missing, or with the posterior teeth all lost. And this problem has been of such intense interest and so vitally important that I have spent every spare moment during the past eight years trying to devise a means of making implantation a permanent operation. I believe my success in this work, the perfection of the process which I shall describe, and the instruments used in it, will be of the same interest to you as they have been to me.

SERIOUS SEARCH FOR A SUBSTITUTE.

Through much study and extensive experimenting, I was early convinced that, even with the most careful work, the implanted tooth could never meet the demands of the profession. Though searching constantly for a substitute, and though having at my beck and call all of the advantages, facilities, and equipment of modern dentistry, my actual discovery of artificial root implantation was somewhat due to chance. One night a few years ago I happened to be present at a very difficult operation. I watched the surgeon reduce a fracture in which he used a silver-wire suture; then and there came the problem-solving query—If a surgeon can use metals in bone, why cannot a dentist do the same?

THE MISSING LINK IN DENTISTRY.

Inspired by this thought, I set to work with increased energy, and it seems to me that the activity resulting from that chance observation of a surgical operation has produced a process which is perhaps as audacious and revolutionizing in prosthetic dentistry as were the discovery and use of wireless telegraphy, radium, and the X rays in their particular fields of science. For this discovery in actual concrete form is an artificial root that is permanent. I have tested and proved it repeatedly, with continued success, and have demonstrated before clinics in all parts of the country that artificial roots can be put into the human mouth to stay.

This new process of implantation is no less than the making of a few circular incisions in the jaw-bone of an edentulous mouth, inserting properly prepared artificial roots of iridio-platinum, and mounting on each a base or anchorage, to which can be attached a full set of permanent, natural-appearing teeth, capable of rendering as good and efficient service as those endowed by nature at her best.

NO SPLINTS NECESSARY.

Perhaps the greatest convenience to dentists in this new process is the fact that the splint is unnecessary. For filling the vacancy caused by the loss of a single tooth, what better method could be employed? No splint will be needed, and the adjacent teeth will not have to be mutilated in order to serve as anchorages or abutments; the artificial root eliminates all that. Besides, the mechanical phase of this wonderful process is so utterly simple that it will be readily understood, and proficiency in its use will be quickly acquired by all who desire to use it.

The permanence of the operation is its chief value. At a clinic in Wichita, Kans., Dr. F. O. Hetrick, now president of the National Dental Association, asked the question, "How long will this platinum root last?" And such was and is my confidence in the permanence of this process that I answered honestly, "I do not expect to live long enough to answer that question." And what is more, though the tooth in question was not a spectacular case in any way, it still does not show any signs of deterioration in its enduring qualities.

THE PROCESS AND THE INSTRUMENTS.

The artificial root used for this process is a hollow, latticed cylinder of

FIG. 1.

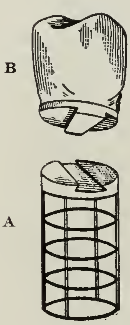


FIG. 2.

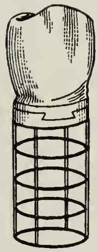


FIG. 3.

iridio-platinum, No. 24 gage, soldered with 24-karat gold. It is impervious to acids, and does not injure the tissue which grows about it. The disk-shaped cast base with groove or slot (Fig. 1, A), in which the crown attachment (Fig. 1, B) is inserted, is made of 22-karat gold, and is soldered to the metal frame of the root.

Special machinery is necessary for cutting and shaping these roots. Absolute accuracy is essential, for the artificial root must fit exactly the circular incision or socket made for it in the jaw-bone of the patient.

These roots are made in three different sizes or diameters, 3/16, 5/16, and 7/16 of an inch respectively, and are ½ inch in length. As a rule, the 7/16-inch size can be used for supporting a molar, while the two smaller sizes are employed for bicuspids and anterior teeth. The character of the ridge, however, in which the roots are to be implanted must serve as the ultimate guide in the selection of the proper size of the root to be used in the operation. In a small, narrow ridge the small root is used for a molar as well as a front tooth. The length of the root—½ inch—is ample for any case. Often it will be necessary to shorten the root a little by removing a layer of the crate-like root-frame.

Of course, thorough sterilization of these roots and of the instruments used always precedes the operation of implantation. When everything is ready and the patient has been put under an anesthetic—either general or local—the gum is cleansed with ether and then painted with tincture of iodin. Next the tubular knife (Fig. 3) is employed in the dental engine for removing the gum tissue.

The remainder of the operation is performed with a cylindrically shaped drill or trephine (Fig. 4), which is made in the same three widths as are the roots; likewise the selection of the drill for any particular operation is determined by the character of the ridge in which the trephinement is to be accomplished.

The trephine is first used with the center rod (Fig. 4, A) in place, for the sake of guiding the instrument in position as it starts the socket in the jaw. After the socket is started, the trephine is removed for a moment and the center rod is taken out. Then the excavation is continued to about ⅜ of an inch depth in the alveolar process or bony structure which supports the teeth. In the absence of alveolar process, a socket is trephined in the jawbone to a depth of ¼ inch plus whatever depth is necessary, if any, to permit the tooth-supporting base of the root to be evenly embedded in the gum tissue (Fig. 6).

Fig. 4.

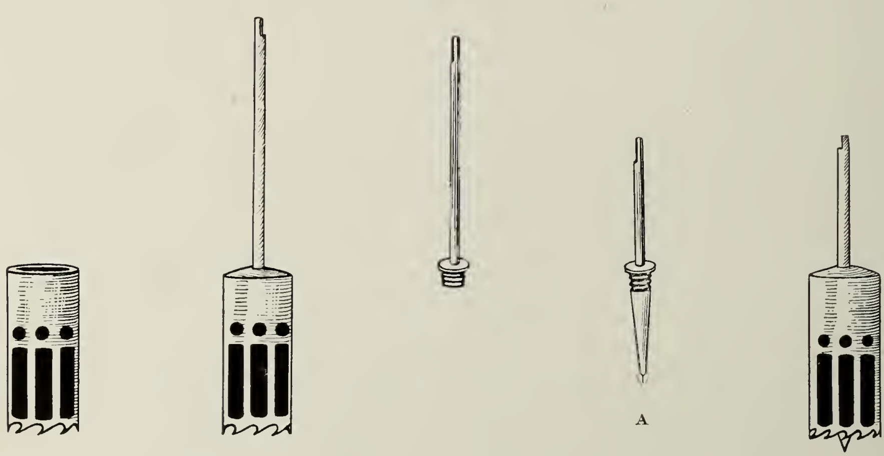


Fig. 5.

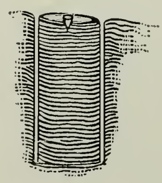
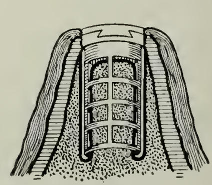


Fig. 6.



From the above, it will be observed that it is absolutely essential to excavate the root-socket (Fig. 5) to exactly the right depth. Conditions determining this depth may vary, but in any event the attachment for the crown of the root, when in position, must be on a level with the outer surface of the gum tissue (Fig. 6). It should be noted that a row of holes is punched through the cylindrical wall of the trephine around its center, to serve as a guide to the depth to be attained in trephining.

Thus far the operation should have consumed about five minutes' time. The circular socket in the jaw-bone (Fig. 5) is now finished, and the patient, if he has been subjected to general anesthesia, can be allowed to regain consciousness.

The root-socket should now be filled with bismuth paste, the formula for which is as follows: Bismuth subnitrate

FIG. 7.*

30.0, white wax 5.0, soft paraffin 5.0, vaselin 60.0 parts by weight; mix while boiling. Then the thoroughly sterilized artificial root is placed in position (Fig. 6), *i.e.* sunk down around the bony core or center of the root-socket.

When once in place, the artificial root should not be removed; but if for any reason there is absolute necessity for its removal, care should be taken not to rotate the root as it is taken out, for in doing so, the core of the socket might be fractured or pulled out entirely.

In the course of a week or ten days after operating, sensitiveness has largely abated, and in six weeks' time—rarely longer, the bony tissues of the jaw have united through the latticed root-structure, and a positive anchorage is provided for the attachment of the artificial denture.

FIG. 8.

FIG. 9.

HISTOLOGIC REASONS FOR SUCCESS OF OPERATION.

By means of the bony core which the trephine produces in making the incision or root-socket, the artificial root,

*[The radiographs here presented were not shown at the time of the reading of the paper.]

after being placed in position, will be held firmly until a sufficient deposit of bone cells has filled the spaces in the root-frame. Thus the artificial root becomes solidly embedded in the jaw.

This bony center of the root-socket is one of the chief factors in the success of this process of implantation. It assures the fit of the artificial root in the socket trephined for it, and an absolutely accurate and certain fit is decidedly essential to permanence and endurance.

Without this core or center, splints would be necessary, also there would be no possibility of operating on an edentulous jaw; but with it, there are practically no limits to the prosthetic appliances available. It is this feature of the process which makes it so inviting and interesting to all members of the profession, especially when the results accomplished are compared with the results of the implantation of natural teeth. The implanted natural tooth fails because of the rarefying inflammation which occurs at the seat of implantation.

The end results can readily be demonstrated by experimentation. It can, also, be proved that in the implanting of new bone in osseous tissue the grafts naturally die, and are gradually replaced by the formation of new bone. In the dead bone or grafts we find a more rapid dissolution, and the defect becomes filled with connective tissue, with latent osteosclerosis or condensation. By analogy, the same process must take place in the implantation of natural teeth.

To go into the minute embryological formation of cartilage and its replacement by bone is a matter too remote for this discussion. Suffice it to state that bone tissue is developed from the mesoblastic layer of the embryo, or the mesoderm, as is all connective tissue. But an understanding of the process of formation of new bone is a necessity in the implantation of artificial teeth, for it is with this knowledge alone that we are able to understand the process, and to gain a clear conception of what we are doing.

When an artificial root is implanted in either jaw, a cellulo-plastic exudation forms around and between the mesh-work of iridio-platinum wire, and is soon converted into granulation tissue, and inasmuch as the constituent cells are derived from bone, they early manifest a bone-forming or osteoblastic function. The periosteum becomes thickened and more vascular, and is slightly loosened for a short distance by an exudation of plasma, which is soon followed by a new deposit of spongy bone on the surface as the result of the irritation.

The granulation tissue from the periosteum unites with that from the bone, forming what might be called the provisional or ensheathing callus. The transformation of this callus into bone starts from the periosteum by the multiplication of the osteoblastic cells and their invasion of the granulation tissue or callus, the cells being derived from the osteogenetic layer of the periosteum.

It will thus be obvious that the continuity of the bone is restored long before the act of repair is completed, and that the end result depends on the ossification of the ensheathing callus. The time necessary for the removal of the clot and the formation of the granulation tissue is about a week or ten days, and new bone formation commences about the first week. By the fourth or sixth week, according to the size of the cavity, the degree of immobilization of the root, and the recuperating power of the individual, the union will be completed, and all tissues consolidated.

APPLICATION IN EDENTULOUS CASES.

In cases of entire loss of the teeth, incisions are made in each jaw at points so selected as to insure sufficient anchorage for the proposed restoration. I have made as many as eight incisions in either jaw for artificial abutments for bridge work.

The danger of these operations may be thought greater, possibly, than the benefits to be derived from them. But such is not the case if attention is given to the prevention of infection by keeping everything sanitary and sterile—a precaution every dental surgeon should exercise in performing any operation.

CONSTRUCTION OF A BRIDGE.

I have found that a great many dentists are confused as to the setting of a bridge on artificial roots. The impression often prevails that the bridge must be soldered to the caps and then made to slide into the grooves on the roots. This, of course, would be impossible.

One practical way of making a full bridge is as follows: First, a heavy platinum pin is soldered to the gold cap or crown-supporting base of the ordinary artificial root (Fig. 1, B); then the caps are placed in position on the roots. The pins are covered with tin foil so that the plaster will not pull too hard on the roots. Next an impression is taken, and the caps are removed and placed in the impression. Care should be taken to keep them in order. Then the model is poured, the bite taken, and the case mounted on an articulator.

Next, inlay wax is pressed over the post or pin. The tooth is placed in position and the wax is carved as it is to appear when finished in gold. This should be continued until all the teeth are in proper position; then the teeth are removed and the casting is made.

If parts are cast separately, it will be necessary to replace them in position, invest, and solder, care to be taken not to solder the caps to the bridge. Finally the caps should be replaced on the roots, and the bridge cemented in place.

A bridge made in this manner can be made removable by drilling a hole in the pins and castings, threading them, and placing screws in them to hold the bridge.

POSSIBLE LIMITATIONS ARE FEW.

The conditions limiting the success of this process of implantation are decidedly few in number, and inconsequential as to effect. The physical condition of the patient must, of course, be taken into consideration as in any other operation. If the patient's condition is anywhere near normal, little trouble should be encountered in implanting an artificial root.

The nature of the maxilla or the alveolar process in which the intended implantation is to be made also has somewhat to do with the success of the operation. The subsequent solidity of the implanted root depends largely on the amount of the area—the width and depth—of the ridge available for the operation.

This operation must not be placed in the same class as all other implantations, nor should it be anticipated that this process comes to the same end as do all other implantations. No fear is to be entertained that infection will occur. If a solid body is inserted in the maxilla there would be room for infection to set in around it, but in this operation a cage-like, hollow cylinder is inserted in a circular socket in the maxilla. This root is open all the way up, clear to the gum, and the circulation carries away any bacteria which might otherwise be destructive. This is one of the main features in the success of this process of artificial root implantation. If the root were a solid body or even simply perforated, it would be thrown off, as nature would not tolerate it, and there would be room for infection.

Another factor which limits the conditions of failure is the simplicity of the operation, which is neither difficult nor complicated, and can be performed in a few minutes.

Another advantage is the immovability of the root. When once implanted, this artificial root is solid and stationary, the bony core in the center of the socket assuring solidity.

I have implanted both natural teeth and these artificial ones, so I speak from experience when I say that the absorption which takes place after a few years and absolutely destroys implanted natural teeth is entirely avoided by this process, which provides for the anchoring in the jaw of good, solid, imperishable artificial roots.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

THE POST-OPERATIVE TREATMENT OF PYORRHEA.

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(Read before the National Dental Association, Section III, at its sixteenth annual meeting, Washington, D. C., September 11, 1912.)

IN this short paper the writer desires to discuss the most effective methods of treating our pyorrhea cases after surgical treatment has been successfully accomplished, and when the cure seems perfect.

PYORRHEA ALVEOLARIS CURABLE.

The surgical treatment of pyorrhea is now so firmly established that it is needless to discuss it in this connection, for it is proved by a multitude of case records that the destruction of the bony process commonly noted in pyorrhea can be absolutely stopped, and the gums be made to resume normal tint and normal resistance. Unfortunately for both patient and operator, many cases are allowed to pass from observation without further care or instruction to the patients, and in the course of a few months such cases show recurrence of inflammation. The patient is therefore discouraged, perhaps goes to some other dentist, who probably does not believe that pyorrhea can be cured, and who frankly informs the patient that the disease is incurable, and promptly advises the extraction of teeth which, under proper care and treatment, could be easily rendered serviceable to the patient for a long term of years.

EFFECTS OF SURGICAL TREATMENT, AND RECURRENCE OF GINGIVITIS.

It is illogical to suppose that teeth which have lost any part of the bony process which nature built around them are as good as teeth which have never lost this supporting process, because the result of such a loss is infection of the root-surface. This infection promptly induces a deeper cellulitis of the gum margins than obtained in the original gingivitis which initiated the inflammation; the clinical picture, therefore, shows the gums swollen and perhaps a trifle higher around the necks of the teeth than normal. The first effect of surgical treatment induces just the opposite condition, namely, the recession of swelling, and because the bony socket has been reduced in height, this recession of swelling of the gingiva lays bare the neck of the tooth below the enamel margins, exposing this surface to the fluids of the mouth and to the attack of caries; then, by reason of the loss of the interproximal bone, the interproximal gum sinks, and crevices are opened to the impaction of foodstuffs, which are very difficult for the patient to remove. The decomposition of such materials brings on caries, and possibly recurrent gingivitis.

THE PATIENT'S USE OF DISCLOSING SOLUTION IN HIS DENTAL TOILET.

In order to prevent this first step in a recurrent attack of pyorrhea, it is the duty of every conscientious operator thoroughly to explain to the patient the absolute necessity for extreme care in keeping the necks of the teeth free from all foreign matter, and to supply him with some method or means of knowing, beyond any shadow of doubt, whether or not his teeth are being kept clean. To this end the patient should be instructed in the use of a revealing stain, than which there is none better than a combination of zinc iodin 15 gr., potassium iodid 15 gr., iodin crystals 15 gr., with glycerin 4 dr., water 4 dr., carefully triturated together in such a manner as to lose absolutely none of the solid material in the mortar when decanting the same in the bottle. This disclosing solution sponged lightly upon the tooth surface by wrapping cotton on a toothpick or orange-wood stick instantly reveals to the eye fermentative materials which are otherwise transparent, and puts the patient at once upon his guard, so that he may remove these damaging substances.

PROPHYLACTIC OUTFIT FOR THE PATIENT.

The patient should be supplied also with the proper outfit for the removal of the irritating matter revealed by the stain. This outfit should consist of a properly shaped tooth-brush, flat silk, mouth-mirror, and wood-point carrier, together with suitable polishing materials, and the patient should be instructed in its use. There is a certain proportion of people who will gladly follow directions implicitly, and the time required to keep the teeth clean by this method is cheerfully spent by these individuals.

PROPHYLACTIC SILVER NITRATE TREATMENT.

For those who will not care for their own teeth, the monthly prophylaxis treatment by the dentist is the only remedy. In addition to the care of the teeth themselves, as outlined in the foregoing paragraphs, it is very wise and sometimes absolutely necessary to flush the necks of the teeth with a 10 per cent. solution of silver nitrate for the restraint of caries, or to rub a 40 per cent. solution of silver nitrate into the roots by means of a wood point held in a carrier, by first drying the necks of the teeth with cotton and hot air, then applying the strong solution of silver nitrate by vigorous rubbing, and drying it in with warm air. This treatment administered three or four times a year by the dentist himself is a vigorous prophylactic measure not only against caries but also against recurrent infection of the gum margins. The gums contiguous to the teeth themselves should be next to receive attention.

IMPORTANCE OF INTEGRITY OF GUMS.

It is the writer's belief that a hard, elastic, pink gum is, beyond any shadow of doubt, the best guarantee of freedom from infection, both local and constitutional. The inner, raw surface of the cuff or sleeve of the gum which surrounds the neck or root of a tooth whence the bony process has dissolved is a serious menace to the life and health of any individual—because it is easily possible that in an ordinary case of pyorrhea, involving perhaps the loss of an average depth of one-eighth of an inch of alveolar process, the equivalent of two square inches of ulcerating raw surface is open to infection. The bone itself, being exceedingly cancellous, renders the spread of infection in its substance from such an ulcerating surface extremely easy, and the penetration of micro-organisms into the cancellous structures of the body of the bone is made certain by the force of occlusion —amounting to thousands of tons of pressure in a year—and this force being applied to the tooth causes the latter to act much like the plunger of a powerful syringe, injecting bacteria and the fluids of decomposition directly into the cancellous substance of the bone and the bloodvessels and lymphatics of the surrounding tissues, thus producing deep inoculation by the bacteria that happen to be present in the pyorrhea pockets or apical abscess cavities.

MASSAGE TREATMENT FOR THE AVOIDANCE OF REINFECTION.

Among the bacteria with which the raw surfaces above described may become inoculated, and which are very commonly found in the mouth, are the pus-forming varieties, of which the streptococcus and staphylococcus are *always* present. The strepto-bacillus of arthritis deformans of Goadby, the pneumococcus of Fraenkel, and the tubercle bacillus and fusiform bacillus, accompanied by the spirillum of Vincent, are constantly found in these pockets, as well as many varieties of anaerobic bacteria of which the significance has not yet been determined. There is no doubt that "lumpy jaw," or *actinomycosis hominis,* is started by the same avenue. It is therefore obvious that in post-operative treatment we should look toward the closing of lesions constantly open to infection. To this end a method of treatment should be adopted which will speedily close these ulcerating lesions to further infection. This is best accomplished by rubbing the gums external to these surfaces as vigorously as possible with some medium which will not break the mucous membrane, at the same time applying as much force as possible to them. This massage promotes toughening of the mucous membrane and healing of the lesions beneath the membrane in the pockets.

The tooth-brush has been the chief implement in use for gum massage until recently, and, when kept clean, answers the purpose reasonably well; coarse linen finger-stalls have also been used with some success. More recently the heavy cotton roll, cut in short pieces three-quarters of an inch in length and held securely by hemostatic forceps or the Kurorus devised by Dr. Skinner, has come into use. These short, heavy cotton rolls held firmly and saturated with a vegetable astringent such as Azone—which is composed of alcohol, glycerin, and an astringent—serve this purpose best of all. The short cotton roll, after rubbing all the gum surfaces both inside and outside the arch vigorously for a few moments, is thrown away, and a new piece is taken for each treatment, thus avoiding the danger of reinfection with a dirty brush. The dense cotton roll, saturated with the alcoholic astringent and vigorously used on the gums as described, causes the gums speedily to harden and shrink, and the ulcerating surface is soon protected by the formation of a dense layer of elastic and fibrous connective tissue, thus closing the lesions to further infection, and affording a reasonable guarantee that reinfection will not occur.

SPLINTS AND REMOVABLE BRIDGE WORK FOR THE RETENTION OF TEETH AND ROOTS.

The next problem in post-operative treatment is that of retaining for useful service such teeth as have lost so much of their supporting bony structure that, even though infection has been stamped out, the teeth will be lost very soon, because there is not sufficient bone left to sustain them. In this type of cases it is necessary to supply some form of splint to compensate for the bone which has been lost. The cementing of fixed bridge work upon loose teeth is an impractical procedure, because it is impossible to keep them free from irritating matter, hence inflammation must recur. It therefore seems advisable that any form of bridge work or other prosthetic appliance be of such a nature that the patient can readily remove it, so that gum massage and thorough prophylactic work may easily be accomplished. After many years of observation the writer has reached the conclusion that removable bridges or other prosthetic appliances constitute without doubt the best practice in the after-treatment of pyorrhea. The fixed splint, such as advocated by Dr. Patterson of Kansas City, Dr. McDonagh of Toronto, and Dr. Logan of Chicago, answers admirably for small groups of teeth, as do the Case retaining appliances devised by Dr. Case for retaining teeth in proper alignment after regulation. When greater numbers of teeth have been loosened, the form of appliance which has given the author the greatest satisfaction is the combination removable splint bridge. In preparing loosened teeth for this type of retainer, it is necessary first to devitalize the teeth and cut them off at the gum margins. Then each tooth should be coped, and the cope must be made to fit the root-end so perfectly that it will not afford any irritation to the gum margin. The cope is made on practically the same lines as the cope for the Richmond crown. After all the copes are made and in position, they are removed in a plaster impression. The impression is then used to obtain a perfect model of the jaw and of the teeth upon which the copes properly belong. After this has been accomplished, the operator has the choice of two methods: (1) He may adjust on each cope a short metallic post slightly lingually to the center of the cope. All these posts are to be placed in perfect alignment, and each is fitted with a gold crown or a porcelain-faced crown, as the position of the tooth demands. After having been thus prepared, these crowns are united as in ordinary bridge work. The copes with their projecting short posts are cemented to the tooth root, and the bridge is placed upon the copes and pins in the lower arch without any retaining device whatever, the patient thus being able to lift the bridge off the root-ends at will, in order to cleanse the under surface of the bridge and to massage vigorously the gums about the root-ends. (2) If large groups of teeth are missing, it is advisable to insert a saddle in the bridge, allowing the saddle to rest firmly on the gum, thus aiding in the support of such roots as still remain in the arch. These saddles should not closely approximate the coped roots, in order to avoid irritation of the gum around the coped root. In the upper arch, or when it is necessary to obtain a greater degree of fixation than the aggregation of posts will afford, we can insert an occasional Roach attachment on the copes, hiding the spring within a molar or bicuspid dummy. When this is not advisable, we can cut a slot on the side of a post and fit a small slide in a dummy on either side of the mouth, placing it so that it will fit into the slot in the post. This slide or key, when in position, firmly locks the piece upon the root-ends. The patient, when desiring to remove such a piece, thrusts a small pin against the slide, driving it toward the lingual surface, thus releasing the bridge from the copes and pins, and thereby permitting the easy removal of the whole piece. In certain cases it is desirable to have the bridge work fastened to the teeth in such a manner that the patient cannot remove it himself, for occasionally we find individuals who dislike removable bridge work, though the great majority seem to prefer it, as it guarantees cleanliness and prevents recurrent inflammation.

SEMI-FIXED BRIDGE WORK.

In those individuals who dislike removable work, but in whose mouths it seems essential that the work allow of ready removal, the Corcoran attachment fitted to the copes can be used. With the Corcoran attachment the copes are made and fastened to the teeth. The piece is placed in position and retained by means of small, heavy screws, which the operator can readily remove, and upon the removal of which the whole bridge is lifted out of position, so that proper prophylactic measures can be instituted as often as the teeth and tissues demand. There is a vast advantage in having all appliances on pyorrheal teeth readily removable. Occasionally an infection may recur in a single tooth or a group of teeth. If we have fixed bridge work, the difficulty of overcoming such inflammation is very great. Removable bridge work may be taken off and any material which may have crept under the bridge removed, with the result that the inflammation rapidly recedes, and the bridge is easily put in place again. If a single root should abscess under a removable bridge, it is an easy matter to remove the bridge, extract the root, and, in the course of a few weeks, add a saddle resting on the gum in the space formerly occupied by the lost root.

COMBINATION BRIDGE AND PLATE WORK.

In cases in which only a small group of very loose teeth is left in the mouth, an artificial denture only hurries the loss of these teeth, because the plate will press upon and strip the gum tissue away from the roots. If, however, instead of fitting an artificial denture around such roots, we amputate the teeth at the gum margins, cope them, and unite them with a half-round bar, and, if desirable for purposes of retention, place one or two Roach attachments on the copes at either end of the group of teeth, we may build a removable denture to rest upon the root-ends with saddles resting upon the gums. The half-round wire which is used to connect these copes will permit the rise and fall of the saddles under the stress of mastication and at the same time enable the teeth to bear and share the work of the denture, without straining the teeth or the copes thereon in any way. Since the copes and the half-round wire have oval surfaces, the denture resting on them has free play, at the same time affording all the retention necessary to approximate natural teeth more nearly than is possible in any other way known to the writer, who in his practice has under observation a considerable number of the types of splints and dentures advocated in this paper.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

THE SPALTEHOLZ METHOD OF PREPARING TRANSPARENT ANIMAL BODIES.

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IN the study of anatomy it has often been found a serious drawback that the internal structures of the various organs as a whole, or the relationship of the various organs to each other, can only be partially revealed by dissection, by the use of the Roentgen rays, or by making corrosions of existing cavities. In dissecting the cadaver with a scalpel, it is a common occurrence that some of the finer vessels are unintentionally cut, or that, under certain conditions, it is often impossible to isolate the minute structures. The X ray necessarily reveals only one phase of the object. The preparation of corrosions of cavities furnishes valuable aids for the study of the internal structure of the organs, but the preparation of a corrosion always means the more or less complete destruction of the original mold. In 1906, Prof. Werner Spalteholz of Leipzig, conceived the idea that it might be possible to make muscle tissue, skin with the underlying fascia, and even bone structure, transparent by subjecting the respective materials to a process which is analogous to the preparation of tissue for microscopical examination, *i.e.* to decalcify the bone, dehydrate the soft structure and clarify in oil of cloves, xylol, etc., and finally immerse it in Canada balsam for permanent preservation. After many laborious experiments, Spalteholz finally succeeded in devising an excellent method by which it is possible to produce perfectly transparent specimens of tissues. Not alone may thick sections of tissue be preserved permanently in this manner, but whole organs or even entire animals may be subjected to the process with equally good results.

THEORY OF PREPARING TRANSPARENT ANIMAL SPECIMENS.

The preparation of transparent animal specimens embodies a combination of specific chemical and physical processes. The chemical processes are of a preparatory nature; they are necessary to render the specimen receptive to the further physical procedures. The latter involve the application of an optical law to which the specimen and the medium with which it is surrounded has to conform. This optical law may be formulated as follows: An animal or vegetable object reflects the least light, and reaches the highest state of transparency, when it is saturated and surrounded by a medium which possesses an index of refraction which is equal to the medium index of refraction of the object under consideration. The light-rays, when striking an object, partially penetrate into its interior and partially are reflected at its surface. The proportion of reflected light reaches a minimum density and the light that penetrates into the interior a maximum density when the indices of refraction of the two substances—the object and the surrounding medium—are equal. The result of the equalization of the two indices of refraction corresponds to the maximum of transparency. A simple practical demonstration will materially assist in the ready comprehension of the above law. Glass, under ordinary conditions, is transparent; it allows the light-rays to pass into its interior. If this glass be ground it presents innumerable angles on its surface which reflect the majority of the light-rays, and, as a consequence, the glass becomes opaque. If we coat the ground surface of the glass with a medium which possesses an index of refraction equal to the glass, *i.e.* if we fill-in the innumerable angles, and thereby change the broken-up surface and the underlying solid surface into a homogeneous mass, the glass at once becomes transparent again. For example, we will take an electric-light globe with a partially ground surface. The light penetrates through the clear glass unhindered, while at its ground portion only a diffuse shadow of the light is visible. If we now coat the ground portion with artificial oil of wintergreen, for instance, that portion of the globe at once becomes transparent. This transparency is so perfect that at a distance of a few feet no line of demarcation between the ground and the clear portions of the globe can be observed. The removal of the oil will immediately restore the opaque surface. The same principle, in a modified degree, is involved in using an oil immersion in microscopic work.

In preparing histologic specimens it is common practice to "clear" the tissues after they have been dehydrated in graded alcohol. The fluids used for such purposes are the essential oils of cloves, bergamot, origanum, etc., or xylol, toluol, and similar substances with a comparatively high index of refraction. Thick sections of tissue or the whole organ may be subjected to this process with equal facility; in fact, there seems to be no limitation to the size of the object. However, for the permanent preservation of the specimen not all of the enumerated fluids are serviceable. Some are very inflammable, as xylol, benzol, and carbon disulfid, and others, especially the essential oils, become dark with age or when exposed to light. The latter fluids may ruin the specimens by discoloration or cause opaqueness. The primary important properties of any fluid used for the purpose of permanently preserving a specimen are to possess an index of refraction which must be equal or nearly so to that of the specimen, and it must not discolor the latter. Professor Spalteholz, in working with the above-enumerated substances and other compounds of a similar nature, reasoned that suitable fluids might possibly be found among the various synthetic compounds as used in perfumery, etc. By soliciting the aid of some prominent manufacturers of essential oils, he finally succeeded in obtaining a few synthetic compounds which apparently answered the demands made upon a fluid intended for the purpose in view. It was found that the methyl ester of salicylic acid, also known as methyl salicylate or artificial oil of wintergreen, has an index of refraction, 1.534–1.538; benzyl benzoate, which is the benzyl ester of benzoic acid, one of 1.568–1.570; and colorless iso-safrol, which represents the aromatic constituent of oil of sassafras, one of 1.577. By mixing these compounds in suitable proportions, a fluid may be obtained which closely corresponds to the index of refraction of the object under consideration. Later on, the benzyl benzoate was eliminated, as it was found that, in most instances, a mixture of five parts of methyl salicylate with three parts of iso-safrol was extremely serviceable as a "starter" in the preparation of the transparent specimens. Depending on the nature of the object, small quantities of either of the two compounds, usually of iso-safrol, have to be added until the greatest transparency of the specimen is obtained. No fixed formula which would answer all purposes equally well can be given for this mixture. The penetration of the specimen by the final preserving fluid requires considerable time—from two to ten weeks may be necessary. During this period, the jar should be kept loosely covered to allow the xylol or benzol to evaporate. Very small quantities of iso-safrol may now be added from time to time, if necessary, until complete transparency is obtained. Extreme care should be exercised in adding only very small quantities of the compound, as too much is very liable to materially affect the transparency of the specimen. The correct gaging of the respective quantities can only be acquired by experience; the beginner, especially, is apt to make mistakes.

To bring out the relationship of the blood and lymph vessels to the surrounding structure they may be injected with colored materials. It should be remembered that the materials used for such purposes must be insoluble in the fluids used in the preparation and final fixation of the specimen. Colored gelatin solutions answer this purpose well. In the preparation of bone specimens, the injection has to be made prior to the decalcification, and the gelatin injection has to be rendered insoluble by immersion in formaldehyd solution in the same manner as the gelatinous matrix of the bone itself is hardened. The gelatin mass is prepared as follows: A sufficient quantity of the best quality of French gelatin (silver label) is placed in distilled water for twelve hours or until thoroughly saturated. It is then pressed out by hand and melted in a porcelain dish on a water-bath. For coloring, carmin, cinnabar, Berlin blue, etc., may be employed as desired. The various details of preparing colored solutions for injection may be found in any good text-book on histologic technique. A gelatin-cinnabar mixture, which has been used by us with satisfactory results, is composed of gelatin solution 25 parts, cinnabar 5 parts. The freshly prepared mixture has to be injected while hot. A paraffin syringe with a hot-water jacket or an ordinary automobile grease-gun are best suited for this work. The successful injection of the specimen depends largely upon the alertness and dexterity of the operator.

EXPERIMENTAL WORK.

Our own experimental work has been solely confined to the preparation of transparent bone specimens, and primarily we have utilized the human jaw-bones for this purpose. While we have described the working method in detail under "the technique, etc.," a few additional items are here enumerated which may prove of some value, especially to the beginner. The thickness and the size of the bones have no bearing on the final results. We have successfully prepared various mandibles and a whole skull; dry or green bone may be used with equally satisfactory results. The bones must be thoroughly cleansed of adhering soft tissue and washed with soap, water, and brush before they are subjected to the treatment. In decalcifying a jaw with the teeth in position, the enamel of the teeth is naturally totally destroyed, while the organic matrix of the teeth and bone remain intact. If it is intended to preserve the enamel of the teeth, the crowns should be carefully coated with wax or paraffin before the preparation is subjected to the acid. The paraffin or wax will readily dissolve in the xylol or benzol which is used as a clearing fluid. Of course, it is understood that such remaining enamel cannot be made transparent. The pulps do not have to be removed from the teeth; they will be made perfectly transparent by the process. The injection of bones with colored materials usually offers difficulties to the beginner. The colored gelatin solution has to be made fresh for every case, and it has to be injected under pressure while hot. In the lower jaw the best place to insert the nozzle of the syringe is the mandibular foramen. The nozzle is wrapped with wet cotton to assist in making a watertight joint. As soon as the colored solution appears about the mental foramen, the opening is closed with the finger and the injection is continued. The alveoli from which the teeth have been removed are plugged with wet cotton, while those in which the teeth remain should not be touched. Superfluous material pressed out may be trimmed away, when set, with a sharp knife. If, for some reason, the injection is a failure, the gelatin solution may be immediately washed out with warm water. If the gelatin has set, its removal is accompanied by great difficulty. The injection of the various canals and the antra of the upper jaw may be readily accomplished by plugging with wet cotton all those cavities which are not intended to be filled. The starting-point of the injection is materially altered by the bone itself, *i.e.* it depends upon whether the maxilla is detached from the rest of the bones with which it normally articulates, or is a single detached bone. If the whole skull is prepared, the canals are best injected from the cranial cavity.

TECHNIQUE OF PREPARING THE SPECIMENS.

Fixing. The fixing of the object may be readily accomplished by using any of the well-known fixing fluids, such as alcohol, sublimate solution, formalin, etc. We have invariably employed a weak formaldehyd solution with good result. The official formaldehyd solution contains about 37 per cent. of the gas dissolved in water. A suitable solution is made by adding 10 parts of the formaldehyd solution to 90 parts of water. The object remains in the solution from two to five days, depending upon its size.

Decalcifying. As a decalcifying fluid, diluted hydrochloric acid is preferably employed. The process is started with a 2 per cent. solution and followed by a 1 per cent. solution until complete decalcification is accomplished. The acid should be used in quantities amounting to about forty to fifty times the volume of the object, and it must be changed daily. The official hydrochloric acid contains 31.9 per cent. by weight of absolute acid. A 2 per cent. solution is prepared by adding 20 parts of the pure acid to 219 parts of water. To test the progress of decalcification, a fine steel (sewing) needle is thrust into the bone at its thickest portion; if the needle readily passes through the bone, the process is completed. Too many punctures should be avoided.

Washing. After complete decalcification, the specimen is washed in running water for a few hours, and then remains immersed in water, with frequent changes, for two or three days, or until the water reacts neutral to blue litmus paper.

Bleaching. Occasionally it is advisable to bleach the specimen. The official hydrogen peroxid solution is satisfactorily employed for this purpose. It should be used undiluted, and the specimen completely immersed in it for one to two hours. After bleaching, the specimen is again washed in running water.

Dehydrating. The removal of water from the tissue cells is best accomplished by immersing the decalcified specimen successively in alcohol of various grades. The process is started by using a mixture of equal volumes of alcohol, 95 per cent., and distilled water. After twenty-four hours a mixture of two volumes of alcohol, 95 per cent., and one of water is used, which after twelve hours is replaced by pure alcohol. Finally the alcohol is changed to absolute alcohol and the specimen remains in it for twelve to twenty-four hours. A small quantity of dehydrated copper sulfate may be added to the absolute alcohol to take up traces of water. The alcohol incidentally hardens or "fixes" the soft gelatinous specimen.

Clearing. Of the various clearing fluids, benzol (benzene) or xylol (xylene) act equally well. Both are hydrocarbons, and are very inflammable; benzol is the cheaper of the two. The clearing fluid has to be changed twice; the specimen remains in the first bath for twenty-four hours, or until complete penetration is accomplished. The fluid is then removed and the specimen is immersed in the second bath, charged with fresh benzol or xylol for two or three days. The clearing fluid may be preserved for future use, but only for the first clearing; the second clearing always requires fresh benzol or xylol.

Permanent clearing and preserving fluid. The final solution in which the specimen is permanently preserved consists of a mixture of hydrocarbons whose index of refraction is equal, or nearly so, to that of the specimen. Methyl salicylate and colorless iso-safrol* are mixed in the proportion of 5 parts of the former to 3 parts of the latter. The specimen is transferred from the clearing fluid to this mixture as quickly as possible to prevent the air from entering into its cellular structure. If air-bubbles have formed in the specimen, they may be removed by carefully turning the specimen about in the final solution or by exhausting the air with a suction pump. The proportions of the two fluids have to be slightly modified for each individual specimen. A very small quantity of one or the other fluid, usually the iso-safrol, has to be added at times until the specimen shows the greatest transparency when viewed in direct light. It is a good plan to start with the original 5 : 3 mixture, and then add either of the fluids, according to need, instead of employing a modified mixture in the beginning.

After the specimen is placed in the final fluid the container is covered with a layer of cheesecloth to allow the benzol or xylol to evaporate and to keep out dust, etc. In from two to ten weeks, depending on the size of the specimen, complete penetration of the preservative solution has taken place.

Preserving jars. Specimen jars* must be made of perfectly clear glass, and have parallel sides. If possible, they should have polished fronts. Round jars will distort the light-rays and consequently disturb the image. The perfect sealing of the lid to the jar has offered many difficulties, as the ordinary sealing materials, which are more or less of a resinous character, will be dissolved by the preserving fluid. A concentrated solution of celluloid in acetone or in amyl acetate, in the proportion of 1 part of celluloid to 8 parts of the solvent, has given fair results. The edges of the glass must be scrupulously clean and dry before the sealing solution is applied; within a few hours it has sufficiently set to allow the jar to be handled.

To insure success, it is imperative that the various steps of the process be carefully followed in rotation, and we therefore recapitulate them briefly:

(1) Fixing of the dry or green specimen in a suitable solution.
(2) Decalcifying.
(3) Washing in running water.
(4) Bleaching.
(5) Second washing.
(6) Dehydrating in graded alcohol.
(7) Clearing in benzol or xylol.
(8) Permanent clearing in preserving fluid.
(9) Evaporating the benzol or xylol, and final sealing of the jar.

Professor Spalteholz has protected his invention for preparing transparent anatomical specimens by letters patent. He has very generously, however, allowed the unrestricted application of his invention for purely scientific purposes.

* Fritzsche Bros., of 82 Beekman st., New York, supply these various synthetic compounds.

* Suitable specimen jars may be obtained from Arthur H. Thomas Co., 1200 Walnut st., Philadelphia.

FINANCIALLY FIXED FOR LIFE.

By H. EVERTON HOSLEY, D.D.S., Springfield, Mass.

(Read at Worcester, Mass., December 16, 1912.)

I AM coming to you tonight on an errand of financial friendship and good fellowship; particularly, as one professional man to another.

So many good articles are being published on fees that it seems timely that we consider how to invest safely a part of our income, so as to eventually travel the road that leads to that haven of rest —"financially fixed for life."

I shall endeavor not to consider this subject in too much of an academic way, but to place it before you on a general practical basis, whereby you may gain knowledge for a distinct betterment of your financial condition.

LACK OF BUSINESS EXPERIENCE AMONG PROFESSIONAL MEN.

The apathy of the profession toward investments may be explained by a lack of financial investigation and education. It is your duty to have recourse to such knowledge as will make you do something worth while on this subject and justify the end in time, by being financially fixed for life.

Professional men of all kinds should be among the first to recognize the fact that, while they may be experts in their own work, yet, when it comes to transacting business of a different nature, they are not qualified to do so to the best advantage. They should not only be the first to admit this, but it is contended, furthermore, that there is no class of men who need to admit it more than professional men. They have specialized along certain lines, and have not had the time or the opportunity to acquire experience and training in other spheres of business activities. They unconsciously recognize this fact in matters of no vital importance, and involuntarily seek the services of others who are better qualified to perform the work in question; but with these small matters of business they stop, and in the important transactions, with so much more at stake, not only in money value but in other respects, they attempt transactions in which they have had no experience and for which, by reason of lack of training, they are not qualified. This is particularly true as regards finances. Few of us will admit that we are not perfectly qualified to manage and invest our money; and yet how few of us but can cite times in our lives, or in those of our friends, when losses in money matters would in all probability have been avoided had we recognized our inexperience in financial dealings and taken the advice of those who are specialists in that work, as we are in ours? We all feel that if we can make money, we can invest, care for, and keep it without the help and advice of others. This tendency is not assumed by all professional men, nor is it contended that it applies to that class alone, but it is true of many of us, and I believe it is more prevalent among professional than any other class. Specialization in one field seems to breed in us a conceit that gives assurance of capabilities in any line of work. Are we loath to admit, even to ourselves, that we cannot do anything equally as well as the work we are adepts in? But do not let professional egotism blind our common sense. We would not think much of the financial man who attempted his own dental work; why should we, then, attempt, unaided and unadvised, the handling and investing of money—work that others specialize in as we do in ours?

ADVANTAGE OF A FINANCIAL ADVISER.

In urging my *confrères* to seek outside help in such matters, it is unnecessary to tell them to get the best help, viz, that of men who have had the experience needed, which the ordinary professional man does not possess. They will not necessarily find such men among their friends, but will find them in the business world—men whose work consists in giving just what is wanted, trust companies which maintain special departments rendering service of this kind. Their very business existence and growth depend upon the value of the service they can give, and their acts, unlike those of many individuals, will be entirely disinterested. Their business consists in handling and investing the money and estates of those who are inexperienced in such matters, and for those who, though competent enough, do not have the time aside from their regular business to attend to financial matters with the greatest degree of advantage and safety, or for those who for a variety of reasons cannot or do not want to manage their own financial affairs. That they exist and thrive is evidence that many people feel unable for one reason or another to transact their financial affairs with the same degree of success and safety as others who make it their business. They recognize in themselves what I am urging my colleagues to see in themselves, namely, that there are those whose advice and services on financial affairs are available, with advantage and profit.

THE CARE OF AN ESTATE.

At this point, it will not be out of place to refer to a man's estate after his death. Assuming that one wishes to leave his affairs in the best possible shape and in the safest hands for the benefit and protection of his family, how is he going to do it? Many, probably, have never even given this a thought. If they have not, it is time they did. How many men know of friends or acquaintances who have died with their estates and family unprovided for, or of men whose estates have been eaten up with costly litigation, or embezzled by reason of having fallen into unreliable and irresponsible hands for management and settlement? How many know of inheritances squandered by heirs of improvident habits? There are ways of avoiding such results, if one will only take advantage of them. We professional men, more than ordinary individuals, should recognize the importance of availing ourselves of the opportunities offered nowadays for safeguarding our estates and families from financial losses. Every professional man should attend to this while he is alive, and not leave it to his family after his death. There are companies engaged in this work of caring for estates and trusts whose officers will gladly give any information wanted and needed, who will point out the ways of providing for and accomplishing the results wanted, and how to attain them in a legal way. No one should say that he has not enough of an estate to bother about, for it is all the more important that his family have that little undiminished by loss and expense.

It has been said that procrastination is the thief of time, but for the man who delays too long the making of proper provision for the protection of his estate and family often imposes expense, worry, and even downright hardship upon those he ought to protect and provide for in every possible way.

NECESSITY OF ADVICE IN REGARD TO INVESTMENTS.

I quote from a recent article bv Arthur B. Chapin, former banking commissioner of Massachusetts:

It has been estimated that over one hundred millions of dollars each year are taken from the public through these wild-cat schemes by those who dress up securities, so called, of mining, oil, rubber, land, and investment companies with attractive statements and the bait of large dividends or visions of wealth. Many of these schemes are frauds, and have no possibilities for the purchasers except loss of all that is invested.

An investigation of this subject in Massachusetts has been authorized by the legislature on my recommendation while bank commissioner. The report of the chief inspector of the Post-office department of the United States for the year ending June 30, 1911, says: "From the final reports submitted by inspectors, covering the arrests for the fiscal year, it has been ascertained that the promoters of these fraudulent schemes who have been put out of business completely during the past year have obtained approximately $77,000,000 from the public.

To the person who has no money to invest, the problem of selecting securities does not seem at all difficult, and the cutting of coupons from bonds appears as a kind of amusement, involving not the least particle of care or anxiety.

The investing of money, on the contrary, requires expert knowledge and sound judgment fully as much as does the accomplishment of any special work. If we wish to find out the law on any special subject, we go to someone who has carefully studied the subject, and is thus qualified to advise us correctly. If an illness overtakes us, we consult a doctor, who is an expert in medical matters. And so, if we have become possessed of some of that highly important article which is the medium of exchange, viz, money, and we desire to have it minister to our needs—bring us medical advice when we are sick, enable us to travel, or, most of all, bring us comforts when we are not able to work—then it is very necessary that we should not be induced to put our hard-earned savings into those securities which merely present a glistening surface for a short time, and then fail us when we need their help the most.

THREE FUNDAMENTAL REQUIREMENTS FOR A SAFE INVESTMENT.

Three fundamental requirements for the investment of money should be made, no matter whether one is able to obtain the benefit of expert advice or not. First, its safety; second, its availability, viz, its being placed so that it can be returned when desired; third, its earnings or interest.

Too many people reverse this order and look at the interest or dividend return, and neglect the principal. It is difficult to make a moderate investment today meet all these requirements and yield a satisfactory income, so the safest way is to diversify the investment of one's savings. Perhaps it would be well at first to eliminate certain classes from consideration for permanent investments.

SAVINGS-BANK DEPOSITS.

The income from the savings bank averages now very nearly four per cent., or forty dollars on each thousand, the limit of a deposit in Massachusetts being $1000. There are today nearly nine hundred millions of dollars in the Massachusetts savings banks alone, held in nearly two million accounts, which means in round numbers that two out of every three persons in Massachusetts have a savings-bank account. This shows how popular such a class of investments has become.

While a certain amount should be placed in a savings bank, provided there is proper state supervision, the amount that the law will allow must necessarily be rather limited, and the income less than that which can be realized on good bonds.

BONDS.

Bonds are the next in the list of investments. One not familiar with bonds should not invest in them without the advice of a reliable bond house, and great care should be taken in the selection of a house that has established a good reputation through its favorable dealings with its customers. The investor can secure from his banker the names and standing of those to whom it is safe to go for advice, or, if this be inconvenient, then a letter to the financial editor of one of the daily papers or one of the magazines may bring suggestions that will be of great assistance.

Even bonds should not be taken under consideration unless the management of the enterprise has demonstrated its ability to succeed, unless the enterprise itself has shown its value, or unless the future possibilities for success are determined.

All these and many other tests must be met before one should think of investing. Here is where the expert advice of a good bond house comes in, and their advice should be heeded. With their expert knowledge, they have, before purchasing, gone into the matter carefully to see that the bonds have merit and will be paid when due—for a reliable bond house cannot afford to sell bonds which are not first-class.

CORPORATION STOCKS.

Next in this class of investments are the stocks of standard corporations which have proved their value by going through a period of hard times, whose management is able, honest, and which are not subject to wide market fluctuations on account of legislation, the tariff, or the uncertainties arising from a conflict of labor and capital. Mining investments are always subject to great risks, and an investor dependent on the income from his investments should not allow himself to be tempted by glittering prospects to risk his principal. No woman should invest in mining securities, and only those who can afford to lose should take the risk.

It is usually true that when the interest or dividend return is very large, the risk is great also, so that the greater care should be exercised in investing in securities the income from which appears to be large. Occasionally, however, a bond house has an opportunity for a select high-yield investment which it can recommend highly.

The most conservative advisers are the safest to trust, and it is well to follow the suggestions of those whose experience has been such that their judgment is sound. The greatest care should be exercised in the making of investments, and the purchaser should be influenced chiefly by the character of the men who are managing a corporation, and the experience and honesty of those who are in charge of the house that is dealing in bonds. Then the lesson of conservatism is learned without bitter cost. Good judgment implies heeding the advice of a first-class investment house or of those who have had experience in making investments.

LIFE INSURANCE.

A dentist can make no better investment of a portion of his income than in life insurance. Like everybody else, the average dentist must use life insurance to protect his family; and, like many other men, there are plenty of dentists whose income is not large enough for investment and life insurance separately.

Endowment policies; advantages and disadvantages. That kind of life insurance which has most nearly the character of an investment, consists in the endowment policy. Under an endowment policy, the insurance is paid to the insured on a definite date, or to his beneficiary if he dies before that date. In a first-class company the amount paid to the insured under an endowment policy will equal the amount paid to the company in premiums, plus about 2 per cent. interest. This is not a high interest, of course, but the difference between that rate and the rate paid is the price the insured pays for life-insurance protection of his dependents during the time the policy was in force; had he died after having paid only one premium, the full amount of the policy would have been paid to his beneficiaries. The man who has an endowment policy will go out of his way to pay his premiums, the policy exercising a sort of gentle coercion upon him; he attends to its payments even though he lets almost every other obligation wait.

I have spoken about the endowment policy and its advantages. Let me now speak of two of its disadvantages. The first is that the premiums are larger than those of other forms of insurance, and consequently, if a man's chief aim is family protection, he should remember that a given amount of money will buy a smaller amount of such protection under this form than under other forms of policies. The other disadvantage is that the average endowment policy matures when a man has reached middle life; the policy is paid, and the insurance is ended. The chances are that he has a family and that they need insurance protection. There is, however, at that time of life, a grave liability that he cannot pass the medical examination that is a prerequisite to further insurance. Of course, he has his endowment money, but if he invests that and his investment turns out wrong, his family might be without provision in case of his death. For a young man who has not formed the saving habit, or for the man who has no dependents and is not likely to have any, the endowment policy is a splendid institution.

Life policies and their various forms. I will now speak of life insurance as an instrument of family protection and of support of a man's old age. It is not necesssary to call to mind that there is no similar economic institution. Nothing but life insurance will capitalize a man's mental worth or manual skill, and pay that capital to his wife or other dependent if he untimely dies. Life insurance does this, wholly or in part, according to the extent to which it is employed; or, to come closer to the average life, it may be said that no other human institution says to a man, "Pay us a stated small sum each year for a number of years or until you die, and we will pay your dependents a stated large sum, even though you die after having paid not more than one of these stated small payments." Life insurance cannot work financial miracles. It is a fixed science, based upon immutable laws of mathematics, and it therefore pays a man's dependents such a sum only as the money paid in by him entitles them to receive. But it does do that which the average man cannot. He cannot, by tomorrow or the next day or the day after, or in a month or in a year, lay aside enough money to protect his family from want or hardship should he die tomorrow or the next day or the day after, or in a month or in a year. Yet it is his aim and his duty to make as certain as possible his family's welfare after his death, if he can pay for a large enough policy.

The life policy is the most employed nowadays. It is payable at the death of the insured, whenever that may occur. It comes in three forms: Single premium policy, the ordinary life policy, and the limited payment life policy. Under the limited payment life form one may pay premiums for five years, or ten, or fifteen, or twenty, or some other period, at the end of which time the policy will be fully paid up. This does not, of course, mean that the policy then becomes payable; it simply means that the policy-holder has paid the insurance company all that it requires of him. The premium in this form of policy is somewhat larger than under the ordinary life form. The limited payment life plan has the advantage that the premium payments usually have all been made during the most productive period of a man's life, and they do not linger on to be a possible burden upon him in his declining years. Life-insurance policies have what is known as a cash surrender value, available at almost any time. Thus a man who is paying premiums is year by year building up a savings fund that can be used in his old age if the policy has not previously become a claim through his death. Life insurance, therefore, combines investment, protection, and savings.

The term plan of life insurance offers temporary protection only. Its premium is very small, and the policy expires at the end of a stated term. There is practically no cash surrender value, and consequently neither an investment nor a saving. If a man cannot pay for a life or an endowment policy, but must have family protection, the term plan can be used until he can afford something better. It is better than none, and only just better than none.

I have seen many dentists whose supreme need was a financial anchor to hold when all else failed, and have seen what life insurance has done for many of them, as an investment, as a medium of saving, and as a family protection.

CONCLUSION.

Professional men throughout the world should be brought together in closer relation with financial advisers, and in more sympathetic emulation to avoid error and arrive at ultimate truth. Method and precision are now coming to characterize our daily practice. Great has been our material, intellectual, and social progress, and now let us add to this progress financial stability.

It is pleasant to think of the growing numbers in our profession that are learning to make helpful deductions regarding their financial needs. A steady, guaranteed, if not a rising income has a strong influence on the happiness of mankind, with the increased power to lessen physical suffering.

I want to leave with my *confrères* this message of hope and encouragement. May it come true so that each will experience the happiness and contentment of living his declining years snugly housed and financially fixed for life!

THE SYSTEMIC RELATION OF SOME MOUTH INFECTIONS.

By FRANCIS ASHLEY FAUGHT, M.D., D.D.S., Philadelphia, Pa.

(Read before the West Philadelphia Odontographic Society, December 2, 1912.)

THE SPHYGMOMANOMETER IN DENTISTRY.

THE development of methods of refinement in the study of disease, particularly the employment of instruments of precision by both the medical and the dental practitioner, constitutes tangible evidence of the advances made in diagnosis during the past half-century.

It is praiseworthy that dentistry has been quick to take advantage of this progress by adapting to its use the clinical examination of the urine and the study of the composition of the blood.

ADVANTAGES OF THE STUDY OF ARTERIAL TENSION IN ORAL CONDITIONS.

It is my intention at this time to direct attention in a slightly different direction, and to show in a general way what practical information may be derived from a study of blood pressure or arterial tension in certain mouth conditions. At first mention it may not be entirely clear what bearing the state of the blood-vascular system has upon the daily practice of dentistry. This I will endeavor to explain.

Studies in pathology, particularly those of Talbot, have shed much light upon the underlying pathologic factors, especially the arterial changes active in the production of chronic inflammatory conditions in the mouth, particularly gingivitis and pyorrhea. It is now, I think, an accepted fact that in a great majority of cases we are dealing with a systemic, and not a local condition; one which demands for its arrest or cure measures directed chiefly toward systemic and constitutional disturbances, rather than to the manifestations in the mouth, which are in reality only local and purely secondary to organic disturbances in some distant organ or region. Talbot has referred to an obliterative endarteritis which occurs in different organs, particularly in the vessels of the alveolar process, and has actually produced this condition by artifically altering metabolism and by administering toxic agents to healthy dogs, in which he produced secondarily a true gingivitis and pyorrhea. In these experimental animals, the auto-intoxication caused arterial changes with accompanying increased blood pressure, thus proving experimentally what has long been suspected clinically, viz, the interrelation between arterial change, high blood pressure, and low-grade inflammation of the alveolus.

The same relation exists in other organs where a low-grade inflammation is set up by chronic changes in blood supply brought about by permanent elevation in blood pressure. The most significant point in this connection is that this permanent blood-pressure elevation precedes for a longer or shorter period the development of the diseases which it produces. It becomes, therefore, one of the earliest signs, often the first, of the condition, and being such, it may be used to great advantage in diagnosis.

Physicians are learning to appreciate this fact, viz, the blood-pressure elevation and its relation to chronic diseases of the heart, of the kidneys, and of the cerebral circulation, so that a systematic effort is now being made to prevent the development of its more serious consequences by regularly repeated physical examinations, directed principally toward the cardio-vascular and renal systems. By so doing, early departures from the normal are often detected at a time when the permanent injury is slight, and when measures directed toward their correction may be instituted with reasonable hope for success. The dental surgeon has an important part to play in this conservation of human life and efficiency. His frequently repeated examination of the mouth for detection of caries gives him almost an unlimited opportunity in this field. He sees a great number of individuals, apparently in good health, yet in whom there can often be found, when sought, evidences of organic change in the gingival margins and alveoli, which, if properly interpreted, will suggest the importance of special examinations, in an effort to detect the changes above referred to. Under such circumstances it is proper, often desirable, to recommend consultation with some medical man competent to carry out the several examinations necessary to establish the presence or absence of the condition suspected. Several joint studies of this character will often, after some practice, enable the dentist later to carry out these examinations for himself—which will redound much to his credit, and often greatly benefit the patient under consideration. This is particularly true of the blood-pressure test, which can be applied by anyone after a little practice, and which should, when properly used, yield brilliant results at his hands.

FAULTY METABOLISM AS REVEALED BY CHANGE IN BLOOD PRESSURE.

The general physical appearance of many patients is often a valuable clue, pointing toward the probable presence of some mouth inflammation or infection, as many patients presenting the early signs of gingival irritation and recession show signs of an unstable nervous mechanism, symptoms of irritability, introspection, lack of concentration, cold extremities, excitability, and attacks of drowsiness. Evidently these symptoms are dependent upon some general disturbance, the basis of which will be found in a faulty metabolism, auto-intoxications, a rheumatic or gouty diathesis—call it what you like.

Here examination into the state of the blood-vascular system and the urine may, in many of these cases, give evidence of definite kidney irritation and an increased arterial tonus, if not of actual permanent thickening, of the arterial walls.

To elaborate: In a fairly well developed case of hypertension, the urine will be found deficient in quantity, containing an excess of solids as shown by high specific gravity, a faint trace of albumin, and also—which is of particular importance—large amounts of indican and skatol, while the microscope will show oxalates and cylindroids. This is a picture of faulty metabolism and deficient nitrogen elimination, which explains the cause of the arterial change. Toxic materials, absorbed in the main from the intestinal canal, enter the circulation and are eliminated by the kidneys. During circulation they act as direct irritants to the vessel walls, causing them to contract and narrow their lumen, and while passing through the kidneys they cause a moderate degree of chronic irritation, resulting in the appearance of cylindroids and oxalates, and not infrequently of albumin in the urine. The effect of this general narrowing of the blood channels consists in a disturbance of the blood distribution throughout the body, which particularly affects certain organs, namely, the heart, the kidneys, the brain, and the alveoli, these several structures being all supplied by bloodvessels having no lateral anastomosis, *i.e.* they are end-arteries. It is thus seen that the vessels of the alveolar process are among the first to suffer from imperfect nutrition and reduced vital resistance, which permits of easy bacterial invasion, resulting in well-known pictures of gingivitis or pyorrhea. The earlier stages of vascular contraction or hypertonus may be manifested in the mouth as gradual recession or irregular attacks of gingivitis. This is where diagnosis is most valuable.

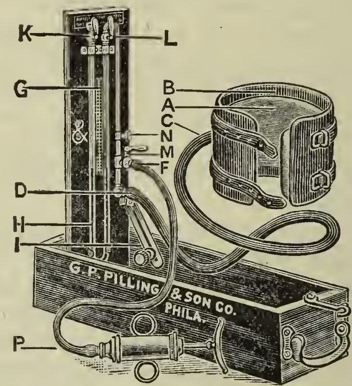
CLINICAL PICTURE OF ADVANCED STAGES OF ARTERIAL IRRITATON.

To follow the clinical picture to a more advanced stage, we may note the effect of this arterial irritation upon the contained blood and upon the vessel wall. As a primary effect of the toxic contraction of the whole arterial system, the outflow of blood from the great vessels is retarded to overcome this resistance; the heart must increase its force, and the inevitable result is increased general arterial blood pressure.

In the presence of general and continued high blood pressure, the vessels are called upon to withstand an increasing strain; consequently, besides augmenting their natural tone, they commence to hypertrophy and thicken, so that when this increased pressure exists for a long period, we have a definite and permanent thickening in the vessel wall. This is in many instances perfectly evident to the palpating finger either in the form of regular, smooth thickening, or as a beaded or nodular irregularity of the bloodvessel, and is known as arteriosclerosis.

We have now logically traced the pathologic sequence. Beginning with some disturbance of metabolism, there follow irritation of the vessel walls and contraction of the vessels. This calls upon the arteries for greater effort, and results in gradual permanent thickening. This primary and secondary alteration in the caliber of the vessels reduces the vital resistance, permits of retrograde tissue changes, and paves the way, among other things, for microbic infection and pyorrhea alveolaris.

Fig. 1.



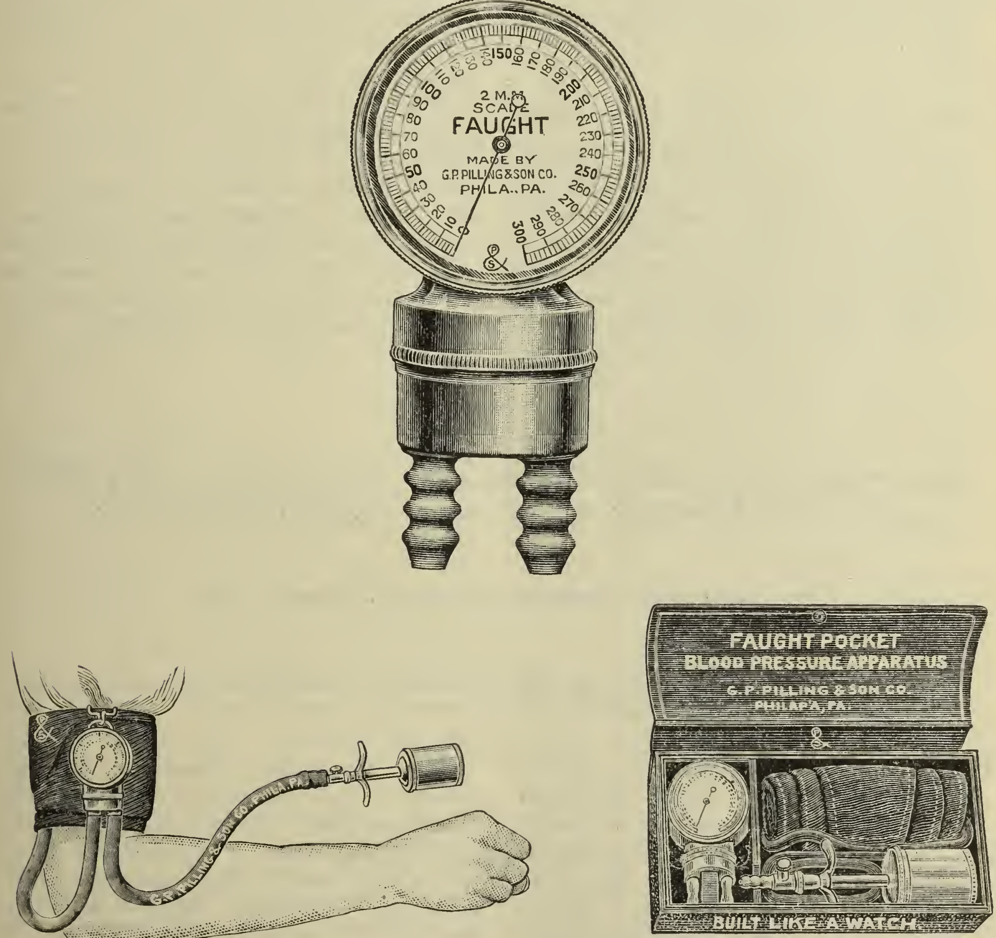
Author's standard sphygmomanometer or blood-pressure apparatus.

EFFECT OF BLOOD-PRESSURE TEST UPON METHOD OF TREATMENT.

If the practitioner takes pains to acquaint himself with the state of the urine and the state of the blood-vascular system in cases of the type above referred to, he will frequently come into possession of a triad of factors which are the key to the situation. These, in the order in which he usually finds them, are chronic alveolar inflammation, a pathologic urine and arterial hypertonus, or arteriosclerosis. Upon this triad a rational and usually successful superstructure of treatment may be erected.

The hygiene of the mouth is of course a preliminary necessity to all forms of treatment. This being accomplished, attention should be directed to the lifelong habits of the patient, in order to determine where the original fault occurred which has gradually resulted in the present abnormal pathologic state. The determination of this is usually not difficult, and when this has been once uncovered, rapid progress will follow the institution of appropriate treatment. Lest some become discouraged by the mention of special examinations, let me say that even if the primary cause is overlooked or cannot be found, very satisfactory results often follow the institution of treatment based upon a general knowledge of the usual causes.

Fig. 2.



Author's pocket sphygmomanometer or blood-pressure apparatus.

CONCLUSIONS.

To summarize:

(1) Alveolar inflammation is usually secondary to some general metabolic disturbance of long standing.

(2) Its true significance is usually appreciated only after careful general study of the patient. which includes—

(3) The past history and a general physical examination, urinalysis, and blood-pressure test.

(4) Early detection and general management play a very important part in effecting permanent arrest and cure.

(5) Local treatment should not be neglected.

DESCRIPTION OF SPHYGMOMANOMETER.

The instrument described in the foregoing article is one now generally employed by the medical profession for the determination of blood pressure, which study during the past ten years has become quite general, and is now employed in both medicine and surgery and in specialties. The instrument follows roughly two types, one on the mercury column (Fig. 1) which measures the pressure in mm.Hg, the other being a modified form of aneroid chambers, which is graduated to give readings in mm.Hg (Fig. 2). The larger of the two instruments shown in the accompanying illustrations is the more valuable when its use is confined to a stationary place, as in the consulting room or in hospital work, whereas the other instrument, which is contained in a case of pocket size, is very valuable on account of its portability. Space will not permit of a more detailed description of the method of application, which is but slightly more difficult than temperature reading or pulse examination, hence the instrument can easily be manipulated by anyone after simple instructions.

THE TREATMENT OF PYORRHEA BY BACTERIAL VACCINES, AND THE RESULTS OF ANIMAL EXPERIMENTATION.

By GEORGE B. HARRIS, Sc.M., D.D.S., Detroit, Mich.

(Read before the National Dental Association, Section I, at its sixteenth annual meeting, Washington, D. C., September 11, 1912.)

THE predisposing causes of pyorrhea have been laid to many conditions, the formation of calcarious deposits on the teeth being generally considered the chief of these. The fact that these calcium salts produce a local irritation, however, is no proof that their effects are local; nor is the fact that they are precipitated from the saliva any proof that they originated there. A superabundance of these salts in the saliva is the direct result of faulty metabolism, and is entirely preventable by the use of Epsom salts. If you doubt that, try it. The fact that pyorrhea entirely clears up after the teeth have been extracted is sometimes considered ample proof that it is purely local in all its phases. Certainly it clears up, but pyorrhea is not cured by removing the tissues involved. What is done is simply the bringing about of certain conditions which later would follow the ravages of pyorrhea. The underlying, predisposing causes still remain. Appendicitis can be cured by removing the appendix, but certainly the appendix is not cured by its removal. Neither does the removal of the appendix, followed by recovery from the attack of appendicitis, prove that the disorder was entirely local in effect, cause, and conditions. I am not attempting to belittle the local treatment for pyorrhea in any way, shape, or form. Local treatment is of vital importance in the treatment of this disease, but we have to get back of the effect of pyorrhea and attack it at its starting-point, if we hope to check and cure it in its later stages. The removal of calcarious deposits is of vital importance, and the gums must be kept from coming in contact with them at all times. Unless this is done, the gums cannot resume a healthy condition, and our best efforts in any other direction will be wasted. But while we are busily engaged in scaling the teeth and applying this or that mouth-wash, we must not lose sight of the fact that pyorrhea is an *infectious* disease, that the infection is generally located at a point which antiseptics cannot possibly reach, and that the entire removal of infectious material is impossible. Even if the removal of all infected tissue were practicable, pyorrhea would recur at once, if indeed it was ever cured. Time will not permit me to point out why this is so, but those interested may be referred to an article published in *Items of Interest*, entitled "Some Phases of Pyorrhea Alveolaris and Its Treatment by Bacterial Vaccines."* When tetanus follows an injury produced by a rusty nail, it might be considered to be of local origin. Tetanus cannot be cured, however, by treating the point of ingress of the tetanus bacillus. Just as tetanus is very plainly more than local in its effect, so pyorrhea certainly has a more far-reaching effect than a purely local one, regardless of the fact that we are a little slow to apprehend its true significance.

Can pyorrhea be cured by local treatment alone? I would answer that question by saying, That depends entirely on what one chooses to call pyorrhea. If a simple irritation surrounding the gums is to be considered as pyorrhea, or ulcers forming on the gums be pyorrhea, then I would say that those forms of the disease—if they are such—can be cured by local treatment. I do not choose to call these conditions pyorrhea, however.

By pyorrhea, I mean an infection of the alveolus producing pus; and these cases, I contend, cannot be cured by local treatment alone. To illustrate: Mr. C. was referred to me as suffering with pyorrhea. Upon examination I found that his gums were in a very bad condition, the upper one being simply one mass of ulcers. This case was cured by two applications of a 20 per cent. solution of silver nitrate—viz, cured by local treatment. That was not a case of pyorrhea, however, although it might have developed that disease later, or the patient may contract it at some later date; but he did not have it at that time. If his resistive powers should be raised, however, he would be in absolutely no danger of contracting it. The resistive powers to infection can be raised by vaccines, which prevent as well as overcome infection. Supposing an infection of the gums has been overcome by local treatment; what has been done to prevent another infection? By what means have the predisposing causes been altered in any way, so that reinfection will not bring about the same condition?

NEGLIGIBLE VALUE OF ANTISEPTICS.

Local treatment is important, but local treatment alone cannot remove infection or prevent it. Oral prophylaxis will do a great deal, and antiseptics may help a little, but if one pins his faith to antiseptics, he will be disappointed, because no antiseptic can be used strong enough or long enough to have any effect on the bacteria. The antiseptics generally used, if the truth be known, when they are diluted—as they have to be before they can be used in the oral cavity—hardly have an inhibitory action, let alone any antiseptic powers. The term antiseptic is the most abused term in all dental nomenclature. When it is applied to a mouth-wash, the idea is conveyed of a little boric or other acid, dissolved in water and alcohol, nicely colored and flavored, such a mouth-wash being supposed to give an alkaline reaction, though it seldom does. To this exceedingly useless concoction is added an astringent to make the mouth feel nice and cool—for a few minutes. Such substances as these are heralded

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* See *Items of Interest* for February 1912, vol. xxxiv, p. 122.

by the manufacturers as preventives, cures, valuable adjuncts, etc., in pyorrhea. The manufacturers depend upon the color, taste, and the ignorance of the dentists for their sale. I do not say that all of these preparations are useless. I will say, however, that some are harmful, as every practitioner may test for himself.

PROBLEMATIC VALUE OF ORAL PROPHYLAXIS.

Oral prophylaxis will do a great deal of good if properly carried on by the patient. We are lucky, however, if we can get the patient to brush his teeth twice daily, in any old way. If he did practice oral prophylaxis as it should be done, reinfection would not be made anything like an impossibility. Indeed, the improper use of the tooth-brush plays an important part in the initial infection, as well as in its recurrence. Oral prophylaxis, then, lessens the danger of reinfection, but does not remove it. A high index toward the organisms with which the tissues are sure to come in contact is the only safe way to prevent a reinfection. Vaccines will do this.

EXPERIMENTAL PYORRHEA IN GUINEA-PIGS.

When the staphylococcus is introduced directly into the gums of a guinea-pig, one of two things will happen. Either the infection, instead of remaining local, will rapidly become general, resulting in the death of the pig, or else the infection is promptly checked and overcome by the leucocytes in the blood. Which of these two processes will happen depends upon the number of bacteria injected and upon the resistive powers of the pig, and this depends directly upon the power of the leucocytes to ingest the bacteria. The same process takes place in the oral cavity; either the resistive force is high enough to ward off the attack, or else an infection follows. The resistive powers in man, however, seldom reach an ebb so low that the staphylococcus is able to produce a general infection, as it often does in guinea-pigs. The best method of producing pyorrhea in a guinea-pig is an indirect one, preferably by means of a putrescent canal. Having produced a putrescent canal with staphylococcus infection, an irritation is produced by means of cement under the gums, preferably in the region of the infected canal, and pyorrhea will develop. It will develop far more rapidly, however, if the pig is constipated, and more quickly in old pigs than in younger ones, although it is possible to cultivate pronounced cases at any age. It is very difficult to produce pyorrhea in the guinea-pig by introducing the bacteria directly into the gums. I would not say that it is impossible to do so, but I have not succeeded in producing the disease in that way. The susceptibility of guinea-pigs to bacteria is the reason why this becomes so difficult, and experiments usually result in a general infection and the death of the pig.

EXPERIMENTS WITH VIRULENT AND ATTENUATED FORMS OF STAPHYLOCOCCUS ALBUS AND AUREUS.

At the meeting of the Northern Ohio Dental Association I made the statement that I did not believe pyorrhea to be caused by true albus or aureus, but rather by an attenuated form of these, and possibly other organisms. My belief is stronger today than it was then. Cultures obtained from acute abscesses and cases of true pyorrhea were incubated at the same time; clusters of each were then put in separate test tubes containing sterile water. They were then counted and diluted until each contained one million bacteria to the cubic centimeter. One-half of 1 cc. from one tube was then injected into a guinea-pig, and the same amount from the other tube into another pig of the same weight. The pig that received the injection from the tube containing the bacteria obtained from the abscess died twenty-four hours before the other. Repeated experiments gave the same result; the virulence of the one was found to be nearly one-third greater than that of the other. There is also a difference in the growth of the two strains: (1) The one is more rapid in growth, (2) it resists various antiseptic agents longer, and (3) cultures obtained from true cases of pyorrhea are much more difficult to separate from the agar, and it is more difficult to break up the clusters in the centrifugal machine.

COMPARATIVE RESULTS OF STOCK AND AUTOGENOUS VACCINES, AND LOCAL TREATMENT EMPLOYED IN EXPERIMENTAL ANIMALS.

Various means were employed in treating the guinea-pigs suffering from pyorrhea, which was produced in them in the manner described above. Stock vaccines were employed in some cases, while autogenous vaccines were used in others; in still others local treatment only was tried. Where local treatment was used, improvement seemed to take place slowly, but as soon as the treatment was discontinued, the condition became worse than it was before, leaving a larger area of involved tissue, which became reinfected at once. The extraction of the root only prevented the area from becoming infected so quickly. Although every effort was made to remove all infection, I do not believe this was accomplished, nor do I believe that it is possible to do so. The amount of pus produced soon became much greater than it had been formerly. When stock vaccines were used in conjunction with local treatment, the results varied. If a pure strain had been used in producing pyorrhea, a stock vaccine for that strain would break up the infection at once. If the infection was a mixed one, the result depended upon the luck I had in guessing the strains and the proportion of each.

TRANSMITTED INFECTION AND IMMUNITY BY VACCINES IN EXPERIMENTAL ANIMALS.

Four other guinea-pigs were infected, two with pure strains of albus, and two with pure aureus cultures. One infected with each organism was isolated; the other two were allowed to be together. Three weeks later an examination was made which showed that the two that were isolated were still infected with the same pure cultures, while the other two each showed mixed infection of the two, the original infection predominating in each case. Pigs not infected were then put with each of these. In every case they slowly became infected from their fellows. Still others, previously injected with vaccine, were put with the infected guinea-pigs, with the result that they showed immunity. In those cases where autogenous vaccines were employed, uniformly good results followed.

ADVANTAGES OF AUTOGENOUS VACCINES.

One strain may be the real cause of pyorrhea, and yet a pure strain vaccine will not produce the results expected. This is best explained by Dr. Schafer of California. He believes all acute and most chronic infections to be mixed infections. "While one species may predominate," he says, "the pathological process produced by it is intensified by other organisms, and while their numbers are either so comparatively small or their pathogenic rôle is insignificant in themselves, yet when brought in contact with other organisms whose pathogenic powers are much greater, they must be reckoned with in any successful scheme of therapeutics." In using the autogenous vaccines all the organisms playing this minor rôle which Dr. Schafer speaks of are made to play their corresponding part in producing beneficial results, which are obtainable in no other way.

CONCLUSION.

In conclusion, as a result of these and other experiments, I would say that—

(1) Pyorrhea is not a purely local condition, although it may be caused by local means.

(2) There are many predisposing causes, as

(*a*) Malnutrition producing constipation and faulty metabolism; (*b*) poor circulation of the alveolar tissue due to astringent mouth-washes and nervous disorders. These conditions cause malnutrition of the alveolar tissue, lowering greatly the force of resistance to invading bacteria.

(3) Pyorrhea may be caused by purely local conditions, as

(*a*) Putrescent canals, (*b*) alveolar abscesses, or (*c*) poorly fitting crowns. Any local condition producing an irritation of the alveolar tissue may so weaken the resistive force that infection becomes possible.

(4) Pyorrhea produces constitutional disorders that are far-reaching in effect, and may be the indirect cause of death.

(5) Pyorrhea is contagious.

(6) The resistive power of the leucocytes to invading bacteria is the main determining factor.

(7) Pyorrheal infection becomes impossible when the force of resistance to the involved bacteria is raised to a high point.

PREDENTAL EDUCATION.

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THE problems of education are today receiving intense attention. A little less than two hundred years ago, Rousseau introduced the idea of utility into education. A trifle over one hundred years ago, Lamarck attempted to show that the organic world was determined by use and disuse. Malthus in pointing out the struggle for existence in human society implicitly emphasized the value of nurturing those characteristics, endowments, and resources which are of use to man. Darwin, impressed with the struggle for existence, demonstrated that the organic world was not "determined" in the Lamarckian sense, but was selected on the sole principle of utmost utility. Herbert Spencer applied natural selection to human society and institutions; and the part his work on "Education" played in gaining for the sciences their present supremacy was enormous. The refrain of that work was utility.

Now that the prophylactic idea has arisen, the finest future rôle of the branches of medicine will be to aid the human organism in adapting itself to the complex conditions of modern civilization. Hence the medical man will be an even more valuable member of society than at present, and his education must demand the most critical and sincere consideration.

ORGANIZATION IN EDUCATION.

Organization and systemization are absolutely necessary to the highest perfection of any subject. Recognition of this truth is here acknowledged in order that what follows may not be misunderstood. As in everything else, however, so in organization the pendulum may swing too far. The organization which was necessary for the establishment of something desirable, frequently becomes, later, when all else is ready for the next step, a hindrance.

Education in this country has been crystallized into the following divisions: The kindergarten, the primary and grammar schools, the secondary school, the college, and the professional or postgraduate school. The termination of any of these divisions is marked by a certificate, diploma, or degree.

DENTAL EDUCATIONAL SYSTEM AS ADVOCATED BY THE AUTHOR.

Until a few years ago the several educational institutions and the laity held these symbols above what they symbolized. The requirement by medical schools of two years of college training in certain definite studies has done much to restore the public mind to sanity in these particulars. The work done, and not the degree, is valued. This salutary change of attitude will facilitate the dental education system here to be advocated. This system will demand—(1) the total disregard of diplomas, etc., *in se,* and (2) the pursuit of certain subjects recommended solely by their value in dentistry.

The present intensity of competition and the urgent necessity of bringing forth men who can efficiently deal with contemporary problems and conditions demand a revision of the currently accepted ideas on professional education. In no field is this need more imperative than in dentistry.

The whole trend of the world-spirit is to show the necessity of asking, of any system or course of education, this question: Was utility the primary criterion in determining what subjects should be taken, and the relative attention given to each?

EFFICIENCY AND ECONOMY IN TIME AND ENERGY THE CHIEF CONSIDERATIONS IN PREPARATORY DENTAL EDUCATION.

There are two considerations, and only two, which are worthy to be mentioned in the preparation of a dental course. The first is of the greater importance —Efficiency; the second, included in a sense in the first, Economy of time and effort. To understand more clearly the relation these two touchstones bear to our subject let us recall their connotations. Efficiency and economy are but two aspects of utility. Efficiency is the power to do the most fitting, useful thing most expeditiously. And economy is included in the word "expeditiously."

The laity, the several dental faculties, and, above all, the general practitioners themselves, are realizing that logically dentistry is a specialty of the general art of healing, and must consequently, in the future, be considered as such. Efficiency demands for the dentist either a preliminary medical course, or a course in certain of the principles of medicine. A medical course occupies four years, and as a preliminary to medicine the better schools are demanding from two to the full four years of an academic course, consisting mainly of the basic sciences.

COMPARISON OF VARIOUS CURRICULA OF DENTAL EDUCATION.

The accompanying table, in the first eight columns (I–VI), gives the possible and more direct procedures, with the respective number of years required, under the present divisions of education, for the production of the most efficient dentist. The medical schools of Harvard, Michigan, Northwestern, Pennsylvania, and Columbia have been considered; and the dental schools connected with the first four institutions named. This selection was made solely because these schools have attracted wider national and international recognition than any others.

To describe the *status quo* of dental education most favorably, let us assume that the child enters school at the age of six, and each year accomplishes what he is supposed to accomplish, and loses no time through accident or carelessness. In column I of the table the dentist is graduated at the age of twenty-one. The consideration of economy of time and effort is surely fulfilled, but in efficiency the graduate is decidedly below what it is desired that the standard of dentistry should be.

In the second column (II*a*) the age of graduation is twenty-four; in the fourth column (III) it is twenty-five. The best that can be claimed for either of these courses is that the student's mind ought to be enabled to grasp more easily and understandingly the principles of dentistry. The keynote of modern ethics is social service. Perfecting of the individual is a beautiful and worthy ideal; but the individual must be sacrificed if the pursuit of perfection would sacrifice or compromise society's welfare.

Educational Years—Primary School to Professional Degree.

Course.	I	IIa	IIb	III	IVa	IVb	V	VI	VII	VIII
Schools:										
Primary and grammar school	8	8	8	8	8	8	8	8	8	8
Secondary school . .	4	4	4	4	4	4	4	4	4	4
College	. . .	3	. . .	4	2	No deg. 2	3	4	2	2
Medical school . . .	. . .	. .	4	. . .	4	4	4	4	2	[2] 4
Dental school	3	3	2	3	2	2	2	2	3	[2]
Total years spent at school	15	18	18	19	20	20	21	22	19	18
Graduation age (with 6 as age of entrance) . .	21	24	24	25	26	26	27	28	25	24
Degrees	D.D.S.	A.B. D.D.S. *	M.D. D.D.S.	A.B. or B.S. or Ph.B. D.D.S.	B.S. M.D. D.D.S. †	M.D. D.D.S.	A.B. M.D. D.D.S. ‡	A.B. or [—] M.D. D.D.S. §	D.D.S.	D.D.S.

* Offered at Michigan.
† At Michigan.
‡ At Michigan.
§ At Harvard, Johns Hopkins, etc.

In the all-important question of efficiency, the main desideratum, viz, an acquaintance with the general principles of medical science, is lacking in both. In economy of time the second column is preferable. There is but little choice between these two, but II*a* approaches a trifle nearer our goal. Neither, however, is what the future demands of dentistry.

In the third column (II*b*) we have a decided advance beyond any of the previous courses. We cannot complain that this course occupies too much time. It gives a general medical foundation for the superstructure of dentistry; but the premedical education does not, in this case, supply those general sciences which are essential to a thorough understanding and best application of medical practice.

In the fifth and sixth columns (IV*a* and *b*) we are reaching the age limit imposed by economy of time. The dental education is well prefaced. We have the training in general medicine and that has been preceded by two years which have been occupied with a serious and intensive study of the fundamental sciences. These two columns represent the best and most desirable curriculum possible under recognized existing educational systems for the preparation of the dental practitioner. If one were to make a choice between them, preference might be given to IV*a*, but solely on account of the slight and meaningless prestige which might arise from the bachelor's degree.

The arrangements represented in the seventh and eighth columns (V and VI) fulfil the demand for highest efficiency, but must be excluded from consideration if we consciencously consult the demand of economy of time and effort. The efficiency of the graduate as a dentist would be just as high after following courses IV*a* or *b*. In the one or two additional years added in V or VI to the academic course, whatever might be studied in the sciences or the arts would be superfluous to the grasping of the essential, fundamental principles on which medicine and dentistry rest.

In the above, all the possible combinations of the now existing educational systems—with deference to the popular prejudice for "regularity"—have been considered from the standpoint of efficiency and economy in time and energy. All have proved more or less unsatisfactory in one or the other particular, or in both. It is not useless to point out a fault, even if no improved substitute can be offered. In this case, however, a constructive arrangement may be advanced which would atone for the iconoclasm. These suggestions will be radical, but they will stand the acid-test of the questions of efficiency and economy. No other criteria will the eternal verities admit in judging what may be most desirable in a plan of dental education.

ADAPTATION TO ENVIRONMENT AS GOVERNING THE MOST EFFICIENT AND ECONOMIC CURRICULUM.

No one appreciates more fully than the writer that teaching of the descent theory that demands of every individual an adaptation to its environment, to the conditions of the world about it—whether these conditions be physical forces or the institutions of society. But in organic nature there exists an analogy to the physical law that to every action there is an equal and opposite reaction. There are two factors in this consideration. As the environment acts on the organism, so the organism reacts on its environment, and *vice versa*. The sole limiting feature is that the environment acts on material already existent, viz, the flora and fauna of any given geographical region at any given geological era; that the organism acts on material already existent, viz, the climatic, meteorological, and other components of the environment.

One example from geological history will illustrate this. In carboniferous times the percentage of carbon dioxid free in the atmosphere permitted and encouraged the growth of a luxuriant, magnificent flora. The very growth of this flora reacted on the environment (among other ways) in diminishing enormously the carbon dioxid percentage in the atmosphere. This diminution first permitted the appearance of the higher forms of vegetable and animal life, the descendants of which populate the earth today.

Man in his coal consumption is liberating this carbon dioxid, which within the present scientific era has appreciably increased in amount. This increase in atmospheric carbon dioxid will have its reaction on man in forcing him to adapt himself to it or perish. Thus the chain of action and reaction goes on forever. This interaction, we must notice, is always and only between material already at hand. Parallelisms with the laws of the indestructibility of matter and the conservation of energy point to the rational procedure which may hope for success in correcting what seems to us wrong—viz, to make use of and to modify the materials we have at hand. This is also the teaching of economy.

If we wish to train a dentist, those subjects (and those alone) must be chosen from those already offered in our schools and colleges which best accord with the demands of efficiency and economy.

THE WRITER'S PROPOSED COMPROMISE CURRICULUM.

With these facts in mind, let us follow our Emile from the time he trudges off to school—smudgy face, sticky hands, and school-bag—till he ascends the commencement platform, clean-cut, in cap and gown and hood, the idol of fluttering hearts. For our Emile we will take just an ordinary, average lad, who accomplishes his work in an ordinary, average fashion.

Primary and grammar schools. He avoids the kindergarten as he would soap-and-water—though he is right in the one and wrong in the other. He enters the primary school at the age of four. This is decidedly unusual, and will meet with objection; but conversations with mothers, supplemented by personal observation, are convincing that the child at four is just as fit, physically and mentally, to learn the elements of reading, writing, spelling, and arithmetic, as at any subsequent age. He pursues in an even, uneventful course the program usually followed in our public primary and grammar schools. He carefully avoids the fads of carpentry, plumbing, and bent iron-work at this period. If, during the latter years of the grammar school, an introduction to one or the other of the modern languages be made, so much the better. At the age of twelve he is graduated—young, care-free, and happy.

High school. The high-school terms are occupied with mathematics through trigonometry; American and general world history; American and English literature; if possible a course of general literature based on Moulton's "World Literature;" Latin for four years. The pupil begins or continues at least two modern languages, preferably German and French. These are so taught that, on graduation, he has a working knowledge of them, so that he may at first hand acquaint himself with the progress of his profession abroad. Manual training is intelligently and persistently applied, not to produce a carpenter, but a high degree of digital dexterity. All sciences should be assiduously avoided in his secondary school course. Science as taught in the secondary school leaves no impress either of detail or principle on the pupil's mind; and being a waste of time is positively harmful. This state has arisen possibly from the methods employed, but primarily because the pupil's mind is not yet fitted to grasp the scientific idea. Ontogeny recapitulates phylogeny; the high-school boy reflects the spirit and attitude of the man of the middle ages. And that period was not the heyday of the sciences. During this school period the studies of general cultural value should receive their greatest attention.

At sixteen the pupil is graduated. He is eager and ready for the unknown; his mind and temperament are plastic. From now on we must be especially careful to emphasize those mental habits which will be essential to the successful prosecution of dentistry.

Hitherto there has been little or no change from the customary educational procedure. Hereafter comes the new.

College. He enters a college—a college wide-awake and scholarly, where the sciences are taught in the spirit of pure science. Here he elects as a special student, with no regard for a diploma or "certificate of proficiency." His curriculum will be as follows:

FIRST YEAR. *First semester*—General physics, general chemistry, general biology, college algebra. *Second semester*—General physics, general chemistry, biology (anatomy of the cat), analytical geometry.

SECOND YEAR. *First semester*—Organic chemistry, qualitative analysis, comparative anatomy of vertebrates, calculus. *Second semester*—Organic chemistry, quantitative analysis, general physiology, calculus.

The general chemistry is taught in the spirit of Alexander Smith's book, emphasizing the philosophy of chemistry. The biology will include a statement of the theories of descent, of heredity; the general principles of embryology and the recognition of the elementary tissues. The anatomy of the cat serves as an introduction to mammalian anatomy. The vertebrate anatomy will afford much illumination when later he takes up the study of embryology in the medical school. Loeb's "Dynamics of Living Matter" is the basis of the course of general physiology. Whatever time this schedule leaves unemployed might be spent on detailed and advanced work in one of the subjects enumerated, or possibly better in studies of a general cultural nature. At the end of these two years and at the age of sixteen the pupil leaves the college.

Medical school. The following fall he

enters a medical school of the first rank: here again as a special student. He follows the courses enumerated below:

Anatomy (including osteology, histology, and embryology)—the regular medical course, with especial attention to the anatomy of the head and neck.

Physiology (including physiologic chemistry with laboratory work), urinary and salivary analysis.

Pathology—gross and histological—general and special.

Bacteriology—regular medical course, and in addition special attention to the oral flora; technique of blood count, opsonic index, and the preparation of autogenous vaccines.

Materia medica and therapeutics.

Lectures and clinical lectures on the principles and practice of medicine, with particular attention to the disorders of the digestive tract.

Neurology—clinical lectures.

Diseases of the nose and throat—clinical lectures.

The above medical courses could be completed in two years, or in two years and a half at most. If necessary, use could be made of summer courses, offered at all our large universities. At this point it is well to mention the system at the university of Chicago, where each year is divided into four terms of three months each, and the courses of any one term are as regular as those of any other term.

The subjects of surgery, obstetrics, etc., which occupy practically the last two years of the present medical curriculum—are in the majority subjects which have absolutely no bearing on dentistry. In the remaining few subjects the bearing upon dentistry is so questionable or indirect that the demand for economy eliminates them immediately from serious consideration here.

Dental school. Under the present law our embryo dentist must spend three years at a dental school, consequently he will have abundant leisure to complete any medical work of the above outline left undone at the end of two years. Thus at the age of twenty he enters the home stretch—the dental school. In these three years he will have time to acquaint himself further with studies of general cultural value, or to do some intensive work in one of the sciences, as his taste dictates. At twenty-three we have a D.D.S.

The system here briefly outlined meets the requirements of the utmost efficiency and economy in time and energy. Any reputable institution will always give a certificate for work done in it, which will be honored in another institution. If any technical difficulty should arise over the validity of a certificate, an examination is but a slight discomfort to determine one's standing. This system is to be looked upon as a compromise between the ideal and the present order of things—scholastic and statutory rulings; it is but a temporary arrangement in this transition period. Its most serious defect is that it lacks the regularity, prestige, and strength conferred by organization.

THE IDEAL CURRICULUM OF THE FUTURE.

Men most thoughtful for the best of dentistry see the need of a four years' dental course—the first two years to be devoted to general medicine, the last to those subjects which are the peculiar domain of dentistry. This four years' course (see column VIII of table) should —on the same grounds as the medical schools demand it today—entail a two years' preparatory course at a college in the fundamental sciences. One will recognize in this ideal system of the future a close similarity with German education —the "gymnasium," which is approximately equivalent to our high school plus two college years, followed by the university. This independent convergence bears witness to the validity of such an arrangement.

ADVANTAGES OF THE AUTHOR'S PROPOSED COMPROMISE CURRICULUM.

Until this hoped-for arrangement becomes definitely organized and offered by reputable institutions, and legalized by legislative enactment, its principles may be realized today, by those so desiring, by following the course advocated in this paper. The college work might well be taken at one institution; what follows, at another. The advice that all the post-high-school work be not taken at one university is given on the same ground that the German student finds it desirable to prepare for his degree at more than one university. On the other hand, the reason why it is suggested that the medical and dental courses be taken at one and the same institution is to obliterate the confusion and friction which one of necessity experiences in changing from one institution to another, in a country where education is not standardized by a central national bureau.

Our system is tabulated in column VII. If we assume that the boy starts school at six instead of at four—so that we may more fairly compare these suggestions with current practice—the graduation age will be twenty-five. An analysis of the table will show that the proposed system (VII) will graduate the student at an age intermediate between II*b* and IV*a*. The former was found unsatisfactory because it lacked instruction in the fundamental sciences. The latter was found to be the most desirable of any of the possible combinations of the official divisions of education; VII, because it saves one year, is, however, preferable even to IV*a*. Further, with the three dental school years of VII, much spare time is offered at the very period when the student is best equipped to judge in what field he wishes to specially engage.

We recall that in this paper we have expressed a belief in the need of a great, deep-reaching change. We realize that the likelihood of such a change in the near future is slight, if we regard man's life as long. To put these suggestions into practice it is not necessary, as we have begun here, to start back at the first year of the primary school. The high school pupil of today, the college freshman or sophomore, the first or second year medical student, in many individual cases throughout the country will not find it too late to follow the essential spirit of this plan.

If the reader is convinced of the supreme and predominant value of using efficiency and economy in time and energy as the standards for each and every course of thought and action, it will be but a step to agree that the course outlined as VII is the best possible under existing conditions.

CLINICAL PATHOLOGY IN ITS RELATIONS TO DENTAL AND ORAL CONDITIONS.

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UNDER clinical pathology are included laboratory examinations of various body fluids, tissues, and exudates, physically, chemically, and biologically, in aiding the diagnosis of given cases. In some conditions the diagnosis may be made by the laboratory examination alone, but in the majority of cases laboratory findings are only a part of the data which, when viewed together, bring us to a final conclusion.

The question may be asked whether a study of clinical pathology by the dentist would be of any practical value, and whether the time spent in obtaining such knowledge could be compensated for in the daily routine of dental practice. To one confining himself to the purely technical side of dentistry, the answer would be negative; but modern dentistry requires a broad understanding of all diseases pertaining to the mouth, with their relation to the system at large, and for a dental practitioner recognizing this fact, clinical laboratory methods should be of great value. It is not urged that great personal expertness should be possessed by the dentist in these procedures, but he should be able to carry out the ordinary ones himself, such as the simple urinary tests, and, what is more important, recognize which examinations will be of the greatest aid in given cases. I will not go into the technical details of the different tests, but will merely outline what they are, and indicate their special bearing on diseases of the mouth.

In the field of dentistry and stomatology, clinical pathology could often be made use of to aid the practitioner in his management of cases, by throwing light on the general health of his patient, and many times aiding in the diagnosis of the local condition present.

The routine measures carried out in the clinical laboratory include chemical and microscopic analysis of the urine, examination of the blood for percentage of hemoglobin or coloring matter and the number and varieties of red cells and leucocytes, examination of the stomach contents and feces, microscopic examination of pus and other discharges, and bacteriological examination by various culture methods. We may add to these the different serological tests, such as the Widal reaction for typhoid fever, and the Wassermann reaction for syphilis. In the clinical laboratory, also, bacterial vaccines are prepared, to be used so successfully in some cases of pyorrhea and other infections, the dosage being guided largely by determination of the opsonic index.

VALUE OF URINALYSIS.

At the present time, examination of the urine probably furnishes us with greater knowledge of the patient's general condition than any other single laboratory procedure. The quantity and composition of the urine is influenced by factors in remote regions of the body, as well as by disease of the kidney itself. Routine examination of the urine consists in: Determination of the quantity passed in twenty-four hours, normally about 40 ounces; color and reaction—acid or alkaline; specific gravity, normally 1016 to 1020; presence of albumin and sugar, both normally absent; microscopic examination for tube casts, epithelial cells, pus, blood, various forms of crystals, and bacteria. Tube casts are albuminous molds of the kidney tubules, and appear in the urine as cylindrical structures of many varieties.

In nephritis we find albumin and various forms of tube casts in the urine; in acute cases blood cells are also generally present.

In diabetes mellitus the patient voids a large quantity of urine with a high specific gravity, due to the presence of sugar.

Gouty diathesis. The gouty diathesis is frequently complicated with secondary disease of the kidney, with albumin and casts in the urine, but there is no direct evidence of gout to be elicited by urinalysis. There is a widespread impression that a deposit of urates in the voided urine is evidence of the gouty or uric acid diathesis. The deposition of normal urates, however, is usually due to concentration of the urine or to the fact that it is voided into a cold vessel. On the contrary, in the majority of cases of gout, the uric acid eliminated in the urine is distinctly less than normal, but may reach normal or exceed it a few days after the attack. In some cases of chronic gout, there is a tendency to a deposition of uric acid crystals in the urine in the form of "gravel," but these deposits occur usually in the intervals between the gouty paroxysms, and even in these cases the uric acid output is low.

In various general infections of the body, the bacteria are eliminated through the kidneys, and are consequently to be demonstrated in the urine. Thus, in typhoid fever, typhoid bacilli are commonly recovered from the urine by culture methods.

Pyorrhea alveolaris. Urinalysis in connection with mouth diseases is particularly important in regard to pyorrhea alveolaris. Patients suffering from diabetes are especially prone to pyorrhea, and a recognition of this constitutional factor as revealed by examination of the urine may be of great importance as a guide to treatment. Nephritis, in a patient under treatment for any mouth condition, is a complication that should always be considered, as the eliminating capacity of the kidneys is a vital factor in the overcoming of any disease by the system. In considering the general condition of a patient before performing an operation upon the mouth under general anesthesia, the condition of the kidneys, as ascertained by analysis of the urine, is of prime importance. The constant presence of sugar in the urine is generally a contra-indication to all but imperative operations, on account of the hypersusceptibility to infection in these cases.

VALUE OF EXAMINATION OF THE BLOOD.

By examination of the blood we are able to determine the existence of anemia, of leucocytosis—inflammatory increase in the normal number of white blood corpuscles, and of leukemia, in the several forms of which there is an enormous increase in certain varieties of the leucocytes. In anemia, we may have a diminution in the percentage of hemoglobin, or in the number of red cells, or both. One of the signs commonly looked for in anemia is paleness of the gums.

Pernicious anemia. In pernicious anemia the hemoglobin may be reduced to 20 per cent. or lower, and the red cells to less than one million per cubic millimeter, instead of five million, which is normal. In addition, in pernicious anemia, we note certain changes in the shape and size of the red corpuscles, and also the presence of nucleated red cells, as seen in stained smears of the blood. It is now known that a great many cases of pernicious anemia have their origin in chronic suppurations of the mouth, therefore it is important for the dentist to understand the blood picture of this disease. In lead poisoning, characterized by the "blue line" of lead sulfid in the gum margin, the diagnosis is confirmed on examination of the blood. Here we find anemia, and a peculiar condition of the stained red blood corpuscles known as "stippling" or basophilic granular degeneration. In this the red corpuscle takes the usual stain, but is dotted here and there with bluish or violet points, instead of being of a homogenous red or pink color. Lead may also be detected in the urine in severe cases of lead poisoning.

Leucocytosis. This is a condition of the blood characterized by an increase in the number of leucocytes, and is a response on the part of the body to infection. Leucocytosis usually occurs in acute infection of any part of the body by pyogenic bacteria in which there is any absorption of the toxic products of these bacteria into the circulation. Thus we would be apt to find leucocytosis in a case of alveolar abscess in which fever is present. The number of leucocytes per cubic millimeter, instead of being about 8000, may rise to 15,000, 20,000, or even 30,000. A stained smear of the blood in such a case would show also that the increase involves chiefly but one variety of leucocyte, viz, the polymorphonuclear. Normally, the polymorphonuclears comprise from 65 to 70 per cent. of all the leucocytes, but in leucocytosis the proportion may rise to 80 or 90 per cent. The procedure of determining the percentages of the different forms of leucocytes in a given specimen of blood is termed a differential count. The relation of the total number of leucocytes to the percentage of polymorphonuclear cells is often a good index of the resisting power of the patient in combating an infection. With an increase of total leucocytes—in other words, a leucocytosis—to about 18,000, and an increase in the percentage of polymorphonuclears, the patient's powers of resistance are regarded as good. If, however, the percentage of polymorphonuclears is increased without a corresponding leucocytosis, the resisting power of the patient is probably low, and the prognosis bad.

Leukemia. This is regarded as a primary disease of the blood-forming organs, of which the distinguishing feature is an enormous increase in the number of leucocytes—far greater than is ever observed in an inflammatory leucocytosis. Moreover, the increase is not so much in the polymorphonuclear leucocytes as in other forms of white cells. In the lymphatic type of leukemia there is an increase in the lymphocytes of the blood—*i.e.* the large and small mononuclear cells. The total leucocyte count may be from 100,000 to 200,000 per cubic mm., and the lymphocytes may rise from a normal of 25 per cent. to 80 or 90 per cent. of all leucocytes present. The splenomyelogenous form of leukemia may present a still greater number of leucocytes, viz, 400,000 or 500,000 per cubic mm., or even more. In this type of the disease, the preponderating leucocyte is the myelocyte, which is not present in normal blood, but is thrown into the circulation in leukemia from the bone marrow. The myelocyte is a large cell with a single, oval, deep blue nucleus, and pale blue protoplasm containing violet granules. Other myelocytes, known as eosinophilic myelocytes, have red granules instead of violet ones. The myelocytes make up from about 30 to 40 per cent. of the total leucocytes in a case of splenomyelogenous leukemia. A knowledge of leukemia is of considerable importance to the dentist, because in the acute varieties, particularly, the mouth is one of the first parts of the body to show the disease. The mouth lesions begin as sponginess of the gums, with hemorrhages, thought to be due to swelling of the tissues from deposits of leucocytes. Infection soon occurs in these points of lowered vital resistance, and is followed by ulceration, gangrene, and even by necrosis of bone. A blood examination in a case of this kind clears up the diagnosis at once, and the dentist, if he has the ability to recognize the association, will often be the first to suspect such a disease in the patient because of the early occurrence of oral lesions in leukemia.

VALUE OF EXAMINATION OF GASTRIC CONTENTS AND FECES.

Examination of the gastric contents and feces does not afford much direct information in diseases of the mouth, except that it often shows the deleterious effects of lesions of the oral cavity on the digestion. Patients with gastro-intestinal symptoms will often be saved much unnecessary laboratory work on the gastric contents and feces, if mouth conditions be investigated and corrected first. In examination of the stomach contents and feces, the detection of small quantities of blood by chemical tests is regarded as an important sign of organic disease of the stomach or intestine. It must not be forgotten that such blood may be swallowed from the mouth.

VALUE OF SALIVARY ANALYSIS.

Examination of the saliva as a means of clinical diagnosis has not yet been fully worked out, but shows great promise for the future. Extensive investigations have been carried out to determine the relation of the saliva to caries of the teeth and to caries-immune mouths. Pickerill, in particular, has discovered important facts bearing on the relation of the reaction of the saliva to this question. The composition of saliva in its relation to dental caries has also been investigated by this worker, as well as by many others.

The examination of saliva as an index of general bodily conditions sometimes furnishes important information when taken along with urinalysis and other tests. This has not yet been included among the routine procedures of the clinical laboratory, but there is no doubt that its importance will come to be fully recognized as the result of further investigation.

DIRECT MICROSCOPIC EXAMINATION OF STAINED SMEARS.

By direct microscopic examination of stained smears made from various discharges and tissues of the body, we are often able to find the micro-organism causing a particular lesion. Thus, in the mouth there is an infection of the gums called Vincent's angina, in which stained smears always show a delicate spiral organism known as the spirillum of Vincent, associated with a bacillus with pointed ends—bacillus fusiformis. We are often able by the aid of the microscope quickly to differentiate this disease from diphtheria, which it sometimes closely resembles. With special staining methods we can also demonstrate the spirochæta pallida in syphilitic lesions of the mouth.

I will not dwell on the immense field in the mouth for the application of culture methods in the search for the causative micro-organisms in pyorrhea alveolaris and other infections.

WASSERMANN REACTION AS AN ALMOST CERTAIN METHOD OF DIAGNOSING SYPHILIS.

In the diagnosis of syphilis, the lesions of which are so commonly found in the mouth, we have an almost certain method in the Wassermann reaction, the principles of which at least should be understood by every dentist. There is no time here to explain the reaction, which depends on the presence in the blood serum of a syphilitic person of certain substances capable of uniting with extracts made from syphilitic tissues and fixing complement. A positive reaction is found in practically 100 per cent. of cases of secondary syphilis. In tertiary syphilis the percentage of positive reactions is somewhat less, but is still high. No other diseases in this country liable to be confused clinically with syphilis give a positive reaction. In view of the common occurrence of mouth lesions in syphilis, and of their extreme contagiousness, the diagnosis of such lesions by the dentist is important, and the Wassermann test should be of use to him in this connection.

CONCLUSION.

There are many other procedures carried out in the clinical laboratory, but those mentioned should suffice to show how a familiarity with clinical pathology may be of assistance to the stomatologist in diagnosis. The general growth of knowledge along these lines is such as to render it imperative for the dentist to get into close touch with them, if progress in his profession is to keep pace with that made in other branches of medical science.

[See also *Discussion,* as reported under "Proceedings of Societies," this issue.]

Correspondence.

"THE MORE HASTE—"

To the Editor of the Dental Cosmos:

Sir,—At the last meeting of the New York State Dental Society, the writer discussed the negative side of the dental nurse question, endeavoring to answer in a fair and impartial manner the arguments that had been brought forward up to that time by those in favor of legalizing young women to do minor dental operations. Since then I have read with great interest the editorial in the November 1912 issue of the Cosmos, on the bill to amend the law regulating the practice of dentistry in Massachusetts. It was probably the recognition of the force of the arguments contained in that editorial (which pointed out the dangerous deficiency of the proposed law) that induced the framers thereof to modify Sec. 2 so that, as it now stands, it is so emasculated as to be even more inadequate and dangerous, if possible, than in the form in which it was quoted on pp. 1281 and 1282 of Cosmos. The new draft of the bill now before the legislature of Massachusetts, together with an editorial indorsing it, appear in the current issue (February) of *Items of Interest.* After a careful perusal of the latter, it seems well that your warning, "Festina Lente!" should again be sounded.

In order to make clear what follows, I will quote Sec. 2 of the original draft, and also Sec. 2 of the bill now before the legislature, according to the *Items.* In the former it is apparent that the framers were met at the very beginning with the difficulty of defining satisfactorily what should be the proposed dental nurse's duties and what should limit his or her sphere of activities. An attempt was made to do this by the legitimate but always unsatisfactory use of negative definition, as follows:

Sec. 2. No dental nurse shall be licensed to perform any service other than the examination, wedging, and cleansing of teeth, inserting and changing dressings in teeth for the relief of pain, and assisting a registered dentist during the performance of his dental operations. The above service shall not include the treatment of the disease known as Riggs' disease, nor the removal of deposits from teeth occurring in the tooth socket, nor the preparation of cavities for filling, nor the treatment of pulpless teeth. The removal of tartar under the gums is included in the cleansing of teeth.

It might be noted in passing that in one part of the above, "removing deposits from the socket" is prohibited, whereas in the latter part "the removal of tartar under the gums" is to be allowed!

The bill which is printed in the current *Items* and is now before the Massachusetts legislature for action, has this section entirely altered, so that it reads as follows:

Sec. 2. A registered dental nurse shall be licensed to perform only such duties as shall be specified in his license, and solely under the direction and in the office of a registered dentist. Nurses may be employed by schools and institutions, and directions for all their work shall be given by a registered dentist. The dental nurse shall be licensed to perform the service of cleansing the teeth.

The present writer was for a number of years engaged on two commissions authorized by Congress to revise and codify the laws and to prepare an organic act for the government of one of our island territories. He recognizes clearly the extreme difficulty involved in the drafting of a piece of legislation which is to become part of the law of a great commonwealth. But while the first draft of the proposed Massachusetts act at least defined negatively the limits of the dental nurse's duties, the present bill entirely sidesteps the question by saying that such duties shall be specified in a *license*—without giving the form or wording of that license; and then, apparently to satisfy those who might object to such a method of lawmaking, the dental nurse is also to be permitted to perform the service of cleansing the teeth. Surely such an ambiguous wording will not pass muster with the lawgivers of Massachusetts, since, if ever bill contained a "joker," it is apparent in this Sec. 2. The vital thing in legislation of this sort is that *the powers and privileges of any new creation of law should be carefully and exactly defined.* In this case they are not so defined.

It is further stated in the *Items* editorial that the duties of the proposed dental nurse are described in the single sentence at the end of Sec. 2, *i.e.* relative to the cleansing of the teeth. Surely the writer of that editorial could not have overlooked the first part of that section, which says that "he [the nurse] shall be licensed to perform only such duties as shall be specified in his license." This is the vital point, and it behooves the dental profession of Massachusetts, in order to safeguard their interests, to inquire closely how the license, which it is proposed to issue yearly, shall read. If the duties of the dental nurse are so clearly defined by saying that "he shall be licensed to perform the service of cleansing the teeth," why not do away entirely with the first sentence of that section, thus avoiding all ambiguity in the wording of the act, and insert the little word "only" in its proper place, making it read: "The dental nurse shall be licensed to perform only the service of cleansing the teeth." If this were done, and if it expressed the object of those who are fathering the bill, there could be no doubt in the mind of anyone regarding the limitations of the so-called dental nurse's activities, and it would furthermore conclusively prove the sincerity of their purpose.

Of course there would then arise the necessity, so well provided for in all well-thought-out enactments, of defining and limiting exactly what "cleansing the teeth" shall mean from a legal standpoint for the purpose of the act. This defining of terms is well illustrated under Sec. 4, 3d subdivision, of the excellent new dental law proposed for the State of Michigan, where "unprofessional conduct" is clearly defined, leaving no doubt in the mind of the reader or of the judge who might be called upon to administer the law. Such careful preparation of any proposed legislation can only result in benefit to the profession, and would not be likely to be called "pernicious legislation," as might happen with a bill in which the meaning was not clear.

The service called by dentists "cleansing the teeth" is susceptible of a wide range of possible interpretations, and requires first of all a correct definition of what constitutes a tooth—at least from the legal standpoint, as in this case. The same with the conception of "cleansing." Some dentists do not consider a tooth properly cleansed if a particle of calculus be present on it, from root-apex to incisal edge or morsal surface; if a cavity exists anywhere upon it; if bacterial plaques be present on its crown, or an abscess sac adherent to its root; or, finally, if it be bathed in vitiated salivary secretions. Other dentists are satisfied to consider that cleansing the teeth is menial work—scavenging, as I have heard men call it—and that it consists in rubbing the buccal and especially the labial surfaces of the teeth with a little brush revolving in the engine, thereby satisfying the esthetic sense of a patient while ignoring the actual cause or causes of septic mouths.

If the figures given in the editorial in the *Items* be correct, we might find it impossible to control the Colossus which might be created if a similar law became operative in New York City. We are told that as a "starter" it would take only about $200,000 a year and 320 dental nurses at $10 per week to care for 64,000 public school children in 32 clinics in that city. On the same basis of computation, allowing an actual combined public school, parochial school, and institutional school population of 750,000 from four to fourteen years of age, all legally entitled to free cleansing of their teeth if such an act became law, it would take 375 clinics, a yearly appropriation of $2,460,000, and a staff of 3750 dental nurses for the city of New York alone! There were only 3980 dentists in the whole State of New York in 1910.

While admitting the need of some such solution of the problem, I doubt if it would be possible to induce many young women of the required ability to enter this new field, if after the lapse of we will say two years' training in a training school for nurses we could only offer them $10 a week remuneration. School nurses in New York now receive $75 a month, which is none too much to support them at the present high cost of living. It cannot be done on $40 a month. It is also proposed that these clinics be in charge of competent dentists (who must of necessity have had much experience in real prophylaxis), at a salary of $1000 a year. The spirit of altruism is not yet sufficiently disseminated among the young men of the profession to induce them to take up this work at such a salary. Private clinics, under corporate or individual names, offer better inducements.

We are further told that cleansing the teeth less often than five or six times a year is not real prophylaxis. Of course it is not. Many who claim to practice it as a so-called specialty say that cleansing the teeth less often than once a month is not prophylaxis. And thus we arrive at another interesting question in connection with the discussion of this subject. Does cleansing the teeth, in the commonly accepted interpretation of the term—*i.e.* rubbing them with a brush or a stick loaded with pumice, from one to twelve times a year, combined with the more or less faithful use of a toothbrush—does that constitute prophylaxis? Or is it but the small part of prophylaxis, of preventive medicine in dentistry, which many dentists believe it is? If the use of detergents, whether with brush or stick, with or without the use of the engine, is all that is to be taught to the proposed assistants to whom it is desired to give legal status, then the title "trained nurse" is far too dignified, and would probably meet with great opposition from the medical nurses who have worked so hard to earn that title. Such tooth-cleaners would be better classified under the title given them by Dr. Wright, namely, "denticure."

On page 147, *Items* also says that it is an indubitable fact that real prophylaxis is not done in one-half of one per cent. of the dental offices of this country, and that where it is practiced it is done by trained dental nurses. *Ergo,* if a dentist does not employ a trained dental nurse he does not belong to the one-half of one per cent. of the elect, and is not qualified to practice real prophylaxis! This is the only logical conclusion that can be drawn from that statement. There are, according to Polk's Directory, some 40,000 dentists in the United States; hence, only 200, the fortunate one-half of one per cent. who are the proud employers of trained dental nurses, are practicing real prophylaxis—or rather, those nurses are doing it. If this be true, it would be interesting to know what the ninety-nine and one-half per cent. of the unchosen are practicing, handicapped as we are.

It is fair to assume that, in the schools for dental nurses which it is desired shall be founded, this small body of 200 men scattered all over the United States, the real masters of prophylaxis, will be the first to be called upon to train and put in the field within a very short time—if the Massachusetts law goes into effect—a sufficiently large number of trained dental nurses to supply the demand. Surely such an important matter would not be left in the hands of any less qualified!

Although I have attempted to point out what I consider a weak point in the proposed dental nurse act, I am heartily in sympathy—as I said in my discussion at Albany, printed at page 919 *et seq.* of the August 1912 COSMOS—with the proposition of properly and carefully training a body of young men and women to do rescue work of the mouth in our public schools and institutions; and I am therefore also in sympathy with the avowed objects of those who advocate that bill, which I understand to be—

First. To extend to the community at large the same service which at present only one in one thousand receives (if the figures quoted in *Items* be correct).

Second. To do this by means of properly trained dental nurses, worthy of that dignified title, and thoroughly acquainted with all the requirements of prophylaxis—which would take a number of years and require as a working basis a composite definition of the meaning of "real prophylaxis" to be formulated by the 200 men in whose offices alone its mysteries are now practiced, in order that no single detail might be overlooked.

Third. To found training-schools for such dental nurses, in order that only those best qualified to teach real prophylaxis may be the trainers of the dental nurse and may bring her to an ideal state of efficiency, a worthy handmaiden of the dental profession. Once this has been done, and a sufficiently large body of such nurses has been trained to supply a reasonable demand, it will be time to look to the legislatures to give them legal status. To them could be safely entrusted the work of prevention—of real prophylaxis, if you please—which the conditions in our public schools and institutions demand.

It is by no means certain that the dental profession as a whole is ready for or desires the dental nurse for private office work; nor are the dental nurses now existent clamoring for recognition. In general medicine the trained nurse was an evolution, from the Sairy Gamp depicted by Dickens, through the sisters of mercy and others who did such noble work in the wars in Europe that preceded the Crimean war, down to the highly-trained licensed and registered nurse of the present day, who has received legal status through the untiring efforts of Florence Nightingale and other pioneer nurses. General nursing was an established institution, a generally recognized and highly developed part of medical practice, before it received the sanction of lawgivers. With dental nursing it is not so. There is as yet no trained and united body of dental nurses who could meet the requirements of even such a law as that proposed for Massachusetts. So we should "make haste slowly," and first train such a body.

While writing the above, I chanced to read the article by Miss D. B. Johnson, a trained dental nurse of fifteen years' experience, in the current *Items.* Her contention is that if women wish to clean the teeth and do the other work of dentistry, they should take the same training as men and ask for no consideration on account of sex; and she makes the significant statement that "There can be no compromise possible on the legal question." It would be interesting to hear from other trained dental nurses, as thus far we have heard only from dentists employing them. Miss Johnson, in her article, does not demand that the assistants who are to be trained for a period of two years in a properly equipped school shall be licensed to practice any part of dentistry.

When the dental profession shall have trained, in the manner suggested by Miss Johnson, a sufficiently large number of women qualified to meet the requirements of the practice of true prophylaxis in our public schools and able to perform the minor operations contemplated in the first draft of the Massachusetts bill as given above, I shall gladly welcome them and accord them equal honor with the trained medical nurses, provided the limits of their activities be as carefully defined as are those of the latter.

Yours very sincerely,

CHAS. C. VOELKER.

BROOKLYN, N. Y., Feb. 17, 1913.

PROCEEDINGS OF SOCIETIES.

NATIONAL DENTAL ASSOCIATION.

Sixteenth Annual Meeting, held at Washington, D. C., September 10 to 13, 1912.

SECTION III: Oral Surgery, Anatomy, Physiology, Histology, Pathology, Etiology, Hygiene, Prophylaxis, Materia Medica, and Allied Subjects.

Chairman—W. H. G. LOGAN, Chicago, Ill.
Vice-chairman—E. E. HALL, Columbus, Ohio.
Secretary—T. P. HINMAN, Atlanta, Ga.

(Continued from page 324.)

WEDNESDAY—*Morning Session.*

The first meeting of Section III was called to order by the chairman, Dr. W. H. G. Logan, Chicago, Ill., on Wednesday morning, September 11, 1912.

The first order of business as announced by the chairman was the reading of a paper by Dr. J. F. BIDDLE, Pittsburgh, Pa., entitled "Diagnosis and Treatment of Important Diseases of the Dental Pulp."

[This paper is printed in full at page 353 of the present issue of the DENTAL COSMOS.]

Discussion.

Dr. ARTHUR D. BLACK, Chicago, Ill. It has been a delight to listen to the essayist, who has dealt with a comparatively limited subject and has gone thoroughly into the details of operative procedure. I am very much pleased indeed to have the opportunity of discussing a paper of this type, even though it is so thorough in itself.

The history of pulp treatment in this country is interesting, and I want to refer very briefly to the general waves that have gone over the dental profession. Previous to about 1860, it was common practice to extract teeth the pulps of which were inflamed. There were, of course, exceptions among the leaders of the profession. To Dr. Hullihen of Wheeling, W. Va., should be given the credit for bringing out a method in the early fifties by which the effort was made to save teeth which had exposed pulps by drilling a hole through the side of the root, close to the gingival line, into the pulp chamber, and then placing a filling in the cavity made by caries without removing the pulp.*

Following this came a treatment in which the pulps were removed, and permanent dressings of cotton with creasote were inserted as root-canal fillings.†

Occasionally we come across root-fillings of that kind, but that method has long since passed out of general practice. It marked, however, a step forward in the progress of pulp treat-

* See *Dental News Letter*, vol. vi, 1852–53, p. 34.

† See *American Journal of Dental Science*, vol. v, N. S., 1855, p. 458.

ment. Following it came various methods of root-canal filling. The first mention I have been able to find of the use of gutta-percha as a root-filling was made by Dr. B. Oscar Doyle of Louisville, Ky., in 1872.*

We have been a little too reckless in the removal of pulps. We have not been sufficiently careful in making diagnoses between pulps which should have been removed and those which might have been saved. Several men, whose judgment we have no reason to doubt, are on record as saying that they believe that 25 per cent. of the people of the country have alveolar abscesses today, due either to dead pulps or as a sequence to pulp treatment and root-canal filling. Many of these abscesses have no sinuses, but would be revealed by the use of the X ray. To this statement recent reports have been added of cases in which the general systemic condition has been shown to be seriously involved as the result of chronic abscesses. We are therefore facing a serious problem. We should be more careful in our diagnosis, as well as in our technique in treating these cases, and every time we operate on a pulp or make a root-filling we should have these facts in mind. The reports of cases of endocarditis, nephritis, arthritis, and other affections which have been traced to these conditions in the jaws, should always be considered. We are really treating the patient, not simply a single tooth, every time we treat a pulp. We have, indeed, the patient's life in our hands to a more considerable extent than most of us appreciate.

I wish to refer briefly to a paper read by Dr. Frank Billings before the Chicago Medical Society last winter in which he reported thirty cases of arthritis, eighteen of which were either cured or very much improved by the removal of the tonsils, and in most of these cases culture taken from the tonsils and inoculated into guinea-pigs produced a similar general lesion in the pigs, several of which died. There is no difference whatever in the possibilities and probabilities of such remote infections from chronic alveolar abscess; the person who has an infection about the root of a tooth is in the same danger as the one with an infected tonsil. I mention this in order to emphasize more strongly the importance of greater care both in diagnosis and in treatment, as suggested by the essayist in his excellent paper.

In the matter of diagnosis I have little to add to what Dr. Biddle has said, except that I wish he had dwelled at greater length upon those conditions of the pulp in which he considers pulp preservation to be indicated and those in which he would advise the removal of the pulp. He said that an inflamed pulp should be removed in all cases, but not in cases of hypermia. If a diagnosis is made of hypermia of the pulp, every effort should be made to restore that pulp to normal, and to save it rather than remove it.

I am very glad that Dr. Biddle showed an X ray of a lower second molar to which arsenic was applied before the roots were fully formed. This illustration calls attention to the fact that we become careless in examination and diagnosis. Ordinarily one should not mistake a second molar for a first molar, even though it be in the position of the first. We should be on our guard for that, especially when the other teeth are not in position. We should of course keep in mind the forms of all of the teeth and the time at which the roots are completely formed, and be careful in the application of our drugs.

I should like to emphasize especially the importance of antisepsis and asepsis in the treatment of these cases. There is no reason why the dentist, in the treatment of the pulp, should not carry out very nearly as strict measures of asepsis and antisepsis as would the general surgeon in an operation; no reason why the dentist should take a chance of carrying an infection into the pulp chamber, because the method of sterilization of the instruments employed is simple and easy, and there is no excuse for the use of non-sterile instruments within a root-canal.

Dr. Biddle did not mention the use

* See DENTAL COSMOS, vol. xiv, 1872, p. 371.

of the rubber dam in connection with the treatment of these cases, although it may be inferred from his remarks on asepsis that it should be used; yet I never like to hear a paper on this subject without emphasis being laid on the use of the rubber dam. I feel certain that a large percentage of blind abscesses are due to the failure of the dentist to place the rubber dam—and I do not except the upper central incisors in making that statement; the rubber dam should be applied in the treatment of every pulp, if it is at all possible to put it on.

One word should be said regarding the possibility of being deceived in the interpretation of radiographs. Dr. Biddle showed in his lantern slides that a great error may be made as to the closeness of a filling to the pulp chamber, depending on the angle at which the ray passed through the tooth. In connection with root-canal fillings, I wish to call attention to the fact that most roots appear larger in X-ray films than they are in reality, by reason of the fact that the film cannot be held in line with the long axis of the tooth, but is usually inclined corresponding to the curvature of the overlying tissues, whereby the length of the root is exaggerated. Especially in X-ray pictures of the upper anterior teeth are we apt to have this distortion.

No reference was made to the amputation of roots, Dr. Biddle contending that this is not properly a part of his paper. Yet I think he might have properly shown us these films as emphasizing what often happens as a sequel to imperfect technique.

The principal reason, probably, why we make so many failures in the treatment of pulps and the filling of root-canals is because we fail to charge a proper fee for the service. We render to our patients no other service which is quite as important as pulp treatment, which means the life or the loss of the tooth. The general custom of "throwing in" the pulp treatment with the filling, in the manner of the merchant who "throws in" a pair of suspenders with each pair of trousers, is wrong. We ought to so impress our patients with the time and care required for pulp treatment that they will be very glad to pay us the fee which we should receive for that service. I do not speak of this for the purpose of suggesting primarily that we increase our fees; I speak of it because I know that if an operator receives a proper fee, he will be more inclined to institute good pulp treatment.

Dr. J. P. BUCKLEY, Chicago, Ill. Dr. Black, in discussing the essayist's excellent paper, has referred to the history of pulp treatment. I am interested in this subject chiefly from the therapeutic or pathological viewpoint, and I wish to emphasize certain phases thereof that have long been in my mind.

Successful therapy, dental as well as general, depends largely on the proper interpretation of the disease that we are endeavoring to cure. The trouble with dentists in the past, and even today, in the treatment of diseases, especially the destructive diseases of the dental pulp—and I need not particularly specify the destructive diseases—has been that they do not take up and delve into the subject of pathology, do not school themselves so that they can read the clinical symptoms of the diseases that we are endeavoring to treat by the application of therapeutic remedies. Unless we study pathology and pharmacology, and know the symptoms of the various diseases and the drugs indicated in their treatment, we shall be groping in the dark. The dentist, unfortunately, is too busy, and has to attend to too many patients, to give to the individual who is suffering from these diseases the proper time, even if he knows the real cause of the trouble. In the average case of toothache, the dentist simply endeavors to find out one of two things, viz, whether the pulp is vital or dead. That, however, is not enough to know. If the pulp is vital, we should endeavor to find out its condition, whether it is in a state of active or one of passive hyperemia, or whether there is true pulpitis or true inflammation.

I agree with Dr. Black that too many pulps have been removed. Dentists remove pulps because they are afraid that a tooth will ache after a beautiful inlay or filling has been inserted. On the other hand, when they find that the pulp is dead, they generally proceed to take the first remedy that comes to hand, place it in the cavity of the tooth after opening into the pulp chamber, and seal it in with a pledget of cotton dipped in sandarac varnish or chloro-percha, being afraid to seal the cavity with cement. If the dentist, no matter what the pathological condition of the pulp be, would always hermetically seal the tooth in the first place, he would be compelled to delve more deeply into the subject and find out just what the condition of that pulp is, so that he may seal the proper remedy into the tooth. The dentist today who fails to hermetically seal his remedy in a tooth at the first sitting, or who advises the patient to remove his filling, if the tooth should ache, either does not understand the pathological condition which he is endeavoring to treat or else has absolutely no confidence in his remedy.

I want to make the appeal here today that we delve deeply into the science of pathology and pharmacology, that we learn to read the clinical symptoms of these diseases—because then, and then only, can we apply our therapeutics along rational lines. When it comes to the question of removing the pulp, the average dentist will do so, regardless of actual conditions, because of his fear that the pulp may subsequently give trouble. When we think of the pictures that have been thrown on the screen, of the small, tortuous root-canals from which pulps have been removed that could have been saved under proper treatment, it is a question whether we are conserving the patient's interests by so readily and indiscriminately, not to say ruthlessly, extirpating pulps as has been the practice in the past. I wish to be understood correctly. I am making no plea for the preservation of a pulp that is diseased to such an extent that it should be removed, but I am pleading for the conservation of pulps which are not sufficiently diseased to warrant removal.

I do not know whether or not it is true—and I hope it is not—that 25 per cent. of the people of this country are suffering with alveolar abscesses, but I do know that dentists have been blinking at abscesses in the mouths of their patients that they were unable to cure. They have been advising their patients that as long as a tooth, though abscessed and discharging pus, was giving no manifest trouble, that tooth should be retained. If anyone had an abscess on his toe, or thumb, or finger-nail, would he tolerate it? He would work continuously until it was healed, fearing that neglect would mean the amputation of the toe or finger, and yet it is infinitely worse for a patient to have his general systemic condition neglected by lack of attention to an alveolar abscess.

Dr. Moorehead, a student of pathology, in the *Journal of the American Medical Association,* reported recently five cases of tubercular infection of the glands in close proximity to abscessed teeth, inferring that these glands became infected through the canals of abscessed teeth, and every dental and medical man knows that from such infected tubercular glands tubercle bacilli can be carried throughout the system, these bacilli attacking any part of the body that is below par. During the year 1911 $14,500,000 was spent by the National Association for the Prevention and Cure of Tuberculosis. Dr. E. C. Rosenow, Dr. Billings' assistant in Chicago, to whom Dr. Black referred, reported recently before the Chicago Dental Society six cases in which the patients had died from endocarditis, the post-mortem examinations showing that the endocarditis was the direct result of poisons absorbed by the blood-stream from pyorrheal pockets containing pus or abscesses associated with teeth. It is time, then, that we stop blinking at these chronic abscesses in the mouths of patients, and if by therapeutics and surgery we cannot cure such conditions, let us extract such teeth, in order to avoid damage to the patients' systems.

If I have said anything in the discussion of the essayist's most excellent paper that will make dentists think more deeply along the lines of pathology and pharmacology, I shall feel that my effort to attend this meeting has not been in vain.

Dr. JAMES TRUMAN, Philadelphia. I do not wish to discuss this paper, valuable as it is, but I desire to correct a statement made by Dr. Black that prior to 1870 there was no treatment of root-canals. This may be true of the environs of Chicago, but not of Philadelphia and neighborhood. I have been a teacher since long prior to 1870, and I can state positively that some of us knew how to treat root-canals, perhaps not as successfully as my friend Dr. Buckley, but we did the best we knew. The trouble at the present time with many young practitioners is that they do not go back far enough; they do not understand, as a rule, the treatment and the work of the older men—the fathers of this profession—as some of us who worked at that period were able to comprehend it.

Dr. OTTO E. INGLIS, Philadelphia. Dr. Biddle has chosen a subject which has always been of interest to me, inasmuch as it involves clinical phenomena, scientific facts, and some degree of imagination. The proper utilization of these three factors will enable one to make a fairly just and practical diagnosis in pulp diseases, and to apply a rational treatment suitable in a given case. All cases of arterial hyperemia are due to causes which act directly on the exposed dentin of an exposed pulp, or to causes which produce an inflammation or hyperemia of the apical tissue so that the excess of blood flows into the pulp vessels, thus establishing that aseptic overfulness of bloodvessels and the consequent over-excitability of the nervous mechanism of the pulp which are characteristic of arterial hyperemia of the pulp. A profound arterial hyperemia of the pulp produced by direct causes can, in its turn, produce an overflow of blood from the pulp into the apical tissue, and thus induce an apical hyperemia with its characteristic phenomenon of tenderness upon tapping. Venous or passive hyperemia in its uncomplicated form is almost invariably secondary to arterial hyperemia, and is due to the compression of the veins at the apical foramen by the enlarging artery. Thus, as the arterial hyperemia increases in severity, the venous variety becomes also more severe, until stasis, either total or partial, supervenes. While there are conditions producing non-septic pulpitis, the vast majority of cases are due to pulp exposure and its mechanical, chemical, thermal, and infective irritation. When an abscess upon another tooth or a pyorrhea pocket upon the same tooth approaches the apical tissue of the tooth in question, the pulp of that tooth may be infected from the apex down, and thus its infective inflammation be produced.

There are clinical phenomena which require some imagination to understand as applied to a given case in a mouth.

I will explain. Recently I vainly treated a lower right first molar for a chronic abscess on the distal root, the abscess discharging over the middle third of the mesial root of the second molar. I could feel this root with a probe. The acute symptoms having abated, I let the patient go on her vacation. A violent pulpitis ensued in the pulp of the second molar, doubtless due to infection from the abscess tract. The dentist whom she consulted diagnosed inflamed pulp, and devitalized it. I do not know whether he saw the cause in his mind's eye or not.

Now, suppose that a tooth equally loose, and equally responsive to cold, should present, and the cause be a pyorrheal pocket not reaching the apical tissue; then the treatment which to the empiricist would be correct is not a correct one, as the diagnosis changes from apical inflammation to apical pulp hyperemia, a disease entirely curable in most cases upon simple removal of the cause.

Dr. Biddle has cited an interesting case of pulp hyperemia due to the alveolitis following the removal of an impacted tooth. This is analogous to a series of causes any one of which may produce inflammation or hyperemia of the apical tissue—by mere extension—and the surplus of blood in the part goes into the pulp, hence its hyperemia and supersensitivity, and hence its response to cold.

In the consideration of all conditions of inflammation, it has been of great value to me to imagine the central area of pus—or, in non-septic inflammation, of stasis—surrounded by an area of stasis in which phagocytosis is active, this being surrounded by a zone of active but less active inflammation, this by a zone of arterial hyperemia which may fairly be regarded as the first stage of an inflammation, and this by a zone of normal tissue. It requires some imagination correctly to distinguish these various zones in their anatomical positions as disease progresses.

Dr. Biddle's views on symptomatology coincide in the main with my own; I shall therefore not repeat them, but content myself with this brief amplification of the pathology involved.

Dr. Biddle (closing the discussion). I am greatly pleased with the discussion which my paper has brought forth. Dr. Black spoke of the use of the rubber dam. I use it always in an operation in the lower jaw, and in the posterior portion of the upper jaw, but seldom in the anterior, where I have everything necessary for the operation prepared in advance, and by using cotton rolls, and not permitting the patient to close his mouth till the operation be completed, obtain very satisfactory results.

Someone in the audience has requested me to speak of mummification, the kind of paste I use, etc. In reply I would say that mummification has no place whatever in my office.

The stereopticon operator failed to show a slide which I shall mention. The case is that of a man thirty-five years of age, with the upper right canine missing. The first bicuspid was crowned, with a canine facing attached, and there was a sinus opening above the place where the canine should have been. A radiograph was taken and revealed the natural canine above the central and lateral incisors. Two years previous to the taking of the radiograph, there had been hyperemic conditions of the lateral and central incisors, but the patient's dentist, upon making an examination, had failed to determine the true nature of the trouble, and had told him that he had better let the teeth alone. He did so, and the results are apparent. It was now necessary to remove the central, lateral, and canine, and to curet the bone, leaving an opening of one and one-half inches along the side of the nose and one inch in width. Had the trouble been correctly diagnosed at the time of the hyperemic condition, doubtless the central and lateral incisors could have been saved. I cite this instance simply to exemplify the need of more accurate diagnosis.

As Section III is pressed for time and there are a number of excellent papers to follow, I shall conclude my remarks, thanking the discussers for their kindly consideration of my paper.

The next order of business for Section III was the reading of a paper by Dr. T. B. Hartzell, Minneapolis, Minn., entitled "The Post-operative Treatment of Pyorrhea."

[This paper is printed in full at page 370 of the present issue of the Cosmos.]

Discussion.

Dr. J. V. Conzett, Dubuque, Iowa. The paper to which we have listened is, in my opinion, one of the most important on the treatment of pyorrhea that has ever been presented to the profession, because of the emphasis which the essayist has laid on the after-treatment of this disease. We know that we can cure pyorrhea, but those who are specializing in this field know that very frequently patients come into their offices with the assertion that some practitioner has said that pyorrhea is incurable, and that their teeth must be extracted. Others have been discharged as cured, but they come to us in as bad condition as before, because of the fact that they have received no after-treatment. I regard this paper as important because it emphasizes the feature that, if pyorrhea is a curable disease, it is curable just to the extent that the condition is followed up and after-treatment is instituted. Dr. Hartzell has indicated very valuable methods as to this after-treatment.

Despite the lateness of the hour, I

want to emphasize a few points in regard to this subject. Cleanliness is the whole secret of cure in this disease; if that condition can be maintained after proper surgical procedure, the patient will be cured and remain cured, but if not, there will be a recurrence of the pyorrheal condition. Dr. Hartzell tells us in a measure how a cure can be accomplished, which must be done largely by the patient himself. Recently I have had two cases that had been treated by two of the best practitioners in this country, and these patients said, "Dr. So-and-so treated me and discharged me as cured, and now you see what the condition is." If the treatment had been followed up by systematic prophylaxis, there would not have been any recurrence. It would be ideal if the patient would properly maintain cleanliness himself, but we all know that patients will not or cannot do this in a majority of cases. They must be impressed with the importance of keeping their teeth free of any salivary calculus, and if they are allowed to judge of this for themselves, considerable damage is apt to be done before the patient realizes that his mouth needs closer attention than he can give to it. Therefore I believe that it is best to follow up the treatment and have the patient present himself to you or to some other practitioner in whom you have confidence, at stated intervals, that the condition may be observed and suitable prophylactic care be instituted, so as to maintain the proper degree of cleanliness and the condition established by the original treatment.

If I were to criticize any suggestion made in the paper it would be the placing of removable bridges on loose roots, because I do not believe that a removable bridge placed on loose roots would allow the deposition of the cells of granulation tissue to take place and become permanent. It would seem to me that, if granulation tissue is deposited, and the bridge is then removed, the granulations would be broken up, and no permanent attachment of the teeth would be established. I should like to ask Dr. Hartzell to tell us in closing what his experience has been in the placing of these removable bridges in loose teeth.

Dr. N. S. Hoff, Ann Arbor, Mich. The essayist has presented two most important phases of the treatment of peridental diseases, both of which are essential to successful results in the more aggravated stages of these conditions. The post-operative treatment in some cases is so complicated that no specific can be safely advocated. In all cases the surgical treatment is preliminary, although some are advocating therapeutic measures for the entire treatment. The essayist has very wisely left these unmentioned, and we shall do likewise because of our time limit.

The suggestion for a proper toilet procedure for the patient is a good one, but we believe the one advocated is rather complicated for the average patient. We find that the simpler the toilet, the more likely is it to be practiced. The worst sufferers are usually busy people, who have no leisure for any but the most essential time-consuming procedures; and they resent innovations, even though they believe in them and realize their own need. They especially do not care to indulge in any habitual time-consumer. I find it difficult to induce these busy patients to remember their periodic visits to the office for treatment, but I have had some success in getting them to use floss silk and an abrasive that is convenient, such as hand sapolio, once a week. I ask them to sit down once a week before a mirror and spend a half-hour passing floss silk around each tooth. The waxed, broad floss, after being drawn over a cake of hand sapolio, is an effective appliance that patients can learn to use conveniently after a few trials, and they derive so much comfort from this process that they will keep it up after once getting the knack of it, and the habit is established. In some cases orange-wood points in the small holder made by Dr. Skinner will also be useful. This, with the use of a proper toilet outfit of brushes and powders, properly selected and advisedly used, constitutes about all the care the average patient will stand for.

The essayist's picture of the high-pressure injection of infectious material in the peridental pockets is rather overdrawn. In a case that has been properly treated surgically, there ought not to be any considerable quantity of pus or infectious material in the peridental pockets, and if so, the forces of occlusion would hardly force it into the healthy bone and soft tissue of the peridental region. I am of the opinion that the inflammatory condition of these parts is due in a large measure to local absorption, or to an auto-infection from the blood and lymph vessels. The movement of the root in the alveolar socket under the force of occlusion, especially when improperly directed, will cause a stretching of the peridental fibers, and a consequent fatigue, with nervous irritation, that results in the congestion and irritation frequently present in these cases. This condition, as the essayist observes, provides an ideal opportunity for external infection, but it is remarkable that we so rarely have serious infection from this source to contend with in these cases. The histologic pathology of these diseases has not been scientifically determined as yet, and its actual character can only be a matter of clinical conjecture, but it would seem as though the disease would spread more rapidly and would more often assume a semi-malignant form if it were of an external character or source.

Massaging the gums is certainly a useful treatment, if applied properly. It should, however, not be excessive, especially in irritable and easily congested tissues. The use of the cotton rolls with an astringent lotion is useful, but not without its limitations. The bulk of the application hinders its use on the buccal and lingual surfaces of the distal molars, and then, too frequently a severe application of an astringent lotion will dry up the mucous membrane so as to hinder the normal secretion and to cause, after a time, an inflammatory condition that is difficult to subdue. The astringent is not indicated when the gums are normal. A simple antiseptic solution that readily mixes with the salivary and mucous secretions is better. The trouble with placing in the hands of the patients a potent drug is that they never know when not to use it. I have had good results from having the patient wet the finger and dip it in tooth-powder, particularly one containing a little myrrh or quinin, and massaging the gum, after having brushed the teeth with powder. If much friction is needed, a little powdered sulfur applied on the finger will increase the friction. As a rule, the use of detergent drugs in massage is dangerous, and should be carefully watched.

In regard to the comparative merits of fixed and removable bridges serving as splints in pyorrhea cases, it is difficult to dogmatize, especially since the innumerable variations of the cases presented have to be treated as individual cases, scarcely two ever being alike. As a rule, I find that teeth that are left free in their own sockets recover sooner than those that are held rigid by a splint. This, of course, is largely dependent upon the extent of absorption of the supporting structure, and the liability to continued irritation from malocclusion. For this reason, and also the reasons given by the essayist, I prefer temporary retention to the fixed splint or any such radical operation as that advocated in the paper. The advantage of a temporary fixture is the possibility of avoiding a fixed retainer, or such a formidable operation as is suggested. In the large majority of cases the teeth can be temporarily retained by the use of ordinary brass ligature wire, such as is used by orthodontists. The orthodontic arch is another valuable means for temporary retention. By these means the teeth can be held in approximate position, with just enough freedom of movement to afford the stimulation to the root environment during occlusion required to cause healthy nutrition, and sufficient recovery in time to justify the removal of all retention. These appliances can be so adjusted as to allow perfect cleanliness, and they can be changed or modified so easily that in suitable cases they are much to be preferred to any fixed bridge work. There are, of course, cases where many of the teeth have been lost, and some form of bridge work and splint in combination becomes necessary. In such cases, I have first used the temporary splints to secure recovery of the peridental tissues to a normal condition, and then have had satisfactory results from fixed bridges.

The operation suggested by the essayist is similar to that suggestd by Dr. W. V-B. Ames,* and I should object to it on the principle that it involves the destruction of the pulps in teeth that are practically sound, also because it involves banding or capping of the roots at a point where extreme skill is required to produce a condition that is even tolerable by the tissues. Banding or capping undoubtedly renders prophylaxis difficult and uncertain. I do not wish to put my judgment against that of Dr. Hartzell, who has had so much more experience in dealing with this condition, and who I am sure would not advocate a procedure had he not thoroughly tested it out. I have never been able to satisfy myself that the destruction of pulps in teeth affected by peridental inflammation is necessary in any considerable number of cases. Pulps must be extirpated in cases of encroachment of dental caries and uncontrollable sensitiveness, but in my judgment pulp extirpation should not be resorted to as a means of curing peridental troubles, because I know that these conditions can be cured without resorting to this procedure, and also because I am convinced that in a pulpless tooth the peridental attachment will certainly degenerate more rapidly than in one in which the pulp is vital. It is my opinion that permanent cures of pericementitis are more practicable in teeth with vital than in those with dead pulps. It is practically impossible to keep a root surface smooth in a pulpless tooth. Besides, the additional hazard of bad root-canal filling and the resulting apical trouble must be taken into account, this being no unimportant consideration in our decisions as to methods of procedure. I have no doubt that the essayist's method will be of great service in some cases, and that operators possessing the skill and judgment of Dr. Hartzell can use it advantageously in many cases, thus adding materially to their resources; but at the same time I fear that in the hands of practitioners of average skill and immature experience, the virtues of the procedure will be endangered, and more harm come from its use than benefit.

The essayist's other suggestion of attaching plates and saddles to isolated teeth is also liable to result in disaster in teeth having a tendency to peridental trouble. In the majority of cases, the retention teeth will become affected, and be lost in a few years. We should like very much to see our way clear to adopting the removable splint in the treatment of these conditions, as it certainly possesses more sanitary features, but our experience has led us to have more confidence in the fixed bridge for the sake of permanence.

Dr. J. D. Patterson, Kansas City, Mo. It surely must be said that when disease of the gums has progressed so far as to involve considerable gum recession and loss of underlying alveolar attachment, a recurrence of the trouble after the initial treatment is more rapid than at its first appearance. It therefore is of vital interest to know how best to avoid its recurrence, and our essayist deserves high praise for bringing the subject to our consideration.

In advanced cases of pyorrhea we do not anticipate more than satisfactory relief and comfort in the affected tissue. A "cure" under these circumstances is a misnomer for that term, to the patient's mind, involves the restoration of the lost tissue and a return to original conditions, which can only be expected in the first stages of the disease. The question therefore is, how we can prolong or render permanent the relief which we have obtained after instrumentation. To attain this end, several methods have been suggested, which may be divided, however, into two, viz (1) local sanitary measures, and (2) systemic treatment.

In the first class we confine ourselves

* See Transactions of the National Dental Association, 1901, page 119.

to all means of preventing irritation and infection by various mechanical means and by the local use of antiseptics, germicides, absorbents, stimulants, or cauterants. In the second class we seek additional aid from drugs or serums acting systemically, and the question before us therefore is, Which method is the most potent in restoring the health of the involved tissues? Does the employment of drugs or vaccines retard or prevent the recurrence of the disease after operative skill and scrupulous hygiene have been exhausted?

Let it be understood that the question of drugs should not be considered until after all mechanical skill and after-care have been exhausted; and those who proclaim that vaccines render unnecessary much of the surgical removal of irritants —and they are not a few—do not, I think, merit the least consideration. We are prone to be slaves to drugs. In these days dental and medical literature are full of cure-alls, as from time immemorial, yet it can be noticed by the careful observer of the trend of current thought that more and more reliance is being placed upon good food and diet, fresh air, sunlight, reasonable exercise, plenty of sleep, and freedom from care, and many great minds have thrown off the shackles and have declared that drugs are rarely, if ever, actually curative in their effects in systemic conditions.

When some twenty years ago the systemic treatment for pyorrhea was first advocated, I hailed it as the crowning relief, and made diligent use of this therapeutic method, said to be effective. Careful observation, however, has entirely failed to show the benefits of this or any other remedies more recently brought to notice. Now we are strongly advised to adopt the vaccine treatment, and the pages of our journals are filled with reports in which relief or cure is supposed to have been effected. This reminds us that if one is prone to believe a certain thing, he can find any amount of evidence in support of his contention. Our knowledge of pathology is so limited that we would gladly call to our aid some therapeutic measures, but the actual benefits derived from drugs are difficult to determine. We have all heard of cures or improvement in pathological conditions in which absolutely no drugs have been administered. They "take up their beds and walk," even though no "laying-on of hands" has been practiced. So we must go very warily when we say that drugs have produced this or that cure, and remember that the *vis medicatrix naturæ* may have had a hand.

A very remarkable paper has recently been published from the pen of Dr. Beverly H. Robinson of New York, who has spent a lifetime in hospitals and private practice. Among other statements he says:

> All medical men today who are thoughtful and informed recognize fully how much more important it is to prevent disease than to cure it. Indeed, what is termed a cure is not in any strict sense a cure at all, nine times in ten, in acute disease, medical or surgical. Nature with intelligent guidance, which usually means little or no active interference, works out the ultimate well-being of the patient so far as may be. Of course, I do not wish to say for an instant that there should not be help rendered in a proper and judicious way. This may be given by a good and reliable nurse, sometimes without much, if any, medical supervision on the part of the physician or surgeon; again, with oversight and instruction from time to time by the latter. But as to very frequent counsel or advice, acting from either source, it is often more than questionable whether or not benefit results. . . . Do we really cure chronic diseases? I fail to have seen it in the large majority of instances. We simply render them more bearable, and by modifying or lessening symptoms for a shorter or longer period, we give comparative ease and comfort, and no doubt also prevent at times the development of certain untoward sequelæ. If the foregoing be admitted as true, doesn't it seem far better to interfere medically or surgically as little as possible? Doesn't it seem wrong to give medicines to correct what at best is doubtful as to origin and consequences, or to use the knife except where the evident condition and natural results amply justify it? . . . Perhaps there are a few exceptions, because up to date we still acknowledge a few specific drugs. But apart from these, I challenge my affirmations to be gainsaid successfully.

In the light of these extracts, what becomes of the claims that a diabetic patient must first be treated for that complaint ere local surgical treatment of concomitant pyorrhea shall be instituted? What of the claims that faulty metabolism must be corrected before local surgical treatment avails? What of the claim that vaccines will be the coming antagonist to pyorrhea alveolaris, and that local treatment is unsatisfactory? The advocates of these measures with one accord claim that pyorrhea is caused by "faulty metabolism and its irritating end-products," and that first of all faulty metabolism must be eradicated or the "opsonic index raised." How soon do these men expect to correct and cure faulty metabolism, if it has become well enough established to cause pyorrhea? Beverly Robinson says *this cannot be done;* that nothing more can be done than to alleviate. In the very last work on pathology by Adami we find that the evidences of faulty metabolism do not come at once, but after a long time of high living, alcoholic indulgences, or other bad habits, if it is not caused by hereditarily predisposed tissue.

The whole weight of the most recent and best authority proves that serious faulty metabolism becomes manifest after long abuse of proper nutrition, and that its cure is well-nigh hopeless. Dr. Beverly Robinson would certainly place this disease in the class that drugs would never cure.

Those who preach the virtues of systemic treatment for pyorrhea must necessarily find systemic conditions to combat, and so they have made the strange pronunciamento that all, or nearly all, who suffer with pyorrhea are on the brink of the grave. One extremist says that those of his patients who have pyorrhea are syphilitic; another that they are usually tuberculous; another hints at degeneracy, while a large coterie sing the song of waste end-products and the uric acid diathesis.

In my opinion, rational "post-operative treatment" consists in the maintenance of perfect sanitation secured by proper brushing with a proper brush and plenty of powder. The interproximal spaces must be cleansed of food remains and glutinous deposits inviting fermentation, by the careful use of Cutter ribbon floss and of a high-power blunt-pointed syringe charged with a salt solution, in order to reach and remove all matter which would soon become irritative. This latter work should be accomplished by the patient under the operator's careful guidance, or, if that is not possible—and often, it seems, it is not—the operator himself should do this cleansing at frequent sittings, all with the express and positive idea *absolutely to divorce the dental organs from any form of irritant whatever.* Instead of drugs and vaccines, if any prejudicial systemic conditions exist, open air, golf, tennis, walking, the drinking of plenty of pure water, sleeping in the open air or with wide-open windows should be prescribed, thus stimulating phagocytosis and the bactericidal action of the blood serum until the "opsonic index" is raised to normal.

In hundreds of cases positive relief has been thus assured, and "so far as the mind of man runneth," or science has proved, there is little necessity for deluging the internal economy with lithia compounds—breeders of appendicitis—or by injecting dead bacteria which may relieve one condition and yet cause a graver one.

The essayist is a careful and successful specialist in pyorrhea, and his paper is a distinct addition to the literature upon after-treatment in cases of gum disease, such treatment being entirely of a local character, the writer ignoring, apparently, the benefits supposed to be derived from systemic treatment. I cannot criticize his position, as it coincides with my view of the matter, but considering the prominence which is being given to systemic remedies, especially to vaccines, in dental literature and at dental conventions, it would seem that the essayist should have noticed these as belonging in the speculative field, at least, of post-operative treatment.

The essayist's observations upon conditions following surgical treatment, and his description of the methods by which a cure or relief can be rendered permanent, are to be commended, though the use of a stain—composed of zinc iodid

15 gr., potassium iodid 15 gr., iodin crystals 15 gr., glycerin and aqua 4 drams each—by the patient as a "revealing" stain for the purpose of detecting fermentative plaques should perhaps be criticized. This preparation is suitable enough for the dentist's use before and after instrumentation, but it is too potent, we think, for frequent domestic use, nor is it necessary, for if brush and powder are employed correctly, no fermentative patches will remain to be revealed, save in concealed interproximal spaces not easily viewed.

Considerable space has been devoted in the paper to the important consideration of retainers, but it seems hardly appropriate to consider these under post-operative treatment, for I think that in nearly all cases retainers should be applied before instrumentation. Teeth that are so loose that their movement annoys the patient, precludes cleaning with the brush and prevents healing, can scarcely be scaled until they are firmly held in position, and the most suitable time for splinting them is prior to the surgical procedure. A fixed splint of one form or another is placed in such a way that the scaling is not rendered difficult, and the cleansing with brush and points can be perfectly accomplished.

The remarkable splint bridge described in the paper, made by cutting the teeth off at the gum margin, placing a pin and cope on the root permanently, soldering the copes together, and placing a removable bridge upon that foundation, would seem an unjustifiable appliance unless the crowns of the teeth were in an advanced stage of caries. Every practitioner, moreover, who has given attention to this subject knows that such dental arches as have been attacked in their entirety by this disease usually exhibit good teeth, free from caries. The expense, also, of such a complicated procedure would, it seems, render it prohibitive to the large majority of patients. Each operator, however, has his own peculiar way of accomplishing satisfactory results, and each case may demand a different method for reaching the desired end.

Dr. Wm. Crenshaw, Atlanta, Ga. I have been very greatly interested in the discussion of Dr. Hartzell's paper, as I am with everything pertaining to pyorrhea, because I am doing that kind of work exclusively. I think Dr. Patterson's ideas as to post-operative treatment are most sound and correct. Dependence on drugs of one kind or another is hardly to be countenanced in this day and time; there was a time when drugs were depended on to do everything. Fifteen years ago I asked Dr. James Truman what antiseptics he would use in pyorrheal pockets after instrumentation to effect, or assist in, a cure of pyorrhea. He opened my eyes for the first time, by asking me what need there was for an antiseptic in a pocket from which all necrotic tissues that had established and maintained the irritation had been removed by proper curetment. "Well," I replied, "would it not be well and safe to introduce a positive antiseptic carried into the pocket for the purpose of killing any form of bacteria there?" His answer was that if any bacteria or irritating material were left in a pocket, it would not be disposed of by antiseptics. He said, "If you can do it that way, what is the use of doing anything else? Why not place the antiseptics in the pockets and have the cure at once?" I have proved to my satisfaction that if the pockets are properly cleansed by removing all incrustations from the roots, and any patches or vestiges of necrotic membrane sticking to the surfaces of the teeth—then they may be filled with any one of three dozen antiseptics, and a cure will be effected. From experience I have found that the pockets will be cured without the injection of any antiseptics whatever. I have proved this convincingly by treating the teeth on one side of the mouth by injecting antiseptics in the pockets, and limiting myself on the other side to as perfect instrumentation as possible, and the pockets not injected with antiseptics became quite as healthy as the others. Any operator can prove this to his satisfaction by a trial.

Dr. E. A. Lundy, Los Angeles, Cal. I am in hearty accord with the remarks of Dr. Patterson and Dr. Crenshaw.

Dr. Patterson's suggestion of retention before cleansing seems to be very advantageous. I have resorted to relieving all malocclusion, but have never inserted permanent retentive appliances before instrumentation, and I fully appreciate Dr. Patterson's useful suggestion.

Pyorrhea is not caused simply by malocclusion or improper care in cleansing the teeth, although these are both important etiologic factors. In my opinion, however, seventy-five per cent. of cases of pyorrhea are caused by malnutrition. I have myself suffered very much from pyorrhea for a number of years. I was able for a time to be under the care of Dr. Younger, formerly of San Francisco, but afterward was limited to what treatment I could apply personally. Those who treat pyorrhea know that one cannot properly care for his own teeth, so my teeth became very badly incrusted.

Neither Dr. Patterson nor the essayist, if I remember correctly, spoke of this disease with a view to dietetics. I have had great success in dietetic treatment when I have been able to obtain the patient's co-operation. The patient is put on a non-uric acid diet as strictly as possible. We have to learn, of course, from the patient's report from time to time as to a desirable or necessary change of diet. I usually ask my patients at the first consultation whether they indulge in stimulants such as tea or coffee, particularly coffee. Generally I find that when the patients refrain from tea or coffee, I am able to cure them more quickly.

Dr. M. L. Rhein, New York. Having been asked to say a few words, I would like to protest against the tenor of the discussion. The essayist's purpose is not being adequately served when a discussion is raised on etiological factors, which Dr. Hartzell did not intend to consider in his admirable paper. Realizing that the treatment of these conditions does not vary, no matter how much different practitioners might quibble over their genesis, he confined himself solely to treatment. Consequently, it seems bad taste to bring up some phases which the essayist has carefully avoided, because he desired to confine the discussion to methods of treatment.

Nevertheless, I must protest against the peculiar views on pathology that Dr. Patterson has given utterance to. It requires a peculiar imagination to see a practical phagocytosis ensue from exercise. The raising of the standard or quality of certain substances in the blood not entirely known even yet, which is spoken of as raising the opsonic index, is something entirely apart from phagocytosis.

It is a great pleasure to approve of the essayist's methods, and I would especially approve of the teaching opposed by Dr. Patterson, the essayist contending that the retention apparatus should not be applied to teeth before treatment. If Dr. Patterson had said that, when the teeth are very loose, some temporary splint should be applied during treatment, he would have met with approval. The treatment of these conditions almost invariably is complicated with a correction of malocclusion, and only when treatment has been concluded can there be any positive knowledge of the position which the teeth should maintain. It is not uncommon to see a splint fail to secure the benefit intended because the teeth have not been placed in the most desirable position. Twenty-five years ago I first called the attention of the dental profession to the great value obtained by splinting loose teeth together permanently. At that time I carefully illustrated the steps taken in bringing them into proper position, and demonstrated the splint as the locking device, after the parts were healthy and the malocclusion had been corrected. This doctrine has stood the test of all this time, and consequently I strongly protest against a form of treatment that is generally followed by disaster.

Dr. Hartzell (closing the discussion). I have no wish to refute the statements of the men who have been kind enough to give my paper attention, with the exception of possibly two remarks that have been made. I did not bring out that phase of post-operative treatment which deals with the raising of the opsonic index or the increasing in the blood-stream of those substances which have the power to inhibit bacterial progress in the system. I had expected to take some little part in the discussion of another paper that dealt with that particular subject, but I did not undertake it, for the reason that in ninety-nine per cent. of cases treated surgically such post-operative treatment is unnecessary. Perhaps I am putting the percentage a little high, but I wish to leave the idea in the minds of my hearers that the main points brought out by Dr. Patterson and those who followed, and in my paper itself, would tend to show that such systemic treatment is not necessary. There are a few cases in which we can build up resistance by the use of vaccines, and in these few cases it is well enough to resort to vaccines; but these instances are so few, comparatively, that it is not necessary to consider them under the heading of post-operative treatment.

I want to make another statement. Of the splints described, three out of five were attached to teeth the roots of which were not much more than an eighth of an inch long, and have been in the mouth from three to five years. No matter whether or not I was justified in putting splints on these teeth, I will say that none of them would have been preserved until today if I had not inserted that appliance, and I leave it to your judgment whether we should insert a splint and fix the teeth, or leave them loose in the mouth.

Section III then adjourned until a later session.

WEDNESDAY—*Evening Session*

Section III was called to order on Wednesday, September 11th, at 8.30 o'clock, by Dr. A. R. Melendy, president of the association, who introduced Dr. W. H. G. Logan, chairman of Section III, as the presiding officer of the evening.

Dr. LOGAN announced that the music of the evening would be furnished by local talent, through the courtesy and kindness of Mr. Bristow, superintendent of the Sunday-school of the Calvary Baptist Church of Washington.

Dr. Logan then introduced Dr. H. W. WILEY, the first speaker of the evening, who delivered an address entitled "A Consideration of the Effects that Impure Foods and Adulterated Drugs Have upon the Human System," as follows:

A Consideration of the Effects That Impure Foods and Adulterated Drugs Have upon the Human System.

Mr. Chairman, ladies and gentlemen,—When I came into this room, realizing that I had not long been a member of the party, and seeing the severe simplicity of the garb of the male members (on account of the heat many were *en manches de chemise*), I wondered if I had struck a democratic ratification meeting, but when I heard the shouting and tumult, I knew I was mistaken, and that I was in a convention of "bull-mooses." My principle is to catch them coming and going, and so I talk for both.

FOOD AS OF PRIME IMPORTANCE TO HUMANITY.

Eating is the greatest industry of humanity; we know that it is widely pursued by all civilized nations, and those of the missionaries who come back tell us that it is practiced also by the savage cannibal. I need not substantiate this, although I have been put down in the Ananias club, but if I were called upon to substantiate it, I should undertake to determine what percentage of human endeavor is devoted to supplying the food of the people. It would certainly be a great proportion of all human effort, if we had any method of getting at the truth of the matter. The principal outlet, I believe, for the salaries of most laboring men and of all wage-earners of every description is to supply the wants of their bodies and their families' bodies; therefore I say it is the principal industry of humanity, and it is that industry which requires of man the greatest amount of his effort.

NECESSITY FOR CONSERVATION OF THE TEETH, AND SUPERIORITY OF AMERICAN DENTISTRY.

Granting for the moment that this is a true statement, it follows that everything connected with that industry is of prime importance, and I take it that all agree with me that, after the cook, the teeth serve the most important function in the nutrition of man—even more so than the cook, for if we have good teeth we can eat raw foods and do not need a cook. It is a pleasure to me to see assembled and be able to speak to such a body of men, whose duty it is to care for the teeth of humanity. I speak with the greater pleasure on this occasion, because it is recognized the world over that American dentistry leads the world in its profession. There may be nations whose physicians are greater—I doubt it, but there may be; there may be nations whose surgeons are more eminent—I doubt that too, but there may be; but I think there is no question of the fact that American dentistry stands first among all the nations of the world. No better proof of this could be given than to point to the success which many American dentists have attained in foreign countries, simply because they have brought into those countries improved methods in their science as taught and practiced in the United States. Therefore I am addressing tonight a body of men who are leaders in their profession, and who have come from all states of this country to take part in the deliberations of this national body.

I am not a believer in that theory according to which one can chew a very little bit of food long enough to make up for a square meal. [Laughter.] I believe in good chewing, and a lot of it. At dinner a very good friend of mine—a man who is somewhat of a valetudinarian and who devotes a great deal of time to thinking what he shall eat for his best welfare—and myself were discussing the subject of nutrition, and he said that the least lapse from the regular course of living might be followed by serious incapacity. I said that I was sorry he had to be so careful; that I for one gave no thought to what I was to eat; that I had followed the scriptural advice about the morrow, as to "what ye shall eat and wherewithal ye shall be clothed"—I let other people worry about that. "Sufficient unto the day," it is further said, "is the evil thereof"—and sufficient unto the day is the food thereof; the thing is, to get enough of it.

Another thought that struck me as I looked at this audience and first thought it was a democratic meeting, was that the democrats had not had a chance at the public crib for more than sixteen years, and when I saw the fulness and roundness of your forms and faces, I was convinced that I was not addressing hungry democrats. You believe, evidently, in supporting in practice the efforts of your profession, and you show in your physical appearance only good nutrition and the good mastication which goes with it. Evidently you either practice on yourselves, or go to your brother to do it. Dog does not eat dog in the professions. So the physician who gets ill can have all the others left to get him well; as one professional brother, you can invite all your professional friends around to attend you, as far as compatible with your own safety; but you do not want to get too many! You know the testimonial Dr. Quack received: "Dear doctor,—My mother-in-law was at death's door. She took two bottles of your remedy, and it pulled her through." [Laughter.]

DUTIES OF THE STATE IN REGARD TO HEALTH PRESERVATION.

We hear a great deal at the present time about medical inspection in public schools, and no one believes in this more than I do. Whatever we may think ourselves about the matter, the fact remains that we are becoming every year more and more socialistic, becoming confirmed more and more in the belief that the state owes us something as citizens; everybody is becoming more sensitive to the idea that the state must care more than it has been doing heretofore for its citizens. We realize it today in the public schools. What right has the state to establish public schools under the doctrine of human rights? None whatever. The citizen must care for himself, and the state has no right to interfere with his education; and yet what would we think of the person who would preach today the doctrine that public education was wrong? No, it is right, and public education is but a step toward socialism—the state does for the citizen what the citizen may do for himself, according to the theory of human rights. We are adopting that idea in education, as well as in the matter of public roads, so that we can all drive automobiles—at least those who have been in practice a few years can do it; our poor farmers of the East cannot do it yet, but they do out West—even if they have to put a mortgage on the farm. Thus we are more and more adopting the doctrine that the state must care for our opportunities. We are also coming to realize that the state must care for the health of the public, and we are coming to it rapidly. [Applause.]

IMPORTANCE OF PRESERVATION OF DECIDUOUS TEETH.

When are we going to begin to care for the health? I should say that in the first years of toothhood—this is a new name!—we should begin to care for the health. The baby's mouth should be as carefully cleansed as the adult's every time it takes a square meal. The little tooth that just puts forth its appearance—and I have seen two in the last month that are the sweetest little teeth you ever saw—must be cared for. [Applause.] I can assure you that I never have taken so deep an interest in dentistry as in the last few months. I have not only made one examination, but about a hundred, to try to see if these young teeth were all right. So I say, in the first days of toothhood the care of the public health should begin. The state should see to it that its citizens are taught these principles of oral hygiene, which they can apply to their own infants in the beginning of their toothhood years. You may say that these teeth are only deciduous. That is true, but there is no reason why they should be lost by decay, because decay is contagious, and if it attacks the deciduous teeth there may be an infection left for the permanent ones, and then those permanent ones may be only as "temporary" as the first. And yet how careless we are, every one, of these first teeth!

Last year, while visiting my farmer, who has three little girls ranging from three to eleven years of age, I noticed that they paid no attention to their teeth at all, and so, in the goodness of my heart, I gave them tooth-brushes and told them how to use them. Some time after that I was back at the farm again, and I asked one of the little girls if she used her tooth-brush three times a day as suggested. "Oh, no," was her reply, "we are saving them until we become grown girls" [laughter]—then, of course, there would not be anything to brush. That was her idea of the way to use the gift; she would not use it in her childhood days, but would wait until she was grown and had no teeth. That is the way people regard the ordinary fundamentals of public health. The important thought to impress on them is that we cannot have good health without good teeth, and yet how often we leave the teeth to rust and be thrown on the scrap-heap early in life! I have seen in the year past girls of fifteen and sixteen years with teeth so badly decayed that they were almost as good as gone, simply owing to negligence on the part of their parents. When I was a child nothing was heard in the public schools of the idea of taking care of the teeth. It was not mentioned in the public schools of that locality. We were taught hygiene of the body in a way, some primitive ideas of living, but never a word of that most important part of personal hygiene, viz, starting infant as well as adult life with a good set of teeth.

Not everyone is born, like Richard Cœur de Lion, with a full set of teeth. That only happens to geniuses, but of course the brighter they are, the sooner they have teeth. My son has two teeth at four months of age. [Laughter.] But whether they erupt soon or late, that is the time to begin to brush them. The teeth are like other blessings. We all know how "blessings brighten as they take flight," and I never appreciate a tooth so much as when I see it coming out of my mouth in the hands of a dentist, because I realize that it is through my negligence that I have lost it. There is no physiological reason why a man should ever lose his teeth; there is no reason why he should not keep them until old age, and I can assure you that, to my mind, there is no better way of reaching old age than by the preservation of the teeth. [Applause.]

DENTAL INSPECTION OF SCHOOL CHILDREN ADVOCATED.

For this reason, while I approve of medical inspection in schools, I approve also of dental inspection. Although this is no new idea, I insist that we should care for the deciduous teeth, and preserve them before the child goes to school. The state can hardly go into the homes and command that we shall preserve our children's teeth, but we can preach at least to the rising generation, so that when they become parents they will realize the importance of tooth conservation. We cannot perhaps save the teeth that are erupting now, but we can do so twenty or forty years from now, just as I preach the doctrine of saving infants' lives. We cannot save the infants dying at the rate of a thousand a day now, but we can save those that will be born forty years from now by beginning to preach infant hygiene today, so that the new generation will grow up with a new idea and a new purpose, namely, to preserve intact as long as possible that precious endowment that has come to us, which we call life—that mystery which we cannot fathom, that heavenly gift which we should appreciate so much as to care for it so that we may get the most possible out of it. Therefore what I say tonight is not for the children of today—it is too late for them, but for the next ten, twenty, and thirty years, when the child will be taught at the family fireside the principles of personal hygiene before he goes to school. As I have been preaching for the last third of a century the health of the public and the importance of preserving human life chiefly by means of proper nutrition, so I have more and more become convinced of the extreme necessity of saving the teeth for the purpose for which nature intended them.

PREDIGESTED FOODS DISCOUNTENANCED.

That brings me to the fact that our country is being flooded with preparations which are prechewed and predigested, with all kinds of infant, invalid, and breakfast foods, the manufacturers of which have taken the trouble to perform the functions not only of mastication but also of digestion. By this feeding of mankind with partially digested food, what happens? Just what happens to everything that is not in use. The next time you take a trip on a railroad, look out at the silver-like appearance of the rail that is in use, and then at the one at the siding which is rusting away. Both tracks are made of the same steel, probably put down at the same time and in the same way, but one is bright and shining, and the other is rusting away because it is not in use. So it is with every organ of the human body; there is a legitimate physiological function for it to perform, and the law of all nature is, that if an organ fails to perform the function that nature intended it to perform, its function diminishes in efficiency, and every time we take prechewed and predigested food we injure the teeth and the stomach. After I have lost my teeth I will thank the manufacturer for chewing for me—until I can raise money enough to get an artificial set. After my stomach is gone and is no longer able to perform its functions, then I will thank him for digesting my food for me; but as long as I am in my present condition—I still have a few teeth left, and also a stomach which produces every day a certain amount of pepsin and other secretions necessary to dissolve my food—I do not want anybody to chew for me, and I want to do my own digesting; and I can assure you that I derive a great deal of comfort from both these performances. Even if this is not the best, I like to have the pleasure of doing it myself. In this respect I do not believe in socialism; that is one of the things that I do not want the state to do for me unless I become incapacitated. If you want to lose your teeth as soon as possible, eat prechewed foods, and if you want to ruin your stomach, eat predigested foods. The Lord knows that most of us can digest our own starch, and do not need the chemist to put sulfuric acid in it to dissolve it for us. All the efforts of the makers of the more modernized foods seem to rest on the assumption that we have no teeth and no gastric juices, and both of these assumptions are erroneous. True dental hygiene demands normal, natural foods on which the teeth and the stomach can exercise themselves, in order to perform their normal functions; and I think, in saying this, that I am preaching not only good physiology, but plain common sense, and am voicing the experience of everyone who has taken the trouble to look into this matter at all.

SOME DIETETIC HINTS.

My next theme is how to give the teeth proper food for mastication, which is as important as having the mill to masticate with. The miller may have a good upper and lower millstone, but if he tries to grind pebbles into flour, he will have hard work. So, after we bring into good condition the millstones which nature has furnished, let us bring good grist to the mill. That is the reason why I have made the keynote of my fight for public health, good, nutritious, unadulterated food, because, without this, health is impossible; and in the same way the dentists of this country should do their share in this great warfare for the welfare of the public. This follows as a natural corollary to that which I have already illustrated. After we have secured the nutritious food which is necessary to the happiness and health of man, we must have proper mastication. I am not so extreme on this question, however, as Mr. Fletcher is. I believe in his doctrine, but, like the rest of us cranks, perhaps he emphasizes it too much. Still, I believe in thorough, slow mastication, in careful selection and a proper and generous quantity of food. I am not an apostle of starvation; I do not believe that humanity will be helped by starving. I am a great admirer of Upton Sinclair, but when he says that fasting will cure every form of disease which attacks humanity, I say, "What are you going to do with the man who is dying of hunger? Thousands are dying from that, and do you propose to preach that doctrine to them?" Fasting is good for a man who habitually overeats, and a great many of us are too well and too often fed.

A few years ago I addressed a company of farmers, worth fifteen millions or more each, and as I looked at them at Sherry's, sitting around the table drinking champagne which cost as much as the milk they produced—when you visit one of these farmers they set before you milk and champagne, and suggest that you help yourself, one costing as much as the other—I felt that they were in danger. I am not speaking disrespectfully of these men, but every one of them was eating himself into an early grave. It is said that Napoleon ate himself into Waterloo; that had he not been such a gourmand and had he not dulled his faculties by overeating, the battle of Waterloo would not have been lost by him. And these men were Napoleons of finance, and were eating themselves into their Waterloo as fast as they could. For that kind of people, fasting is good. The man who really works, who puts forth exertion every day to the utmost, is not the man to preach starvation to, but the man who "sits still," as Mrs. Browning says, "in easy chairs and damns the general world for standing up"—he is the man to recommend starvation to. Physiologists all over the world advise us to eat pure food and masticate it well, and that is the doctrine I preach to you tonight.

PREVENTION AS THE AIM.

Let me ask for a moment what is to become of the medical and the dental professions in that day, which I hope is not far off, when disease will be banished from this world, and when all will be born, not with actually sound *teeth,* but with sound germs for perfect teeth, which are not found in all newly-born today. We inherit the tendency to caries, as all know. What is to become then of the physician and the dentist? I have said this summer in lectures before chautauquas that only two really learned professions are necessary to the happiness of mankind, the one the profession of agriculture, the other the teaching profession, to which we all belong—every good citizen is a teacher. When the propaganda for public health has had its full fruition there will be no disease, and as far as we are informed at the present, we would have no need of physicians; and when my propaganda for good teeth has reached its fruition we will have no need for the dentist as he works today; but, as we shall see immediately, physicians and dentists will still be needed in another way. Then I hope, when we are all perfectly well and need no doctors, and when we have good teeth and need no dentists, we will not need many preachers. We will be so good that we will not need anybody to tell us how to get to heaven—we will just get there naturally; and when we do not need any ministers of the gospel, we will not need any lawyers; we will not break the laws. In short, in the Wiley millennium there will be no physicians, no dentists, no ministers, no lawyers, just farmers and teachers—that is the Wilson platform, that's all. [Laughter.] My friends, I am not trying to put you out of business, since, as I have said, there will still be use for the physician and the dentist. We will be employed then for the prevention of disease of the body and the mouth, and then, in those future days of ideal socialism, the physician and the dentist will be employed as officials of the state to look after the health of the state, and their salaries will be in proportion to the good teeth and the health of the people, and as people become sick, and lose their teeth, the salaries of the physician and the dentist will diminish! That is the way in which we will employ the physician and the dentist of the future; but you need not be afraid that you will lose your jobs tomorrow. Somebody will have toothache tomorrow in spite of my talk, and that ideal time is still far off. It is not going to come through any battle of Armageddon, but it will come through the preaching of the gospel of health and the teaching of this generation and the next to care for their children's teeth and health, and not have them die by the thousands, as they are dying today in the United States. Nearly a thousand babies not yet one year of age have closed their eyes today in this country of ours, and this can be avoided when the mothers and fathers are educated to understand the principles of hygiene, and know how to bring healthy children into the world, as well as care for them after they are born; these will grow up to be healthy men and women, and gray hairs will be as common then as bald heads are today [laughter], and we shall not look with disfavor on age, as we do at the present time. Then we shall have four grandfathers and grandmothers, instead of none, and happiness and prosperity will come to this country; not wealth for the few and poverty for the many, but an even distribution of the wealth of the country, according to the individual's effort and usefulness, and everyone will have an opportunity to make an effort for the good of the world, and health and happiness and contentment will be the lot of humanity. [Applause.]

Dr. Logan, the chairman, then introduced the next speaker of the evening, Dr. George Edwin Hunt, Indianapolis, Ind., who spoke on "Teeth and Health," as follows:

Teeth and Health.

Mr. President, ladies and gentlemen,—Our distinguished guest of the evening, as you all know, has been engaged for some years in harassing those who desire to put impure or adulterated foods and impure or adulterated drugs before the American people, and has displayed such pernicious activity in this direction that naturally those who desire to profit by that sort of business did what they could to make it unpleasant for him—and I rather imagine from the action he took last March that they succeeded in their endeavor. Since he resigned his office in Washington, those manufacturers of impure foods and drugs have shown renewed activity, and this reminds me of the story of the little mouse that lived in a wine-cellar. One day a boy came down into the wine-cellar to draw some wine, and before departing did not turn off the spigot fully, so that a quantity of wine dripped on the floor. The little mouse soon afterward found a little pool of wine and tasted it. He liked it so well that he tasted it again, and after the wine was gone, the mouse, feeling pretty good, climbed up on the wine-keg, looked around, and said, "I wonder what has become of that blamed old cat that has been hanging around here for the last week." [Laughter.]

The Program Committee announced that I would speak on "Teeth and Health," and now that I have the floor, I want to say a few words on the status of the mouth hygiene movement before taking up the subject assigned to me by the committee.

PRODUCERS AND NON-PRODUCERS AS INFLUENCED BY HEALTH.

A socialistic writer recently observed that there are three ways of making a living—begging it, stealing it, or working for it; and furthermore, that since it was manifestly impossible to beg or steal something that does not exist, the workers of the world must first create the living which the beggar begs and the thief steals. I do not believe that I can divide humanity into beggars and thieves and workers, because there are some people whom we cannot classify under any of these divisions, and so I would prefer to classify everyone as either producers or non-producers. Producers are those who contribute to the mental, physical, or material welfare of themselves and others. Men may differ in their classification of their fellow men as producers or non-producers, but in my mind this classification is perfectly clear. I believe that tramps, hobos, criminals, bankers, brokers, "middle men" of all sorts, and the men of the army and navy, so far as they are men of war, are non-producers, and I believe the rest of us are producers.

There are two kinds of producers, the direct and indirect. Direct producers are those who actually create things necessary to life, who grow products on or in the ground, or dig raw material out of the ground which can be converted into useful things. These are the agriculturists, the stock-growers, the miners and the artizans who take the raw material and convert it into clothing, houses, etc., for our citizens' comfort and well-being. There are a number of other people who do not directly produce, who do not create the materials necessary to life, but who are nevertheless necessary to our life, and in this class of indirect producers I would place all people who look after the health and intellect of the citizen. The physician and the dentist are indirect producers, because they enable the direct producer to produce to his fullest capacity, or at least to a fuller capacity than he would otherwise possess.

There are other men who are rightfully called indirect producers, because without their aid direct producers would not produce their full capacity. For instance, it is necessary that the direct producer be intelligent, that he may know how best to produce his product, and it is necessary for someone to teach him how to achieve this; therefore the pedagog is an indirect producer. Furthermore, in order that the direct and the indirect producers both may cultivate their intellectual capacity to its limit, we must have writers, musicians, and poets, all of whom are indirect producers who contribute to the mental welfare of the world. The distinction, therefore, between those who serve mankind, the producers, and those who do not serve mankind, the non-producers, can be quite sharply drawn.

The mouth hygiene movement is but a part of the grand, world-wide movement toward the bettering of the physical, mental, and material condition of the people, the increasing of the efficiency of our producers, and the decreasing of the number of our non-producers. The mouth hygiene movement, as the phrase implies, is especially concerned in the betterment of physical conditions, and is therefore intimately allied with the tuberculosis campaign, as well as all other movements toward better health. Physical incapacity reduces production more than any other one cause. It makes non-producers of those who should be partial producers, and partial producers of those who should be full producers. Perfect physical condition is necessary for anyone who would produce to his full capacity.

ORAL HEALTH AS INFLUENCING MAN'S EFFICIENCY.

I believe that but few of you are producing to your fullest capacity, are doing all you are capable of doing. I know I am not, and I doubt if any of you are, but the more nearly we reach our full productive capacity, the more we add to the material welfare of the nation and of each individual in the nation. I have said that there is no one other factor which reduces the capacity for production more than ill health. It is true that a good many non-producers are not in ill health. Some non-producers are too lazy to work, others do not fit their groove in life—they went to dental colleges when they should have become streetcar conductors; but ill health is responsible for the largest number of our non-producers. Thirty per cent. of the unemployed are out of employment because of ill health, therefore the less ill health there is, the less will be the number of non-producers, and the greater will be the united product of the workers.

Among the many factors which produce ill health in individuals, limit and retard the output of their work, and are responsible for a large portion of these two classes of partial producers and non-producers, I believe the condition of the mouth to be a leading one. Let me give you my reasons.

METABOLIC DISEASES DUE TO ORAL CONDITIONS.

There are two classes or divisions of diseases which are largely influenced by the condition of the mouth. These are, first, diseases of faulty metabolism, or faulty nutrition, to use a more familiar term. Diseases of faulty nutrition are very largely due to oral conditions. Some of these diseases of faulty nutrition are due to the fact that the patient has not enough teeth to chew his or her food properly, while others are due to the fact that the condition of the patient's mouth is such that he is continually swallowing quantities of poisonous matter. Among the diseases due to faulty nutrition I might mention rheumatism, cancer, gout, gastritis, diphtheria, appendicitis, diarrhea, biliousness, constipation, arterio-sclerosis, diabetes, and various other manifestations of auto-intoxication. Three forms of food are necessary for the nurture of the body, viz, carbohydrates, proteids, and fats. The digestion of carbohydrates—viz, starchy foods, such as grain products of all sorts, potatoes, sugars, etc.—actually begins in the mouth by the action of the saliva upon the food. It is certain that if the digestion of these foods is not started properly, it will not be completed successfully.

For the digestion of proteids and fats, it is necessary that they be well divided and subdivided before passing into the alimentary canal and being acted upon by the digestive juices. The stomach has no teeth, as has been aptly said, and unless that comminution takes place in the mouth, it will be but imperfectly accomplished. So one can readily see how these diseases of faulty nutrition depend on the condition and use of the mouth. If a person has no teeth to chew food with, or if the teeth are in bad condition, digestion cannot be properly begun. If the mouth is in such a condition that the individual is taking into the stomach quantities of pus along with the food, digestion cannot properly be performed, and faulty metabolism results. Furthermore, even if the mouth is in good condition, and there are enough teeth to masticate the food, but the teeth are not used properly, diseases of faulty metabolism will occur. They frequently occur in patients who, although their masticatory apparatus is splendid and their mouth in fairly clean condition, bolt their food instead of chewing it.

INFECTIOUS DISEASES DUE TO ORAL CONDITIONS.

The second class of disease-producing factors especially under the control and influenced by the condition of the mouth—more so than the average person realizes—are the various infectious diseases. Five times as many micro-organisms pass into the lungs through the mouth as pass through the nose. The nose has a series of filters which sift the inhaled air and remove a great many micro-organisms even though they may be in the air when it enters the nares, but the mouth has no such protection; therefore many more micro-organisms reach the lungs through the mouth than through the nose. This, of course, is true to a greater degree of the stomach than of the lungs. Seventy-five per cent. of tubercular trouble is the result of infection through the mouth. Tubercular trouble occurring in the glands of the neck is claimed to be due either to infection from tubercular tonsils or from carious teeth and diseased gums. Pneumonia is another disease largely due to the condition of the mouth. It has been proved that the tubercle bacillus and the pneumococcus will exist in carious cavities in teeth for forty days; therefore if cavities are present in the teeth, it may readily be seen what the effect may be if the patient's health deteriorates at any time during these forty days. Dr. Evans has told about the epidemics of scarlatina which had to be combated in the schools of Chicago; of the children who had to be sent away and quarantined until they were well, and how, when they were allowed to return, the epidemic of scarlatina broke out again. For a long time the cause of this recurrence could not be determined, until the sterilization of every mouth and the filling of every cavity in the teeth was insisted upon before these children were permitted to return to school; and in that way the epidemic was stopped. The school authorities of Valparaiso, Ind., have had the same experience.

Typhoid fever is another disease in which the condition of the mouth plays a large part. In a neglected mouth with carious teeth, food débris collects around the teeth, and the opportunity for the cultivation of the typhoid bacillus in such a mouth is great. On the other hand, a person may harbor innumerable typhoid bacilli in the mouth without being harmed, if he has no carious teeth and if his physical condition is perfect. Some of these bacilli will probably pass into the stomach, but if the person's condition is perfect his physiological resistance will be sufficient to throw them off, as the field is not ripe for them. But inside of ten, twenty, or thirty days this same person's condition may change so that the typhoid bacillus finds the alimentary canal an easy field in which to propagate, and then typhoid fever may be the result. So a person may have typhoid fever two or three weeks after having been exposed to it, if the state of the mouth favors retention of the bacillus. The condition of the mouth, therefore, is of serious importance in stamping out the different contagious diseases. A neglected, septic mouth, with carious teeth in which food is constantly putrefying, will bring about an inflammation of the mucous membrane the effect of which will be felt by the mucous membrane of the throat. The membrane becomes inflamed, the physiological resistance is depreciated by the presence of these conditions, and the result is that the diphtheria bacillus finds a favorable field upon which to grow and propagate. In the same way a great many other of these infectious diseases may be produced through infection in the throat.

UNCLEAN MOUTHS A MENACE TO THE COMMUNITY.

I would impress upon you, then, that the condition of the mouth and of the teeth is not a matter of only local importance. It affects the individual's whole body, and not the mouth alone. Its influence goes even farther than that. I believe honestly and earnestly that the time will come when the condition of a person's mouth will be taken as much into account by the municipal authorities as the condition of his morals is taken into account to some extent today. The time will come when no one will be allowed by the municipality to carry around an immoral mouth, as it were. This is only a question of the *mores,* of the custom of the time. At present the opinion prevails that the condition of a person's mouth is his own private affair, and if you went up to a man on the street today and told him that his mouth was a menace to the community, and he must either clean it or go to jail, he would probably knock you down or consign you to a place which is even hotter than Washington—if any such place there be. The time is coming when a dirty, immoral mouth will be considered as much a menace to the community as an infectious disease, and the person with such a mouth will be quarantined the same as the person who has smallpox. And that is the thought I want to leave with you—that the condition of a person's mouth is not only of importance to that person, but is a matter of moment to the community at large; that a dirty, uncared-for mouth is not only a source of disease to the individual, but also a menace to the health of every person who comes within a reasonable distance of him. When viewed in that way, it can readily be seen that the condition of your mouth is not only your business, but is my business, and everybody's business; it is the business of the community.

Dr. J. P. Buckley. Mr. Chairman, I move that we extend a rising vote of thanks to Dr. Wiley, and also wish to include Dr. Hunt, the singers, and others who have taken part in the program.

The audience then rose as a vote of thanks to those who had taken part in the meeting.

Section III was then declared adjourned *sine die.*

(Report of clinics to follow.)

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

Regular Monthly Meeting, held January 28, 1913.

The regular monthly meeting of the Academy of Stomatology of Philadelphia was called to order by the president, Dr. Joseph Huggins, in the lecture hall of the College of Physicians and Surgeons, Tuesday evening, January 28, 1913, at 8 o'clock.

Dr. Huggins announced that since the last meeting he had taken the liberty of appointing a committee to draft resolutions on the death of Dr. Wilbur F. Litch, such committee being Drs. Gaskill, Lee, and Jaquette, and called upon Dr. Gaskill for a report of the committee.

Dr. J. H. Gaskill then reported the following resolutions, which were adopted and were recommended to be published by the Academy:

Whereas, the Academy of Stomatology learns with deep regret of the death of Dr. Wilbur F. Litch, one of its most distinguished Fellows; and

Whereas, we feel that we should spread upon our records a testimonial of the esteem in which this society held him as an author, teacher, and editor; and

Whereas, while owing to failing health for several years Dr. Litch had not been active in society work, his death will be felt by the profession in general, and to those near him the loss will be a personal one; therefore be it

RESOLVED, That in the death of Dr. Litch the Academy feels that, in common with the dental profession as a whole, it has lost one of its most honored members; a man endowed with most scholarly attainments, kindest of dispositions, and noblest of characters; and be it further

RESOLVED, That a copy of these resolutions be sent to Dr. Litch's widow, with expressions of our sincere sympathy.

J. HOWARD GASKILL,
ALFRED P. LEE,
W. A. JAQUETTE,
Committee.

Dr. Huggins then announced as the first essayist of the evening Dr. E. J. GREENFIELD, Wichita, Kans., who read a paper entitled "Implantation of Artificial Crown and Bridge Abutments."

[This paper is printed in full at page 364 of the present issue of the COSMOS.]

Discussion.

Dr. M. H. CRYER. This is a very interesting subject indeed, but whether the operation is a success from a surgical standpoint depends on the length of time this root will remain in position. The implantation of roots in the manner described by the essayist will be a very valuable operation to the dental profession, if the implanted root will remain in the jaw for any appreciable length of time. I am, however, somewhat afraid that this desired result will not be as permanent as the essayist seems to think it will be. He is very sanguine in regard to this method of implantation of roots, as all men are who have something new to present, but it will require the test of time for us to determine whether or not operating in this manner will be worth while.

Judging from my studies of the anatomy and formation of the jaws, I am of opinion that there are very few places where I could insert such a root or crib in the jaws. A few minutes before I started for this meeting, I ran into my workshop and gathered together a few specimens of jaws to show tonight. In this case [demonstrating] we have a section of the full face; here we have the two orbits, and here the maxillary sinus on each side of the nasal chamber. In the center the alveolar process is absorbed until it is not more than two or three millimeters in thickness. Now, if we undertook to implant an artificial root such as has been described by the essayist in this process in any position, we should simply go into the maxillary sinus or into the nasal chamber, and in this case we should go into both; in this case, therefore, such an operation would be neither possible nor practical.

Here is another specimen in which there is a good alveolar process, but the roots bifurcate, and the antrum goes down between the roots. Looking into the maxillary sinus on either side, we see a thin layer of bone covering the apices of the roots, and we readily see that if we inserted an artificial root here, we should go into the sinus.

Here we have another bone, somewhat similar to the last. Looking into the maxillary sinuses on either side, we see a half-dozen conical processes covering the roots, and again in this specimen, in fact in almost any specimen I might select, excepting one of a negro skull, there would not be sufficient room to insert a post as deeply as we have here, figuring the depth of the root in proportion to the length of the crown. I am therefore at a loss to know how the essayist manages to implant these artificial roots in the majority of cases. It is possible that in the case of the anterior teeth, the canines, or the first and second bicuspids, there may be room for this operation, because the alveolar process is usually thick here, but in many cases, like this one, there would not be sufficient room in this region.

Take the lower jaw. In this specimen, if one attempted to go into the mandible to the depth of this artificial crib, one would strike cancellated tissue, and at this point, posterior to the canine, be liable to cut into the inferior dental canal. This would produce anesthesia of the lip, which would result in great discomfort to the patient.

Here we have another specimen in which about half of the upper portion of the alveolar process was cut away, leaving nearly half the sockets of the teeth. If one attempted to insert a crib in this jaw, one would drill into the cancellated tissue, which would not afford the support necessary. Right here I should like to emphasize the reason why the natural teeth stand so firmly. Here is a case, for instance, showing the bony walls of the socket with the bracing of the cancellated tissue through the bone in every direction, making a firm socket for the tooth. Now, if we penetrate into the cancellated tissue of the jaw where the tooth has been lost, we lose this bony socket, and have nothing for the cancellated tissue to brace against.

Here is another specimen which shows these bony sockets braced by the cancellated tissue, and making the teeth firm. If we drill into the bone at this point, down into this cancellated tissue, we have nothing to approximate the support that the natural bony socket affords.

I am very much interested in this method, and I like men who try innovations and keep dentistry from standing still or perhaps going backward. Therefore I am very much pleased to have had the opportunity of hearing the demonstration of the method, and will be glad to watch the results in the future.

I wish, in closing, to thank the essayist for coming before our society and offering to us this very interesting paper.

Dr. John B. Roberts. I do not know of anything that I, as a surgeon who operates on various parts of the body, have heard in a long time which has interested me so intensely as this method of implantation therapy brought forward by one of your colleagues of Kansas. This revolution in surgery must delight you who are interested in the mechanical side of oral surgery; and to those of us who are not so closely associated with this branch of surgery, and who take up these methods with some hesitation unless we have an oral surgeon to stand back of us, it must be equally interesting. Looking at this method as a surgical proposition, it seems to me absolutely feasible. So far as I know physiology as it applies to our surgical work in bone, such as fractures, the treatment of deformities, sections of the jaws, etc., the essayist's operation seems to me perfectly feasible. Hence, when Dr. Greenfield tells us that he has tried it successfully, I cannot but believe that his prognosis that it is going to stand the test of time is correct. It apparently is going to be a great advance, like the crowning of teeth, which has been so valuable to many dentists and to people in general. We medical men safely put gold or glass balls within the sclerotic coat of the eye, and in this way improve very much the cosmetic appearance of the face; we put paraffin and celluloid in noses of saddle shape and make Roman noses with perfect freedom; in fractures we insert screws that remain for years, and in many cases, like Dr. Greenfield, we do not know whether we shall live long enough to see these screws come out; we insert metal plates in bones to hold fractures together, and in many instances we put two Lane plates in broken bones of the forearm, and hold fragments together in this way, with no special inconvenience to the patient. We may take these plates out after the fracture has united, but if they cause no inconvenience to the patient we allow them to remain, because it is necessary to subject the patient to a second operation for the removal of the plates. We thought once that these screws and plates must be removed, else a softening of the bone might follow, such as the essayist mentioned in cases where there was a softening of the bone around the implanted root, followed by a detachment of the tooth. This does take place, if the operation is not done aseptically, but when inserted under aseptic conditions the screws and plates in the forearm, the leg, the clavicle, and other bones will remain in a quiescent state for I do not know how long. There are many people going around Philadelphia today with metal plates three or four inches long in their arms or legs who have never had any trouble therefrom. If surgeons can do these operations, if we can remove a portion of the lower jaw and insert a plate or fenestrated ramus of wire to hold the parts together, can use plates to hold together fractured tibias and fibulas, why cannot Dr. Greenfield, or anyone with sufficient skill, implant a fenestrated root in the alveolar process, put a crown upon it, and have it remain without irritation? The only wonder is that somebody has not successfully advanced this scheme earlier. These operations have perhaps been tried with more or less varying success before, but by the essayist's efforts this method has reached apparent perfection. When one takes into consideration the fact that the osteoblasts may develop bony tissue that will extend through these openings and cause attachments between the outer portion and the inside column of the alveolar process, it seems to me that this method is almost certain to be successful surgically and physiologically, if the operation is performed aseptically. When Dr. Greenfield, in describing this operation, says that he cleanses the gum with ether, sterilizes his instruments by boiling, and then fills the cavity with bismuth paste, he is not a mere dentist, he is a surgeon. That is the way surgeons perform such operations of implantation therapy, some of which I have rather carefully described in volumes v and vi of "Keen's Surgery."

We surgeons, however, cannot do well these operations that involve such fine mechanical work. If I want to have anything done of that nature, I have to send for help to one of my dental friends.

Surgeons, after resecting the jaw for a non-malignant tumor at times insert a firm wire substitute between the ramus of the jaw and the symphysis. It will stay there without causing trouble for months and probably years. The Greenfield operation seems to me a finer piece of work in the same region, the essential feature of success being the necessity of thorough asepsis. In the mouth we cannot maintain the same perfect asepsis as in other regions. Wounds, however, readily heal there, although there are so many bacteria present. Your colleague Miller of Berlin showed their abundance at the beginning of our study of bacteria of the mouth. I have found that somehow or other wounds of the lips and cheeks, which I had imagined would not do well in plastic surgery of of the mouth, heal with less irritation than would be expected. This is probably because of the good drainage obtained after oral operations.

I have been exceedingly interested in the essayist's paper, and I consider that you have heard tonight something of much value to you. and which after a while will become of great value to us medical men.

Dr. Edward C. Kirk. I want in the beginning to express my great pleasure and interest in the exhibit made by Dr. Greenfield. I have been interested in the subject of implantation for a great many years. I believe I did the first implantation operation done in Philadelphia, after Dr. Younger demonstrated the technique of that method in my office in 1886, and my experience with this operation, in so far as it has involved implantation of natural teeth or crowns mounted on natural roots, is on the whole about the same as the essayist's, viz, that implanted teeth are invariably lost by resorption of the roots and after varying periods of time. I have had cases where they were lost in six months by resorption; on the other hand, I have had cases in which the implanted teeth have given good service for sixteen years. The question of the conditions which modify the rate of resorption has never, to my mind, been clearly solved. I have repeated the operation in a mouth in which one implanted tooth was lost in a year, while the second implanted tooth lasted six years. There are some factors about the question of absorption of the natural roots which I am unable to understand, but all implanted roots ultimately undergo resorption, as stated by the essayist.

The question of the implantation of metallic roots has been under consideration for a number of years, and I took occasion today to look up some of the records of this operation, and would call to your attention some of the historical data that I picked up in the course of a very superficial search through the literature on this subject as published in the DENTAL COSMOS. I find the following records of operations of this character:

1887. Dr. S. M. Harris of Grass Valley, Cal., implanted in an artificial socket formed in the jaw of a Chinaman a porcelain crown fixed upon a platinum post around which lead was melted in a mold to resemble a tooth-root, and was slightly roughened to afford a retaining hold for the new tissues in the socket after the ligatures should be removed. The operation is said to be original with Dr. Harris, who reports the case at this date doing well.

1889. Dr. J. M. Edmunds of New York, on October 21, 1886, implanted a porcelain crown mounted on a platinum shell made in tooth-form coated with metallic lead, afterward roughened with a wheel bur, and performed the same operation at a clinic of the First District Dental Society of the State of New York on March 12, 1889. He again demonstrated his appliances and artificial root at the First District Society meeting on May 14, 1889.

1889. Dr. Edmunds inserted one of his crowns, an upper right incisor, in the mouth of Dr. Juan José Ross of Guatemala. Dr. V. H. Jackson examined the operation four days subsequently, and reported the tooth as being at that time remarkably firm, and the surrounding tissues free from any evidences of irritation.

1895. Dr. W. G. A. Bonwill reported at the First District Dental Society of New York in March 1895, his experiments with the implantation of metal tubes or pins of gold or iridium into the solid alveolar process, one or more to retain one tooth or a full upper or a full lower set.

1898. Dr. R. E. Payne gave a clinic before the National Dental Association on "The Implantation of a Silver Capsule." Again, in 1901, he demonstrated his method of implanting a silver capsule in a tooth socket to act as the support for a porcelain crown, which was to be mounted after a few weeks' time.

1905. Dr. C. R. Scholl of Reading reports the implantation of a porcelain tooth with a corrugated porcelain root. The operation was done in August 1903, and the operator reports the conditions satisfactory in November 1904. This tooth, however, was held in place by pins anchored in the crown and to fillings in adjoining teeth, which were sound otherwise.

I report these literary records merely as experiments or attempts made to overcome the tendency of resorption of the natural roots by using metallic substitutes therefor. In this connection I had a faint recollection of an attempt at implanting in a tooth socket an artificial root of gold, made by some French operator in the early part of the last century. I spent varying portions of several evenings rummaging for this record, and finally ran across it. I am reporting it with no desire or intention to detract from the credit which the essayist should have for originality in this method, but it is an excellent example of the way in which the human mind acts, and of how ideas are discovered and independently rediscovered from time to time. The following is a translation from a book by Maggiolo printed in 1809 that I picked up some years ago in the Latin quarter of Paris.*

* The title of this book, translated, reads—

MANUAL OF DENTAL ART. Containing the Description of New Mechanical Appliances, etc., invented by Monsieur Maggiolo, Doctor of Surgery of the Faculty of Genoa, Member of the Society of Medicine of Lyons, etc. New edition, embellished with engravings. Nancy, December 1, 1809: Printed by Claude Leseure, Rue de la Constitution, No. 392.

The authenticity of Maggiolo's invention is indorsed by William Rogers in his book "L'Encyclopédie du Dentiste." Paris: J. B. Baillère, 1845.

After speaking of the use of roots for the fixation of pivot teeth, Rogers says, in his chapter on "Pivot Teeth," p. 434: "The use-

Only one of the bibliographers seems to know anything about it.

The description of the artificial metallic tooth-root and its implantation is contained in the tenth chapter, and is as follows:

CHAPTER X.

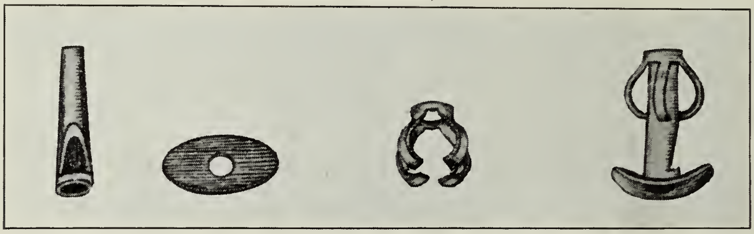
The Making of Artificial Roots Suitable for Carrying a Pivot Tooth.

It often happens that persons who wish to have artificial teeth inserted have nothing left but old roots too weak and dilapidated to carry firmly pivot or spring dowel crowns. In this case, before resorting to ligatures, one should investigate if it is not possible to replace them by an artificial root made of gold, which should be strong enough to receive and support a pivot tooth as solid as if it had been placed on a natural root.

This operation is practicable in all cases in which an old root is still entirely inclosed in its alveolus, that is to say, when it has not half protruded from its socket, and when the alveolus still possesses all its natural capacity. In any other case failure would be certain if one were imprudent enough to attempt this operation.

If circumstances are such that one may hope for certain success, one should start by making an artificial root proportionate to the thickness of the root which it is to replace.

Farsighted and ingenious dentists should have an assortment of all sizes, varying in all the natural dimensions to the incisors, canines, and bicuspids, which are the only teeth in which this operation is practicable. The following is the method of construction: The artificial root illustrated in No. 14 of the first plate, requires three different small pieces as represented in Nos. 11, 12, and 13 of the same plate. [See illustration.]



11 12 13 14

In order to make the first piece, No. 11, which we call the body of the root, a long and thick metal tube is selected answering to the thickness and height which the artificial root is to have. Its lower portion is distended by a triblet or slightly tapering mandrel, which is driven into the tube by hammer blows. It is then notched like a spring dowel, of which we have already spoken; then the surface of the root is made by shaping up an oval metal base, being about equal in size to the horizontal surface of the root which is to be replaced. In the center of this base a hole is made the size of which must be equal to the diameter of the tube which forms the body of the root. These two pieces, Nos. 11 and 12, must be soldered together as they are seen united in No. 14, in such a way that the hole in the base corresponds quite exactly to the open-

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fulness of the roots for the fixation of artificial teeth seemed so great that the idea of making even roots was conceived. This procedure was indicated by Jourdan and Maggiolo. If an old root was too weak and dilapidated to maintain a pivot tooth, or entirely buried in its alveolus, and this alveolus still possessed all its natural capacity, a root of gold could be supplied. Mr. Maggiolo, author of a good work on the 'Art of the Dentist,' invented a means for fixing pivot teeth in natural or artificial roots by means of a spring. . . . This procedure was, without doubt, the most ingenious, because the person who had the artificial tooth inserted could maintain in his mouth the greatest cleanliness and protect himself from evil odors.

"The insertion of the pivot teeth was inevitably followed by more or less intense pains, divers accidents, gingival inflammation. To remedy this, gargles, emollients, footbaths, and narcotic lotions were employed. These medico-surgical precautions were mostly unavailing, and the patient demanded loudly to be delivered from the pivot teeth which caused his torture."

ing in the body of the root, and that one of the two apices of the elliptic base comes to lie over the notch made in the lower part of the body of this root. The soldered portion is then trimmed, in order to give to these pieces a smooth and polished surface. After the base has been solidly soldered its ends are slightly bent, this being an indispensable precaution in order to make the base adjust itself more perfectly to the contours of the gum upon which it is to rest.

After this is done in the way described, a piece of gold tubing of such thickness is selected that it will just fit the tapered extremity of the body of the root. It is split into four blades up to nearly its upper extremity, which then forms a sort of a ring uniting the blades. With a fine file these four blades are filed so that they are slightly separated from each other. All the four blades are then bent to form a sphere, as seen in No. 13 of the first plate. This little globe is then set on the pointed extremity of the body of the root in such a way that two of its blades correspond to the two extreme ends of the oval base, and the two others to the lateral portions of the base which are most closely together. They are then fixed in place by soldering the ring which unites them to the end of the body of the root, and three of the ends of the same blades to the body of the root itself, toward the middle of which they must taper. I shall explain still further why the fourth blade of this globe must not be soldered.

The three pieces, the union of which is necessary for the making of artificial roots, must be made of eighteen-karat gold—first, because this gold has sufficient solidity for this kind of work, and second, because no inconvenience can result before it rests for good within the gums.

After the artificial root is thus constructed everything must be prepared for putting it in place. First, the old root which is still in the mouth must be extracted. Since it is, however, absolutely necessary not to break the alveolus, it should first be split in three pieces with a cutting pliers having side-cutting edges, by introducing one of its beaks into the root and placing the other between the root and the gum in a perpendicular direction, then by closing the two beaks of the pliers the natural root will immediately split along its entire length up to its apex. These pieces are grasped and removed one after the other with a flat, watchmakers' pincers. By pulling them in a perpendicular direction and with gentle and gradual movements, they can be removed without injuring the gums or fracturing the alveolus. This operation requires a few minutes of patience, but this is nothing if success is the operator's aim. In fact, it is desirable that no dentist should ever be in a hurry in making an extraction of teeth or roots.

After the root has been entirely removed from the alveolus the patient is made to wash his mouth with tepid water and vinegar mixed in equal portions, then this artificial root is introduced into the alveolus. It should enter quite accurately, and the base of the root should be well supported by the gum, which will quickly tighten itself upon the artificial root. Care is to be taken that the notch in the body of this root is turned toward the cavity of the mouth. The root is then pushed forcibly into the alveolus so that it touches its bottom. By placing the thumb in front and the index finger on the back of the gum one seeks to compress the walls of the alveolus by a gradual and sufficient force. The patient is then given a rest until the following day. The same compress is renewed for two weeks, and the patient is advised not to touch this artificial root. Astringent and alcoholic lotions are used even after the root has solidified in the alveolus.

A very extended experience proves to us that after the extraction of a tooth the walls of the alveolus, being no longer supported in their natural place by the presence of the root, approach one another and fuse together, thus obliterating this alveolar cavity, which no longer exists in persons who have lost their teeth. We believe even that it is less the loss of the teeth than the approachment and obliteration of the alveoli which alters so visibly the lines of the physiognomy, and produces on the face those disagreeable wrinkles which announce premature old age.

If no disease has altered the substance of the alveoli and the gums, and if the alveolar walls have not been fractured by the extraction of the natural root, one can easily conceive how the walls of the alveoli, which continually tend to approach each other, contribute to rendering solid an artificial root which replaces the natural one, before this approachment has taken place. For this new root, made of an incorruptible material, filling by its globe the whole bottom of the alveolar cavity, prevents the walls within the alveolus from becoming obliterated. On the other hand, the inferior portion of this root, being narrow, permits the alveolar plates and the gingivæ to approach the neck of the artificial root and to close themselves in a circle around it, thereby insuring its solidity to such a degree that afterward it could not be removed without breaking portions of the alveolus. Although the four little blades, the contours of which form the globe of the artificial root, are arranged in the same manner, we have observed that one of these four should not be soldered to the body of the root, for the following reasons:

It is quite possible that if the globe is slightly larger than the cavity of the alveolus, the root cannot enter to the bottom, which would prevent its surface from resting well upon the gum. On the other hand, the pressure applied in order to make the root go to the very depth of the alveolar cavity forces the unsoldered blade to approach the body of the artificial root, and acting as a spring in the depth of the alveolus, the latter is entirely filled, a condition which is absolutely necessary for the success of this operation.

A few days generally suffice to insure success. One will find that the artificial root has assumed sufficient solidity if, upon touching its external surface very slightly, one notices that it no longer shakes in the alveolus, and that the root stays in place when slight pressure from below upward is exerted on the gum. This is evident proof that the alveolus has fastened itself against the artificial root with enough energy to insure its solidity in the alveolus.

No undue haste should ever be made to insert the tooth, the pivot of which must enter the artificial root, of whose solidity one must be perfectly assured; otherwise this valuable work will be destroyed. I therefore advise not to insert a simple pivot until one month after the root has been inserted, so that it may no longer be possible to impair its solidity.

This operation never involves any subsequent inconvenience, because the humor which can flow from the interior of the alveolus can circulate at full ease through the fenestrum made in the base of the body of the artificial root.

This operation may be considered as one of the most beautiful of the art of the dentist. It combines such important advantages that for some time I have never missed an opportunity to employ it. I have almost always obtained results that were as satisfactory to me as to the persons on whom I have operated.

There is, as Dr. Roberts said, ample surgical or physiological justification for this operation. The fact that foreign metallic bodies will be tolerated in the tissues has been demonstrated over and over again. Some of you probably attended the International Dental Congres held in Paris in 1900, and saw the patient exhibited by Michaels of Paris, who had restored the patient's entire shoulder joint. The shoulder joint had been affected by tuberculosis and had been removed by Pean, the great French surgeon, and was replaced by Michaels with an artificial joint consisting of an iridio-platinum and vulcanite mechanism attached to the bones. That patient, after recovery from the operation, could take a bucket of water and swing it over his head with ease. We saw a radiograph of the joint at the time, and some six or seven years later, when the man died, the piece was taken out, and embodied in Michaels' collection in the Stomatological School of Paris. That is an example of an extensive replacement which was tolerated by the tissues. We have also the recorded work of Delair and Sébileau with reference to the replacement of portions of the cranial wall by fenestrated metallic plates:

> In replacing pieces of bone of the skull after craniectomy, Delair and Sébileau, since 1903, employ anchored fenestrated metal plates. The fenestration reduces the weight, and the plate is quickly immobilized by fibrous tissue. In order to fasten the plate at first, they use metal hooks, which seem to invite condensing osteitis, while screws produce rarefying osteitis. The tissues seem to take more kindly to silver than to gold. Drainage must be maintained by a bundle of horsehair, as abundant hemato-serous discharge will take place.—*Gaz. des Hôpitaux.*

I offer these facts as proofs that there is abundant surgical justification for this operation in so far as that aspect of it is concerned.

Dr. Cryer has spoken about the mechanical relations of this metallic crib to the structures that may be immediately involved by the operation, but there is a further question of the difference between the alveolar process and the character of its structural tissue, and that of some of the other bones. Talbot has taken the ground—and not without justification, I think—that the alveolar process is a provisional or temporary tissue, and because of its transitory character he has regarded it as being particularly vulnerable to that class of infections which we group under the general term of pyorrhea alveolaris; it is useful so long as it is functionally active in supporting the teeth, but as soon as the teeth are lost, it disappears. This, then, seems to represent a different type of bone, and the question to my mind is how such a tissue, with its tendency to undergo degenerative changes, would be affected by an operation of the character we are now considering; whether under stimulation it would tend to promote functional activity in the alveolar border again, or whether it would have the effect of hastening the alveolar resorption.

I congratulate the essayist on his enthusiasm. I believe in the enthusiast, the optimist, the crank, because they have the courage of their convictions. But in listening to the paper, I divided the essayist's statements into two classes, viz, first into his personal opinion about this operation, his prognosis, and his prophecies, and second, into his actual knowledge regarding the success of this operation. I did not hear him say what was the date of his first operation, and what its status is today, nor did I hear him say that radiographic studies had been made of his work. It seems to me that we should have such records, so that we might see what these cribs and the surrounding tissue look like under the X rays. We should also have other data with reference to actual practical results, in order that we may form our own judgment as to the possible endurance and utility of the operation.

I want, in closing, to express my gratification at having had the opportunity of listening to this interesting paper.

Dr. Otto E. Inglis. I had the pleasure of seeing Dr. Greenfield perform this operation this afternoon, and I was surprised at its extreme simplicity. Like the rest of you, I know nothing particular about the operation, although I have made some implantations by the old methods. We must depend entirely upon the length of time which has elapsed since the first use of this cribriform root, for forming an opinion as to whether this operation is really a success.

In discussion with Dr. Greenfield this afternoon, I mentioned the fact that a few months ago I had published in the *Garretsonian* a description of his method by Dr. Guilford. Since that description was published, Dr. Greenfield has to some extent modified the process of this operation, and I should like very much to have him state his reasons for the change. Dr. Greenfield also told me of several peculiar accidents he has had during operations, as for example, cutting into the inferior dental canal, the operation still being successful, and I wish he would mention this in closing the discussion.

From a mechanical viewpoint, this operation looks very promising. The appliance used is so readily introduced after the circular opening is made in the bone that it really seems as simple as pushing a drawer into its proper receptacle.

Dr. Robert H. Ivy. I would like to say a word about the form of anesthesia Dr. Greenfield uses in this operation. I should think that in view of the danger of injuring the inferior dental nerve, particularly if the patient is rendered unconscious by a general anesthetic, the use of local anesthesia would avert that danger. The patient would feel when the drill or trephine went into this region, and the operator could then guide the depth of his incision into the bone.

Dr. Dudley Guilford. I had the pleasure of seeing Dr. Greenfield perform this beautiful operation this afternoon, but to my mind, the gist of the matter, if it is to prove a permanent operation, lies in the ability of the gingival tissue to resist infection.

Undoubtedly an appliance of this kind, inserted in the bone and entirely covered by normal tissue so that it cannot be exposed to infection later, would remain indefinitely; such appliances have been used by surgeons for years. Granting that this operation can be done aseptically, the whole question hinges on the manner in which the gingival tissue is going to act, and how it will heal. Of course there is a cicatrix formed around the cap, and this would afford some protection, as it would hug the cap very tightly, owing to the contraction which always takes place; however, we would not have a normal attachment, as we have between the natural root and the gingival tissue. To my mind, the crux of the matter lies in the question whether the gingival tissue will heal in such a way that it will prevent infection. If the tissues around the platinum root do not become infected, I see no reason why it should not last indefinitely, because it certainly cannot be resorbed.

Dr. W. A. Jaquette. There is one phase of this subject that has not been touched upon. The natural tooth is held in its socket not only by the bony wall but by the peridental membrane, which acts as a cushion, and the blow of the force of mastication on the tooth is taken up somewhat by this cushion. The natural tooth is very much more able, therefore, to stand this force than I would suppose this mechanical appliance would be, as the latter has no cushion to receive the blow. We would naturally suppose that force or pressure or a blow exerted on a rigidly supported crib such as this would much more readily produce absorption.

Dr. Greenfield (closing the discussion). Dr. Cryer has shown you a few selected cases of maxillæ that do not seem to me to be fair examples at all. They are jaws in which absorption has fully taken place, and which are dried out and narrow. Here is a bone [demonstrating] which, while it is not the bone of a human jaw, will demonstrate the point I wish to make. This is the bone of a cow, which shows that the socket I make is so small that, when I place the crib in the bone, it is as solid practically as before. The crib becomes more firm in time, as the bone condenses over it. This shows very clearly that owing to the smallness of the opening that I make, we have a solid foundation, if any ridge is left at all. I do not advise this operation in every case, because there are some cases in which the ridge is so narrow that it is not practicable. When a person comes to me with a thin, narrow jaw and an absorbed ridge, I refuse to perform this operation.

I wish to mention one case of a man whom I treated six or eight months ago, one-half of whose jaw had been replaced by Dr. Brophy by an operation that had been performed some fifteen years previously. The bone had grown over the plates, and was almost united again. I cite this case to show that bone does grow in these places and under the conditions mentioned. This operation for which I claim success is being done at the gum line, and while the mouth, as has been said, is one of the most unclean portions of the body, it seems that nature has come to our aid by making provision for the care of these portions. It appears as though the bacteria are carried away more quickly from these than from any other parts, and it is a well-established fact that wounds of the mouth and in the region of the rectum heal more quickly than in any other part of the body.

Dr. Roberts mentioned different operations where surgeons use metals in bones. I have read a great deal about the use of different metals in bones, and I find that it makes little difference what kind of metal is used, so long as it is aseptic. Surgeons are using steel screws, steel plates, etc., in different kinds of fractures and operations with perfect freedom.

Dr. Kirk has asked how long ago these operations have been performed, and while I know, of course, that he did not mean to intimate that I had intentionally failed to mention how long these teeth had been in place, I will say that I have been doing this work about seven years. Most of the cases that I treated at first were lost very early, but I had the right idea, although I did not know just what I wanted to do. I had no suitable instruments for the work, but this difficulty was overcome later. My attention was first directed to this work by an operation on a fractured leg that I saw. A lady of my acquaintance fell and broke her leg, and in the attempt to set the bones properly it seemed that as a portion of the bone was gone entirely, the ends of the bone would have to be drawn together and attached, which would necessitate the lady's going through life with one leg shorter than the other. She was a fine-looking woman, and it worried me a great deal to think that she would become crippled. While investigating as to how the surgeon used metal in the operation, which in this case resulted in preventing the condition so much dreaded, the thought came to me that, if we could twist wire into the shape of a root, it could be implanted. My thought was that the bone would grow into the crib, and there would be no infection, because these wires were so small that the infection would be carried off by the blood before it could do any damage. In my office the next morning I made a root of this kind, and implanted it. I had nothing but an old rubber bur to make the opening in the alveolus with, and when the opening was completed, nothing but two walls of the alveolus were left. I put the root in position, and it was not long before I found it in fairly good condition. It never became very solid, because there were no means of fastening it, and as a consequence there was motion, and no very firm growth of tissue occurred. But that was my start, and after continual experimentation, I finally made an appliance of the shape which you see here [illustrating], and implanted one of these. The first case in which I tried it was that of a second molar. I drilled out all the bone and made a hole of the size of the root and inserted the root. In about six weeks I attached to this root a four-teeth bridge, which extended to the first permanent bicuspid. This was done six years ago. Dr. Herrick in this case asked me how long I thought it would last, and I replied that I did not know whether I would live long enough to answer that question. That case today is in as good condition as it has ever been, and the patient has never had a particle of trouble with the bridge.

I believe I have answered all the questions that have been asked, and in closing, I wish to thank the members of this society for the kind treatment and reception accorded me.

The President then announced as the next paper for the evening one by Dr. Robert H. Ivy, Philadelphia, entitled "Clinical Pathology in Its Relations to Dental and Oral Conditions."

[This paper is printed in full at page 398 of the present isue of the Cosmos.]

Discussion.

Dr. Edward C. Kirk. I do not think that this very interesting topic should go by without some comment. I am very glad indeed that Dr. Ivy has brought the subject before us this evening, for it is one of those that we should know about and should take advantage of in a practical way. The tendency in the past has been too much, I think, to regard dentistry as purely a mechanical handicraft, and to concern ourselves too largely with that aspect. Dentistry is making progress inevitably along lines of larger development of our knowledge with reference to what may be called the biological side. No one would question, for example, in considering the first paper of this evening, the mechanical perfection of the device which Dr. Greenfield uses for restoring the lost tooth-root, that it is sufficiently strong, sufficiently resistant, of correct form, etc., but the problem that concerns us most in that connection is not these mechanical factors, but rather, What will nature, the tissues, do with this mechanical device? Its utility is determined not by the question of whether the crib or the attachment between the crown and the bridge is strong enough, but by what the tissues will do with it. That is the vital question. The mechanical, the restorative side has been worked out almost to the point where there is little opportunity left for larger improvement along these lines, so for that reason, among others, we must give our attention to the other aspect of the question. Therefore I am glad our attention has been drawn to it.

I wish to make a few practical applications of what Dr. Ivy has called attention to. I read a paper on arthritism—the exact title of which I have forgotten—before the National Dental Association at its Birmingham meeting some years ago,* and in that paper I reported a case of infection of the lower jaw that originated about the central lower incisor. The dentist who treated the case had diagnosed it as one of ordinary dento-alveolar abscess. A little abscess broke out just over the apical region of the lower incisor, and the dentist drilled into the pulp chamber of that tooth upon the assumption that it was an abscess due to putrescent pulp, but to his surprise he found a vital pulp; then thinking that he was mistaken as to the particular tooth affected, he drilled into the other lower incisor, and found that this also contained a vital pulp. He then began to make some inquiry, and found that what he was dealing with was one of those peculiar cases called by Dr. D. D. Smith pericemental abscess—abscess upon a tooth with a living pulp, and that the adjoining teeth were becoming loose very rapidly. I asked this man if he was in good health, and he said, "Yes, generally speaking," but that he had had a little sugar and a little albumin in his urine, off and on for several years. I felt that the diabetic condition gave the case a grave aspect, and told the patient and his wife that I considered the case serious so far as this particular infection was concerned, because we know very well that resistance to infection by pyogenic bacteria is greatly reduced in diabetes mellitus. I advised him to go to the hospital and avail himself of the services of two competent men, one to look after his nutritional condition and the other the oral condition. After considerable persuasion he agreed to do so. Dr. Cryer took charge of the surgical aspect of the case, Dr. Edsall of the nutritional side, and a careful record was kept of what was taking place, which included making examinations of the blood and testing the opsonic index regularly. This patient, however, went from bad to worse, and in less than two weeks he died. Dr. Cryer will remember the case and how rapid was the spread of that infection to the periosteum of the mandible up to and including the temporo-mandibular articulation, and down the neck to the arm. But what Dr. Cryer in particular and all of us were interested in was the absolute synchronism between the rise and fall of the sugar contents, the opsonic index, and the flow of pus; the resistance to infection of pus germs was synchronous with the elimination of sugar by the urine. I believe that this patient died from pyorrhea alveolaris, because, on account of the internal resistance to infection being lowered, the pus spread from that single point of local pericemental infection and involved the whole alveolar border, resulting in the loss of teeth in the lower jaw, and involving the periosteum of the mandible, etc. So if this was not pyorrhea, what was it?

Now, this is the practical application of this case history: Had it not been known that the diabetic individual is particularly liable to pus, and this particular patient had not been therefore warned of the seriousness of his infection, or supposing he had gotten no farther than the dentist, or the family physician, and the case had not been successfully diagnosed because we had not this knowledge of the fact of the lowered resistance involved, it is entirely possible that his wife might have felt that the dentist, by drilling into these pulp chambers, or by the use of instruments not properly sterilized, had infected the tooth with some particularly virulent germ, and would have blamed the dentist for the fatal result that followed. This is not an overdrawn picture, because this particular case has happened in my own knowledge. Insurance against that kind of calamity, which results from ignorance of the situation, is to be furnished by the help which the laboratory of clinical pathology offers to the practitioner. So often,

* [See "The Dental Relationships of Arthritism," DENTAL COSMOS for July 1909, vol. li, p. 793.]

when papers of this kind are read, the attitude of the audience is—"Oh well, what is all that to us? We do not have the time to do that sort of thing." That is doubtless true, but granting that, we cannot afford to neglect the time and study necessary to find out the possibilities of such help. That is to say, we must recognize the possibility of helpfulness from the expert along these lines, and we should utilize his abilities, if only as a means of protection in practice as well as of benefit to the patient. I have had a number of instances which have convinced me that it is quite possible, through a careful study of the mouth secretions, the urine, and the blood with reference to certain pathological conditions, to get at the inception of the nutritional fault, and be able to detect the particular pathological difficulty back of the local lesion, long before the patient is so ill that he feels it necessary to engage the services of the physician. I believe the dentists who awaken to the possibilities before them along that line will be the ones who will be the advance guard in the diagnosis of important bodily diseases, and be able to refer their cases to physicians for treatment in time to prevent illnesses and to save life in many instances.

Dr. Ivy (closing the discussion). I have nothing further to add in closing, except to thank the society for their kind invitation, and for listening so courteously to a paper which is a little out of our general line of work.

The meeting then adjourned.

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EDITORIAL DEPARTMENT.

THE NEXT STEP.

IN closing his paper read before the Chicago Dental Society, in Chicago, January 31st, Dr. Charles H. Mayo, the eminent surgeon of Rochester, Minnesota, said: "It is evident that the next great step in medical progress in the line of preventive medicine should be made by the dentists. The question is, Will they do it?" On a former occasion—to wit, in December 1905—we called attention to another important pronunciamento emanating from an authoritative medical source, namely, the address delivered by Sir William Osler at the Royal Dental Hospital, London, October 13, 1905, upon which occasion he called attention to the important position which dentistry as a scientific profession was called upon to exercise in relation to public health matters by the relief of suffering, the improvement of the digestive capacity of the public, and the beautification of the race. The address made certain practical suggestions for the promotion of the propaganda of dental service as a public health measure.

Attention was editorially directed to Professor Osler's address at the time, for the reason that it had received much attention by the lay press as well as the medical, both in Europe and in this country, the interesting feature of the whole matter being that while the substance of the address and its contentions were matters quite familiar to the dental profession in all countries, and while much had been written thereon for dental professional consumption, but little advance had been made in the way of attracting the attention of medical men and the lay public to the importance of the care of the teeth and of mouth hygiene until the facts were re-stated by the eminent medical authority just mentioned. While many influences and activities since that time have helped to bring about the more general recognition of the importance of the care of the mouth and its contained organs, it may be safely stated that no single influence up to that time accomplished so much in the way of directing public attention to dental affairs as did the address of Dr. Osler above referred to. The reasons for the widely aroused interest that was expressed in his statements at the time need not be here rehearsed, as they were gone over in the editorial pages of this magazine in December 1905.

An analogous situation is apparently created by the statement made by Dr. Mayo, quoted at the beginning of this article. When an authority of such eminence makes, as the result of his deliberate judgment, the statement that "The next great step in medical progress in the line of preventive medicine should be made by the dentists," we have as clear a recognition as could be desired, from as high medical authority as exists anywhere, of the opportunity presented to those whose life-work is the study and care of the mouth; and in his appended inquiry, "Will they do it?" we have the implied recognition of the equivalent responsibility which this great opportunity involves. The main difference between the situation which is created by the statement of Dr. Mayo as compared with that created by the statement of Sir William Osler is that in the latter instance the response has materialized in a practical recognition by the public and the medical profession of the possibilities of dentistry, and growing out of this recognition has now come the demand that the dentists shall do something commensurate with their opportunity.

For centuries, much—indeed, practically all—of dental service in a prophylactic direction has been to preach and to put into practice the axiom that "Clean teeth will not decay." We have at last come to realize that the ancient axiom is subject to certain qualifications—that it is only relatively and not absolutely true, and that the prophylactic idea in its broader conception must deal not only with local diseased conditions, but must deal with the problems of general bodily health; that mouth sanitation, the integrity of the dental and oral tissues, is intimately related with the more complex problems of bodily nutrition, and that prophylaxis, in order to be broadly used as a principle in safeguarding the bodily health through the integrity of the mouth and its contained organs, must be so expanded in its conception and application as to embrace a scientific understanding and adjustment of the whole nutritional process. Each progressive step that has been thus far taken toward the scientific protection of the dental apparatus from the destructive effects of disease has been attained only through the larger conception of the underlying principles of nutrition and the scientific study of those factors which tend to disturb normal nutrition both locally and generally. It is through just such lines of investigation and only by means of such studies that we can hope to affirmatively answer the as yet unanswered question of Dr. Mayo—"Will the dentists do it?"

Much valuable preliminary work has already been done, but much more remains to be accomplished. The realization of the necessity for additional research into the various causes of tooth destruction is manifested not only by the frequent reports of scientific studies of the caries problem in its various aspects, but most encouraging of all is the demand which comes from the dental profession at large for more light of an original character upon these questions. The creation of a National Dental Scientific Foundation Fund for the prosecution of original dental research under the auspices of our National Dental Association, with the activities of the committee in charge in arranging the preliminary phases of the work, and above all the activity of the committee in securing benefactions to meet the expense incident to the research work involved, presents a condition of the utmost hopefulness that the forward step indicated by Dr. Mayo will undoubtedly be taken by the dental profession. We shall in a succeeding issue present the purpose and plan of the National Dental Scientific

Fund for the information of our readers, in the belief that the importance of this great work will arouse a sympathetic and liberal response to the appeal which the National committee makes for support by the dental profession at large.

BIBLIOGRAPHICAL.

DISEASES OF THE MOUTH. For Physicians, Dentists, and Medical and Dental Students. By Prof. Dr. F. ZINSSER, Director Dep't Dermatology, City Hospital, Lindenburg; Dozent, Academy for Practical Medicine, Cologne. Translated and Edited by JOHN BETHUNE STEIN, M.D., Prof. of Physiology, New York College of Dentistry; Late Instructor in Genito-Urinary Diseases, College of Physicians and Surgeons, New York City. Pp. 269, with 52 colored and 21 black-and-white illustrations. New York: Rebman Co., 1912.

While this book is entitled "Diseases of the Mouth," it deals exclusively with syphilis in its oral manifestations and their differential diagnosis from other conditions liable to be confused with them. There is a short account of syphilis in general, but by far the greater portion of the work is taken up by colored plates showing practically all the lesions of the different stages of the disease as it may occur in the mouth, together with a few illustrating follicular tonsillitis, Vincent's angina, herpes labialis, aphthæ, carcinoma, and other conditions. There are also several black-and-white illustrations of casts showing Hutchinson teeth and other dental hypoplastic defects attributed to hereditary syphilis. Finally, the various forms of spirochætæ found in the mouth, as well as the treponema pallidum, are shown.

The chronological chart at the end of the book would indicate that calcification of the teeth begins earlier and occupies a shorter time than has been generally accepted in the past. Whether this applies both to dentin and to enamel or to dentin only is not clearly stated in the book. If the view be true that calcification of the crowns of the permanent incisors, canines, and first molars is complete before the end of the first year of extra-uterine life, then it follows of necessity that hereditary syphilis is practically the only cause of developmental defects in these teeth, since it is the only disease commonly causing severe nutritional disturbance thus early in life. While it is very likely that the dentin is fully calcified by this age, yet there is good authority for holding that the hardening of the enamel goes on up to the time of the eruption of the teeth—viz, six years of age and upward. Therefore the teeth mentioned may all show hypoplasia of the enamel due to exanthemata and other diseases causing nutritional disturbances within the first six or seven years of life.

The translator and editor has performed his task in an able manner, but shows here and there a leaning toward foreign words where English would be better understood by the average reader. The word *moulage,* for example, if not recognized as French, might puzzle many not familiar with the language as to what dictionary to consult in order to translate the term into the equivalent English designation—"cast."

The colored plates form probably the finest collection illustrating these particular lesions ever assembled under one cover, for which reason, if for no other, the work is most valuable; and it should be as useful to the student or practitioner as a study of the living subject—at least so far as visual examination is concerned.

R. H. I.

Review of Current Dental Literature.

[*Deutsche Zahnaerztliche Wochenschrift,* Berlin, November 2, 1912.]

THE USE OF ROOT-CAPS WITH CAST PLUGS. By Professor Chr. Bruhn, Duesseldorf.

In order to avoid the perforation of root-canals, which frequently occurs in an effort to enlarge them for the reception of a pivot, the writer prepares the root in the same way as for a cap and pivot; then the pulp chamber is widened, imparting to the chamber a round shape in single-rooted teeth, oval in bicuspids, square in molars. The diameter of this chamber is about the same throughout its extent. The roof of the cap, which has been made in the usual way, is then perforated so as to correspond exactly to the enlarged chamber. While the cap is in place on the root, softened modeling compound is pressed through the aperture in the roof of the cap, the compound is cooled with cold water from a syringe, and the cap and the plug formed by the compound are removed together. A plaster model of the chamber can then be made, the modeling compound is removed, the plaster chamber is oiled, and the plug is modeled in wax that is pressed through the apertures in the cap on the plaster model. The cap and plug are then invested, and the plug is cast in gold. (In our opinion, this operation can be greatly simplified by modeling the plug while the cap is on the root in the mouth, as there is little danger of distortion of the wax in removing the plug and cap from the tooth.) The cap is held by such a plug more firmly than by a pivot, and is of special advantage in teeth with small diameter, as in lower incisors, and in those with strongly curved roots. The retention of the plug can be enhanced by a groove cut in it.

[*Lancet,* London, October 26, 1912.]

INDUSTRIAL MERCURIAL POISONING AS SEEN IN FELT-HAT MAKERS. By F. E. Tylecote, M.D.

The association of chronic mercurial poisoning with the carroting process carried out by hatters' furriers has long been known, and as a result many methods of dressing the skins have been suggested as alternatives to the process of carroting, or brushing the fur with a solution of acid nitrate of mercury, but all the suggestions have so far proved useless in practice, or have not had a fair trial, and carroting is still the favorite method of preparation. It is, however, not so much the writer's intention to deal with mercurial poisoning as it occurs in furriers, but as it is met with in felt-hat makers themselves. In America the work of Dr. Lloyd and in Austria that of Dr. Teleky have brought this vocational disease into prominence, while in England it has been only scantily referred to in the literature.

In Tylecote's exhaustive treatise, the chapter relating to the mouth and alimentary canal is of special interest to the dentist.

In all cases of mercurial poisoning, whether acute or chronic, special attention has to be paid to the mouth, for it is here that some of the most distinctive and diagnostic signs are seen. To those accustomed to cases of chronic mercurialism some of these signs are quite diagnostic, but others may entirely miss their significance. The profuse salivation of acute mercurialism is hardly ever seen, neither does ulcerative stomatitis occur, but slight increase of saliva is the rule. The tongue is large, flabby, silvery or dove-colored, with indented edges. The teeth are blackened, especially near the crowns, and the front teeth more markedly so than those farther back. Caries is not often seen, and the process is rather one of erosion. The black, eroded teeth are seen in their most typical form in the furriers, and next in the plankers, so it is a reasonable assumption that the acid fumes play an important part in the causation of this condition. The teeth often show a considerable amount of tartar. Some degree of pyorrhea alveolaris is common, and pus and blood may often be squeezed out of the sockets. The gums then become retracted, and soon the teeth become loose and may fall out. Dr. Legge has shown that they often fall in a definite order, the upper molars first. The mouth-changes as a whole are more marked in inveterate smokers, and most of all in tobacco-chewers. Vomiting was complained of in three cases, as a rule at night after work was over, but in two cases occasionally in the morning also. Diarrhea was not a usual symptom.

The appearance of the gum margin recalls the blue line in lead poisoning, though the gum, apart from the margin, may be quite pale. There is not a blue line in the proper sense of the term, *i.e.* there is no line of granules; but there is often a cyanosed edge to the gum, which at a casual glance can be taken for a blue line. It is an almost uniform line, a purplish blue, not a "lead" blue. Tylecote makes a plea for greater care in the diagnosing of a lead blue line, as, in his opinion, it is far too lightly diagnosed. Any line, or even any blue line, is not a typical lead blue line any more than any spot is a typhoid spot; but to listen to evidence in a county court on occasion one feels that some, at any rate, give to it a much broader definition than others. In some cases there was slight edema of the fauces and palate. The margin of the gum may be swollen.

The question of an odor must be mentioned. In acute mercurialism one has only to have smelled it once to be able to diagnose a case from it again at some distance. This is not so in chronic mercurialism, but there is a curious odor, definite, though not easy to describe, and not very pungent, but fairly lasting, so that it can be detected after the patient has left the room. Some would call it a metallic odor; it emanates from the body as a whole, and is not localized, as is the case in acute mercurialism. Some of the patients complained of a bad taste in their mouths, but none of them described it as metallic. Anorexia was mentioned as a symptom by two.

One case was quite different from the rest. Here a blower of twenty-five years' service suddenly had an acute attack, which from the after-history was apparently mercurialism; he had profuse salivation, diarrhea, and bloody stools; when his condition improved, he went back to work, but in a week tremors began. Yet he had worked all those years with no signs at all. This is the only case observed by Tylecote.

[*Deutsche Zahnaerztliche Wochenschrift*, Berlin, October 26, 1912.]

UNTOWARD SECONDARY EFFECTS FOLLOWING THE APPLICATION OF ARSENOUS OXID, AND THEIR PREVENTION. By Dr. M. Lipschitz, Berlin.

The dangers which inhere in the careless application of arsenous oxid for the devitalization of the dental pulp are the following: Pericementitis, necrosis of the interdental papilla, necrosis of the alveolar septum, osteitis and necrosis of larger bony portions, and general intoxication, and Lipschitz cites very interesting cases from practice as examples of each one of these possible accidents. All of these can be prevented by the use of a minimal quantity of the drug, by hermetically sealing it in the cavity with a dense reliable cement, and by avoiding the mixing of the drug with the obturating material. In regard to the therapeutic treatment, the writer advises, in cases of mild pericementitis, to wait for from two to three days after extirpation of the pulp, when the pain usually disappears. In severe pericementitis, an antiseptic cotton dressing is inserted under temporary stopping, and the permanent filling is inserted about a week afterward. If the interdental papilla is necrosed, all necrotic portions are carefully removed with a bistoury or sharp spoon, when healing generally occurs after a few days. Witzel recommends touching the necrotic portions with iron chlorid. If the alveolar septum is affected, the part is removed with the bur, or, if pus and a sequestrum have already been formed, the sequestrum is removed, and the wound treated like any other. In cases of general intoxication, a medical man is to be called. In the meantime, unless the antidote, an emetic, or the stomach pump are at hand, albumin or milk are to be administered. As antidote, the ferric hydroxid with magnesium oxid of the U. S. Pharmacopeia is recommended, which is to be made freshly, and is given in doses of from one to two tablespoonfuls every few minutes, later on every hour.

[*Lancet*, London, November 16, 1912.]

NITROUS OXID AND OXYGEN AS AN ANESTHETIC FOR DENTAL AND SURGICAL PURPOSES. BY MR. W. GUY AND DR. J. S. ROSS.

The advantages claimed by the authors for the mixture of nitrous oxid and oxygen are: (1) That it produces an anesthesia most closely resembling physiological sleep; (2) that it produces the least disturbance of respiration, circulation, and alimentation, and (3) that it involves of itself the least risk of life. Heretofore, they claim, the disadvantages which attached to the apparatus and the methods of administration had discouraged the ordinary practitioner from employing the mixture. The general and extended use of this valuable anesthetic depended on the adoption of a simple and inexpensive method which enabled the anesthetist to control with some degree of accuracy the percentage of oxygen in the mixture, and by allowing re-breathing of the bagful of gas and oxygen for definite periods gave economy of consumption with the advantages attendant upon conservation of CO_2 and a moderate rise in the CO_2 content in the blood. Henderson might or might not be right in stating that a deficiency of CO_2 in the blood was a common cause of syncope and shock under ether and chloroform. It would, however, be admitted that this gas was the stimulant of the respiratory center, and that the alternate cessation of respiration attendant on the administration of nitrous oxid through valves was as much acapnic as anoxyemic. While conservation of carbonic acid was to be desired, oxygen starvation must be avoided. According to Starling and his co-workers, Kaya and Jerusalem, excess of CO_2 acted, so far as the nervous system was concerned, upon the medullary centers only, and mainly upon the respiratory center, of which it was the natural stimulant. It was also a cardiac stimulant until the percentage of CO_2 in the air respired rose to 12 per cent. when it began to have a depressant action. Lack of oxygen was a much more serious matter, and affected the whole nervous system, especially the spinal and vaso-motor centers, causing a rapid rise in blood-pressure, and eventually convulsion. The heart, depressed from the first, was rapidly overcome by the rising peripheral resistance. It was thus apparent that, with a method providing for a sufficient supply of oxygen under due control, the pressure of a slight excess of CO_2 in the air respired might be regarded with equanimity. They felt themselves, therefore, on firm ground in adopting the re-breathing principle. In America much important work and research bearing on the administration of gas and oxygen had been carried on, and the mixture had been extensively and successfully employed. The importance of re-breathing had been generally recognized by American anesthetists. The apparatus employed might be described as a lineal descendant of the Guy "gas and ethyl chlorid" inhaler. The facepiece, Barth 3-way tap, and bag mount with the side tube for ethyl chlorid were the same, but instead of the one-gallon bag, a two-gallon bag was used, the distal end of which carried a Y-union. One limb of the Y was connected directly by rubber tubing to the nitrous oxid cylinder. To the other limb was attached a ball syringe, the bulb of which was of two-ounce capacity. At each end of the bulb was a rubber valve, so that squeezing the bulb propelled its contents into the two-gallon gas bag. The distal end of the ball syringe was connected to a one-gallon bag fixed in front of the oxygen cylinder, with which it was connected by a metal tube. A portable fan was also shown. For use, the one-gallon bag was filled with oxygen, and the two-gallon bag moderately distended with nitrous oxid. The facepiece having been adapted to the face, re-breathing was commenced with the two-gallon bag. At the end of fifteen to twenty seconds the patient required some oxygen, and four ounces were supplied to him by two squeezes of the bulb. Further known quantities of oxygen were supplied at such intervals as were indicated by the complexion, care being taken to steer between the two extremes of rosiness and cyanosis. Usually, about four ounces were required every fifteen or twenty seconds, until from six to ten ounces had been given in all; this sufficed for the 110 to 120 seconds required to induce anesthesia for a dental case—*i.e.* extraction of two or three easy teeth. If a more lasting anesthesia were required, from 1 to 3 cc. of ethyl chlorid were run in at the end of from 25 to 40 seconds, and the mixture was re-breathed for another thirty seconds, when anesthesia lasting for from 70 to 100 seconds resulted. If longer anesthesia were required, after the mask was removed the Clover inhaler was inserted, and a little ether given with the gas and oxygen. This system had been in daily use at the dental hospital for five months, and 800 cases had been so anesthetized. The results were very much better than with gas, or with gas and ethyl chlorid unmixed with oxygen. There was a striking absence of crowing respiration, and of cyanosis or excitement. The addition of measured quantities of oxygen may make the difference between slight risk and perfect safety. The average quantity of gas used is from 2 to 3 gallons, and of oxygen from 6 to 12 ounces.

Dr. Ross said that the method was applicable for minor surgery, but at the end of each two minutes or so, the bag must be emptied out to get rid of CO_2 by placing the valve at the intermediate position. When the bag was nearly empty, a fresh supply of gases was run in. The amount of oxygen required to keep a good color rose steadily with the first few bagfuls, until a point was finally reached when about forty ounces of oxygen were being given on each new bagful, and another 10 to 20 ounces were gradually introduced during the following two minutes. This gave a percentage of about 12, and corresponded with the figures arrived at by Hewitt in his experiments with a gasometer. For major surgery, nitrous oxid had many valid claims to be ranked above ether. It did not irritate the mucous membrane or excretory glands, produced no anemia and no reduction in the phagocytic power of the blood, did not damage the central nerve cells, while ether did all of these in varying degrees. Above all other questions was that of the prevention of shock, and here Crile's results showed that nitrous oxid was from three to four times more powerful than its rival. Nitrous oxid and oxygen of themselves might give too light an anesthesia for abdominal work; it could be helped by the preliminary administration of quite a small dose of morphin and atropin, and by giving a little ether by the drop method to help the induction stage, after which it was possible to maintain anesthesia for an almost indefinite time by the gases alone. Proceeding by this plan, abdominal section became quite a feasible operation in a large group of cases. A number of cases could be quoted where the patients had recovered from grave conditions with a rapidity and a certainty that could not have been expected had ether been given throughout the operation. The list of surgical cases included gastro-enterostomies, hernias, extensive breast operations, amputations, goiters, etc. His youngest patient was 2¼, and the oldest 69 years. The longest period during which the gases were given was 75 minutes on two occasions. Both of these patients awoke in a few minutes perfectly fresh.

[*Boston Medical and Surgical Journal*, Boston, February 13, 1913.]

PERSISTENT MOUTH-BREATHING FOLLOWING ADENOIDECTOMIES. By Dr. I. Sobotky.

In his inquiry why there are so many failures after adenoidectomies, and what can be done to facilitate nasal breathing, the writer comes to the following conclusions:

For the cure of persistent mouth-breathing, the nasal breathing exercises have not proved efficient. An operative treatment of the nasal condition is indicated, which treatment must be appropriate for the age of the patient. Patients should have the adenoid removed before the typical high palatal arch is formed. If this high arch is formed, the treatment should be dental, such as spreading the arch and regulating the teeth. Cutting a slice of mucous membrane from the enlarged lower turbinates, as an aid to nasal respiration, has given good results. A submucous resection should not be made in children under sixteen. Electrolysis, using the bipolar method, is effective in reducing the enlarged turbinates, but is not suited for children.

[*Dental Surgeon*, London, November 16, 1912.]

A METHOD OF GIVING NITROUS OXID WITH THE ADDITION OF ETHER IN MINOR SURGERY. By J. K. Pedley.

Having witnessed the very painful recovery from nitrous oxid administered for the opening up of a whitlow, and having once had a similar experience himself, the author recommends the following method of administering nitrous oxid and ether. The mention of ether is sufficient to call up a vision of violent emesis; administered, however, as an addition to nitrous oxid in the following manner, it will be found exceptional that the patient becomes sick. The nitrous-oxid anesthesia is conducted in the usual way, but after the inhalation of the first bag of gas, which is, of course, refilled, the ether is turned on fairly quickly until the indicator stands at full ether. On the commencement of stertor, the anesthetic is withheld. This will produce an anesthesia of about twice the length of anesthesia by nitrous oxid alone. If a longer anesthesia than this is required, air is given from time to time. No to-and-fro breathing takes place at any time during the administration. The difference in the feelings of the patient on recovery from a short though painful operation under this anesthetic mixture as compared with anesthesia by nitrous oxid alone has to be experienced to be fully appreciated.

[*Beitraege zur Klinischen Chirurgie*, Berlin, 1912, vol. 76, No. 3.]

A CASE OF DEATH UNDER NITROUS OXID AND OXYGEN. By Dr. John Olow.

The patient, a very stout man of fifty-three, exhibiting unmistakable symptoms of emphysema and coronary sclerosis, was given 0.01 cc. of morphin hypodermically half an hour before the operation. As usual, a high percentage of nitrous oxid was administered at the beginning of the anesthesia, followed by a gradually increasing percentage of oxygen. The patient became suddenly cyanosed, and, although pure oxygen was at once turned on, ceased to breathe; a slight twitching of his legs was observed. After another thirty seconds, pronounced pallor ensued, despite artificial respiration and ether hypodermically, and the heart-beat could no longer be perceived. The air could not be made to pass properly through the nose and mouth, although the tongue was held well forward, and no obstacle to respiration could be detected. The post-mortem showed luetic aortitis, secondary hypertrophy of the heart, sclerosis of the coronary arteries, and degeneration of the heart muscle.

The author attributes the asphyxia to the narrowing of the oro-pharyngeal aperture ensuing upon the light cyanosis occurring during nitrous oxid anesthesia, and giving rise to impeded respiration, especially through the mouth, which, as Threwby has pointed out, occurs mostly in cases of large and flabby tongue.

In the case described, the short asphyxia sufficed to produce symptoms of heart collapse. In similar cases, a quickly instituted tracheotomy might save the patient's life.

Periscope.

High-pressure Hypodermic Needle Packing.—Waxed floss silk wrapped around a shortened hypodermic needle used for a high-pressure anesthesia makes an absolutely tight joint.—W. H. Craft, *Dental Brief.*

Preventing Nausea in Taking the Impression for a Denture.—In sensitive patients an impression can be taken without causing nausea, if the palate is first touched with spirit of camphor.—*Archiv fuer Zahnheilkunde.*

High-frequency Currents in Trigeminal Neuralgia.—W. F. Sommerville reports the successful result of the use of these currents in a case of very resistant trigeminal neuralgia which had not been improved by any other form of treatment.—*New York Med. Journal.*

Etching Gold Inlays to Obtain Better Cement Adhesion.—The part of the inlay to which the cement is to adhere is dipped in mercury, the surface being evenly coated by using a moist piece of cotton and spreading the mercury around. When this has been accomplished, the inlay is inverted over an alcohol flame and the mercury is slowly driven off, leaving a rough surface for the cement to adhere to.—R. I. Lewis, *Dental Review.*

Wax Inlays.—It appears to be a very common practice to suck out wax inlays, by the mouth, before investing to cast. Such a procedure is certainly inviting infection, particularly tubercular infection. To obviate any possible danger, a motor horn, the bulb of an enema syringe, or suchlike, can be conveniently attached to the wax absorber, and will produce the same result without any risk of infection.—H. C. Moxham, *Commonwealth Dental Review.*

Use of Paraldehyd as an Intravenous Anesthetic.—Starting at first with extremely small doses, 4 cc. of the pure drug were injected by the writer into the median basilic vein. Almost before the syringe was empty, the patient was unconscious; he slept naturally for about two hours. Subsequently 8 cc. were injected, with satisfactory results. It was found, however, that the pure drug caused a certain amount of local discomfort and coughing, and it was therefore diluted with saline to form a 10 per cent. solution. 100 cc. of this solution produced in about forty seconds an anesthesia lasting about twenty minutes, and suitable for minor surgical procedures. Paraldehyd, while acting temporarily as an anesthetic, has a prolonged hypnotic effect, considerably reducing the amount of ether subsequently required. Being volatile, it is rapidly excreted by the lungs, an important element in the safety of the drug, an advantage which cannot be claimed for hedonal.—H. L. C. Noel, *Lancet.*

Repair of Vulcanite Dentures.—Time may be saved by fixing two pieces in proper relation, and then making a modeling compound model; the latter having hardened, the pieces of the denture are removed and the undercuts are prepared for repair, the pieces replaced on the model, and wax is flowed in to take the place of the rubber which has been cut away. The wax having been smoothed, it is only necessary to flask and proceed as usual.—*Dental Record.*

Vaccine or Ionization in Pyorrhea.—An autogenous vaccine will undoubtedly produce good results in all forms of pyorrhea, and will temporarily raise the resistance of tissues to reinfection. But the vaccine often takes some time to prepare, especially when the trouble is due to a mixed infection. Ionization with chlorid of zinc is available for every case without any delay. The zinc ions take the place of an autogenous vaccine, and destroy all bacteria, thereby permitting nature to restore the normal resistance of the tissues.—R. F. Reading, *Commonwealth Dental Review.*

Removing Gum Tissue with Trichloracetic Acid.—To remove gum tissue projecting into a carious cavity, trichloracetic acid is applied on a small pellet of cotton, and in a few minutes the gum can easily be removed with a spoon excavator. This acid can also be used for gum tissue overlying a third molar when badly inflamed, instead of lancing the gums or trying to remove this tissue with the scissors. It is applied on cotton wound around a root-canal plugger, protecting the tongue and cheeks from the action of the acid with absorbent cotton rolls.—M. M. Brown, *Dental Summary.*

Removing Deposits from German Silver Appliances.—Regulating appliances of German silver can be freed of deposits and discoloration by ordinary pure hydrochloric acid applied cold. The cleaned appliances are immersed in a solution of sodium bicarbonate.—*Archiv fuer Zahnheilkunde.*

Drying Root-canals.—The important process of drying a root-canal following the extirpation of a pulp can be accomplished—as well as it can be done at all—by applying alcohol of three successive strengths, viz, fifty, seventy, and one hundred per cent., and drying with hot air after each application. —*Archiv fuer Zahnheilkunde.*

Removing Platinum Matrices for Porcelain Inlays.—It is often difficult to remove the platinum foil matrix from the cavity without distortion. To prevent this, the platinum foil is allowed slightly to overlap the cavity margins. Over it, a piece of heavy lead foil is burnished to fit approximately. The platinum foil will stick to the lead foil during removal from the cavity, and can subsequently be easily separated.—*Les Annales Dentaires.*

Allocain in Local Anesthesia.—Although we have in novocain an almost ideal local anesthetic, it is a matter of fairness to mention the more prominent of the innumerable local anesthetics which have recently flooded the market. Allocain is composed of novocain, alypin, synthetic suprarenin, and traces of thymol. By the mixture of novocain and alypin a more rapid anesthetic action is intended. Clinical experience has shown that in extractions, for instance, complete anesthesia was established in three minutes in the maxilla, and in five minutes in the mandible.—*Zeitschrift fuer Zahnheilkunde.*

Amalgam Dies for Gold or Porcelain Inlays.—An impression of the prepared cavity is taken with a stick of impression material, cut off in a small piece. A small amount of plaster of Paris is mixed and built up in a little heap. Into this, the impression is pushed with the mold uppermost, making a little wall around it. When the plaster is hard and trimmed, it forms a small cup. Into this a sufficient amount of softly mixed amalgam is then carefully packed. When the amalgam is hard, the plaster and impression are removed, leaving a very clear die, from which the inlay can be formed either by making a wax model for a gold inlay or by burnishing a platinum matrix for a porcelain inlay.—G. D. Sitherwood, *Dental Review.*

Vaselin as a Separator in Plaster Casting.—When a model from a plaster impression is needed in a hurry, the impression is coated with vaselin by rubbing it on the impression with a lock of cotton and carefully wiping off the surplus. This fills the pores of the plaster, and is absolutely impervious to moisture, therefore there is no adhesion. It is not advisable for general use, as to some extent it is liable to fill the fine lines of the impression. It is excellent for use on a model when casting on it an articulating model, and also when flasking for a vulcanite denture.—W. H. Craft, *Dental Brief.*

Disinfection of the Oral Cavity.—The authors recommend a one per cent. solution of oleate of soda, viz, soap, heated to 45° C. To counteract the disagreeable taste, the mouth is subsequently rinsed with a five per cent. solution of potassium chlorate. Investigation has shown that by this disinfection the microbic contents are reduced to one per cent., returning to the original only after twenty-four hours. By repeated rinsing the bacterial flora are reduced and modified. Leptothrix and spirilla are diminished in number, and pneumococcus disappear. The mucosa resumes its normal state, and the breath becomes clean; at the same time, dental caries is arrested.—Pane and d'Agata, *Les Annales Dentaires.*

Rheumatic Fever, and the Relation of Oral Sepsis to Its Cause and Cure.—(1) Rheumatic fever is an acute or attenuated general infection accompanied by toxemia, auto-intoxication, chorea, high blood pressure (51), anemia, carditis, and arthritis. (2) The micro-organism and its toxin most concerned in the stimulation of the particular symptoms evidenced in rheumatic fever is the *diplococcus rheumaticus*, of the streptococcus family. (3) The portal of entry for the infection is the oral cavity. (4) Oral sepsis plays a direct part in the causation of rheumatic fever by supplying the necessary conditions and ingredients for the absorption, via the gastro-intestinal tract, of the factors concerned in the excitation of the symptoms exhibited. (5) Oral sepsis plays a direct part by supplying the necessary conditions also for the absorption from the mouth of the agents that induce the train of symptoms manifested in rheumatic fever. (6) The correction of the conditions contributing to oral sepsis will exert a positive and favorable influence in preventing and curing rheumatic fever.—A. M. Nodine, *Items of Interest.*

Simple Means for Polishing Fillings and Cleaning Teeth.—Around an old inverted-cone bur, while it is revolving in the engine, cotton is wound in sufficient thickness so that the bur will not cut through the cotton. This polisher is dipped in a solution of pumice and water for polishing amalgam fillings and cleaning the teeth. For polishing gold inlays and fillings, it can be dipped in prepared chalk and water.—F. SCHWARTZ, *Dental Review.*

Repair of Broken Facings on a Bridge or Crown.—A piece of regulating tubing is mounted on the shank of a bur. This tubing should just fit over the individual pins of the new facing. With carbo-powder the porcelain is cut away from around each of the pins until they fall out. The holes remaining are undercut, and the facing is ground to fit at the gingival margin and cemented over the headed pins which were left standing on the bridge or crown backing. This gives as good a fit as a Steele or any similar facing. With a headed pin thus cemented into an undercut cavity, the facing is securely held. The effect is neat; the work can be quickly done, and the backing remains unchanged in contour.—G. B. MITCHELL, *Dental Brief.*

Purifying Gold for the Casting of Gold Inlays.—Sometimes a small pit, fissure, or imperfection in the gold of a well-fitting inlay will make it necessary to repeat the operation. At times the gold will not run smoothly; this is many times caused by impurities in the gold at the time of casting.

A useful method for warding off this difficulty is to purify the gold before each casting operation. A prepared charcoal block is used, after scraping a hollow in the center and placing the gold in it. Over the gold a little powdered borax is sprinkled, and the gold melted. Then, still applying the blowpipe, a little potassium nitrate or common saltpeter is sprinkled on the molten gold. This is repeated several times, still keeping the gold boiling with the blowpipe. The ingot is allowed to cool slightly on the block, and then put in a pickle of sulfuric acid and washed, and the gold is ready for the casting operation.—R. W. CALKINS, *Dental Brief.*

Oral Sepsis and Heart Disease.—Oral sepsis has sometimes a definite association with infective disorders of the heart, and although the mere existence of the unclean mouth does not, of course, indicate any cardiac condition, yet, given the suspicion of endocarditis, the presence of a focus of infection is in a measure a confirmation. A case which recently came under notice illustrates this. The patient, a man, had been for some weeks in bed with a persistent but intermittent temperature showing an excursion of three or four degrees. No Widal test had been tried, and the diagnosis hung between enteric fever and infective endocarditis. There were no cardiac signs other than those common to all febrile conditions. The existence of a septic sinus in the mouth pointed to the greater probability of infective valvular mischief. The agglutination test subsequently proved negative, and still later an autopsy revealed a recent and destructive lesion of the aortic and mitral valves.—*Dental Surgeon.*

Tuberculosis and Dental Practice.—(1) Tubercular lesions in the oral cavity are very rare, while the pharynx and larynx are not uncommon locations. (2) The dentist should make an effort to discover the presence of such conditions and recommend his patients to the proper source for treatment, although they come to him for mechanical work only. (3) He should possess such knowledge on these subjects as to enable him to use the utmost care to prevent contagion, and to protect himself. (4) He should be able to use his mouth-mirror in the pharynx and larynx of all suspicious cases, and get a history of such cases, to be kept on record. (5) He should add his mite to the host of enthusiastic workers in the endeavor to stamp out the ravages of disease. (6) He should improve every opportunity to give the patient and the public the best there is in him, and at the same time protect himself from any unnecessary exposure to or contact with diseases liable to shorten his years of usefulness.—J. W. SHANKLAND, *Dental Summary.*

Filling Deciduous Teeth.—In deciduous teeth it is well to make an application of silver nitrate when the enamel is decalcified or caries is just beginning. This will retard the carious process, or may even stop it. But when caries has progressed far enough to permit food particles to lodge in the cavity, the application of silver nitrate will be insufficient. Time and later trouble will be prevented by filling such cavities. If, however, there are several cavities to be filled, it is wise to make an application of silver nitrate to all the cavities at each sitting as the work proceeds. These applications should be made several days before any attempt is made to prepare the cavities for the filling. The soft dentin may then be removed from one or two of the cavities, and an application of

Cocain hydrochlorate,	grs.	v
Menthol,	"	xx
Thymol,	"	xl
Phenol,	"	xl
	Ad	℥iij

or of eugenol and aristol may be made. A small pellet of cotton may be dipped into the eugenol and squeezed with a napkin, and then dipped into the aristol. Either of these applications may be left in the tooth several days before the final preparation of the cavity for the filling.—G. H. WESTHOFF, *Dental Summary.*

A Substitute for Window Crowns in Bridge Work.—Window crowns have lost some of their popularity since we have discovered that the support they lend in bridge work is very unreliable. They can be trusted to hold for a considerable time only when they are fixed upon long and nearly cylindrical teeth, such as, for instance, the lower incisors and canines, when they are standing well up out of the alveolus, as is the case in older patients. Even thus they are not always successful, especially if the band on the labial side be at all too narrow. What is to be done in those cases, occurring almost every day, in which two or more molars are absent, and one canine and a molar are required for abutments? A full crown on a canine is undesirable from the esthetic point of view; a sufficiently large inlay is hardly possible, and many patients object to the drilling and cutting away of sound tooth substance demanded by the Carmichael method. Only a root-pivot remains. If there is a cavity, the pulp should be opened from that side, the pulp removed, and then the cavity extended until sufficient space is obtained to allow of the easy introduction of a pivot in the direction the bridge will follow when it is pressed down. The whole of the posterior and, if necessary, also the approximal surfaces of the tooth should be covered with a backing soldered to the pivot.

In the case of a sound tooth, I find the backing unnecessary, and use a free-lying root pivot, thus avoiding the risk of the collection of alimentary detritus. Fractures need not be feared if the pivots are made of strong materials, such as clasp-gold or iridio-platinum.—*Deutsche Zahnärztliche Zeitung* per *Dental Record.*

Nursing versus Bottle-Feeding and Dental Irregularities.—As to the relation between nursing babies and bottle babies there is a great difference of opinion. Some claim that the nursing baby has to work harder to obtain his food than the bottle baby, and as a result of this more powerful suction, a similar condition is present to that found in cases of thumb-sucking.

In answer to this argument it may be said that there is a wide variety in the supply of milk among nursing mothers, and many babies find it very easy to obtain their meal. A similar variation is found among the bottle babies, depending on the kind of nipple used and the size of the opening. A very common nipple is one with a large, rounded extremity and rather stiff rubber to prevent collapsing. Such a nipple gives as much or more chance for extra exertion on the part of the baby than a mother's breast with a limited milk supply. In addition, the nipples are usually long and press against the roof of the mouth, similarly to the pressure obtained by sucking the thumb. The proper nipple should be straight, with an opening just large enough to allow the milk to drop steadily when the bottle is inverted. On the whole it seems that, considering the large variety of nipples for bottle-feeding and the great chance for carelessness in feeding a bottle baby, there is no more opportunity for damage to be done to the mouth than in the case of nursing babies. It is simply a question whether either method of feeding has very much to do with the formation of irregular arches and teeth.—A. C. EASTMAN, *American Orthodontist.*

Technique of Making an Accurate Matrix for Porcelain Inlays.—The following is a description of the technique of using medium weight China silk, instead of gold-beaters' skin, as suggested by Dr. Emil Schreier of Vienna, as a cradle support for gold or platinum in obtaining matrices for inlays. The silk may be regarded as an improvement over the velum, as it has greater bulk and better sustains the foil.

The foil being cut sufficiently large to cover the prepared cavity amply, is placed between a fold of silk, dipped in water, and with a wet pellet of cotton or spunk is quickly carried to the floor of the cavity. With a suitable instrument in one hand it is held firmly in position; in the other hand, with ball-pointed pliers, the metal is grasped, together with the silk, pulling and smoothing out all folds or wrinkles. Then it is packed full with wet cotton or spunk, using heavy pressure, turning all margins with a large pellet of wet spunk held in the ball-pointed pliers. It is then taken from the cavity, the silk is carefully removed, and the matrix returned for completion by again swaging with pellets of cotton or spunk, this time used dry. The operation is completed by filling with wax or gum camphor for safe removal. At the same time all margins are made perfect with a roller burnisher. The matrix is then removed and invested. When the wax has been melted or boiled out, the porcelain is introduced and baked in the usual manner. Much time can be saved, however, with a smaller number of bakings, by packing the wet porcelain into the matrix with a short, stiff camel's-hair brush, absorbing the moisture after the introduction of each layer of porcelain.—E. S. GAYLORD, *Dental Brief.*

Mixed Tumors of Salivary Glands.—Fifty-six cases of mixed tumors of the salivary glands, which were removed, are analyzed by Wilson and Willis. The sexes are almost equally divided, but with a slight preponderance of males. The age at onset in more than two-thirds of the cases is under forty years, while in one-half the cases it falls between twenty and forty years. These figures agree, on the whole, with those of other observers. The length of the period between the onset of the tumor and the time of surgical operation varies from one month to forty-four years, with a large preponderance of the cases running from one to ten years, and an average of six years and four months. The obvious lesson from this is that these tumors do not cause sufficient inconvenience to the patients to make them seek operation early. In only fourteen cases was there a history of pain. Of the twenty-one patients with tumors of the parotid who could give a definite history concerning mumps, fourteen (66 per cent.) were sure they had never had the disease. In other words, there seems to be no etiologic relationship established by the statistics of mumps and "mixed" tumors of the parotid. Of the fifty-six tumors, fifty were in the parotid and six in the submaxillary glands; thirty were on the right side and twenty-six were on the left. Grossly, the tumors may be divided into four groups: (1) Hard, fibrous masses with little cartilage and with little parenchyma—in this group were fifteen cases; (2) very hard tumors containing large cartilage masses—in this group were seventeen cases; (3) soft, more or less sarcoma-like tumors, with a relatively small amount of fibrous connective tissue and a relatively large amount of parenchyma cells—in this group were four tumors.

There is little evidence that these tumors arise from proliferating adult epithelium, or endothelium; on the other hand, there is considerable evidence to support the theory that they are mesotheliomas of embryonic origin. After fairly complete operative removal, few of the tumors recur.—*Amer. Journ. of Med. Science.*

Electroplating on Plaster.—At different periods attempts have been made to produce dental plates by an electroplating process. So far it has not proved a practical success. The deposited metal lacked the tenacity of metal cast into an ingot and rolled into plate. If it could be satisfactorily accomplished, with certainty and economy, depositing the plate directly upon the plaster model would be ideal. Processes at present in use for depositing gold upon plaster are not promising; substituting a less desirable metal for the body of the plate, and covering this with a substantial coating of gold, while theoretically promising and readily accomplished, leaves a great deal to be desired. The more accurate adaptation secured does not compensate for the loss of durability, the time consumed, and the inability of such a plate to stand laboratory manipulations. The first difficulty encountered in electroplating upon a plaster model is the porosity of the plaster. Not only does this cause a loss of plating solution, but the solution penetrating the plaster may cause its disintegration, and would make the metal surface in contact with the model quite rough. It is essential to not only thoroughly fill the pores in the mass of the model, but to give the model a smooth surface. Varnishes are not effective. Paraffin is effective but too smooth to hold the graphite or other conducting medium; beeswax, and rosin also, has too high a melting-point. About equal parts of beeswax and rosin gives satisfactory results. The plaster must be perfectly dry; a long-continued heat of about 220° F. gives a better result than a shorter time at a higher heat. The high heat is apt to distort or crack the model. After the moisture has been nearly all driven off, the heat may be increased to 300° F., so as to make it perfectly dry. Then the model is immersed in the wax and rosin heated to just its melting-point, not higher, and allowed to remain until no bubbles appear, and a little longer to make sure that it is thoroughly saturated. The model is removed, the surplus wax wiped off, and the surface is coated with a cheap furniture varnish, giving it a thin, even coat. This is allowed to dry until it is just sticky, then graphite or copper powder is applied over all the surface which it is desired to coat, and the model is allowed to dry. The surplus is dusted off with a soft brush, and the model is then ready for plating.—*Brass World*, per *Western Dental Journal.*

Investigations Concerning Surgical Methods of Treatment for Trigeminal Neuralgia.—Otto considers that the justification of the operative treatment for trigeminal neuralgia is generally recognized, but that just which operation should be done in a given case is not an easy question to decide. Neither the peripheral operations nor the resections at the base of the skull will always give permanent relief. Even the extirpation of the ganglion in many cases gives only temporary relief, probably because of incomplete operations. Only rarely do we find the seat of changes in the nerve, and the mode of origin of the neuralgia is rarely determined; nor do we know whether the neuralgia is due to functional or organic disease. As the result of his studies, Otto believes that the peripheral operations are frequently followed by recurrence. Thiersch's nerve exeresis in most cases leads to recurrence, very frequently after a few months. The condition recurs more rarely after resections at the base of the skull. Extirpation of the Gasserian ganglion gives the best results, provided the ganglion is wholly removed. The operation is, however, technically difficult, and should be reserved for otherwise hopeless cases, and especially for those in which the three branches of the ganglion are involved. Under these circumstances, one is fully justified in trying out the injection method of combating the affection. Alcohol—from 70 to 80 per cent.—is the most suitable fluid with which to inhibit the conductivity of the nerves without damaging the other tissues. The deep injection at the base of the skull suffices even in severe cases to anesthetize the regions supplied by the treated branches for months, and it can be repeated without danger. The effect usually lasts a long time, but whether a permanent cure may result remains to be proved. The Offerhaus method is favored, because it is easily performed without previous practice. It is without danger, and may be employed to obtain anesthesia for the performance of operations in the trigeminus regions.—*Mitt. a. d. Grenzgeb. d. Med. u. Chir.*, per *Amer. Journ. Med. Science.*

Hints, Queries, and Comments.

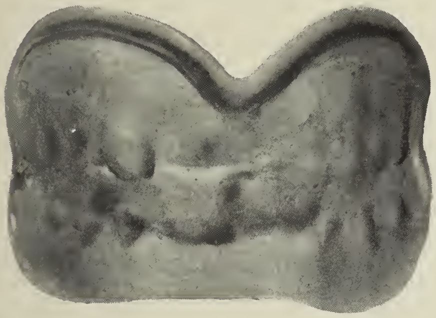
APPLIANCE FOR THE PREVENTION OF MOUTH-BREATHING.

The following describes a clinic given before the Northeastern, New Hampshire, and Vermont dental societies:

Although much is being said and written today about the evils of mouth-breathing, surprisingly little is being done to prevent it. Two methods with this object are prevalent, viz, the halter or sling, which goes under the chin and buckles at the top of the head, and the surgeon's adhesive plaster, which is applied to both lips at night, thus keeping the mouth closed. Either of these methods is very uncomfortable, and does not accomplish the end proposed.

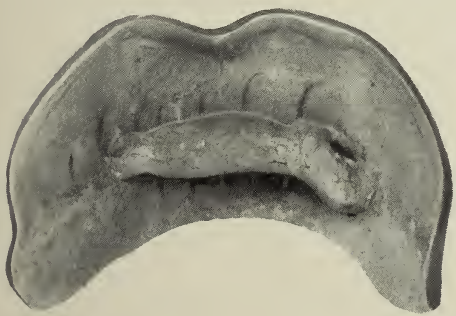
The apparatus to be described was devised by the writer three years ago, and has never failed in any of the cases where it was applied. The mode of construction is as follows: A piece of base-plate wax is cut in such a manner that it will fit into the vestibule of the oral cavity, viz, the space between the lips and the teeth. Notches are cut in the wax so as to make it fit the upper and lower frena. The wax is then slightly softened, and placed in the vestibule of the mouth. The operator then requests the patient to draw in his breath, while he manipulates the lips and face in such a way as to obtain an impression. The wax impression thus obtained is chilled, and a small piece of soft yellow wax is added to its inner surface. The patient is then requested to bite into this yellow wax to within one-eighth of one inch of his usual articulation. The upper ridge of the wax model is then reinforced with a single layer of base-plate wax, as shown in the accompanying illustration. The wax model is then invested in an ordinary vulcanite flask, with the inner surface bearing the yellow wax portion down-

FIG. 1.



ward, leaving all the outer surface of the wax model exposed. Separating fluid is applied, and the other half of the flask is poured. After the plaster is fully set, the flask is opened, the wax is washed out, both surfaces

FIG. 2.



of the mold are covered with tinfoil and soaped well.

For the bulk of the apparatus, excepting the upper ridge, Doherty's velum rubber is used, while for the reinforced ridge ordinary plate rubber is employed, in the following manner: A piece of No. 29-gage gold wire is conformed to the ridge with contouring pliers. This wire is then covered with ordinary plate rubber and set into the upper portion of the model. The flask is then closed, and the case is vulcanized at 280° F. for three hours. After cooling, no finishing will be necessary except the polishing of the hard rubber ridge.

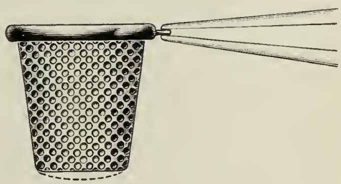
With this appliance, attrition also can be prevented, and the habit of thumb-sucking broken.*

HARMAN NEWELL, D.D.S.

Claremont, N. H.

HEATING ALCOHOL BEFORE APPLYING TO TEETH.

ONE of the most painful sensations is that following the application of cold alcohol to a cavity. This can be avoided by warming the alcohol, using the following method:



An aluminum thimble is placed in a vise and the tip is flattened out as shown by the dotted line in the drawing. This prevents it from falling over when placed on the table. The end of the rim is also flattened out at one end, forming a projection for grasping with tweezers.

The empty thimble is held over the alcohol flame for about ten seconds. It is then set on the table and a few drops of alcohol are poured into it. In a short time the alcohol is sufficiently warm to be used on a pellet of cotton for wiping out the cavity without pain.

BERNARD FISCHLER, D.D.S.

Brooklyn, N. Y.

* [A similar appliance, invented by Dr. Frank B. Darby of Elmira, N. Y., was described in COSMOS, vol. xxii, March 1890, p. 214.—ED.]

Obituary.

DR. NORMAN W. KINGSLEY.

Died, at his home, Warren Point, Bergen co., N. J., on Thursday, February 20, 1913, Dr. Norman W. Kingsley, in his eighty-fourth year.

The funeral of Dr. Norman William Kingsley, dentist, sculptor, artist, and author, and founder of the New York College of Dentistry, who died at his home, Warren Point, N. J., was held on Saturday, February 22d, from the "Little Church Around the Corner," in East Twenty-ninth st., Manhattan. Interment was in Woodlawn Cemetery.

Dr. Kingsley was the son of Nathaniel and Eliza Williams Kingsley, and was born in St. Lawrence county, New York, October 26, 1829. He was a direct descendant of one Ranulph de Kingslea, a Saxon keeper of the king's forest, in 1166, through John Kingsley, who came to America in 1634.

Receiving his early education in the Troy Academy, Dr. Kingsley, after his graduation, became a clerk in a store at Elmira, N. Y. He began his dental studies with his uncle, Dr. A. W. Kingsley of Elizabeth. Later he took a course at the Baltimore College of Dental Surgery, and in 1852 began practice in New York.

In 1853 Dr. Kingsley was awarded the highest prize for porcelain teeth at the World's Fair, held at New York, and two years later he was similarly honored in Paris. In 1859 he invented an artificial palate for aiding the speech of persons with harelip, a device that is still used. For this invention Dr. Kingsley was awarded a gold medal by the American Dental Convention at Saratoga in 1863, and later another medal was given him by the Odontographic Society of Pennsylvania.

Dr. Kingsley went in 1864 to London, where honors were bestowed upon him by various societies and by the French Academy of Medicine. In 1865 he founded the New York College of Dentistry, becoming dean of the faculty and the first professor of dental art and mechanism. He was a member of a score of dental and surgical societies of this country and Europe, and in 1881 was a member of the International Medical Congress in London.

Dr. Kingsley was the author of "A Treatise on Oral Deformities," the first text-book ever published on the scientific treatment of irregularities of the teeth.

As an artist Dr. Kingsley achieved considerable fame, principally in sculpture. His most notable work was a portrait bust of Whitelaw Reid, which was cast in bronze, and is now in the Lotos Club, New York, of which Dr. Kingsley was long a member.

In 1850 Dr. Kingsley married Miss Alma N. Shepard, who, with two daughters, survives him.

Brief Necrology.

Dr. Louis S. Berdelon of Moreauville, La., on December 23, 1912.

Dr. Elon G. Douglas of Lapeer, Mich., on January 1, 1913, in his seventy-fourth year.

Dr. Wm. G. Smith of Salisbury, Md., on January 30, 1913. Deceased was a graduate of the Pennsylvania College of Dental Surgery.

Dr. Marshall B. Dennis of Port Huron, Mich., on December 5, 1912. Deceased was a graduate of the College of Dental Surgery of the University of Michigan, and at one time member of the state board of dental examiners.

Dr. Thomas Western Pritchett of Whitehall, Ill., on January 20, 1913, in his seventy-second year. Deceased was a member, and at one time president of the Illinois State Dental Society, for several years member of the Illinois State Board of Dental Examiners, member of the Madison County District Dental Society, honorary member of the St. Louis and the Morgan County Dental Societies, and a veteran of the civil war.

Dental Legislation.

DENTAL LAW OF VERMONT (1904),

INCLUDING

Amendments of 1912.

An act to Regulate the Practice of Dentistry

Approved November 30, 1904, Together with Amendments Exacted by the General Assembly of the State of Vermont and Approved December 14, 1912.

It is hereby enacted by the General Assembly of the State of Vermont:

Section 1. The state Board of Dental Examiners shall consist of five dental practitioners of good standing, who have practiced in this state for a period of five years or more. Each member hereafter appointed shall hold office for a term of five years from and including the first day of January in the year following his appointment and until his successor is appointed, and no member shall serve for more than two full terms. The governor shall annually, in the month of December, appoint an examiner to succeed that member of the board whose term expires on the first day of January following. A vacancy in the board shall be filled by the governor.

Sec. 2. The meetings of said board shall be held annually at the State-house in Montpelier, or oftener on the call of three members, and thirty days' notice of such meetings shall be given in at least three dental journals circulating in this state. Said board shall annually, at its first meeting after the first day of January, elect from its members a president, secretary, and treasurer, and shall make annual reports to the governor and to the Vermont State Dental Society.

Sec. 3. A person above twenty-one years of age, of good moral character, and who is a graduate of a reputable dental college or school, or of a college or school authorized by law to grant diplomas in dentistry, and who is a graduate of a high school or academy of the first class approved by the superintendent of education, or who furnishes evidence of an education equivalent to that of a high school of the first class, shall upon the payment of a fee of twenty-five dollars, be entitled to be examined, and, if found qualified, shall be licensed to practice dentistry, dental surgery, and medical dentistry, and shall receive a license signed by the members of the board of examiners. The examinations shall be elementary and practical, but sufficiently thorough to test the applicant's fitness; they shall be wholly or in part in writing, in the English language; and shall embrace the subjects of anatomy, physiology, chemistry, materia medica, therapeutics, metallurgy, histology, pathology, bacteriology, anesthesia, oral surgery, operative and prosthetic dentistry, orthodontia and crown and bridge work, with demonstrations by the applicant in operative and prosthetic dentistry. An applicant who fails to pass a satisfactory examination shall be entitled to a re-examination at any future meeting of the board without payment of a fee, but for any subsequent re-examination a fee of five dollars shall be paid. Rules relating to qualifications of applicants and to conduct of examinations and to the granting of licenses may be made by the board of examiners.

Sec. 4. Said board, in its discretion, may, without examination, issue a license to a dentist who has been lawfully in practice in another state for at least five years upon the payment of a fee of twenty-five dollars, provided such applicant presents a certificate from the board of dental examiners or other like board of the state in which such dentist has practiced, certifying to his competence and good moral character, and provided further that such state maintains a law of requirements equivalent to our own and grants a like privilege to dentists licensed to practice in this state.

Sec. 5. Any duly licensed dentist of this state who is desirous of changing his residence to that of another state shall upon application to the board of dental examiners receive a certificate which shall attest that he is a duly licensed dentist in the state of Vermont. The same shall be given without fee.

SEC. 6. The board of dental examiners shall keep a book in which it shall enter the name of each person licensed as provided for by this act.

SEC. 7. A person who receives a license from said board shall, within thirty days from the date thereof, cause it to be recorded in the office of the secretary of state and shall pay him fifty cents for recording the same. Such license duly recorded by the secretary of state or a duly certified copy of such record shall be evidence of the authority of the person therein named to practice dentistry.

SEC. 8. If a person does not cause his license to be recorded within the time required by the preceding section, he shall forfeit the same, and shall not be re-licensed until he has paid the board a fee of twenty-five dollars.

SEC. 9. Whoever engages in the practice of dentistry in this state shall keep his license displayed in the room or rooms in which he practices, in such manner as to be easily seen and read. A person who practices dentistry under a fictitious or assumed name, or who, not being licensed, practices dentistry or advertises or holds himself out to the public as a dentist, or assumes the title of "Doctor of Dental Surgery" or "Doctor of Dental Medicine," or appends the letters "D.D.S." or "D.M.D." to his name, not having the right to assume such title by a degree conferred upon him by a college or school empowered by law to confer such title, or who shall wilfully make a false material statement in his application and license, or who changes or alters a license issued by said board, shall be fined not more than one hundred dollars nor less than twenty-five dollars, or imprisoned not more than three months, or both. A license granted to a person not entitled thereto may be revoked by the board, and a license may be revoked for immoral or unprofessional conduct of a licensee; but such revocation shall be upon notice to the licensee and a hearing at which he shall be given an opportunity to be heard, and when a license is revoked such revocation shall be recorded with the secretary of state. Nothing in this act shall be construed to interfere with the rights and privileges of physicians and surgeons licensed under the laws of this state; nor to any person who is now practicing dentistry under a license granted under the existing laws. Nor shall it apply to the mere extracting of teeth by a person who has been engaged in that work for a period of five or more years in this state; provided, however, that such person file in the office of the secretary of state previous to February 1, 1913, an affidavit that he has been so engaged for such period.

SEC. 10. The treasurer of the board, or the person whose duty it is to receive all moneys for examinations and certificates, shall quarterly make a report to the state treasurer of all examinations given and certificates granted, and pay into the state treasury all moneys received by him for such examinations and certificates.

SEC. 11. Each member of the board of dental examiners shall receive four dollars a day for services rendered and necessary expenses.

SEC. 12. This act shall take effect from its passage.

SOCIETY NOTES AND ANNOUNCEMENTS.

DENTAL SOCIETY MEETINGS:

April, May, and June.

APRIL.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA. Philadelphia. April 22d.

ARKANSAS STATE DENTAL ASSOCIATION. Little Rock. Five days: April 7th to 11th.

CONNECTICUT STATE DENTAL ASSOCIATION. Waterbury. Two days: April 15th and 16th.

DENTAL FACULTIES ASSOCIATION OF AMERICAN UNIVERSITIES. Boston, Mass. Two days: April 22d and 23d.

FIFTH DISTRICT (N. Y.) DENTAL SOCIETY. Syracuse. Three days: April 3d to 5th.

ODONTOLOGICAL SOCIETY OF WESTERN PENNSYLVANIA. Pittsburgh. Two days: April 8th and 9th.

MAY.

DENTAL SOCIETY OF THE STATE OF NEW YORK. Albany. Three days: May 8th to 10th.

INDIANA STATE DENTAL ASSOCIATION. Indianapolis. Three days: May 20th to 22d.

IOWA STATE DENTAL SOCIETY. Davenport. Three days: May 6th to 8th.

KENTUCKY STATE DENTAL ASSOCIATION. Lexington. Three days: May 26th to 28th.

LAKE ERIE (PA.) DENTAL ASSOCIATION. Cambridge Springs. Three days: May 15th to 17th.

MASSACHUSETTS DENTAL SOCIETY. Three days: May 8th to 10th.

NATIONAL DENTAL PROTECTIVE ASSOCIATION. Washington, D. C. May 20th.

NEBRASKA STATE DENTAL SOCIETY. Omaha. Four days: May 19th to 22d.

NORTH DAKOTA DENTAL ASSOCIATION. Fargo. Two days: May 16th and 17th.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION. Los Angeles. Four days: May 26th to 29th.

SUSQUEHANNA (PA.) DENTAL SOCIETY. Wilkes-Barre. Three days: May 20th to 22d.

TEXAS STATE DENTAL ASSOCIATION. Temple. Three days: May 15th to 17th.

VERMONT STATE DENTAL SOCIETY. Burlington. Three days: May 21st to 23d.

JUNE.

CALIFORNIA STATE DENTAL ASSOCIATION. Oakland. Four days: June 2d to 5th.

COLORADO STATE DENTAL ASSOCIATION. Manitou. Three days: June 19th to 21st.

GEORGIA STATE DENTAL SOCIETY. Columbus. Three days: June 12th to 14th.

MAINE DENTAL SOCIETY. Portland Harbor. Three days: June 25th to 27th.

MISSISSIPPI DENTAL ASSOCIATION. Meridian. Three days: June 24th to 26th.

NORTHERN OHIO DENTAL ASSOCIATION. Cleveland. Three days: June 5th to 7th.

SOUTH CAROLINA STATE DENTAL ASSOCIATION. Isle of Palms. June 25th to 27th.

TENNESSEE STATE DENTAL ASSOCIATION. Nashville. Three days: June 5th to 7th.

WASHINGTON STATE DENTAL SOCIETY. Seattle. Three days: June 16th to 18th.

Examiners' Meetings.

ARKANSAS BOARD OF EXAMINERS. Little Rock. April 7th and 8th.

ILLINOIS BOARD OF EXAMINERS. Chicago. June 4th.

MARYLAND BOARD OF EXAMINERS. Baltimore. May 29th and 30th.

NORTH CAROLINA BOARD OF EXAMINERS. Winston-Salem. May 26th.

PENNSYLVANIA BOARD OF EXAMINERS. Philadelphia and Pittsburgh. June 11th to 14th.

SOUTH CAROLINA BOARD OF EXAMINERS. Isle of Palms. June 20th.

TEXAS BOARD OF EXAMINERS. Houston. June 23d.

WASHINGTON STATE BOARD OF EXAMINERS. Seattle. May 22d.

WISCONSIN BOARD OF EXAMINERS. Milwaukee. June 16th.

NATIONAL DENTAL ASSOCIATION.

THE 1913 session of the National Dental Association will be held in Kansas City, Mo., July 8 to 11, 1913. The Local Committee of Arrangements have selected the Baltimore Hotel as headquarters, and have made the other necessary arrangements for this meeting. The officers and committees are planning to present an exceptionally interesting program, the details of which, together with the other arrangements, will be presented in later journals.

FRANK O. HETRICK, *President*,
Ottawa, Kans.,
HOMER C. BROWN, *Recording Sec'y*,
185 East State st., Columbus, Ohio.

N. D. A.—SOUTHERN BRANCH AND VIRGINIA STATE DENTAL SOCIETY.

THE fifteenth annual meeting of the Southern Branch of the National Dental Association will be held at the Chamberlin Hotel, Old Point Comfort, Va., July 22 to 25 inclusive, 1913. The Virginia State Dental Society will meet conjointly with the Southern Branch at that time.

THOS. MOORE, JR., *Cor. Sec'y, N.D.A.So.Br.*

DENTAL FACULTIES ASSOCIATION OF AMERICAN UNIVERSITIES.

THE next annual meeting of the Dental Faculties Association of American Universities will be held at Harvard Dental School, Longwood ave., Boston, Mass., April 22 and 23, 1913. The meeting will be called to order on the morning of April 22d, at 11 o'clock.

EDWARD C. KIRK, *Sec'y-Treasurer.*

NATIONAL DENTAL PROTECTIVE ASSOCIATION.

The annual meeting of the National Dental Protective Association will be held at the Fredonia Hotel, Washington, D. C., May 20, 1913, at 7.30 P.M., for the election of trustees and transaction of business.

E. P. Dameron, *President*,
M. F. Finley, *Sec'y*,
1928 "I" st., N. W., D. C.

THE PANAMA PACIFIC DENTAL CONGRESS.

As one of the attractions of the Panama Pacific International Exposition, a dental congress, international in character, to be known as the Panama Pacific Dental Congress, is to be held in San Francisco, California, beginning on the last Monday in August 1915, and continuing for ten days.

A Committee of Organization has been perfected, including representatives from the Pacific Coast states—California, Oregon, Washington, Utah, Idaho, Colorado, and Arizona.

This committee is now actively engaged in perfecting the work of organization, including the establishment of executive committees in every state of the United States and in every foreign country where dental organizations are known to exist, which will be empowered to promote the business of the congress by bringing it to the attention of their national, state, and local societies, and securing memberships and contributions to the program.

The American Society of Orthodontists and the National Dental Association, of the United States of America, have already made arrangements to meet in San Francisco in 1915 as a part of the congress, and invitations will be extended to other dental societies to take similar action.

The Panama Pacific Dental Congress is the first organization to apply to the Exposition management for space for exhibits, and to ask that a definite time be set aside for its meeting.

Manufacturers of dental goods have signified their intention to maintain during the congress the greatest exhibition of dental supplies ever held. Ample space for this purpose has already been promised by the Exposition authorities, and we are assured of their hearty co-operation in all things pertaining to the success of the congress.

The membership fee has been fixed at ten dollars, and the finances of the congress are being cared for by a corporation, formed within the Committee of Organization, and known as the "Pacific Dental Congress Commission of 1915."

Over $8000 has already been subscribed for promotion purposes by the dentists and dental societies of the Pacific Coast states, and this fund will be increased by many thousands of dollars before the congress meets.

Ample funds for promotion of the congress are assured, and in due time Committees on Local Arrangements, Transportation, Exhibits, Clinics, Program, etc., will be appointed, and everything possible will be done to insure the success of the congress and make it in attendance and scientific and professional interest the greatest dental congress ever held.

The whole world is coming to San Francisco in 1915 to participate in and enjoy the Panama Pacific International Exposition, which will commemorate the completion of the world's engineering masterpiece, the Panama Canal.

Never in the history of the profession has there been so auspicious a time for holding a great dental congress, and the Panama Pacific International Exposition Company and the Committee of Organization of the Panama Pacific Dental Congress unite in a cordial invitation to the members of the dental profession to come to San Francisco in 1915 to attend the congress and view the wonders of the Exposition and the Pacific Coast of the United States of America.

Frank L. Platt, *Ch'man*,
Committee of Organization.

ODONTOLOGICAL SOCIETY OF WESTERN PENNSYLVANIA.

The thirty-second annual spring meeting of the Odontological Society of Western Pennsylvania will be held at Hotel Henry, Pittsburgh, Pa., April 8 and 9, 1913. Practical papers and instructive clinics will predominate. Ethical practitioners are cordially invited to attend.

King S. Perry, *Sec'y*,
719 Jenkins Bldg., Pittsburgh, Pa.

CONNECTICUT STATE DENTAL ASSOCIATION.

THE next annual meeting of the Connecticut State Dental Association will be held in Waterbury, April 15 and 16, 1913.

A. V. PRENTIS, *Sec'y*,
New London, Conn.

FIFTH DISTRICT (N. Y.) DENTAL SOCIETY.

THE forty-fifth annual meeting of the Fifth District Dental Society of the State of New York will be held at the Onondaga Hotel, Syracuse, N. Y., April 3, 4, and 5, 1913. Papers and clinics of unusual merit have been secured, and it is confidently expected that this will be the largest and most instructive meeting ever held by the society. A most cordial invitation is extended to all ethical practitioners.

J. N. GARLINGHOUSE, *Sec'y*.

ARKANSAS STATE DENTAL ASSOCIATION.

THE Arkansas State Dental Association, instead of having papers and clinics by its own members as heretofore, will hold a Post-graduate Course, in Little Rock, Ark., April 7 to 11 inclusive, 1913.

This course will be under the direction of Drs. John P. Buckley, Hart J. Goslee, and J. H. Prothero of Chicago. All ethical dentists are eligible, and a membership fee will be charged.

For further information address

I. M. STERNBERG, *Sec'y*,
Fort Smith, Ark.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

THE regular meeting of the Academy of Stomatology will be held on Tuesday, April 22, 1913, at the College of Physicians, Twenty-second st. above Chestnut st., Philadelphia, Pa., at 8 P.M. Dr. F. L. Stanton of New York will read a paper on "Mendelism and Its Relation to Some Dental Problems."

A special meeting of the Academy will be held on Thursday, April 10th. There will be three papers, giving a Symposium on Dental Histology, by Drs. W. T. Addison, M. T. Barret, and J. D. Appleton; also a paper by Dr. S. M. Dorrance entitled "The Oral Cavity as an Etiological Factor in Cervical Glandular Enlargement."

All members of the dental profession are invited to be present.

NORMAN L. JAMESON, *Sec'y*.

VERMONT STATE DENTAL SOCIETY.

THE next meeting of the Vermont State Dental Society will be held in Burlington, Vt., May 21, 22, and 23, 1913.

P. M. WILLIAMS, *Sec'y*,
Rutland, Vt.

NORTH DAKOTA DENTAL ASSOCIATION.

THE eighth annual meeting of the North Dakota Dental Association will be held at Fargo, N. D., May 16 and 17, 1913.

E. N. HEGGE, *Sec'y*,
Hatton, N. D.

NEBRASKA STATE DENTAL SOCIETY.

CHANGE OF DATE OF MEETING.

THE thirty-seventh annual meeting of the Nebraska State Dental Society will be held in Omaha, Nebr., May 19, 20, 21, and 22, 1913, instead of May 12, 13, 14, and 15, as formerly announced.

For programs and any information address

WM. A. MCHENRY, *Sec'y*,
Nelson, Nebr.

IOWA STATE DENTAL SOCIETY.

THE fifty-first annual meeting of the Iowa State Dental Society will convene at Davenport, Iowa, May 6, 7, and 8, 1913, beginning Tuesday, May 6th, at 9 A.M. Elaborate clinics and lectures and a large exhibit will be presented.

Further information will be furnished upon request from ethical practitioners of other states contemplating a visit to the meeting, to whom we extend a cordial invitation.

Exhibitors desiring space should apply to Dr. Wm. Finn, Cedar Rapids, Iowa.

C. M. KENNEDY, *Sec'y*,
Des Moines, Iowa.

TEXAS STATE DENTAL ASSOCIATION.

The thirty-third annual meeting of the Texas State Dental Association will be held at Temple, Texas, May 15, 16, and 17, 1913.

The clinics will be in charge of Dr. J. O. Hall, Waco, Texas, who will furnish any information relative to same. Exhibitors desiring space will please address Dr. J. M. Murphy, Temple, Texas. All ethical practitioners are cordially invited to attend the meeting.

Any other information will be cheerfully furnished by

J. G. Fife, *Sec'y*,
Dallas, Tex.

SUSQUEHANNA DENTAL ASSOCIATION OF PENNSYLVANIA.

The fiftieth anniversary meeting of the Susquehanna Dental Association of Pennsylvania will be held at Irem Temple, Wilkes-Barre, Pa., Tuesday, Wednesday, and Thursday, May 20, 21, and 22, 1913.

The Executive Committee is composed of the following members: A. E. Bull, W. E. Davis, T. W. Thomas, B. A. Courtwright, A. J. Heffernan of Wilkes-Barre, A. B. Miller of Kingston, and I. H. Jennings of Danville.

All ethical practitioners are invited.

E. J. Donnegan, *Recording Sec'y*,
Scranton, Pa.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

The forty-fifth annual meeting of the Dental Society of the State of New York will be held at Albany, N. Y., Thursday, Friday, and Saturday, May, 8, 9, and 10, 1913. There will be the usual reduced railroad rates on the certificate plan.

The first session will open on Thursday at 10.30 A.M. The literary program of the meeting will be rendered in the auditorium of the Educational Building. Headquarters will be at the Hotel Ten Eyck, where the exhibits and clinics will be held.

A cordial invitation is extended to all ethical dentists in New York and sister states. Exhibitors wishing to engage space please address Dr. O. J. Gross, Schenectady, N. Y.

A. P. Burkhart, *Sec'y*,
52 Genesee st., Auburn, N. Y.

MASSACHUSETTS DENTAL SOCIETY.

The forty-ninth annual meeting of the Massachusetts Dental Society will be held at the Hotel Somerset, Boston, Mass., on Thursday, Friday, and Saturday, May 8, 9, and 10, 1913.

A. H. St. Clair Chase, *Sec'y*,
Everett, Mass.

LAKE ERIE (PA.) DENTAL ASSOCIATION.

The fiftieth annual meeting of the Lake Erie Dental Association will be held at Hotel Bartlett, Cambridge Springs, Pa., May 15, 16, and 17, 1913. This meeting celebrates the "golden anniversary" of this society, and the Program Committee have arranged for the best meeting ever held. Entertainment for the ladies; come, and bring them.

C. L. Mead, *Sec'y*,
Union City, Pa.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION.

The sixteenth annual meeting of the Southern California Dental Association will be held in Los Angeles, on May 26, 27, 28, and 29, 1913.

An excellent program of essays and clinics, as well as a large and elaborate exhibit, is being arranged. All ethical practitioners of dentistry are cordially invited to be present.

Further information will be sent upon request.

Jas. D. McCoy, *Ch'man Publicity Com.*,
708 W. P. Story Bldg., Los Angeles, Cal.

INDIANA STATE DENTAL ASSOCIATION.

The fifty-fifth annual session of the Indiana State Dental Association will be held at the Claypool Hotel, Indianapolis, May 20, 21, and 22, 1913.

The officers of the association recently met at Indianapolis and perfected plans for a three-day "Post-graduate Course." The very best instructors and specialists are being secured for each day. The course will be as follows: Tuesday—"Humanitarian Dentistry." Wednesday—"Preventive Dentistry."

Thursday, A.M.—"Prosthodontia"; P.M., a great table clinic. The clinic will also be held in the hotel.

No tuition fee for the members of the association, or visitors from outside the state who are in good standing in their state associations, but all others desiring to take this course must arrange their tuition fees with the secretary.

Otto U. King, *Sec'y,*
Huntingdon, Ind.

KENTUCKY STATE DENTAL ASSOCIATION.

The forty-fourth annual meeting of the Kentucky State Dental Association will be held at the Phoenix Hotel, in Lexington, Ky., on May 26, 27, and 28, 1913. All ethical dentists are invited to attend.

C. R. Shacklette, *Sec'y.*

NORTHERN OHIO DENTAL ASSOCIATION.

The fifty-sixth annual meeting of the Northern Ohio Dental Association will be held at Cleveland, Ohio, June 5, 6, and 7, 1913.

C. D. Peck, *Sec'y,*
Sandusky, Ohio.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

The forty-third annual meeting of the South Carolina State Dental Association will be held on the Isle of Palms, June 25, 26, and 27, 1913.

W. Busey Simmons, *Recording Sec'y,*
Piedmont, S. C.

MISSISSIPPI DENTAL ASSOCIATION.

The thirty-eighth annual session of the Mississippi Dental Association will be held at the Great Southern Hotel, Meridian, Miss., June 24, 25, and 26, 1913.

A determined effort is being put forth to make this meeting our best. There will be a fine clinic, excellent papers, a banquet, and a fine exhibit.

L. B. Price, *Sec'y.*
Corinth, Miss.

MAINE DENTAL SOCIETY.

The forty-eighth annual meeting of the Maine Dental Society will be held at the Ottowa House, Cushing's Island, Portland Harbor, Me., on June 25, 26, and 27, 1913.

I. E. Pendleton, *Sec'y.*

WASHINGTON STATE DENTAL SOCIETY.

The Washington State Dental Society meets June 16, 17, and 18, 1913, in Seattle, Wash.

A. D. Remington, *Sec'y,*
Seattle, Wash.

CALIFORNIA STATE DENTAL ASSOCIATION.

The next annual meeting of the California State Dental Association will be held on June 2, 3, 4, and 5, 1913, in the Hotel Oakland, at Oakland, Cal.

E. E. Evans, *Sec'y,*
Oakland, Cal.

TENNESSEE STATE DENTAL ASSOCIATION.

The Tennessee State Dental Association will hold its annual meeting in Nashville, Tenn., on June 5, 6, and 7, 1913, with the following officers in charge: F. W. Meacham, president; W. C. Gillespie, first vice-president; J. L. Manire, second vice-president; C. Osborn Rhea, recording secretary; W. G. Hutchinson, treasurer; C. E. Hines, corresponding secretary.

C. Osborn Rhea, *Sec'y.*

GEORGIA STATE DENTAL SOCIETY.

The forty-fifth annual meeting of the Georgia State Dental Society will convene at Columbus, Ga., June 12, 13, and 14, 1913, beginning Thursday, June 12th, at 11 A.M. Some very interesting lectures and papers will be presented; also an elaborate clinic has been secured.

Further information will be cheerfully furnished upon request from ethical practitioners of other states contemplating a visit to the meeting, to whom we extend a cordial invitation.

M. M. Forbes, *Sec'y,*
Atlanta. Ga.

BRIDGEPORT (CONN.) DENTAL SOCIETY.

At the regular monthly meeting of the Bridgeport Dental Society, the following officers were elected for the ensuing year: J. L. Egan, president; J. J. Myers, vice-president; C. E. C. Atkins, secretary; R. H. Tuthill, treasurer. Executive Committee—W. J. McLaughlin, *chairman*, B. E. Turney, and W. H. Ryan.

Immediately after the business meeting, the annual banquet was served at the University Club.

Clarence E. C. Atkins, *Sec'y*,
Bridgeport, Conn.

TRI-COUNTY (N. Y.) DENTAL SOCIETY.

(Allegany, Cattaraugus, and Steuben.)

In June last, at a regular meeting of the Allegany County Dental Society, held at Cuba, N. Y., it was decided to call a meeting of the dentists of Allegany, Steuben, and Cattaraugus counties in August at Olean, N. Y., for the purpose of organizing a Tri-County Dental Society.

The meeting took place August 24, 1912, when the society was organized, and the following officers were elected: Dr. J. F. Sortore, Belmont, N. Y., president; Dr. R. J. Conway, Hornell, N. Y., vice-president; Dr. E. O. Whipple, Olean, N. Y., secretary and treasurer.

The second meeting of the society was held in Hornell, January 25, 1913. The third meeting will be in Wellsville, N. Y., on May 17th. This gives each county one meeting each year. It is a single society, in which the dentists of the three counties hold membership.

E. O. Whipple, *Sec'y*.

ARKANSAS BOARD OF EXAMINERS.

The next meeting of the Arkansas Board of Dental Examiners will be held in Little Rock, Ark., April 7 and 8, 1913. All applicants are required to pass an examination to obtain a certificate. Examination fee $15.

For application blanks apply to

E. H. Johnson, *Sec'y-Treas.*,
305 Citizen's Bank Bldg., Pine Bluff, Ark.

WASHINGTON BOARD OF EXAMINERS.

The Washington State Board of Dental Examiners will meet in Seattle, Wash., on May 22, 1913, for the purpose of holding the spring examination.

L. B. Manchester, *Sec'y*,
Wenatchee, Wash.

NORTH CAROLINA BOARD OF EXAMINERS.

The next regular meeting of the North Carolina State Board of Dental Examiners will be held in Winston-Salem, N. C., beginning promptly at 9 o'clock on Monday morning, May 26, 1913.

For further necessary information, address

F. L. Hunt, *Sec'y*,
Asheville, N. C.

MARYLAND BOARD OF EXAMINERS.

The Maryland State Board of Dental Examiners will meet for examination of candidates for certificates, May 29 and 30, 1913, at the Dental Department of the University of Maryland, Baltimore, Md., at 9 A.M.

Candidates must pass a written examination in anatomy and physiology, chemistry and bacteriology, oral surgery, operative and prosthetic dentistry and pathology, therapeutics, and materia medica.

The practical requirements consist of the insertion of one gold and one amalgam filling in the mouth, and the submission of a metal plate or bridge of not less than four crowns—two of which shall be of porcelain—the parts being assembled and invested in advance, and soldered in the presence of the board.

Applications, accompanied by the fee of ten dollars, must be filed with the secretary prior to May 29th.

For application blanks or further information, apply to

F. F. Drew, *Sec'y*,
701 N. Howard st., Baltimore, Md.

ILLINOIS BOARD OF EXAMINERS.

The semi-annual meeting of the Illinois State Board of Dental Examiners, for the examination of applicants for a license to practice dentistry in the state of Illinois, will be held at the Chicago College of Dental Surgery, corner of S. Wood and W. Harrison sts., Chicago, beginning Wednesday, June 4, 1913, at 9 A.M.

All applications, together with the fee, Twenty-six dollars, must be filed with the secretary at least five days prior to date of examination. Address all communications to

T. A. BROADBENT, *Sec'y*,
705 Venetian Bldg., Chicago, Ill.

SOUTH CAROLINA BOARD OF EXAMINERS.

THE next meeting for examination of applicants for license will be held Friday, June 20, 1913, at 3 P.M., at the Isle of Palms, Hotel Charleston, S. C.

J. M. QUATTLEBAUM, *Sec'y*.

WISCONSIN BOARD OF EXAMINERS.

THE Wisconsin State Board of Dental Examiners will convene in Milwaukee, at Marquette University, on June 16, 1913, at 2 P.M., for examination of applicants to practice in Wisconsin.

High-school diploma, application, and fee of $25.00 must be filed with the secretary fifteen days prior to above date. Dental diploma to be presented in advance of examination.

F. A. TATE, *President*,
W. T. HARDY, *Sec'y*,
422 Jefferson st., Milwaukee, Wis.

TEXAS BOARD OF EXAMINERS.

THE next regular meeting of the Texas State Board of Dental Examiners will he held in the high-school building, Houston, Texas, beginning Monday, June 23, 1913, at 9 A.M. Official application blanks and other necessary information will be furnished candidates upon application to the secretary.

All applications, accompanied by a fee of $25.00, should be in the hands of the secretary at least five days before the examination.

Address all communications to

C. M. MCCAULEY, *Sec'y*,
Abilene, Texas.

PENNSYLVANIA BOARD OF EXAMINERS.

THE next regular examination of the Pennsylvania State Board of Dental Examiners will be held in Philadelphia and Pittsburgh, on Wednesday, Thursday, Friday and Saturday, June 11, 12, 13, and 14, 1913. Application blanks can be secured from the department of Public Instruction, Harrisburg.

Further information can be obtained from

ALEXANDER H. REYNOLDS, *Sec'y*,
4630 Chester ave., Philadelphia, Pa.

EXAMINATION OF DENTISTS FOR THE U. S. ARMY.

THE Surgeon-general of the army announces that examinations for the appointment of acting dental surgeons will be held at Fort Slocum, N. Y.; Columbus Barracks, Ohio; Jefferson Barracks, Mo.; Fort Logan, Colo., and Fort McDowell, Cal., on Monday, April 7, 1913.

Application blanks and full information concerning these examinations can be procured by addressing the Surgeon-general, U. S. Army, Washington, D. C.

The essential requirements to securing an invitation are that the applicant shall be a citizen of the United States, shall be between twenty-one and twenty-seven years of age, a graduate of a dental school legally authorized to confer the degree of D.D.S., and shall be of good moral character and habits.

Acting dental surgeons are employed under a three years' contract, at the rate of $150 per month. They are entitled to traveling allowances in obeying their first orders, in changing stations, and in returning to their homes at termination of service. They also have the privilege of purchasing certain supplies at the army commissary. After three years' service, if found qualified, they are promoted to the grade of dental surgeon, with the rank of first lieutenant, and receive thereafter the pay and allowances appertaining to that rank.

In order to perfect all necessary arrangements for examination, applications must be in the possession of the Surgeon-general at least two weeks before the date of examination. Early attention is therefore enjoined upon all intending applicants. There are at present a large number of vacancies to be filled.

ARMY DENTAL SURGEONS.

MEMORANDA OF CHANGES.

For the week ending February 15, 1913:

C. B. Seely, J. W. Scovel, and W. A. Squires, ACT.D.S., sailed February 5th, from San Francisco, Cal., for the Philippines.

First Lieut. R. E. Ingalls, left Fort Worden, Wash., February 3d, for temporary duty at Fort Casey, Wash.

B. C. Warfield, ACT.D.S., left Fort Terry, N. Y., February 12th, for Fort Totten, N. Y.

A. R. White, ACT.D.S., left Fort Des Moines, Iowa, February 10th, and arrived at Rock Island Arsenal same day.

For the week ending February 21st:

First Lieut. E. P. Tignor, left Fort Howard, Md., and arrived at Washington Barracks, D. C., February 13th.

B. C. Warfield, ACT.D.S., arrived at Fort Totten, N. Y., February 13th, for temporary duty.

C. E. Sherwood, ACT.D.S., arrived at Presidio of Monterey, Cal., February 10th.

First Lieut. F. P. Stone, left Fort Williams, Me., February 19th, on leave of absence.

For the week ending March 1st:

J. H. Snapp, ACT.D.S., left Camp E. S. Otis, Panama, February 12th, for San Juan, Porto Rico.

A. T. Knoderer, ACT.D.S., left Fort Morgan, Ala., February 19th, and arrived at Fort Barrancas, Fla., same day.

E. M. Kennedy, ACT.D.S., returned to Fort Robinson, Nebr., February 19th, from leave of absence.

For the week ending March 8th:

J. F. Feely, ACT.D.S., *en route* from Philadelphia, Pa., to San Francisco, Cal., and Manilla, Philippine Islands, March 3d.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING FEBRUARY 1913.

February 4.

No. 1,052,374, to HENRY A. PARR. Combination dental and surgical tool.

February 11.

No. 1,052,539 to WILLIAM P. WELCH. Combined tooth-brush and holder.

No. 1,052,806, to WILLIAM W. EVANS. Dental instrument.

No. 1,052,832, to JOSEPH KOHN. Artificial tooth.

No. 1,052,850, to JACOB C. SCHWARTZ. Device for shaping gold crowns to teeth.

February 18.

No. 1,053,190, to WHITNEY LYON. Tooth-powder cup.

No. 1,053,523, to WALTER R. MCMILLAN. Dental floss-holder.

No. 1,053,720, to DAVID FEIGENSOHN. Toothache remedy.

February 25.

No. 1,053,965, to L. R. BARGHAUSEN and C. L. CONSTANTINI. Saliva ejector.

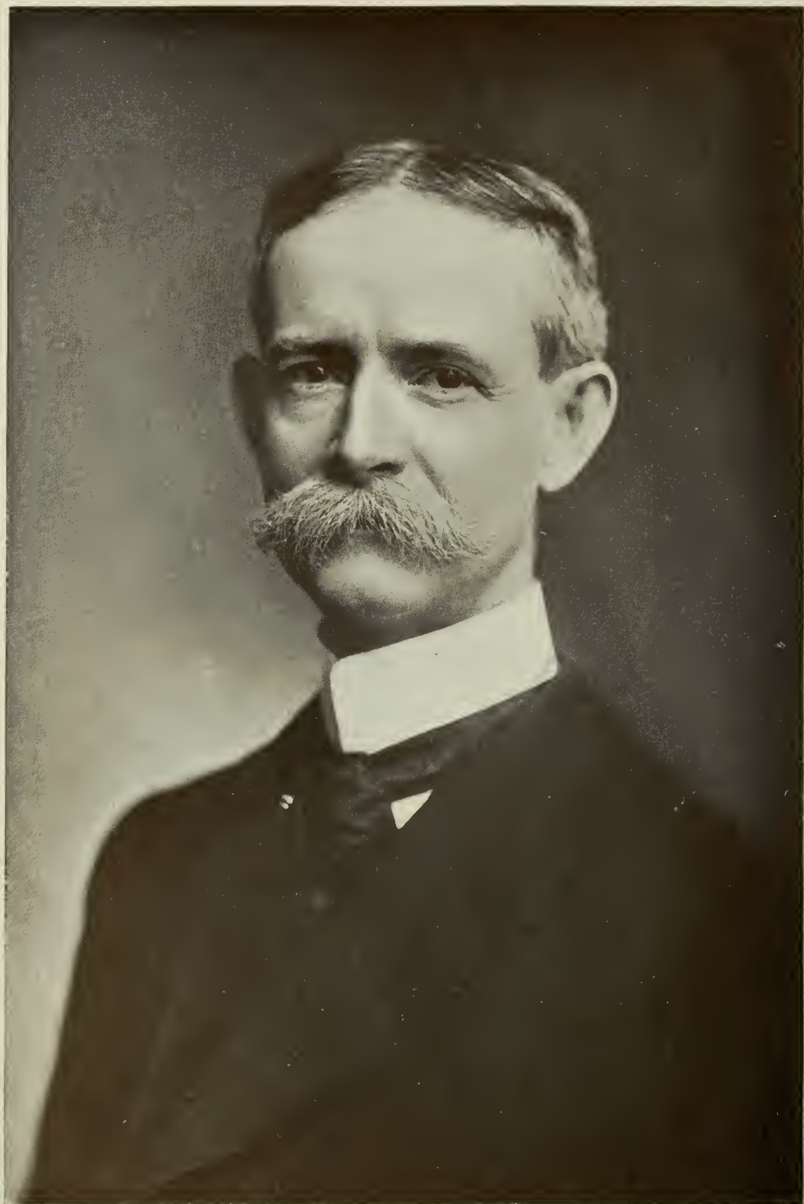
No. 1,053,968, to LEON L. BOWER. Blowpipe.

No. 1,054,017, to GUSTAF E. W. MILLER. Tooth-brush.

No. 1,054,028, to OSCAR H. PIEPER. Bracket support for dental engine.

No. 1,054,033, to FRANK RITTER. Head-rest.

No. 1,054,488, to MALCOLM BAILEY. Dental instrument.



DR. DAVID R. STUBBLEFIELD.

THE DENTAL COSMOS.

VOL. LV. MAY 1913. No. 5.

ORIGINAL COMMUNICATIONS.

THE PROGRESS OF DENTAL CARIES IN RELATION TO CAVITY PREPARATION.

By ARTHUR D. BLACK, A.M., M.D., D.D.S., Chicago, Ill.

(Read before the Northeastern Dental Association, at its annual meeting, Crawford Notch, N. H., October 1, 1912.)

THIS paper will be limited to the discussion of certain phases of cavity preparation in relation to the pathology of caries which seem of most importance at the present time. From the numerous articles and extended discussions which have appeared in recent years, it might seem that this subject had been fully threshed out, yet a critical review of these articles and careful observation of the operations being performed by many practitioners show much variation both in views and practice. So long as these differences exist there will be room for discussion, and the subject should be a live one at our society meetings. It is certainly proper that we should use every endeavor to come to a better understanding in order that our patients may receive the best possible service. With this object in view, there will be presented in this paper certain points regarding which there seems to be considerable difference of opinion.

MODERN PRINCIPLES OF PREVENTION.

The treatment of each disease should be based on our knowledge of its etiology and pathology. As our knowledge of the etiology and pathology of a certain disease becomes more complete, our treatment of that disease should be more effective, and the most thorough knowledge of etiology should often result in the successful use of preventive measures. This is quite as true of dental caries as of any other disease. Not so very many years ago, little attention was paid to the pathology of caries; the carious portions were removed, and the cavity so made was filled. As our knowledge of the pathology has grown, our treatment has been, or should have been, modified to combat the progress of the disease; a better knowledge of the etiology should result in the employment of more effective preventive measures.

PRINCIPLES OF CAVITY PREPARATION.

Our knowledge of the pathology of dental caries is now practically complete so far as the beginnings and the gradual progress of the destruction of tooth structure is concerned. Our knowledge of the etiology is lacking as to some factors which relate to the formation of the gelatinoid plaques. So far as concerns the carious process itself—the condition which renders necessary the preparation of a cavity—we know the full pathology, and our cavity preparations, based on this knowledge, should be the same the world over.

In the preparation of each cavity we should have in mind two ends which we should accomplish: (1) The cavity should be so prepared that the filling will serve to the best advantage in the treatment of the pathological process, not only in order to cure the existing condition by eradication, but to prevent its recurrence so far as possible. (2) The cavity should be so prepared that the filling operation will be the best possible from the purely mechanical standpoint. In connection with both of these principles we should, in many cavities, also have in mind the danger of inflammation and death of the pulp, and should modify the cavity form accordingly. We should, then, consider first the pathological process which we have to treat in the particular case presented, and we should have in mind the conditions under which the carious process began, its progress up to the time of the operation, and the possibilities of a continuance or a recurrence subsequent to the operation. As the recurrence would necessarily involve the surface of the tooth, our consideration of the pathology will determine the outline form of the cavity. We should next consider what form of cavity will give sufficient retention, with the best opportunities for proper adaptation or fit of the filling, modifying this form when necessary, to give the best possible protection to the pulp.

AREAS IN PROXIMAL SURFACES SUSCEPTIBLE TO CARIES OR IMMUNE.

In this paper we will consider proximal cavities only, as the time allowed is not sufficient for a consideration of all classes. The beginnings and progress of the carious process may be easily observed clinically. Anyone who will record examinations of a few hundred cases will observe that these carious processes begin on the surface of the enamel just gingivally of the contact point, between the contact point and the crest of the gum septum. They always begin at this position unless there are abnormal features present in the form, position, or environment of the teeth. The progress of the growth of the colony of micro-organisms on the surface of the enamel occurs in both directions, buccally and lingually, from the contact point, involving a narrow band of enamel just occlusally of the margin of the gum septum. This surface growth does not, except in rare instances, extend as far as the angles of the tooth. As we pass from the contact point buccally or lingually toward the angles, we find the surface gradually less liable to the spread of the growth of the colony and consequently to superficial caries. This is, of course, because the angles of the tooth are thoroughly scoured in chewing, so that a growth could not maintain itself on the enamel; and likewise because the enamel toward the contact is less well scoured in proportion as the opening of the embrasure between the two teeth is broad or narrow. There is, then, in each proximal surface a definite point at which caries begins, a definite area over which a colony of micro-organisms may grow, and there are definite limits beyond which it may not grow. In other words, we may outline on each proximal surface an area that is susceptible to caries and an area that is immune.

THE RULE OF EXTENSION FOR PREVENTION.

It is certainly rational to apply this knowledge of pathology in cavity preparation; in fact, this knowledge should be our guide in determining the outline form of the cavity. If a cavity is presented which has not involved *on the surface* all of the enamel which our observation and records show to be clearly susceptible—enamel on which micro-organisms will grow and cause caries irrespectively of whether we place a filling or not—is it not very clearly our duty to include that susceptible enamel in the cavity outline? I believe practically all will agree with me in this statement, but we may differ in the application of these principles in practice. If I can in this paper make clear the application of this rule of extension for prevention, I feel sure everyone will agree that it is right both in theory and practice.

THREE CASES OF PROXIMAL CARIES, AND TREATMENT.

To illustrate the application of this rule I wish to describe three different proximal cavities, with the treatment adapted for each. The first is a small area of superficial caries *which has not spread over the full area of susceptibility;* the caries has penetrated the enamel, and there is an area of dentin involved which is *less wide* than the involved surface of the enamel. The treatment of this carious area requires that the remainder of the susceptible area of enamel be cut away so that the margins of the filling will be in immune areas. *That is extension for prevention.* (See Fig. 1.)

The second case is one of caries *which has spread over the full area of susceptibility* on the surface of the enamel, and the area of dentin involved is *less wide* than the involvement of the enamel. The treatment of this case requires that the cavity include all the affected enamel, which here comprises all of the susceptible area. It would not therefore be necessary to cut away any sound enamel; the outline of the cavity would, however, be exactly the same as in the first case. *Extension for prevention would be unnecessary, and would not apply in this case.* (See Fig. 2.)

The third case is one of caries *which has spread over the full area of susceptibility on the surface,* and the area of dentin involved is *considerably wider* than that of the enamel; considerable enamel, unaffected on its surface, has been undermined by lateral caries in the dentin. In this case, the caries in the dentin has undermined not only the enamel susceptible to caries on its surface, *but also the immune enamel* farther toward the buccal and lingual angles, possibly including the angles, or even beyond. The extent of caries in the dentin, therefore, controls the outline form of the cavity and carries it far beyond the position demanded by the rules of extension for prevention. *Extension for prevention is not practiced,* therefore, in the treatment of caries of this type. (See Fig. 3.)

These three cases are cited to emphasize the fact that extension for prevention applies to but one type of cavities—those in which the surface caries has not extended far enough to include the entire area of susceptibility, and in which the caries in the dentin has not undermined the enamel of this area. Extension for prevention applies to no other cavity, because it involves only the cutting away of sound enamel within the area of susceptibility, and it is obvious that no sound enamel in this area could be cut away if the surface spread of caries, or the lateral spread in the dentin underneath, has rendered it unsound.

DIFFERENTIATION BETWEEN AREAS OF SUSCEPTIBILITY AND AREAS OF IMMUNITY.

The important question which next arises is the differentiation between the area of susceptibility and the area of immunity. This is very simple; it is purely a matter of observing a sufficient number of cases of surface caries to be

Fig. 1.

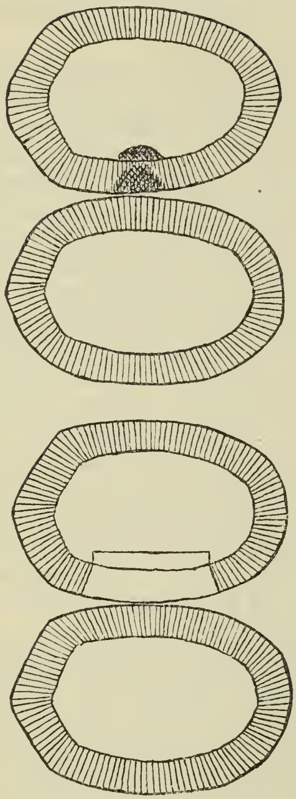


Fig. 2.

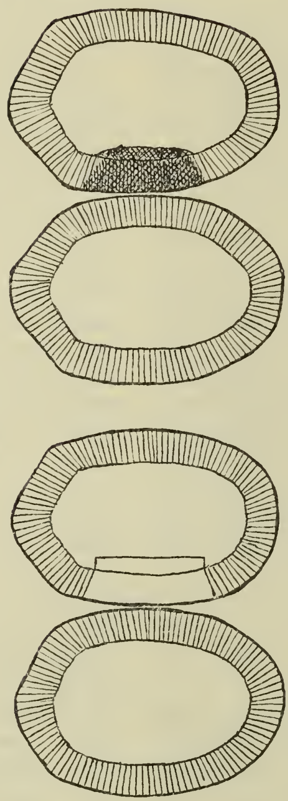


Fig. 3.

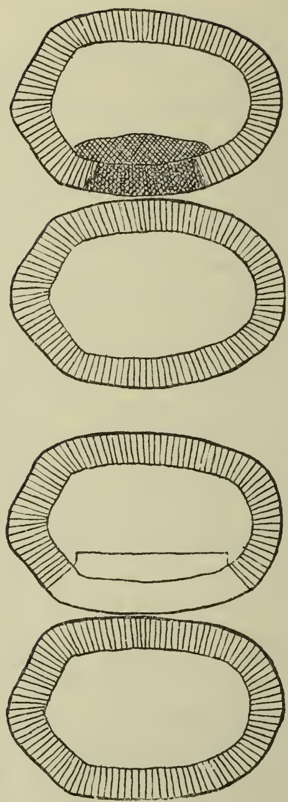


Fig. 1. The diagram above illustrates an area of proximal caries which has not spread to the full limit either buccally or lingually on the surface of the enamel. The caries in the dentin has undermined less enamel than is involved on the surface. The proper cavity preparation requires that sufficient sound enamel be cut away to place the buccal and lingual margins in self-cleansing positions, as shown in the lower diagram. *This is extension for prevention.*

Fig. 2. The diagram above illustrates an area of proximal caries which has spread to the full limit buccally and lingually on the surface of the enamel. The caries in the dentin has undermined less enamel than is involved on the surface. The proper cavity preparation requires no cutting away of sound enamel buccally or lingually, because the caries has already reached the limit to which it may spread in either direction. *Extension for prevention is not required.* The cavity, as shown in the lower diagram, is the same as in Fig. 1.

Fig. 3. The diagram above illustrates an area of proximal caries which has spread to the full limit buccally and lingually on the surface of the enamel. The caries in the dentin has undermined more enamel than is involved on the surface. The proper preparation of this cavity requires the cutting away of all enamel which has been undermined by the caries in the dentin. The margins are therefore carried farther than would otherwise be necessary to reach self-cleansing positions, as shown in the lower diagram. *Extension for prevention is not practiced* in the preparation of this cavity.

able to recognize the limit to which the caries extends buccally and lingually, and the application of this knowledge in the preparation of those cavities in which the caries has not extended to the limit. Especial attention is called to the fact that this limit is not one which includes a definite area or portion of the surface of every tooth, but is determined by the width of the embrasures between the two proximal teeth. If the proximal surfaces are more nearly flat than the average, then the embrasures are narrow and there is less opportunity for food to scour the proximal surfaces; therefore the area of susceptibility will be broader bucco-lingually than in the case where the proximal surfaces are more convex. The most definite rule which could be laid down would be that the cavity should be cut buccally and lingually to a line at which the width of the embrasure is sufficient to insure a self-cleansing margin. Even this width would vary somewhat according to the susceptibility of the individual, but I think we would be safe in saying that a width of 0.8 mm. (about 1/32 of an inch) at the position of the margin would be the minimum, and that a width of 1.2 mm. (about 1/20 of an inch) would be the maximum width necessary. (See Fig. 4.) A good idea of these widths may be gained by using two excavators with blades of these widths for measuring the embrasures as the cavities are prepared.

Fig. 4.

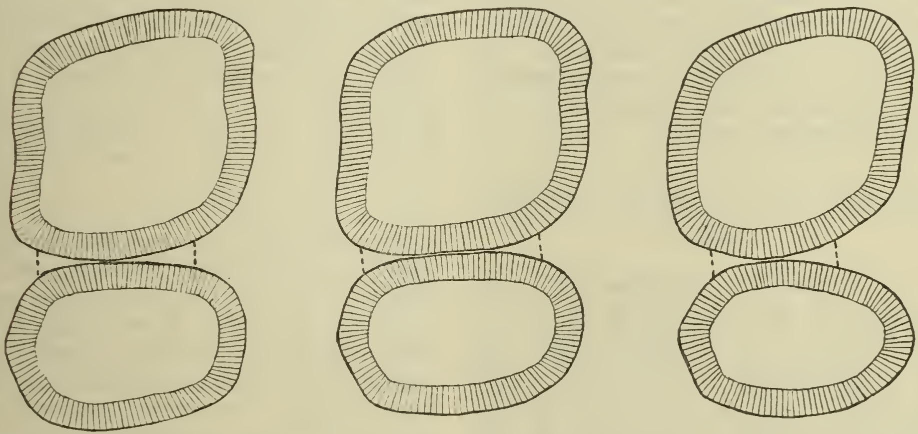


Fig. 4. These three diagrams illustrate the importance of the width of the embrasures in relation to the positions of buccal and lingual margins of cavities. The dotted lines indicate positions of equal embrasure widths in all three diagrams. It will be observed that the more convex the proximal surfaces of the teeth, the less wide must cavities be cut to place the margins in self-cleansing positions.

PREPARATION OF THE GINGIVAL MARGIN.

It may be observed by anyone that surface caries does not extend under a healthy gum margin. Therefore a cavity should be cut far enough in this direction to be certain that the free margin of the gum will cover it. An examination of the gum septum previous to the operation is important in this connection. Particular attention is called to the fact that the surface extensions of caries are parallel to the free margin of the gum, therefore care should be taken to extend the cavity outline far enough at this position both buccally and lingually. This means that the bucco-gingival and linguo-gingival angles should be cut to form right angles, with the exception that the enamel margin may be very slightly rounded. It has been the writer's observation that more operators fail in this one point than in any other. Cavities are cut with the gingival wall in the form of a curve connecting the buccal and lingual walls. This leaves a little triangular area of enamel at each angle that is more susceptible to caries than much of the enamel that has been cut away. It is the writer's belief that if all operators made no other change in their present cavity preparations than to square out these angles, the average life of our proximal fillings would be doubled. I make this statement because these areas are the most susceptible positions on the enamel remaining, as evidenced by the fact that recurrences of caries begin in these positions in the large majority of cases.

RETENTIVE AND CONVENIENCE FORM OF CAVITY.

For purposes of retention and convenience in placing fillings or inlays, the box-like form of cavity, with the surrounding walls nearly parallel and all angles sharply cut, answers all requirements. Such cavities have the best mechanical forms for retention and for resisting the stress of mastication, and the fillings may be started and placed with greater ease and facility than in cavities of more rounded form.

ADVANTAGE OF WEDGING GOLD BETWEEN PARALLEL WALLS.

Another advantage of the parallel walls, which does not seem to be fully appreciated, is the opportunity afforded to take advantage of the elasticity of the dentin by the proper manipulation of gold foil. Gold may be wedged between absolutely parallel walls with mallet blows which are not uncomfortable to the patient, in such a manner that the walls, on account of their elasticity, will be forced apart sufficiently to cause them to maintain a secure grip on the filling. I have tested such fillings, placed between two parallel walls ⅛ inch apart, and not in contact with the other two walls, and have been unable to dislodge them until weights of more than sixty pounds have been attached in a straight pull outward from the cavity.

CONCLUSION.

In closing, I wish to emphasize the fact that, so long as all of the carious area is removed, the inner form of the cavity has nothing to do with the treatment of caries other than to enable us to make fillings which are less liable to come out. Extension for prevention has been charged with all of the accidents which have occurred in cavity preparation because operators have not understood its principle, and it is no wonder that the profession has erred in this, when many prominent practitioners have insufficiently studied the propositions involved and then have led others to believe in their own misunderstandings. The propositions laid down under the maxim of extension for prevention are simple, but it is necessary that an operator study them and apply them with a proper appreciation of the existing conditions in each particular case.

Extension for prevention has nothing to do with depth of cutting in the dentin, it has nothing to do with the possibilities of exposure or nearness of the cavity to the pulp, it has nothing to do with the preparation of cavities in which there has been widespread caries of the dentin. It applies essentially to the treatment of small areas of caries, and never involves the necessity of making a really large cavity. May I ask a careful consideration of all these points, presented with the hope that we may so prepare cavities that the fillings placed will serve better in the preservation of the teeth?

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

PYORRHEA ALVEOLARIS: TREATMENT BY THE OPSONIC METHOD.

By THEODORE CHAPIN BEEBE, M.D., Boston, Mass.,
INSTRUCTOR IN SURGERY, TUFTS COLLEGE MEDICAL SCHOOL; ASSISTANT SURGEON TO THE BOSTON DISPENSARY.

(Read before the Northeastern Dental Association, at its annual meeting, Crawford Notch, N. H., October 1, 1912.)

AN experience of several years in the treatment of pyorrhea alveolaris by the opsonic method—that is, by the use of bacterial vaccines—has led to some revision of the writer's opinions on this subject.

ETIOLOGY.

The consideration of the treatment of pyorrhea alveolaris, as with any other form of disease, presupposes primarily a knowledge of the cause or causes of the malady. Unfortunately, a clear and definite source, applicable to all cases, has not as yet been discovered. The fact that so many various conditions have been suggested seems to the writer to prove that no one of them can be attributed to all cases. Among the diseases and conditions brought forward as predisposing agents may be mentioned diabetes, Bright's disease, syphilis, rheumatism, gout, heart disease, liver affections, and auto-intoxication from faulty metabolism. Certain forms of nervous disorders also, and the presence of localized collections of pus in various portions of the body, have been suggested. The question always arises, also, whether calcareous deposits on the teeth cause pyorrhea, or whether pyorrhea causes calcareous deposits. It will thus be seen that, with so many causes at work, the observer can scarcely say that any given condition is the real reason for the disease in all, or even in many cases. For example, one of the writer's patients was told that the sole cause of her trouble was auto-intoxication from faulty metabolism. She immediately placed herself under the care of an intelligent dietetic expert in New York, where she remained six months. During that time her general condition was greatly improved, but, in spite of careful dental treatment, she lost three teeth, and the progress of the disease was not checked.

OPSONINS AND PYORRHEA.

It will probably be admitted by all that the underlying condition in pyorrhea, from whatever source, is an inflammation of the connective tissue of the gingiva in varying degree, associated in many cases with the presence of pus. Having had considerable experience with opsonic treatment in many other surgical forms of bacterial infection, it occurred to the writer that it might be possible to apply these principles to the opsonic treatment of pyorrhea. Here we have a definite localized condition of inflammation where, theoretically at least, opsonic treatment should be of avail. The question at once arose whether or not pyorrhea in every case might be caused by a deficiency in the normal protective substances found in the blood of the patient. It may not be out of place to review here, briefly, our present knowledge of the rôle of opsonins in the blood.

As you are all probably aware, Wright and Douglas of London discovered several years ago that the serum from normal and immune blood contains substances which they called opsonins, from *opsono,* "I prepare the food for." These opsonins, by their action on bacteria, render them more easily digestible by the polymorphonuclear leucocytes of the blood. They showed beyond question that this process depends upon the action of serum upon the bacteria. Bacteria suspended in salt solution resist this process of phagocytosis by washed leucocytes, while bacteria previously mixed with serum and then washed—that is, freed from serum—are quickly taken up and digested by washed leucocytes. Treated in this manner, bacteria are said to be "opsonified," while there is no apparent change in form, staining reaction, or function. The "opsonic index" means the relative amount of opsonins in the serum of a given patient, compared with the amount in the serum of a normal standard. To find the opsonic index of a patient in regard to a given bacterium, the average number of bacteria taken up per leucocyte under the influence of the patient's serum is divided by the average number taken up per leucocyte under the influence of a standard normal serum under similar conditions. In this way the opsonic indices of all the usual pathogenic bacteria can be found, and the results compared with the clinical and bacteriological findings. The opsonic index cannot be taken as a complete index of the anti-bacterial power of the individual under all circumstances, because opsonins are only a part, though probably the most important, of the protective substances formed in the blood. It must be remembered, also, that the opsonic index alone, without clinical and bacteriological corroboration, cannot be taken as a sure diagnosis of infection, because the index may be high or low according to whether the patient is improving or not.

MAKING A STANDARDIZED VACCINE.

It is now necessary to consider how we can increase the amount of opsonins in the blood. This has been shown by innumerable tests to be possible by the injection into the blood of suitable bacteria in proper amounts after sterilization. This is true in the normal individual, as well as in chronic infections due to the corresponding bacterium. Cultures of the organism causing the infection are grown, usually on agar slants or on blood serum, for about twenty-four hours. The growth is then separated from the medium and churned up in a tube with from 5 to 10 cc. of 0.85 per cent. NaCl solution. The growths in several tubes are emulsified in this manner, and are then sterilized in sealed tubes at 60° C. for about one hour. The suspension is standardized by counting the number of bacteria per cubic millimeter of fluid. After the bacteria have been killed, the tubes are unsealed and cultures are taken and incubated to make quite sure that the bacteria are dead. When the sterility of the emulsion is proved, it is diluted to the proper standard with 0.85 per cent. NaCl solution containing 0.25 per cent. carbolic acid. The "vaccine" is then ready for inoculation. Autogenous vaccines, *i.e.* vaccines made with bacteria obtained from the patient's own lesions, are not always necessary, but are sometimes desirable.

CONSIDERATIONS FOR INOCULATION.

On the inoculation of any vaccine, there is at first a period of diminished resistance, called the "negative phase," lasting normally from twenty-four to forty-eight hours. This is followed by a period of increased resistance, owing to the increase in the protective elements of the blood, called the "positive phase." After several days there is again a gradual decline in resistance, the so-called "secondary negative phase." It will therefore be seen that the next inoculation should be given only during the positive phase, in order that there may be an accumulation of the protective substances of the blood.

Hektoen summarizes as follows the considerations for inoculation:

(1) The power of the injected bacterial substances to stimulate the formation of opsonins and other specific antibodies.

(2) The belief that increased forma-

tion of such substances may hasten healing of the corresponding infections.

(3) The apparent inability of the body under certain conditions of natural infection to produce such substances without special stimulation.

The essential pre-requisites for therapeutic inoculations are:

(1) Correct etiologic diagnosis.

(2) Sterilized, pure culture of the bacterium causing the infection in each disease, or sterile products of such bacteria.

(3) The injection of proper doses at proper intervals, so as not to necessarily lower the anti-bacterial power, or cause other unfavorable disturbances.

ROUTINE OF VACCINE TREATMENT IN PYORRHEA.

The routine of treatment is as follows: At the first visit of the patient, a culture is taken from the gums around the affected teeth, care being taken to press toward the surface any trace of pus which may be present in the gums around the teeth. An autogenous vaccine is made from the bacteria found in the culture, if present, and used in the treatment, or, if thought best for one reason or another, a stock vaccine made from several virulent strains of the same bacteria may be used.

It is my custom to give the injections in the upper arm, having previously sterilized the skin with alcohol. After the injection the needle-puncture is sealed with collodion to prevent the possibility of infection from without. During the course of several thousand injections there has never developed an abscess at the site of the puncture. The dose varies according to the vaccine used. The standard minimum dose of staphylococci is 150 million, while that of pneumococci is 50 million. Our vaccines are standardized at staphylococci $\frac{1}{2}$ cc. = 500 million; pneumococci, $\frac{1}{2}$ cc. = 100 million. These are mentioned as being the two most common bacteria found in inflammatory conditions in the gums. The injections are repeated every three to five days, according to the local constitutional reactions and the experience of the operator.

Bearing this necessarily brief description of opsonic principles in mind, we will now return to a consideration of their application to the disease. First, however, let me state that a complete history of every case is obtained to see what conditions there may be present which may have a bearing on the disease, such as past and present sicknesses, the diathesis, and the mode of life. The urine is also carefully examined for signs of renal diseases and diabetes, and the amount of indican.

BACTERIAL AND OPSONIC FINDINGS IN PRACTICAL CASES OF PYORRHEA.

An analysis of the author's first seventeen cases shows that in six cases the culture revealed a practically pure growth of pneumococci. In all the others the growth was principally one of pneumococci with a small admixture of staphylococci. As compared with cultures taken from normal mouths, and in connection with the opsonic indices, this showing is most significant. We all know that the mouth contains many bacteria normally, but cultures never show growths such as were found in this series. We will now examine the opsonic indices in these cases. In one case the index to pneumococci was 48 per cent. of normal; seven varied from 52 to 59 per cent.; two from 61 to 65 per cent.; four, from 70 to 78 per cent.; one was at 80 per cent., one at 95 per cent., and one at 120 per cent. The indices for staphylococci varied from 36 to 145 per cent., all but four being below 87 per cent. It will thus be seen that the presence of these bacteria in the gums was corroborated by the corresponding opsonic indices, showing that the blood of these patients was deficient in the normal protective substances. The occasional high indices are accounted for by the fact that the blood was temporarily, at least, manufacturing more protective substances than usual. In all cases of doubt, a series of indices, taken at regular intervals, will show whether the high level is being maintained. For the past two years or more it has not been thought necessary to take the opsonic indices, because of the uniform results secured by the writer and other workers in this field.

CONCOMITANT DISEASES.

In but one case was there any sign of renal disease or diabetes. Two patients had an indefinite previous history of rheumatic tendency. Two others had constipation and indigestion to a slight degree. In four there was a precedent family history of pyorrhea. Every case had recession of the gums. Many cases showed active pus which could be expressed on pressure around the teeth. The duration of the disease varied from three to forty years. The presence of the spirochæta refringens was not demonstrated in any case. Except as noted above, the patients were all in good general physical condition. At the time of examination, many of the cases showed red and tender gums about the affected teeth, and most bled easily. Four patients had loose teeth at the time, but two of these four had lost teeth previously from the disease. All cases were referred to me by careful and capable dentists, and all were having thorough dental treatment. One patient had had, in addition, I K I treatment locally during the previous year, without apparent benefit. Whenever it was necessary, as in constipation, rheumatism, or other abnormal condition, appropriate remedies were given. On examination of the urine several cases have shown an increase in the amount of indican, pointing to a disturbance in the digestive processes.

TWO EXTREME EXAMPLES OF EFFECT OF VACCINE TREATMENT FOR PYORRHEA.

The length of time of opsonic treatment varied from four weeks to nine months, with remissions from time to time. The shortest case was that of a lady, sixty years of age, who presented on March 21, 1908. Her gums were red, inflamed, and bled easily. There was recession of the gums but no loosening of the teeth, although she had previously lost one. A culture showed a pure growth of pneumococci, while her opsonic indices to pnemococci varied from 67 to 81 per cent. of normal. Injections of an autogenous vaccine of pneumococci at intervals of three and four days, increasing steadily from 50 to 240 million, were given for four weeks. At the end of this time the gums were of normal appearance, there was no tenderness or bleeding, and there has been no recurrence for four years.

The longest case noted is of an entirely different character: On February 26, 1908, E. G., sixty-five years of age, presented. She had had pyorrhea for forty years. She had lost all her upper teeth, all the lower molars, and two bicuspids. The gums around the lower teeth, which were all loose, were spongy and ulcerated, and pus could be seen around all the teeth. The pain on eating was so great that she had made no attempt to chew meat for many months. Cultures from the pus showed a growth of staphylococci and pneumococci, and the corresponding opsonic indices were 36 per cent. and 58 per cent. There was a definite history of an acute lighting-up of the disease one year previously, following an attack of grippe It seems very probable that, in this case, the infection secured a foothold at that time from which it was never dislodged.

Autogenous vaccines were made, and injections varying from 200 to 500 million staphylococci and 60 to 120 million pneumococci were given every three or four days. There was a gradual, though slow, improvement during the first month. The ulcerations began to heal, the odor was less foul, and the tenderness and bleeding were greatly diminished. During the next month the improvement was more marked, and by the end of the third month the gums were of normal color and texture. There was no bleeding, and the patient could chew with comparative comfort. During this time, however, three very loose teeth, the lower left incisors and canine, which had been held in place by silk from the beginning of treatment, were removed, cleaned, and tied in place again. The lower right canine and first bicuspid, which had been slightly loose, were found to be much more firmly held than before. The indices taken from time to time remained consistently above normal. Owing to the fact that some of the teeth have become almost solid, the patient insists on continuing the treatment from time to time, in the hope that all the teeth will become firm. She has been told many times that, where the alveolar process has been absorbed, there is probably no chance of its regeneration so as to enable the teeth to become very firm. In spite of this she is most hopeful, and insists on having the treatment, saying that at any rate it makes her feel better. The teeth which were taken out and cleaned are now held in place by a gold brace behind the teeth, and there appears to be a slight adherence of the gums around them.

Ranging in severity between these two examples are many types, some of which yielded readily to treatment, while others were more resistant. In the cases where there was no loosening of the teeth the beneficial results were more quickly obtained, as may be imagined. In all cases where there was tenderness, inflammation, and bleeding of the gums, relief was obtained usually inside of one week. In most cases where pus was present there was considerable resistance to treatment, lasting from a few weeks to four or five months. In a few instances loose teeth became markedly firmer.

RÉSUMÉ OF TYPICAL CASES.

A brief *résumé* of typical cases may be of interest.

February 29, 1909, T. B., fifty-nine years. Treated for past ten years for pyorrhea. Has lost two upper molars; has several loose teeth at present. General recession of gums, which are tender and bleed easily. To chew meat hurts him. No pus seen. Treated seven weeks with staphylococcus and pneumococcus vaccines. At end of that time, the gums were in healthy condition. The patient could chew beef easily, and there was no bleeding from use of a brush. The teeth felt firmer, but were still slightly loose.

March 5, 1908, E. C., twenty-eight years. Treated for twelve years. Has lost three teeth. Recession of gums. Several loose teeth with pus around them; is wearing a brace. Gums red, swollen, and painful most of the time. Does not attempt to chew meat. Treated three months with staphylococcus and pneumococcus vaccines with marked benefit. When patient stopped treatment, in order to go away for the summer, there was no inflammation of the gums evident. There was occasionally a trace of pus seen. She was told to return for treatment in the autumn if she still had trouble, but did not appear. In this case there was no evident tightening of the teeth while the patient was under treatment.

October 20, 1908, A. C., forty-seven years. Three years' duration. Two loose teeth at present. Gums slightly inflamed and tender; no pus seen. Gums bleed easily on using a brush. Injections of pneumococcus and staphylococcus vaccines were made for nine weeks, when the patient was obliged to leave town. At that time her gums were of normal color and were not tender or bleeding. The teeth felt much less insecure, and she could chew without tenderness.

November 19, 1908, P. F., forty-nine years. Disease of ten years' standing. Frequent scaling of teeth, and local treatment with I K I for past year without benefit. Patient was sent to me by his dentist as being a particularly difficult case to treat. Has lost several teeth. Recession of gums for many years. Gums red and boggy with free pus around four loose teeth. Cannot eat meat, because of pain on chewing. Given autogenous vaccines of staphylococcus and pneumococcus. By the end of the month the gums were in nearly normal condition, with no redness or tenderness. There has been constant improvement since then. At present the only symptom noticed is a rare trace of pus around one of the lower incisors. The loose teeth have all become markedly firmer, especially the lower incisors.

March 24, 1908, W. G., sixty years. Fifteen years' duration. Has lost eight teeth. Two loose teeth at present. Gums slightly inflamed, but there is no pus present. The loose teeth are very tender and painful on chewing. The patient was given an autogenous vaccine of pneumococcus for five weeks, at the end of which time she discontinued treatment, as she lived at a distance of seventy-five miles. When she stopped treatment there was no inflammation of the gums, and no tenderness or pain in the teeth on chewing. When heard from recently there was no recurrence, and the loose teeth were much firmer.

February 17, 1909, A. H., sixty-four years. Pyorrhea for from ten to twelve years. Has lost two teeth recently, and there are four loose teeth at present. Gums bleed easily, and occasionally become red and tender. Some pus around upper molars. The patient eats no meat because of pain on chewing. Because of looseness and projection of one of the upper left molars, the teeth do not come together well. Culture shows a pure growth of pneumococcus. The patient was given autogenous vaccines of pneumococcus and staphylococcus. In this, as in several other cases, the staphylococcus vaccine was given because of a low opsonic index and for its stimulating effects. Treatment lasted six weeks. At the end of that time there was no redness or tenderness of the gums, and the teeth were not at all painful. There is no discomfort on eating meat. The patient feels much stronger and in better general condition. The upper left molar, which was loose and projecting, has gone back into place and is firmer, so that the upper and lower teeth meet better. Treatment is discontinued, because patient is going abroad.

October 12, 1908, A. K., forty-five years. Duration of three years. Gums receding; are occasionally red, tender, and bleeding. No loose teeth and no pus seen. The patient had been treated for the past year in London by scaling, etc. After opsonic treatment for two months her dentist advised stopping for a while, as in his opinion the condition was entirely relieved. No recurrence.

January 25, 1908, S. S., thirty-eight years. Five or six years' duration. Has had recession of gums from the beginning, and has lost three teeth during the past year. Pus always present as teeth begin to loosen. At present none of the teeth are very loose, but two are just beginning to loosen. Gums are red and tender, and there are small ulcerations about the loose teeth. No especial bleeding except when a stiff brush is used. After two weeks' treatment, there was much less redness, and practically no tenderness. The teeth also felt firmer. At the end of one month the ulcerations were all healed, and the gums were apparently normal. Two weeks later the teeth were quite firm, and treatment was stopped. When seen over a year later, there had been no sign of recurrence.

TWO CASES OF GUM INFECTION.

Two other cases, not pyorrhea, but of infection through the gums, may also be of interest:

November 28, 1908, D. B., twenty-two years. Born and brought up in Ireland, the patient lived there until three or four years ago. Has had hypertrophy of the gums since she was five years of age. Gums are always red and tender, and bleed very easily, particularly when eating. On account of the pain she does not chew her food; is suffering from poor digestion for this reason. Pus is usually present around the upper and lower incisors. Culture shows practically a pure growth of pneumococcus with a few staphylococci. After a week's treatment with autogenous vaccines there was very little redness and bleeding of the gums, and the appetite was much improved. At the end of a month the patient stopped treatment, as she felt so much better. The gums were of normal color, much shrunken from the former condition, and there had been no bleeding for two weeks. She could chew meat easily, had a splendid appetite, and her general condition was excellent.

H. R., twenty-nine years. Two years previously, August 1907, the patient had undergone treatment of left upper canine by a country dentist, who for some reason filled the canal with an arsenical preparation. This was removed later by her regular dentist. One year ago (April 1908) she developed an abscess in the roof of the mouth, near the root of the upper left canine. This abscess was incised, and pus containing staphylococci and pneumococci was evacuated. No bare bone was felt. The patient was given autogenous vaccines for three weeks, during which time the abscess healed. One month ago another abscess in the same location appeared, and was opened. The tooth was removed, and a communication was found between the opening in the roof of the mouth and the socket; bare bone was felt with a probe. It seemed singular that the channel remained open and discharged pus in spite of opsonic treatment, until, two weeks later, a sequestrum one-fourth inch square and one-eighth inch thick, was removed from the palate process. The wound then promptly healed.

CONCLUSION.

It seems probable that, underlying all the various conditions which contribute to the onset and progress of pyorrhea, there is a deficiency in the normal protective substances in the blood. This is shown by the almost invariably low opsonic indices to the same bacteria which are found to be active in the gums. We have found that, whatever conditions may be present, as soon as the blood is stimulated to form new protective substances, there is an immediate improvement in the patient's condition, both locally and generally. It must be distinctly understood—and this point cannot be too strongly emphasized—that in order to secure the best results, the opsonic treatment *must be* combined with careful and thorough dental treatment. The statement is often made that the disease can be held in check, and sometimes cured, by dental treatment alone. This is probably true in some cases, but most of the patients seen by the writer were referred by good dentists, being cases which they were unable to benefit. As a rule, the opsonic treatment is slow, and it may take several months before the gums are free from pus and in a healthy condition. Especially in these cases is it necessary to assist nature by removing calcareous deposits which act as a constant irritation, fastening loose teeth for the same reason, and correcting malpositions. Wherever it is found that some constitutional condition is complicating the case, this must be relieved as far as possible, as in any other disease.

There are many cases which are considered as pyorrhea alveolaris in which there is no pus to be demonstrated, and no evident inflammation of the gums. There is a gradual and chronic recession of the gums, with eventual loosening and dropping out of the teeth. Several of these cases have been treated, with no apparent benefit. In these cases it has been impossible to discover the cause or to stop the progress by dental or other forms of treatment. It is possible that in time these cases may be cured by some means as yet unknown.

The writer is often asked whether teeth that are already loose can become firm again. Patients are told that the cause of the teeth becoming loose is the absorption of the alveolar processes about the sockets, and that in all probability opsonic treatment will not cause a regeneration of the bony structure. In the face of this statement there is absolutely no doubt that in several cases the teeth have become firmer. Another question often asked is as to the length of time the improvement will continue after treatment has stopped. It is too soon to answer that question satisfactorily, owing to the shortness of time which has elapsed since this method of treatment was begun. It is my procedure to tell patients that, when they are relieved once, it is easy, reasoning from results obtained in opsonic treatment of other diseases, to hold the disease in check on the first appearance of further symptoms. It is unfortunate that many of the patients have had the trouble so long, and have suffered so much from it, that unless they obtain immediate results, and are promised future immunity, they easily become discouraged.

Judging from the results so far obtained in all stages and degrees of pyorrhea, it is apparent that we now have at our disposal a method of treatment which, though often slow, is constant in its good results, especially when combined with thorough dental treatment.

CONCERNING THE SCIENTIFIC METHOD OF FILLING TEETH.

By GEO. C. NICHOLSON, M.A.C.D., Melbourne, Australia.

(Read before the Third Australian Dental Congress, held at Brisbane, July 8, 1912.)

BEFORE dealing with the actual operation, it may be well to first speak of the causes of dental caries and to give a brief *résumé* of its etiology. As the study of bacteriology has, within recent years, altered our whole conception of the causes of disease, consequently our methods of treatment have been changed.

ETIOLOGY OF DENTAL CARIES.

The production of caries in teeth depends almost entirely upon the presence of micro-organisms or bacteria in the mouth, and among those isolated and cultivated by Miller, twelve were characterized by the formation of lactic acid, one of the most active agents of dental disintegration.

The late Professor Miller described dental decay as a "chemico-parasitical process consisting of two distinct stages, viz, decalcification or softening of the tissue and dissolution of the softened residue, and liquefication of the gelatinous matrix."

Tomes says—"Caries is an effect of external causes, in which the vital forces of the individual play no part."

Once a breach has been made by decalcification, other organisms, or possibly the same, take an active part in further disintegration. Numerous micro-organisms are always present in the mouth, which, being moist and warm and well supplied with food, is a well-devised incubator wherein organisms may multiply. When food—particularly of a carbohydrate nature—and micro-organisms are left together, fermentation sets in, and acid, chiefly lactic acid, is generated.

First the enamel is attacked, after which the dentin becomes accessible to the above-mentioned chemico-parasitical process, when sufficient destruction of dentin occurs to subject the nerve tissue to irritation and subsequent inflammation of the pulp.

THE RÔLE OF FOODSTUFFS IN DENTAL CARIES.

The various foodstuffs consumed by man are (1) albuminous, or proteids; (2) fats, and (3) carbohydrates (starch and sugar).

(1) *Proteids.* The action of the mouth bacteria upon proteids is such as to give rise to the products of putrefaction with an alkaline reaction. They have no solvent action upon the teeth, but neutralize, to a certain extent, the acids with which they come in contact.

(2) *Fats,* or their products of disintegration, have practically no action, so far as is known, on the teeth.

(3) *Carbohydrates.* These are converted into one or another of the various forms of sugar by certain bacteria and ptyalin, the active principle of saliva. These conversion products undergo further change by the agency of bacterial fermentation, with the ultimate production of acids—viz, lactic, butyric, citric, malic, and tartaric—principally, however, lactic. The focus of infection on the enamel is established by means of a bacterial plaque, or by food settling in a crevice of the enamel, and the calcium salts in the enamel, being attacked by acids thus generated, are dissolved; and with a breach once formed, the fermentative process can proceed uninterruptedly. On the dentin being reached,

bacteria invade the dentinal tubules and complete the work of disintegration.

BACTERIOLOGY OF DENTAL CARIES.

The principal organisms found in carious dentin belong to the order of cocci and bacilli. Those that are the most common are the streptococcus brevis, staphylococcus albus, staphylococcus viscosus, various sarcinæ, leptothrix, and members of the mesenteric group of bacilli. Whereas the cocci are for the most part acid-formers and decalcifiers, the mesenteric group act as liquefiers of the decalcified dentin.

The relation of bacteria to the oxygen of the air is so important a factor in the life of these organisms that it enables a biological division to be made among them. Some bacteria will live and develop only when oxygen is present; these are called (1) *obligatory aerobes.* Other bacteria live and grow only when no oxygen is present. These are called (2) *obligatory anaerobes.*

In still another class the presence or absence of oxygen is a matter of indifference. These may be grouped into—(*a*) those which are preferably aerobes but can be anaerobes, and (*b*) those which are preferably anaerobes, but can be aerobes. As a matter of fact such differences are manifested only in a slight degree, and all such organisms are usually grouped as (3) *facultative anaerobes, i.e.* preferably aerobic but capable of existing without oxygen.

The majority of pathogenic bacteria are facultative anaerobes, and in this class, I think, may be safely included the organisms found in carious dentin. Recognizing the cause of caries and the conditions which are necessary antecedents, the process of filling teeth then emerges from empiricism and becomes a scientific operation.

SHAPE OF FILLINGS.

All fillings must be so shaped that no food will lodge at their edges, and must, of course, be retentive and with no fine edges of enamel left standing. Briefly stated, there should be no marked raggedness. The enamel margins should be smooth, and as nearly as possible at right angles to the surface of the tooth; in the masticating surfaces of bicuspids and molars, however, the margins may be beveled slightly outward, but not sufficiently so to make a ragged edge. The general shape of all cavities should give a curved appearance to the filling, which should have no very pronounced angles. When an approximal surface of a tooth requires to be filled, it is nearly always necessary to contour it, not only to prevent the lodgment of food at the edge of the filling, but also to prevent the change of position of the teeth which will surely take place unless this precaution be taken. This point is called the "point of contact."

FORMS OF CAVITIES.

Various forms of cavities are met with:

(1) Simple cavities in which the enamel and a portion of the dentin is penetrated on one surface of the tooth.

(2) Compound cavities, some involving—

(*a*) One or more surfaces, but not penetrating more than one-third or one-half of the dentin.

(*b*) Others involving an exposure of the pulp, and therefore requiring extirpation.

(*c*) Others, again, occur in which the death of the pulp has already taken place some considerable time previously, and the gangrenous pulp has infected the dental periosteum.

STEPS IN THE PREPARATION OF A TYPICAL CAVITY.

As consideration of the treatment of all the above cases would occupy too much time, I propose to take a typical case, and deal with a simple cavity.

We find the enamel penetrated, and the dentin involved to a considerable depth. The cavity contains a mass of carious débris, and the tubules have become penetrated by and infected with various micro-organisms. First it is necessary to remove the carious matter, after which the cavity must be properly shaped and sterilized. In order to obtain the best results, the rubber dam should be applied to two or more teeth adjoining the tooth under treatment, if practicable. In the case under treatment, we will suppose the cavity to be in the crown of a lower first molar, which will make it a comparatively easy operation. The dam is applied to the molar by the aid of a clamp, and to the second bicuspid by ligaturing it. The removal of the carious matter is effected by excavators and excavating burs, the cavity being finally shaped by wet carborundum stones and disks; when this has been effected, and sufficient of the dentin has been removed, the all-important part of the operation—sterilization of the cavity—is reached.

STERILIZATION OF THE CAVITY.

As we have seen, the micro-organisms which have invaded the tooth structure are "facultative anaerobes," *i.e.* aerobes, but capable of existing without oxygen. If, therefore, any be left in the cavity after the filling is inserted, caries may recur, and this negligence Ottolengui condemns as "malpractice." When, however, bacteria exist in unfavorable conditions, multiplication takes place with difficulty.

The ordinary method of sterilization consists in the use of moist and dry heat at high temperatures. This method is inadmissible and impossible in the mouth, therefore other means must be used to bring about comparative asepsis. The term sterilization is used very often with regard to the cleansing of instruments, cavities, the hands, etc., with a surprising amount of vagueness, as are also the terms germicide, deodorant, disinfectant, and antiseptic.

Perhaps it may not be amiss here to define these several terms:

Sterilization is the destruction of all spores and germs, no matter where situated—as by heat, etc.

Germicide and *disinfectant* are now used synonymously. They are agents employed for the destruction of germs, *e.g.* mercury bichlorid, hydrogen dioxid, formaldehyd, chlorin, etc.

Deodorant. A medicinal agent capable of destroying infectious and fetid odors, but not necessarily a germicide; *e.g.* creasote, thymol, iodoform, etc.

Antiseptic. An agent which prevents or retards the growth of bacteria without necessarily killing them. All disinfectants in weak solutions are antiseptics, *e.g.* carbolic acid, boric acid, iodol, hydronaphthol, the essential oils, etc.

In sterilizing the cavity, therefore, as we cannot employ the necessary heat, it is requisite to employ an effective germicide or disinfectant, such as carbolic acid, silver nitrate, mercury bichlorid, hydrogen dioxid, and to any one of these may be added one of the essential oils as a deodorant.

The cavity may be sealed with gum mastic and cotton for not longer than twenty-four hours; if, however, it be considered necessary to leave the antiseptic dressing for a longer time in place, I consider it should be sealed with an osteoplastic filling, otherwise the beneficial effect of the dressing will be nullified.

Personally, for small simple cavities, I prefer to sterilize and fill on the same day, if possible, considering that thus quite as good, if not better results will be gained than by taking the risk of the cavity becoming reinfected. For that reason, after allowing the germicide to be retained for about five minutes, I remove the dressing, dry, and then dehydrate with absolute alcohol, using a hot chip-blower.

FILLING MATERIALS.

At this stage the cavity is ready to receive the filling, and we may now consider the filling materials at our disposal. These are—

(1) Gold, cohesive and non-cohesive.

(2) Amalgams of mercury with single metals, as copper and palladium; mercury and alloys of two or more metals, mostly silver, tin, zinc, copper, gold, etc.

(3) Osteoplastics, three principal varieties—(*a*) Oxychlorid of zinc. (*b*) Oxyphosphate of zinc. (*c*) Oxyphosphate of copper. 2d. Silicate cements.
(4) Gutta-percha.
(5) Inlays of porcelain and gold.

Of all the filling materials above mentioned, the osteoplastics alone, when properly introduced into a cavity, adhere to the cavity walls. As they are composed of antiseptic materials, cavities should be lined, whenever it is possible, with one of these cements, as by this means the dentinal canaliculi are hermetically sealed against the entrance of micro-organisms.

Cements. Cements may be divided into two classes—(*a*) Osteoplastics, (*b*) Silicates. We will first consider the osteoplastics, which are subdivided into two classes, viz, oxychlorids and oxyphosphates.

Zinc oxychlorid. This is composed mainly of zinc chlorid and zinc oxid. This material is principally used as a root-filling and a lining for cavities. It should not be used in a deep cavity, as it is an irritant, and might cause the death of the pulp. While zinc oxychlorid is an antiseptic filling, it must be regarded as a temporary one when exposed to the action of the saliva, which rapidly disintegrates it.

Zinc oxyphosphate is mainly composed of zinc oxid, magnesia, aluminum, silicate, and phosphoric acid. This material is to be preferred to oxychlorid of zinc, as it is less irritating, and not quite so easily dissolved. It is an excellent lining for cavities, and has proved itself invaluable for setting pivots, crowns, and bridges; but like the oxychlorid it should be regarded as only a temporary filling, the serviceability of which is impaired by an improper method of mixing.

Dr. McCauley has published an interesting table in his paper appearing in the DENTAL COSMOS for February 1912,* which is well worth consideration. When we consider the numerous makes of cement appearing under various names, it is surprising how very few stand the test for expansion, shrinkage, and porosity. As with McCauley's tests of amalgams, however, it must be remembered that these cement tests are made *outside of the mouth.* I have found that, on the whole, when cements are protected from the action of the saliva, the oxyphosphate, in particular, acts very well, and is a means of preventing recurrent caries.

Oxyphosphate of copper. The same may be said of oxyphosphate of copper, which to a marked degree possesses adhesive properties; its color, however, seems to limit its popularity. For deciduous teeth it is an excellent filling material.

Silicate cements. The second class of cements consists of the silicates, or, as they are often termed, translucent, or porcelain cement fillings.

Various makes of this class have been before the profession for some time. The disintegrating action of the saliva condemned quite a number, while others became discolored thereby, rendering them useless for the purpose for which they were inserted. Some, however, have lasted well, and it is to be hoped that the most recent of this class will prove an exception to its forerunners. This material looks remarkably well in distilled water; but, unfortunately, distilled water is not human saliva, and time alone will tell whether we now have the all-to-be-desired filling in our hands. I certainly do not think any cement, translucent or other, should be placed where it has to bear the stress of mastication. It is, of course, absolutely necessary, when inserting *any* cement filling, that the cavity be dry and protected with the rubber dam.

GOLD.

Gold is without doubt the most reliable filling material, and the method of its insertion which I have used exclusively for the last six years was described in the DENTAL COSMOS of No-

* "Amalgams: Their Manufacture, Manipulation, and Physical Properties. Cements: Their Manipulation and Physical Properties." By C. M. McCauley. DENTAL COSMOS, February 1912, p. 174.

vember 1907, by Dr. J. Leon Williams of London.* It is as follows:

The cavity is prepared in the ordinary fundamental way, *i.e.* retentive in shape. The enamel margins being well defined, retaining pits or grooves are unnecessary, as, after the cavity has been dehydrated with absolute alcohol, a small quantity of a quick-setting cement is introduced and placed on the floor of the cavity. This is allowed to remain until it is tacky, after which a fairly large piece of moss fibre gold is pressed firmly into place, as evenly as possible, commencing from the center.

The cement will now be seen to spread itself over every part if a suitable broad condensing plugger be used, care being taken not to allow the cement to reach the enamel margin. Should this occur, it is best not to attempt to remove it until the cement has set thoroughly, when it is easily and cleanly picked off with an excavator.

I usually allow the cement to remain five minutes before attempting to condense the gold. This interval is allowed, because any cement, no matter how rapid in setting, requires at least that time to get reasonably hard and to withstand the pressure necessary for thoroughly condensing cohesive gold. When the cement has set well, the edges of the enamel should be thoroughly examined. This is most important, as, should any cement be allowed to remain there, it will certainly crumble under the mallet and will prove a danger-spot.

When everything is satisfactory, the operator proceeds in the ordinary way, taking care, of course, not to use too large pieces of gold. I have for the last ten or twelve years always finished my gold fillings with heavy rolled gold foils, Nos. 120, 60, 40. I like No. 60 best; three layers of No. 60 rolled gold will make an ideal finish.

The filling is burnished thoroughly with a steel or agate hand or engine burnisher, and, in the case under treatment, reduced with finishing burs or Arkansas stones, and finished with little rubber, moose-hide, or wood points, charged with fine pumice. (For anterior teeth, of course, we use cuttlefish or other strips and disks and little rubber cups.)

I consider that in this way a scientifically correct gold filling is inserted.

At the last dental congress, held in Melbourne three years ago, I gave a clinic demonstrating my method of making a gold filling as above described, and then stated that I did not claim that all gold fillings should be so inserted, but that I considered it one of the best methods of filling. A further three years' experience convinces me that it is absolutely the most reliable and perfect filling I can insert. It will save teeth by reason of its being cemented into place —which, as we have seen, renders it impervious to the ravages of dental caries. It also supports instead of weakens frail walls, and is a filling inside a filling.

The gold and porcelain inlay, which it is here unnecessary to describe, will last—for the same reason, viz, its being cemented into place—until the perfect plastic for which we still hope supersedes zinc oxyphosphate, gold, and porcelain.

AMALGAM.

Amalgam is the filling material next in importance. Here let me speak of the customary method of inserting an amalgam filling.

Unscientific method of introducing amalgam fillings. The alloy is placed in a mortar, and a sufficient quantity of mercury is shaken into it. The two materials are then triturated together, until a pasty mass results; this mass is then "worked up" in the hand—sometimes a moist and not scrupulously clean one—after which the excess of mercury is squeezed out in a dirty piece of chamois leather, and the filling is packed into the cavity as quickly as possible.

I was an articled pupil twenty-five years ago, and this method was largely in vogue at that time; but quite recently I saw a dentist of standing fill a tooth

* "Gold, or Gold and Platinum, Cemented Linings for Amalgam and Gold Fillings." By J. Leon Williams. DENTAL COSMOS, November 1907, p. 1157.

in this way, without even having the rubber dam in place. We are supposed to be practicing as dental specialists, with scientific training, but are those who work on such haphazard lines deserving of being so classified? It was excusable to insert fillings as above related twenty-five or thirty years ago, the science of bacteriology being then but in its infancy, and the practice of dentistry not having at that time reached the high standard which it now occupies. Exactitude in his minutest processes stamps the work of a man of high ideals.

Physical properties of amalgam. Before proceeding to discuss the method of filling teeth with amalgam, it is necessary, first, to consider some of the physical properties of this most valuable agent and its behavior in general practice.

To Prof. G. V. Black we are indebted for the exhaustive investigations he made, the results of which were published in the DENTAL COSMOS as far back as 1895.

He showed that, if a block of amalgam be submitted to stress, and the force be applied rapidly by means of a screw, when the stress reaches a certain point the block of amalgam bursts in pieces with a crash; this point is termed the "crushing stress." If the block be submitted to constant stress, less than the "crushing stress," it is found that the mass gradually yields. This movement is termed the "flow" of the amalgam, and as a result of this flow the whole filling changes shape when under pressure, such as exerted by mastication.

Another point Professor Black showed in his investigations, when considering the silver-tin alloys, is the "aging" of amalgam. Tomes defines this phenomenon as—"the curious fact that, as regards expansion or shrinkage, the same sample of alloy will be found to give different results according as it is used when freshly cut from the ingot, or after a lapse of some time." Dr. McCauley, in his paper before referred to, says: "The best assurance we may have in our amalgam work against recurrence of caries is the certainty that our fillings will not shrink sufficiently to allow micro-organisms to enter between the filling and the cavity wall, and will not permit sufficient flow to disturb the marginal adaptation." Proceeding, he says: "One of the dearest and most widely advertised alloys was tested, and I found, during the first twenty-four hours, 6/10,000 of an inch, or six points, of shrinkage; twenty points, or 20/1000 of an inch of flow, which is nearly one-fourth its volume; and an average strength of only 236 pounds. Such shrinkage is absolutely fatal; the flow is ten times more than it should be, and the strength only two-thirds as much."*

Bearing in mind that when inserting amalgam fillings we believed we were at least dealing with a stable mass, when it was placed in position under proper and scientific conditions, this statement from such an authority is a very disquieting one. If we consider the minuteness of the organisms with which we are contending, and which usually do not measure more than 1 micron (1/25,000 of an inch) in diameter, it will be seen that a force of microbes about seven or eight abreast can march from all positions around our filling which we considered safely stopped.

It will further be seen that the non-recurrence of caries under these circumstances is largely a matter of *luck*—which, it must be admitted, is not what one generally relies on to build up a creditable or lucrative practice!

Lining the cavity. As early as 1883, Marshall Webb recommended that cavities be lined with either oxychlorid or oxyphosphate of zinc, as non-conductors; and Ottolengui, in his book on "The Methods of Filling Teeth," recommends that amalgam be cemented into place—not, however, for its therapeutic value, but for the retention of very shallow fillings. For the last seven or eight years I have adopted the method of lining cavities with cement, with most satisfactory results wherever absolute dryness was obtainable. When, however, these conditions do not prevail, and when

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* DENTAL COSMOS, vol. liv, 1912, pp. 175 and 176.

the rubber dam will not keep out the creeping moisture, I have adopted a plan of my own, which I have found to work very well, and which I hope my *confrères* will try for themselves.

With the saliva ejector, bibulous paper, cotton rolls, and Stokes' and other clamps, we can do a great deal to reduce moisture, but cannot obtain the requisite degree of dryness necessary when using cement. I therefore use copper amalgam as a lining for such cavities.

Copper amalgam as a cavity lining. Colyer says, "Copper amalgam does not flow under stress; it does not shrink nor expand." The black discoloration is due to the formation of copper sulfid, which has proved itself a valuable germicide, and has been a means of saving very many badly broken-down teeth. In considering copper amalgam it is necessary to state that, while it possesses valuable therapeutic qualities, it has also one very pronounced fault, which must not be overlooked.

The desirable quality in a copper amalgam filling is to have it, after insertion, turn a coppery black when it sets —then all will be well. It very often remains gray, however—the color of a silver-tin amalgam; when this is the case, disintegration rapidly takes place. I am inclined to think that this is largely due to the method of treating after deflagration. I always warm both pestle and mortar and thoroughly triturate, inserting the amalgam fairly dry, using it as a lining only, and completing the filling with one of the harder amalgams, pressing one amalgam into the other.

The union of the two amalgams is perfect. I have made test pieces with copper amalgam and the following well-known alloys, viz, Foster Flagg's Contour and Submarine, Fellowship, DeTrey's, True Dentalloy, Standard, C. A. S.—in fact, any alloy that came under my notice. I may say that when making these test fillings I did not use more force than when filling a tooth in the mouth.

I consider that notwithstanding the liability to disintegration of copper amalgam when exposed to the free action of the saliva, the remedy I have mentioned above should save it from being banished from our surgeries—as doubtless it has been, and is, a valuable tooth-saver.

AUTHOR'S TESTS IN REGARD TO HERMETIC TIGHTNESS OF AMALGAM FILLINGS.

Prof. Black has said that most amalgam fillings contain from 10 to 15 per cent. of air which it is impossible to press out. If an old filling that has been in a tooth be placed in a deflagrating spoon and heated, it will give off a very bad odor, showing that organic matter must be present, which has certainly been the home of microbes. If it is impossible to exhaust the air out of an amalgam filling itself, what amount of air remains between the filling and the walls of the cavity? To this must be added the space created when the amalgam crystallizes, and also the shrinkage that has been proved to take place in almost every alloy. Some makers of alloys assert that their amalgams expand, but my experiments and experience have shown me that there are very few amalgams that, *outside* the mouth, make a watertight plug if left long enough submerged. For a while I used, for experiments, little glass tubes about a quarter of an inch in diameter. I inserted a cork at one end, and filled in amalgam on top of the cork. When the filling had set I removed the cork, and at the opposite end I put in red ink. The result was failure almost every time. I then changed the materials, as I did not consider cork a fair substitute for dentin, and used vulcanite in place of the glass tube. I drilled holes of all sizes and filled into these various amalgams, not using undue pressure in the operation, and, after waiting about a quarter of an hour, I laid the vulcanite into black or red ink. After immersion for some days I cut through the vulcanite and filling with a fine saw, and it was easy to detect the watertight plug. From the result of these rather crude experiments I determined that, if I wished to prevent recurrent caries, the cavities should be lined with either cement or copper amalgam.

I continued the experiments with vulcanite and lined the cavities with either cement or copper amalgam, and inserted the amalgam as before, the result being invariably satisfactory. I then adopted this method in practice—with, certainly, more satisfaction than I had previously obtained. If the amalgam filling still contains from 10 to 15 per cent. of air filled with microbes, and even allowing for a certain amount of flow which may take place under pressure of mastication, micro-organisms have still to pass copper amalgam or cement before reaching the dentin. Ultimately, of course, they may reach it, as cements are not always free from porosity, as we have seen. Copper amalgam does not flow or shrink, and the copper sulfid arrests the progress of the microbe and prevents a condition favorable to further attacks of caries.

Sometimes, if the cavity be extensive, I add to the cement a little chinosol or hydronaphthol, which drugs do not in any way injure the setting qualities of the cement, and are good antiseptics.

Use of matrices. In filling teeth with amalgam in approximal cavities in bicuspids and molars, it is necessary to use the matrix in order to obtain the requisite condensation of the filling material, and also to obtain four walls. In two adjacent cavities it is better to fill the less accessible first.

Although there is no unanimity among authorities as to the use of matrices, especially in regard to the difficulty of obtaining perfect adaptation of the filling to the enamel margins and point of contact, this possible drawback is overcome by subsequently adding a little amalgam to the filling before it has set, after the matrix has been removed; the filling can then be finally contoured.

GUTTA-PERCHA.

Gutta-percha employed in its proper place is very useful indeed. The best results are obtained with it when the cavity is dry, but as it will not bear attrition it should never be placed in an occluding surface. Gutta-percha is useful in cavities caused by denture clasps. These cavities are usually extremely sensitive, and, if they are excavated deeply enough for a metal filling, the pulp may be jeoparded. But with gutta-percha this danger will be obviated largely.

For buccal and lingual cavities near or under the gum, gutta-percha gives more satisfaction than any other material, especially in the case of elderly people. Gutta-percha is not, however, watertight in the ordinary acceptation of the term, and therefore cannot, in my opinion, be classified as a permanent filling. It is a non-conductor, and for this reason is useful as a capping in sensitive dentin.

I am using this material principally as a temporary filling and for root-canals, besides its employment in the above-mentioned cavities. There are several good makes, but I prefer the pink or white base-plate to all others.

My method of inserting gutta-percha is as follows: Having made the cavity as dry as possible, I apply a little oil of cajuput on a pellet of cotton. Then a fair-sized piece of gutta-percha is warmed, dipped in cajuput, and pressed home with a conical warm instrument. Each additional piece is moistened with cajuput, the last piece is placed dry, and the filling is finished off with an instrument that has been dipped into cocoa butter. This imparts a fairly dense surface to the filling.

GENERAL REMARKS.

Of late years manufacturers have devoted special attention to the color of amalgam, with considerable success, but apparently at the cost of the most important quality of an alloy, viz, "the balance"—that is, the greatest number of desirable and the smallest number of faulty physical properties.

In the discussion which followed Dr. McCauley's valuable paper, the suggestion was made that the various alloys at present before the profession should be tested by an independent body of experts, and the results as to their reliability published. At the present time the general practitioner is at the mercy of the manufacturers, and takes for granted the laudatory notices of their products—not only alloys and cements, but other dental requisites. The proposed investigation, therefore, is a matter we should all welcome and heartily support.

CONCLUSION.

We have now considered the cause of dental caries, the method of cleansing the cavity, its sterilization, the preparation of the enamel margins, and the various materials suitable for restoring the contour and usefulness of the tooth, with the object of keeping it in that condition. Whatever the material used may be, whether gold, amalgam, or an inlay, the marginal lines should be too fine to be felt, and the surface of the filling be as highly polished as the enamel of the tooth. The personal equation and attention to exact technique will, of course, depend on the operator.

I desire to express my thanks to Dr. R. J. Bull, director of the bacteriological laboratory, University of Melbourne, for his kindly advice.

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A STUDY OF POTASSIUM CHLORATE.

By ALONZO MILTON NODINE, D.D.S., New York City.

IN his paper on "Drug Idolatry in Dental Medicine," published in the DENTAL COSMOS for December 1911, one of the "idols" that Dr. Hermann Prinz attempts to demolish is potassium chlorate, an attempt involving certain misconceptions which it is the purpose of the present article to remove.

PROFESSOR PRINZ' INDICTMENT OF POTASSIUM CHLORATE.

Professor Prinz' unreserved and unqualified indictment of potassium chlorate sounds like an echo of the unreasonable and unsound condemnation of a few medical men.

Evidently this is not Professor Prinz' serious intention, for in a recent book, entitled "Surgery and Diseases of the Mouth and Jaws," by Professor Blair of the University of Washington Dental School, with whom Professor Prinz collaborated, one finds, on pages 288 and 297, potassium chlorate recommended for stomatitis!

"When absorbed [referring to potassium chlorate] by the blood, the greater part of the hemoglobin is either directly destroyed or is changed to methemoglobin,"[1] declares Professor Prinz.

This charge, made without restriction or proviso, is not only untrue but is contrary to common experience and to the common observation of all who for a long time have used potassium chlorate. Were Professor Prinz' statement true, every user of the drug should be dead, and every prescriber of it would be a criminal! Still, such denunciation from a less able and less distinguished man would be passed unnoticed and unprotested.

Before we obey the fiat to "eliminate potassium chlorate from the medicinal armamentarium of the dental practitioner," as we are directed, it is fitting and proper that the drug be judged fairly, squarely, and scientifically; and to that end each man may conduct an investigation of his own, and thus constitute himself his own judge and jury.

REVIEW OF THE THERAPEUTIC USES OF POTASSIUM CHLORATE.

Professor Prinz (on page 1373 of the DENTAL COSMOS, December 1911) declares: "Potassium chlorate is not a specific for stomatitis."

What is a specific? As defined by Dr. J. P. Buckley, "A specific is a remedy which, if used in the proper manner, can generally be depended upon to produce results in certain diseases."[3]

Stomatitis. Potassium chlorate has been used for almost a century by the most scientific men in the medical and dental professions as a treatment for the various forms of stomatitis. It has been used with a success so great that in the majority of text-books in which stomatitis is considered, the one drug recommended as effective in the treatment of this condition is potassium chlorate. Other writers, with but few exceptions, accord it the chief place among two or three other drugs.

Were Professor Prinz' statement true, then the authorities whose books have appeared in the last six or eight years either do not know what a specific is, or what stomatitis looks like, or else the results which they have achieved are due, not to potassium chlorate, but to some mysterious influence peculiarly associated with the use of potassium chlorate!

When Professor Osler of the University of Cambridge,[4] Professor Tissier of the University of Paris,[5] Shoemaker of the Medico-chirurgical College of Philadelphia,[6] Bovaird of the College of Physicians and Surgeons, New York,[7] Holt,[8] Hare,[9] Potter,[10] Roberts,[11] Strumbull,[12] Latham,[13] Fleming,[14] Dayton,[15] Bartholow,[16] and Tuley,[47] declare that potassium chlorate is a specific for the treatment of stomatitis, they come very close to knowing what a specific is, what stomatitis is, and what successful treatment is.

Dr. Prinz says: "Potassium chlorate as a remedy for the various forms of stomatitis is looked upon by many practitioners as a veritable panacea. As someone has said, 'It is one of the most reliable remedies, indeed almost a specific, in ulceration of the mouth, particularly in stomatitis, etc.' "[1]

This is not only the common accumulated experience of over one hundred years' continuous use of potassium chlorate, but forty of the most distinguished writers of England, France, Germany, Austria, and America, in scientific books published within the last six or eight years, declare it to be a specific for stomatitis.

One of these writers states: "For maternal stomatitis it is reported by men of authority as the only remedy worth mentioning."[6]

"Others lauded it as a prophylactic in mercurial stomatitis." (Prinz.[1]) Potassium chlorate is almost without exception the only drug named as a prophylactic for mercurial stomatitis in medical or dental literature. (See bibliography, Nos. 6, 10, 12, 14, 15, 17, 18, 19, 20, 21, 22.) How did it gain this reputation?

Let us turn to the latest books in the English language and published since Professor Prinz wrote his paper—books written by Osler,[4] Latham and English,[17] Stevens,[18] Dayton,[15] Buckley,[19] etc. Are these men hypnotized by a delusion, or are they announcing a scientific truth? If there is any other drug used with the same universal success as potassium chlorate, will Professor Prinz please name it?

"Others claiming that it will prevent salivation." (Prinz.[1])

In the latest and best books are to be found such statements as these: "When ptyalism occurs, the potassium chlorate treatment should be immediately begun."[20 10] "Patients who are taking mercury should use potassium chlorate."[21 6] "As a prophylactic, patients should employ a gargle of potassium chlorate faithfully from the beginning of the treatment, in order to prevent mercurial stomatitis."[12 22]

PHYSIOLOGIC ACTION OF POTASSIUM CHLORATE.

Prinz tells us that "Potassium chlorate has been introduced into therapeutics on the erroneous theory that it will decompose in the body and supply oxygen to the tissues."[1] Whereas potassium chlorate was introduced into therapeutics in 1796 by Fourcroy, on the rather vague theory that acids and oxids have some beneficial effect on the human body, and was first used as a cure for syphilis.[23] Lavoisier first advanced the theory that potassium chlorate gives up its oxygen to the tissues.[23]

"The theory that it will decompose in the body" is not entirely "erroneous," as asserted by Prinz. "Dr. I. Von Mering finds that the chlorate is decomposed in the system with the formation of chloric acid by the action of carbonic acid upon it, and the fact that similar symptoms are produced by sodium chlorate, shows that they are due to the acid rather than to the base."[24] Simon declares: "It is even a stronger oxidizing agent than potassium nitrate, for which reason care must be taken in mixing it with organic matter or other deoxidizing agents."[26] "Chlorates give up their oxygen to the tissues, and it is largely on this account that they have received wide employment in foul conditions of the mouth and pharynx."[27] Wilcox says: "Locally it is easily decomposed by septic tissues, and the nascent oxygen given off acts as a stimulant and antiseptic."[28] Marshall writes: "It is a powerful oxidizing agent."[29]

If potassium chlorate does not part with its oxygen at the temperature of the body, will Professor Prinz please explain by what chemical process it does combine with the red blood cells to destroy them, as has been claimed?

The answer to this question is best stated by Walter E. Dixon, professor of materia medica and pharmacology, Kings College, London, and examiner in pharmacology in the Universities of Cambridge and London: "It is easily shown that chlorates undergo a slow reduction when in contact with putrefying organic matter, and it is known that they are continuously eliminated by the salivary glands, the mucous membranes, and the kidneys; hence it is suggested that, although normal tissue fails to reduce them, the reduction is effected by septic tissue." "Taking man's blood as an example, the addition of 20 per cent. potassium chlorate takes six hours to destroy the hemoglobin!"[62]

Again Prinz says: "It is supposed to be largely excreted by the saliva, and thereby continuously bathe the diseased mouth with its oxygen-laden fluid."[1]

This is not a "supposition." It is an actually demonstrated fact that "Potassium chlorate can be detected in the saliva five minutes after being taken by the mouth."[31]

Other authorities declare that it is eliminated by the buccal secretions, which keep the ulcerated surfaces constantly bathed with the drug, so that its internal administration is recommended. (See bibliography Nos. 9, 22, 32, 33, 34.)

ANTISEPTIC VALUE OF POTASSIUM CHLORATE.

Prinz continues: "It possesses little if any value as an antiseptic."[1] This is diametrically opposed to the views and experiences of the highest authorities in medicine, as a consultation of the following authorities will show: Stevens,[18] Dayton,[15] Kelly,[21] Dieulafoy,[22] Strumbull,[12] Edwards,[34] Forchheimer,[20] Hughes,[35] Taylor,[36] Bovaird,[7] Roberts,[11] Fleming,[14] and many others.

"Its therapeutic effects do not "depend wholly on its salt action," as Sollmann, the only authority whom Professor Prinz names, states,[37] being confirmed by Marshal,[28] and Miller.

"The chlorates have also a disinfectant and local stimulant action which seem to be stronger than would be accounted for by its salt properties, and would therefore appear to be a specific *ion* action."[37]

"This fact" does not "decide its worthlessness as a prophylactic in mercurial stomatitis."[1] Professor Miller states: "It has a distinct and specific antimercurial action." Cushney,[25] Osler,[4] Bovaird,[7] Shoemaker,[6] Buckley,[3] Marshall,[29] Greve,[38] Hall,[17] Tissier,[5] Phillips,[24] Long,[39] Stevens,[18] and many others, declare that it is a specific prophylactic for mercurial stomatitis.

THE QUESTIONABLE TOXIC ACTION OF POTASSIUM CHLORATE.

Prinz says: "It should be remembered that potassium chlorate acts as a dangerous poison."[1]

Holland declares: "If used as a mouth-wash it is harmless, but when taken in large doses it is an irritant, causing abdominal pains, etc."[40]

And Blyth: "No drug has been given more recklessly or on a less scientific basis. Where there were sloughing wounds, low fevers, and malignant sore throat, usually those of diphtheritic character, practitioners administered potassium chlorate in colossal doses. Its too reckless use has led to many unrecorded accidents."[41]

And further, Wittehaus gives a record of 143 poisonings, 116 of which were fatal. "Almost all of these were accidental, caused either (as in 15 cases) by chlorate of potash being mistaken for some other medicine, or, as in a great majority of cases, by its having been administered in overdoses or swallowed by the patient when prescribed as a gargle."[31]

It is such a dangerous drug that one man took 719 grains in thirteen hours and showed no effects![31]

Were we to follow such reasoning, we might as justly condemn the use of common table salt, because a pound of it has killed a man, and because a dentist in Scranton, Pa., has suffered from hyperchloria.

Neither in the U. S., the German, the French, the Swiss pharmacopeias nor in the British Pharmaceutical Index is it classed as a dangerous poison or drug. Other authorities declare: "When taken internally in full pharmacopeial doses it has a saline taste, is generally well borne by the stomach, and usually produces no obvious effects except diuresis." (See Nos. 18, 29, 31, 32, 42.)

Prinz says, however: "When absorbed by the blood, the greater part of the hemoglobin is either directly destroyed or changed to methemoglobin."[1]

We must take this statement together with his other statements that "It does not part with its oxygen at the temperature of the tissues," and that "about 90 per cent. is removed with the urine, the remainder passing out through the salivary glands." Reconcile these three statements if one can!

In the cases that are so often cited as exhibiting the terrible danger (?) of potassium chlorate, most of the adults took from one to two ounces and the children and babies took large amounts. Under conditions such as these, it is quite legitimate to conclude that potassium chlorate is a dangerous drug—*i.e.* when taken by the spoonful or given to children to drink in large quantities.

Prinz continues: "Potassium chlorate in tablet form for throat trouble is in common usage by the laity; such practice should be condemned." Why should it be condemned? Because one man in St. Paul[60] and another in Detroit[61] ate very freely of these tablets—in the former case producing an erythematous rash, in the latter the loss of an eye? Two cases!—only two cases out of the millions who have used such tablets for over a century, and which are sold almost as freely as candy! Truly, a dangerous drug!

THE TASTE OF POTASSIUM CHLORATE.

"Aside from its disagreeable salty taste, the constant use of dentifrices containing potassium chlorate is very prone to produce inflamed and easily bleeding gum margins."[1]

Prinz begs the question when he focuses his attention on the taste of potassium chlorate. When has a therapeutic agent been condemned because of its transient taste? The saline taste remains for only a short time, when it gives the mouth a cool and an unexpected and unusual feeling of cleanliness.

USE IN DISEASES OF THE GUMS.

Further, in regard to its "producing inflamed and bleeding gum margins," the experience of those who have prescribed dentifrices containing potassium chlorate and used them is entirely to the contrary. In addition, for over a century, potassium chlorate has been considered almost a specific for the very condition which it is alleged to create, that is, bleeding gums, and is recommended in such phrases as: "It makes an excellent local application in inflammatory affections of the mouth and throat."[18 25] "It is recommended for bleeding gums concomitant with scrofula."[6] "Potassium chlorate is used as a wash when the gums are inflamed."[27] "For the special ulceration of the gums of scorbutus, the chlorate of potassium is a specific." (See Nos. 4, 9, 24, 17, 43.)

RANGE OF USEFULNESS.

Professor Prinz says: "Potassium chlorate has a very limited range of usefulness."[2] And at page 1374 of his article in the December 1911 DENTAL COSMOS, he says: "Potassium chlorate should be eliminated from the medicinal armamentarium of the dental practitioner."

Before we eliminate it entirely we will explore this so-called "limited range of usefulness," which even Prinz himself admits. It must be borne in mind that potassium chlorate as an ingredient either of dentifrices or mouthwashes is advocated for the treatment and the prevention of a few diseases of the mucous membrane and gums, and as an agent for cleansing the healthy mouth and teeth.

Therefore, when others claim that it produces beneficial results outside of the oral cavity, and has effected cures of diseases other than the ones for which it is specifically suggested, it is "another feather in its cap." When others fail to get the same effects in those cases for which this drug is not especially indicated, this should not detract from or discount its efficiency in the cases for which it is specifically indicated.

In regard to this so-called "limited range of usefulness," it will be found that it is considered and recommended as an antiseptic by Sollmann,[37] Fleming,[14] Latham and English,[17] Taylor,[36] and many others.

A few of the conditions for which potassium chlorate is recommended by the acknowledged authorities in medicine and therapeutics are—*Aphthous stomatitis* (Nos. 4, 5, 6, 9, 11, 13, 15, 16, 17, 21, 22, 24, 25, 28, 30, 32, 33, 39, 42, 44, 45, 51, 54, 57, 65, 67). *Bronchitis* (Nos. 10, 16). *Catarrhal stomatitis* (Nos. 25, 28, 30, 32, 34). *Catarrh of the throat* (Nos. 18, 25). *Diphtheria* (Nos. 5, 10, 24). *Foul ulcers* (No. 42). *Herpetic stomatitis* (No. 47). *Herpes of the buccal cavity* (No. 42). *Leucoplakia buccalis* (No. 59). *Maternal stomatitis* (Nos. 6, 16, 28). *Mercurial stomatitis* (Nos. 3, 4, 5, 6, 10, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 28, 30, 36, 37, 42, 49, 66). *Moist eczema* (No. 42). *Noma* (Nos. 11, 20, 30). *Parasitic stomatitis* (Nos. 17, 28, 30). *Pharyngitis* (Nos. 9, 10, 18, 24, 31, 42). *Pharyngomycosis leptothricia* (No. 7). *Prevention of salivation* (Nos. 3, 6, 10, 12, 20, 21, 22). *Simple parotitis* (No. 17). *Scarlet fever* (No. 24). *Scorbutus* (Nos. 4, 6, 9, 12, 13, 24, 34, 38, 43, 53, 56, 66). *Syphilitic mucous patches* (No. 42). *Tonsillitis* (Nos. 10, 16, 28, 31, 44, 58). *Ulcerative stomatitis* (Nos. 4, 5, 6, 7, 8, 11, 12, 14, 15, 18, 20, 21, 22, 24, 25, 28, 30, 32, 33, 34, 44, 45, 46, 47, 48, 51, 54, 55, 59, 64, 67). *Typhoid fever* (No. 10). *Mercurial periosteitis* (No. 63). *Chronic cystitis* (No. 10). *Pseudo-membranous laryngitis* (No. 10). This list is sufficient to show that potassium chlorate has a wide range of usefulness, without going outside of the oral cavity for additional evidence.

RESULTS OF INVESTIGATION AS TO TOXICITY.

To settle the much-discussed question as to the toxicity of potassium chlorate in dentifrices, Bachem of Berlin, at the request of the German government, investigated this question in 1912, and rendered his decision as follows:

(1) "There is no record of any case in which potassium chlorate in a dentifrice has caused any trouble whatever," states Lewin, the toxicologist of Berlin.

(2) It is impossible for the amount of potassium chlorate remaining in the mouth after brushing, when absorbed, to cause any toxic effect whatever.

(3) The amount capable of being absorbed when used as a dentifrice produces no effects on either the stomach or kidneys.

(4) The toxic effect of potassium chlorate on the blood depends upon the amount taken.

(5) Potassium chlorate liberates oxygen in the mouth, as is shown by the rengalit and methylene-blue tests.

SUMMARY.

(1) It has been shown by a vast array of testimony that the charges made against potassium chlorate, and potassium chlorate used in dentifrices, are neither just, true, nor reasonable in either fact or theory.

(2) Potassium chlorate is a specific for the treatment of aphthous, ulcerative, parasitic, catarrhal, and mercurial stomatitis.

(3) It is a prophylactic for mercurial stomatitis, and is recommended by distinguished authorities as a preventive of ptyalism.

(4) It has been successfully used in the treatment of noma and pharyngitis, and in the sore throat of diphtheria and scarlet fever.

(5) It is decomposed in the body and parts with its oxygen at the temperature of the body, as its action in excessive doses proves by its destruction of the red blood cells, by the rengalit and methelene-blue tests, and its effect on septic tissues.

(6) It is largely excreted by the saliva; and because of this,

(7) Its action is continuously antiseptic.

(8) It possesses a decided value as an antiseptic in the mouth because of its oxidizing properties, its *ion* action, and its excretion by the saliva.

(9) It stimulates the healthy flow of saliva, stimulates circulation in the mucous membrane, and because of its salt action, relieves capillary stagnation.

(10) It is, by reason of its effects on alkaline salivary secretion, its effect on the capillary circulation, its tonic effect, its oxygen effect, its saline effect in promoting natural cell activity, very efficient in preventing the multiplication of lactic acid bacteria, and in neutralizing the acids produced during the life-activities of other bacteria and putrefactive processes.

(11) It is effective and efficient in preventing and relieving bleeding and spongy gums.

(12) It is neither a dangerous drug, nor are potassium chlorate dentifrices poisonous compounds when used in mouth-washes or in tooth-powders or pastes, either for adults or for children.

(13) Potassium chlorate has never had an alarming or untoward case recorded against it, when used with even the slightest amount of care as a mouth-wash or as a dentifrice.

(14) *Finally:* Potassium chlorate is efficient and harmless when used as a tooth-paste or tooth-powder and in the treatment of diseases of the mucous membrane of the mouth.

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AN OBSTACLE TO ORAL HYGIENE.

By JAMES G. CLUNE, D.D.S., New York City.

IT is an indubitable fact that mental impressions are transmitted from one individual to another through both inheritance and environment; that our conceptions and our sentiments pass from one generation to another, and that, whether right or wrong, some of them gain strength with age, because we are, in a measure, naturally inclined to regard with affection the views held by our forefathers.

THE POWER OF TRADITION.

Just as we observe a similarity of the features of the several members of a family, so do we observe that the beliefs, religious and otherwise, of the consanguinous are, as a rule, alike; and just as family influences tend to perpetuate conceptions and sentiments of a similar character, so do racial, social, and occupational influences tend to prove conducive to the same effect. Broadly speaking, our mental impressions are the product of our ancestors or our associates, for like causes must needs be followed by like effects.

The common propensity to cling to such mental impressions as are handed down from one generation to another accounts, in great part, for the sway of soothsayers and the longevity of most of the current superstitions. It also accounts, in some degree, for the reluctance with which established facts are allowed to replace ancient fallacies.

The disposition to adhere blindly or stubbornly to such convictions as were current in the past or were gained too hastily is not peculiar to the uneducated, for a trait that is common to a race must be common, in some degree, to the individual members of the race; consequently the educated must share, to some extent, the tendency to retain inherited or acquired impressions, whether they be proper or improper.

Regardless of any opinion to the contrary that may be due to "the pride of ignorance," the fact remains that the advancement of dentistry, like that of every other scientific pursuit, is hindered by the common reverence for antiquated convictions; in dentistry, as in every other field of intellectual endeavor, each newborn truth bears the stigma of an antecedent fallacy, or it is received with widespread distrust. Hostility to newly discovered truths prevails because belief in the established order of things is a heritage of our race—the heretic is born, not made.

FALLACIES REGARDING DENTAL HYGIENE.

In no division of present-day dental thought are the evil consequences of this inherent weakness, this innate stubbornness, more generally and conspicuously exhibited than in that which deals with the subject of oral hygiene. Obstinate adherence to the preposterous speculations and irrational deductions of untrained and superficial pioneers has caused many of our profession to remain practically unacquainted with some of the most remarkable developments of skilful research; it has hindered progress; it has exalted the foolish and discredited the wise; it has put asinine phrases into the mouths of the gullible, and savable dentures into the cuspidors of extractors. It has burdened contemporaneous literature with ridiculous inconsistencies; it has retarded popular enlightenment, and it has injured public health.

This inborn inhospitality to such

truths as are revealed by modern methods of investigation is chiefly responsible for the persistence with which many hold to notions that have long since been proved to be entirely erroneous. It accounts for the still prevalent, though totally false impression that oral hygiene means nothing more nor less than caries-prevention; that caries-prevention consists in the employment of alkaline mouth-washes; that all acid substances are highly conducive to carious action, and that oral sterilization is practicable. It also accounts for the continued use of agents that are now known to possess none of the properties formerly attributed to them.

RECOGNITION OF THE IMPORTANCE OF ORAL HYGIENE.

Even to this day, many dentists labor under the false impression that oral hygiene means nothing more than the maintenance of that degree of tooth cleanliness which will either prevent or retard the development of dental caries. Far too many of them fail to understand that so contracted and erroneous a view is entirely out of accord with the present broad scope of dental endeavor, and that it ill becomes one whose knowledge and interest should extend beyond the narrow confines of the oral cavity. In enlightened circles, oral hygiene is now recognized as one of the most important branches of both the dental and medical sciences; we have awakened to the fact that a foul mouth is the preface to many a funerary event, and that a healthy condition of every organ of the body is contingent, in some degree, on mouth cleanliness. We have outgrown the delusion that oral hygiene can be maintained solely by the use of a tooth-brush soaked or swabbed with an alkaline tooth-wash, paste, or powder; we have recovered from the mistaken idea that the use of an acidulous agent in the mouth constitutes a misdemeanor or malpractice; we have evoluted beyond the conviction that chlorate of potash liberates oxygen in the oral cavity.

MODERN KNOWLEDGE OF DENTAL CARIES.

While none but the hopelessly stupid or the incurably conceited will contend that the last truth concerning the etiology of dental caries has been disclosed, the fact remains that the present state of knowledge is such that we can safely abandon many of the convictions that have long been deeply rooted in the minds of the majority, and can deal quite intelligently with carious processes. In spite of the many obstacles that have been interposed through innate reluctance to forsake time-worn convictions, the mysteries concerning dental caries are well-nigh dispelled. We have ceased to take fright at acidulated saliva; we have extended our view far beyond pumice and orange-wood sticks.

Contrary to the popular opinion, which is still shared by a few members of the dental profession, dental caries is not, *per se*, a filth disease. This is evidenced by the fact that it is commonly seen in the cleanest of mouths, and is frequently absent from the filthiest of oral cavities. It is a matter of common knowledge that dental caries is widespread among the better class of civilized races, who, as a rule, make daily use of the tooth-brush; yet it is uncommon among savages, who are practically strangers to the dental toilet. Broadly speaking, teeth suffer decay where the dental toilet is the rule, and escape decay where the dental toilet is the exception. And this is true in spite of the fact that the tooth-brush is a most serviceable, a necessary, article.

CARIES IN MOUTHS WITH ALKALINE OR ACID SALIVA.

Dental caries is not essentially a consequence of tooth-exposure to acid-producing bacteria, for these organisms are, as a rule, quite as plentiful in the mouths of those immune to carious action as they are in the mouths of those predisposed to it. As a matter of fact, dental caries is almost confined to mouths in which the saliva is alkaline, not acid, in reaction. Hence the folly of placing sole reliance on alkaline mouth-washes, tooth-pastes, or powders. It is known, in fact, that the use of vegetable acids, such as cider, vinegar, or the juice of edible fruits, for detergent purposes is productive of much better results than can be obtained by a similar employment of alkaline agents. Paradoxical as it may seem to the unenlightened, vegetable acids enhance the alkalinity of salivary secretions, whereas the alkalis ordinarily used lower it through their inhibitory action on the salivary glands. Acidity of the saliva arises, as a rule, from some perversion of metabolism attended with subnormal alkalinity of the blood. The oral use of alkaline substances cannot possibly affect the underlying cause of this metabolic impairment. One cannot arrest the growth of hair by frequently trimming it, nor can one arrest the output of an acid fluid by frequently applying an alkaline substance to the area of its discharge.

CONCLUSION.

The energy now being expended in an endeavor to acquaint lay minds with the importance of oral hygiene will ultimately prove of incalculable benefit to public health. But it is none the less regrettable that progıessive movements originating in dentistry, like those in medicine, are materially embarrassed through an inherent and widespread disposition to distrust whatever threatens to disprove the validity of convictions handed down from the past.

A NEW METHOD OF TREATING EMPYEMA OF THE ANTRUM.

By VAL. MACDONALD, L.R.C.S.Ed., D.D.S.Univ.Pa., Melbourne, Australia.

THE result of an apparently successful new method of treatment does not render it possible to claim assured success by that method with a record of only one case. Yet in that one case the results so rapidly bore out the hopeful anticipation from a certain line of treatment that I feel some justification in reporting it, if only to advocate its further trial.

HISTORY OF CASE.

On September 23d, the patient came to me complaining of pain and tenderness in the region of the upper right first molar. On examination I found the tooth very tender to the touch, and showing all the signs of a dead or dying pulp, with the inflammation extending to the pericemental tissues, as is usual in these cases. Opening of the tooth from the occlusal surface into the pulp chamber gave immediate relief. A very loose dressing of tricresol-formalin was left in the opening made, to control the septic condition and yet allow the escape of gas, etc.

The next day the pain had gone, but tenderness on biting remained and there were also tenderness and swelling in the apical region. A 1 per cent. alcoholic solution of formalin was vaporized through the pulp as well as possible before removing it, in order to lessen any risk of forcing the septic matter through the apices of the roots, and the tooth was then carefully sterilized and loosely dressed again.

On September 25th there was still much swelling and tenderness in the apical region, and apparently no drainage through the tooth. The patient was questioned as to signs of antral trouble, the pain being suspicious, but there was no discharge.

On September 26th the pain extended all over the right side of the face, and the patient thought there was a slight discharge, but she was not certain, and I requested her to keep for me for examination her handkerchief used on the next morning.

On September 27th I saw the patient at home. She had fainted that morning when dressing, and in falling heavily had bruised her chin, malar bone, and temple—all on the right side. I found her somewhat weak and in bed. There was pain and tenderness in the malar region, and especially over the infraorbital foramen, but this was difficult to differentiate from the pain caused by the injury received. There were signs of a slight discharge on the handkerchief that had been used first that morning, but none after that. I advised extraction, in the hope of thus aborting antral trouble, and on the same evening, under a general anesthetic given by Dr. Lionel Hood, I extracted. I found the roots to be very short, but the anterior buccal one entered the antrum, and I took advantage of that fact to irrigate with a normal saline solution.

On September 28th I saw the patient at her home, and irrigated with normal saline solution again. I also advised a normal saline nasal douche for the next few days.

On October 1st I saw the patient in my surgery. The temperature had risen slightly each evening, but was subnormal now. The socket was closing well, and there was no discharge from it, but some nasal discharge persisted, and there was some slight pain referred to the right eye. On transilluminating no shadow was observed. Dr. Stawell examined the patient for her general condition on Sunday, September 29th, and prescribed a tonic and rest.

On October 2d a slight shadow was perceived. The discharge had slightly increased, and the patient noticed an offensive odor.

On October 3d the pain was less marked, but the offensive odor was still complained of. The shadow was slight. The discharge was examined, and pronounced to be full of pus.

On October 4th there was orbital pain, the discharge had increased, and the shadow was distinctly more marked. At this point I will interrupt the history, in order to explain briefly the rationale of treatment followed to date, and the position arrived at.

TREATMENT.

Although there was pericemental trouble in the beginning, and some slight swelling and soreness over the apex, this was not great, and in the majority of cases it would have cleared up upon the mere opening of the tooth and removal of the dead pulp. The reason why it apparently did not clear up was afterward found to be in the perforation of the antrum by the anterior buccal root, although it was very short. When all efforts at immediate relief failed, I still hoped that careful treatment would eventually lull the inflammatory trouble, and kept an eye open for antral involvement. When this latter was apparent, its effect was sudden and severe, as evidenced by the sudden appearance of pus in the nasal discharge and the probably high temperature which caused the patient to feel weak and faint. When I saw her a few hours after that fainting spell, she was more or less collapsed, and although I then strongly advised the sacrifice of the tooth, I decided to wait until evening, so that, after resting in bed throughout the day, the patient would be in a better condition to tolerate the shock of the anesthetic and the operation. I advised sacrificing the tooth because in three other recent cases I have aborted antral trouble by this early removal of the cause, and I hold that no tooth is worth saving if its loss is likely to avoid the usual necessary surgical treatment that must otherwise be instituted. I explained to the patient and her parents that I did not intend to attempt to drain the antrum through the socket, for it was useless, and tubes or plugs were an abomination and unscientific.

I simply would attempt to abort trouble by an early removal of the cause, and if I should fail, I told them, surgical interference must follow. I extracted, and irrigated with normal saline solution, and, except using normal saline solution as a nasal douche for a few days, instituted no treatment, but waited, hoping for nature to assert itself. On October 4th, viz, six days after the extraction, there was an increased discharge from the right nostril and a distinctly marked shadow on transilluminating, and I abandoned hope of treatment by other than surgical means. I suggested then that surgical interference must be resorted to, but advised first seeing Dr. Stawell.

EMPLOYMENT OF ELECTRIC CURRENT AND NORMAL SALINE SOLUTION.

I then suggested my plan of treatment to Dr. Stawell, who was at once favorably impressed. On the following morning, October 5th, the patient presented with all symptoms more marked, and with additional pain in the region of the frontal sinus. I again opened the socket of the anterior buccal root of the extracted first molar, and carefully enlarged it with an alveolar bur, sufficiently to admit a fine rubber tube. This tube was connected with a syringe and also protected a small bundle of fine platinum wire, which was connected to the negative pole of a battery. The positive electrode, immersed in a 1 per cent. salol solution, was held in position under the chin—as the most convenient place of application—by a special head-gear used by Mr. R. Morse Withycomb in his pyorrheal treatment. The current used was a mild faradic, with the assistance of one dry cell of a galvanic battery; then, with the current turned on, I continually flooded the antrum with normal saline solution from a syringe, and of course wherever this fluid was carried, it acted as an electrode for the current, which was so in turn carried to all parts of the antrum. This treatment I kept up for three-quarters of an hour, and then left the socket entry to close without plug or drainage.

On October 6th, the patient reported by telephone that she was notably free from pain, and feeling better.

On October 9th I repeated the treatment, and then freshened the edges of the wound, which looked very healthy and was granulating well.

On October 11th and 14th I used faradic stimulation about the socket without forcing a passage.

On October 17th transillumination showed no shadow. By request the patient brought the first handkerchief used on waking, so that I might have the discharge examined.

On October 18th Dr. Zwar reported the discharge to be a normal nasal passage.

On November 19th the patient was feeling quite well. The socket was quite closed and filled up, and transillumination gave no sign of a shadow.

When last seen on December 1st, the case was perfectly satisfactory, and the result most gratifying.

CONCLUSIONS.

Frequently, incipient antral trouble may be aborted by an early removal of the cause when it is of dental origin, or a simple saline irrigation may suffice, but I have never seen such an advanced case in which the patient escaped without a radical operation or without a so-called drainage tube attached to a plate, which method is now recognized as being worthy of nothing but unreserved condemnation. I certainly believe that the treatment adopted spared the patient the usual surgical interference.

In explanation of the treatment adopted and the result obtained, I should emphasize that very thorough irrigation must not be forgotten; but it is chiefly to the stimulation of the faradic current that I attribute the result. Dr. Lewis Jones, in his excellent work on "Medical Electricity," says—"A large part of the benefits derived from electrical application can be ranged under the heading of stimulation." D'Arsonval has shown that induction-coil currents, even when so gentle as to cause no muscular contraction, can nevertheless cause modification in the nutritive exchanges of the body, with increased production of heat. Lewis Jones also says—"As well as nutritive exchanges leading to a growth or renewal of the tissues, equally important is the stimulation given to processes of elimination of waste products or toxic substances from the system."

I used the galvanic current in conjunction with the faradic, in the hope that even a mild chlorin ionization would assist the stimulating effects of the faradic current. Dr. De Watteville and others strongly believe that the effects of the interrupted current are enhanced by a simultaneous galvanization. I have been using zinc ionization for some time in the treatment of pyorrheal and other purulent conditions about the mouth, and also the faradic current in the mouth flooded with normal saline solution, as suggested by Mr. Withycomb, and it was the gratifying results attained that suggested the treatment of the present case.

May these notes induce others further to test this form of treatment, and to record their results.

CONSERVATISM IN ORAL SURGERY.

By E. H. CARLETON, M.D., Hanover, N. H.

(Read before the Northeastern Dental Association, at its annual meeting, Crawford Notch, N. H., October 1, 1912.)

THE close relationship between the dentist and the physician is becoming more and more recognized the farther we advance in the study of these professions, or I might better say, in the study of these branches of the same profession, for we can no longer consider dentistry as anything but a specialty of medicine. As we cannot isolate any one region from the rest of the organism or separate its functions and diseases, so neither can the treatment be a separate matter. A fuller appreciation of their common interests should bring the family physician and family dentist together. In recent years we have heard much about the prevention of disease. One of the most efficient factors in this prevention is the dentist; his influence in race improvement ranks with the highest. The study of eugenics and eusthenics—its sister science—is interesting men of every profession, but probably no profession offers a larger opportunity for the betterment of the human race than dentistry.

CONSERVATISM URGED IN ORAL SURGERY.

In the short time allotted me today it is only possible to touch upon a few of the conditions that confront us in the broad field of oral surgery. Both from the standpoint of the physician and of the dentist, mouth surgery is a development of recent years. On this account, as in most methods that have not been long established, we find many advocates of very radical procedures. Fortunately for many of our victims, a decided reaction is now taking place, and leading operators everywhere are advising more conservative methods in this field of surgery. It is true that in our special branches of surgery, as in general surgery, we are prone to applaud the skill of the operator, overlooking the fact that knowledge and judgment might have made the skilful procedure unnecessary.

HASTE IN TONSILLECTOMY CONTRA-INDICATED.

Probably no field of surgery offers more offenders against this recommendation of radical measures than laryngology. The wholesale measures advised by some laryngologists in tonsil surgery can hardly be equaled, unless it be some of our appendix friends. Today the rage for the complete excision of tonsils has become an obsession, which has infected not only the general profession but also the laity. We find parents bringing their children for tonsillectomies, expecting relief from all manner of complaints.

Yet wrong inferences should not be drawn from such statements as these; it is a self-evident truth that there are a host of conditions that call for more or less complete destruction of the tonsils. Conservatism and common sense should be our guide in the selection of cases for operation. Wright of Boston reports an interesting series of 150 cases in which operation on the tonsils was deferred until after the eruption of the molars, not only the first but also the second, and, when dentition had been completely accomplished, the enlarged cervical lymphatic glands disappeared, together with the swelling of the tonsils. Such observations as these teach us the practical lesson that if in infancy and childhood we pay more attention to the neglected nasal cavities and to the hygiene of the mouth and teeth, we will have less tonsillar disease and fewer operations.

Most dentists see more abnormal throats than physicians do; their knowledge should be such that the proper advice can be given with benefit to their clients. We should always bear in mind the few following ideas, which are almost universally accepted according to our present knowledge: That nearly all children at some time of life have more or less enlarged tonsils, that many of these are harmless if not actually physiological, that their removal is only advisable when they interfere with respiration, deglutition, or speech; that in the present state of our knowledge the functions of the tonsils are unknown. Until these functions are known, the final word on their removal cannot be spoken. Therefore, considering the knowledge or lack of knowledge we now have in regard to these structures, we should approach the subject of their complete extirpation with very great conservatism, especially in the throats of very young children.

EMPYEMA OF THE MAXILLARY ANTRUM AND DIAGNOSIS.

In this same state of mind should we approach the other diseases of the mouth requiring surgical interference. Let us take one more example, viz, the management of acute and chronic maxillary empyema. It is a matter of daily observation that, when the exciting cause of a disease is removed, the disease itself frequently disappears. If the normal functions of the part are not too much interfered with, nature effects a cure. This is true of the diseases of the maxillary antrum as well as of disease conditions in other parts of the body. Diseases of the maxillary antrum are almost always secondary to diseases of associated structures, either the nose or the dental organs. Formerly it was considered that 80 per cent. of such diseases were of dental, and 20 per cent. of nasal origin. Many investigators, however, contend that diseased roots are not frequent etiologic factors, as by far the larger number of cases of antral disease are secondary to pathologic conditions in the nose. The experience of the physician in regard to the frequency of disease of the accessory sinuses differs very decidedly from the pathologic findings at autopsy. At autopsy, disease conditions are found much more frequently than were suspected during life. One reason for this is that many suppurative processes of the sinuses cause so little suffering that the patient does not seek the advice of a physician, also in many cases the diagnosis presents many difficulties. In the past few years, aids to the diagnosis of these affections have increased very much, transillumination and the X ray being of great service in many obscure cases. Still more recently the presence of pus has been determined by the suction method.

MAXILLARY EMPYEMA OF DENTAL ORIGIN.

Infection from the teeth usually takes place in these cases in one of the following ways: Caries of extreme degree, extending into the root; apical abscess of a root of a tooth; perforation of the floor of the sinus, with penetration of pus into the antrum, lifting but not perforating the mucosa; perforation of the mucosa. We usually do not find granulations in these dental cases.

POLICY OF TREATMENT IN ANTRUM CASES.

The treatment of acute cases is best described as a policy of conservative non-interference. It is as true of acute antral disease as it is of acute diseases of any of the accessory sinuses, that surgical interference is almost always contra-indicated.

Proper treatment of the nasal conditions will, in the majority of cases, be all that is necessary. The washing out of the antrum through its natural opening in acute cases is too difficult of accomplishment to give much result.

In the treatment of chronic maxillary empyema, it is generally conceded that no methods of treatment except the operative ones need be considered. Opinions differ very widely as to the method and extent to which we shall go in the treatment of such cases. In the European clinics we find a much greater tendency toward the more radical procedures. Consequently, European literature is filled with descriptions, more or less elaborate, of ways and methods of curing maxillary empyema. In doing work of this kind, there is one point that should be kept constantly in mind, and that is, what post-operative discomforts are likely to ensue. We occasionally see cases in which these discomforts seem to the patient greater than the discomforts of the disease itself, and such a condition very seldom increases the gratitude of our patients toward us. In many of the large clinics, considering the class of patients mostly treated, this may seem of minor importance, but certainly to many of us, who have little to do with such clinics, it is a real issue.

METHODS OF ANTRUM OPERATIONS.

After it has been determined that the antrum should be opened, the four best-known routes by which such an opening is made are through the alveolar process, the canine fossa, the hard palate, and the naso-antral wall. In those cases in which the exciting cause of the antral trouble is the penetration of a diseased tooth through the floor of the antrum, the extraction of the tooth and the free opening of the antrum through the tooth socket, with proper irrigation and medication, will generally cure the disease if it has not existed too long. In all such cases, if the disease does not yield readily, other methods should be employed.

It is the contention of most operators in this country that disease of the antrum from this source is the only condition that justifies us in making either a temporary or a permanent opening into the mouth in incipient cases. The opening through the roof of the mouth is only advisable in certain cases for the removal of growths so situated as to make this route the most direct method of reaching them. The route through the canine fossa, the so-called Küster or Danker operation, consists in the removal of enough of the anterior wall of the antrum to permit of a free exploration of the cavity.

Caldwell of New York has described a combination of the external and internal routes, by which an opening is made through the anterior wall sufficiently large for inspection, continuing the opening through the naso-antral wall into the nose; through this latter opening, subsequent treatment is carried out and the external opening permanently closed.

There are a great many methods employed by different surgeons in opening the antrum by the naso-antral route. The simplest method is by penetrating the wall with a trocar and cannula, which instrument can be used both as a means of diagnosis and as a medium for washing out the cavity, which is often sufficient in recent inflammations to effect a cure. In cases requiring more elaborate treatment, success seems to depend a good deal upon the size and position of the opening made. Innumerable instruments have been devised for this work, but it seems best that each surgeon should choose what seems most practical to him and insures him results.

DR. J. O. ROE'S OPERATION FOR CHRONIC CASES.

Dr. J. O. Roe's method seems to offer as much hope of permanent relief as any in these chronic cases requiring more or less radical treatment. He first removes the lower anterior portion of the inferior turbinate, if this body is large enough to interfere with the subsequent steps of the operation; then an incision is made through the periosteum to the bone from behind forward, covering the entire length of the antrum and close to the attachment of the turbinate. At right angles to this incision, two more incisions are carried from either end to the floor of the nose. This flap is then raised from the bone and turned into the center of the nostril out of the way of injury. Puncture is then made anteriorly into the antrum, and the wall is nipped out with forceps. Care should be taken that there be no projection of bone between the floor of the nose and the floor of the antrum. The cavity can then be carefully explored and irrigated. The flap that has been raised is then turned down over the stump of the wall, and held by packing the entire antrum and nose. Dr. Roe claims that this conversion of the antrum into a portion of the nasal cavity is never followed by any ill effects or discomfort. This method certainly has the advantage in the ease with which the cavity can be medicated. Perfect drainage is maintained, and the danger of a recurrence of the empyema is prevented, no matter what the infection be.

These cases tax our skill and knowledge to the utmost. An intelligent survey of all conditions having any relation to these affections will reduce the number of patients who either wish that someone else had done the operation, or that one never had been done.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

PULP CAPPING *VERSUS* DEVITALIZATION.

By L. J. BROWN, D.D.S., Westfield, N. Y.

IN introducing this subject, the first and most important factor to be considered is, in the writer's opinion, the histology and anatomy of the pulp.

HISTOLOGY AND ANATOMY OF THE DENTAL PULP.

We know that the dental pulp is composed of embryonal connective tissue, odontoblastic cells, bloodvessels, and nerves. The odontoblasts, forming a continuous layer over the pulp surface, are everywhere in contact with the dentin by the protoplasmic processes projecting into the dentinal tubules. The odontoblasts also have processes which extend into the pulp tissue, while their lateral processes unite with each other.

The vascularity of the pulp is greater in youth than in old age. The bloodvessels communicate with the general circulation through the small apical foramen or foramina of the tooth. One or more arteries enter, divide into capillaries, and form a plexus around the peripheral portion of the pulp. Although the arteries do not anastomose to any extent, they are generously distributed throughout the pulp tissue.

The veins form a similar plexus, and a central vein, corresponding to the artery, conveys the blood out through the apical foramen. It is claimed by some that these veins have no valves and are non-collapsible. The arteries are without almost any external fibrous and muscular coats, and the veins have only a single layer of endothelial cells to form their walls; the pulp has no lymphatics.

The nerves of the pulp are transmitted through the apical foramen with the bloodvessels. Several bundles of the medullated fibers enter and break up into a plexus of nerves, which are widely distributed throughout the pulp. Those lying just beneath the layer of Weil lose their medullary coat or sheath, and are lost between the odontoblasts.

CONTRA-INDICATIONS TO PULP CAPPING.

So much for the histology of the pulp, which will substantiate the reasons why exposed pulps should not be capped.

(1) *Thermal changes.* There is great possibility of death of the pulp due to thermal changes, especially when gold or amalgam is used in filling a cavity. The action of heat and cold on the very delicate and unprotected nerve fibers causes an irritation from which hyperemia results, and the sensory and perhaps vaso-motor nerve fibers become stimulated, irritated, and then paralyzed. The bloodvessels retain their tonus up to a certain point, but suffer vaso-motor irritation, followed by paralysis, leading to their dilatation and to throbbing pain which is difficult to relieve, and the pulp dies or has to be removed in the course of a short time.

(2) *Death of pulp due to infection.* Death of the pulp may ensue from infection beneath the capping material. Pathologically there is no abrupt line of demarcation between diseases of the dentin and those of the pulp, as the dentinal tubules contain the fibrillar prolongations of the odontoblasts of the pulp. Affections of the fibrils, therefore, cause a pulp reaction, which may lead to a destructive activity by the hyperemia or inflammation set up. A most prolific source of trouble is furnished by dental caries, or the invasion of pathogenic bacteria and the absorption of ptomains. When the pulp is capped, some of the diseased and softened dentin is usually allowed to remain, because its removal in entirety would cause too great an exposure. If any softened dentin is left, it must be thoroughly sterilized, and all micro-organisms destroyed, else caries will advance as before. Sterilization of such dentin is an uncertain and difficult task, for it is almost impossible to find a sterilizing agent which is non-irritating and mild enough in its action to be used in such close proximity to the pulp without setting up an irritation followed by hyperemia. Burchard cites experimental cases upon microscopically sound-looking dentin in which the bacillus gangrenæ pulpæ has been found vital after concentrated phenol and other antiseptics had been sealed in the cavity for months.

We know, too, that infection may travel via the tubules, and that septic inflammation has resulted even before the pulp was quite exposed. The reason for this is that the dental pulp has no chain of lymphatics to remove the products of inflammation, and their removal is as impossible as that of any effusion in the brain. The slightest possible irritation, therefore, will produce a hyperemia or determination of blood in the irritated pulp tissue, and an engorgement of its capillaries; and owing to the absence of the usual venous and arterial coats, the blood-channels at once yield to the pressure. Neither is there the normal vaso-motor system of nerves to control the resilience of the vascular system, and the escape of the elements into the pulp tissue is materially modified. The pulp, moreover, being incased by bony walls, and its only entrance and exit being the small apical foramen, the complications which arise from congestion are enhanced by added pressure against the walls, and a tendency to choke or shut off the entrance of arterial nutriment and the exit of venous impurities, which will soon lead to disease and death of the organ.

(3) *Secondary dentin; calcific deposits; pulp nodules.* There is danger of an over-production of secondary dentin, calcific deposits, or pulp nodules. These result from slight but continued irritation of the pulpal organ, deranged neural currents, and some perversion of nutrition which induces a formation of dentin in abnormal quantities, owing to the undue activity of the odontoblastic cells, and excessive irritation. Our text-books tell us that in pulp capping this secondary dentin is depended upon to heal up the exposure, but in the majority of cases the formation of secondary dentin is not discontinued when this protective layer is completed, but its deposition continues until there is an abnormal amount, which causes very serious trouble, or the pulp may die from the atrophy and degeneration attendant upon the formation of too much secondary dentin. Neuralgia has been caused by this degenerate condition of the pulp, and has been followed by pericemental irritation. In many cases, where the cavity is well up on the tooth or near the cervical margin, the deposit extends into the root-canal, totally obliterating it, producing death of the pulp, and rendering the opening and filling of the root-canal afterward a very difficult operation.

(4) *Uncertainty of success of pulp capping.* The time required for assurance of the success or failure of pulp capping is unduly long. Some practitioners, when asked if they ever cap a pulp, reply, "Yes, sometimes when I make an accidental exposure, and am in a hurry." But do they gain anything by this method? In nine cases out of ten the gain is only temporary, for the operation may not have been successful, and it is only a question of a few days or weeks before the patient returns ready to heap vengeance on the operator, or has become disgusted and has consulted some other dentist. If one ever does cap a pulp, he should never insert a permanent filling at the same sitting, but should resort to a temporary filling, and allow some time to elapse awaiting results.

(5) *Consideration of patient's age and health.* The age and health of the patient are important factors in the success of pulp capping. As has been stated before, the pulp is much more vascular in youth than in old age, and for this reason it is inadvisable to attempt the capping of pulps in the teeth of elderly people. The vitality of the pulp in such persons is so low that the shock of exposure is fatal to the recuperative powers, and trouble ensues. Great attention should be paid to the patient's health and oral conditions. If there is congestion or any evidence of degeneration of the structural components of the pulpal organ itself, it would be futile to apply capping, as would also be any attempt permanently to save a pulp in the mouth of any patient suffering from some systemic derangement interfering with the general circulation, thus lessening vital resistance; for in such cases the pulp would fail to receive from the blood supply the elements necessary for the restoration of its functional activity.

PRECAUTIONS IN THE DEVITALIZATION AND EXTIRPATION OF THE PULP.

Now the question arises, How can we avoid many if not all of the complications and disagreeable features enumerated which so often occur in connection with pulp capping? The answer is: Devitalize, remove the pulp, and fill the root-canals. By this I do not wish to convey the idea that it is advisable to destroy ruthlessly all pulps, for this would be most injudicious. In fact it is the duty of every dentist to save the pulps of teeth, if it can be done with any reasonable prospect of success.

If, in the devitalization and removal of pulps, we observe the three following factors, we are fairly sure of success, and of a just reward for the operation: (1) Establish and maintain asepsis in performing the operation; (2) preserve the color of the tooth, and (3) thoroughly fill the root-canals.

It is needless to go into details concerning the processes of devitalization, for we all know that, by the present methods and new combinations of drugs, this operation has been made almost painless and extremely simple.

PRESERVATION OF THE COLOR OF DEVITALIZED TEETH.

A few words, however, should be said in regard to the preservation of the color of the tooth. The cause for the darkening of a great many teeth after the pulp has been removed can be traced directly to failure to remove blood from the dentin of the crown of the tooth. The prevalent practice of wiping out the bloody canal with a solution of hydrogen dioxid cannot be too strongly condemned. Hydrogen dioxid simply decomposes the blood within the tooth and oxidizes the iron of the hemoglobin, and the gases evolved force this pigment into the tubuli, where, if left—*and it is difficult to remove*—it will cause the tooth to darken in almost every instance.

For the removal of blood from a root-canal, alcohol followed by sterile water applied by a syringe is excellent, or a solution of peppermint water to which two minims of phenol per ounce and a little sodium chlorid have been added will accomplish the desired result.

It is also the practice of many dentists, after removing an arsenical dressing, to flood the cavity with a solution of dialyzed iron, after which the pulp chamber is opened into, thereby usually producing a hemorrhage; then, without removing the blood or the dialyzed iron, tannic acid is applied to toughen the tissue before removal. This application of tannic acid is totally unnecessary, and owing to the fact that tannic acid and iron are incompatible and form iron tannate, which is a form of ink, such practice is another prolific source of discoloration. We should therefore avoid forming, within the tooth structure, a pigment which we know will discolor the tooth. The color of a tooth does not depend upon the life and vitality of the pulp, but upon the array of colors in the dentin, which are reflected through the nearly colorless and transparent enamel. Therefore, unless these colors are changed by our failure to remove blood, or by the use of staining remedial agents in the treatment subsequent to pulp removal, the tooth will not discolor.

CONCLUSIONS.

In conclusion, the arguments advanced may be summarized in three indisputable statements:

(1) The consensus of opinion is that, ordinarily, all exposed pulps should be removed.

(2) There is no certainty that pulps exposed by caries and otherwise will remain vital under capping material.

(3) The inherently experimental character of pulp capping argues strongly in favor of the but little more laborious root-canal treatment.

BAKERS' BREAD AS A FACTOR IN INDUCING DENTAL CARIES.

By ALBERT B. KING, D.D.S., Baltimore, Md.

(Read before the Maryland State Dental Association, at its annual meeting in Baltimore, June 14, 1912.)

I WISH to present a subject that has interested me for some time, and of which I have recorded a number of cases that have come under my supervision. I refer to bakers' bread as a factor in inducing dental caries.

I do not propose to assume an antagonistic spirit to any of the theories that have been advanced in regard to dental caries, but wish to suggest a line of thought on foodstuffs by which, in time, we may be able to determine the best possible diet—especially for the young—that will be conducive to the formation of a perfect normal denture.

I write as a result of some observation, some thought, and some experience, which have convinced me that the dental as well as the medical profession is passing through an era of prevention. While we are impressing upon our patients the importance of oral prophylaxis and are advocating oral hygiene, and, where caries exists, extension of cavity margins to immune areas for the prevention of further ravages, I think it would be well to continue a step farther, and investigate foods that are generally used, and ascertain their susceptibility to lactic acid fermentation.

There is little doubt that the process of caries is affected by the character of our food. This has been fully demonstrated by the comparison of the teeth of different races, those living close to nature being practically immune, while those living on a mixed diet are very susceptible. It has been shown very clearly by Miller that caries of the teeth is the result of decalcification of the tooth substances by lactic acid, and that the carbohydrates, starches, and sugars are the only foods that are capable of lactic acid fermentation. Kirk attributes the prevalence of caries in children to the excess of carbohydrates in their food, which consists mainly of starches and sugars.

This subject was first brought to my attention several years ago. A patient, a man about thirty years of age, presented himself for examination. I found that he had a practically perfect denture, large and well-formed teeth, with perfect occlusion, and a color to denote hard, dense tooth structure. I found two small fissure cavities in the upper first molars, which I prepared and filled. He told me that he had just opened a bakery in the neighborhood.

A year later he came to me again, and upon examining his mouth I could hardly believe that he was the same patient, so great had been the ravages of caries. The central and lateral incisors presented large labial cavities, while the bicuspids and molars had equally as large approximal cavities, and what a year before appeared to be a perfect set of teeth was now a wreck. I questioned him about the care he had given to his teeth since his last visit, and he assured me he had brushed them faithfully night and morning, which statement was corroborated by the almost total absence of calculus.

After questioning him, my suspicions fell upon the bread he was eating; so I determined to investigate along this line and keep a record of the kind of bread used by different patients.

The result has been that of one hundred and thirty-two cases recorded, eighty-seven used bakers' bread exclusively, thirty-one used bakers' bread alternately with home-made bread, and fourteen home-made bread exclusively. The majority of the cases observed were children between eight and fourteen years of age, although some cases ranged in age from twenty to thirty-five years.

After having had most of the cases under my supervision at regular intervals for three or more years, I found caries quite prevalent among the eighty-seven individuals who ate bakers' bread exclusively. With those who alternated with home-made bread, caries was not so prevalent; while for the fourteen who used home-made bread altogether, I have filled but six cavities in over three years. The difference has been so marked that I am convinced that the commercial bread of cities is deficient in bone-producing elements, and is extremely conducive to lactic acid fermentation.

In the DENTAL COSMOS for May 1912 appears an article on this subject by Dr. J. Sim Wallace of England. He says, "No farinaceous foodstuff in general use is less harmful to the teeth than bread when eaten with butter," and that "the different varieties of bread, *i.e.* white, standard, and stone-milled, make no appreciable difference in inducing dental caries."

From my own observations I cannot agree with Dr. Wallace in regard to there being no difference between different forms of bread in inducing dental caries, unless the breads he speaks of were made in the same way and under similar conditions.

I find that when bakers' bread is thoroughly masticated and moistened with the saliva, the bolus formed is pasty and sticky, and therefore adheres more readily to the teeth than the bolus formed from home-made bread, and that feature alone, in my mind, would be more conducive to lactic acid fermentation. Added to this are chemical constituents used for raising or leavening the bread, which also have a deleterious effect on tooth structure.

I therefore believe that while we are advising oral prophylaxis and bringing oral hygiene before the attention of the public, we should also advocate proper, wholesome, pure food, especially for our patients of tender years.

AGAIN THAT DENTAL SOCIETY PAPER.

By FRANK W. SAGE, D.D.S., Cincinnati, Ohio.

READERS of scientific papers in dental societies often unwittingly place an insurmountable obstacle in the way of the stenographer's making an intelligible report for the journals. I refer now expressly to the paper accompanied by a chart.

It often happens that the writer of a paper, having in mind to refer by means of a pointer to his chart as he reads, *fails to letter or number* the chart, forgetting that when the said paper, accompanied by the chart, appears in the dental journal, there will be no hand present directing the reader with a pointer indicating the lecturer's meaning. Let us illustrate by actual reproduction of words used by one such essayist:

"At this point you will see [pointing] that the line curves upward toward that point [pointing], thence dropping down to this place [pointing], and finally being lost there [pointing]."

Now, in all this not a point has been indicated in such a way that reporter, editor, or reader of the dental journal can make out its location. The reporter, when he comes to transcribe his notes, is aware that they must be unintelligible; the editor so finds them, and must refer them to the essayist, who must then supply what he in the first place omitted, to wit, letters or figures to accompany the reported words.

Now for the simple remedy: Number or letter your charts, and when pointing, fail not to *mention the number or letter* you are pointing to. This, of course, is as indispensable to an intelligent understanding of the reporter's verbatim rendering of the speaker's words as the numbering or lettering itself—in order that the reporter may hear, for he cannot always raise his eyes to see, and besides, seeing would not help him. If the reader of the paper omits to do this, then the reporter's transcript, as a moment's reflection will show, will fail to convey an intelligible idea to the reader of the dental journal. And do not use two sets, large and small, of either letters or figures. The reporter is utterly unable to indicate to the reader a large *A* as contradistinguished from a small *a*.

Our journals employ expert stenographers at great expense, under the impression that a verbatim report must be satisfactory, whereas it may wholly fail of the real requirements of the editor. This *en passant*, by way of adding emphasis to the importance of essayists' helping reporters—and editors—by suitably preparing their papers.

A word in general as to aiding the reporter: Do not leave your sentences uncompleted. Many otherwise excellent speakers break off in the middle of a sentence, and begin another. This leaves to the reporter a choice of omitting your speech altogether, or else supplying what you omitted. Some who have perhaps noticed that their remarks were omitted in the published discussions may now understand how it probably happened. The reporter cannot supply what you omitted to say, having only vague surmisings to depend on. The wonder is that professional reporters do as well as they do.

THE DENTAL DEPARTMENT OF SING SING PRISON.

By CHAS. W. FARR, M.D.,
MEDICAL DEPARTMENT, SING SING PRISON.

BRIEF HISTORY.

THE dental department of Sing Sing prison was organized about five years ago, at which time an old Yale chair was purchased, together with sufficient instruments to carry on the work; this consisted of the extracting and filling of teeth, and when absolutely necessary the making of dentures. Previous to that time all extractions were made by the prison physician, and any other work was done by a dentist from the village.

The inmates paid for their work at rates such as they would have had to pay in the outer world, the operator naturally charging for the material and his time, which, in many instances, was more than most of the convicts could afford.

Just subsequent to the appointment of Jesse D. Frost as agent and warden of the prison, a prisoner was received who had been a practicing dentist previous to his incarceration. Warden Frost, knowing the need, saw the advantage of having an inmate dentist who could do the work for his fellow prisoners, the state paying for what material was necessary to carry on the work that was then being done, and he assigned this prisoner to the hospital, where he continued to do the same class of work as had formerly been done by the visiting dentist.

Later the field of work was broadened, to include crown and bridge work, and inlays, etc., were made for the patients—who, however, paid only for the actual cost of the gold and whatever other material entered into the manufacture of the specific work accomplished. This arrangement continued in force for about four years, when another dentist was received at the prison. Just about this time the new prison at Great Meadows was made ready for occupancy, and as a dentist was needed, the man who had been doing the work at Sing Sing was transferred there, and the new arrival was assigned to the Sing Sing hospital to carry on the work.

PRESENT CONDITIONS.

To understand the manner in which the dental work is conducted in Sing Sing prison at the present time, it is first necessary to know something of the arrangements for the daily hospital clinic, as the dental department is carried on in conjunction with the general hospital work. Each morning on the arrival of the various companies in their shops after breakfast, all inmates desiring medical treatment have their names and prison consecutive numbers entered in the hospital book by the company clerk, and later they are marched in squads to the hospital on the top floor of the administration building. Entering the clinic room one by one in order, they state their various complaints to the attending physician, Dr. Henry E. Mereness, Jr., who is assistant physician to Sing Sing prison and whose duty it is to take the morning sick call, and are prescribed for, receiving immediately whatever treatment is indicated. Among these men are those who desire to have dental work done, and on so stating to the physician they are referred to the dentist. A superficial examination is made at once by him, and the patient's name, number, and shop location recorded. An appointment is made and the patient returns to his shop with the squad. The sick call being over, the dentist makes a list of appointments for that day, and the same is sent to the office of the principal keeper, where it is placed on file. After the midday meal, as the men file out of the mess-hall, they are called from the ranks and marched to the hospital. Upon arrival there they are summoned in order to the dental operating room, and the work begun, or continued if it has been started at some previous time.

The present warden of the prison, Hon. John S. Kennedy, is very much interested in this department, and has recently purchased for use therein a new dental chair of the latest pattern, and a complete new outfit of instruments, which enables the present operator to accomplish more work for the inmates and is largely conducive to the general health of the convict body. It may be stated that the discovery has been made that in excess of ninetv per cent. of the new arrivals at the prison have disease conditions of the teeth to a greater or less extent.

All simple work, such as extractions, cement fillings, amalgam fillings, etc., together with the treatment of the diseases of the mouth, are provided by the state free of charge to the prisoner. When, however, the mouth is shown to be in such a condition as to demand artificial teeth in the form of plates or bridges, the inmate pays for the same from the money he may have on deposit with the clerk. In the event that he has no such account, he is permitted to use the amount necessary from the "earnings account," a sum of money with which the state remunerates him for his labor, and which is only available for certain purposes according to law. A form of contract is signed by the inmate in such cases, and is witnessed by the officer attending the hospital. This contract is filed with the clerk of the prison, who puts a stop check against the prisoner's account, so that the amount represented thereby cannot be expended in the interim between the signing of the contract and the arrival of the material and the finishing of the work. When the work is completed, the prisoner signs a voucher to the effect that he has received value for the amount, and the transaction is thereby closed.

When a case presents itself, as sometimes happens, in which the patient has not sufficient funds on deposit or to his earnings account to cover the cost of the proposed work, and the need is absolute for a rubber denture, the attention of the prison physician is called by the dentist, who takes up the matter with the warden, explaining the need, and the necessary expenditure is made from the state funds.

The whole work is carried on under the supervision of the prison physicians, the dentist taking to them all matters which are out of the ordinary, and receiving from them instructions to proceed as he deems proper for the best interest of the patients.

The report appended is a copy of the one made to the Prison Department for the fiscal year ending September 30, 1912. An examination of the same will show the great amount of work accomplished by the department, and its variety, all branches of dentistry being practiced:

MEDICAL DEPARTMENT SING SING PRISON—DENTAL CLINIC.

Annual report of the work accomplished in the Dental Department for the fiscal year ending September 30, 1912.

Applicants for treatment during entire year	2878
Applicants treated	2854
" not treated	24
Teeth extracted	639
" devitalized	122
Fillings—amalgam	242
" cement	128
" gutta-percha	44
Inlays—gold	16
" porcelain	7
Teeth crowned with gold	69
Porcelain crowns (Logan, Davis, and Richmond)	32
Miscellaneous gold bridges put in	116
Full upper dentures	17
Partial upper dentures	23
Full lower dentures	6
Partial lower dentures	4
Applicants' teeth cleaned	180
Gingivitis treated	61
Pericementitis treated	36
Pyorrhea alveolaris cases treated	192
" " " improved	168
" " " not impr.	24
Alveolar abscesses treated	85
Full upper dentures repaired	19
Partial upper dentures repaired	11
Full lower dentures repaired	8
Partial lower dentures repaired	3
Gold bridges repaired	18
" crowns "	9
Bridges re-cemented	4
Crowns "	12

PROCEEDINGS OF SOCIETIES.

NORTHEASTERN DENTAL ASSOCIATION.

Eighteenth Annual Convention, held at Crawford Notch, N. H., October 1, 2, and 3, 1912.

TUESDAY—*Afternoon Session.*

THE eighteenth annual convention of the Northeastern Dental Association was held at the Crawford House, Crawford Notch, N. H., October 1, 2, and 3, 1912.

The first meeting was called to order by the president, Dr. A. J. Sawyer, Manchester, N. H., at 3.30 o'clock, Tuesday afternoon.

The first order of business was the reading of the minutes of the last meeting.

Motion was made and carried that the reading of the minutes be dispensed with, in view of the fact that they had been printed in full in the Transactions and were in the hands of each member of the association.

The next order of business was the report of the Committee on Necrology.

Dr. KINSMAN, secretary, reported that a memorial page had been set aside in the program on which a notice was given of each deceased member, and this practically constituted the report of the committee.

Dr. KELLEY asked if the committee had received any correspondence in regard to the death of Dr. Stockwell.

Dr. KINSMAN reported that he had received a letter from Dr. A. J. Flanagan in regard to the matter, stating that he thought the society should take some special action on the death of Dr. Stockwell. Dr. Kinsman further explained that at the last meeting, on resolution, the association bowed in silence for a few moments in respect to the memory of Dr. Stockwell, and that also his name had appeared on the memorial page.

Dr. RIDER moved that the Committee on Necrology of the association formulate a suitable resolution of sympathy, to be sent to the members of the family of any member of the society who dies. The motion was carried, and the report of the Committee on Necrology was on motion accepted.

Dr. KELLEY moved that a committee of three be appointed to bring in a list of nominations for officers for the ensuing year. (Motion carried.)

Motion was then made and carried that the association adjourn until the evening session.

Evening Session.

The meeting was called to order at 8.30 o'clock, Tuesday evening, October 1st, by the president, Dr. Sawyer.

Dr. Murlless having been called to the chair, the president, Dr. A. J. SAWYER, read his annual address.

Dr. Sawyer resumed the chair, and announced as the next order of business for the evening session the reading of a paper by Dr. ARTHUR D. BLACK, Chicago, Ill., entitled "The Progress of Dental Caries in Relation to Cavity Preparation."

[This paper is printed in full at page 469 of the present issue of the COSMOS.]

Discussion.

Dr. N. A. Stanley, New Bedford, Mass. New England has been rather loath to accept Dr. Black's method of cavity preparation. We all know that success in filling teeth is dependent upon the proper preparation of cavities, which is of the same importance as the foundation under a house; if the cavity is not properly prepared, the filling will not stand. We have had a most scientific demonstration of cavity preparation, and the profession is indebted to Dr. Black's father for giving to us this truly scientific method. I want to give my testimony to the weak point to which Dr. Black calls attention, that is, the buccolingual aspect of approximal cavities in which the gingival portion is curved rather than straight, leaving a little triangle of enamel which is susceptible to recurrence of caries. It is nearly always at this precise spot that I have observed this recurrence; not in platoons, but now and then, just to remind me. I acknowledge this, and am going to adopt the method described. Of course, with the use of ordinary common sense and judgment in any given case, as Dr. Black says, we should make self-cleansing margins, which the process of mastication will keep polished and immune from caries.

Dr. W. I. Brigham, South Framingham, Mass. I have heard many papers read upon the Black preparation of cavities, and I am generally ready to discuss such papers. No paper is of much value unless the ideas contained therein are demonstrated, and I came here to give a clinic tomorrow entitled "Anti-Black Preparation," and I suppose there are other clinicians who will insert fillings by the Black method.

Dr. Black has said this evening that extension for prevention has nothing to do with the interior portion of the cavity. If a cavity is prepared according to the demands of extension for prevention, then the interior of the tooth has a great deal to do with extension for prevention. I have from the beginning opposed the Black preparation, and I was one of the first who was willing to stand up, denounce it, and demonstrate that it had but little value. After many years, many writers are denouncing the Black preparation, so that I feel encouraged in my objection to that method. Why do I object? Because it involves unnecessary cutting for the preservation of a tooth. I object to its being taught in dental schools as the ideal preparation, because the student thus prepared is not equipped to fill teeth as they are presented to us for treatment. At this point I would like to refer to that portion of Dr. Sawyer's address where he spoke about the colleges. Some society ought to take a stand in regard to what the colleges are teaching their students. The dental student today, when he is graduated, is a very poorly equipped operator. Otherwise, we should not see glittering gold crowns on teeth that should have been filled. This is not all done for mercenary reasons, but because the student has never been taught to fill these teeth properly. Very few operators would do inferior work if they knew how to do good work. It is surprising how little really esthetic dentistry is being taught in the dental schools. How much porcelain work is being taught in our schools? I remember reading not long ago a catalog of one school in which it was stated that within one year in that school thirty-three porcelain fillings had been inserted. Think of it! A whole class made thirty-three porcelain fillings. Can one expect students to graduate and do esthetic work with that preparation? Thirty-three porcelain fillings a week would have been too small a number. If we think of the different instructors we had in college, how few of them ever taught us anything! The great trouble is, as I stated in a paper which I read in Boston, that many of the students who are graduated today are tomorrow back in the colleges as instructors. In the editorial in the September Cosmos, in which Dr. Kirk speaks of educating men to become teachers, this same thought is expressed.

While these remarks do not pertain

strictly to cavity preparation, they emphasize how poorly students are being equipped today in our colleges for operative work. I claim that there are men today teaching the Black system who cannot demonstrate it, and others, as I discovered in conversation with one not long ago, who have never read Black's book.

I want to ask the essayist a few questions. Does he advocate the preparation of cavities as laid down in Black's "Operative Dentistry"?

Dr. Black. Yes, sir.

Dr. Brigham. Then, if you follow the preparation of cavities as laid down in Black's "Operative Dentistry" and as demonstrated to the student, the preparation of the cavities which you have shown is tame indeed. There is no comparison, to my mind, between the illustrations in that book and what we have seen here tonight.

The essayist said that the cavity always starts at the contact point. In this, I think, he is generally correct. Once in a while we see a cavity on or near the approximal surface which did not start at the contact point. If the cavity begins at the contact point, why shall we extend the cavity awav out here [illustrating], in order to carry out the principle of extension for prevention, if caries never commences there? If in the cavity a tight and properly contoured filling is inserted, why is that tooth not as perfect as it was in the beginning, if caries never starts except at the contact point? This is a reason, then, why it is not necessary to extend a cavity to these wide extremes to preserve the tooth.

In a cavity like that [illustrating] the essayist carries the gingival margin under the free margin of the gum. If the cavity begins at the contact point and never at the free margin of the gum, why is it necessary to carry the cavity under the gum line, if caries never begins there? The essayist says that the gold must be packed in the cavity with such force that the elasticity of the dentin would be sufficient to hold the filling in place. How many of us wish to have a filling inserted in that way? If the cavity margins are perfect and smooth, it is not at all necessary to carry them out to an angle. I may appear dogmatic. I admit that I am positive, but I have the right to be so, because I am willing to demonstrate my ideas practically and have the results compared with those of any operator who wishes to follow Black. A filling can be inserted as well if the margins are curved, provided the gold is packed in very tightly. What do we see at conventions where operators are demonstrating the Black cavity preparation? At a convention in Boston not long ago, a man—one whom I am sure Dr. Black would be willing to have demonstrate his ideas anywhere—demonstrated cavity preparation and the filling of a tooth. It was a cavity, or he said it was a cavity, although I could not see any, on the mesial surface of a molar, in which he wished to demonstrate his cavity preparation. In the same mouth were several large or medium-sized cavities temporarily filled with gutta-percha. Why did he not select these cavities? Simply because the Black preparation of cavities is not applicable to all carious teeth. It is only applicable to teeth in which the advocates of the Black method can demonstrate extensive cutting. What did we see at the convention at the Weirs? One of the clinicians selected a lower bicuspid with a little imperfection in a woman of about fifty years, and he prepared a large cavity with undercuts, which it required more gold to fill than would have been necessary if the cavity had been properly prepared.

Another point in this connection. The Black followers always select bicuspids or molars to demonstrate their principle of cavity preparation on. Why? Because their preparation of a cavity in an incisor or canine would be very difficult to follow indeed, and I venture to say few of them could ever insert a perfect filling in an incisor and have it last, unless they had produced a wide separation beforehand. In bicuspids the extension of the cavity into the coronal surface greatly weakens the tooth, if the sulcus is a perfect one, and is seldom necessary. In a bicuspid Black extends the filling from the cervical wall to the coronal surface, exerting enough pressure to have the gold spread out and come in tight contact with the approximal walls. As the gold becomes hardened by malleting, it is difficult to obtain close adaptation to any of the walls, and that is the vulnerable point in many of these fillings. If that wall is perfect, with proper manipulation of the gold it is as easy to fill as any other portion of the cavity.

Dr. Stanley. The filling is just as tight there as anywhere else.

Dr. Brigham. You may think so.

Dr. Stanley. I know it.

Dr. Brigham. That is rather difficult to say. I make mistakes, and sometimes find fillings give way that I assumed I did not have tight there. Many of these may not be tight there, and that is why they have failed. But why should we cut in the longitudinal direction of the tooth when caries does not progress that way? A cavity in a tooth of that type should be filled from the approximal side, and as the gold comes down it becomes tighter and tighter.

Speaking of the retentive form of the cavity, I think too much stress is laid upon retentive form in bicuspid fillings. But little retention is required if the gold is placed properly. If we have a cavity in a bicuspid, it should be cut so that it shall be wider at the cervical than at the occusal border; then, as we insert the gold, and come down here [illustrating], in packing the gold with the mallet we are driving it in from a larger to a smaller space.

As to the illustrations shown on the board, I seldom see the gum line so high up as has been illustrated. If the cavity extends below the gum line, we must prepare it accordingly, but if it does not extend under the gum line, I should be very loath to extend it there. With a very small undercut along parallel walls [illustrating] all the retention necessary is obtained, whether there is a flat base or whether it is beveled to the extent of the outer surface.

I hope to find a patient tomorrow for a clinic, and to demonstrate to the satisfaction of almost anyone that this ruthless cutting of tooth structure is unnecessary.

Dr. G. A. Bowers, Nashua, N. H. I did not come prepared to discuss this paper, and I do not think that Dr. Black needs any indorsement. Dr. Brigham certainly has taken a very positive stand in regard to extension for prevention. I have been on the New Hampshire Dental Board for fifteen years, and in that time it has seemed to me that the real purpose of about every one of the students was to go just as quickly as he could to the pulp of a tooth in order to find a retention place to hold his gold. About two years ago we had eleven applicants, most of them from the Baltimore schools, some from Harvard, some from Tufts and other schools, and out of this number of applicants, five or six prepared and submitted to us for examination the most beautiful cavity preparations that I have ever seen, and some of the most beautiful fillings. These were the only students I ever saw that seemed to treat a tooth with any clear understanding. Most of the students we come in contact with seem afraid to use the chisel. One of the men in question took an old rocker as an operating chair, placed his patient in it, and went at the tooth as if he knew his business. The point that I am driving at is that these men had been taught the Black system of cavity preparation.

It was my pleasure some years ago to attend a meeting of the National Dental Association at Buffalo, and I met there Dr. Wedelstaedt, Dr. Conzett, Dr. Searl, and a number of other representatives of the Black Club. It was one of the greatest inspirations of my life to see the work demonstrated by these men. I think the operations of Dr. Cooke, as far as I can remember, were done about fifteen or sixteen years ago almost on the same lines as have been advocated here tonight. I might say they were composite fillings of the three "B's"—Black, Brigham, and Bowers—combined, perhaps, with horse sense.

I have nothing but the highest commendation for Dr. Black's paper, and I honestly feel that, if students were taught some system, this would tend to produce very beneficial results.

Dr. G. A. Maxfield, Holyoke, Mass. I was very much interested in this paper and in the modified views presented, which were so well illustrated by the tooth passed around by the essayist which showed his principle of cavity preparation. The cavity in that tooth evidently was originally small, and he has not made it an exceedingly large one. I believe and have always advocated the theory that the less metal we can use in filling a cavity, the better it will be for the tooth.

The reason why many colleges are teaching the Black method, I understand, is because it is the only system that has so wide an application, and it is so difficult to instruct the students in all the various methods of filling teeth. There is an old Yankee expression, which probably many of you have heard —"That man has no gumption," meaning he lacks common sense and the proper way of applying it. The majority of dentists who are practicing today and teaching the Black system are not using any gumption. I do not think that small approximal cavities in incisors, canines, and bicuspids should be made any larger than is necessary for the thorough removal of carious portions, and for giving them a retentive form and perfect edges. Fillings placed in such cavities and thoroughly polished, I think, are much the best means of restoration.

I have seen fillings inserted according to the Black method, some of which failed in five years, and then had to be reinserted with very little tooth structure left. If these cavities had been prepared and filled after the manner which I have just advocated, and had then failed after five years, there would still be a large amount of tooth structure left, and even after reinsertion the filling would not be as large as many of the practitioners of the Black method would extend a small pinhead cavity to. I believe that we should conserve tooth structure, and should not sacrifice any more than possible.

There is another instance where we should use gumption, that is, in considering the texture of the teeth and the conditions of the patient's mouth. We know that at times the teeth decay very rapidly, and again in the same mouth the teeth seem to have changed and there is very little caries. We must consider these conditions; every patient that comes to us must be treated individually. We should not try to adapt the Black system to every one, but treat each case as appears best for that individual.

In my own practice, whenever it is possible, I like to shape cavities so that I can use soft gold, filling the cavity two-thirds or more with soft gold, and finish with cohesive. I believe that in this way I can make a much better filling, which is better adapted to the walls of the cavity than if I had used cohesive gold altogether. I also save my own time and strength, and do not tax the nerves of my patient. This cannot be done in using the Black system.

There is another point to be considered, that is, the question of compatibility between the tooth structure and the material used for filling. Tin is much more compatible with tooth structure than gold, and a cavity filled with tin covered with gold makes an excellent filling and also preserves the tooth better than an all-gold filling. I would not, however, advocate this method for the anterior teeth, for tin discolors and appears dark through the thin walls of the incisors, though it does not discolor the tooth. It is favorably indicated in the bicuspids and molars. I hardly think, however, that a cavity could be filled with this combination of gold and tin if it had been prepared by the Black method.

Dr. Henry A. Kelley, Portland, Me. I am not a student of Dr. Black's book, nor of his system, except as I have seen it demonstrated at conventions by many different operators. I should say, however, that there is nothing that Dr. Black has said or shown on the board that I would not indorse. His teachings appear to be sound and scientific. It is when it comes, however, to extension for approach and extension for retention, points which Dr. Black has not touched upon, that I would probably differ with him. I have no doubt that I can indorse his theories as explained here today. The first lesson that I received from the gold inlay cavity preparation was how much better I could preserve the teeth by the inlay system than with fillings, because previously I had not cut away enough tooth surface. The inlay method necessitates a good deal more cutting of tooth substance, and I believe that is one advantage in favor of the inlay method. In a certain way, being neither old nor young, I bridge the space of time between the older and the younger operators, and of course I have been influenced by both schools. I think if Dr. Maxfield were more conversant with the teaching force at Harvard Dental School, he would not have said that it was so difficult to teach all the different methods. They have there a great number of different operators, and the different methods are taught, so that the students leave with a knowledge of many ways of filling teeth.

Dr. Black's paper has been instructive and useful; and he seems to have carried out in a scientific way what many of us have noticed in a clinical way. It occurs to me, as a believer in prophylaxis, that if these teeth always start to decay at the contact point, why is it not possible for us to keep that point clean? Also, why is it possible for us, instead of extending these surfaces to immune areas, to extend the immune area farther into the approximal space, so that there would be no necessity for a great amount of cutting of the tooth. I believe with Dr. Maxfield in the incompatibility between metal and tooth structure, and I think that proper prophylactic care of the mouth can do a great deal to make large extensions of the cavities, with the resulting large metal fillings, unnecessary.

I was pleased to see Dr. Black's drawings on the board, and realized at once that what they showed was not what I had supposed to be the Black system, nor what many so-called exponents of the Black system have taught. I had supposed that much more cutting was necessary than his drawings showed. I have no criticism to make of Dr. Black's presentation of his views. As to his opinion regarding the question of extension for approach and retention, however, I might radically differ.

I admire Dr. Brigham's courage very much, and I know that he can do all that he claims. I also know that Dr. Gerrish can show pinhead cavities that have retained fillings as many years as any inserted by the Black system; this, however, does not disprove any theory. It seems to me that Dr. Brigham's criticism pertains rather to what he thought Dr. Arthur Black might say—viz, upon his father's book and the theories propounded there—than upon Dr. Arthur Black's paper. As a conservative operator, I am much pleased with the conservatism which Dr. Black has exhibited.

Dr. Brigham. The point I wish to make is that the cavity preparation as shown here tonight is not as I understood it from Black's "Operative Dentistry." I spoke of what I saw demonstrated at one of the conventions by one of Dr. Black's disciples. This operator selected a small cavity in a molar and prepared it so that it required about five sheets of gold to fill it. While he was giving this clinic, two other clinics were going on in the room. These other clinicians had finished their work an hour and one-half before this Black advocate completed his filling. It required about three and one-half hours to insert the filling, the patient being subjected all that time to ruthless cutting and hammering, although this filling could have been completed in three-quarters of an hour, and would have preserved the tooth probably indefinitely, because the patient was no more than thirty-five years of age.

Dr. Stanley. I saw that clinic, and the reason why it took so long was because the clinician had a large audience and was lecturing during the clinic.

Dr. Brigham. The other operators were doing the same.

Dr. W. P. Cooke, Boston, Mass. I had not seen the Black cavity preparation until a few years ago, when it was my privilege to view one of the cleanest preparations of a compound cavity that I ever saw. I was brought up in dentistry under Dr. Shepard, whose great maxim was that, if the cavity was of reasonable depth, two parallel walls were sufficient to hold a filling, and that undercuts were not necessary; and that is the principle according to which I have filled teeth ever since.

Demonstrators choose certain cavities instead of badly decayed teeth, because they prefer to select a cavity that can be seen by the audience, and in which they can make a clean cavity preparation and demonstrate the principles of filling.

The principles laid down here tonight are, in my opinion, the proper ones for inserting amalgam, gold, porcelain, or gold inlays, and I do not think they can be controverted, since the more we think over them and the more closely we come in contact with the men who practice these principles, the more firmly we believe in them.

Dr. W. H. Rider, Danbury, Conn. We have always been taught to conserve tooth material, taking due care, however, to obtain firm, sound margins, in the preparation of cavities. A certain percentage—say fifty per cent. for argument's sake, though I would not admit of anything like that amount—of approximal, labial, and buccal fillings we are, in time, compelled to extend slightly or to a greater extent, and sometimes to replace. Can Dr. Black give good, adequate reasons why we should condemn the other fifty per cent. to that loss of enamel and dentin? There are tendencies in certain mouths to marked forms of cavities of decay, idiosyncrasies of the teeth, as of general temperament. Should we not study those idiosyncrasies rather than treat all teeth alike by the rigid rule of a positive system? Would Dr. Black dispute it, in general actual practice? There is a certain percentage of criminally inclined individuals. Shall we treat all of them as criminals? There are many consumptives, many insane or incompetent, others with peculiar tendencies to many forms of diseases. Shall all be isolated, confined, or treated alike the instant a symptom shows? It seems to be almost criminal to teach so indiscriminate a system in a dental college. There is one very essential point, however, that I would like to emphasize particularly. It must be remembered that Dr. Black is teaching this system to inexperienced men, that is, young students, and is sending them out with but little actual experience but with a knowledge of a certain very radical system. He says the cavities should be extended below the gum margin. This margin we know is the weakest at the junction of the cementum and enamel, and more easily fractured than any other portion of the tooth, yet he sends these boys out—for they are boys yet, not dentists—without experience, and many, not a small percentage but a large majority, without even the knowledge that the slightest blow against the enamel causes a fracture at that point, resulting in subsequent failure of the operation. This also accounts for the failure of many fillings the cavities for which have been prepared in the old way.

Dr. Cooke. I would like to ask how a fracture would occur there, if the large mass of gold was there to be condensed over the margin?

Dr. Rider. You need but a slight blow there, and you know also that it requires an expert, not a novice, to hold and properly condense even a small mass, as you term it, of gold under the most favorable conditions.

Dr. Cooke. It is simply a question of packing the gold properly.

Dr. Rider. But these boys have not had sufficient experience to do it even approximately correctly in most cases. Would you allow one of them to undertake it in your own mouth?

Dr. John F. Dowsley, Boston, Mass. I must take issue with Dr. Brigham in one particular criticism he has made. He claims that the young men who are being graduated from our colleges at the present time are poorly prepared, intimating that they are more poorly prepared now than before we knew or heard of the Black method. On the contrary, I have been examining the product of our colleges throughout this country for even a few more years than my friend Dr. Bowers. I have examined hundreds of candidates, and I and my colleagues have been impressed by the amazing improvement of the student body in regard to cavity preparation. The improvement has been simply wonderful, and it was noted not in one or two men of a class, but in nearly all of them. This is due, I believe, to the teaching of the Black system. I wish to emphasize the fact that *a system* is being taught, and that every student is being taught that system. These men not only prepare beautiful cavities, but do it in very much less time than was spent by students previous to the adoption of this particular method. This might have been the case if any other method had been taken up; but it happened to be the Black method, and we can, in our examinations, recognize the young men who have received that particular instruction by the clean-cut cavities they present.

It has also been said that it is not good to teach the young man a system. I believe, however, it is better to give him some definite system. Then, after starting to practice, he can improve on that system, and acquire better knowledge and judgment as he goes along. I think if the Black method has done nothing else, it has done a great deal for the colleges in their teaching of a definite method of cavity preparation.

Dr. Rider said also that these young men are not dentists when they are graduated. I do not agree with him. I believe that many of them are expert operators after a year or so of practice and are far in advance of those not having received a college training.

Dr. Brigham. We speak of a cavity as being nicely prepared. Do we know whether the filling which is placed in such a beautifully prepared cavity will preserve the tooth? We are not always able to say whether a filling is a good filling or not, by its appearance. I have seen students insert fillings which any expert would have declared good fillings, yet in a little while they failed. I know of a young man who went before a state board in a certain state and passed, and the filling he made at that time did not stay in the tooth three weeks. This filling, however, seemed to be a good filling when it was inserted. I know of another case where a young man, before a state board, inserted a gold filling in the distal surface of a lower canine, and did not pass, but I saw the filling seven years afterward, and it was preserving the tooth perfectly. The proof of the pudding is in the eating. I venture to say that there are not five men in this room who can fill a tooth and have it last under the Black preparation. That is a pretty bold statement, but I will pay for their time if they can do it. I have seen fillings fail that were made by the Black system, and only a little while ago I took one out from the mesial surface of an upper molar, that had been inserted only a short time, and that filling never can have been tight, because otherwise there would never have been so much recurrent caries. So we cannot tell always by appearance how well a filling is going to last. I can show fillings that have been inserted for years and are preserving the teeth perfectly, although this heroic cutting was not resorted to.

Dr. Black (closing the discussion). We are tonight considering especially the shape which we should give to the cavity in order to treat certain pathological conditions which present. One should not judge a thing by what anyone tells him; one should look into these things and study them out for himself, and do that which my father did when he developed this system, viz, take a paper and record what he saw. He observed thousands of small proximal cavities and found that they were practically all in the same place in relation to the contact point, and as a result he was justified in saying that caries begins there. This all can do; it is simply recording facts.

If we would take other thousands of teeth which have extensive proximal carious surfaces, and note how far the caries has spread on the surface and make records thereof, we would know something of the tendency of the progress of dental caries on proximal surfaces. If there were found in this examination not more than one or two in which caries had spread around the angle, then would it not be sound reasoning to say that, as a rule, caries does not extend there, and that the area near the contact point is the most susceptible point, and the condition gradually changes as the angles are approached? This is simply a plain fact that no one can get away from, and which anyone who goes to the trouble of making observations cannot possibly deny. It is not anyone's theory that I am trying to bring out, it is just a plain fact.

I would not agree with Dr. Maxfield that we should make a small filling, and when caries recurs, fill the cavity again. I would just as soon do as a dentist, whose respect for the code of ethics was questionable, said he did in placing fillings in the occlusal surfaces of the molars. Speaking of the lower second molar, he said he would not cut out the fissures in the occlusal surface and make one large cavity in the shape of a Greek cross, as others had advocated, but would make a small filling in the central pit, and then within a year or so the fissures would be affected by caries, and he would make four more fillings, and thus charge for five fillings altogether, instead of one. This quack understood dental pathology, but he was applying it to his own advantage. We are doing the same when we do not extend small proximal cavities, although we know that the tooth will again be affected by caries in the course of a few years. What happens after such a filling is placed in a tooth? Let us suppose that the filling is as smooth as the surface of the tooth was in the beginning; what is the result? If there is a slight space where the gum septum has receded from the contact point, micro-organisms will attach themselves to the filling or to the gold or porcelain inlay, in the same way as on the tooth itself in the first place. The colony grows on the filling in the same way as on the tooth, because there is nothing to prevent it, and it grows out beyond the margin of the filling in the same way as if the filling were not there; then there is a recurrence of caries on the surface of the enamel beyond the margins of the filling. It seems, therefore, common sense to extend the cavity so that it includes the area on which the colony will grow, thereby preventing recurrence of caries. It is not necessary to make a big cavity to do that.

Dr. Brigham spoke of cavities being shown in Dr. Black's book which appeared much larger than those that I showed in the drawings here. There are illustrations showing methods of preparing various kinds of cavities, and in many cases the cavities shown are extremely large, because extensive caries in the dentin had undermined large areas of enamel, but that has nothing to do with extension for prevention.

As to the elasticity of the dentin, it does not require a hard mallet blow to get good results in securing a grip on the filling by the dentin. A fifteen-pound blow on a one-millimeter plugger point will do it. Gold may be malleted in teeth with healthy peridental membranes with a blow of fifteen pounds without harm to the tissues and without discomfort to the patient. It is only necessary to apply the force in the proper direction in order to wedge the gold in and force the dentin back.

Dr. Kelley. Is there not also elasticity in the gold?

Dr. Black. Yes, but it is practically *nil* if compared with that of the dentin.

There is evidently quite a little misunderstanding in regard to recurrence of caries. There are two conditions which cause fillings to fail. In the one case the cavity has not been extended sufficiently; enough of the tooth surface has not been cut away in preparing the cavity, and caries recurs on the surface where the colony of micro-organisms has grown beyond the margin of the filling on the surface of the enamel. Such caries occurs no matter how perfect the filling, because the tightness of the filling has nothing to do with the recurrence of the growth of the colony of bacteria on the surface of the tooth. In the other case, the failure is due to the fact that the filling is not adapted to the walls of the cavity. In the first case, caries begins on the surface of the tooth; in the second, between the filling and the cavity wall. This statement must be kept distinctly in mind, because it refers to two types of recurrence of caries due to absolutely different causes.

Dr. Kelley spoke of prophylactic treatment of caries. If caries begins in a certain place and extends from that point, Dr. Kelley raised the question as to why we should not prevent it by prophylactic methods. There is one area of predilection of caries which can be effectively dealt with in this way, and it is situated in the region of the gingival third. Any patient can prevent such caries by brushing these areas thoroughly twice a day, but for proximal caries, I do not consider such treatment practicable, for the reason that in the constant effort to keep the surfaces clean, the gum septum is often injured to such an extent that additional recession occurs, and the patient is worse off than before.

The association then adjourned, to meet again on Wednesday afternoon at 3 o'clock.

Wednesday—*Afternoon Session.*

The meeting was called to order on Wednesday, October 2d, at 3.30 P.M., by the president, Dr. Sawyer.

Election of Officers.

The Committee on Nominations, Dr. Boardman chairman, then presented the following list of nominations for officers for the ensuing year:

President—F. T. Murlless, Jr., Hartford, Conn.

First Vice-president—G. A. Maxfield, Holyoke, Mass.

Second Vice-president—F. H. Brown, Lebanon, N. H.

Secretary—E. O. Kinsman, Cambridge, Mass.

Assistant Secretary—Charles F. Kreppel, Forest Hills, Mass.

Treasurer—David Manson, Burlington, Vt.

Librarian—D. W. Fellows, Portland, Me.

Editor—I. B. Stilson, Providence, R. I.

Motion was made and carried that the report be received, and the secretary be instructed to cast one ballot for the list of nominations for officers.

The society then adjourned to meet again at 5 o'clock.

The society re-convened and was called to order by the president, Dr. Sawyer, at 5.30.

The first order of business, as announced by the president, was a paper by Prof. E. H. Carleton, Hanover, N. H., entitled "Conservatism in Oral Surgery."

[This paper is printed in full at page 502 of the present issue of the Cosmos.]

Discussion.

Dr. F. H. Brown, Lebanon, N. H. This subject came to my attention very forcibly about two years ago. I was unfortunate in having the process left much exposed in the extraction of my upper left first molar. The process failed to cover even by a clot. I remonstrated with my friend who performed the extraction for not trimming with excising forceps the protruding alveolus, and predicted trouble. In about two weeks I began to have peculiar sensations. I suspected the trouble, and consulted several of my professional friends, but was assured that I had no indication of antral abscess, to which I could not agree. The next day I consulted a specialist in Boston, who asked me to wait two days for developments before he would venture a diagnosis. Three days later I went to the Mary Hitchcock Hospital at Hanover, and was operated upon by Dr. Carleton for antral abscess. Dr. Carleton told me afterward that the case had run on to the danger-point. From my personal experience, therefore, I want to emphasize the importance of removing all exposed alveolar process after extraction, as it is dangerous to leave it.

This operation impressed me as being so simple that I believe any qualified dentist could perform it as well as the specialist, if he had the courage to attempt it.

I wish that Dr. Carleton would state a few details of his method of diagnosing an antral abscess, as this seemed particularly difficult in my case.

Dr. G. A. Maxfield, Holyoke, Mass. I used to treat antral cases and was very successful, but after considerable experience and close study I found that so many other parts are liable to be involved that I concluded it was best to send these cases to the rhinologist. A case illustrating this difficulty was one that was sent to me last fall from a neighboring town. The patient, a woman, had been suffering from neuralgia for several years, and it had become so severe that her physician had sent her to the hospital. After eight weeks she was discharged, because they could not do anything more for her. A patient of mine, a superintendent of one of our paper mills, for whom this woman had worked several years, sent her to me to see if I could find anything wrong about the mouth. She said she was suffering severely, and at times the pain was so intense that she almost went insane. She located the pain on top of the head just to the left of the median line. On examination I found three roots decayed to the gum line, but no teeth that would cause this reflex pain. I at once thought of antral trouble, and, upon questioning her, was told that when she stooped over to pick up anything from the floor, there always was a dull heavy pain over the left side of the face. Whenever we note this symptom, we may feel quite certain that some antral trouble is present. I extracted the roots, and passed a probe into the antrum through one of the sockets, confirming my diagnosis. I told the patient that I had given up treating such cases, and advised her to consult Dr. Hopkins of Springfield. The next day I received a letter from him saying: "Transillumination shows shadow in region of left maxillary sinus and left frontal sinus. The use of the pharyngoscope does not show pus coming from the sphenoidal sinus, although the symptoms would lead one to suspect that this sinus is involved. She has hypertrophy of both middle turbinated bones, and this hypertrophy interferes with drainage from the frontal sinuses. I suggest the removal of the anterior end of the middle turbinated bones, and the opening and washing out of the left maxillary sinus." Upon his direction she went to the hospital, but was in such a nervous condition that she had to be kept in bed three days before the operation could be performed. She remained in the hospital two weeks, and subsequently had several treatments in Dr. Hopkins' office. Since then there has been no pain on the top of the head, and the neuralgia has gradually passed away.

This patient had been under the observation of several physicians for many months, and none of them had suspected that the trouble was due to conditions in the oral cavity. I cannot understand why so many physicians overlook the conditions of the oral cavity in making their diagnosis, and in the treatment of neuralgic conditions.

Dr. W. H. De Ford, Des Moines, Iowa. In my opinion Dr. Maxfield has struck the nail squarely on the head. The dentist should not undertake to treat any of these cases unless he is satisfied that they are due to some mouth or tooth lesion. If the essayist had undertaken to operate in the case mentioned, he would have removed the teeth and made an entrance through the alveolar process into the antrum, while the trouble was probably in the frontal sinus, and the patient would not have recovered as the result of this operation.

It is very difficult to enter the frontal sinus, and we do not have the proper instruments suitable for this operation; but dentists can take care of antral troubles that arise from teeth, and this is best, because physicians are not so apt to observe these affections as dentists.

The essayist has stated the subject clearly, and I wish to compliment him on his paper.

Dr. W. A. Brigham, South Framingham, Mass. I should like to cite a case in which the physician advised against the removal of the tonsils. A member of my family suffered considerably with tonsillitis, consulted a specialist, and, after being questioned somewhat as to the trouble, she was advised not to have the tonsils removed. In questioning the patient, the physician found that the most severe attacks of inflammation in the region of the tonsils followed the eating of candy, of which the patient was very fond. He advised that she avoid candy, and there was no recurrence of the trouble. The explanation of this difficulty was that, in eating candy, enough sugar was caught in the folds of the tonsils to facilitate the growth of bacteria. The inflammation did not return when the patient stopped eating candy, and with a little care has been easily controlled since. In this case many physicians would have advised the removal of the tonsils, but the trouble was overcome without an operation, and the patient is probably better off.

Dr. David Manson, Burlington, Vt. I recall a practical case that may be of interest in this connection. It was a case of antral trouble in a man approaching middle age, and with a syphilitic history. He came to me because of the loosening of his teeth, saying that he had removed with his fingers the upper right first molar and first and second bicuspids. On examination I could readily see that the case was a syphilitic one, although of some years' standing. I cleansed out the sockets with a saline solution, and advised the patient to see me again in a few days. During the intervals between treatments he was troubled in smoking his pipe, in that he was unable to create proper suction on the pipe, and the smoke would pass up through the nose. On examination I found that the sockets of the teeth opened into the antrum and that quite a large piece of bone was loose. I removed this piece, leaving an opening of a size to admit my thumb, resulting in a ready access to the antrum. At this time I referred the patient to a specialist, with whom I discussed the case. The patient came back to me for cleansing and treating, and was given proper directions as to keeping the opening clean. The final result was that more teeth became loosened, and one after another were removed with the fingers until only the left second molar remained. This tooth was quite firm, and I hesitated to remove it with the forceps because of the frailty of the whole process, fearing that the antrum on the left side might also be opened. I allowed this tooth to remain in position and made for the patient a vulcanite denture. At the open point of the antrum I built of velum rubber a bulbous portion, which goes into the antrum, covers the opening, and aids somewhat in the retention of the plate, and by this means I have given the patient comparative comfort. He can use the denture, is saved the annoyance of fluids passing into the nose, and is able to smoke his pipe with a comparative degree of comfort. This is a somewhat unusual case, but possibly interesting in this connection.

Dr. Carleton (closing the discussion). I think that the comment of Dr. Maxfield that physicians are not careful in their observations of the conditions of the mouth is very true. I have recently had a case in which a patient was sent to me with a terrific pain in the ear, and we naturally thought that she was suffering from an abscess in the middle ear. On examination, I found almost normal conditions of the drum, but possibly, if I had exercised my imagination at all, I might have been convinced that a little congestion was present. The patient said she could not hear anything through the affected ear. I could not, however, discover anything wrong about this ear, but it finally occurred to me to ask her if she had had anything done to her teeth recently. She said she had recently had one tooth filled, but had suffered no inconvenience therefrom. After examination of the mouth, I advised her to consult a dentist. In removing this filling which had recently been inserted, the dentist found that pressure had been brought to bear on the pulp of the tooth, and the relief of that condition caused the cure of the trouble in the ear without further treatment.

There are, however, many cases in which the trouble is not so well marked as in this case. I have recently had under treatment a child of ten years of age with inflammation of the cornea and vascular infiltration of the coat of the eye. This was a child of lowered vitality and with bad teeth, every one of which was a focus of infection. Our treatments of the eye mean little in a case of that sort, if teeth remain untreated. Many minor inflammations of the eye and disturbances of the conjunctiva undoubtedly have their origin in the teeth. The throat specialist, of course, now knows that many of the affections with which he has to do come from mouth conditions. It is to be deplored, however, that so many physicians examine the mouths of patients without regarding the teeth and the condition of the oral cavity, etc., seeing only the condition of the throat. I am convinced, however, that the more intelligent and progressive practitioners are noticing these conditions, and this practice, we hope, will become more general in the future.

In regard to dentists' treating affections of the antrum of Highmore, I think many of them would be in the same position as many young surgeons are who operate on the appendix. You know everywhere now we find physicians, young men especially, who like to perform the appendix operation. I have a good many friends among the medical profession, who I know can perform the appendix operation perfectly, and whom, if it were within human ability to say that the trouble was confined strictly to the appendix, I would as soon have operate on me as to engage some other surgeon with far greater skill and knowledge. But there are complicating conditions that we are not absolutely certain of. It is very much the same in treating the antrum. We know from examination and experience that the accessory sinuses are likely to be involved. I think, however, as Dr. Brown has said, that when it is possible to diagnose with certainty a case as empyema of dental origin, there is no reason why the dentist, under proper antiseptic precautions, should not treat it. Of course, we must take into consideration the fact that many of these cases do not turn out as favorably as that cited by Dr. Brown. I know a physician whose alveolar process was perforated for twenty-five years, and who washed the antrum through that opening twice a day all that time. Of course, if a case can be diagnosed with certainty, and the dentist wishes to take the chance, I do not see any reason why he should not attempt the treatment. I am not of the opinion that the dentist cannot do as well as the surgeon; but if there are other conditions involved, it would seem rather wrong. There are two factors to be considered: One is, not to be too hasty in curetting the cavity, because, as I pointed out in my paper, granulations are seldom found in these cases of dental origin, and, second, the use of simple alkaline washes. Even in those cases of long standing where there is more or less thickening of the mucosa and loss of vitality, it is surprising, after a certain length of time, how much we can accomplish by the use of mild washes and stimulation of the parts with silver nitrate.

The diagnosis of these cases is sometimes easy and sometimes difficult. The case of Dr. Brown's was shown up perfectly by the aid of transillumination the day I saw it, while it may not have been possible to see the conditions as perfectly on the day when the patient was examined in Boston. By the application of cocain and adrenalin in the nose around the normal opening of the antrum, which has become congested and swollen so that it is closed up, drops of pus can sometimes be produced from the region of the anterior turbinate bones. If it is not possible to use the X ray or transillumination on account of the smallness of the opening into the antrum, as is found in many cases, the results are not satisfactory even with the use of cocain. Under such conditions the case is very difficult to diagnose. I wish to emphasize chiefly that too early opening of the antrum should be avoided, because, as one of the speakers said, neuralgic conditions are frequently set up as the result of various affections of all the sinuses.

I see no reason, however, if the dentist is willing to take chances with a case of several weeks' or months' standing—because lots of these cases run that time, and they are just as likely to occur in the dentist's as in the physician's practice—I see no reason why, if the dentist is willing to take these chances, he should not operate on such cases.

The next order of business, as announced by the President, was the reading of a paper by Dr. T. C. Beebe, Boston, Mass., entitled "Treatment of Pyorrhea Alveolaris by the Opsonic Method."

[This paper is printed in full at page 475 of the present issue of the Cosmos.]

The meeting was declared adjourned after the reading of Dr. Beebe's paper.

Thursday—*Morning Session.*

The meeting was called to order Thursday morning, October 3d, at 10 o'clock, by the president, Dr. Sawyer.

Dr. Kinsman moved that a vote of thanks be extended to the hotel proprietor, to the essayists, the clinicians and exhibitors, and others who had contributed to the success of the meeting.

The motion was carried.

Dr. Boardman moved that an appropriation of $25.00 be made for the coming year for the use of the secretary in addition to his regular salary.

The motion was carried.

There being no further business before the association, the President declared the meeting adjourned until the next annual session.

NATIONAL DENTAL ASSOCIATION.

Sixteenth Annual Meeting, held at Washington, D. C., September 10 to 13, 1912.

(Continued from page 429.)

THE CLINICS.

MISCELLANEOUS.

Dr. C. M. McCauley, Abilene, Texas. "The Use of the Black Micrometer and Dynamometer for Testing Amalgams."

A duplicate of the amalgam micrometer invented by Dr. G. V. Black was exhibited, together with fillings made from twenty-five of the most popular alloys used by the profession. Some of these fillings showed shrinkage sufficient to render them worthless, while others showed expansion, some as high as 300 points and over. Only a very few remained unchanged in the cavity—*i.e.* showing neither shrinkage nor expansion.

Dr. D. H. Young, Attica, N. Y. "Surgical Treatment of Prominent Alveolar Process Before Introducing Artificial Dentures."

The advantage of this treatment is that it enables the dentist to get rid of all objectionably prominent portions of the process and undesirable undercuts, this operation, in many cases, not only transforming the patient's appearance from an unsightly to a pleasing and intelligent one, but adding much to the credit of the dentist's operation.

If a case of this kind is treated without some such surgical intervention, the dentist is sure to be criticized for the ill appearance of his patient.

Dr. W. F. Andrews, Springfield, Mass. (I) A Simple and Effective Method of Restoring Worn-down Teeth and Replacing Missing Ones." (II) To Replace a Missing Tooth."

(I) To restore worn-down teeth, the cutting edge of an incisor or canine is ground to a smooth surface, then two holes, of 22 gage, are drilled parallel with the pulp without encroaching on it. Gold of 22-karat is burnished to the surface, after having fitted platinum pins in the drilled holes; the gold and the pins are fastened together with hard wax, removed, and soldered. Next the piece is applied in the mouth, given a second burnishing and trimmed to the tooth. It is then removed, sufficient solder is added to restore the length, and the appliance is finished and fastened with cement.

(II) The occlusal surface of a molar or bicuspid is ground so as to allow sufficient space for gold, then the same procedure is followed as for a worn-down tooth, or pins are inserted, a wax model is made, and an inlay cast. This is placed in position, removing the appliance with the impression, and then the usual procedure for fastening to it the missing tooth is followed.

Dr E. A. Schillinger, Lee, Mass. "Gold Fillings in Artificial Teeth."

The first step in the preparation of the cavity is to grind a concave depression with a large-sized carborundum stone. Following this, grooves are cut on the margin of the cavity with small-sized stones. On the lingual side of the tooth dovetailed grooves are ground at obtuse angles to the cavity.

The filling is started by placing a small portion of cement in the bottom of the cavity. While this is still soft, a piece of gold is inserted, waiting until the cement sets before finishing the filling.

To hold the tooth to work on, a hole is cut in a large cork, and around it waxable rubber is built.

This work is done entirely without the use of diamond drills.

Dr. J. M. Levy, New York, N. Y. "Radiography as a Regular Part of Office Practice, and as an Aid in the Extraction of Impacted Third Molars."

The case presented for impacted third molar operation was one of simple maleruption of the lower left third molar. In regular practice the operator would most certainly not extract such a tooth. The patient's dentist, who accompanied her, however, and the patient herself, insisted upon its extraction. The tooth was extracted under local anesthesia with alypin 2 per cent. and adrenalin 1:1500, by the use of ordinary cowhorn forceps.

Dr. Levy also showed a new film-holding device for making radiographs, and explained his method of taking and developing radiographs.

Dr. A. H. Corbett, Atkinson, Nebr. "Scalers for Personal Use."

The clinician demonstrated a method by which a person can thoroughly scale his own teeth by the use of a set of scalers, such as Nos. 3 and 4 of Dr. King's set made by the S. S. White Co. These instruments, he said, are especially indicated when the patient cannot return for subsequent treatments. The patient is instructed in the use of the scalers, which are to be used in conjunction with a good antiseptic mouthwash.

OPERATIVE DENTISTRY.

Dr. L. S. Breed, Boston, Mass. "Removing Pulps, Preparing and Filling Root-canals."

The pulp is first removed under pressure anesthesia. Extremely small canals are enlarged to a size which will allow of their being properly filled, and the canal is filled by first pumping it full of chloroform with the aid of a broach, after which properly selected, stiff gutta-percha canal points are inserted.

Dr. C. G. HUGHES, Pittsburgh, Pa. "Painless and Quick Removal of Pulps and Immediate Canal Filling."

The tooth operated upon in this clinic was an upper right third molar, with a saucer-shaped cavity and slightly exposed pulp, though the tooth had never ached. The cavity was washed out with dioxid, after which the pulp was anesthetized by the use of a half-tablet of cocain and adrenalin. The preparation was first worked over the cavity with a pointed explorer, and an opening made directly into the pulp. Another application of the cocain and adrenalin was made directly to the pulp, producing pressure anesthesia by the aid of soft plate rubber. Proper opening was then made, and the pulp removed from the chamber and canals. The canals were next reamed, and after drying properly, the upper fourths of the roots were filled with Oxpara, being pumped up into the root-canals with a broach. A small pellet of cotton was next inserted, and the Oxpara forced to the apex of the root. The canals were then filled with gutta-percha, and a permanent filling was placed over this.

Dr. ROBERT PURVIS, Camden, N. J. "Ascher's Artificial Enamel."

This clinic consisted in the insertion of two artificial fillings, one being a large contour filling in an upper lateral, placed over a capped pulp, the other a restoration of the labial cusp and surface of an upper bicuspid.

Dr. SIMON SHAPIRO, Brooklyn, N. Y. "A Method of Separating Teeth by the Use of Silk Ligatures."

By means of dental floss, a double ligature of French silk or very thick darning silk is drawn through the interproximal space below the point of contact, and tied over the morsal edge, forming a loop lingually and a knot labially. The swelling of the French silk, caused by the absorption of moisture, will in the course of a day or two separate the teeth, and afford sufficient space for almost any dental operation.

Dr. F. E. BALL, Fargo, N. D. "Treatment of Putrescent Pulps."

The cavity is first flooded with the following preparation:

Creasote (beechwood),	
Formaldehyd 40 per cent.,	
Alcohol,	āā ℥j
Thymol,	
Menthol,	āā ʒss
Lysol,	gtt. xxx

The canal is then carefully excavated and prepared, keeping the medicament in advance of the instruments. A portion of the medicament is sealed in the tooth for forty-eight hours. At the next sitting this dressing is removed, then a paste is made by adding powdered zinc oxid to the liquid prescription, and as much of this paste as possible is carried into the canals of the tooth, forcing it to the end of each canal and filling the latter with gutta-percha points.

This paste formula is useful in all canal work, and is heartily recommended by the clinician.

Dr. JOHN H. KENNERLY, St. Louis, Mo. "Filling Root-canals with an Improved Paraffin Compound."

The root-canal is thoroughly dried with acetone, bibulous paper cones, and a hot wire. The canal is then coated with a very thin film of pure paraffin oil and a cone of the prepared paraffin compound is melted into it by means of the electrically heated root-dryer. The source of electricity may be obtained from the electric light supply current, after it has been passed through a suitable switchboard, or from a series of from 6 to 8 dry-cell batteries. This method is fully described in a paper by Dr. Hermann Prinz entitled "Filling Root-canals with an Improved Paraffin Compound," published in the DENTAL COSMOS for October 1912, p. 1081.

Dr. J. W. Bryan, Nashville, Tenn. "A Method of Treating Pulpless Teeth."

Treatment of pulpless teeth by the use of equal parts of cresol and formalin is recommended, in the following cases:

(1) When the pulp has been extracted, regardless of the method of anesthetization or devitalization employed.

(2) When the pulp has died and but little, if any, apical pericementitis is present.

(3) When there is decided apical pericementitis, or when pus is present but no fistulous opening has formed or can be made as yet.

(4) When there is a fistulous opening, or when such can be made.

The clinican discussed the subject according to the above analysis, and gave reports of the most satisfactory results following the treatment demonstrated.

Dr. John H. Bristor, Mansfield, Ohio. "Three Helpful Hints."

A pulp capping for filling deciduous teeth where the pulp is close, and for fillings where metal is not indicated, may be made by adding one or two drops of beechwood creasote to the liquid of the oxyphosphate cement, mixing the liquids together before incorporating the powder.

A stainless counter-irritant consists of—Tinct. iodin, 3 parts, tinct. aconite, 3 parts, aqua ammonia, 1 part. (The first two form the official preparation.)

Glass saliva tubes, glass cement slabs, and all pieces of glassware are easily cleaned by immersing in a dilute solution of muriatic acid, then rinsing in clear water.

Dr. J. E. Tibbetts, Rockland, Me. "Filling of Mesio-bucco-distal Cavities, under the Gingival Margin, Extending Too Far for Ligatures or Clamps."

The rubber dam is applied without ligatures or clamps over the teeth of a human skull. The dam is held in place above the cervical margin by an elevator, the cutting edge of which has been altered, by one hand of the operator, while he manipulates the filling material with the other hand. The advantages of this method are saving of time, less pain to the patient by less laceration of gum tissue, and preservation of the gingival margin.

Dr. J. Austin Dunn, Chicago, Ill. "An Improved Method for Cleaning Teeth by Means of Rubber Cones."

These rubber cones are submitted to the dental profession as an improved means of cleaning the teeth, and for the purpose of meeting the modern requirements of prophylaxis and sanitation.

The fine feather-edge on these cones will admit of a close contact and thorough cleaning of the gingival borders and angles of all the teeth, and they are sanitary because, having been once used, they are thrown away.

Their use on the right-angle handpiece is especially new and satisfactory for cleaning the buccal and lingual surfaces of the teeth. These cones are very easily and quickly mounted on a crosscut fissure bur No. 4.

Dr. Frank J. Ryan, Chicago, Ill. "Amalgam Fillings."

The clinician showed six cards of amalgam fillings, fifteen to each card, showing—(1) Amalgam fillings as they are after failure, the defects being easy to see and avoid; (2) amalgam fillings as made by the clinician in cavities in human teeth and ivory blocks, all made under ideal conditions, showing the reasons for failures of amalgam fillings; (3) a card of fillings made by other operators, showing that some operators do better work than others, but that none can make even a good filling with amalgam alone; (4) a card of fillings made in glass tubes, some with soft cement linings that looked splendid, and others with amalgam alone that did not look as though they would arrest caries in a tooth.

Dr. Edward S. Gaylord, New Haven, Conn. "Rapid and Positive Method of Obtaining Gold and Platinum Matrices."

The gold or platinum is placed between a fold of thin China silk, which is immersed in water to make the silk and metal better conform to each other. With ball-nosed foil-carriers the combination is held over the cavity, while with a round-ended instrument in the other hand it is carried promptly to the floor of the cavity, and held there. With foil-carriers the folds are pulled out until a pellet of wet cotton, spunk, or bibulous paper can be packed in so as to swage the matrix and make it conform to the cavity. The silk is then removed carefully from the cavity, then the partially formed matrix is returned to the cavity for completion, by packing dry pellets of cotton, spunk, or bibulous paper firmly into the cavity until the matrix is perfectly adapted to it. The margins are also carefully adapted by a burnisher or roller, Pierson's rollers being preferred. The cotton or spunk is removed, the matrix in the cavity is filled with softened wax or gum camphor, and with a small heated copper wire, inserted in the wax, the matrix is removed from the cavity. It is then invested in Jenkins' or Pelton & Crane's investment No. 1, a pellet of absorbent cotton is placed on the wax, which, on heating slowly, is taken up in the cotton. The matrix is then ready to receive the porcelain for the bake.

Dr. V. M. Rundle and Dr. H. I. Beemer, Newton, N. J. "Preparing and Inserting a Gold Filling in a Cavity in the Approximal Surface of a Bicuspid by Dr. Black's Methods."

The cavity filled was in the distal surface of an upper right first bicuspid. It was prepared after Dr. Black's method of extension for prevention. The buccal, lingual, and gingival margins were extended to areas of greatest immunity, and an occlusal step was made for anchorage. The gingival and occlusal seats were made flat, and all opposing walls parallel.

The gingival third of the approximal portion of the cavity was filled with unannealed gold cylinders, specially rolled for this purpose as taught by Dr. Black, and the rest of the filling was made of annealed gold pellets, also specially prepared for this use after the methods of Dr. Black.

The hand mallet was used for condensing the gold, and special cutting instruments were employed for preparing the cavity; the pluggers were also specially designed for this work. All the instruments used were manufactured from models made by Dr. Black, Dr. Wedelstaedt, and Dr. Conzett.

Dr. W. R. Clack, Mason City, Iowa. "Gold Foil Filling in the Disto-occlusal Surface of an Upper Bicuspid or Molar by Dr. Black's Method."

In preparing his operation, Dr. Clack removed two amalgam fillings, one from the occlusal, the other from the mesial surface of an upper right second bicuspid. He then squared the cavity as much as possible without going to the full depth of the center, or pulpal wall.

After the cavity had been completely prepared, the first step in the operation consisted in placing three cylinders of gold against the cavity margins, one on the buccal, one on the lingual, and one on the gingival wall, the last binding the former two in place. These pellets or cylinders consisted of one-quarter sheet of No. 4 soft gold, the same quality of gold being used for the entire gingival third of the filling. At this point, the clinician began to anneal his gold, which thereafter consisted of loosely-rolled pellets containing from one-sixty-fourth to one-sixteenth of a sheet each. The entire work of placing the filling was done either by hand pressure or hand mallet, the latter being wielded by an assistant.

The points that Dr. Clack desired to emphasize in his finished filling were the production of an accurate contact point and the shaping of the filling so that food, in its excursion from the occlusal surface of the tooth toward the gum, would be brought in contact with both the buccal and lingual margins throughout their length, thus mechanically assisting in keeping the margins polished. This condition was produced not so much by extensive cutting as by the shaping of the filling and a narrowing of the contact points.

[This report was made at Dr. Clack's request by Dr. Alfred P. Lee, Philadelphia. Pa.]

Dr. C. L. Brininstool, Rochester, N. Y. "Vapor Bleaching."

Vapor bleaching is accomplished by the use of 25 per cent. pyrozone, the vapor being generated by the application of heat.

For bleaching the marginal or cement line of a porcelain inlay, the rubber dam is applied to protect the surrounding tissues, as in all cases where this method is used. Then a pledget of cotton moistened with the solution is placed over the margin, and heat is applied in order to vaporize the solution by means of a flat instrument or one that conforms as nearly as possible to the surface to be bleached. The electric wax spatula answers this purpose nicely, as it generates just about the proper amount of heat.

For bleaching an anterior tooth the moistened cotton is placed in the cavity, and the heat is applied with an instrument that closes the cavity as nearly as possible, the object, of course, being to retain the vapor so that it will be forced into the tubuli of the dentin. Care should be taken to seal the point of the root carefully, so that no vapor will be forced through the apical foramen. If the opening be only a small and round one, where the pulp-chamber has been entered, it is quite a simple matter to vaporize the pyrozone with a short, tapered root-canal drier, which can be made to close the opening quite effectually. Care should be taken not to use an instrument that is too hot, or the vaporization will be so rapid that a mild explosion will take place. Other methods of applying this principle will suggest themselves, the object being to confine the pyrozone vapor so that it will be forced into the tubuli and be brought in contact with the material to be bleached.

Dr. J. Fremont Burket, Kingman, Kans. "The Filling of Root-canals."

If a patient presents an exposure, the pulp is removed, the cavity and canals are washed and thoroughly cleansed with hydrogen dioxid, and the canals dried with bibulous cones made by cutting little triangles from sheets of bibulous paper and twisting them into cones, made of any size so as to suit the case. This procedure is followed by applications of hot air to the canals. After the canals are thoroughly dried, a little powdered iodoform is placed in the pulp chamber, and with a small plugger a little of it is worked into the canals. Then a gutta-percha point is selected, small enough to be gently carried to the apex of the canal, and if more than one canal is present, a point is placed in each; then, with a small drop syringe, made of a little glass barrel with a platinum point and a rubber bulb, a drop of chloroform is dropped upon the gutta-percha point, which drug will immediately follow the gutta-percha point to the apex and dissolve it. As soon as this point is dissolved, another gutta-percha point is introduced into the canal, thereby forcing the first gutta-percha, which has now been changed to chloro-percha, into the recesses of the canal. This is repeated till all the chloroform is evaporated, and the canal is filled.

If the case is one of a dead pulp, the pulp chamber is opened freely so as to make the opening large enough to allow free access to all canals, and all decayed matter is removed. Then the cavity, pulp chamber, and root-canals are washed out with dioxogen and the canals filled as indicated above.

If the case is one with a fistula, the process described is followed until the pulp chamber and canals are thoroughly cleansed, then a small ball of vulcanite rubber is placed on a "sub Q" syringe point, to cork the cavity in the tooth and prevent back flow, and a syringeful of dioxogen is forced through the canal and fistulous opening. This is repeated till the fistulous tract is thoroughly cleansed, two or three applications usually being sufficient. Then the root-canals are filled as described above.

The clinician demonstrated the method of filling roots as above described by the use of glass tubes, prepared for this purpose, permitting of an accurate observation of the results of the process employed, the tubes being made to approximate root-canals of different sizes.

ANESTHESIA.

Dr. A. E. Smith, Cleveland, Ohio. "Nitrous Oxid and Oxygen for Producing Prolonged Analgesia and Anesthesia."

Deep analgesia was produced in several patients in whom, during this condition, hypersensitive cavities were excavated and prepared without pain. At no time were the patients unconscious, as only the sensory nerves were acted upon. During the analgesic state, patients are fully conscious and can talk, but have no sense of pain. The patients were kept in the analgesic state for from three to thirty-seven minutes.

Dr. R. H. Riethmüller, Philadelphia, Pa. "Local Anesthesia with Novocain-Suprarenin."

The clinician demonstrated the use of novocain-suprarenin for local anesthesia in dental operations, the methods of injection, the preparation of the most serviceable and safe solution, the instrumentarium required and its sterilization; and the prophylactic treatment of patients. Statistics were given as to the very successful employment of local anesthesia by means of novocain-suprarenin in dental as well as in minor and major surgical operations as practiced in European countries to such an extent that general anesthesia has been assigned second rank. The four methods of injection available for dental operations—viz, terminal, conductive, peridental, and intraosseous anesthesia—were demonstrated by means of large anatomical drawings and a natural skull, in which the oral tissues had been replaced in wax. The preparation of an isotonic, so-called "normal" novocain-suprarenin solution, as indicated by Dr. G. Fischer of Marburg, and its sterilization by boiling, was shown, preference being given to the tablet form of the anesthetic mixture over ampules containing ready-made solutions. Precautions necessary for keeping the drugs free from decomposition by air, light, and traces of alkalis, for making an isotonic sodium chlorid solution, and for obtaining absolutely sterile distilled water were pointed out. The instrumentarium demonstrated consisted of several syringes, all-metal and glass-and-metal of various makes, as well as hypodermic steel needles of various diameters, lengths, and makes, a glass jar fitted with a German-silver stand for the convenient preservation of two fully mounted syringes in a 70 per cent. alcohol solution, which is burned off the syringe and needle before use, or in a saturated boric acid solution, for the sake of sterility; a small porcelain pan for boiling and thereby sterilizing the solution to be injected; an electric sterilizer for sterilizing the syringe and needles after use, and a syringe tray for holding the sterilized instruments temporarily. Samples of synthetic drugs most useful in preparing the patient for the injection and divesting the injection of even the minutest trace of subsequent intoxication—viz, pyramidon, trigemin, and bromural—and precautionary preparations for the counteracting of possible shock in mild form—viz, strong black coffee, camphorated validol, and amyl nitrite—were exhibited. The advantages of novocain—the fact that it is not a nostrum like innumerable other substitutes for cocain, its low toxicity, which is from seven to ten times less than that of cocain, the confinement of the anesthesia to a small area produced by the admixture of suprarenin, its low price, its sterilizability by boiling, its compatibility with vital tissue, the absence of after-pain, inflammation, and necrosis following its employment, and its universal usefulness in dental practice, ranging from the desensitization of hypersensitive dentin and devitalization of pulps to the painless resection of the whole mandible—were emphasized. To prove his absolute faith in this ideal local anesthetic, the clinician had Dr. Potter of the Harvard University Dental School make a buccal and lingual injection for the anesthetization and subsequent excavation and filling of an extremely hypersensitive cervical cavity in an upper second bicuspid, the vitality of which has been fully preserved.

Dr. E. O. WHIPPLE, Olean, N. Y. "Cocain Anesthesia Without Pressure."

After removing the loose carious portions present, a pellet of cocain and adrenalin is placed as near the pulp as possible, sealing it in with hot temporary stopping. It is left for from fifteen minutes to one hour, depending on other work to be done. Then as much of softened dentin and of the pulp is removed as is possible without pain, and the operation is repeated, leaving the dressing for fifteen minutes more. If at the end of that time the pulp is not thoroughly anesthetized, the process is repeated a third time.

As a rule, other work is to be done for the patient, so no time is lost. Otherwise the patient can wait while the operator works on another patient. The more the pulp is inflamed, the more time is required for the production of thorough anesthesia.

Dr. J. A. BLISS, Ruthven, Iowa. "Instruction in Somnoform Analgesia Induction, Using the DeFord Appliance."

A number of patients were put into an analgesic state, also several dentists inhaled the somnoform for the sake of personal experience as to the amount necessary, the depth of analgesia required, and the technique involved. Some who had cavities which elicited pain upon the slightest touch of a toothpick or instrument volunteered to take somnoform. Two or three inhalations were found to be sufficient to render the dentin insensitive to pain when touched with instruments.

Stress was laid upon the small amount of somnoform vapor necessary in inducing the analgesic stage as compared with the air used. In one case only was anesthesia induced for the purpose of showing that the anesthetic stage is but a step from that of analgesia and can be induced with no discomfort whatever to the patient. Several dentists who had never had an analgesia appliance in their hand before, and an assistant of one of the local dentists, induced analgesia in patients without difficulty. The DeFord appliance is so constructed that the anesthetic agent can be controlled absolutely and scientifically.

Dr. H. E. TOMPKINS, New York City. "Anesthesia in Oral and Dental Surgery."

The clinician presented an anesthetic apparatus with which it is possible to administer any combination of anesthetics in any desired proportions. Its particular use in dentistry is realized in analgesia, for any desired percentage of air, N_2O, and O, either singly or in combination, may be administered with this apparatus. It also presents a regulating feature by which the flow of gas is under absolute control, ranging in pressure from zero to 10 pounds. Because of the lack of material, this apparatus was not put to a practical test at this meeting.

There was also presented a new capsule of aromatic ammonia, containing 10 drops, which is wrapped in a layer of absorbent cotton, this in turn being wrapped in a sheath of silk cloth. The preparation is known as Vaporole Ammonia, and is useful in all cases where a disposition to faintness is manifested.

Dr. FRANK L. PLATT, San Francisco, Cal. "Peridental Anesthesia."

The clinician demonstrated a method of injecting a local anesthetic into the cancellous tissue of the alveolar process, thus anesthetizing the peridental membrane and rendering the tooth insensitive to operative procedures. The anesthetic used was a preparation of novocain and adrenalin.

The region to be operated upon is first thoroughly cleansed by means of any good antiseptic mouth-wash applied with an atomizer, particular attention being paid to the interdental spaces and the free margins of the gums.

The point on the gum where the puncture is to be made is then painted with tincture of iodin and well swabbed with a pledget of cotton saturated with the antiseptic used in the atomizer.

An all-metal hypodermic syringe with a short, sharp 28-gage needle is used. Pressure is made on the gum with the finger to render it somewhat insensitive, and the needle is inserted slowly and gently, beginning the injection of the anesthetic as soon as the needle touches the tissue, in order to keep the anesthetic always ahead of the needle.

No pain need be inflicted in this or any subsequent part of the operation.

The needle is inserted until it reaches the bone of the interdental septum next to the tooth or between the teeth to be operated upon, and just above the base of the interdental flap. It is then driven through the hard outer plate of the process by light taps on the piston of the syringe, stopping between blows to exert pressure and inject the anesthetic into the tissue. Should the needle become clogged, the obstruction may usually be removed by withdrawing the syringe and striking sharp, heavy blows on the head of the piston.

After the needle has been cleaned, or a new one has been adjusted, it is again inserted in the previous puncture, and the process is repeated. When the cancellous tissue is reached, the injection should be made slowly and gently, with but little pressure.

From one to two or even three teeth may be anesthetized with one injection, though more than one puncture may be required for a single tooth, in portions where the bony tissue is more than ordinarily dense. Where difficulty is experienced in driving the needle through the hard outer plate of bone, the latter may be punctured by means of a No. 1 half-round bur in the engine handpiece, after anesthetizing the gum at the spot where the puncture is to be made.

The bur must be sterile and dipped in vaselin to avoid winding the membrane on it, and should be revolved slowly and with little pressure to avoid heating. The outer plate of bone having been punctured, the syringe is used with a conical needle, which may be made from an ordinary hypodermic needle by grinding the reinforcement down to a long tapering point, and cutting the needle off close to the point of reinforcement. After this conical needle is inserted in the puncture made by the bur, the syringe should be held firmly in position, and the anesthetic deposited in the tissue by slow, gentle pressure.

When the bur is used, the puncture should be made between the teeth, if they be single-rooted, or between the roots if the teeth be molars, from one-half to two-thirds of the way from the gingival border to the apices of the roots of the teeth.

In the case exhibited, the needle was driven into the process between the upper right first and second bicuspids, and the pulp was removed from the first bicuspid "without a bit of pain"—as the patient remarked. This intra-osseous injection of an anesthetic will render any dental operation, even the extraction of impacted third molars, positively painless, and marks an important advance in modern, ethical painless dentistry.

Dr. Emerson R. Sausser, Philadelphia, Pa. "Subperiosteal Injection of Novocain in Preparing Two Hypersensitive Cervical Cavities. (According to Dr. Guido Fischer.)"

The patient presented two intensely sensitive cervical cavities of the erosion type, the affected teeth being the upper left lateral incisor and canine.

The technique employed by the clinician was as follows:

Complete sterilization of the field of operation and the instruments used, and the solution then injected.

One cubic centimeter or sixteen drops of distilled water was prepared, in which one of Prinz' novocain tablets was dissolved. The formula of this tablet was suggested by Dr. Hermann Prinz, and is as follows:

Novocain,	gr. 1/3
Thymolated adrenalin,	gr. 1/1500
Sodium chlorid,	gr. 1/8

This tablet, when dissolved in the above amount of distilled water, gave a 2 per cent. isotonic solution of novocain. The Parke-Davis dental syringe improved, with a short hub and a medical Schimmel hypodermic needle, was filled with the above solution.

The mucous membrane was painted with iodin and the needle was inserted directly over the root of the upper left central at a point between the gingival and the apical regions, where one drop of the solution was injected, after which the needle was passed under the periosteum in a direction toward the apex of the lateral, viz, the tooth to be anesthetized, where six minims of the solution was injected. After fifteen seconds had elapsed, the needle was withdrawn and the finger quickly placed over the point of insertion to prevent the escape of the solution. After a few seconds the parts were massaged.

The mucous membrane on the palatal side in the apical region of the lateral incisor was painted with iodin and an injection of four drops of the solution made into the subperiosteal tissue at this point; the needle being withdrawn, the finger was placed over the point of the insertion and the parts were massaged. In three minutes complete anesthesia was established and the tooth was ready for painless excavation of the cavity and extirpation of the pulp.

In anesthetizing the canine the same technique was followed, excepting that the point of inserting the needle was midway between the gingival margin and the apex of the lateral incisor, and the needle was advanced toward the apex of the canine.

Dr. S. G. Wallace, Lakewood, N. J. "The Immediate Cutting and Grinding of Hypersensitive Dentin in Dental Operations."

The clinician demonstrated the use of his obtundent in the preparation of an upper second bicuspid for a jacket porcelain crown in a male patient of about twenty-five years of age and nervous temperament. Dr. W. A. Capon of Philadelphia, who later applied the crown, directed and assisted in the preparation. The hypersensitive tooth structure and the stones and burs were kept wet with the obtundent during the operation, and the grinding and shaping of the tooth was completed in about twenty minutes. After the application of the obtundent, the tooth structure was completely desensitized, and the patient stated that he experienced no pain during the operation. While cutting the tooth under the gum with an Evans' tooth trimmer up to the alveolar ridge, there was not the slightest indication of pain. This method also afforded a great saving of time.

The two succeeding demonstrations showed the use of the obtundent in removing hypersensitive dentin and in cavity preparation. The first patient to be operated on was a young man of nervous temperament, who presented a large, extremely sensitive cavity in the occlusal surface of the lower right second molar with a nearly exposed pulp. After carefully removing the débris, a pledget of cotton saturated with the obtundent was placed in the cavity and allowed to remain for ten minutes. The operation proceeded then without delay, the burs being kept wet in chloro-carbolin while in motion. The fully prepared cavity was examined and found to be thoroughly excavated even in the portion overlying the pulp chamber, without an exposure having been produced. The pulp was then capped with one part of chloro-carbolin and two parts of Harvard liquid, rubbing up the two and drawing in powder to make a cream-like paste. The entire operation was completed in less than one-half hour; the patient showed no signs of pain, and stated that he felt no discomfort whatever in the operation.

In the other case, the cavity to be excavated was situated in the disto-approximal surface of an upper right bicuspid, the tooth structure being broken down around a gold filling near the gingival margin. This cavity was unusually sensitive and difficult to work on without a right-angle attachment. Cotton saturated with the obtundent was placed around the gold filling and held there for ten minutes; the gold filling was removed in the usual way, and, as sensitiveness presented, the use of the obtundent was repeated. This operation was performed on a dentist who was attending the convention, and who expressed himself as being delighted with the absence of even the least discomfort, as he had expected to be hurt unmercifully.

PYORRHEA ALVEOLARIS.

Dr. R. G. Hutchinson, Jr., New York City. "Surgical Treatment of Pyorrhea. Final Scaling and Curetment."

This surgical treatment was applied to nine lower anterior teeth which were greatly involved. The treatment was completed at one sitting, with the exception of final polishing with pumice.

Dr. Elbert J. Weaver, Milwaukee, Wis. "Surgical and Systemic Treatment of Pyorrhea Alveolaris."

The clinician showed a method of instrumentation in two lower centrals affected with pyorrhea pockets. He also gave an exhibition of urinalysis charts, showing constitutional conditions to be found in pyorrhea cases, with suggestions as to the improvement of these abnormal conditions, in conjunction with the surgical treatment. The clinician also showed results obtained in one case particularly.

Dr. J. M. Gompertz, New Haven, Conn. (I) "Bacteriology and Vaccine Therapy of Pyorrhea Alveolaris." (II) "The Making of Autogenous Vaccines."

The clinician showed pure cultures of from 24 to 48 hours' growth in agar, milk, and potato, of staphylococcus albus and aureus, streptococcus, and pneumococcus, with cultural features. He also showed fifty pure cultures of different bacteria found in pyorrhea alveolaris cases, on slides stained by the Gram method, as seen under the microscope, also suspensions of definite quantities of bacteria killed by heat in a 0.9 solution of sodium chlorid. He demonstrated a method for the determination of bacteria by the Thoma-Zeiss blood-counting chamber, also the initial step in the making of an autogenous vaccine, the finished product, and the method of inspection.

Dr. Clyde M. Gearhart, Washington, D. C. "Pyorrhea Case."

This clinic consisted in the exhibition of a well-defined case of pyorrhea, the patient having been dismissed only three months previously by a dentist who had completed the operative work, but neglected the manifest pyorrheal condition, assuring the patient that his mouth was in a healthy condition. The clinician treated the upper and lower left side, and presented the results obtained by him in comparison with the opposite neglected side.

Considerable stress was laid upon the fact that, as in this case, many mouths that are in a similarly precarious condition are being slighted by dentists, and patients are being dismissed under the impression that their mouths are in a normal state.

Dr. Moore Stevens, Atlantic City, N. J. "High-frequency Current in the Treatment of Pyorrhea Alveolaris and Congested Conditions of the Oral Cavity."

In May 1911, the clinician, not receiving as quick results as he desired in the treatment of pyorrhea alveolaris, applied a high-frequency current directly upon the gums, thinking that the stimulating results, if the patient could tolerate them, might be beneficial in more quickly healing the gums. The patient and the operator were more than pleased after a few treatments, as the excessive stimulation of the gums removed all congested blood in these tissues. As the patient was using care to keep his mouth in a sanitary condition, it was restored to a healthy state in much less time than was possible with the medicinal treatments previously used.

High-frequency currents possess therapeutic power in passing through tissues in which vitality has almost been exhausted. These currents appear to promote circulation, increase metabolism, and more or less completely restore general harmony in the part.

With the proper application of this current, relief from pain can also be brought about in the treatment of toothache, tic douloureux, painful eruption of teeth, gangrene, sensitive teeth during menstruation, ulcerated gums, neuralgia, in fact any congested condition of the oral cavity.

Dr. Jules J. Sarrazin, New Orleans, La. "New Riggs' Instruments. Preventive and Corrective Local Adjuncts."

Dr. Sarrazin demonstrated the use of a new set of instruments for the surgical treatment of Riggs' disease, in which six of the points are original, viz, Nos. 3, 4, 5, 6, 7, and 8. These six instruments are devised for delicate root-scaling, and besides being universal in their reach on roots, they are also capable of entering and scaling at and around the bifurcations of molar roots, both above and below. The other numbers in the set of twenty-four instruments are compiled from other pyorrhea sets, with more or less modification. The aluminum-knob finger-rest No. 21 is an improvement on the use of any perishable material for the purpose of increasing firmness of grasp, and has the advantage of allowing sterilization by boiling. Nos. 22 and 23 are burs especially devised for the convenient removal of carious bone in sockets and at their borders. No. 24 of the set is a sharpening disk, to be used in the dental engine for quickly and accurately edging any instrument in the set.

Three tooth-brushes were also shown, specially devised to facilitate not only the cleansing of teeth, but the massage of gums. The wide-head brush carries a very small head on a very long neck, with ample space between the transverse rows of bristles, terminating in a long tuft. This brush is universal in its access to dental arches, both above and below, brushing from gums to teeth, both lingually and buccally, or labially. Where buccal space is scant at upper molars and distally of the farthest one, this brush is replaced with advantage by a still narrower one, which was also exhibited. The third brush in the set is a double-ender, one head being like a small hoe, and the other head like a small, flat paint-brush, to cleanse under bridges and at crowns forming the abutments thereof, and to reach properly the necks of natural teeth next to gaps, no matter whether those teeth tilt over the gaps or not; also for use lingually of lower incisors and distally of rearmost molars.

Tooth-powders were also demonstrated, and mouth-washes with proper medicinal properties and polishing power, not commercial toilet articles. Powder No. 2 does active oxidizing without danger of irritation, and possesses mild alkaline germicidal properties. It is capable of polishing the enamel without scratching the cementum; it is classed as a preventive powder for general purposes. Powders Nos. 3 and 4 possess medicinal properties necessary in the adjunct treatment of pyorrhea, the only difference between those two numbers being that No. 4 has a perceptible grit to meet conditions which require it. This latter is valuable in office prophylactic work, besides home treatment in Riggs' disease. Mouth-wash No. 5 is a preventive preparation, which is at the same time capable of coping with congestion of the mucosa. It owes its efficacy to the combination of zinc iodid and zinc chlorid with other favorable drugs. It is also prescribed as a daily mouth-wash with preventive properties.

The clinician also exhibited flat dental flosses charged with antiseptic polishing powders supplying the different grits necessitated by the various conditions to be cared for, including the cleansing underneath bridges.

Dr. T. Sydney Smith, Palo Alto, Cal. "Pericemental Diseases."

This clinic is an effort to show that by early diagnosis, prevention, and cure of pericemental diseases—so-called pyorrhea alveolaris—we may not only keep the gums strictly normal, but also keep all the teeth in excellent condition to extreme old age. This brings about a new and wonderful era in dentistry, for it is the highest standard we can ever reach. The clinician wishes to contrast this statement with the teaching of the past age as voiced by many of our leading writers, viz, that the loss of these dental structures is a physiological event to be expected. Today we know that nature does not remove the gingival and septal tissues which she placed for essential purposes, but that their destruction is due to pathological actions, and always preventable simply by keeping the teeth highly polished and clean under the free margins of the gums.

The clinician also wishes to show that even though deep pockets are present and the teeth have become very loose, the gum tissues can be reattached to vital teeth by first intention—the blood-clot method—just as rapidly as a clean cut will heal in some other part of the same body, and the bone will also be reconstructed at the point where the soft tissues have been reattached. This rapid healing by first intention can only be secured by perfect surgery and nature's forces; we must therefore emphasize the value of the blood, which should not be washed out of the wound during any stage of the operation. We require it first for cleansing, second for sterilizing, and third for its reconstructive properties. This blood is cleansing because of the tendency for liberated blood to coagulate, thus incorporating the loosened particles of deposit in the fibrin. In this way the instruments bring them to the surface much more perfectly than would be possible by washing, since the tissues act like a sponge to hold them. Blood is sterilizing because the presence of micro-organisms in the pockets for considerable time has fortified the blood with anti-bodies to hold these germs in check. The specificity of these anti-bodies is beyond all human imitation, and these do not interfere with the reconstructive properties of the blood, as they are normal to it; they quickly sterilize the wound when we turn the balance of power on their side by perfect surgery. Lastly, the blood is essential to form the union between the freshened gum tissue and the cementum.

This method of healing has proved that the denuded cementum does not die while the pulp and dentin are vital. Microscopic anatomy has revealed the possible path for nutrition to pass from the dentin, and the easy passage of staining solutions from the pulp chamber to the pericementum has strengthened this theory, but the blood-clot method of reattachment has settled the question by showing that only granulation and close contact can be secured around a pulpless tooth, while the tissues readily unite with a vital one. This difference lies in the cementum, and shows life in the one case and death in the other.

This method of healing has determined another vital question. The fact that all absorption and destruction of bone immediately ceases when the reattachment of the soft tissues is secured indicates that the local seat was not in the bone, but its reconstruction proves beyond any doubt that the seat of the disease is in the pericementum and not in the alveolar process. We must therefore change our terminology. Pyorrhea is never an alveolar disease, but rather, in all its stages, a pericementitis.

(To be continued.)

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EDITORIAL DEPARTMENT.

ORIGINALITY—PRIORITY.

WE publish elsewhere in this issue the full text of the decision handed down by Associate Justice Chas. H. Robb of the Court of Appeals of the District of Columbia, in the case of Taggart *vs.* Boynton, which in effect nullifies the right of Taggart to the claims of his patent under which suit was brought, and renders them null and void within the territorial limits of the District of Columbia. The case has run its devious course through the judicial machinery of the courts of the District of Columbia, and, after sifting and weighing all the evidence in the light of the law of the land in such cases made and provided, the result is as stated. The present decision cannot be taken as final, for there still remains the possibility of suit upon other Taggart patents, or upon the same patent in other jurisdictions, or the possible right of appeal to the Supreme Court of the United States.

Quite apart from all the material interests directly involved, and the emotionality which is apparently an inseparable concomitant of such an incident, affecting as it has the interests of many individuals, there is the underlying ethical problem that in a certain sense is more important than the material interests concerned, in that it raises a question that should be squared with the conscience of every man who owes allegiance to the ethical standard of the dental profession.

The evidence reviewed by the learned judge of the Court of Appeals clearly shows that the principle involved in the Taggart casting process had been employed in a similar way previous to the issuing of the Taggart process patent, and, for the reason that his invention had been anticipated by others, his patent is declared invalid—which is technically in harmony with the patent law. There remains, however, the well-recognized fact that these desultory instances of application of the process of casting under pressure and with the disappearing model were unknown to the dental profession as such; they attracted little, if any, attention—so little that for the defense of the Boynton suit the securing of direct evidence of anticipation in the use of the Taggart casting process was by no means an easy task. On the other hand, immediately that Taggart made known his invention and published it as a well co-ordinated and practical procedure, with an apparatus by which the process could be put into effective and successful use, it was received with almost instantaneous approval by the whole dental profession, and in every country of the civilized world the cast inlay made a place for itself as an accepted and recognized procedure. Moreover, so enthusiastic was the reception, and so far-reaching were the recognized possibilities of the invention, that the ingenuity of its advocates developed applications of the process to practically every department of dental prosthesis. And further, so fascinating was the fundamental principle of the process that ingenuity directed itself toward the creation of new appliances for utilizing it; and to such an extent did success crown these efforts that casting machines multiplied like rabbits, and seemed to spring up overnight like mushrooms, so that one might buy a casting machine at any price from a few cents to as much as one hundred dollars, as his judgment and fancy dictated.

From all of the indications above referred to, we have for some time held the opinion that the cast inlay in its proper place and usage is a good thing, and has apparently come to stay. That being conceded, we are inclined to ask, How did it get here? What was its origin? Who made it possible and practical? Did any outside of a favored and non-favoring few ever hear of cast inlays before the announcement of the Taggart inventions? If they did, and kept their knowledge to themselves, to what credit are they entitled? Did they do their whole duty to their profession—were they strictly ethical in reserving their information until it was needed to prevent the man who made the method possible from securing the reward to which otherwise, under the law of the land, he would have been clearly entitled? We are well aware of the arguments that can be adduced against the iniquity of "professional patents," but "professional patents" is a very comprehensive term—too comprehensive, in fact, to be justly applicable in all instances—and the factor of iniquity is, therefore, a relative one. But the question here under consideration is not the ethics of patent rights from a legal standpoint; it is the moral responsibility of an ethical profession toward a benefactor.

It is presumed that there is no reasonable doubt that Taggart believed himself to be the inventor, the originator, of the process and the appliance known by his name and for which he secured letters patent. The courts have decided from the historical evidence that he was not the first inventor of the process, and as the legal right to protection in the use of his discovery depends upon priority of invention, his right to protection in its use falls. But notwithstanding the legal aspects of the question, it still remains the incontestable fact that it was the ingenuity of Taggart that made the cast inlay possible and practicable, and it was his introduction of the process that made it an accepted dental operation. Therefore we ask, What does the dental profession owe to Dr. Taggart?

Those who view the matter wholly from the legal standpoint will, of course, decide that they owe him nothing. Others, who down in the depths of their souls realize that they owe him much, will consider the obligation more than canceled by the fact that he tested his right to a reward for his service to dentistry by a suit at law; and yet others, whose ethical sense is not measured nor measurable by the restrictions of a so-called code, but is expressed in the spirit and practice of the "golden rule," will forget the emotionalism and personal friction which the settlement of this case has engendered, and remember Taggart as not the least of the benefactors of our profession, and treat him accordingly; for, apart from the question of the legality of Taggart's right to protection under the terms of his patent, apart from whatever exceptions may be taken to his methods in endeavoring to secure to himself the material benefits of his invention, and apart from whatever of friction, ill-feeling, or antagonism have been engendered in testing the involved issues in the courts, there still remains the fundamental ethical question of the credit due to the man who made the procedure practically possible.

In years to come we believe that the credit will be universally accorded to W. H. Taggart;—and if it shall be due him then, why is it not due now?

SIXTH INTERNATIONAL CONGRESS.

The Committee of Organization is now engaged in the preparation of the preliminary details incident to the holding of the Sixth International Dental Congress in London in 1914. It will be held at the University of London, August 3d to 8th inclusive, 1914. His Majesty King George V has accepted the patronage of the congress. Announcement is made at this early date so that those from America who are expecting to attend the meeting may have ample time in which to make the necessary preparations. For the reason that this great gathering will be one of the most important congresses of the international series, and because of the unusual attractions, both in a professional and a social way, which it will afford to American dental practitioners, it is hoped and expected that a large and representative contingent of American colleagues will arrange to attend the London meeting.

Correction.—Dr. Geo. B. Harris desires to make the following correction in his paper, entitled "The Treatment of Pyorrhea by Bacterial Vaccines," published in the April issue of the Dental Cosmos: Page 392, *for* "(5) Pyorrhea is contagious;" *read* "(5) Pyorrhea is infectious."

Bibliographical.

An Introduction to Dental Anatomy and Physiology, Descriptive and Applied. By Arthur Hopewell-Smith, L.R.C.P.Lond., M.R.C.S. Eng., L.D.S.Eng., Prizeman of the Royal Coll. Surgeons, Lecturer Dental Anatomy and Physiology, Dental Surgeon, and Demonstrator Prac. Dental Histology, Royal Dental Hospital; Member Faculty of Medicine, University of London, etc. Large octavo, 372 pages, with 340 new and original illustrations, including a frontispiece in photogravure and 5 plates. Cloth, $4.00, net. Philadelphia and New York: Lea & Febiger, 1913.

In the preface, the author states the purpose of his book, namely, to furnish the advanced student and the dentist with a knowledge of the anatomy and physiology of the teeth—it being a fact that these subjects have to a certain extent been crowded off the modern dental curriculum. The "mission" of the book is to explain how it comes about that man has a certain number of teeth, to describe their functions, plan of attachment, and the rôle they play in the general economy of man.

After outlining his plan, the author makes a plea for the use of certain terms, most of them being in accord with my own belief. Thus: The terms "central" and "lateral" should be dropped, and "first" and "second" used in their stead. Likewise, "six-year" and "twelve-year" molar should give place to the terms "first" and "second." "Third molar" should be used instead of "wisdom tooth." "Premolar" is more descriptive than "bicuspid." "Deciduous" should be used in speaking of the first set of teeth which man develops. The author also recommends the term "occlusion," where the profession has been in the habit of using "articulation." Certain terms suggested for use in speaking of certain malocclusions, however, I do not consider to be as good as those now employed in orthodontia.

Chapter I is devoted to a general introduction to dental anatomy and physiology, with a view to letting the student know some of the questions and problems that can be better understood if they possess a knowledge of the above subject. Attention is called to the various theories of "tooth eruption," and I doubt if very many practicing dentistry today could name the various theories of such an important part of the dental apparatus, let alone describe and criticize them.

Chapter II is devoted to the classification of the animal kingdom. The Teeth in general are taken up, and a definition of "teeth" is attempted. The definition given is no better than that given by Dr. A. H. Thompson, *i.e.* "Teeth are hard, usually calcified substances placed at the orifice of the alimentary canal." There are, however, structures which resemble teeth, found under certain conditions in other parts of the anatomy besides the mouth. Various examples are cited.

The kinds of teeth among the vertebrates, viz, corneous and calcified, are then described, which description is followed by a section on the functions of the teeth, divided into major and minor, the former being further divided into general and specific. It makes little difference just how the functions of the teeth are divided, but it has been my plan to divide into primary and secondary, which method is much simpler and includes everything which comes under the four heads given by the author. The principal function of the teeth is the securing and preparing of the food. In the fish and in lower animals, the teeth are used to secure the food, and are of little use to the animal in preparing it for digestion.

Then follows a description of the foods of the various animals, and an account of the foods of the various races and nations. Probably not enough attention has been paid in times past to the various foods, and their possible relations to dental lesions. As a function of the teeth is mentioned the development of the face, following which the statement is made that "A study of this quesion is, however, wanting, and definite statements cannot yet be made as to their precise rôle in this respect." It would have been well if the author had been familiar with the work done by the American Society of Orthodontists. Speech as influenced by the teeth is well explained, although the citing of different opinions is liable to confuse the student. Under the head of "minor functions of the teeth" are placed some of those functions which relate to the preparation and securing of the food, viz, prehension and the use of the incisors as seen in the rodents. These functions belong to primary use of the teeth, for they help the animal to secure its food and thereby prolong life.

Chapter III is devoted to the Number of the Teeth and their various shapes in the different classes of animals, the relation of the teeth to the osseous structures, along with the notation of the same. Supernumerary and missing teeth are taken up, and a number of radiographs are shown.

In Chapter IV is treated the Morphology of the Teeth, with the modifications of the cone, flat plate, prism, cylinder, and blade. Fish, reptiles, and mammals are described, with the forms of the incisors, canines, premolars, and molars.

The reasons of the morphological variations are considered as an answer to the question: "What has brought about these variations in dental shape and pattern?" Inheritance is mentioned, and considerable space is given to "adaptive modification," in which examples are cited of different teeth being adapted to certain functions and purposes. The difference between the non-poisonous and the poisonous snakes, and again, the incisors of the kangaroo, are among the good and interesting examples cited. Types of dentition of the carnivorous, herbivorous, insectivorous, and omnivorous animals receive attention.

"Darwinia" is the title of Chapter V, in which is given a short review of Darwin's work and its application to the teeth. Natural and sexual selection are considered: "The males choose the handsomest of females in one class of animals, and the females choose only the handsomest males, and so on. The rise of the human race is largely due to the advanced sexual selection which our ancestors exercised in choosing their mates. It is possible that sexual selection tends to prevent irregularities of the teeth." This is a grateful change from the old theory that sexual selection or mixing of types produced all sort of malocclusions. However, much of the satisfaction derived from the above statement is lost when we read under the title of "A Typical Dental Heredity" the old arguments of the inheritance of supernumerary teeth, altered character of the jaws, and even the most foolish of all, the inheritance of large teeth and small jaws. As is always the case, there is no explanation of how the above conditions could be brought about.

Evidences of the mutability of species, proofs of derivation of species, make other topics for consideration; post-Darwinian theories, the Mutation theory and the Mendelian theory, with the results of experiments, make valuable additions to this chapter. While I could suggest additions and changes in the arguments presented, I believe that the above chapter is one of the most valuable in the book for the advanced student, as it will cause him to think and perchance read and investigate the subject farther, as a result of which a great good will have been done.

Chapter VI contains a consideration of the Implantation and Replacement of Teeth, which have always been considered as "attachment" and "succession" of teeth by the American writers; I doubt if the English terms are better than the American. Each class is considered in its order.

Chapter VII treats of Homology and Analogy, which must have a place in a work of this nature.

Evolution of the Mammalian Crowns is the title of Chapter VIII. This chapter makes interesting reading, as does anything on this phase of dental anatomy. There is, however, one objection as regards a text-book for the student in college; that is, so many different theories are advanced, without the author settling upon any particular one, that the reader will become confused, unless he has a good knowledge of the subject before beginning. The concrescence theory and the tritubercular theory are given, and the objections and proofs in favor of the same are cited. The old terms antero-external, antero-internal, postero-external, postero-internal, and postero-median are used, instead of the more modern much-used terms mesio-buccal, disto-buccal, mesio-lingual, disto-lingual, and distal. I would be in favor of the dental profession adopting the terms protocone, paracone, and metacone for the upper cusps, and protoconid, paraconid, and metaconid for the lower cusps; but never the antero-external, postero-median, etc. The evolution of the teeth can be better understood if the theory of radiation and mutation is also given some consideration.

The Teeth of the Primates and Prehistoric Man are discussed in Chapter IX. Descriptions of the Heidelberg jaw, the Neanderthal skull, the man of Spy, the *Pithecanthropus erectus,* the Galley Hill man, the Ipswich man, the Tilbury skull, and others are given, along with the conditions under which they were found. These descriptions are valuable and serve to show the great age of man, and the conditions under which he lived. The various dental and cranial indices are also taken up in this chapter.

Chapter X contains a description of the Anatomy of the Teeth of Man. In one chapter is considered what would make a book of many pages. The objection to this chapter is that the descriptions of the teeth are entirely too brief. One feature which I heartily recommend is the naming of the teeth in preference to the terms generally used. Instead of the right upper central incisors and the right upper lateral incisors, the author uses "the first right maxillary permanent incisor" and the "second right maxillary permanent incisor." Also the "first right maxillary premolar" is better than the first upper bicuspid. The term "occluding" surface is used, instead of "occlusal," the latter term being the better one and more in keeping with mesial, distal, lingual, and buccal. I am aware that an objection will be raised by some of the profession to the use of "maxillary" and "mandibular" series, on the ground that the patients would not understand the terms; and this may be true, as far as the patients are concerned. However, for the use of the profession they are much better than upper and lower.

Speaking of the surgical anatomy of the first maxillary premolar, Professor Hopewell-Smith recommends the extraction of this tooth before eruption for the correction of irregularities. While some men in this country have advocated the extraction of this tooth for the treatment of malocclusions, I know of none who have gone so far as to advocate the extraction before eruption. It is almost needless for me to say that a large number of orthodontists in America have found that the extraction of the first maxillary premolar is never advisable for the treatment of malocclusions.

In various places in this chapter, the terms "from side to side," and "before backward" are used when the terms "mesio-distally" and "bucco-lingually" would be more descriptive. As a rule, the descriptions of the teeth are fairly good, but better descriptions could be given than by saying that the mesial surface of the first right mandibular permanent molar is "roughly triangular, with its apex considerably reduced, and base corresponding with the neck. Convex in both directions, it is more greatly flattened than the opposite surface. Its upper border is furnished with two cusps, which are part and parcel of the two anterior cusps."

The description of the Deciduous Teeth is briefer than that of the permanent teeth, which should not be. If there is need for a good description of teeth, it should be accorded to the deciduous teeth. Every day I am impressed with the fact that few practitioners could tell, if asked to do so, the difference between the maxillary and mandibular first deciduous molars. It is a mistake to say in a modern textbook, "The configuration of the teeth of the milk series is essentially that of the permanent dentition."

The chapter closes with a consideration of the "age changes" of the teeth.

In Chapter XI are considered the relations of the teeth with the mouth and osseous system, the nervous system, the vascular system, and the lymphatic system.

By the mutual relationships of the permanent teeth is meant the occlusion of the teeth. Here again, the author makes use of the terms antero-external and antero-internal, to which I raise the same objection as before. The occlusion of the individual inclined plane of the cusp is not given with the inclined plane with which it occludes. There are also some errors which I hope have been due to the printer, not the author. On Page 235, under E, we find: "The antero-external [mesio-buccal] cusp of the first mandibular molar occludes with the distal ridges of both cusps of the second maxillary premolar in front, and the antero-external [mesio-buccal] and antero-internal [mesio-lingual] cusps of the maxillary first molar behind—" This is correct, but continuing we find—"while the antero-external [mesio-buccal] cusp of the lower first molar [which is the same as the antero-external cusp of the first mandibular molar just described] occludes with the central portion of the morsal [occlusal] surface of the upper first molar, and the postero-external [disto-buccal] with the posterior portion of the morsal [occlusal] surface of the same tooth." It should read: "the postero-external [or disto-buccal] cusp of the first mandibular molar occludes in the central fossa of the first maxillary molar."

Under F the error is as great. I quote from the text: "The antero-external [mesio-buccal] cusp of the first maxillary molar interdigitates with the central sulcus of the corresponding lower tooth in front, and the postero-external [disto-buccal] with the postero-lingual [disto-lingual] and postero-buccal [disto-buccal] cusps of the first mandibular molar and the antero-external [mesio-buccal] and antero-internal [mesio-lingual] of the second lower molar." It certainly would be very difficult to get the cusps into the positions named, let alone call it normal occlusion. The antero-external or mesio-buccal cusp of the first maxillary molar occludes in the buccal groove of the first mandibular molar—that is, the mesio-lingual inclined plane of the first maxillary molar occludes with the disto-buccal incline of the mesio-buccal cusp of the first mandibular molar. The disto-lingual inclined plane of the mesio-buccal cusp of the first maxillary molar occludes with the mesio-buccal incline of the disto-buccal cusp of the first mandibular molar. The antero-internal or mesio-lingual cusp of the first maxillary molar occludes in the central fossa of the first mandibular molar. The postero-external or disto-buccal cusp of the first maxillary molar occludes in the buccal occlusal embrasure between the disto-buccal cusp of the first mandibular molar and the mesio-buccal cusp of the second mandibular molar.

Under G the occlusion of the antero-external cusp of the second mandibular molar is given correctly. The occlusion of the postero-internal cusp, as given, is the occlusion of the postero-external.

Under H it is stated: "The antero-external cusp of the second maxillary molar occludes with the central part of the crown of the second mandibular molar" [which should read, "in the buccal groove of the second mandibular molar"]—"and the postero-external cusp, with both posterior cusps of the second mandibular molar in front, and both the anterior cusps of the third mandibular molar behind." It is the postero-internal or disto-lingual cusp which has the occlusion stated, and not the postero-external [disto-buccal], as stated by Professor Hopewell-Smith.

I am aware that these errors may be printer's errors, but it is unfortunate that so many should occur on one page while dealing with such an important subject as the occlusion of the teeth.

Under the heading "Variations," some of the terms used to express certain conditions are justly criticized, but the terms suggested have been proposed before, and have not been accepted by those who have more to do with malocclusions than any others. Orthodontists realize that their classification of malocclusions and their terms for denoting positions may be faulty, but the classification and terms suggested by Dr. Angle, with slight modifications, are better and more descriptive than any yet proposed.

The relations of the nervous system, the vascular system, and the lymphatic system are taken up, and valuable knowledge for the general practitioner is found in these pages.

The Gingival Region is the title of Chapter XII, under which is considered the character of the alveolar socket of the teeth of man, and comparison is made with some of the lower animals, which is a great help. In order to show the relation of the socket to the tooth, radiographs are employed to good advantage. A number of good photomicrographs are shown, to illustrate the relations of the gingival tissues.

Chapter XIII is devoted to the Development of the Teeth and Jaws. The development of the embryonic structures is taken up, and the development of the different adult parts explained. As a whole, this chapter is very good. There are several disputed points in the development of the jaws of man, and some of the authorities quoted are contradicted by others equally as high. The question as to whether there is any cartilage ossification in the mandible seems to be decided by Professor Hopewell-Smith in favor of the cartilage theory. He even states that the external alveolar border is developed from cartilage, which hypothesis is contradicted by a large number of investigators. Personally, after having studied a large number of specimens made from embryos of various ages, I have never seen any evidence of calcification of cartilage within the mandible or region of the alveolar process.

A description of the growth of the deciduous teeth and the permanent teeth, illustrated by several good half-tones and drawings, completes this chapter.

A very important chapter is that on the Dynamics of Tooth Eruption (Chapter XIV). The different theories of tooth eruption are taken up very thoroughly and analyzed. If nothing else were found in this section, the following statement would be worth the entire space given to this subject: "The socket is subservient to the position of the tooth, and wherever the tooth may chance to get to, there the socket will be built around it." The following theories are given and considered: The "radicular elongation theory," the theory of "bone currents," the "deposition of bone" theory, the "blood pressure" theory, the "epithelial" theory, "gubernaculum" theory, "epiblastic" theory, the "addition of dentin," and the "influence of nutrition." After all of these have been considered, we are confronted with the fact that not one of them explains everything satisfactorily, that probably several or all of them may play some part in the eruption of the teeth, and that the principal factor in the eruption of the teeth is cell metabolism, or physiological growth. And when this has been said, about all has been said that we know—and that is practically nothing. The time of the eruption of the teeth is taken up, and attention is called to the fact that different tables which have been compiled differ greatly as to the time of age and as to the teeth which erupt first. Anyone who has practiced orthodontia for a number of years and has observed the loss of the deciduous teeth and the eruption of the permanent teeth knows the reasons for the difference. The ages vary, and the teeth vary as to which appears first.

Chapter XV contains a consideration of the Functions of the Dental Tissues. The author gives great importance to the function of Nasmyth's membrane, and seems to believe that it has some protective influence upon the enamel, but he also points out the lack of data upon this much-neglected structure. The enamel, dentin, and dental pulp are considered, and valuable information is offered by the comparative study of specimens. The "periodontal" membrane, cementum, and the gums are next taken up in the order named, followed by a review of the sensitiveness of teeth, and dental pain.

Chapter XVI is devoted to comparative dental anatomy, under the title of "Mammalian Dentitions." The following orders are considered: Cheiroptera, Insectivora, Rodentia, Carnivora, Cetacea, Sirenia, Ungulata, Edentata, Marsupialia, and Monotremata. Each order is described more with a view to giving the details of their dentition than to outlining the principles of tooth evolution and the evolution of occlusion, along with the effect of food upon the jaw movements and the resulting changes. A large number of illustrations are shown which are a great help to those who have no anatomical collection available.

This book is one which I would highly recommend to the practitioner of dentistry who is desirous of becoming familiar with the principles of dental anatomy and physiology. It will repay careful reading, and while some of the theories offered are not proved facts, they are the best known at the present time, and will have the effect of causing thought upon that particular subject which may lead someone to attain the actual truth. Probably the greatest compliment I could pay the book is to say that it has been many days since I have read a book I so thoroughly enjoyed.

MARTIN DEWEY.

A HANDBOOK ON SURGERY. Intended for Dental and Junior Medical Students. By ARTHUR S. UNDERWOOD, M.R.C.S.Eng., L.D.S.Eng., late Examiner Royal College of Surgeons of England, etc., and BAYFORD UNDERWOOD, M.B., B.S.Lond., L.R.C.P., M.R.C.S.Eng. Pp. 244, with 19 illustrations. New York: Wm. Wood & Co., 1913.

As an introduction to the subject of general surgery for the dental student this book has some value, as it outlines briefly the principles of surgical pathology, and also the surgical affections of the mouth, jaws, and neighboring parts, such as the eye, nose, and throat. The few illustrations make no pretense to be anything but mere diagrams, and even as such add little value to the book.

R. H. I.

SURGICAL OPERATIONS WITH LOCAL ANESTHESIA. By ARTHUR E. HERTZLER, M.D., Surgeon to the Halstead Hospital, Halstead, Kan., and to the Swedish Hospital, Kansas City, Mo. Pp. 205, with 104 illustrations. New York: Surgery Publishing Co., 1912.

This work covers in a compact manner the subject of local anesthesia. Each drug used for the purpose is taken up in detail, and its advantages and disadvantages in given operations are thoroughly discussed. The author prefers quinin for the great majority of cases, on account of its safety and lasting effects. The technique of all operations to which local anesthesia is adapted is minutely described, greatly enhancing the practical value of the volume. Ten pages are devoted to operations on the mouth and teeth, giving the indications and limitations of local anesthesia in this region. The numerous illustrations and general make-up of the book are to be highly commended.

R. H. I.

Review of Current Dental Literature.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, January 1913.]

CONTRIBUTIONS TO THE MICROSCOPY OF GRANULOMATA AND ROOT-CYSTS. By Dr. F. Proell, Koenigsberg.

In continuation of his researches on the microscopy of granulomata and root-cysts, which were published in the March 1911 issue of the *Deutsche Monatsschrift fuer Zahnheilkunde*, and reviewed in the Dental Cosmos, December 1911, p. 1457, Proell has come to the following conclusions:

Granulomata represent sequestral granulations, presenting the same histological pictures as albuminous periosteitis. Their chief characteristics are increase in tissue fluids, lack of fibrillar connective tissue in the central portions, and extensive accumulation of fat. The abundant fat substances found in granulomata and cysts are not due to the fatty degeneration of connective tissue cells, as Proell maintained in his first essay, but to the increase in tissue fluids caused by vascular alterations. These fatty substances are lying free in the tissue or in macrophages, which are derived from lymphocytic fibroblasts as well as plasma cells. Proof for the mucoid degeneration of the connective tissue as claimed by Partsch and Williger could not be established from stained specimens. Cysts grow by the pressure of the increased tissue fluids and the resulting irritation of the cyst epithelium, and finally by the absolute increase in size of the fat-eating cells.

[*British Dental Journal*, London, February 15, 1913.]

ACTINOMYCOSIS FOLLOWING EXTRACTION. By F. J. Padgett.

The writer reports of a case of extraction of carious molars under nitrous oxid anesthesia. Three weeks later the patient, a farmer's wife, returned complaining of acute pain in the sockets of the extracted teeth. On examination, the gums were found to be deeply congested and inflamed, but not actually swollen. A poppy-head fomentation and purgative proving unavailing, the sockets were scraped well under nitrous oxid anesthesia, and packed with gauze dipped in a 1:40 carbolic acid solution. The patient returned two days later complaining of continuous pain and inability to sleep. The gums were then repeatedly and thoroughly lanced in the presence of the patient's physician. After several days, the writer was notified by the patient's husband that an abscess had broken out on her face, probably to result in disfigurement for life, and that the dentist must have left one or several roots behind. Suit for damages was threatened at the same time.

A week later the attending physician informed the writer that he had seen the patient, that he had noticed the discharge to be of a yellowish color, and that he suspected actinomycosis. Upon microscopic examination of the discharge, the specific ray fungus was found, and the diagnosis confirmed. Subsequently, a surgical operation was successfully performed.

The ray fungus had undoubtedly entered the wounded sockets. This case teaches a valuable lesson in regard to the post-operative treatment of extraction wounds, especially in rural districts.

[*New York Medical Journal*, New York, February 8, 1913.]

THE MOUTH FROM A DIAGNOSTIC STANDPOINT. By Dr. M. Manges, New York.

Remarking upon the curious trait of human nature that the closer at hand and the more available anything may be, the less it is resorted to, the writer scores the neglect by physicians of mouth symptoms in diagnosis. The mucous membrane, in which constitutional changes manifest themselves at a much earlier period than in other portions of the circulation, offers many diagnostic criteria which are readily detected, and are easily interpreted if one would only make the examination of the mouth part of the routine of physical examination. The proper examination of the oral cavity and all its contents should be made with a spatula or tongue depressor and a good electric light, and should include smelling of the breath—a sweet, champagne-like odor, for instance, indicating acidosis. In acute infections, the mouth manifestations often afford early diagnostic information; scarlet fever, measles, and diphtheria require only mention; but variola, varicella, and rötheln may also have their local or even early manifestations in the mouth. Herpes of the lips is a valuable diagnostic symptom, which is usually associated with a diplococcus, either of pneumonia or of cerebro-spinal meningitis. Chronic infectious diseases, like tuberculosis, syphilis, leprosy, etc., are always recognizable by unmistakable local mouth symptoms. Skin diseases, also, are often associated with lesions in the mouth, and should be divided into two classes, those in which the mouth lesions are only extensions of the process from the skin on to the mucous membrane, and those in which isolated efflorescences appear in the mouth, sometimes before they develop in the skin, and even sometimes without any cutaneous involvement at all. In the first group eczema and erythematous lupus may be mentioned; in the second, lichen ruber planus, pemphigus, multiform erythema, bullous erythema, and herpes iris.

Drug rashes may sometimes appear in the mouth and may cause great difficulty in diagnosis. These mouth lesions occur most frequently with antipyrin, quinin, phenacetin, and aspirin. Finally, angeio-neurotic edema and scleroderma should be mentioned among the skin diseases with oral symptoms.

The occurrence of pigmentation in the mouth is usually associated with Addison's disease, and pigmented plaques are not infrequently found in diabetics and patients suffering from gastro-intestinal disorders or pernicious anemia. Pigmented areas occur in the mouth following metallic poisoning by mercury, lead, silver, and bismuth, each of which are followed by characteristic lesions. In the diagnosis of anemia the pallor of the mucous membrane of the mouth is always noted. The differential diagnosis between pernicious anemia, Barlow's disease, scurvy, acute leukemia, pseudo-leukemia, lymphosarcomatosis, and chloroma, deserves special attention, and cannot be made from the oral symptoms alone. Finally, pyorrhea alveolaris must be mentioned.

In concluding, the writer makes the following remarks, which carry special weight coming from the pen of a medical man:

"We have been singularly deaf to the pleas of the dentists to pay more attention to the subject, and we should heed their statements much more than has been the habit of most physicians. A skilled dentist can tell us much about the general condition of the patient from an examination of the gums, and a good differential diagnosis can be made by them of the incipient stages of diseases like nephritis, diabetes, tuberculosis, gout, etc. Each constitutional disturbance has certain peculiarities in the pyorrheal picture which enable the skilled stomatologist to differentiate them as to their etiology. Therefore the routine examination of the gums should be included in one's inspection of the mouth, and the presence of a pyorrhea should warn us to look for the cause of it. Should we be unable to discover it, the case should be referred to a dentist who is skilled in stomatology, both for treatment and differential diagnosis."

Mouth inspection, the writer contends, is absolutely necessary in the treatment of patients, for of what avail is it to bombard the stomach with drugs and to diet patients, when the real cause of the symptoms lies in a foul mouth, missing teeth, filthy bridges and plates? A long uvula, adenoids, and enlarged tonsils may be the cause of much mischief, and in articular rheumatism, chronic or even acute nephritis, and in all cases of sepsis, the mouth should first be looked into. In the treatment of acute diseases of any kind, keeping the mouth clean is the first and a very important stage.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, December 1912.]

NOMA. By Curt Proskauer, Breslau.

Noma, cancer aquaticus, or cancrum oris is a rare form of gangrenous stomatitis involving especially the mucous membrane of the lips and cheeks, sometimes also of the genitalia. It is one of the most destructive of children's diseases, resulting fatally in from seventy to eighty per cent. of cases. It is observed chiefly in subjects whose vitality has been reduced by the disturbances in nutrition so common in children, by inclement weather, and especially by acute exanthematous diseases, such as measles, scarlet fever, smallpox, whooping-cough, pneumonia, scrofula, rhachitis, tuberculosis, and syphilis—in short, by any weakening disease. Bottle-fed children are more susceptible to the disease than breast-fed ones; there is also a preponderance of the disease in the female, probably owing to her weaker constitution. Only rarely does noma spread from the affected cheek to the other.

The symptoms of the disease consist in pronounced lassitude combined with high fever, and a painful swelling of the entire half of the face without marked discoloration. The swelling is of hard consistence, circumscribed, and exhibits at one portion a tumor, which generally develops from a blister, and is separated from the surrounding tissue by a small red line of demarcation. There is painful involvement of the submaxillary lymph glands, and increased salivation. An extremely penetrating and disagreeable fetor is present, and the oral mucosa exhibits on the affected side an ulcer of dirty brown color. The facial skin assumes a dark blue discoloration, and rapidly undergoes penetrating suppurative necrosis, the affected tissue forming a loosely connected, dirty, dark brown, fatty mass. The destructive process rapidly advances in combination with high fever, chills, and trismus; the patient grows weak very rapidly, the gingivæ and the periosteum of the alveoli become involved, exposing the bone, and the teeth become loose and fall out. In very severe case, the uvula, hard and soft palate, tonsils, tongue, pharynx, and epiglottis are also involved, causing death. In the last stages, some patients become restless, others apathetic, and perish under symptoms of exhaustion and delirium. In some cases death follows hemorrhage from the external maxillary artery.

If the disease takes a favorable turn, the necrotic portions are surrounded by a pale red zone of demarcation, which inhibits a further spread of the destructive process. The necrosed tissue is exfoliated either spontaneously or following treatment, exposing to view a portion of the oral cavity. The hole is gradually filled-in by granulating tissue, the scar generally leaving unsightly disfigurement.

As to the etiology of noma, we know nothing; even in regard to its contagious character views differ widely, although its endemic character has been frequently observed in institutions of all kinds. No specific causative agent of noma has thus far been found, nor has the experimental transplantation upon animals or man been successful beyond doubt. Bacteriologic examination reveals the typical picture of a mixed infection, containing, besides the usual bacterial flora of the mouth, diplococci, streptococci, and especially staphylococci, moreover numerous streptothrix bacilli, varying in shape from short and thick rods to long and thin threads. Of special interest are isolated semicircular bacilli, also a U-shaped micro-organism, as has been described by Perthes.

As for differential diagnosis, only certain forms of gangrenous stomatitis need be considered; but from these noma is readily differentiated by its characteristic development, duration, and symptoms.

The prognosis, as has been shown, is very unfavorable, death ensuing in from 70 to 80 per cent. of cases within from one to three weeks, although one case of seven months' duration has been reported. Recurrence of the disease is rare. The involvement of internal organs is another unfavorable factor in the prognosis, as pneumonia, pleuritis, or pericarditis, also severe diarrhea, are generally present.

The therapeutic treatment consists in raising the patient's vitality by plenty of fresh air, good nutrition, and heart tonics. The local seat of the disease can be favorably influenced only in the first stage. Caustics such as hydrochloric acid, nitric acid, caustic potash, and carbolic acid are indicated, for local applications, in combination with antiseptic mouth-washes. Partsch recommends primary excision with the scalpel and subsequent cauterization of the wound edges with 8 per cent. zinc chlorid solution. The wound is then packed with moist iodoform gauze. The Paquelin thermo-cautery is contra-indicated. Isolation of the patient is necessary.

The author adds to his comprehensive treatment of this fortunately rare affection the history of a case treated by him, illustrating his report by eight very clear and instructive photographs.

[*Oesterreichisch-ungarische Vierteljahrsschrift fuer Zahnheilkunde*, Vienna, January 1913.]

THE QUESTION OF EXTRACTION IN ORTHODONTIA. BY DR. EMIL HERBST, BREMEN.

Herbst, who wishes to assume an intermediary position between Angle and Case, and who gives both their deserved liberal share of recognition, states the following rules for extraction in orthodontia: Extraction can be resorted to—(1) In pronounced protrusion, if no results are obtainable within reasonable time by the application of intermaxillary bands. (2) In prognathism, when in the lower jaw the majority of the teeth have been lost by early extraction, and the lost space can no longer be restored, generally on account of advanced age. (3) In lateral anomalies of the bite, viz, subdivisions of Angle's classes II and III, if the patient can be saved great inconvenience by the extraction of a bicuspid, which will generally remedy the condition. (4) In cases where the teeth present are out of all proportion with the rest of the body, which has undergone defective development, and where a preservation of the teeth would continue to disfigure the patient. (5) In open bite, which can be considerably improved by extraction of the last molar. (6) In weakly, backward children who could not very well tolerate prolonged orthodontic treatment. (7) In excessive number of teeth the extraction of which will harmonize the number of teeth in either jaw. (8) In deficient number of teeth, if by extraction of teeth in the opposite jaw a harmony in the number of the teeth in either jaw and subsequently greater masticating efficiency can be produced without impairment of appearance. (9) In serious pathological conditions when the preservation of certain teeth is contra-indicated. (10) In secondary anomalies, especially in advanced age, when tooth regulation is hardly possible any longer, and the success of such regulation would be out of proportion with the time and efforts required. (11) In anomalies of the teeth themselves, such as gemination, fusion, peg-shaped and hypertrophic teeth, interfering with articulation and marring facial beauty. (12) In anomalies of the jaws when mobility of the intermaxillary bone, cleft palate, or semi-hypertrophy of the jaws justifies the extraction of teeth for hygienic or esthetic reasons.

This list, while not intended to be perfect, shows that so many reasons may oppose the ideal postulate of normal occlusion, and that this postulate can no longer be maintained. Individualization cannot be dispensed with in orthodontia.

As examples in which extraction is absolutely contra-indicated, Herbst cites the following: In case of nasal obstruction the preservation of all teeth is necessary in order to retain the normal width of the upper arch after it has been brought about by expansion. The extraction of molars in the hope of bringing about an improvement in the position of the anterior teeth by nature's own regulating forces is a fatal mistake. If anomalies have been brought about by habits in children, the defect must always be corrected by orthodontic means.

Herbst insists that the categorical demand of normal occlusion and the categorical condemnation of any extraction whatever are two extremes to which no thinking practitioner will unconditionally subscribe. While recognizing the beneficial influences of the so-called new school of orthodontia, he maintains that, after all, its doctrines have simply been borrowed from the old school and perfected and enlarged, and that no absolute distinction or contrast exists between the two schools.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, October 1912.]

THE FUTURE OF DENTISTRY IN WARFARE. BY DR. RÖSE.

[*Deutsche Militaeraerztliche Zeitung*, Berlin, October 20, 1912.]

CARE OF THE TEETH IN THE GERMAN ARMY. BY DR. TUESHANS.

In these days of practical dental hygiene in all sorts of public and private institutions, the above papers, written by members of the medical staff of the German army, are of timely interest. Röse in his paper points out the inadequate provisions for dental treatment that existed during the Franco-German war of 1870-71, and refers to the official reports of some twelve thousand injuries to the jaws, the repair of which was anything but satisfactory from the point of view of function as well as of esthetic appearance. Since then, dental technique has made wonderful progress, yet with it the tendency to injuries of the jaws has also greatly increased, owing to modern methods of warfare. Albert, for instance, estimates that of the total number of injuries to the head about twenty per cent. involve the jaws, more frequently the lower one. Dr. Hashimoto, a Japanese physician, puts the injuries to the jaws at 44 per cent., which figures are largely accounted for by the kick of the modern high-power rifle, the use of quick-firing arms, explosive projectiles and hand-grenades, and by the fact that in engagements under fire only the head is visible. Ordinary surgical procedures are by no means sufficient for the setting and immobilization of the lower jaw especially, and every army surgeon should therefore know how to apply all kinds of jaw-bandages and splints. A certain amount of familiarity with dental technique is also necessary for certain prosthetic appliances that may be indispensable in the treatment of injuries of the face, mouth, or jaws. In the Russo-Japanese war, the Japanese treated fractures of the face bones by means of fixation of the fragments by the methods employed in compound fractures; resection was resorted to only in cases of severe splintering of the lower jaw. An aluminum splint, suggested by Dr. Hashimoto, was largely used, these splints being kept in stock in several sizes, so that only comparatively minor changes had to be made for each individual case. Since the war, the German army regulations provide for two dentists for each army corps, these dentists ranking as superior officers, with the duties and privileges of such, and being attached to the military hospitals. A dentist was sent with the German expedition to the far East, and two dentally trained health officers and one dentist accompanied the German troops during the Southwest African campaign.

Dental services, however, are obviously needed by the soldier, quite apart from the exigencies of actual warfare, and although up to the year 1907 there was no regular organized military dental service, several army corps have now a regular dental station, and a propaganda is on foot for appointing a dentist to each regiment. While considering these demands excessive, Röse urges a large number of most practical reforms, such as a local anesthesia outfit as indicated by Guido Fischer. Every medical officer, he suggests, should be trained in the technique of local injection, in order to minimize the soldiers' fear of dental operations, and relieve them of pain caused by exposure to wet or cold. During actual campaigning little dental work except first aid and temporary relief can be done in the flying field hospitals, but at the base hospitals and at transport stations and forts, dentists and dental mechanics should be available. The author in this lengthy and most interesting paper goes into a number of most valuable details in regard to organization, in peace and warfare, therapeutic and prosthetic methods, instrumentarium, etc., which deserve serious consideration by all those who are intrusted with the dental welfare of soldiers, according to the classic saying of Frederick the Great: "Our warriors deserve to be taken care of, because they are staking life and health for their country."

Reviewing the present state of dentistry in the German army, Tueshans states that of a large number of soldiers whom he examined, only six per cent. were found to have perfect teeth. Before the new regulations were in effect, it was noted that of 450 recruits examined annually each man on an average had five carious and two missing teeth. All non-commissioned officers and regulars can now obtain dental treatment when ordered by a medical officer. When this treatment cannot be given by a dentally trained medical officer in the garrison hospital, it is provided under contract by fully qualified dental surgeons. At present, there are twenty-five army medical officers specially qualified in dental surgery, and dental divisions have been established in twenty-two of the large military hospitals. During the year 1910-11, there were 23,500 attendances in the dental divisions, although some of these divisions were only opened late in the year. Artificial dentures are supplied only when teeth have been lost in and by military service, and under certain conditions preventing a man from being efficient owing to the loss of teeth.

[*Le Laboratoire et Le Progrès Dentaire*, Paris, September 8, 1912.]

PROTECTION OF THE ROOT-APEX IN FILLING ROOT-CANALS OR INSERTING PIVOT TEETH. By H. Leger-Dorez.

The writer introduces into the thoroughly cleansed and sterilized root-canal a delicate point of lead reaching just a little short of the apical foramen, after having slightly heated it and passed it through sterile thymolated paraffin throughout its length, and having built up with the same paraffin compound the small portion of the lead point which it lacks in order to reach to the very apex of the tooth. After thoroughly drying the root-canal with hot air, the lead point is coated with Harvard cement mixed to a creamy consistence, the cement, however, not being allowed to cover the small point of paraffin. The root-canal point is then inserted with pliers, and the cement is allowed to set for twenty-four hours, or, if desirable for the sake of observation in doubtful cases, for several days. If a pivot tooth is to be set on the root, a hole for the pivot can be easily and safely drilled through the lead.

If no reaction has taken place in the root after correct extirpation of the pulp under aseptic precautions, a pivot tooth may be directly employed as a root-canal filling, by treating it in the same way as described for the lead point. The hot-air blast applied to the canal heats the tooth sufficiently to melt the paraffin, thus hermetically sealing the root-apex.

Periscope.

"Truing" Carborundum Stones.—The stone is mounted on the mandrel and placed in an old handpiece. Then the stone is held against a lathe-stone in lateral position so that it will rotate in the handpiece, which operation will true the stone in a half-minute. This will save time and trouble.—H. T. McCune, *Dental Digest*.

Removing Enamel from Occlusal Surfaces of Teeth in Preparation for Crowns.—Two, three, or four knife-edged carborundum disks are mounted together, and grooves are cut as deep as the thickness of enamel to be removed. By keeping the disks moist, this can be done almost entirely without pain. With a chisel placed in the grooves, the entire occlusal surface can be chipped off.—H. A. Mares, *Dental Review*.

Prevention of Irritation by the Mouth-mirror.—When operating upon second or third molars, irritation by the mouth-mirror when corners of the mouth are irritated or chapped, can be prevented by winding absorbent cotton around the handle near the glass, and moistening it with an antiseptic solution; or the mirror may be detached from the handle and a piece of thick rubber tubing slipped on.—W. I. Prime, *Dental Digest*.

Interchangeable Pin-Facing in Crown and Bridge Work.—The ordinary facing is backed in the regular way and then waxed up with inlay wax to the desired shape, or the facing can be waxed up without backing.

The porcelain facing is removed and carbon points are inserted in the pinholes left in the wax. The form is then invested and cast in the usual way. The carbon points are then removed, and the facing is cemented to place. Carbon points for this purpose may be obtained at any dental depot.—C. A. Priest, *Dental Summary*.

Insufficient Retention a Cause of Failure in Orthodontia.—One of the most frequent causes of failure in the treatment of malocclusion is inattention to the fundamental requirements of post-treatment maintenance. Progress in this phase of treatment has been quite marked, and many of our earlier difficulties have only recently been overcome. The most practical and concise statement of the problems here involved is as follows: Post-treatment maintenance must be so designed as to provide for (*a*) maintenance of tooth position, (*b*) of arch form, and (*c*) of arch relation.—B. E. Lischer, *Dental Review*.

Natural-Looking Bridge Work.—In cases where there has been much recession of the alveolar process owing to loss of teeth, the most artistic results can be obtained by shaping the porcelain substitutes in such a manner that the crowns are of the same length as the crowns of the natural teeth on each side of the space, and by cutting the balance of the porcelain to simulate the roots as they would appear in cases of recession of the gums.—O. DeF. Davis, *Dental Review.*

Extraction of Lower Bicuspids.—A good method to be pursued in the extraction of the lower bicuspids is this: After having grasped the tooth as far down below the neck as possible, the forceps should be tightly closed, then, starting with the usual out-and-in motion, traction should be applied. If this should not show results, a fresh grasp of the tooth should be made lower down, if possible, always bearing in mind the danger of injury to the vessels coming from the mental foramen, or of fracture of the bone if we go too low. Having secured a fresh grasp, the forceps are closed so as to cut through the intervening process; then, being quite sure that the process is cut, the forceps are rotated strongly, at the same time applying traction. If the force be applied carefully and persistently, the root will probably be removed.—J. F. Hasbrouck, *Items of Interest.*

Rosin Dissolved in Chloroform for Root-canal Filling.—Dr. J. R. Callahan of Cincinnati, Ohio, recommends first filling the cleansed and dehydrated root-canal with a solution of one part rosin in three parts chloroform, pumping it thoroughly into the canal. This is allowed to remain a few minutes, and then the surplus is removed with paper points, and the canal filling is completed with a rosin solution, to which sufficient pink gutta-percha has been added to make it of the consistence of chloro-percha as usually used. When using the rosin solution, in preparing the canal for filling, he uses chloroform instead of alcohol. He claims to be able by this method not only to fill the canal perfectly, but also the tubuli right up to the cementum. The rosin, he states, remains hard and insoluble in the body fluids, and makes a permanent and safe root-canal filling.—*Dental Brief.*

Inlay for a Compound Cavity Involving the Incisal Edge Without Step.—It is often desired to place a gold inlay involving the approximal side and incisal edge without sacrificing the sound structure of the tooth to make a step. This may be done by placing an iridio-platinum post near the incisal edge, after the inlay has been completed. The inlay should have a wide, deep groove carved in the approximal surface extending from near the incisal to the gingival margin. This should be done in the wax model. This groove is to pass over the iridio-platinum post, when the inlay may be set from the incisal edge without interference from an approximating tooth. An extension of this iridio-platinum post may be made for additional retention in the groove of the inlay. Since the inlay model is completed before the incisal retention post is provided, there is absolutely no interference with the removal of the model. The retention post fits loosely in the tooth and in the inlay, until cemented. Post and inlay are both set with the same mix of cement.—H. C. Dean, *Dental Summary.*

Method of Reinforcing Plaster Casts.—Many times we find that when our models are made they are very thin, too thin and weak to withstand the pressure necessary in closing the flask. We also find abutments breaking off the model in bridge work, etc. An easy, cheap, and sure method to overcome this difficulty is to get some brass wire gauze, to be found at all tin shops—this gauze is used for milk-strainers, etc. For reinforcing crowns used as abutments in bridge work, a piece about one-half inch long and one-half of the size of a lead pencil is rolled up, and after dipping it into water it is gently worked into the crown, when pouring the investment in to get the model. If a lower impression has a very thin ridge, and the operator ready to make the model, a piece of the gauze is cut, about two inches wide and long enough to go from one end of the model to the other. Then the gauze is folded in the middle and as the plaster is being poured into the impression the smooth edge of the gauze, not the cut edge, is worked into the plaster, holding it for a moment until the plaster begins to set.—J. M. Prime, *Dental Brief.*

The Use of Elevators in the Extraction of Fractured Roots.—In the case of a multi-rooted tooth, when one root is completely extracted and another root is broken off too low down to be safely grasped with the forceps, the extraction may sometimes be completed by using one of the various elevators. By so placing the elevator that the bone will act as a fulcrum, with the edge of the elevator against the root to be extracted, and by a proper manipulation of this instrument so that the force will be applied to the root along the proper line, the extraction may be accomplished. To use the elevator properly, the handle should rest in the palm of the hand with the index finger extending along the shank of the instrument, and the operation should be performed by a manipulation of the instrument in such a way that, if the elevator were not there, one would have performed the operation with the tip of the index finger. By placing the elevator in an empty root-socket, and applying force, as above stated, the broken roots adjoining will be removed, together with the septum between, which does no harm at all, and under some conditions is very much to be desired.—J. F. Hasbrouck, *Items of Interest.*

Oral Sepsis, with Special Reference to Antiseptic Properties of Tobacco.—The chewing or smoking of tobacco, the former more so than the latter, is decidedly germicidal in laboratory experiments, though the results of examinations of a small number of mouths would seem to give the use of tobacco somewhat less, though still noticeable, effects practically; by exercise of the teeth it helps their nutrition and eliminates pathologic organisms, both by destroying them *in situ* and by removing them in the expectoration. Of seventy-four males examined, twenty-three, or 31 per cent., did not use tobacco in any form; twenty-six, or 35 per cent., smoked only; nine, or 12 per cent., chewed only; sixteen, or 22 per cent., both smoked and chewed. Of this number only twenty-three, or 31 per cent., took any care of their teeth. Of those who brushed their teeth, 43 per cent. showed a marginal gingivitis as compared with 82 per cent. who took no care of their teeth. Of those who did not use tobacco, 74 per cent. showed pus under their gums, as did 69 per cent. who smoked, 77 per cent. who chewed, and 68 per cent. who smoked and chewed. Fullerton says that these results, though bearing out in the most part that tobacco is toxic to bacteria, are not nearly so striking as one might expect, and one might with considerable certainty argue that, with the same individuals and the same lack of care, the conditions might be much worse without the use of tobacco. Of twenty-two women, none of whom used tobacco, twenty, or 90 per cent., brushed their teeth, 50 per cent. showing a gingivitis.—H. D. Fullerton, *Cleveland Med. Journal*, per *Journ. of the Amer. Med. Association.*

Sulfuric Acid in Difficult Cases of Pulp Devitalization.—Everyone is aware of the difficulty of devitalizing a pulp in which nodules exist. It is here especially that the use of sulfuric acid is indicated. If an application of this acid is made, less pain is experienced, and this is always of shorter duration than when arsenic is used. At the next appointment the pulp nodule will be clearly seen, and in the majority of cases it will be found to be quite loose. The acid has not only broken up the surrounding pulp tissues, but the nodule has been slightly dissolved, which makes it readily removable.

In making the application a minim dropper is used, taking up but half a drop of the acid at a time. Care should be exercised in order that not too much acid is used at a time. When the floor and no more has been flooded, a smooth iridio-platinum, or preferably a tungsten broach, is employed to gently puncture its way into the canal. It is a good plan to have a glass of saturated soda solution always at hand in the cabinet in case of an overflow of acid from the cavity. It will be noticed that just as far as the broach penetrates the pulp is disorganized and easily taken out. This is quite different from the action of carbolic acid when used for removing the apical third. The carbolic acid coagulum is slow in losing its sensation, and is difficult to remove.

The strength of acid used for this purpose should be above 75 per cent., which will act upon cotton. When, therefore, a dressing of this strength of acid is to be left in for any length of time, asbestos wool, not being acted upon to any extent by the acid, will serve instead of cotton.

As soon as tungsten broaches can be had in suitable sizes we will have a metal almost as stiff as steel, and one which is not acted upon by sulfuric acid.

In summing up, sulfuric acid from 75 to 90 per cent. pure is indicated as a devitalizing agent when arsenic fails and is especially useful when pulp nodules are present.—L. E. Custer, *Dental Summary.*

Diseases of the Mouth and Rheumatism.—Goadby's researches have been directed to determining the special mouth organism causally associated with various arthritic symptoms; mouth diseases or oral sepsis, to use a generalized term, were so frequently complicated with chronic arthritic changes that the clinical association appeared undoubted. Typical cases were therefore selected, and the bacteria isolated from the oral secretions and tested on animals for virulence, by intravenous, subcutaneous, and intraperitoneal injections. In some cases the animals died from generalized infection; in others pus formation and local abscesses were produced, but no rheumatic symptoms appeared. Considerable difficulty was at first experienced in devising a suitable culture medium, as well as a proper standard of alkalinity for the growth of all mouth organisms. Finally this obstacle was overcome, and the majority of the bacteria obtained in pure culture. A series was then tested against the blood of the patients, and those organisms regularly showing alteration in the opsonic index were selected. Inoculations were made with these into the joints (knee), and into the periarticular tissue of rabbits. One type of organism produced chronic swelling of the synovia and membranes, while in a few instances, definite bony changes followed. The organism obtained from the majority of the mouth lesions in arthritic cases, and which produced these changes in the joints of inoculated animals, is a streptobacillus, which Goadby has provisionally termed the *streptobacillus malæ.* It resembles in its morphology, but not in its cultural characters, the streptobacillus described by Ducrey as the cause of soft chancre. In many ways the organism resembles a streptococcus, but is easily differentiated from the streptococci by its morphology and cultural characteristics. Goadby is convinced that diseases of the gums account for a certain, perhaps a very large number of cases of arthritis, namely, those of apparently bacterial origin with no obvious infective focus. Lambert states that in 172 cases of rheumatoid arthritis where special inquiry was made for an infective focus, 141 of the patients (76 per cent.) had badly decayed teeth, or the teeth had dropped out.—*London Practitioner,* per *Journ. of the Amer. Med. Association.*

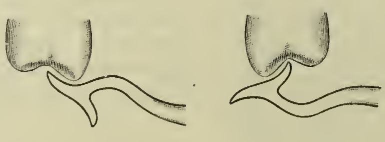
HINTS, QUERIES, AND COMMENTS.

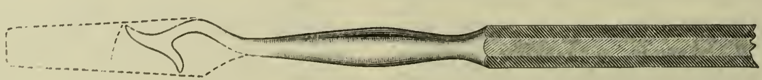
A HOME-MADE INSTRUMENT FOR CARVING WAX MODELS IN CAST INLAY WORK.

A BROKEN cement spatula can be converted into a handy instrument for carving wax models in cast inlay work.

The lower figure shows how the carver is cut out of the spatula by means of a carborundum wheel. The edges of the beaks are square, so that they will shave off the wax, while the points are rounded to make smooth indentations.

In making large contour inlays, where it is necessary to restore the cusps and fissures of the lost tooth structure, the carver can be used as shown in the upper figures. By simply turning the handle, one can carve first one cusp and then the other, at the same time also carving the fissures between them.





Plaster models can be carved in the same manner.

BERNARD FISCHLER, D.D.S.

Brooklyn, N. Y.

RECOVERING MAT GOLD FROM OLD GOLD FILLINGS.

Old gold fillings that have been saved until there is about one-half ounce of material are melted with the blowpipe, and the ingot is rolled or hammered until a large surface is obtained; then a fine platinum wire is soldered or swaged to this gold. The wire is connected with the carbon pole of a dry cell, while to the other pole a thin strip of platinum is attached. The gold and platinum are placed in a shallow dish filled with chemically pure hydrochloric acid. The acid soon turns yellow, and after it has been saturated with gold, a deposit is formed on the platinum strip. This deposit consists of very fine crystal gold, which, after having been washed thoroughly to remove all traces of the acid, dried on blotting paper, and annealed on a sheet of mica, is as serviceable for filling purposes as any other mat gold.

H. B. Findley, D.D.S.
Vancouver, B. C.

Obituary.

DR. D. R. STUBBLEFIELD.

Died, at his home, Nashville, Tenn., on March 12, 1913, David R. Stubblefield, B.A., A.M., M.D., D.D.S., in his fifty-seventh year.

Although he had been in ill-health for some time, Dr. D. R. Stubblefield's demise came as a shock to the host of his friends, both social and professional; for the deceased was one of the most popular and beloved men in Nashville, and his position as a teacher and his connection with many dental and literary societies had spread his reputation throughout the country.

Dr. Stubblefield was born at Jasper, Tenn., in 1856, and received his education at Emory and Henry College, Va. In 1876 he received his B.A. degree, and on account of his excellent work was honored with the A.M. degree. He was graduated from the medical department of Vanderbilt University in 1878, and from the dental department of the same institution in 1882. In 1879, when this dental department was organized, he had been called to the chair of anatomy and physiology. He practiced medicine until the spring of 1883, when he changed over to the practice of dentistry. Immediately upon his graduation he was elected president of the Tennessee Dental Association, and subsequently became president of the National Institute of Dental Pedagogics. In 1900 he was elected dean of the dental department of Vanderbilt University, which position he held until forced to retire by ill-health. He was treasurer of the dental department from the time of its organization until his call to the deanship, also treasurer and vice-president of the Athletic association of the University. The latter position he held up to the time of his death.

The deceased was an ex-president of the Vanderbilt Alumni Association, and altogether rendered to the university thirty years of indefatigable and most efficient service, in recognition whereof, following his retirement from his activities, he was honored by the conferment upon him of the title of emeritus professor and dean of the department of dentistry of Vanderbilt University.

Before his health began to fail, Dr. Stubblefield was much in demand as a lecturer and demonstrator at dental meetings throughout the South. Among many other honors that were conferred upon him was the presidency of the Old Oak Club, a prominent literary organization of Nashville.

Dr. Stubblefield was married to Miss Hettie Wilkins of Nashville, who, with three sons and one daughter, survives him.

Interment was made at Mt. Olivet Cemetery, the faculty of Vanderbilt University and many dentists serving as pallbearers.

DR. HENRY A. HULL.

Died, at his home, New Brunswick, N. J., March 5, 1913, of pneumonia, Dr. H. A. Hull, in his eighty-second year.

Henry A. Hull was born at Columbia, Pa., October 19, 1831, and was the eldest of four sons. He traced his genealogy back to George Hull, ancestor of the Hulls of Fairfield county, Conn., who sailed from Plymouth on the ship "Mary and John," and arrived May 30, 1630, at a place on Nantasket, afterward called Hull in honor of Joseph Hull, brother of George Hull. His paternal great-grandfather was Jedidiah Hull, prominent in the military record of the invasion of Canada in 1758 and during the Revolution.

At the early age of thirteen years he left school to clerk in his father's store, and at the age of eighteen, becoming interested in dentistry, placed himself under the tuition of Dr. James F. Stratton of New York City. In the early part of 1852 he engaged as an assistant to A. D. Newell, M.D., of New Brunswick, N. J., who was at that time one of the most skilful dental surgeons of the state. Two years later he opened an office in Rahway, N. J., practicing there until the outbreak of the civil war, when he was moved by the spirit of his ancestors and enlisted in the 11th Connecticut Volunteers, being mustered into service on October 3, 1861. He was soon promoted to corporal of company I, and was subsequently transferred to company D as first sergeant. Later he was clerk in the Adjutant-general's office at Richmond, Va. Before his first term of service was completed he re-enlisted for three years, and was mustered out of service on December 21, 1865.

After the war, Dr. Hull again associated himself with Dr. A. D. Newell, with whom was now associated Dr. E. W. Robbins, the offices being situated in the National Bank of New Jersey Building. After the retirement of Dr. Newell, and the death of Dr. Robbins, Dr. Jas. G. Palmer joined him, but some years afterward transferred his interest to Dr. Harvey Iredell, who then became a partner of Dr. Hull. A few years later this partner purchased the full practice, which had been in existence for forty years. Dr. Hull then formed a partnership with Dr. W. D. Rice, and carried on the practice at his dwelling until his death.

During his association with the old office, many men who have since been prominent in the dental field were connected therewith, including S. H. Guilford, now dean of the Philadelphia Dental College and the dental department of the Temple University of Philadelphia, Pa., Dr. J. D. Thomas of Philadelphia, specialist in extracting, and the late Dr. James G. Palmer of New York, a specialist in operative dentistry. He had always numbered many of the best citizens of the county among his patrons.

Dr. Hull was a stanch republican, and served New Brunswick in an official capacity for several years. He was a Scottish Rite Mason, also a Knight Templar, was a member of the Mystic Shrine, being past presiding officer in several of its bodies. He was past president of the Central Dental Association of Northern New Jersey and the New Jersey State Society, and was treasurer of the State Society until last summer, when he resigned. He was a Fellow of the American Academy of Dental Surgery of New Jersey, member of the Boggs Janeway Post G. A. R., and many other organizations, at the time of his death.

He married Catherine S. Merrill of Millstone, N. J., who died May 31, 1893. Four sons were born to them, none of whom survived. An adopted daughter brightened their home for several years, until death claimed her in his declining years, leaving him quite alone. In spite of all this, Dr. Hull's genial, sunny disposition won him many friends, to whom he very seldom unburdened his disappointed and lonely life, but made the best of his surroundings. He was a great traveler, and a fund of stories of his adventures was always at his command, he being a keen observer and capable of relating his experiences in the most fascinating manner.

A good man and a true friend has fallen, and while those of us who knew him well keenly feel his loss, we cannot but rejoice in his splendid record of achievement, covering a long and useful life.

Harvey Iredell,
Frank L. Hindle,
Herbert S. Sutphen,
Charles F. Jones,
Edward F. Harlan.

"IN MEMORIAM" RESOLUTIONS.

Dr. Wilbur F. Litch.

Following are the preamble and resolutions passed by the American Academy of Dental Science in memory of Dr. Wilbur F. Litch, who was an associate member of the society:

Wilbur F. Litch, D.D.S., M.D., an associate member of this society, died at Philadelphia, December 25, 1912. Dr. Litch was best known to our society through his publications and his school work, for we missed to a large extent his personal contact with our members. Throughout his long and useful life he was always laboring for professional betterment. As a practitioner he was able and skilful; as a teacher, scholarly and effective, and his loss is greatly to be deplored. Be it, therefore,

Resolved, That we spread upon our records this testimonial of his worth, and record our deep sense of a great loss. And be it further

Resolved, That a copy of this resolution be sent to the dental magazines for publication, and a copy sent to his widow.

Eugene H. Smith,
William H. Potter,
Waldo E. Boardman,
Committee.

Brief Necrology.

Dr. Horace A. Davis of Boston, Mass., on March 4, 1913. Deceased was a graduate of the Harvard University Dental School.

Dr. James B. Snyder of Bryan, Ohio, on November 26, 1912, in his fifty-third year. Deceased was a graduate of the Kansas City Dental College.

Dr. Matthew H. McElroy of Newport, R. I., on December 14, 1912, of heart failure. Deceased was a graduate of the Harvard University Dental School.

Dr. William Adair Jones of Bloomington, Ill., on February 28, 1913, in his sixty-ninth year. Deceased was a graduate of the St. Louis Dental College, and for several years demonstrator at the Chicago College of Dentistry.

Dr. Samuel A. Packard of Portland, Me., on December 25, 1912, in his seventy-first year. Deceased was a member of the Maine Dental Association and the Maine Academy of Medicine and Science, also a veteran of the civil war.

Dr. David C. Whaley of Pomeroy, Ohio, on December 30, 1912, of pneumonia, in his eighty-fifth year. Deceased was a graduate of the Ohio College of Dental Surgery.

Dr. Edward Cooney of Brooklyn, N. Y., on March 11, 1913, in his forty-fifth year. Deceased was a graduate of the Dental Department of the University of Pennsylvania.

Dr. Emilio Alvarez of Granada, Nicaragua, on April 5, 1912, of malaria, in his sixty-seventh year. Deceased was a graduate of the Pennsylvania College of Dental Surgery.

Dr. James Munroe Daly of Boston, Mass., on December 27, 1912, in his eighty-third year. Deceased was a graduate of Tufts College Dental School, and a member of the Boston Dental Society.

Dr. James Richard Bell of Cleveland, Ohio, on January 31, 1913, in his fifty-ninth year. Deceased was a graduate of the Ohio College of Dental Surgery, and member of several dental societies.

Dr. Edward Lyman Washburn of New Haven, Conn., on February 10, 1913, of arterio-sclerosis, in his seventy-fourth year. Deceased was a graduate of the Yale Medical School. He was well known to Connecticut dentists as a dealer in medical and dental supplies.

Dr. Rudolph Beck of Chicago, Ill., on March 15, 1913. Deceased was a graduate of the Chicago College of Dental Surgery, professor of dental anatomy at that institution, and a member of the Illinois State and Chicago Dental Societies, and the Odontographic Society of Chicago.

Dr. Henry A. Hull of New Brunswick, N. J., on March 5, 1913, of pneumonia, in his eighty-first year. Deceased was one of the charter members and Fellow of the American Academy of Dental Surgery in 1884, and had filled the offices of examiner, president and treasurer of the New Jersey State Dental Society, president of the Central Dental Association of New Jersey, and was a member of many other dental societies.

Legal Decisions.

THE CAST GOLD INLAY CONTROVERSY.

Washington, D. C., February 25, 1913.

In the Court of Appeals of the District of Columbia:

George W. Boynton, *Appellant,*
vs.
William H. Taggart, *Appellee.*
No. 2426.

Decision.

This appeal involves a decree in the Supreme Court of the District in an infringement suit sustaining the validity of letters patent numbered 872,978, granted December 3, 1907, to William H. Taggart, the appellee, upon a divisional application filed July 12, 1907, of original application filed January 12, 1907.

According to the specification the invention relates to "a new and useful improvement in methods for making molds for dental inlays and the like." It is further stated that these molds are particularly designed for the casting of dental fillings of the type known as inlay fillings, but that "they can obviously be used for certain other types of work of a fine grade, one of their principal fields of usefulness being in the formation of other types of dental metal work, as, for instance, bridge work and the like." Searching the original specification we find that the phrase "certain other types of work of a fine grade" was intended to embrace the art of manufacturing special pieces of jewelry, for it is there written: "The process can also be used in the art of manufacturing jewelry, wherever it is desired to make a single piece of any kind, as for instance where a piece of jewelry is made to order. The manufacturer can carve up a pattern in wax with comparative ease, as the graving operation in wax requires neither the high class of tools nor high manual skill required for graving in metal. . . . . After the pattern is completed in wax the process proceeds as herein set forth and an absolutely perfect duplicate can be obtained." The claims are twelve in number, of which we reproduce the following five as representative:

1. The process of making patterns for dental inlays and the like, which consists in molding plastic material upon the tooth surface to the size and shape of the desired inlay.

3. The process which consists in making a pattern of a tooth filling within the cavity to be filled and in contact with the surface thereof, removing the pattern from the cavity, forming about the pattern a mold provided with a sprue, and melting out the pattern.

6. The process which consists in making a pattern for a cast tooth filling within the cavity to be filled and in contact with the surface thereof, from plastic material capable of being changed from its solid condition, supporting the pattern upon a sprue former, inclosing the pattern in a primary body of mold material, supporting the pattern and primary body of mold material within a flask by means of the sprue former, adding a secondary body of mold material, removing the sprue former and removing the pattern from the mold thus formed by way of the sprue.

8. The process of making molds for casting dental fillings and the like, which consists in forming a pattern of the desired size and shape, forming a mold about said pattern with a depression in the mold adapted to form a crucible, forming a sprue hole extending from the depression to the pattern, and then removing the pattern.

12. The method of forming patterns for casting dental inlays, which consists in forming moldable material to the size and shape of the desired inlay in the cavity to be filled and against its walls.

An examination of these claims discloses that they do not cover nor purport to cover a new process for filling teeth. On the contrary, they relate solely to the process of making *patterns* out of plastic material or wax, and the process of forming a mold about such pattern from which mold a duplicate of the pattern may be produced. The words "dental inlay and the like" as used in the claims of the patent, when read in connection with the specification as they may be read, clearly embrace "bridge work and the like." It is unnecessary here to determine whether they have even broader signification, although as previously stated the specification specially includes "certain other types of work of a fine grade."

To produce the pattern to which these claims relate, an impression in wax or other plastic material is obtained; that is to say, if a tooth cavity is to be filled, wax is first inserted therein, chilled and removed. When thus removed a pattern of the filling has been obtained. Substantially the same process would be followed in obtaining a pattern for a bridge between other teeth. After obtaining this pattern it is put upon a short piece of wire, technically called a sprue former, initially coated with investment material and then enclosed in a secondary layer of investment material. This is allowed to set when it is sufficiently heated to volatilize the wax. The mold is then completed and the gold or other metal may be inserted through the sprue hole.

We will here briefly review the prior art. It is not disputed that the art of producing metal castings by means of a mold formed of a wax pattern is very old. It is in evidence that this art was practiced by the ancient Greeks and Romans and was extensively used in the middle ages for producing statuary and other accurate casts. This process is known as the *Cire perdue* or "Lost wax" process. See Simpson Bolland's "Encyclopedia of Foundings," page 515. It is conceded that Cellini used this process hundreds of years ago in casting one of his most celebrated statues. It is further conceded that the burnished inlay process was also well known for many years prior to the application for this patent. See patent No. 402,352 to Robinson, dated April 30, 1889. In that process a piece of platinum or gold foil is placed in the tooth cavity and rubbed or burnished against the walls of the cavity. The foil, then called a matrix, is usually filled with wax so as to conform to the original shape of the tooth, then removed and precisely the same process followed as in the Taggart process; in other words, the only difference between the burnished inlay process and the Taggart process lies in the use of the foil, which subsequently fuses with the "solder" or lower karat gold. The patent to Hollingsworth No. 708,811, dated September 9, 1902, covers machines for casting dental bridges. The wax pattern in the Hollingsworth process is treated in substantially the same manner disclosed by the Taggart patent, and the casting process disclosed by Hollingsworth in no material way differs from that disclosed by Taggart. The patent to Reese No. 200,760, dated February 26, 1878, covers a mold for casting dental plates. It is thus seen that it was old long prior to the Taggart patent to manufacture dental castings by the Lost wax process.

It is conceded that appellant practiced the process disclosed by the claims of the patent in suit, the defense being the invalidity of these claims. In addition to the prior art as disclosed in the patents to which reference has been made, much testimony was introduced by appellant tending to show that the identical process disclosed by this patent was for more than two years prior to the date of the original application practiced by dentists throughout the country. Of course, if the testimony amounts to proof beyond a reasonable doubt of such prior use, the defense must be sustained, as the claims must fall. Sec. 4886 R. S.; Forncrook vs. Root, 127 U. S. 176; Peters vs. Active Mfg. Co., 129 U. S. 530. We shall here review that evidence.

Dr. Oscar H. Simpson, of Dodge City, Kansas, a dental practitioner since 1882, a graduate of the Ohio College of Dental Surgery, a member of the State Board of Dental Examiners, at one time president of the State Dental Association, and a member of the National Board of Dental Examiners, testified that he gave his first inlay clinic in about 1887 and had since given clinics at Topeka, Wichita, and Newton, Kansas, at the World's Congress of Dentists at St. Louis, and at other places. The witness described his process in inlay work and further described in detail the method he employed in about 1898 to form a dental tip or crown for a boy by the name of Malcolm Judd. Without going into detail it is sufficient to say that the process described by the witness was substantially the process disclosed by the patent in suit. The original apparatus by which the process was practiced was introduced in evidence. Not only this, but the original work, which had been subsequently removed after performing a useful purpose, was also introduced. While this piece of work was attacked by experts for the complainant, we nevertheless are fully convinced that the process by whch it was made was the process disclosed by the Taggart patent in suit. Dr. Simpson gave other instances of employing this process in his practice. He further testified that in the clinic at Wichita, Kansas, in about 1898 or 1899, he described the method which he employed to form the Malcolm Judd tip or crown. In this he was corroborated by Dr. B. L. Shobe, a dentist residing at Bartlesville, Oklahoma, who remembered very distinctly the clinic at Wichita, because he then thought the process adapted to a case which was troubling him. After watching the clinic he returned to his home and tried to practice the process, but failed. He then consulted Dr. Simpson at Dodge City, learned the cause of his failure and was thereafter able to practice the process. In his testimony he gave the names and addresses of different persons for whom he did that kind of work. No matrix was employed in the clinic Dr. Simpson gave at Wichita, the wax pattern coming in direct contact with the tooth. A Mr. Lyle T. Henkel, now a locomotive engineer, an entirely disinterested witness, testified in direct corroboration of Dr. Simpson. From 1893 until March 1897 he studied dentistry with Dr. Simpson, and his testimony is clear and convincing that Dr. Simpson during that time practiced the process disclosed in complainant's patent in making cast inlays for teeth.

Dr. Judson O. Ball, of Mt. Pleasant, Iowa, a dental practitioner since 1880, testified concerning inlay work. In about 1889 he prepared a tooth cavity, then ground a piece of porcelain to fit the cavity and cemented the porcelain in place. This was his first work of that kind. In 1894 a Mrs. Shaffer, living at Merrimac, Iowa, sixteen miles from Mt. Pleasant, came by appointment to have a Logan crown set. The crown had been ordered by mail but had not arrived. The Doctor desiring if possible to complete the work upon that occasion, took a wax impression and from it by practicing the process disclosed by the patent in issue produced a casting which he used successfully. He subsequently practiced the same process in the spring of 1895 in doing work for Dr. A. O. Pitcher, of Mt. Pleasant, Iowa. Sometime between 1895 and 1899 he employed the process in doing work for Mrs. William Gladden, also of Mt. Pleasant. In his testimony he described the work in detail. During September 1903, the Doctor set a large inlay for Mr. F. S. Finley, a lawyer of Mt. Pleasant. This inlay was for the right central incisor decayed on the central proximal, involving both the facial or labial and lingual surfaces of the tooth and also the lower cutting edge surface. After the cavity was prepared, wax was inserted to conform with the labial, lingual, and proximal surfaces of the tooth; in other words, a wax impression of the filling or casting was taken. A casting was then produced by a process substantially the same as that of the Taggart patent. This casting was then cemented in place and has since done service. The original apparatus by which this casting was made was introduced in evidence. The names and addresses of other parties for whom work of a similar character was done by Dr. Ball were given by the witness. Mr. Finley, formerly city solicitor of Mt. Pleasant, Iowa, his home, testified in corroboration of Dr. Ball. He remembered that sometime during the year 1903, when he and Dr. Ball were together in the city council, the Doctor had filled a front tooth for him. The witness was asked what circumstances if any impressed this particular occurrence upon his mind, and replied: "The manner of putting this filling in was impressed upon my mind from the fact that the tooth was prepared and an impression taken of the tooth and the filling cast and cemented into place, which was different from any other filling that Dr. Ball had ever put in for me, and I inquired of the Doctor at the time the filling was put in about the manner of his doing it, and he explained it to me. He told me that he had taken a wax impression of the cavity. I knew that he had done this. He then showed me the apparatus where he had set the wax filling on a point of a cone and put a cylinder over it and then used some substance something like plaster of Paris to get the form of the filling; he then removed the cylinder with the plaster cast, removed the metal cone and explained to me how he heated the plaster cast or the wax in the plaster cast, and how it would come out and leave the cavity. He then filled the cavity in some way with gold, making the cast which was cemented into my tooth. I merely have his explanation as to how he made the filling aside from the fact that I knew he took the wax impression, that the filling was put in in one piece, that he showed me the apparatus where he said he had made it and explained to me the process of making it as I have explained it above." The witness stated that the apparatus which had been introduced in evidence was exactly the same in principle and similar in fact to the one used in making the casting for his tooth. There was no cross-examination of this witness nor was an examination sought to be made of the tooth which the testimony shows had been filled in 1903. One Robinson, who had been Dr. Ball's janitor for seventeen years, also testified concerning the Doctor's use of the process here involved.

Dr. Valentine H. Hobson, of Richmond, Kentucky, testified to the circumstances surrounding the practice in 1889 of the process of the patent in issue. The Doctor subsequently practiced the process for other patients and gave their names and addresses.

Dr. William E. Harper, of Chicago, Illinois, a man of wide preliminary training, testified to casting dental bridges by the present process and to the giving of clinics in 1893 or 1894 in which he explained it. The names and addresses of people for whom he had made cast bridges were given.

Dr. Merrill W. Hollingsworth, who, as we have seen, in 1902 patented a machine for casting dental bridges, and who therefore was thoroughly familiar with the Lost wax process in the manufacture of dental castings, testified to having made bridge castings by the process in issue as early as 1893, the names and addresses of different people for whom he had made castings being given. Dr. Hollingsworth's testimony was corroborated by Dr. George A. White.

Dr. Jacob G. Schottler, of Milwaukee, Wisconsin, a practicing dentist and also a teacher of dentistry, testified to the casting of a gold inlay in 1898 by the process in issue. This casting was for a patient who refused to have the work done in the old way owing to nervousness. The name of the patient was given.

Dr. George W. Blaesser, of Cedarburg, Wisconsin; Dr. Emil M. Kapitan, of Manitowoc, Wisconsin; Dr. John M. Higgins, of Chilton, Wisconsin, all testified in corroboration of Dr. Schottler. A Mr. Thomas H. Savage, a stenographer, testified that Dr. Schottler took a wax impression of one of his teeth that had been broken off and from this produced a tip which was cemented in place. The witness was asked in cross-examination whether he had any objection to permitting an examination of his tooth by a dental expert, and replied that he had not. The record does not show that any such examination was made, however.

We come now to the testimony of Dr. George B. Martin, of Frankfort, Indiana, who has been engaged in the practice of dentistry since 1884. In 1888 Dr. Martin organized the Indianapolis Post-graduate School of Prosthetic Dentistry and was president of the school and also instructor, his subjects including crown, bridge, and inlay work. When he took up the practice of dentistry he was already familiar with the making of patterns for metal castings in other lines of work. The Doctor testified in detail to practicing the process here involved and to the disclosure of that process to his students and others. He introduced in evidence various apparatus by which his work was accomplished. His testimony covers a period from 1890 on. Dr. Blain H. Sellers, of Indianapolis, Ind., who attended the Indiana Dental College in 1891 and 1892 during the time Dr. Martin was an instructor and demonstrator of prosthetic dentistry, testified in corroboration of Dr. Martin. The witness was asked to describe the instruction he received in the casting of bridges and crowns, and replied: "Well, we first took the crown, made the crown to suit yourself—I always did, and then take a piece of wax and place that into the mouth and have the patient bite down onto that, and that would form the bite for the articulation, and then carve the wax any size and shape that we would want the cast itself to be. We would invest that in the plaster of Paris, placing into the wax an instrument to act as a sprue; after that part of the investment became hardened we added to that another on top, and after that had hardened we removed the two pieces separate and then removed the wax from the mold, and we melt our gold and pour it into what we called the die and then place the counter die on top of that, and the impression would form the cast bridge itself." Drs. Cravens and Bloor, both of Indianapolis, also testified in corroboration of Dr. Martin. Dr. Myrom E. LeGalley, of LaFayette, Indiana, who was a student at the Indiana Dental College from 1892 to 1895 inclusive, testified in detail as to the instruction which he then received from Dr. Martin in the art of making cast bridges. The testimony of Dr. LeGalley is clear and leaves no room for doubt that the process of the patent in suit as applied to dental bridges was fully explained to and understood by him during the time mentioned. It was stipulated that Dr. Clarence Williams, of Terre Haute, Ind.; Dr. W. H. Upjohn, of LaFayette, Ind.; Dr. Johnson and Minnie Howes, of Indianapolis, Ind., if called as witnesses would testify exactly the same as Dr.

LeGalley as to the instruction received by them while in attendance at the Indiana Dental College through Dr. Martin, their attendance upon said school covering a period between 1889 and 1897. In addition to these several witnesses Miss Martha Vories, who was Dr. Martin's assistant for about a year commencing in 1897, testified to seeing Dr. Martin practice the process in issue. The testimony of this witness shows that she thoroughly understood the process at the time she saw Dr. Martin practice it.

Dr. Joseph Head, of Philadelphia, Pa., whose article on inlays is incorporated in the "American Text-book of Prosthetic Dentistry," who is a graduate of the Philadelphia Dental College, a graduate in medicine of the University of Pennsylvania, and a man evidently of wide experience and attainments, testified to the casting by him in the apparatus of Dr. Ball, which had been employed in making the Finley inlay, of a cast inlay. Dr. Head says: "I find that the material and apparatus that I employed and which is stated to have been used by Dr. Ball to be capable of producing an inlay as perfect as any inlay I have ever seen." Dr. Head has produced a cast gold inlay which he had made by the use of the same investment compound and apparatus used by Dr. Simpson and to which reference has been made. There is other corroborative testimony in the record, but we do not deem it necessary to review it.

Has the defense of prior use been made out? As no two cases are exactly alike, it is apparent that the character of the invention involved, the prior art, and the particular circumstances surrounding each case must be considered, in weighing evidence of prior use. The contention in this case that Dr. Taggart's discovery was revolutionary in character is not sustained. On the contrary, as appears from the record art at the time Dr. Taggart applied for his patent, dental castings produced by the Lost wax process were well known. Having this in mind, there is nothing improbable about the testimony of appellant's witnesses. Indeed, Dr. Taggart himself according to his own testimony was in full possession of the idea involved in these claims more than ten years before he applied for his patent. The thing that most troubled him and that deferred his patent application was the production of a machine by which the gold could be quickly and easily forced into the mold after its completion; in other words, the process of producing such patterns and molds, generally speaking, was already well known. The real difficulty, therefore, was in producing a device that would quicken the practice of the process and thus induce the profession generally to make use of it. This is apparent from an examination of Dr. Taggart's bill in this case, wherein he states: "Your orator has expended large sums of money preparing for the market machines and apparatus with which the method of said patent can more readily and perfectly be practiced, and is now prepared to supply the demand for such machines and apparatus." The Doctor's testimony also shows, we think, that it was the production of these machines that consumed time, and not the evolution of the process.

The testimony which we have reviewed comes from witnesses whose standing is unchallenged in this record. Several of these witnesses are entirely disinterested. The cross-examination of nearly all of them was confined to a few questions as to the character of the investment material employed, and considerable stress is laid in the brief because one of these witnesses when recalled failed to include in the formula then given an ingredient contained in his former answer to a similar question. We attach no importance whatever to this. In the patent itself Dr. Taggart conclusively disproves the contentions of his counsel that it required any special skill to evolve a formula for investment material, for he says: "The sprue former is then used as a handle to support the pattern and the entire pattern is covered with a primary coating of investing material. *This investing material may be any one of the various dental investing materials on the market.* Moreover, the prior record art contained ample information concerning the investment feature of complainant's patent. The real question which we are called upon to determine from the evidence before us is whether the various dentists who have testified, or any of them, were in possession more than two years prior to the date of the original application for this patent of the idea attempted to be covered thereby, and whether they, or any of them, gave expression of that idea in a practical and public way. It is of no possible consequence that by the use of Dr. Taggart's machine gold inlays and the like may be produced more cheaply and rapidly than they were produced by dentists who have testified. It is enough if those dentists took a wax impression in the manner described by these claims and formed a mold around the pattern thus obtained, for the purpose of casting a dental inlay or the like. To hold that this was not done would be arbitrarily to disregard and set at naught the testimony of witnesses whose character and reputation are unimpeached and whose testimony is reasonable and in entire harmony with the circumstances of this case. We are unwilling to assume such a position. We are fully persuaded that the evidence shows beyond a reasonable doubt that for many years prior to the filing of the original application herein the process of making patterns and molds for dental inlays and the like as expressed in these claims had been publicly practiced upon many occasions. This finding avoids the patent and renders it unnecessary to determine whether the claims thereof were anticipated by the prior record art.

It follows that the decree must be reversed, with costs, and the cause remanded with directions to dismiss the bill.

Reversed and *remanded*.

[Signed] CHAS. H. ROBB,
Associate Justice.

SOCIETY NOTES AND ANNOUNCEMENTS.

DENTAL SOCIETY MEETINGS:
May, June, and July.

MAY.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA. Philadelphia. May 27th.

DENTAL SOCIETY OF THE STATE OF NEW YORK. Albany. Three days: May 8th to 10th.

ILLINOIS STATE DENTAL SOCIETY. Peoria. Four days: May 13th to 16th.

INDIANA STATE DENTAL ASSOCIATION. Indianapolis. Three days: May 20th to 22d.

IOWA STATE DENTAL SOCIETY. Davenport. Three days: May 6th to 8th.

KENTUCKY STATE DENTAL ASSOCIATION. Lexington. Three days: May 26th to 28th.

LAKE ERIE (PA.) DENTAL ASSOCIATION. Cambridge Springs. Three days: May 15th to 17th.

MASSACHUSETTS DENTAL SOCIETY. Boston. Three days: May 8th to 10th.

NATIONAL DENTAL PROTECTIVE ASSOCIATION. Washington, D. C. May 20th.

NEBRASKA STATE DENTAL SOCIETY. Omaha. Four days: May 19th to 22d.

NORTH DAKOTA DENTAL ASSOCIATION. Fargo. Two days: May 16th and 17th.

SOUTH DAKOTA DENTAL SOCIETY. Watertown. Two days: May 13th and 14th.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION. Los Angeles. Four days: May 26th to 29th.

SUSQUEHANNA (PA.) DENTAL SOCIETY. Wilkes-Barre. Three days: May 20th to 22d.

TEXAS STATE DENTAL ASSOCIATION. Temple. Three days: May 15th to 17th.

VERMONT STATE DENTAL SOCIETY. Burlington. Three days: May 21st to 23d.

JUNE.

ALABAMA DENTAL ASSOCIATION. Birmingham. Three days: June 10th to 12th.

AMERICAN SOCIETY OF ORTHODONTISTS. Chicago, Ill. Three days: June 30th to July 2d.

CALIFORNIA STATE DENTAL ASSOCIATION. Oakland. Four days: June 2d to 5th.

COLORADO STATE DENTAL ASSOCIATION. Manitou. Three days: June 19th to 21st.

DISTRICT OF COLUMBIA DENTAL SOCIETY AND MARYLAND STATE DENTAL ASSOCIATION. Washington, D. C. June 12th to 14th.

GEORGIA STATE DENTAL SOCIETY. Columbus. Three days: June 12th to 14th.

MAINE DENTAL SOCIETY. Portland Harbor. Three days: June 25th to 27th.

MINNESOTA DENTAL ASSOCIATION. Minneapolis. Two days: June 13th and 14th.

MISSISSIPPI DENTAL ASSOCIATION. Meridian. Three days: June 24th to 26th.

MONTANA STATE DENTAL SOCIETY. Butte. Two days: June 13th and 14th.

NEW HAMPSHIRE STATE DENTAL SOCIETY. Wiers. Three days: June 18th to 20th.

NORTHERN OHIO DENTAL ASSOCIATION. Cleveland. Three days: June 5th to 7th.

PENNSYLVANIA STATE DENTAL SOCIETY. Philadelphia. Three days: June 24th to 26th.

SOUTH CAROLINA STATE DENTAL ASSOCIATION. Isle of Palms. June 25th to 27th.

SOUTHERN WISCONSIN DENTAL ASSOCIATION. Delavan Lake. Two days: June 13th and 14th.

TENNESSEE STATE DENTAL ASSOCIATION. Nashville. Three days: June 5th to 7th.

WASHINGTON STATE DENTAL SOCIETY. Seattle. Three days: June 16th to 18th.

JULY.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS. Kansas City, Mo. July 7th.

NATIONAL ASSOCIATION OF DENTAL FACULTIES. Kansas City, Mo. July 4th.

NATIONAL DENTAL ASSOCIATION. Kansas City, Mo. Four days: July 8th to 11th.

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH, AND VIRGINIA STATE DENTAL SOCIETY. Old Point Comfort, Va. Four days: July 22d to 25th.

NEW JERSEY STATE DENTAL SOCIETY. Asbury Park. Three days: July 16th to 18th.

Examiners' Meetings.

ARIZONA BOARD OF EXAMINERS. Phoenix. May 5th to 9th.

CALIFORNIA BOARD OF EXAMINERS. San Francisco, June 7th; Los Angeles, June 20th.

CONNECTICUT DENTAL COMMISSIONERS. Hartford. June 12th to 14th.

FLORIDA BOARD OF EXAMINERS. Tampa. June 21st to 24th.

ILLINOIS BOARD OF EXAMINERS. Chicago. June 4th.

INDIANA BOARD OF EXAMINERS. Indianapolis. June 9th to 14th.

IOWA BOARD OF EXAMINERS. Iowa City. June 2d.

MARYLAND BOARD OF EXAMINERS. Baltimore. May 29th and 30th.

MASSACHUSETTS BOARD OF REGISTRATION. Boston. June 4th to 6th.

MONTANA BOARD OF EXAMINERS. Helena. July 14th to 17th.

NEBRASKA BOARD OF EXAMINERS. Lincoln. June 16th to 18th.

NEW JERSEY BOARD OF REGISTRATION. Trenton. June 30th to July 2d.

NORTH CAROLINA BOARD OF EXAMINERS. Winston-Salem. May 26th.

OKLAHOMA BOARD OF EXAMINERS. Oklahoma City. May 19th to 24th.

PENNSYLVANIA BOARD OF EXAMINERS. Philadelphia and Pittsburgh. June 11th to 14th.

SOUTH CAROLINA BOARD OF EXAMINERS. Isle of Palms. June 20th.

TEXAS BOARD OF EXAMINERS. Houston. June 23d.

VERMONT BOARD OF EXAMINERS. Montpelier. June 30th to July 3d.

WASHINGTON STATE BOARD OF EXAMINERS. Seattle. May 22d.

WISCONSIN BOARD OF EXAMINERS. Milwaukee. June 16th.

NATIONAL DENTAL ASSOCIATION.

THE 1913 session of the National Dental Association will be held in Kansas City, Mo., July 8 to 11, 1913. The Local Committee of Arrangements have selected the Baltimore Hotel as headquarters, and have made the other necessary arrangements for this meeting. The officers and committees are planning to present an exceptionally interesting program, the details of which, together with the other arrangements, will be presented in later journals.

FRANK O. HETRICK, *President*,
Ottawa, Kans.,
HOMER C. BROWN, *Recording Sec'y*,
185 East State st., Columbus, Ohio.

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH AND VIRGINIA STATE DENTAL SOCIETY.

THE fifteenth annual meeting of the Southern Branch of the National Dental Association will be held at the Chamberlin Hotel, Old Point Comfort, Va., July 22 to 25 inclusive, 1913. The Virginia State Dental Society will meet conjointly with the Southern Branch at that time.

THOS. MOORE, JR., *Cor. Sec'y, N.D.A.So.Br.*

NATIONAL DENTAL PROTECTIVE ASSOCIATION.

THE annual meeting of the National Dental Protective Association will be held at the Fredonia Hotel, Washington, D. C., May 20, 1913, at 7.30 P.M., for the election of trustees and transaction of business.

E. P. DAMERON, *President*,
M. F. FINLEY, *Sec'y*,
1928 "I" st., N. W., D. C.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The thirty-first annual session of the National Association of Dental Examiners will be held at the Baltimore Hotel, Kansas City, Mo., beginning July 7th, at 10 A.M. and continuing until adjournment.

Every state board holding membership in the association is earnestly requested to have at least one representative present at this session. Members of all state boards are invited. Hotel reservations should be made immediately.

John P. Stiff, *President*,
Fredericksburg, Va.,
T. A. Broadbent, *Sec'y.*,
15 E. Washington st., Chicago, Ill.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The next annual meeting of the National Association of Dental Faculties will take place at the Hotel Baltimore, Kansas City, Mo., beginning at 10 A.M., on Friday, July 4, 1913. The Executive Committee will meet at 9 o'clock on the same morning, at the same place.

B. Holly Smith,
Chairman Exec. Com.

AMERICAN SOCIETY OF ORTHODONTISTS.

The thirteenth annual meeting of the American Society of Orthodontists will be held in Chicago, Ill., June 30, July 1 and 2, 1913.

Frederick C. Kemple, *Sec'y*,
576 Fifth ave., New York City.

OKLAHOMA STATE DENTAL ASSOCIATION.

The following officers were elected by the Oklahoma State Dental Association at its recent annual meeting: R. S. Parsons, Oklahoma City, president; N. C. Woods, Ardmore, first vice-president; A. B. Potter, Oklahoma City, second vice-president; A. B., Walker, Fairview, treasurer; C. R. Lawrence, Enid, secretary.

The society unanimously voted to continue the postgraduate feature of the meetings, which is proving to be very interesting and profitable.

C. R. Lawrence, *Sec'y.*

DENTAL SOCIETY OF THE STATE OF NEW YORK.

The forty-fifth annual meeting of the Dental Society of the State of New York will be held at Albany, N. Y., Thursday, Friday, and Saturday, May 8, 9, and 10, 1913. There will be the usual reduced railroad rates on the certificate plan from points in New York, New Jersey, and Pennsylvania.

Program.

Dr. George V. I. Brown, Milwaukee, Wis. "The Pathologies and Therapeutic Possibilities of the Upper Maxillary Contraction and Expansion as Evidenced by Experiments upon Guinea-pigs, Rabbits, and Dogs, in Confirmation of Clinical Manifestations in Human Cases."

Dr. Ellison Hillyer, Brooklyn, N. Y. "The Development of Anatomical Articulation."

Dr. T. B. Hartzell, Minneapolis, Minn. "Operative and Post-operative Treatment of Pyorrhea."

Dr. R. Ottolengui, New York, N. Y. "Can the Illegal Practice of Dentistry be Limited by Law?"

Dr. W. B. Dunning, Chairman, New York. Report of Committee on "Scientific Research."

Dr. W. D. Tracy, Chairman, New York. Report of the Committee on "Practice."

Report of the Oral Hygiene Committee.

The first session will open on Thursday at 10.30 A.M. The literary program of the meeting will be rendered in the auditorium of the Educational Building. Headquarters will be at the Hotel Ten Eyck, where the exhibits and clinics will be held.

A cordial invitation is extended to all ethical dentists in New York and sister states. Exhibitors wishing to engage space please address Dr. O. J. Gross, Schenectady, N. Y.

A. P. Burkhart, *Sec'y*,
52 Genesee st., Auburn, N. Y.

SOUTH DAKOTA STATE DENTAL SOCIETY.

The thirty-first annual meeting of the South Dakota Dental Society will be held at Watertown, S. D., on May 13 and 14, 1913.

A. O. Stutenroth, *Sec'y*,
Watertown, S. D.

KENTUCKY STATE DENTAL ASSOCIATION.

The forty-fourth annual meeting of the Kentucky State Dental Association will be held at the Phoenix Hotel, in Lexington, Ky., on May 26, 27, and 28, 1913. All ethical dentists are invited to attend.

C. R. Shacklette, *Sec'y,*

ILLINOIS STATE DENTAL SOCIETY.

The forty-ninth annual meeting of the Illinois State Dental Society will be held at Peoria, May 13, 14, 15, and 16, 1913.

Dr. Chas. M. Smith, Peoria, is chairman of the Committee on Local Arrangements.

Henry L. Whipple, *Sec'y,*
Quincy.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

The regular meeting of the Academy of Stomatology will be held on Tuesday, May 27, 1913, at the College of Physicians, Twenty-second above Chestnut sts., Philadelphia, Pa., at 8 P. M.

Dr. A. W. Sweeney of Baltimore, Md., will read a paper entitled "Prove All Things; Hold Fast That Which is Good." The subject will be discussed by Dr. M. L. Rhein and Dr. R. Ottolengui of New York, and Dr. Edwin T. Darby, Dr. F. D. Gardiner, and Dr. L. Ashley Faught of Philadelphia.

All members of the dental profession are invited to be present.

Norman L. Jameson, *Sec'y.*

TEXAS STATE DENTAL ASSOCIATION.

The thirty-third annual meeting of the Texas State Dental Association will be held at Temple, Texas, May 15, 16, and 17, 1913.

The clinics will be in charge of Dr. J. O. Hall, Waco, Texas, who will furnish any information relative to same. Exhibitors desiring space will please address Dr. J. M. Murphy, Temple, Texas. All ethical practitioners are cordially invited to attend the meeting.

Any other information will be cheerfully furnished by

J. G. Fife, *Sec'y,*
Dallas, Tex.

MASSACHUSETTS DENTAL SOCIETY.

The forty-ninth annual meeting of the Massachusetts Dental Society will be held at the Hotel Somerset, Boston, Mass., on Thursday, Friday, and Saturday, May 8, 9, and 10, 1913.

A. H. St. Clair Chase, *Sec'y,*
Everett, Mass.

NEBRASKA STATE DENTAL SOCIETY.

Change of Date of Meeting.

The thirty-seventh annual meeting of the Nebraska State Dental Society will be held in Omaha, Nebr., May 19, 20, 21, and 22, 1913, instead of May 12, 13, 14, and 15, as formerly announced.

For programs and any information address

Wm. A. McHenry, *Sec'y,*
Nelson, Nebr.

IOWA STATE DENTAL SOCIETY.

The fifty-first annual meeting of the Iowa State Dental Society will convene at Davenport, Iowa, May 6, 7, and 8, 1913, beginning Tuesday, May 6th, at 9 A.M. Elaborate clinics and lectures and a large exhibit will be presented.

Further information will be furnished upon request from ethical practitioners of other states contemplating a visit to the meeting, to whom we extend a cordial invitation.

Exhibitors desiring space should apply to Dr. Wm. Finn, Cedar Rapids, Iowa.

C. M. Kennedy, *Sec'y,*
Des Moines, Iowa.

SUSQUEHANNA DENTAL ASSOCIATION OF PENNSYLVANIA.

The fiftieth anniversary meeting of the Susquehanna Dental Association of Pennsylvania will be held at Irem Temple, Wilkes-Barre, Pa., Tuesday, Wednesday, and Thursday, May 20, 21, and 22, 1913.

The Executive Committee is composed of the following members: A. E. Bull, W. E. Davis, T. W. Thomas, B. A. Courtwright, A. J. Heffernan of Wilkes-Barre, A. B. Miller of Kingston, and I. H. Jennings of Danville.

All ethical practitioners are invited.

E. J. Donnegan, *Recording Sec'y,*
Scranton, Pa.

NORTH DAKOTA DENTAL ASSOCIATION.

The eighth annual meeting of the North Dakota Dental Association will be held at Fargo, N. D., May 16 and 17, 1913.

E. N. Hegge, *Sec'y*,
Hatton, N. D.

VERMONT STATE DENTAL SOCIETY.

The next meeting of the Vermont State Dental Society will be held in Burlington, Vt., May 21, 22, and 23, 1913.

P. M. Williams, *Sec'y*,
Rutland, Vt.

LAKE ERIE (PA.) DENTAL ASSOCIATION.

The fiftieth annual meeting of the Lake Erie Dental Association will be held at Hotel Bartlett, Cambridge Springs, Pa., May 15, 16, and 17, 1913. This meeting celebrates the "golden anniversary" of this society, and the Program Committee have arranged for the best meeting ever held. Entertainment for the ladies; come, and bring them.

C. L. Mead, *Sec'y*,
Union City, Pa.

INDIANA STATE DENTAL ASSOCIATION.

The fifty-fifth annual session of the Indiana State Dental Association will be held at the Claypool Hotel, Indianapolis, May 20, 21, and 22, 1913.

The officers of the association recently met at Indianapolis and perfected plans for a three-day "Post-graduate Course." The very best instructors and specialists are being secured for each day. The course will be as follows: Tuesday—"Humanitarian Dentistry." Wednesday—"Preventive Dentistry." Thursday, A.M.—"Prosthodontia"; P.M., a great table clinic. The clinic will also be held in the hotel.

No tuition fee for the members of the association, or visitors from outside the state who are in good standing in their state associations, but all others desiring to take this course must arrange their tuition fees with the secretary.

Otto U. King, *Sec'y*,
Huntingdon, Ind.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION.

The sixteenth annual meeting of the Southern California Dental Association will be held in Los Angeles, on May 26, 27, 28, and 29, 1913.

An excellent program of essays and clinics, as well as a large and elaborate exhibit, is being arranged. All ethical practitioners of dentistry are cordially invited to be present.

Further information will be sent upon request.

Jas. D. McCoy, *Ch'man Publicity Com.*,
708 W. P. Story Bldg., Los Angeles, Cal.

CALIFORNIA STATE DENTAL ASSOCIATION.

The next annual meeting of the California State Dental Association will be held on June 2, 3, 4, and 5, 1913, in the Hotel Oakland, at Oakland, Cal.

E. E. Evans, *Sec'y*,
Oakland, Cal.

NORTHERN OHIO DENTAL ASSOCIATION.

The fifty-sixth annual meeting of the Northern Ohio Dental Association will be held at Cleveland, Ohio, June 5, 6, and 7, 1913.

C. D. Peck, *Sec'y*,
Sandusky, Ohio.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

The forty-third annual meeting of the South Carolina State Dental Association will be held on the Isle of Palms, June 25, 26, and 27, 1913.

W. Busey Simmons, *Recording Sec'y*,
Piedmont, S. C.

MISSISSIPPI DENTAL ASSOCIATION.

The thirty-eighth annual session of the Mississippi Dental Association will be held at the Great Southern Hotel, Meridian, Miss., June 24, 25, and 26, 1913.

A determined effort is being put forth to make this meeting our best. There will be a fine clinic, excellent papers, a banquet, and a fine exhibit.

L. B. Price, *Sec'y*,
Corinth, Miss.

MONTANA STATE DENTAL SOCIETY.

The next annual meeting of the Montana State Dental Society will be held in Butte, June 13 and 14, 1913.

T. T. Rider, *Sec'y*,
Missoula, Mont.

TENNESSEE STATE DENTAL ASSOCIATION.

The Tennessee State Dental Association will hold its annual meeting in Nashville, Tenn., on June 5, 6, and 7, 1913, with the following officers in charge: F. W. Meacham, president; W. C. Gillespie, first vice-president; J. L. Manire, second vice-president; C. Osborn Rhea, recording secretary; W. G. Hutchinson, treasurer; C. E. Hines, corresponding secretary.

C. Osborn Rhea, *Sec'y*.

ALABAMA DENTAL ASSOCIATION.

The Alabama Dental Association will meet in Birmingham, Ala., June 10, 11, and 12, 1913.

We earnestly solicit every good dentist in Alabama who is not now a member to join. It will enhance your efficiency, because in the doctrines we teach we incorporate the best of professional principles and within our ranks we encompass the best of professional men.

G. F. Petrey, *Sec'y*,
Florala, Ala.

SOUTHERN WISCONSIN DENTAL ASSOCIATION.

A New Departure.

The nineteenth annual meeting of the Southern Wisconsin Dental Association will be held at Hotel Highland, Delavan Lake, June 13 and 14, 1913.

Having decided to combine business with pleasure, we will hold our sessions in the afternoons only, consisting of a few of the best papers and clinics obtainable. The morning and evening can be spent boating, fishing, bathing, or automobiling.

Hotel Highland and Delavan Lake are seldom equaled and never surpassed as a place for such a gathering. It is our purpose to take our wives with us, and together enjoy the Lake as well as the beautiful hills and valleys surrounding Hotel Highland. Bring the young folks with you; they will enjoy the outing.

All ethical dentists are cordially invited to attend.

C. W. Collver, *Sec'y*,
Clinton, Wis.

WASHINGTON STATE DENTAL SOCIETY.

The Washington State Dental Society meets June 16, 17, and 18, 1913, in Seattle, Wash.

A. D. Remington, *Sec'y*,
Seattle, Wash.

MAINE DENTAL SOCIETY.

The forty-eighth annual meeting of the Maine Dental Society will be held at the Ottawa House, Cushing's Island, Portland Harbor, Me., on June 25, 26, and 27, 1913.

I. E. Pendleton, *Sec'y*,

NEW HAMPSHIRE DENTAL SOCIETY.

The New Hampshire Dental Society will hold its annual meeting at Hotel Weirs, Weirs, N. H., June 18, 19, and 20, 1913. The profession are invited to attend.

Fred F. Fisher, *Sec'y*.

MINNESOTA STATE DENTAL ASSOCIATION.

The thirtieth birthday of the Minnesota State Dental Association will be celebrated by a large clinic and manufacturers' exhibit in Masonic Temple, Minneapolis, June 13 and 14, 1913. A rate of a fare and one-third has been granted by the railroads, and a large meeting is assured. For information address

Benjamin Sandy, *Sec'y*,
636 Syndicate Bldg., Minneapolis, Minn.

GEORGIA STATE DENTAL SOCIETY.

The forty-fifth annual meeting of the Georgia State Dental Society will convene at Columbus, Ga., June 12, 13, and 14, 1913, beginning Thursday, June 12th, at 11 A.M. Some very interesting lectures and papers will be presented; also an elaborate clinic has been secured.

Further information will be cheerfully furnished upon request from ethical practitioners of other states contemplating a visit to the meeting, to whom we extend a cordial invitation.

M. M. Forbes, *Sec'y*,
Atlanta, Ga.

NEW JERSEY STATE DENTAL SOCIETY.

The forty-third annual convention of the New Jersey State Dental Society will be held in the Beach Auditorium, at Asbury Park, N. J., July 16, 17, and 18, 1913, beginning on Wednesday, July 16th, at 10 A.M.

The exhibits of modern dental appliances and the latest in office and laboratory equipment will be in charge of Dr. William H. Gelston, 40 N. Thirtieth st., Camden, N. J., who will be glad to furnish information regarding rates and space still available. Early application from those desiring to exhibit with us this year will be greatly appreciated.

The clinics will be in charge of Dr. Henry Fowler, 114 N. Fourth st., Harrison, N. J., and will be comprehensive and of a very high order.

Further announcements will be made from time to time.

Edwin W. Harlan, *Sec'y*,
47 Crescent ave., Jersey City, N. J.

OKLAHOMA BOARD OF EXAMINERS.

There will be a meeting of the Oklahoma Board of Dental Examiners, May 19 to 24, 1913, at Oklahoma City.

Candidates are requested to have their application and fee of $25 deposited with the secretary at least ten days before meeting.

Theoretical examinations include the following subjects: Operative dentistry, anesthesia, oral surgery, orthodontia, prosthetic dentistry, crown and bridge work, dental anatomy, physiology and pathology, materia medica and therapeutics, chemistry and metallurgy, histology and bacteriology. Practical demonstration of skill in operative and mechanical dentistry will also be required, and candidates should come prepared with instruments and material for making fillings and crowns in the mouth. Admission by examination only. For further particulars address

E. E. Heflin, *Sec'y*,
Oklahoma City.

WASHINGTON BOARD OF EXAMINERS.

The Washington State Board of Dental Examiners will meet in Farouts Hall, Seattle, Wash., on May 22, 1913, for the purpose of holding the spring examination.

L. B. Manchester, *Sec'y*,
Wenatchee, Wash.

NORTH CAROLINA BOARD OF EXAMINERS.

The next regular meeting of the North Carolina State Board of Dental Examiners will be held in Winston-Salem, N. C., beginning promptly at 9 o'clock on Monday morning, May 26, 1913.

For further necessary information, address

F. L. Hunt, *Sec'y*,
Asheville, N. C.

ARIZONA BOARD OF EXAMINERS.

There will be a meeting of the Arizona Board of Dental Examiners on May 5, 6, 7, 8, and 9, 1913, at Phoenix, Ariz.

Candidates should have in their applications, and fee of $25 should accompany same, at least twenty days before meeting.

Theoretical examination includes the following subjects: Anatomy, physiology, chemistry, materia medica, therapeutics, metallurgy, histology, pathology, operative and mechanical dentistry, oral surgery. Practical demonstration of skill in operative and mechanical dentistry will also be required, and candidates should come prepared with instruments and material for making fillings and crowns in the mouth.

W. A. Baker, *Sec'y*,
Tucson, Ariz.

MARYLAND BOARD OF EXAMINERS.

The Maryland State Board of Dental Examiners will meet for examination of candidates for certificates, May 29 and 30, 1913, at the Dental Department of the University of Maryland, Baltimore, Md., at 9 A.M.

Candidates must pass a written examination in anatomy and physiology, chemistry and bacteriology, oral surgery, operative and prosthetic dentistry and pathology, therapeutics, and materia medica.

The practical requirements consist of the insertion of one gold and one amalgam filling in the mouth, and the submission of a metal plate or bridge of not less than four crowns —two of which shall be of porcelain—the parts being assembled and invested in advance, and soldered in the presence of the board.

Applications, accompanied by the fee of ten dollars, must be filed with the secretary prior to May 29th.

For application blanks or further information, apply to

F. F. Drew, *Sec'y*,
701 N. Howard st., Baltimore, Md.

NEW JERSEY BOARD OF REGISTRATION.

The New Jersey State Board of Registration and Examination in Dentistry will hold their semi-annual examination in the State-house, Trenton, N. J., beginning on Monday, June 30, and continuing Tuesday, July 1, and Wednesday, July 2, 1913.

Practical work Monday, June 30th, 8 a.m. sharp; theoretical examination Tuesday, July 1st, and Wednesday, July 2d, promptly at 8 a.m. The business meeting of the board will be held at 10 a.m., Tuesday, July 1st, and anyone having business with the board may have an audience. Applications must be in the hands of the secretary five days prior to the examination. For further information address

Chas. A. Meeker, *Sec'y*,
29 Fulton st., Newark, N. J.

ILLINOIS BOARD OF EXAMINERS.

The semi-annual meeting of the Illinois State Board of Dental Examiners, for the examination of applicants for a license to practice dentistry in the state of Illinois, will be held at the Chicago College of Dental Surgery, corner of S. Wood and W. Harrison sts., Chicago, beginning Wednesday, June 4, 1913, at 9 a.m.

All applications, together with the fee, twenty-six dollars, must be filed with the secretary at least five days prior to date of examination. Address all communications to

T. A. Broadbent, *Sec'y*,
705 Venetian Bldg., Chicago, Ill.

SOUTH CAROLINA BOARD OF EXAMINERS.

The next meeting for examination of applicants for license will be held Friday, June 20, 1913, at 3 p.m., at the Isle of Palms, Hotel Charleston, S. C.

J. M. Quattlebaum, *Sec'y*,

INDIANA BOARD OF EXAMINERS.

The next regular meeting of the Indiana State Board of Dental Examiners will be held in the State-house at Indianapolis, beginning Monday, June 9th, at 9 a. m., and continuing until Saturday, June 14th. All applicants for registration in this state will be examined at this time. No other meeting will be held until November; no temporary licenses are issued.

The new law requiring annual registration will be in effect about May 15th. The first registration will take place in December of this year. For application blanks and further information apply to

F. R. Henshaw, 507-8 Pythian Bldg.,
Indianapolis, Ind.

CONNECTICUT DENTAL COMMISSIONERS.

The Dental Commissioners of the State of Connecticut hereby give notice that they will meet at Hartford, on Thursday, Friday, and Saturday, June 12th, 13th, and 14th, to examine applicants for license to practice dentistry, and for the transaction of any other business proper to come before them.

On receipt of application blank, filled in and sworn to and accompanied with fee of twenty-five dollars, each applicant will be sent a number, which number will represent the applicant during the examination.

The practical examination will take place at Putnam Phalanx Armory, corner Haynes and Pearl sts., on Thursday, June 12th. All prosthetic pieces should be tagged with the applicant's number, and handed to the Commissioners at nine o'clock Thursday morning. Applicants whose numbers range from 1 to 20 inclusive will be examined in operative dentistry at 9 a.m. Those whose numbers are above 20 will be examined in operative dentistry at 12 m. All applicants whose credentials are accepted shall be entitled to take both the practical and theoretical examinations. Credentials will be examined at the Hotel Heublein, Wednesday evening, June 11th, at 8.30, and at Putnam Phalanx Armory at 9 o'clock on Thursday morning.

On Friday, June 13th, the theoretical examination will be held from 9 to 11, 11.30 to 1.30 and 3.30 to 5.30. Theoretical examination will be held at the State Capitol.

By order of the Commission.

D. EVERETT TAYLOR, *Recorder*,
Willimantic, Conn.

CALIFORNIA BOARD OF EXAMINERS.

THE next examination by the Board of Dental Examiners of California for licenses to practice dentistry will be held in San Francisco, Cal., beginning on June 7, 1913. This will be followed by an examination in Los Angeles, beginning on June 20th. All applications, accompanied by the fee of twenty-five dollars and the necessary credentials—a diploma or license from some other state—must be filed with the secretary of the board on the morning of the date set for examination—June 7th in San Francisco and June 20th in Los Angeles. Said application must be accompanied by a recent unmounted photograph of the applicant.

C. A. HERRICK, *Sec'y*,
San Francisco, Cal.

VERMONT BOARD OF EXAMINERS.

THE next meeting of the Vermont Board of Dental Examiners for the examination of candidates to practice in Vermont will be held at the State-house, Montpelier, Vt., continuing four days, commencing at 2 P.M., June 30, 1913.

To be eligible for examination a candidate (1) must be twenty-one years of age; (2) must be a graduate of a high school of the first class; (3) must be a graduate of a reputable dental college.

Applications must be in the hands of the secretary not later than June 20th.

For further information apply to

GEO. F. CHENEY, *Sec'y*,
St. Johnsbury, Vt.

PENNSYLVANIA BOARD OF EXAMINERS.

THE next regular examination of the Pennsylvania State Board of Dental Examiners will be held in Philadelphia and Pittsburgh, on Wednesday, Thursday, Friday, and Saturday, June 11, 12, 13, and 14, 1913. Application blanks can be secured from the department of Public Instruction, Harrisburg.

Further information can be obtained from

ALEXANDER H. REYNOLDS, *Sec'y*,
4630 Chester ave., Philadelphia, Pa.

TEXAS BOARD OF EXAMINERS.

THE next regular meeting of the Texas State Board of Dental Examiners will be held in the high-school building, Houston, Texas, beginning Monday, June 23, 1913, at 9 A.M. Official application blanks and other necessary information will be furnished candidates upon application to the secretary.

All applications, accompanied by a fee of $25.00, should be in the hands of the secretary at least five days before the examination.

Address all communications to

C. M. MCCAULEY, *Sec'y*,
Abilene, Texas.

WISCONSIN BOARD OF EXAMINERS.

THE Wisconsin State Board of Dental Examiners will convene in Milwaukee, at Marquette University, on June 16, 1913, at 2 P.M., for examination of applicants to practice in Wisconsin.

High-school diploma, application, and fee of $25.00 must be filed with the secretary fifteen days prior to above date. Dental diploma to be presented in advance of examination.

F. A. TATE, *President*,
W. T. HARDY, *Sec'y*,
422 Jefferson st., Milwaukee, Wis.

MONTANA BOARD OF EXAMINERS.

THE Montana State Board of Dental Examiners will hold the annual session in Helena, Mont., July 14, 15, 16, 17, 1913. Address all communications to

G. A. CHEVIGNY, *Sec'y*,
Butte, Mont.

ARMY DENTAL SURGEONS.

MEMORANDA OF CHANGES.

For the week ending March 15, 1913:

First Lieut. F. F. Wing left Fort D. A. Russell, March 8th, *en route* to San Francisco and Philippine Islands.

J. H. Snapp, ACT.D.S., ordered to San Juan, P. R., for four months from February 1st, and to Henry Barracks for one month thereafter, and then to return to his station, Camp E. S. Otis, Panama.

For the week ending March 29th:

H. L. Rush, ACT.D.S., left Fort D. A. Russell, Wyo., for Texas City, Texas, March 20th.

First Lieuts. G. L. Mason and H. G. Voorhies, and H. L. Rush, ACT.D.S., A. R. White, ACT.D.S., and E. M. Kennedy, ACT.D.S., are ordered to report to the commanding general, 2d div., Texas City, Texas, for duty.

B. C. Warfield, ACT.D.S., left Fort Wood, N. Y., March 26th, for temporary duty at Fort Hancock, N. J.

Upon arrival in the United States the following dental surgeons, U. S. Army, will proceed to the posts set opposite their names for duty: First Lieut. R. H. Rhoades, Fort Bliss, Texas; First Lieut. J. R. Ames, Fort McPherson, Ga.; First Lieut. F. L. K. LaFlamme, Fort Hamilton, N. Y.

For the week ending April 5th:

First Lieut. J. R. Bernheim granted leave of absence for two months, about June 15th, with permission to apply for an extension of one month.

First Lieut. W. H. Chambers granted four months' leave of absence about May 1st.

First Lieut. G. H. Casaday relieved from duty in the Philippines Department, about June 15th.

For the week ending April 12th:

First Lieut. J. R. Ames granted leave of absence for three months.

First Lieut. R. E. Ingalls will leave Seattle, Wash., about April 14th, visiting posts in Alaska; returning about September 1st to his station, Vancouver Barracks, Wash.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MARCH 1913.

March 4.

No. 1,054,999, to MAXIMILIAN O. THEIN. Dental impression tray.

March 11.

No. 1,055,343, to FRED L. MARK. Apparatus for casting.

No. 1,055,357, to PIERRE ROBIN. Method of manufacturing dental models.

No. 1,055,607, to DANIEL L. CHANDLER. Tooth-brush.

No. 1,055,718, to JOHN B. DAVIS. Dental articulator.

No. 1,055,894, to WILLIAM W. EVANS. Dental articulator.

March 18.

No. 1,056,341, to ALEXANDER R. KELTIE. Handpiece for dental engines.

No. 1,056,427, to JOSEPH KOHN. Process of placing anchors in artificial teeth.

March 25.

No. 1,057,192, to G. L. WERNET and H. A. COLLETT. Dental crown and bridge structure.

THE

DENTAL COSMOS.

VOL. LV. JUNE 1913. No. 6.

ORIGINAL COMMUNICATIONS.

THE *LOCUS MINORIS RESISTENTIÆ* IN PYORRHEA ALVEOLARIS.

By EDWARD C. KIRK, D.D.S., Sc.D., Philadelphia, Pa.

(Read before the Seventh and Eighth District Dental Societies of the State of New York, at Rochester, November 14, 1912.)

AT the very outset let me forestall what in simple justice I assume to be no more than a proper critical attitude in your minds, by apologizing for the title of this paper. I was told by the chairman of your Executive Committee that when he attempted to telegraph the subject of this communication to one of the gentlemen who has kindly consented to discuss it, the intelligent agent of the telegraph company said to him, "We don't take night messages in a foreign language." I anticipate no serious difficulty in clearing up whatever obscurities the title may present to your minds, but I feel beset with more or less doubt concerning my ability to elucidate the subject that it involves. I shall, therefore, confine myself to the effort to set before you some data and certain deductions therefrom which I hope will present the study of what we call pyorrhea alveolaris from an angle of view that may help us to get a little additional light on its perplexing problems.

Let it be understood that the term "Pyorrhea Alveolaris" is here used to designate that group of destructive, inflammatory disorders affecting the retentive structures of the teeth by which degeneration and necrosis of their attachment is produced and ultimate exfoliation of the teeth takes place—a series of phenomena dependent upon bacterial infection of the retentive structures for its exciting cause. I am well aware that the foregoing characterization is imperfect as a general definition applicable to all of the pathological processes that may eventuate in exfoliation of the teeth; but the same objection may be urged against the term pyorrhea alveolaris itself, or indeed against any general definition of these alveolar disorders in the present state of our knowledge concerning their etiology and pathology. Furthermore, I wish to exclude from present consideration the group of destructive gingival disorders that obviously result from the mechanical irritation due to impingement of salivary calculus upon the gingival and alveolar tissues, and to confine attention wholly to the form of pyorrhea alveolaris that is manifestly a pus-producing and therefore destructive inflammatory process.

The very fact that, by reason of the light thrown by modern scientific investigation upon the causes of pus formation and the inflammatory reactions involved, we are able to classify certain forms of pyorrhea as pus infections, at once greatly simplifies the problem of their etiology and pathology, and is fraught with suggestiveness as to their therapeutic treatment.

Viewed, then, as a destructive inflammatory process of bacterial origin, or, otherwise described, as a pus infection, the etiological problem with which we are concerned is that of susceptibility of the gingival tissues to infection by pathogenic organisms of the pus-producing type.

The history of the germ theory of disease causation is a long and interesting one, with its beginnings in the superstitions and misty obscurities of antiquity, surviving and gradually taking on more definiteness until the researches of Koch in the last quarter of the past century finally evolved the demonstration of the fact that these low organic forms were in certain instances the exciters of those reactions in the higher animal organisms which constitute the phenomena of disease. Koch's discoveries and original methods of investigation made possible the systematic study of the whole field of bacteriological activity, and bacteriology as a department of biological science may be said to have had its birth in his work.

In the evolution of the investigation of the relations of bacteria to disease causation, two distinct points of view have characterized the history of the subject. The first may be designated as that which was concerned with the modus of disease production through the agency of the bacteria, while the second involved a study of the defensive agencies of the organism against bacterial invasion. The first point of view was the necessary result of lack of knowledge of the nature and biological activities of the bacterial exciters of disease action—a lack which, through over a quarter of a century of research by a large army of skilled scientific investigators, has been eliminated by the substitution of a rich store of data covering the life-processes and disease-producing activities of a long list of pathogenic bacteria. So complete is the testimony that in general terms we may say that the principles by which pathogenic bacteria induce disease reaction are now in a broad sense clearly understood.

In the course of investigation of the modus of action of disease-producing bacteria the fact constantly obtruded itself that a given form of organism did not always produce the same disease reaction in several individuals, or at all times in the same individual; from which it was later demonstrated that there may be not only a variation in virulence of a given bacterium, but likewise a wide range of susceptibility among individuals, and in the same individuals at different times, to infection by a particular kind of organism. It is the discovery of these fundamental facts governing the reactions of the higher organisms to bacterial activity, the conditions which determine the balance of vital potential as between the higher organisms and pathogenic bacteria—in short, the question of susceptibility and immunity to bacterial invasion—that constitutes the second point of view which in an historical sense I have already referred to; and it is the vital problem of susceptibility and immunity with which medical science is at present most intensely concerned.

The study of pyorrhea, as the subject has presented itself from an historical viewpoint, seems to have evolved in much the same way that I have indicated with reference to the general attitude of investigators of the germ theory of disease. Our historical records show that in the first period attention was directed almost wholly to the objective fact that deposits of tartar, salivary calculus, were an obvious cause of destruction of the retentive tissues of the teeth, and that such teeth eventually fell out. Tartar thus became recognized as the general cause of the disease. Later it was observed that many teeth were lost, with coincident pus formation, yet without tartar deposits in such obvious quantity as to satisfactorily account for the activity of the inflammatory reaction that had characterized the destructive process; and still later, observations were reported of cases of an atrophic form of gingival destruction in which neither pus nor tartar were obviously present. Thus we have come to realize that we are dealing, not with a single disorder with well-defined and characteristic symptoms, but with a group of disorders having certain pathological features in common, but sufficiently distinct in etiology and clinical manifestations to entitle them to separate classification.

In discussing the type of gingival pyorrheal disease to which I have limited this paper, I wish to direct attention more particularly to the question of the factor of susceptibility in the retentive tissues rather than to the question of the nature of the bacterial exciter of the inflammatory process—which limitation, I may state incidentally, is the justification for the cumbersome title of this paper.

The view now held by many students of the subject that the teeth are "end-organs" as designated by Talbot, and that their retentive tissues, including the alveolar borders of the jaws, are provisional structures intended to subserve a relatively temporary purpose, is a view which has never appealed to my general conceptions of the ordinarily high standard of efficiency of nature's economics. That point of view has always seemed to me to be open to the suspicion of special pleading in the effort to find an explanation for a group of phenomena into the antecedents of which we have not as yet delved deeply enough to discover their true causes. The same kind of reasoning has been applied to the loss of teeth from caries by a learned medical writer, who asserted, even since the death of Miller, that caries of the milk teeth was nature's method of getting rid of the deciduous denture, which was intended only to subserve a temporary purpose. If we look farther for the conditions that give rise to the loss of the teeth by pyorrhea we shall probably find eventually that the inherent weakness of the alveolar structures, if it exist at all, is a relative weakness, and that there is no more reason *per se* why the teeth should be lost by pyorrhea than that they should be lost by caries, or that the patient himself should die of tuberculosis or diabetes mellitus or any other nutritional or infectious disorder.

Assuming that in the normal individual the physiological processes are balanced upon a plan sufficiently high to maintain the defensive forces of the economy at a point of efficiency that will protect the individual against bacterial invasion, then the normal individual does not have pyorrhea. We see many such mouths—free from even a suspicion of pyorrheal symptoms. On the other hand, malnutrition in any of its forms—acute illnesses, prolonged fevers, rheumatism, gout, syphilis, tuberculosis, or unhygienic local mouth conditions, a filthy buccal cavity, any of these factors being present—may develop a coincident pyorrhea, the objective features of which, its character and course, and its response to therapeutic treatment, will be in no small degree determined by and be symptomatic of the general conditions that gave rise to the attack.

In the character of the local phenomena developed during the course of the attack we frequently meet with manifestations of the factor of relativity of resistance to the progress of the disorder in the involved tissues.

In the atrophic form characterized by decalcification of the alveolar bone without noticeable pus formation or pockets, followed by shrinkage of the gum tissues with or without terminal infection and pus formation, we are dealing with the local manifestation of a general malnutritional state, accompanied if indeed it is not caused by auto-intoxication. Just what are the poisonous substances contained in the blood stream that, when carried to the alveolar tissues, set up the decalcification process, the halisteresis of the bony sockets of the teeth, is not known, nor do we know by what agency these toxic irritants effect their results. These are problems for the physiological chemist and histopathologist, but enough is known of the tissual derangements induced by toxic substances in the blood plasma from the studies of Bouchard, Lauder Brunton, and many others to warrant us in holding to a belief in the sufficiency of auto-intoxication as a cause of this form of pyorrheal disorder, and that the frequency of its association with cases of evident auto-intoxication is more than a mere coincidence. Auto-intoxication, broadly speaking, is a result primarily of faulty nutrition by which the processes of metabolism are imperfectly carried on, and poisonous substances, toxins, leucomains, etc., are taken up by the blood stream and carried to the tissues, producing a variety of reactions both functional and morphological. Incidentally the resistive forces of the organism are lowered, the defensive bodies of the blood are weakened, and susceptibility to bacterial invasion is consequently increased. Infection brings its addition of toxic substances to the blood plasma with characteristic acute disease reaction of the tissues at the field of invasion, and the tissues succumb in the order of their relative resistive powers and with clinical manifestations conditioned by their histological structure.

From the point of view of this general survey of the principles underlying the inflammatory process let us consider some of the phenomena of pyorrhea in their bearing on the question of the points of diminished resistance in the tissues in which the disorder is locally expressed.

In 1887, G. V. Black, in his work entitled "A Study of the Histological Characters of the Periosteum and Peridental Membrane," described certain structures which at that time he designated as lymphatic glands of the peridental membrane, a study which he has further elaborated in a later publication, "The Fibers and Glands of the Peridental Membrane" (DENTAL COSMOS, 1899, vol. xli, p. 101), in which he has somewhat modified his earlier statement as to the lymphatic glandular character of these bodies. The previous studies of Magitot and Malassez and the exhaustive investigation of Von Brunn, published the same year as Black's original communication, point very strongly to the conclusion that these structures described by Black are epithelial "rests," débris or remnants of the epithelial sheath of Hertwig, the embryonal tissue of the enamel organ. The origin and histological character of these bodies found embedded in various parts of the peridental membrane is of considerable importance in connection with their susceptibility to infection by pathogenic organisms. Black reports a direct microscopic observation made upon a section of an extracted tooth with a portion of the alveolar wall and peridental membrane adhering, in which he found these so-called glands filled with micro-organisms, and in his later paper on the subject (*loc. cit.*) he says: "It seems to me very certain that the disease which I have described as phagedenic pericementitis has its seat in these glands. The location of the initial lesion and its progress to the formation of deep pockets indicates that the beginning is in these glands, and that in its progress they are followed into the depths of the alveolus, the fibers and adjacent tissue suffering by reason of their proximity."

My own observations from a clinical standpoint are wholly in accord with the view of Black here quoted, with the understanding that it applies only to that type of pyorrhea which is a true pus infection of the deep-seated and pocket-forming variety.

If these so-called glands of the peridental membrane are epithelial rests, remnants of an embryonal tissue that has subserved its purpose, they are degenerative in character, and like all other degenerative tissues are lacking in vital resistance. They therefore are readily infected by pathogenic bacteria when the general resistive forces of the organism become lowered to a degree that permits bacterial invasion at any point. Or, otherwise stated, a degenerative tissue being relatively weakest is the first in order to succumb to bacterial invasion when invasion through any generally acting cause becomes possible. Black's observation of the fact that these gland-like structures of the peridental membrane were the nidus of bacterial infection in the specimen examined and reported upon by him, I regard as extremely important and suggestive. It is quite true that a single observation is wholly insufficient as a basis upon which to establish a generalization, nevertheless it constitutes a scientific datum that must be given its due weight of consideration; and even should it serve only as a point of departure for further investigation, a single positive observation of this character viewed in its proper relationships is often of the utmost importance.

Granting that the embryonal origin and character of these gland-like bodies of the peridental membrane stamp their cellular elements as degenerative in type, and therefore of inferior resistive power toward bacterial invasion, then we have accounted for a *locus minoris resistentiæ* in the peridental membrane, and in the light of the histological distribution of this degenerative tissue in the membrane itself, as described by Black, we are able to account rationally not only for the major features of the etiology of the disorder, but for many of its characteristic clinical phenomena. I am not able to find from a fairly close study of the literature that any observer other than Black has reported upon the infection of the gland-like bodies of the peridental membrane.

A. Hopewell-Smith, in the report of his studies of sections of mandibles with teeth *in situ* affected with pyorrhea (Cosmos 1911, vol. liii, p. 404) in describing the "apical space," says: "The gland-like bodies, which may be of the nature and perform the functions of a lymphatic system, are increased in numbers and very prominent in the sections. The latter frequently branch and are filled with small cells."

In the article quoted the author reports the presence of bacteria in large masses or clumps visible in his sections when examined by a one-inch objective, but makes no report of specific findings of pathogenic bacteria in the gland-like structures of the peridental membrane as described by Black.

In the only other report of a direct microscopical study of the retentive structures of the teeth affected by pyorrheal inflammation, of which I have any knowledge, that of Professor Znamensky of Moscow University (see *Jour. Brit. Dental Association,* vol. xxiii, October 1902, page 585, the examinations of tissues made by him, in connection with Professor Nikiforoff, of the same university, were all made under magnifications ranging from 80 to 360 diameters, a magnification quite insufficient to determine the question of the infection of the glandular structures under consideration, and while we are left to make the necessary and logical deduction that the inflammatory process is the result of infection by pyogenic organisms, we are still in the dark regarding the modus of infection, and especially with regard to the particular tissue constituting the avenue through which infection takes place—in other words, the tissue of greatest vulnerability in the dento-alveolar structures. It seems to me to be of the utmost importance that more light should be thrown upon this fundamental question, for, given the fact of bacterial invasion of the tissue and the causes leading to it, then the balance of the inflammatory process, its nature and results, will become reasonably clear.

Black's studies point to the conclusion that these gland-like bodies of the peridental membrane surround the tooth-root as a sort of reticulum ramifying throughout the peridental membrane; and if, as he believes, they are the seat of that form of pyorrhea which he designates as phagedenic pericementitis, a belief with which for the reasons already stated I am in sympathetic accord, then we can understand not only the pocket-forming tendency of the disorder, but its pathological identity with the condition designated by D. D. Smith as pericemental abscess, known otherwise and frequently reported as "abscess upon teeth with vital pulps." Invasion of these glands by pyogenic bacteria sets up suppurative inflammation the clinical phenomena of which are determined by the depth and rapidity of the infection. Thus the disorder may be ulcerative in type where the invasion is superficial, or it may take on an abscess character when the invasion is deeper; and whether the discharge of the purulent exudate takes place, on the one hand, between the cementum of the tooth and its investing membrane, or, on the other hand, through the gum tissue forming a free fistulous outlet upon the gum surface away from the gingival margin, has thus far determined whether we designate the resulting lesion as a pus pocket or a pericemental abscess respectively.

In presenting for your consideration the foregoing aspect of the pyorrhea problem you will recognize that I regard the disorder as a local lesion symptomatic of a constitutional aberration from normality, a nutritional vice having a local expression. I am quite well aware that the data which I have presented to you concerning the probability of a *locus minoris resistentiæ* in the tissues which are the seat of the local lesion are meager and unsatisfactory in the sense that they fall short of being conclusive. I have, however, been emboldened to set this view of the subject before you in the hope that it may lead to more exhaustive investigation of the histo-pathological side of the question, to the end that the truth concerning it may be brought to light. My long and careful study of the clinical phenomena involved encourages me to believe that further investigation will demonstrate the correctness of Black's single observation, and that we shall find that the gland-like bodies of the peridental membrane are the weak points, the tissue of greatest susceptibility to pyorrheal infection.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

SCIENTIFIC AND PRACTICAL PHASES OF THE AMALGAM ALLOY QUESTION.

By **WM. W. ATKINSON, Philadelphia, Pa.**

(Read before the Monmouth County Dental Society of New Jersey, at Asbury Park, N. J., April 4, 1913, and the North Philadelphia Association of Dental Surgeons, Philadelphia, April 9, 1913.)

FOR many years after the introduction of amalgam alloy for the filling of teeth, dentistry had looked forward to the time when an ideal material of this kind should be found—one which would possess the qualities of plasticity, pleasing color, resistance to the stress of mastication, durability, and preservation of the teeth without staining them. Troublous years were these, for the science of metallurgy had seemed to be a side issue with those who had the business of alloy-making in hand, and who, despite the observations of distinguished scientists, gave scant heed to the chemical constitution of alloys, and in many instances had shown only a commercial interest in the subject. Thus, those upon whom dentistry most depended for its supply of amalgam alloy knew least about it.

DR. J. FOSTER FLAGG'S EARLY SCIENTIFIC STUDIES ON AMALGAM ALLOYS.

Small wonder then, that in these early days amalgam alloy should so often have been condemned as untrustworthy, and that there were sorrowful tales of "bulging," "shrinkage," and "tooth-staining." At that time, when amalgam alloy was most fiercely assailed because of such aberrations, there emerged the sturdy figure of Dr. J. Foster Flagg, patient, resourceful, and courageous, who made what was probably the first attempt to investigate systematically the subject of amalgam alloys and arrange the facts in orderly fashion. Out of his work grew formulæ that are basic, each with its leading property clearly accented, and each a guidepost for future investigators. He definitely established the functions of gold, zinc, and copper as modifying agents in the customary mixtures of silver-tin. Gold contributes plasticity, hence his "Contour" alloy contained a percentage of that metal. Zinc he showed to be a whitening agent, hence his "Facing" alloy contained zinc in addition to a small percentage of gold, introduced to add plasticity. Copper contributes strength, is by the germicidal action of its salts a tooth preservative, and has the quality of setting under saliva, which, needless to say, was exemplified in his "Submarine" alloy.

He made many original observations on the preparation and clinical manipulation of alloys, and proved that alloys undergo a change through what he termed "aging," and demonstrated how this may be artificially produced. The work of Dr. Flagg was based, however, largely upon empirical experiment rather than upon scientific considerations. The result was that no one of his alloys combined within itself those qualities imperatively required, nor were any of his alloys properly balanced, using the term in its broader sense.

Dentistry is deeply indebted to Dr. Flagg; his results have been eclipsed through the more exact knowledge of the present day, yet his painstaking labors stand as his enduring monument.

DR. G. V. BLACK'S STUDIES.

The formulæ of Dr. Flagg dominated the amalgam alloy situation until Dr. G. V. Black took up the question. Equipped with a well-trained, analytical mind, he was in these respects well fitted for the work of investigation, which he approached from the standpoint of the conditions existing in the mouth itself, which he first studied, and from this factor resolved the problem into its ultimate form, viz, the requirements for a satisfactory amalgam filling. These investigations were, I am informed, suggested by another line of investigation in which he was engaged, namely that of ascertaining the significance of the term "soft teeth." He first established the average force exerted by the jaws in masticating, thereby determining the resistance which a filling of any kind must offer to this force. He determined the space necessary for the invasion of micro-organisms between the walls of a tooth cavity and a contained filling which has shrunk; he made improvements in certain testing machines, one a dilatometer which reads down to 1/20,000 in., the other a device for determining crushing strength and percentage of compressibility, the ideas for which were, however, not original with him, as similar machines had long been used in this and other scientific fields. He termed these devices "amalgam micrometer and dynamometer," and with them made many tests. He developed the fact that "contouring" quality due to gold content in an amalgam usually meant too high a percentage of change of form under compression, which he termed "flow," and therefore that gold as a modifier is undesirable. He proved that the Flagg formula, 60 per cent. Ag, 35 per cent. Sn, 5 per cent. Cu, undergoes condensation (shrinkage) when amalgamated. This he showed to be due to an excess of tin and a deficiency of silver.

He demonstrated that in order to preserve a tooth, an amalgam filling should undergo an increase corresponding to an advance of at least 1/20,000 in. in the altitude of a column 0.38 in. high by 0.33 in. diameter; this he termed ½ point expansion, thus a "point" on his micrometer index equals 0.0001 in. He proved that a filling, to meet any crushing stress that might be placed upon it in masticating, should, on a cube of 0.085 in., withstand a pressure of 350 lb., which is said to mean about 38,000 lb. to the square inch, or 19 tons, and compressibility not exceeding 0.002 inch.

Dr. Black believed, nor has his belief been seriously questioned, that silver, tin, and copper are the only metals now known which should be combined in an amalgam alloy, and that the usual percentages of other metals, such as platinum, gold, or zinc are either without beneficial effect or are detrimental. He thus established several of the requirements for a satisfactory amalgam alloy, and upon these and the scientific research and experiment which preceded their enunciation, as well as his improvements in testing apparatus, rests the fame of Dr. Black as an amalgam investigator. For this service the dental profession must accord him its grateful appreciation.

THE G. V. BLACK METHOD OF ALLOY-MAKING AND ITS DEFECTS.

Had Dr. Black left the utilization of his work to others, the luster of his achievement would now be undimmed; but unfortunately he followed his researches into a strange realm, that of metallurgy, and as a result threw the question of alloy-making into confusion. He developed an elaborate system of "balancing" which is entirely empirical, and the system itself is condemned by the facts. Summarized, it is as follows:

First: As, in his opinion, all metals procured commercially for use in amalgam alloy-making are impure, and as impurities aggregating from 4/10 to ½ of 1 per cent. are fatal to the attainment of certain requirements in an amalgam made from their alloys; therefore test batches must be made from each new lot of metals, and, upon the basis of the results obtained on the micrometer and dynamometer a perfect "test" formula must be evolved from which the regular batches intended for use are to be made.

Second: Alloys are not chemical compounds but mere physical solutions of two or more metals within each other, the percentages of which may be varied at will.

Third: No "formula" is needed when the manufacturer follows the G. V. Black method of "balancing."

Let us take up the first of these assumptions. Upon the authority of Mr. Jacob P. Eckfeldt, chief assayer, U. S. Mint, Philadelphia, bar silver of a fineness of 999.5 and from that point upward to 999.75, is commercially available at the U. S. Assay-office, New York City, N. Y., at current market rates. This silver the writer is able to purchase, regularly, from a Philadelphia broker of precious metals, who does not seem to regard its fineness as being especially remarkable. Purified shot copper, electrolytic, has a guaranteed fineness of 999 plus, and analyses have shown that the odd one-thousandth of impurity is oxgyen, due to dissolved oxids, an easily corrected deficiency. "Straits" tin, purified, has an average fineness of 999.5, often it is finer, and a recent analysis of commercial tin made for me by Booth, Garrett & Blair, showed a fineness of 999.61. Thus a "G. V. Black" alloy made from a formula approximating 68 per cent. Ag, 27 per cent. Sn, 5 per cent. Cu, made from metals of the purity noted, should be within 0.036 of 1 per cent. of 1000 fine, a negligible difference.

It might be argued that such metals were not to be secured at the time of Dr. Black's investigation, but that would not be correct, for pure metals were certainly then obtainable at an added retail cost to dental alloys not exceeding 20 per cent. With such metals available, a formula once established could be continuously reproduced, provided the work were done by a metallurgist having the knowledge and exercising the care needed in such operations.

Pursuing this, then, to its logical conclusion, it must have been assumed that the dental fraternity was unwilling to pay a price commensurate with an alloy of pure metals, which assumption seems untenable.

The second assumption, that the metals of an alloy may be varied in their percentages, which means that their chemical affinities may be disregarded, shows that Dr. Black either did not avail himself of the copious literature on the subject or entirely ignored it, and therefore merited to some extent the caustic criticism of Dr. Ad. Fenchel,* who denominated Dr. Black's measurements as superficial and his metallurgical investigations as barren of a true comprehension of the internal structure and chemical constitution of alloys.

The first published observations upon this important theory of alloying (quantivalence and chemism), by an American investigator, are, so far as I have been able to learn, those of Dr. Edward C. Kirk, in the section of Dental Metallurgy, chapter on Alloys, page 796, Litch's "American System of Dentistry, 1887," from which I quote the following:

> There is little doubt that in many, if not the greater number of alloys, the laws of quantivalence and chemism are factors of their formation, giving rise to the production of metallic compounds, the component parts of which are united in equivalent atomic ratios. This is indicated by the energy which attends their union in some instances, and the definite crystalline form of many of the alloys, notably those of copper with tin. The tendency of metals to unite in definite proportions may be verified by cooling a melted mixture slowly, and when partly solidified pouring off the liquid remnant (as in the familiar experiment of making sulfur crystals), when crystals are left which are always combinations in the proportions of the atomic weights of the component metals.

There has been no lack of convincing confirmation of this statement, as many American and foreign scientists have sustained it; in fact, there can be no doubt that Dr. Black's achievement would have been enhanced had he given serious consideration to this factor, for alloys made according to his system of physical balancing are, of their nature, out of chemical balance—an error which seems unexplainable when his opportunities are considered.

DR. C. M. MC CAULEY'S TEST OF ALLOYS.

Dr. C. M. McCauley's report to the National Dental Association of his tests of amalgam alloys, which report was published in the DENTAL COSMOS for January 1913, may be cited to show the weak points of Dr. Black's system of "balancing." The results of Dr. McCauley's tests have not only caused a great change in the attitude of dentists toward purely commercial alloys, but have shown that there are marked aberrations in alloys made by Dr. Black's method. Some of these alloys showed a wide range of shrinkage and expansion, a phenomenon easily understood by those who accept the chemical theory of alloying. It may be remarked that the alloys of silver, tin, and copper stood the best, while those containing zinc showed greater aberrations; but as zinc must be used in alloys of the Black or other percentage types, if light color be required, it may be easily seen that "percentage" alloys without a zinc content are likely to undergo chemical solution in the oral fluids as a result of their not being in chemical balance, and so, despite their "physical balance," discolor the teeth in which, as amalgam fillings, they are placed. The alloys with a zinc content should, from the observations of many investigators and from the electro-chemical relation of this metal to the copper content, exhibit volume movements in both directions—in fact, set up a battery in the mouth which should prevent their amalgams from ever attaining equilibrium. There are other factors which militate against the use of zinc, one of which is its property of determining to the top of a cooling mass of alloy, which causes the ingot to be uneven and therefore out of physical balance, and the other is its property of oxidizing during

* See Ad. Fenchel, "Is Dentistry a Science? —An Open Letter to Dr. G. V. Black," DENTAL COSMOS, February 1910, p. 196.

the pouring of the melt, its oxids penetrating and dissolving in the alloy mass before it has cooled, with the effect of reducing the strength of the amalgam which contains it.

The third assumption, that no formula is needed for the making of an amalgam alloy when the manufacturer follows the G. V. Black system of "balancing," might at first thought be dismissed as the extravagant utterance of an overzealous enthusiast, were it not for the commercial advantage which may be taken of it, to the consequent detriment of efforts to secure uniformity in this most important material. It has given rise to a multiplicity of formulæ, afforded opportunities for advertising claims of wonderful and mysterious properties secured through the medium of awe-inspiring "tests" with micrometers and dynamometers—all with the glory of Dr. Black's prestige skilfully interwoven —and, through the relatively enormous expense which attaches to frequent analyses of such alloys, has blocked attempts to ascertain their constituents or to secure other details of importance excepting those of strength and volume change. This leaves the behavior of amalgam fillings made from these "tested alloys" to the "test of time," the very thing that Dr. Black most strongly and most justly condemns. The assumption that no formula is needed, however, falls of itself, for it is a well-known fact that, under the Black method of "balancing," a formula must be worked out before a melt is made, and this formula must be based upon a previously attained "tested" formula which has met the physical requirements noted.

THE CHEMICAL THEORY OF ALLOYS.

Opposed to all this empiricism comes the science of chemistry, illuminating a pathway that has been dark, and with invincible fact leading to truth. Its charts map out the behavior of the metals and their alloys, its microscopes search into their structure and reveal their internal physical characteristics, its delicate apparatus weighs and dissects and classifies them, marks their freezing-point, cooling-curve, miscibility, electrical and thermal conductivity, volume changes, specific and atomic weights—in fact, nothing escapes its searching scrutiny. Chemistry has shown that certain alloys of metals undergo condensation in freezing, and that others undergo expansion, that the affinities of certain metals for each other must be considered before they can be perfectly combined into an alloy, and that the atomic law is the important factor in such combinations. Herein lies the significance of the failure of percentage alloys; they are not combined with respect to their atomic relationship, and therefore, within them, atomic compounds are formed which are surrounded by an unappropriated surplus, a eutectic perhaps, which makes physical balance impossible.

Therefore, bearing in mind the precision of its data, and the fact that such data afford the means whereby the physical behavior of alloys of metals may be accurately forecast, I place supreme confidence in the chemical theory of alloys, and know that it offers the only solution to the amalgam alloy problem.

THE PRACTICAL PHASE.

In connection with the chemical theory of alloying, the writer has repeatedly been asked the question, "Is this chemical theory, which to many of the dental fraternity is unfamiliar, of merely academic interest, or has it a practical significance? Has is been, and is it now, of use?" This, it must be conceded, is an entirely fair question, for truly the dentist busy with everyday problems should not be asked to assume the burden of the consideration of a theory which does not attain results that will be useful to humanity and to dentistry.

The answer to this question is that this theory is the foundation upon which all practical metallurgical work must be based. Without it the metallurgist can well be likened to a navigator afloat upon an uncharted sea, without compass or sextant to guide him. He may grope his way into port and be thankful for his good fortune, but the way has been strewn with wrecks, for which he and others of his kind have been responsible. In the laboratory the study of the chemistry of the metals will enable him to work with them understandingly, to do with them that which in empirical work would seem impossible. The information gleaned from the scientific study of metallurgy will dispel a host of untoward and confusing phenomena, it will be a revelation of the possibilities of applied chemistry, and will, in addition to its practical and useful side, prove a delightful and beneficial study to the dentist having the welfare of his profession in mind.

CAVITY PREPARATION FOR THE GOLD INLAY.

By J. V. CONZETT, D.D.S., Dubuque, Iowa.

(Read before the Seventh and Eighth District Dental Societies of the State of New York, at their annual meeting, Rochester, November 14, 1912.)

THE science of cavity preparation has become a science within the past twenty years. Before the monumental work of Dr. G. V. Black, who demonstrated the fact that all teeth were of the same density and that the carious condition of certain teeth was not the result of their softness, cavity preparation was in a most uncertain and chaotic state. There were good operators before that day, to be sure, operators whose names stand out with the most resplendent glory to this day, and we do not wish to detract one iota from the honor which they so fully deserve; in fact, the greater credit is due them for being what they were in a time when science had not reached its present point. The splendid operations that these men made were made under conditions to cope with which would have been well-nigh impossible for the great operators of today. But great as these men were, they evolved no scientific system that could be handed down to posterity for the guidance of other men not so gifted as they were; each man was a law unto himself, and each operation was made as the exigencies of the case demanded. Today we have a method of cavity preparation that is founded upon scientific and well-demonstrated principles, a system that is fundamental to the preparation of all cavities and all classes of cavities, regardless of whether the cavities are prepared for the reception of a gold filling, an inlay, or a plastic. This system is the work of Dr. Black, and in presenting this paper I do not wish to arrogate any of the credit for the principles that I present. All that I have done in the way of evolving a method of cavity preparation for the reception of the gold inlay has been based upon the system that Dr. Black has given us.

INLAY FAILURES VS. FILLING FAILURES.

The gold inlay has now been before the profession sufficiently long to enable us to determine something of the permanence of operations made by that method, and I think that we can rest assured that the method is all that we hoped for. There have been failures, indeed many of them, and we see them multiplying before our eyes day by day. The poorly made inlays are beginning to assert themselves, for now the cement, which has heretofore saved the teeth in spite of the poorly made inlay, is dissolving out and leaving a space for the ingress of the organisms of caries, and as a consequence there is a recurrence of caries around the inlay, and a recorded failure. Most faulty inlays, however, do not require so long a time to manifest their shortcomings, for the greater part of faulty inlays simply drop out. This is the desirable way of their failure, for a failure of that kind does not disastrously affect the tooth, as the cement usually clings to it and the dentin is protected from caries even though the inlay has fallen out. The loss of the inlay at the same time is an immediate warning to the patient, and as the result the dentist is visited in order to have it replaced, or a new one made, as the case may demand. How different is the failure of a filling! Here the cavity is so made that the filling is mechanically retained, and, if there is a failure, it consists in a leaking of the filling, or a recurrence of caries around the margins; in either case, before the filling is entirely lost, the caries progresses until a sufficient amount of the tooth is gone to render the mechanical retention of no avail, and when such is the result, so much of the tooth structure is lost that there is grave danger for the future safety of the organ. We need no amplification of that truth; it has impressed itself upon all of us so often that no comment is needed.

THE IMPORTANCE OF CAVITY PREPARATION.

There *are* failures of the inlay, however, and it is our duty to observe them, and, if possible, try to find the cause and the remedy.

In all of the failures that have come to my notice there has been one great cause, and that has been an unscientific cavity preparation.

If this observation be correct, then it is our duty to point out the defects and show how to prevent them in the future. It will be impossible to go over the entire field of operative dentistry in the time allotted to this paper, neither will it be possible for me to take up all the classifications of cavity preparation, but certain fundamental principles should be stated and their application to a few selected cases studied, in an effort to establish our argument from the few cases at our disposal.

THE OUTLINE FORM.

The first object that we must attempt to obtain in the preparation of any cavity is the outline form. This form comprises the doctrine of extension for prevention and the esthetic form. It would hardly seem to be necessary to emphasize the necessity of obtaining sufficient extension of the margins of the cavity to bring them into the areas of comparative immunity to caries, but an extended observation of operations made by various practitioners in all parts of this country convinces me that it is still necessary to preach extension for prevention.

EXTENSION FOR PREVENTION.

What is extension for prevention? Does it mean cutting a tooth all to pieces, as has been frequently charged by those who have opposed this principle? Or is it a safe and sane method of so preparing a cavity that the organisms of caries will have the greatest difficulty in obtaining a foothold for a further invasion of the tissues of the repaired tooth? We contend it is the latter, and that no cavity is scientifically filled if this principle has been ignored. We claim that it is scientific because it takes into account the universally recognized etiology of caries, and represents the most rational method of combating a recurrence of that disease.

We know that caries of the teeth is caused by a micro-organic invasion of the dental tissues, and that the inherent strength or weakness of the tooth has nothing to do with this invasion. In other words, there is no such thing as a hard or a soft tooth; all teeth are of the same density. That being the case, and knowing further that the organisms of caries, in order to begin their work of devastation, must protect themselves with an osmotic membrane called the bacterial plaque of Williams, and further knowing that this plaque cannot be deposited upon a surface of the tooth that is subjected to the friction of the food or the movement of the tongue and lips, we believe that, by carrying the lines of a cavity that we are to fill out far enough to have the margins of the finished filling lie in such territory, we are safeguarding the tooth with the greatest factor of safety against the recurrence of the process of caries around the filling.

This doctrine has been thoroughly tested for over twenty-one years by men who have won for themselves a place in the forefront of the ranks of operative dentistry, and has in no case been found wanting. It means, in cavity preparation, the carrying of all the lines of the cavity margins so far out of the embrasures buccally and lingually that the food in its excursions over the teeth during the process of mastication will keep the margins of the filling clean. All fissures and pits are followed out to their farthest ends. The margins of the fillings in such territory will lie in smooth surfaces, and the gingival surface will lie under the free margin of the gum, for again it has been observed that caries never occurs under healthy gum tissue. The argument has been raised that it is not possible or advisable to extend a cavity so that the filling will be under the gum in those cases in which the gum has so receded by reason of pyorrheal process that the cementum is exposed. All this is true, but in such cases and those of a similar character in which the gum tissue has been crowded out by reason of the food crowding into open interproximal spaces, the extension should be sufficient to carry the margin far enough to have it lie in the territory that would normally have been under the gum, and if the tooth is then properly contoured, and the contact point is properly reproduced, the gum will in many cases come back into the interproximal space, and a healthy condition of the septal tissues will be reproduced.

There is no ironclad rule to determine just how far each tooth must be cut in order to carry the margins into safe territory; this is determined by a study of the conditions involved in each case. In teeth with well-developed bell-shaped crowns there is no necessity for as great an amount of cutting buccolingually as in teeth that have flat, broad contact points. In those cases, if it is possible to obtain sufficient separation and the contour of the tooth can be so shaped that there is a well-defined contact point, it will not be necessary to cut as far as it would otherwise be. In all cases, however, the cavity should be cut far enough to bring the margins to lie in territory that can be automatically kept clean.

ESTHETIC CONSIDERATIONS IN CAVITY PREPARATION.

The esthetic form is that form given to the filling which most perfectly conserves the beauty of the tooth. A curve is always more beautiful than an angle, therefore it should be our endeavor always to avoid sharp angles in any part of the filling that is visible. The filling should always be so shaped that the tooth is as nearly as possible restored to its original shape. A tooth that is not so restored loses its symmetry and disturbs the harmony of the entire denture, and is, to that extent, lost. A restoration made with gold is in most cases more esthetic if the metal itself is brought into the line of vision, rather than if it is hidden to the extent of appearing as a dark line between the teeth, consequently making the tooth surface appear unclean. It is far better to show the clean gold than to expose the patient to the suspicion of having neglected the toilet of the mouth. Therefore, for esthetic reasons, the cavity is extended until the metal comes into the line of vision.

THE RESISTANCE FORM.

The resistance form is the next step that demands our attention, and must be determined by a study of the condition that we are called upon to correct. All fillings do not have the same amount of stress to resist, consequently it would be foolish to cut as broadly and as deeply in one case as in another. If we were not to cut sufficiently deeply and broadly for the filling that is to bear a great amount of stress, the filling would fail by being forced out of the cavity, or by the walls of the tooth breaking under the force. All individuals do not exert the same amount of force upon their teeth. The dynamometer tests will vary from 75 pounds in one individual to 300 pounds in another, and it would obviously be foolhardy to use the same cavity form for two fillings which are to resist different stress. We should in all cases observe the strength of the occlusal force, the strength of the masticatory muscles, and the facets that have been worn upon the teeth by reason of occlusal stress, and then, with the knowledge so gained, lay out a proportionately resistant cavity form. Neither do all surfaces of the teeth in the same mouth receive the same amount of stress. For instance, a filling placed in the mesio-occlusal surface of an upper molar or bicuspid will have to resist many times more stress than a filling placed in the opposite surfaces of the same teeth; likewise a filling placed in a cavity in the disto-occlusal surface of the lower molars or bicuspids will have to bear a much greater stress than fillings placed in cavities in the mesial surfaces of the same teeth. This by reason of the fact that the mandible closes upon the maxilla with a combined upward and forward motion; thus the thrust is directed against the distal surfaces of the upper teeth and the mesial surfaces of the lower teeth, and fillings placed within these surfaces are thrust into the cavities, while fillings in the mesial surfaces of the upper and in the distal surfaces of the lower teeth receive the stress in such a way that the filling has a tendency to be forced out of the cavity. Therefore it is necessary to make the resistance form broader and deeper in the mesial surfaces of the upper and in the distal surfaces of the lower teeth than in the opposite surfaces of the same teeth.

FLAT SEATS AND OTHER IMPORTANT FEATURES IN THE PREPARATION OF CAVITIES FOR INLAYS.

The form best adapted to resist the forces that are brought to bear upon a filling is that of the flat seat and parallel walls. The box form is the ideal, and the nearer we approach that in our cavity formation, the nearer we will be to the perfect cavity. The flat seat is the logical form to give to any foundation that is to carry any stress, for in that form the stress and weight are equally distributed over the entire surface of the seat, while if the seat were made round, there would be a tendency for the filling to rock away from the point of greatest stress, and as a consequence some other point of the seat would have to bear more than its equal share of the burden; and if the walls were not of sufficient strength to withstand the additional stress placed upon them by reason of the tendency to rocking, they would break; in fact they frequently do so in this form of cavity seating. Not only is the tendency to rock a menace to the stability of the walls of the tooth, but, if there is the slightest motion of the filling within the cavity, a fissure is opened for the ingress of the fluids of the mouth, followed by leakage and failure. Both the gingival and the occlusal seat should be made as flat as it is possible to make them. This can be readily accomplished with an inverted-cone bur of the proper size, which should be sufficiently large to make the seat in one sweep of the bur—usually a number 37 or 39. If the filling is to be an inlay, there may be some danger of making an undercut with an inverted-cone bur, but it is my practice to use this form of bur, and I have no trouble in that respect, but, if it is desired, the same effect can be produced with a square-end fissure bur of the proper size, or with an end-cutting bur, which is really ideal for this form of work. The walls of the cavity should then be paralleled as nearly as possible, and while all undercuts must be avoided in the making of an inlay, we should not err in the other direction, and make the cavity cone-shaped, for that form of cavity offers the minimum of frictional resistance and is the cause of frequent failures, owing to the falling out of the inlay. The walls can be paralleled with a fissure bur held at the proper angle and by sweeping back and forth. At the same time the pulpal wall is prepared in proper relationship to the gingival seat and axial line angles. The occlusal seat should be sufficiently deep to resist all forces that may be brought to bear upon the inlay, whether these forces be those of thrust or pull, and it is just at this point that the majority of failures occur. I have seen many cavities prepared in which the occlusal step was made so shallow that it scarcely penetrated the enamel, so that I was not surprised at the failure of the inlay. It is upon the occlusal step that the safety of the filling chiefly depends. If the step is made deep and broad enough and has its axial walls properly paralleled, there will be no danger of the inlay coming out, but if it is not so prepared, failure may be confidently expected after a shorter or longer period, according to the stress that is exerted upon the inlay. I purposely emphasized the broadness of the cavity in its occlusal aspect, for there must be width of cavity sufficient to allow for enough gold to give strength to the inlay.

SUFFICIENT BULK OF GOLD REQUIRED FOR AN INLAY.

If the inlay is a little narrow piece of gold in its occlusal aspect, it will not have sufficient strength to resist the forces of mastication without the gold stretching or flowing, and if this occurs to ever so slight a degree, the gold moves away from the cavity margin, leaving a vulnerable point which the organisms of caries will readily invade. Gold, and particularly cast gold, flows and stretches under stress, and he is a wise man who, understanding this physical characteristic of the metal, will so protect it from the flowing and stretching forces of mastication that his inlay will not receive a dangerous amount thereof. When the gold must bear a great amount of stress it must be so reinforced that the stress will not be too great for it to bear.

Time forbids to take up in this paper the subject of casting in any of its many aspects, but by way of digression it should be said that in all cases where any stress will be exerted upon the inlay, regardless of whether that stress is occlusal or approximal, pure gold is decidedly contra-indicated. Cast gold is too soft to bear any appreciable degree of stress without flowing or stretching, and the result of its use in many cases will be calamitous.

THE RETENTIVE FORM.

The retentive form is very largely comprehended in the resistance form in the cavity preparation for the gold inlay. A cavity with a flat gingival and occlusal seat and parallel walls answers the purpose of retention in all but special cases which cannot be considered at this time. The resistance form is that form which tends to resist the thrust forces that are brought to bear upon the finished inlay, and the retentive form is more particularly that which has to do with the resistance to the forces that would pull the inlay out of the cavity. In the case of an inlay, the preparation that will best serve the one purpose will best serve the other, so we will only attempt to emphasize that in a cavity which is to receive an inlay there should be no converging gingival lines necessitating a conically formed inlay, for such a form offers practically no frictional resistance, and must therefore depend almost entirely upon the cement for its retention. While the modern cement-makers have given us a cement that is splendid in its place, it never was intended to glue an inlay into the cavity without the assistance of any mechanical retention.

THE CONVENIENCE FORM.

In the formation of a cavity for an inlay there is very little need for a convenience form, and yet a cavity must always be so cut that the wax model and the finished inlay as well can be properly introduced and removed, and if there is a necessity for more extensive cutting of the tooth in order to accomplish this than would be necessary for the sake of extension for prevention, I should never hesitate to do so. It is not possible or advisable for us to make any rules for this purpose, for a cavity that can be easily filled by one operator of greater skill often presents insurmountable difficulties to another. All these factors must be decided by the operator according to his ability. It would be foolish for a dentist, simply because some other operator is able to do so, to attempt to prepare and fill a cavity when he knows it to be an impossibility for him; neither would I admit for a minute that there is any operation that I could not do, when I know that I have been doing it time and time again, simply because some other man says that it could not be done. The only rule, then, that I would make in regard to the convenience form would be always to cut the cavity broad enough to make it perfectly accessible so that the operator is able to make and trim his model perfectly in it. For unless a perfect model of the cavity is obtained, it will make no difference how well the cavity has been prepared, the inlay will fail at some time by reason of the faulty adaptation of the inlay that has been made from a poor model.

PREPARATION OF THE CAVO-SURFACE ANGLE.

The preparation of the cavo-surface angle really belongs to the outline form, but, as it is the last thing that we do in a cavity preparation, and as it is one of the most important, and one of the most abused factors in the preparation of the cavity, I have purposely reserved its discussion for the last. The enamel is the protective coat of mail of the tooth; as long as its integrity is unbroken, the tooth is safe. It is the hardest tissue in the body, and the most resistant to the forces that make for dissolution. In structure it is composed of rods or prisms resting upon the dentin, and held together by a cementing substance. It contains extremely little organic material, and some histologists claim that it contains none at all. Those who think that there is some organic matter in its chemical makeup, admit that it is but a trace. The organ that called it into existence disappears with the eruption of the tooth, consequently the finished enamel is finished for all time. There is no possibility of repair, for the organ of amelification has gone out of existence. While it is exceedingly resistant to chemical and physical forces in its perfect state, once its continuity is broken, by reason of its morphology—viz, a succession of rods resting upon the dentin—when some of the rods have been broken out, the neighboring rods are very easily displaced, and fall into the ditch made by the loss of the approximating rods. Consequently, the repair of a tooth that has been attacked by caries must be made in such a way that the enamel will be properly protected; for if it is not so protected, and if there is left a place where the enamel rods are not supported, they will in turn fall out, and the destructive process will continue as long as there are any unsupported rods next to the carious process. In the preparation of the cavo-surface angle it is the purpose of the operator to prepare this angle so that the filling will protect and seal-in the rods next to the cavity, and, if this is done, the rods farther on will find their accustomed support continued and all will be well; if it is not done, and the rods next to the cavity continue their disintegration, the process will continue indefinitely, no matter whether the tooth has been filled or not. The enamel must be protected, and in the best way.

THE BUTT JOINT CONDEMNED.

There has been advocated the butt joint in the making of an inlay, and I cannot too severely condemn it. In the first place, the butt joint affords no protection to the enamel rods in many places upon the surface of the tooth. In the second place, there is nearly always a slight discrepancy between the inlay and the tooth in the butt joint by reason of shrinkage of the metal. In the third place, there is no flange upon the finished inlay that can be burnished down upon the tooth; and in the fourth place, the butt joint inlay leaves a thin flat piece of cement between it and the tooth which, under the continued pounding during the process of mastication, is liable to fall out and leave a large opening for the entrance of food débris and bacteria. All enameled surfaces should be beveled, and the bevel should be a generous one, but should not be so long that it will leave a thin flange of gold which will curl up under stress, and make a ditch for the harboring of all kinds of filth.

The gingival angle is perhaps the most important, as it is the most frequently neglected, and most frequently the seat of recurrent caries. This angle should be beveled very carefully, because at this portion of the tooth the enamel rods incline apically and, if the margin is not sufficiently beveled, the margin of the cavity would contain a multitude of cut-off rods, leaving unprotected short rods to fall out, subsequently leaving a gap between the inlay and the tooth. This angle can be beautifully made with the gingival margin trimmers designed by Dr. Black, but in some cases I prefer an instrument that I make myself by beveling two Wedelstaedt chisels No. 39 right and left, thus making an ideal trimmer to reach the gingival margins in most of the upper teeth.

IMPORTANCE OF A CORRECT CONTACT POINT.

While the title of this paper does not include making or finishing of the inlay, I cannot but emphasize the necessity of properly shaping the inlay so that the contour of the tooth is properly restored and the contact point properly placed and made. The making of the contact point is a fine art and one of the achievements that distinguish the operative dentist from the bungler, for a filling made so that the contact will allow the food to crowd in between the teeth is worse than a failure—and many a filling I have removed for no other reason. A filling so made is a constant source of discomfort to the patient and a menace to the life of the tooth. The contact point should be placed near the occlusal surface, but not upon that surface, for there should be a rounding of the filling toward the contact point in all directions, or, as Dr. Black puts it, the contact point should be as though two marbles were placed together. If this is done, the embrasures will be so accentuated that the food will encounter no difficulty in traveling over them and keeping them polished, neither will there be any difficulty because of the food crowding in between the teeth, for the bolus will strike the contact and slide off over the rounded margins over the marginal embrasures and into safety.

IMPORTANCE OF SMOOTHLY FINISHED GINGIVAL MARGINS.

Again I must point out the necessity of obtaining a smoothly finished gingival margin. The gingivæ will not tolerate a rough surface, and, if there are overhanging portions and rough surfaces on the filling in this region, a gingivitis will be set up. Dr. Arthur Black has pointed out the fact that the large majority of cases of gingivitis are caused by faulty dental operations in this region.

[See also *Discussion,* as reported under "Proceedings of Societies," this issue.]

TUMORS OF THE MOUTH.

By ROBERT P. BAY, M.D., Baltimore, Md.,
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(Read before the Maryland State Dental Association, Baltimore, June 14, 1912.)

IN considering the very important subject of tumors of the mouth, I shall mention the benign tumors, but shall lay special stress on the early diagnosis of the malignant ones, namely, the sarcoma and the carcinoma groups.

We hear daily of the dreadful scourge of tuberculosis, and the profession and the laity are instructed in its symptoms, prevention, and treatment, but little do we hear of the ever-present and much-dreaded malady cancer.

CANCER.

In my opinion, this malady is more amenable to treatment than is tuberculosis, but we are not trained to be on our guard, to recognize it, and advise its removal. Why should a young girl be ashamed to mention the fact that she has a breast tumor, and why do men carry a carcinoma of the lip under a long mustache to hide it, rather than have it cured? Simply because they are not educated to the fact of the danger of this disease and the possibilities of its cure. And we cannot blame this entirely on the laymen, for we are seeing daily cases in which the different patent medicines have been and are being applied until the disease has spread beyond hope.

This worldwide disease is not confined to any certain people, but occurs among all races of mankind and is found throughout the animal kingdom, being especially prevalent in fish, birds, and rats. It is estimated that twenty-five thousand deaths occur in Japan each year from this disease, and in this country we have constantly eighty thousand cases, and forty thousand deaths each year.

It is undoubtedly true that the public is at present looking for a specific or cure for cancer rather than for a means of preventing it, but we must remember that the profession has done more to prevent disease than it has ever done toward specific cures as we have stamped out smallpox and yellow fever, and recently have gotten typhoid fever under our control by prevention.

ETIOLOGY OF CANCER.

What is cancer? I will quote Dr. L. S. Pilcher, who describes the condition as follows: "It is in the lawless proliferation of pre-existing epithelial cells—in luxuriant, irregularly arranged masses that invade underlying and surrounding tissues, permeating and destroying them, and finally themselves attaining a mass which can no longer be adequately nourished by an accessible blood supply, and which itself then falls into central decay while at the periphery the process goes on—that cancer consists."

From all information which has been presented on this subject, it is evident that there often exists a precancerous condition. Bashford shows that, while no race of mankind is exempt from cancer, the predilection for the disease in certain countries is more due to local irritation than to the peculiarity of climate, soil, or diet. I shall mention only a few well-known sources of irritation as the cause of special cancer. For instance, cancer of the mouth is rare in

European women, but common in men, yet in Ceylon and India women suffer greatly from this form of cancer, because of the chewing of betel-nut and holding the plug in the mouth. In this country, we usually find a history of using a rough pipe-stem, or of a jagged tooth with constant chewing. This process, a chronic irritation, is the causative factor in the production of cancer.

CLASSIFICATION OF TUMORS.

Irritation cannot be classed as the responsible factor in the other form of malignant tumor, namely, sarcoma, as it is largely a growth of young life, and there may be no history of irritation. In this class, the pinched-off embryonic tissue seems to be the more plausible theory. But although many theories have been advanced, we are absolutely ignorant as to facts concerning the production and growth of this form of tumor.

Clinically, a tumor may be defined as an abnormal swelling. The diagnosis of tumors naturally falls under two heads, clinical and microscopic. Clinically, we distinguish two groups of tumors, the benign and the malignant. Microscopically, tumors are classified according to the character of the tissues composing them, namely, epithelial, connective tissue, and mixed tumors.

A benign tumor is one which has no unfavorable influence upon the general health of an individual. It may, however, produce disagreeable and even fatal symptoms on account of its size or situation, by pressure on the surrounding vital structures.

The malignant tumors, on the other hand, possess what may be called an infectious character; that is to say, they not only increase in size, but sooner or later infect the entire organism. Their growth takes place not only by an increase in volume, but by growing into, infiltrating, as it is called, and destroying the surrounding tissues, without regard to their character. They may also spread through the lymphatics and bloodvessels; another marked tendency of malignant tumors is to return after they have been removed.

DIFFERENTIAL DIAGNOSIS OF SYPHILIS.

In the diagnosis of tumors, it is necessary to exclude certain inflammatory processes, notably syphilis, either as a primary lesion of the lips, tongue, gums, or the inside of the cheeks, or the tertiary stage of gummata of jaw, tonsil, etc.

We should no longer be content to wait for the secondary symptoms of syphilis to occur, or to try the administration of mercury or the iodids; rather should we make a section of the tumor and have it examined by a competent pathologist, to whom the section may be mailed, and from whom a diagnosis may be received in from forty-eight to seventy-two hours. We also have two positive diagnostic means, namely, Wassermann's reaction and, if a chancre be present, the examination for spirochæta pallida. By these methods we can exclude the most common disease resembling a beginning oral tumor.

AIDS IN THE DIAGNOSIS OF TUMORS.

The history of a tumor furnishes our most important aid. A tumor which has existed for a long time and has grown slowly is probably benign; if such a tumor takes on a rapid growth, it has probably become malignant.

Age has a certain characteristic attraction for tumors. For example, the benign tumor may be considered a growth of young life. The sarcoma, or malignant connective tissue tumor, also occurs most frequently in the young adult; while a cancer or malignant epithelial tumor practically always occurs in middle life, or the cancerous age, from forty to sixty. It may be stated here that the younger the patient, the more rapid the growth of the malignant tumor, and the more advanced the patient is in years, the more favorable the prognosis. The average duration of sarcoma, untreated, is from eighteen months to two years; of carcinoma, from three to four years. This includes the pain and suffering known only to those bearing the burden, and the foul ulcerating tumors are disagreeable not only to the bearer, but to his friends, making him an outcast during the remaining days of his life.

SYMPTOMS OF SARCOMA.

I shall discuss briefly the local appearance of the most common tumors of the mouth and their most prevalent position. Sarcoma involves the jaw in the form of an osteosarcoma. It may start in the interior, from the cells of fetal marrow, or from the surface of the bone and the periosteum. This tumor usually occurs in the young, it grows rapidly, is of a soft consistence, and gradually absorbs the bone, with no enlargement of the neighboring lymph glands. It is of a brownish-purple color, and there is no limit to its extent. It may invade the antrum and orbit, or form a large mass of the size of a child's head in the lower jaw. Concomitant with this, there is the anemia and cachexia so characteristic of malignant disease. To recapitulate, sarcoma has its origin in connective tissue; it is a tumor of rapid growth; it may early be incapsulated, but later infiltrate; it practically always occurs in the young.

SYMPTOMS OF CARCINOMA.

Carcinoma or epithelioma has its favorite site in the lip and is generally due to chronic irritation. It always occurs after middle age, and is caused by the irritation of a tobacco pipe or a prominent jagged tooth. The first symptom will be a slight thickness of the mucous membrane, which will peel off and practically disappear only to recur again. There will be noticed a slight discharge and, at this early period, no enlargement of the lymphatic glands, but it requires only a short time for the disease to become embedded in the tissues and to extend to the neighboring glands, often involving a dangerous risk, and a serious prognosis, if surgical treatment is finally resorted to.

NECESSITY OF EARLY CORRECT DIAGNOSIS AND TREATMENT.

These conditions are frequently overlooked by the busy dental surgeon or are passed by in the early stages as mere ulcerations, and temporized with until the critical time has passed, and what would have been a preventable disease stands out defying every known means of treatment. This is not mere hearsay, but almost daily we see neglected cases coming to the surgeon too late, which while not wholly the fault of the profession, is largely due to our failure to teach the layman not to trifle with conditions with such grave possibilities.

At present we recognize no cure of cancer other than that obtained by its removal from the body by means of the knife, the cautery, or destructive rays. We ourselves must learn and we must teach our patients that the risk lies not in surgery, but in delayed surgery. We can, however, say this—that we know nearly or quite as much concerning cancer as we do of other medical and surgical diseases. Our present knowledge of the prophylaxis of cancer indicates that all tumors of the mouth should be subjected to a careful examination, and excision should be advised in order that we may reduce the mortality by early and careful diagnosis.

SUGGESTIONS IN THE TECHNIQUE OF RETENTION.

By ALFRED M. DESNOES, D.D.S., Brooklyn, N. Y.

(Clinic given before the Eastern Association of Graduates of the Angle School of Orthodontia, New York, N. Y., April 26, 1913.)

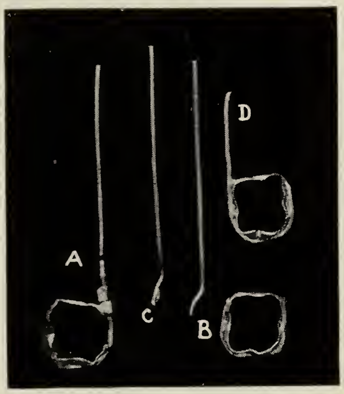
ACCURACY in the alignment of their component parts is essential in the construction of all retaining devices.

The method most commonly in use for making retaining appliances, by first fitting the bands, placing them on the teeth, then taking an impression with the bands in position, replacing the bands in the impression, and then filling this up with some suitable material, and building up the device on the model thus obtained, insures accuracy in alignment, but occupies a considerable portion of time, allowance having to be made for the pouring of the impression, the hardening of the plaster, and the separating of the model.

The suggestion that I am about to make is one that insures absolute accuracy in adjustment with a great saving of time and obviates the necessity of pouring the impression and separating the model.

Previous to the patient's arrival, in order to save time, bands are fitted for the anchor teeth, using some old model for this purpose. If an old model is not obtainable, a modeling-compound impression is taken of the teeth to be banded, from the original model, and the bands are fitted upon this. If a screw band is selected, the end of the screw portion is filed to the same gage as the lingual wire that is to be used, and this wire is soldered to the end of the screw. (Fig. 1, A.) I will later explain the purpose of this procedure. If plain bands are used, they are placed on the teeth, and a scratch is made at the spot where the lingual wire is to be soldered. The end of this wire is bent to the contour of the band, and a flat surface filed so that it will rest firmly on the band. (Fig. 1, B.) A little solder is then flowed on this surface (Fig. 1, C), the band is held with a pair of tweezers over the seam, the wire dipped in flux, placed in position and soldered;

FIG. 1.

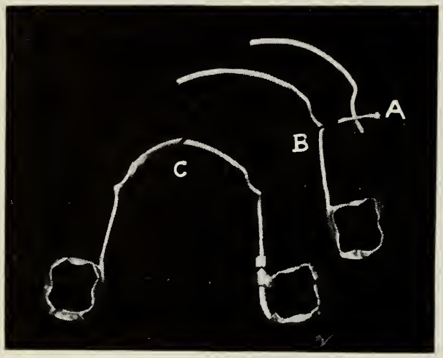


the flat surface on the wire forms a seat, and keeps it in position while soldering. This wire is then cut off to a length that will reach either distally or mesially to the canine, depending upon where the next attachment is to be soldered (Fig. 1, D), and adjusted in the mouth.

A piece of wire is then selected to be made into the front segment; this is bent at a sharp angle and then conformed to the contour of the canine (Fig. 2, A), allowing, of course, for a band if one is to be placed on that tooth, leaving it sufficiently long so that it can be cut off distally to bend—it is much easier to cut this wire off distally than to change the sharp bend in the wire. It is then soldered to the extension wire coming from the molar band. (Fig. 2, B).

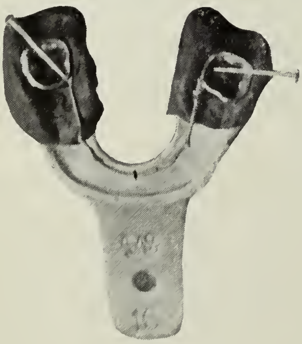
At this point I would say that joints of this character are often weakened in

Fig. 2.



soldering by the slight jarring of the hand in the removal of the piece from the flame, while the solder is in the process of congealing. I prefer, therefore, to keep the hands in the same position and blow the flame out of the way,

Fig. 3.

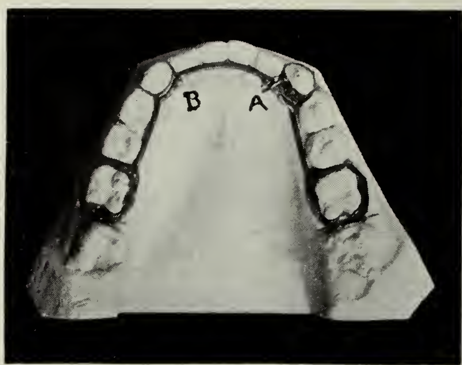


thereby cooling the piece quickly and preventing the jarring of the congealing solder.

The band with the attached wire is then placed in the mouth and bent to conform accurately to the lingual surface of the incisors, allowing the end to just barely come in contact with the end of the extension wire coming from the opposite band (Fig. 2, C). In my experience the easiest place to make this joint is at the central incisors, although it can be made at any convenient spot.

At this stage the attachments are added to the bar, regardless of whether it be a spur to maintain a space, or whatever other attachment the case demands. On this particular piece an attachment has been placed for a stop—and this is done by soldering a piece of wire lengthwise on the spot where the stop is to be made, and then cutting off the surplus. After the attachments have been soldered in position, the appliance is polished in order to avoid the

Fig. 4.



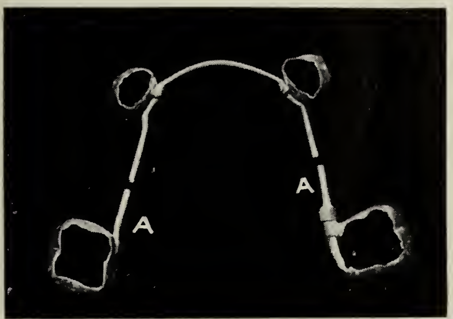
possibility of its bending when finally assembled.

The two parts are now placed in position on the teeth, and a suitable impression tray—from which the front and back flanges have been cut away (Fig. 3) is selected, and the inside surface roughened so that the impression material will adhere to the cup. A small amount of plaster or modeling compound, depending upon the location of the joint to be soldered, is placed in the ends of this tray, and an impression taken over the bands. By having the flanges of the cup removed, it can be observed that the ends of the two wires do not move out of position while the impression is being taken. When the impression material is hard, the whole is taken from the mouth; the bands are then removed from the teeth and replaced in the impression. If a screw band is used, the number of turns required to loosen the band is counted, and the screw is turned back again before replacing the band in the impression. The bands can be held firmly in position by means of a few pins. The two ends of the wire are thus held in perfect alignment, and with a delicate flame can be easily soldered together. (Fig 3.)

The joint can be soldered quite near the compound, if the imprints of the teeth are filled with cold water while soldering, and a small flame is used. In this way a rigid retainer is provided as far as the molar bands are concerned.

In this case, I am going to put on an extra attachment to hold the canine

Fig. 5.

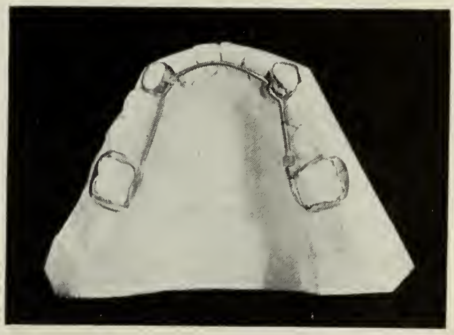


region; it was for this purpose that the stops were placed on the wire. Bands are made in the usual way for the canine teeth, and, with the appliance in place, a scratch is made on the band to mark the position for the soldering of a small wire hook. The band with the hook soldered to it is then replaced on the canine, and a mark made on the lingual wire alongside this hook. (Fig. 4, A.) The appliance is then taken off, and a groove filed on the lingual wire following the mark (Fig. 4, B), into which the hook coming from the canine band will fit when adjusted.

The lingual wire is now cut apart at any suitable place—usually about one-eighth of an inch from the anchor bands—and a tube is slipped over each short end and soldered to it. (Fig. 5, A.) The lingual wire will fit accurately into these tubes when assembled.

The object of filing the screw portion of the screw band will now be fully comprehended; by cutting it apart at the

Fig. 6.



joint where it was soldered to the lingual wire, the tube can be slipped over the end of the filed portion of the screw and soldered.

It is much easier to make the appliance first rigid and then cut it apart and solder tubes to the end of the wires coming from the bands, than to solder the tubes first to the bands and attempt to fit the lingual wire into these tubes.

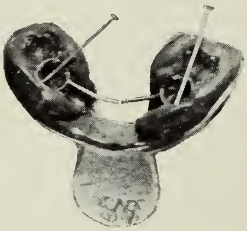
Fig. 7.

After the appliance is cemented in place, the little hook attached to the canine bands is bent over the lingual wire into the groove filed in it and the canine region is thus securely held by the stop on either side of the hook, and yet free movement is allowed for the roots of the teeth. (Fig. 6.)

Occasionally a great deal of the retaining appliance can be made on a model before the arrival of the patient, and the final adjustment made in the mouth and the appliance held together while soldering in the manner shown. Fig. 7 shows one of a pair of right and left pliers for the bending of the lingual wire.

The same plan can be utilized for making an independent retainer between the canines, and I have here a cup trimmed for the purpose, and holding an appliance in position. (Fig. 8.)

Fig. 8.

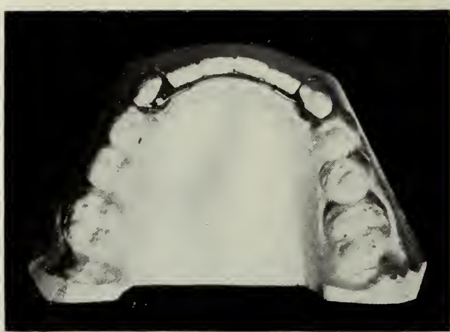


After the halves have been soldered together they are cut apart, and tubes are soldered to the short ends of the wire attached to the bands. The lingual wire will fit accurately in the tubes and allow the movement of the canines during the period of retention. (Fig. 9.)

This method of holding the parts of the appliance in alignment while soldering—by means of the impression instead of the models—can be utilized in other ways, and will save a considerable amount of time when it is necessary to complete the retention at one sitting.

One word should be said as to the cementation of this appliance. I usually cement one molar band at a time, keeping, however, the two bands in position, but with the cement in only one of the bands. In this way the appliance is still kept in alignment, but one's attention is concentrated on the band that is being cemented. After the cement is hardened, the uncemented band is slipped off, dried, and cleaned, the cement is placed in the band, which is slipped over the end of the lingual wire and cemented in place. In this way a firmer cementation of the band is insured than if the operator's attention were occupied by the manipulation of two bands at the same time.

Fig. 9.



BLOOD PRESSURE.

By P. H. MARKLEY, M.D.,
VISITING PHYSICIAN TO COOPER HOSPITAL, CAMDEN, N. J.

(Read before the Southern Dental Society of New Jersey, at its monthly meeting, held at Camden, N. J., March 19, 1913.)

THOUGH the phenomenon of blood pressure was pointed out nearly two centuries ago, it attracted but little attention until comparatively recent years, and even at the present day but few practitioners have any definite conception either of the elements controlling its variations—so far as they are known—or of their significance.

THE PHYSIOLOGY OF BLOOD PRESSURE.

Blood pressure may be said to be a mechanical problem of physiology, an evolution of the laboratory, depending upon four separate factors: (1) The energy of the heart; (2) the peripheral resistance; (3) the elasticity of the arterial walls, and (4) the volume of the circulating blood. A disturbance of the equilibrium normally existing between these factors, even though it be but of functional origin, will be shown by a variation in the normal blood pressure scale.

HISTORY OF BLOOD-PRESSURE MEASURING APPARATUS.

As far back as 1733, Hales demonstrated the importance of some of these factors, though it is to the kymograph of Ludwig, perfected in 1847, that we owe nearly all of our knowledge of the circulation.

His method consisted in obtaining a blood-pressure tracing by a recording manometer, connected directly with an opened artery, and writing upon a rotary cylinder. As this method involved the opening of a vessel, it was not adapted for clinical purposes, and it was left to Marie, in 1858, and later to Kries, in 1878, to perfect the working models, of which the instruments now in use are modifications.

These instruments, it should be borne in mind, do not register the mean pressure, but simply the highest, the systolic, and the lowest, the diastolic, though by certain mathematical calculations the mean pressure may be accurately obtained.

THE VALUE OF BLOOD-PRESSURE RECORDS.

To attempt other than a brief reference to these various methods would involve a multitude of details far exceeding the limitations of the present paper, which simply consists of an attempt to call attention to a few practical points.

So customary has the recording of blood pressure become that no examination of a patient is considered complete without a chart attached to the usual history, showing the findings and variations. In the light of our present knowledge, is this not largely mere fashion? For the mere reading of 150 or 200 does not mean anything definite nor conclusive, and becomes significant only when studied in connection with the concomitant symptoms.

Within the past year, at the bedside of a patient whom he had been called to see, one of the most prominent surgeons of the East made this statement in my presence regarding the value of blood-pressure recording: "I can tell all that it is necessary to know by compressing the radial artery with my finger." This was perhaps true, and entails a condemnation, not of the taking of measurements of the blood pressure, but of our inability to interpret properly the variations of the dial; thus, now, from these variations, we simply know that there is something pathological somewhere in the system, though as the physiologist and the pathologist further enlighten us regarding the significance of such variations we shall no doubt find the study of blood pressure filling an important field of practical usefulness. Its present status may be aptly compared to the position of a young mother using a clinical thermometer. She finds her child to have a high fever, but is entirely unable to interpret it properly, having but little idea as to whether a slight stomach attack, which will subside in a few hours, or the beginning of a profound infection is indicated by the reading of the thermometer, though these phenomena can usually be easily differentiated by the physician.

Life insurance companies have almost universally adopted the measuring of blood pressure as a part of their routine examination, and for this purpose it would, even in its present state of uncertainty, seem to be of the greatest value, for when the physician has carefully examined the applicant, and fails to find anything abnormal, the blood pressure reading affords an additional safeguard, for a reading not conforming to the average table indicates that there exists somewhere in the economy some pathological condition, though its nature and seat may be, for the time being at least, but a mere conjecture.

EFFECTS OF NITROUS OXID ANESTHESIA ON BLOOD PRESSURE.

With the exception of nitrous oxid, I presume, the blood-pressure phenomena observed during the administration of general anesthetics do not interest the average dental practitioner. Observers agree that, in all cases, before the administration of an anesthetic the blood pressure was found to be above normal, and the pulse-rate increasing. This is accounted for by excitement stimulating the cardio-motor and vaso-motor centers.

When nitrous oxid is administered, hypertension and consequent rise of blood pressure quickly follows, presumably owing to the partial asphyxia which it induces. This rise of pressure may be reduced to a minimum by the simultaneous administration of oxygen.

BLOOD PRESSURE IN PNEUMONIA.

Personally, I have found the most reliable and practical use of blood-pressure phenomena in pneumonia, a disease in which death is now believed to be due to vaso-motor paralysis, the patient, as has been suggested, actually bleeding into his own vessels. To use Gibson's words:

> A pressure appreciably below normal in pneumonia is invariably of evil omen, and any considerable fall bodes disaster. When the arterial pressure, expressed in millimeters, does not fall below the pulse-rate expressed in beats per minute, the fact may be taken as an excellent augury, while the converse is equally true.

My personal results are entirely in accord with those of Gibson.

AN INTRODUCTORY STUDY OF HABIT.

By A. LE ROY JOHNSON, D.M.D., Springfield, Mass.

(Read before the Eastern Association of Graduates of the Angle School of Orthodontia, at its annual meeting at New York City, April 26, 1913.)

IN orthodontia we have heard a great deal about the influence of pernicious habits upon maxillary development, a little about the treatment of these habits, and practically nothing about the normal manifestation of *habit* in the life-history of the organism. When we remember the generally accepted fact that an intelligent understanding of pathological processes depends upon a knowledge of normal conditions, we cannot fail to realize our position. If we are to solve the problems presented by this phase of our work, we must get down to a study of the normal expression of it; then we shall have a basis to work upon, and from such a foundation will evolve scientific methods of treating its abnormal expressions. It is in the appreciation of these facts, together with a belief in the vital influence that habit has upon our work, that I have essayed to present an introductory study of it. A paper of this nature must of necessity be elementary and didactic. It is a preliminary study, first pointing out the source of the material, and then introducing the subject itself.

SCOPE OF INVESTIGATION.

When investigating any phase of human experience, recourse is first had to the mass of accumulated knowledge. As the facts of life are observed they are classified, systematized, and formulated with reference to the discovery of general laws or truths. These classifications are called sciences, but, though designated by different names, they are not essentially distinct. How can it be otherwise? —since the units of an organism, though functioning more or less separately, are equally essential to the life of the whole, and therefore the ultimate analysis of the phenomena pertaining to the life-history of the organism must result in but one great classification of knowledge.

Despite our logic, since the present-day schemes of analysis cannot explain away the facts of life, we classify our observations, and from comparative study of these classifications a conception of the whole is evolved. So it must be from a study of many sciences, or at least of the more fundamental laws upon which they are built, that we arrive at anything like a just appreciation of the value of our own.

The study of Habit involves a consideration of both physical and psychical phenomena, as expressed in the general sciences of biology and psychology.

Biology, in its broadest sense, is the science of the physical life of organisms, and at the present time implies a knowledge of molecular physics and chemistry.

PSYCHOLOGY AND ITS DOMAIN.

Psychology is the science of mental life or consciousness, and bears the same relation to the mind as biology to the body. It attempts to treat the mind analytically, to resolve it into its ultimate factors, and to observe the transition from the simple to the complex. Mental life is individual. As expressed by Royce, "Physical facts are public property, while psychical facts are private property. All may observe the same outward physical facts, while but one can be informed of his own mental state." If it were possible to interpret psychical processes as modes of motion or of physical energy, all would fall within the domain of biology. But such is not the case. How, then, since mental life is individual, and since its processes are subjective, can there be a science of it? It is a science owing to the fact that all mental activities have physical expressions, that all psychical processes are accompanied by an interchange of physical forces, and that much of our mental life depends upon more or less definable physical conditions. The science of psychology, then, is the result of study of the physical concomitants to mental activity. It is "symbolic verity." How else can a mind know itself?

In psychology there are two methods of study, one subjective or introspective, the other scientific, observing what exists in nature as contrasted with that which exists merely in the thought of the individual. The first applies more especially to the older general psychology. It consists in the psychologist's determining general laws of the mind by comparing his own mental states with those of other adult human beings. The scientific method is purely objective, and is, in consequence, undoubtedly of greater value. It is the method of experimental and genetic psychology. The former is the most recent branch of psychological investigation, and is carried on in laboratories by means of instruments which seek to determine the physical conditions of mental processes. The latter begins with a study of structure and behavior as a basis for inference regarding possible mental states. However, it is to physiological psychology, which combines both methods of study, that one turns most frequently in the investigation of habit. It is "the science of the human mind investigated by means of its relations to the physical organism." In consequence of its purpose, the subject-matter of this science furnishes a most valuable source of information. In fact, to gain such a conception of the sciences of biology and psychology in general that the material of each pertaining to orthodontia may be systematized and formulated with the ultimate aim of practical utility, they must be studied with the final purpose of ascertaining laws of development, not for the physical side alone, nor for the psychical side, but for the living unity. This, physiological psychology aims to do: "It attempts to ascertain and combine under definite laws the facts of the human nervous system and the facts of consciousness;" to unite in one classification the phenomena of the nervous system and of the mind.

DEFINITION OF HABIT.

Habit is the tendency of matter to yield more readily to subsequent influences of external force, and is manifest by increased facility of adjustment or by decreased resistance. It is the tendency to repetition, and depends upon the plasticity of matter, the physical attribute of yielding to external influences without disgregation of substance. In drawing illustrations of this characteristic from the inorganic world, Dumont says:

> Everyone knows how a garment, after having been worn a certain length of time, clings to the shape of the body better than when it was new. It costs less trouble to fold a paper when it has been folded already. The sounds of a violin improve by use in the hands of an able artist, because the fibers of the wood contract habits of vibration conformed to harmonious relations.

In the organic world the "law of habit" forms a part of the groundwork of life. Every phase shows signs of its influence—the moral rules, the intellectual acquisitions, and the physical activities both of the individual and the race. It is agreed to be the cornerstone of the various theories of development, since with contractility it is fundamental in organic adaptation. It "simplifies movements, makes them more accurate, and lessens fatigue." It reduces action to the realm of the subconscious, and makes possible the highly complex adjustments and activities of our daily lives.

Of protoplasmic substance, nervous tissue is by far the most highly endowed with this property of plasticity; in fact, it owes its very existence to its expression of this characteristic. Here, however, the principle applies to inner structure rather than to outer form. The nature of the effect of stimuli upon the inner structure of nerve tissue has been a source of much speculation, yet at present there is very little definite information to be obtained. In the higher animals the nervous system links the life processes of the organism together in accordance with the external and internal conditions acting upon it, so it is quite evident that a study of the movements of an organism must be founded upon a knowledge of the nervous system, its structure and function.

HABIT-FORMING INFLUENCES.

Now, since habit is a tendency, its study is, in the main, the study of the influences to which it is subject. These influences are the causes of all action, and philosophers see fit to divide them into two great classes, the *external* and the *internal*. As will be seen later, this division is in recognition of the limits of our methods of investigation.

The External Influences include all stimuli from the world outside the organism; stimuli from within the organism itself other than nerve tissue, as the kinesthetic sensation or consciousness of our own movements; and also stimuli from within the brain through its association centers.

The Internal Influences include the type known as mental initiative, free-will, or spontaneous variation, and the idea is clearly conveyed that these are not distinct influences independent of the external class. Some of the activities of animals cannot be explained by either their present sensory disturbances, past experiences, or habits, but seem to possess a certain spontaneity of action, which stubbornly resists reduction to the great external class of influences. At times, what have seemed to be spontaneous activities have been explained, but leading writers think it wise to retain, at least provisionally, the separate class. It is quite obvious that phenomena cannot influence our ideas until they have first impressed our brain through our senses. It is of interest here to note how the view of James that "A particular emotional condition is due to a particular physiological state of some peripheral tissue" received a qualifying jolt by Prof. Sherrington's observation that "A dog was capable of exhibiting much emotion even after all neural connection between a very large portion of the periphery and its brain had been severed some months previously."

Rather than discuss in detail these great divisions of influences as possible causes of habit formation, I think it more advisable, at this time, to suggest three important factors in the development of a specific habit movement. But let it be clearly understood that the division which I make is solely for the purpose of study, and is not to be thought of as distinct in effect; also, that the potency of these factors is due largely to the inherent tendency of neural tissue to repeat adjustments, and of impulses to pass more readily along channels through which others have just passed. These divisions are, first, the nature and order of stimulation; second, the result of action; third, inherited instinctive tendencies. I name them in order of scientific value, although it seems better to consider them in inverse order, beginning with instinctive tendencies.

INSTINCTIVE TENDENCIES.

The conceptions of instinct conveyed by different authorities vary to quite an extent. Some express it as being of a general reflex type, called forth by a particular sensation, perception, or image. They consider instinct and reflex as synonymous, definable as "innate reactions to stimuli." Instinct they apply to the more complex reflex which may be attended by consciousness and desire. Other writers of equal authority say that a concrete explanation of instinct must be looked for, at present, in other fields than science, perhaps metaphysics, or wherever we can explain sympathy. They say that our feeling is what happens in the consciousness of animals acting upon instinct.

Professor Loeb has made a careful study of what he calls tropism—"the innate tendency of an organism to react in a definite manner to external stimuli." His investigations were made upon the simple organisms of low life, and, from his point of view, a nervous system is not essential to these tropisms; organisms without a nervous system exhibited these tendencies, and also those normally possessed of such a system retained for quite a period the power of discriminating sensitiveness, after the system itself had been deprived of its functioning power. He says in conclusion: "I consider a complete knowledge and control of these agencies the biological solution of the metaphysical problem of instinct and will."

But notwithstanding this variation in opinion, it seems agreed that the human organism is born with an extremely large number of tendencies to certain sorts of action, and that the first reaction in a given situation is strongly influenced by these tendencies, whether they are structural determinants or natural dispositions. The influence of the instinct is upon the primary reaction.

Many instincts ripen at a certain age, then pass away. Sucking is one which at birth is strong in all mammals. But it is difficult to realize its existence unless furnished appropriate stimuli during the first few days of life. It would almost seem that instincts appear at different periods as accompaniments of adaptation. Now, as we recognize the influence of instinct upon action, so shall we appreciate the restricting influence of the phenomenon of habit upon the realization of these innate tendencies. And further, the repetition of a reaction which has vitalized an instinct to the profit of the individual, if continued under conditions of abnormal nervous equilibrium and forces productive of the same, will persist and induce disproportion and deformity. May not the normal tendency for old habits to assimilate new ones, and for new impressions to revive old habits, predispose this abnormal expression under such conditions?

THE RESULT OF ACTION.

As yet our conception of habit does not take into account a factor which might select the movements it is desirable the organism should repeat. No provision has been made for the exercise and development of movements upon which life processes depend as contrasted with all other movements. And yet we know that some forms of reaction are more liable to be repeated than others; that painful movements are inhibited is a fact verified in the lowest living creatures. So it is that a consideration of the result of action as a determining influence upon its repetition will extend our knowledge of the significance of the law of habit as expressed in the living organism.

If a movement or action result advantageously, if it elicit a feeling of pleasure, satisfaction, relief, or desire, the chance of its being repeated is greatly enhanced. The apparatus concerned in its exercise is strengthened. It is upon this conception that Baldwin, in his "Mental Development of the Child and Race," builds his circular reactions as a basis for imitation. He says that "Accommodation is the outcome of habit. The result of every attainment of a beneficent experience is to discharge an excessive pleasure wave of movement from which new adjustments are selected." In contradistinction to Baldwin's idea of pleasure as the determining factor in the repetition and extension of activity, Royce suggests restlessness. He says that an unsatisfactory result will lead to the repetition of movements when few sources for variation are available, and, under reverse conditions, to efforts at movement in new directions. It is quite evident that both recognize the determining influence of the result of action upon its repetition.

Professor Freud, in his "Three Contributions to the Sexual Theory," discusses certain habit movements in children as a manifestation of infantile sexuality. Thumb-sucking he takes as an illustration, showing how, as a result of a rhythmic sucking or rubbing contact, a portion of the skin or mucous membrane may behave like an erogenous zone, and the child find gratification in the simplest way. Notwithstanding the wide difference of opinion among his critics regarding the merits of his work, it is pregnant with many suggestions. And one cannot fail to appreciate his viewpoint that every child is born with instincts which furnish desires and cravings of a primitive nature, and that these are molded into energies of value under the influence of a healthful environment acting through a normal nervous irritability. If the reverse is true, then under the pressure of conventional civilization and an unhealthy environment, a hypersensitive nervous system will develop unlimited variation. Habit movements in children are, to an unknown extent, expressive of the conditions of nervous equilibrium in the growing organism.

NATURE AND ORDER OF STIMULATION.

The first factor in habit formation which I mentioned was the nature and order of stimulation. That it is the most prolific source of study can hardly be questioned in the light of the nature of our subject. We know that a habit movement is primarily the result of a reflex or impulse. Consequently a study of the nature and order of stimulation as a factor in the development of a specific habit is a study of the cause and character of the primary reaction from which the habit movement has evolved, and of the increased susceptibility to different expressions of this primary cause, as a result of organic modification from exercise. Such a study, as intimated, must be founded upon a knowledge of the structure and functions of the nervous system.

THE NERVOUS SYSTEM.

So far as the nervous system will admit of scientific explanation, it must be considered as a molecular mechanism. Such parts of it as can be controlled for experimental purposes demand a physical and mechanical interpretation. The inadequacy of a mechanical theory, however, is obvious when we realize that, to explain the acts of the nervous system is to explain what it is—since, when the nerve dies, the physiological functions depart. Nevertheless, the nervous system is a mechanism; but it is a biological one, and distinctly so. Its plan shows the marks of growth and adaptation, of modification from exercise. The structural units are arranged in a systematic whole; they are dependent upon each other for the part each plays in the system. For this reason it is not possible to isolate perfectly the elements, such as a nerve fiber or cell, to study its normal functions. Just so far as they are separated from the other parts, they are in abnormal conditions and show abnormal results. Notwithstanding this fact, many important discoveries in the general physiology of nervous tissue have been made by experimental methods upon detached parts. But the results of such experiments assume their real value through an appreciation of the fact that the mutual condition and reciprocal action of the units are essential to the normal nervous mechanism. A scientific study of human action is inseparably linked with general nervous physiology.

PURPORT OF THE RECENT INVESTIGATION TO ORTHODONTIA.

The purpose of orthodontia is to assist in establishing and maintaining normal occlusion of the teeth of the human individual. This end we have endeavored to realize through the direct application of artificial force. The limitations of this method are evidenced by clinical experience and scientific data. Both call for the utilization in treatment of those natural forces to which all cases are in the end referred. The teeth are units of the human organism, and so bear a definite relation to the whole life-history of it; consequently, an intelligent conception of the influences to which they are subject can be formed only from a thorough study of the fundamental expressions of life activity. I have endeavored to emphasize one—the Law of Habit.

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CORRESPONDENCE.

THE DENTIST'S RIGHT TO ADMINISTER ANESTHETICS.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—The Legislative Committee of the Ohio State Dental Society takes a pride (a pardonable pride, we believe) in telling the dental profession through the COSMOS that the dentist's authority has been widened here in the State of Ohio by the passage of the Senate bill No. 220. Said bill gives legal authority to the dentist to practice the administration of anesthetics for any purpose.

Hitherto a construction of the medical practice law limited the dentist's right to give general anesthetics to their administration for dental operations alone. Under the new law a dentist has the right to administer anesthetics for a physician or surgeon for all sorts of major or minor operations.

This extended power was asked for by the organized physicians of this state, as well as by the dentists, and the work that has been done this winter by the dentists of the state through the Legislative Committee has only cemented more firmly the bonds of fraternal friendship that already existed between the professions of medicine and dentistry.

W. I. JONES,

Ch'man Legislative Committee.

COLUMBUS, OHIO, April 26, 1913.

Proceedings of Societies.

NATIONAL DENTAL ASSOCIATION.

Sixteenth Annual Meeting, held at Washington, D. C., September 10 to 13, 1912.

(Continued from page 539.)

THE CLINICS.

(Continued.)

CAST INLAYS.

Dr. Joseph Head, Philadelphia, Pa. "Compound Approximal Contour Gold Inlay, with a Gold Matrix, Moss Fibre Gold, and 22-Karat Solder."

The method demonstrated by the clinician is as follows: An accurate impression is made of the cavity with pure gold plate, 1/300 of an inch in thickness. A mass of moss fibre or any sponge gold is then molded in the fingers until it has the form of a wedge that will approximately fill the cavity when condensed. This wedge is pushed into the gold form while it is resting in the tooth cavity, great care being taken to burnish the moss fibre gold toward the wall of the adjacent tooth, so as to make a dense plate of gold that will serve as an approximal contact point. The filling being thus formed, more gold being added to obtain the desired contour, the gold matrix with the molded moss fibre gold is removed from the cavity and is filled with 22-karat solder, great care being taken that no solder flows on the outside of the contact point. When this is finished, the filling can be trimmed and polished in the usual way.

Dr. L. L. Zarbaugh, Toledo, Ohio. "Removing Impressions, Attaching and Chilling Sprue Wire in the Mouth."

The sprue wire is attached to the end of a nozzle on a water-syringe by means of a set-screw. The wire is heated and inserted in the wax, and a jet of cold water chills and firmly attaches the wax to the wire. The wax model is then removed and invested.

Dr. H. H. Street, Baltimore, Md. "Facing Inlays with Silicate Cement."

The cavity is prepared in the same manner as for a gold inlay, and the wax model is made; then the labial surface of the wax is carved away, and the model invested and cast. The gold is cemented into place, and the labial surface filled with any silicate cement. It is best to make undercuts in the gold before using the silicate cement.

By using this method we have all the advantages of a gold inlay without any gold showing.

Dr. C. O. Simpson, St. Louis, Mo. "Details in Inlay and Treatment Work."

The clinician demonstrated the following methods of practice: A staple of gold is incorporated in mesio-disto-occlusal wax inlay models to prevent their distortion. Hollow inlays are made by investing the external surface and the margins of the wax models, with the cavity surface exposed, so that the interior may be removed as desired without danger of distortion or injury to the margins. The desired contour on the approximal surface of inlay models is built up by additional wax before investing.

The clinician also showed some technique cases which illustrated the accuracy of fit to be obtained with Welden's Casting Porcelain. The clinician also demonstrated the ease with which cotton dressings may be carried to place in root-canals by the use of Dr. Funk's Apex-treating Broach. This broach has a small notch in the end to carry the dressing forward, but offers no resistance on its removal.

Dr. H. Herbert Johnson, Macon, Ga. "Other Methods of Making Gold Inlays, and Ideas in Crown Work."

The clinician demonstrated that in many cases the making of inlays by the Alexander Plastic Gold method is simplified by using a matrix in the cavity of No. 60 gold foil, or No. 20 rolled gold. The use of plastic gold was also shown in mounting crowns, backing teeth, etc. The clinician also showed how fillings of a high karat can be made for exposed surfaces by burnishing moss fibre or Corona gold into a matrix of No. 60 gold foil in the cavity, and can afterward be further solidified with a limited amount of 22-karat solder flowed into its surface.

Cases, represented by models, of broken lower jaws set with an original burnished gold splint to be cemented on the teeth, were also shown and explained. The use of Price's artificial stone was shown in the making of Alexander's hood abutments. This method was recommended because of the hardness of the stone, which renders it possible to do burnishing on its surface. This artificial stone will withstand a high heat, and annealing and soldering can be done directly on a model made of this material.

Dr. W. C. Gowan, Peterboro, Ont., Can. "New Cavity Forms for Gold Inlays, Shown by Preparations upon Extracted Teeth. Impressions, Models, Wax Patterns, and Castings."

The clinician demonstrated a departure from hitherto established cavity forms, which is rendered possible by Price's artificial stone and a new technique.

A cast inlay of complex form differs from a corresponding foil filling, in tensile strength, retention, manner of insertion, and form necessary for resisting stress.

Gold alloyed with 5 per cent. of platinum or coin silver, or reinforced with iridio-platinum wire and cast under high pressure is stronger in all ways than is a foil filling of like size and form.

Certain interior dimensions and a certain form of the cavity are necessary for the insertion of foil which are not necessary for the insertion of an inlay.

To withstand masticatory stress an approximo-occlusal foil filling requires a broad, flat gingival wall at right angles with the axis of the tooth, as a foundation, and a dovetailed step on the occlusal aspect as a brace. An inlay, on the other hand, being a single rigid piece, is supported by the whole transverse area covered by it. Its hoodlike hold in the occlusal portion of the cavity is much stronger than that of a foil filling, so that in order to resist occlusal stress, a relatively smaller gingival wall, and sometimes none at all, is needed.

When the dentin underlying a marginal ridge is not destroyed by caries, broad rectangular preparation of the proximal portion of the cavity only transfers a part of the stress-resisting area from the step to the gingival wall, without increasing this area at all. Such preparation for a gold inlay, while perhaps necessary for making a wax pattern in the mouth, is obviously unnecessary for the purpose of retention or resistance against occlusal stress. It is, moreover, a cruelty when practiced in vital teeth, and a waste of tissue in any tooth. Thin edges of a gold inlay can be extended to any desired distance beyond the necessarily deep parts of a cavity; therefore the extension of the cavity outlines to immune areas does not require a like extension of deep parts designed for retention or resistance, as in foil fillings.

By use of an impression and stone model, the complex cavity preparation for gold inlays can and should be made simpler and less wasteful than that for any other filling.

A thickness of gold sufficient to withstand the impact of opposing teeth without changing form, and a depth and distribution of parts effectual for resistance and retention when cemented, are always necessary; but no advantage is gained by adding to the mass of gold in excess of these requirements—the remainder of the cavity space, if any, would be better if filled with cement.

With our present facilities, cast inlays do not exactly fit cavities; they fit approximately. The joints are closed by burnishing. Speaking from experience, the greater the mass of gold in a cast inlay, the greater will be the errors in fit due to small though unavoidable inaccuracies such as arise from expansion or contraction in the wax, investment, or gold. Besides, the massive casting is more stubborn to manipulate in case of a small error in fit than is a thinner one.

Ordinary approximo-occlusal preparation. After excavating the débris to ascertain the extent of caries, the cavity is filled with a temporary cement. With a safety disk moistened with water the approximal surface, cement and enamel together, is cut flat, until a satisfactory cavity outline is established by the margins of the facet so prepared. It is not necessary that this facet be exactly flat, but it will be found that a flat preparation of either approximal surface of a molar or bicuspid will terminate in an outline closely measuring up to the ideal extension for prevention. The plane of this facet may be inclined slightly to the long axis of the tooth occlusally, to allow of withdrawal of the impression, or to terminate the facet gingivally without a step.

The occlusal step is prepared with a square-edged wheel, so as to terminate in a pit or groove to be deepened for the reception of a hook on the inlay. The margins upon the occlusal surface are beveled with stone points.

With a tapered fissure bur a groove is cut parallel to the long axis in the cement, as deep axially as the tooth is decayed, and reaching from the step to the dentin at the gingival termination of the carious area. This groove may vary in form or depth axially, according to the space for retention or resistance required in each case, but it always marks with certainty the gingival termination of the cavity, beyond which only the beveled enamel extends.

If the impression of the gingival outline should be mutilated in withdrawal, the end of this groove marks the place so well that no error need be made in building the wax or finishing the gold. The rib upon the casting produced by this groove serves to strengthen the casting, to guide it to place in setting, and to afford the cement a firm grip.

For mesio-occluso-distal cavities, the preparation is very simple. The mesial and distal portions are united by a square groove with beveled margins.

Chisels are not used in this method of preparing cavities. Before setting the inlay, the temporary cement filling and all carious tissue are removed.

The advantages of this new method of preparation are:

(1) Conservation of tooth tissue and consequent economy of time and labor. Conservation of the strength of the cavity walls and avoidance of painful cutting and needless removal of tissue in the region of the marginal ridge.

(2) An abrasive disk moistened with an excess of water cuts sensitive tissue with less pain than other instruments cause. Enamel cut with wet abrasive is in better condition to resist an attack of any kind than if cut with steel instruments.

(3) The impression and stone model technique, for which this form of preparation is intended, lessens the work done in the mouth, to the comfort of patient and operator.

(4) The form of the casting determined by this mode of preparation, especially of a mesio-occluso-distal cavity, makes the control of shrinkage in the solidification of the gold upon the stone model effectual, so that the inside di-

mensions of the casting are maintained, resulting in a more accurate fit.

(5) The relatively thin inlay, with consequently larger quantity of cement or tissue between the gold and the pulp, better protects the pulp against thermal irritation. The greater overlap of the joints protects the cement in case of inaccuracy of fit, and by their thinness the margins of the casting yield to the burnisher, allowing of perfect closure of the joints. An inlay that does not touch the interior surface of the cavity at all points is not so difficult of management in case of misfit, as a massive casting always is when designed to fill the whole interior of a complex cavity.

(6) The gold being outside the tooth tissue rather than inside—*i.e.* the tough material inclosing the brittle—the latter is better protected against stress and abrasion. This permits the conservation of walls too thin or weak to be allowed to remain in any other form of cavity preparation or design of inlay.

(7) The principles, if not the details, of the preparation described are applicable to any complex cavity where a gold inlay is indicated, no matter whether in a molar, bicuspid, or incisor.

ORAL SURGERY.

Dr. Don M. Graham, Detroit, Mich.

This clinic consisted of radiographs showing various dental lesions, and illustrating the method of treating fractures of the jaw by means of wire anchorages and fracture bands.

The wire anchorage and immobilization of the mandible is the method most frequently used. Fracture bands can be made to do good service also, but the wire anchorage would appear to give a wider range of usefulness and does not require the same close attention for safe retention, as do the fracture bands. Wires can be adjusted for anchorages about the teeth with almost absolute assurance that they will remain where placed. Copper or its alloy is the best material, and a 22-gage annealed copper wire will be found of sufficient strength for most cases. A German copper alloy of from 24 to 26-gage, as used by orthodontists, is employed by the clinician.

There appears to be no universally satisfactory method of fixation, but binding the jaws together seems to promise the best results. The comparative comfort and the results obtained are sufficient justification for such a procedure, and it is very seldom that objections are made to this method by the patient. The difficulty of obtaining nourishment has been greatly over-estimated, and the average patient, after such a fixation, can go about his usual duties with comparative comfort. Patients should return at frequent intervals for inspection and adjustment of the apparatus. The wires will sometimes demand tightening, and the prevention of oral sepsis will necessitate careful oversight of the case until treatment is concluded.

Dr. John B. West, Elmira, N. Y. "Hyperemia in Dentistry."

The clinician demonstrated the technique of the application of Dr. August Bier's method of producing obstructive hyperemia to dentistry.

The oldest and most favored means of producing obstructive hyperemia is the elastic bandage. Soft rubber is generally used, but for dental purposes garter elastic is preferable. The elastic should be about one inch wide and about eighteen or more inches in length, with a hook at one end and a number of eyes at the other.

The bandage is placed around the neck for the purpose of producing passive hyperemia of the superficial veins of the head. By passive hyperemia we mean a condition in which a part of the body has its vascular net more full on account of a diminished venous outflow.

The bandage is placed about the neck below the larnyx. It should feel somewhat like a tightly fitting collar, but only the superficial veins should be partially obstructed, and there must never be an increase of pain. Its action may be intensified by placing upon the jugular vein a pledget of soft cloth. Soon after the bandage is adjusted, the focus of acute inflammation will show an increase in the cardinal symptoms, viz, marked redness, heat, and swelling, but a slow definite diminution of pain. If the bandage is placed about the neck for combating acute inflammation, it should remain in place from twenty to twenty-two hours, then be removed to allow the slight edemic condition to pass away. For chronic affections a shorter time will suffice—from two to four hours per day is generally sufficient.

The suction cups used for producing passive hyperemia are made of glass. The larger cups are intended for use on the outside of the jaw, while the smaller ones are for use on the gums. By means of a short piece of stout rubber tubing the suction cups are connected with the saliva ejector, and by regulation of water-pressure, suction of any desired degree is readily obtained. The suction for the ordinary cases of pericemental trouble is applied but once a day for about three-quarters of an hour, five minutes at a time, with three minutes' intermission, repeating the suction five to six times at the same sitting.

In certain stages of pyorrhea, congested hyperemia is of marked benefit. A special suction cup has to be constructed for each individual case. For the lower anterior teeth, the clinician uses an Angle impression tray from which the handle and heels have been cut off and a hole drilled in the center of the tray, to which brass tubing is soldered. The tray is filled with modeling compound, and an impression of the lower anterior teeth is taken. After the tray has been removed from the mouth, the modeling compound is cut away from the inner surface of the cup, leaving a thick continuous roll of compound covering the rim of the tray. By means of the rubber tubing, the tray is connected to the saliva ejector. The suction must be of mild degree, and is applied but once per day.

Bier's method of producing hyperemia is indicated in the treatment of all painful disturbances of the periosteum of the teeth and jaws. Some of the advantages of hyperemia treatment over the therapeutic procedures are suppression of infection and avoidance of suppuration, diminution of pain, and culmination of pathologic processes. Large incisions into abscess cavities may be entirely dispensed with, simple punctures, which naturally heal quicker, leaving very small or no scars, are usually sufficient for drainage with the suction cup. In the very early stages an artificially increased inflammation may successfully abort an incipient infection, and in already existing suppuration the processes of demarcation and final resolution are materially hastened.

Dr. H. L. Oliver, Dayton, O. "Restoration of Lower Mandible."

The cause for removing a section of the mandible in the case presented by the clinician was sarcoma originating in the region of the second bicuspid. The entire portion of the lower mandible was removed from the canine posterior to the glenoid fossa, including the coronoid process. No matrix was left.

The technique employed in the restoration of the mandible was as follows: In the remaining portion of the mandible eight teeth were left. Shell crowns were made to fit the two centrals, the left lateral, and the second molar, the first molar having been extracted. After the crowns had been fitted, an impression of the lower mandible was taken. The mandible should be drawn to the left in order to get the muscles at their highest point. An impression of the upper arch was taken, and models were made of both jaws. The case was articulated with the crowns in position. Before pouring the model, a thin film of wax may be spread on the inside of the crowns. After the model is made the crowns may be easily removed by warming. The three anterior crowns were soldered together on the incisal edge in order to insure strength. A 14-gage wire of clasp metal is used. The angle-bar is then adjusted, and soldered at the cervical portion of the crowns. The latter can now be placed on the model in its original position. In order to obliterate the undercut, arising from the wire being round, a little plaster is spread along the sides of the bar before packing, otherwise the rubber would so engage the wire as to make separation after vulcanizing difficult. A clasp standardized, adjustable for tension and made to engage exactly a 14-gage wire of clasp metal, is used.

A lingual bar is used on the lower arch, with lugs fastened for the attachment of rubber where a portion of bone has been removed. Facial expression is restored by building up with rubber and articulating to the upper arch. The case is finished in the usual way. If occlusion, etc., is satisfactory, the abutments are tapped in position on the respective teeth, and the whole appliance is cemented in position at once.

CROWN AND BRIDGE WORK.

Dr. F. E. Buck, Jacksonville, Fla. "Soldering in Bridge Work."

The object of this clinic was to show the advantage of using solder in long strips and being able to change the position of the work instantly without being obliged to lower the temperature.

The solder flows by gravity to the spots where it is wanted. Less solder is used, and bubbles are entirely eliminated.

The solder in this work is made up into strips, eight inches in length, and one-fourth of an inch in breadth. The invested bridge is held in an adjustable soldering tray which can be moved instantly to any desired position.

Dr. R. F. Rowdybush, Decatur, Ill. "(I) The Injurious Effects of Poorly Constructed Crowns and Bridges. (II) Proper Construction for the Conservation of Hygienic Conditions of the Mouth."

I. The clinician showed poorly constructed pieces of crowns and bridge work and their injurious effects upon the surrounding tissues, also the systemic effect produced by wearing an unsanitary crown or bridge.

II. Sanitary bridges were shown.

Dr. P. B. Laskey, Marblehead, Mass. (I) "Refinement of Impression. (II) Repairing Inferior Bridges in the Mouth. (III) Compound Hypodermic Syringe. (IV) Stiffening Logan Crown Posts."

I. The clinician's method consists in eliminating all superfluous material. This is done through the form of the cup employed.

II. A tooth is fitted to take the place of the broken artificial one, and is placed in position; the pins should extend well through the backing, which has been countersunk. With a piece of firm metal charged with compound plaster or other impression material, an impression of the labial surface is taken and allowed to harden in place. With a pair of strong pliers the ends of the pins are riveted down to the backing.

III. The instrument demonstrated is controlled by a lever which increases the power fourfold. The labor is divided, one hand controlling the needle and the tissue, the other applying the power.

IV. Strong, short-beak pliers were shown adapted for compressing the post.

Dr. J. L. Kelly, Chicago, Ill. "Removable Bridge Work."

Dr. Kelly demonstrated removable bridge work in which the principle of retention is a dovetail obtained by converging or diverging the attachments toward or from each other, or placing them in such relation to a tuberosity or other projection of the mouth that a dovetail or undercut is produced.

The attachment consists of three parts, viz, holding post, adjusting tube, and bridge tube. The holding post is made of round iridio-platinum wire, generally 14 gage, and one-eighth of an inch long. The adjusting tube and bridge tube are made of iridio-platinum in steel dies. The adjusting tube telescopes the holding post, and is telescoped in turn by the bridge tube.

After the attachments are made, the holding post is soldered to the cope, which is constructed as for a Richmond crown; then the adjusting tube is cemented to the holding post to center the bridge tube, which is made to telescope it. The bridge tubes are connected by a bar, completing the framework for the bridge, the remainder of which may be constructed as in the making of a plate.

When this denture is completed, the adjusting tubes which have been cemented on the holding posts are removed, so as to give play between the bridge tube and the holding post. This play is necessary to put the bridge in harmony with the flexibility of the tissue, thus preventing any strain on the roots.

If the play becomes so great as to loosen the bridge in time, a very thin adjusting tube may be cemented on one or as many of the holding posts as is necessary, until the desired retention is obtained. This makes it possible for the dentist to control the retention at will, without weakening or changing the attachment.

Dr. D. C. Clark, Blacksville, W. Va. "Restoration of Broken-down Roots for the Insertion of Porcelain Crowns."

The clinician demonstrated two methods of restoration, as follows:

(1) If the operator desires to place a porcelain crown on the root or roots of any tooth that is broken down on one side below the free margin of the gum, a small groove is drilled around and in the end of the root at the portion where it is broken down. A slot is drilled into the canal and around for a short distance on the inside. The canal is filled with amalgam, and the crown is placed in position while the amalgam is yet soft, to secure a perfect joint between the crown and the amalgam. The crown is then removed and placed back in position with cement. This method causes much less pain than the placing of a gold band in cases where the gum adheres closely to the root.

(2) The broken-down side is restored by placing around the end of the root a gold band wide enough at the broken side to extend above and fill out the broken place. The band is to be very narrow for the balance of the distance around the root, so that it covers the joint between the root and the crown, and also strengthens the union.

If the band fits the end of the root, and also the tooth, the broken-down part will be filled with cement when the crown is in position. This cement will not dissolve any more than if employed according to the ordinary method of setting a crown.

Dr. Edward C. Hoffman, Plainfield, Ill. "Bandless Crowns."

A method of substituting metal or porcelain for enamel on teeth that have been worn down by mechanical abrasion was demonstrated by the clinician.

First the tooth is devitalized, the root-canals are treated and filled in the usual manner, and about one-eighth of an inch of the tooth is cut off; next an opening is cut in the center of the crown of the tooth about one-eighth of an inch in depth, and from one-eighth to one-fourth of an inch square, according to the size of the tooth. This opening is filled with inlay wax. The patient is requested to bite, and the cusps are carved in wax. The wax model is removed and cast in any metal desired, but, if porcelain is used, the space should not be less than three-sixteenths of an inch. The inlay is cemented to place, and the margins are finished in inlay wax.

Dr. J. G. Reid, Marion, N. C. "Suggestions for Crown and Bridge Work and Operative Dentistry."

This clinic showed a method of making a post for a cast crown, casting the post and crown together. A little piece of ordinary iron wire is cut and on it sufficient casting wax is built up to fill the canal. The wire is placed in position, allowing it to extend far enough in the root-canal to hold the facing when placed in position; then the crown is waxed up and carved ready for investing. The sprue is attached to the waxed post and the crown is invested. When the wax melts out, the little iron wire drops out, and when the cast is made, the post and crown are in one piece.

The clinician also demonstrated his method of casting into diatoric teeth. He also demonstrated a method of repairing broken facings in bridge work as follows: The old pins are ground off and the backing is slit up to the pins. The backing is ground off and a facing selected and set in position. A piece of 36-gage pure gold is then burnished over the back of the facing to extend over the tip, and the pins of the backing are pushed through the gold. The facing is held in position with sticky-wax, removed with the impression, invested, and soldered.

Dr. Reid also showed two cavities, one prepared and one filled, in the lingual surfaces of lateral and central incisors, the feature of the filling being that it was started with cement.

Dr. J. W. O'Bryon, Lawrence, Kans. "A Bandless Crown Which Reinforces the Root."

The crown described by the clinician is especially indicated in cases where the root is subject to fracture or splitting, as in lateral incisors, but it is applicable to any of the six anterior upper teeth. The root is prepared labially as for any bandless crown, being ground just below the free margin of the gum, to make sure that the joint between the root and crown is hidden by the gum.

Lingually, however, the root is ground only to within one millimeter of the gum line. A lingual step is then made by cutting away with a small knife-edged stone the lingual side of the root to a depth of about one millimeter, this step to extend toward the root just below the free margin of the gum. The root can be more perfectly squared by preparing it, following the stone, with a sharp square-end fissure bur. The root-canal is then enlarged until a No. 4 round bur can easily be passed into it. A round 16-gage clasp-metal post is to be adapted to the canal with the end projecting sufficiently to reach the bottom of the hole in the base of a detachable-post crown —such as the Davis or S. S. White. The next step consists in grinding the crown labially to fit the labial surface of the root—which usually requires very little grinding. The lingual two-thirds of the base of the crown should, however, be ground considerably more in order to produce a V-shaped space which will insure sufficient bulk to impart adequate strength to the cast base with its lingual projection.

Having the crown thus prepared and fitted to the labial portion of the root, and the post adjusted to the opening in the base of the crown and reaching its bottom, a plate of pure gold of 34-gage is adapted to the lingual two-thirds of the base of the crown and perforated at the opening into the crown so as to receive the crown end of the post. The object of this plate of gold is to reinforce the thin portion of the wax pattern for the cast base and to prevent its becoming loosened from the post during manipulation. This plate of gold having been adapted, the crown end of the post is inserted through it into its place in the crown, and then carefully removed together with this plate, and the two are tacked with a bit of 18-karat solder. The little plate with the post attached is then placed in position on the base of the crown, and a small portion of Taggart inlay wax is softened and adapted to the lingual two-thirds of the base of the crown, the wax being shaped to approximate the form of the cast base to be, and without very much excess of material.

The crown and the adapted wax are then warmed together and placed in position on the root and pressed home, and with a warm, flat-sided burnisher the wax is pressed lingually closely to the root. It is then carefully carved to conform with the perimeter of the root. The crown is then removed, leaving the post and wax base pattern *in situ*. The wax may be further carved if necessary, and then removed and cast to the post in 22-karat gold. The remainder of the operation is the same as for any cast-base crown.

The finished crown has a 22-karat gold lingual extension, engaging with the step in the prepared root, which affords more strength than the ordinary band, absolutely prevents rotation of the crown, and being flush with the outline of the root, causes no irritation of the lingual margin of the gum.

Dr. S. D. Ruggles, Portsmouth, Ohio. "Crown-Setting Pliers."

The purpose of this clinic was to demonstrate a new instrument for setting crowns and regulating bands.

When a crown is to be set, the mouth is usually packed with cotton rolls, bibulous paper or napkins, and when into

this already obscured field the crown is introduced, being held between two fingers, it is seldom that a clear view is at all possible.

The nervous strain at this point of the operation often results in a mishap, or in placing the crown in an incorrect position, resulting in failure.

The pliers illustrated have been used for two consecutive years, and have proved beyond a doubt their adaptability to holding and accurately placing any crown in its proper position on a bicuspid or molar without at the same time obstructing the full view of the root. A four-tooth bridge can be manipulated with the same ease as a regulating band by means of these pliers.

Dr. C. B. Reed, Topeka, Kans. "Steele's Facings in Plate Work."

Dr. Reed demonstrated the utility of Steele's facings as applied to "short-bite" dentures, the special feature being that of soldering gold plate extensions to the backings with dovetail terminals to engage in the vulcanite, resulting in the greatest possible strength, and at the same time reducing the bulk and thickness to an absolute minimum. Such a denture is indicated in those exceedingly troublesome cases where the mechanical stress is such as to force the teeth continually from the plate when attached in the conventional manner.

Dr. Reed also exhibited various partial plates, both of gold and rubber, showing the peculiar adaptability of Steele's facings in cases of extreme absorption. These facings being replaceable render possible the substitution of longer teeth as resorption progresses.

Dr. C. E. Peters, Pittsburgh, Pa. "A Banded Porcelain Crown Combining All Necessary Requirements with a Time-saving Technique in Its Construction."

The preliminary preparation of the root demonstrated by the clinician is the same as for a Richmond crown. A gold ferrule is fitted to the root, and to this a floor of 36-gage pure gold is soldered, allowing the solder to attach only the lingual half of the circumference. A 14-gage tapered iridio-platinum or platinized gold wire is then fitted to the root-canal, allowing it to project about three-sixteenths of an inch. The cap is then placed upon the root, and the pin forced through it to place. This is attached to the cap with sticky-wax, removed, and placed into a soft asbestos block, which holds the parts in their proper relation until soldered. The labial portion of the band is then cut away. Before being placed upon the root for final adaptation, the labial portion of the root end is trimmed beneath the gum sufficiently to hide the joint, using a large bur or small stone. The cap is then placed, and the labial portion burnished to the root. A detached-post crown of the proper size is ground to fit, using thin carbon paper to secure the joint. The crown is then cemented to the cap, removed, and ground flush with the side of the cap, polished, and cemented to the root. This method combines pleasing results and interchangeability with strength, simplicity, and economy of time.

Dr. J. E. WATERBURY, Los Angeles, Cal. "A Quick and Accurate Seamless Gold Crown."

The clinician demonstrated a method of reshaping the ordinary, conventionalized cusp of the die-plate-made crown, by softening the gold in alcohol at white heat, replacing it on the tooth in the mouth, and allowing the patient to bite it into perfect occlusion. The points of the cusps are extended and shaped with special pliers in such a manner as to provide the best possible masticating surface for the finished crown. The pliers are also used to form the correct contact points with the adjoining teeth.

The clinician also showed a method of coaxing the solder which reinforces the cusp back to the center and away from the sides of a crown, by dropping a small bit of plate gold, fluxed on the lower side, into the invested crown and reheating. The solder will flow to this piece in the center and distribute itself evenly over the whole floor of the cusp.

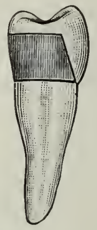
Dr. W. A. CAPON, Philadelphia, Pa. "Porcelain Bicuspid Jacket Crown."

The preparation of the crown or remainder of crown—more often the latter—is very similar to that for a gold cap, with the exception that the buccal surface must be ground to allow for the veneer, as shown in Fig. 1.

The circumference is measured with wire, and the band cut from platinum plate, gage 31, allowing for the lap-joint always used in this crown as in other porcelain jacket crowns. The joint is soldered with a small quantity of pure gold, then the edge is cut to conform to the gum margin, and the root is fitted as shown in Fig. 1. The joint of the platinum band is placed on the lingual side. If found to be a little large, the edge is compressed with bent-nose pliers; but in any case, the fitting must be corrected before adding porcelain. The band is then marked to be cut almost even with the tooth-crown, or at

FIG. 1.

FIG. 2.



least closely enough to be free of the opposing tooth.

The band is removed and platinum foil is burnished over the end of the root or the portion of the tooth to be crowned, and the band replaced. Porcelain body is then packed over the whole surface even with the edges of the band. A veneer is put into position, or the face may be carved, and the whole crown is drawn and placed in the furnace ready for fusing. After the first baking, it is placed on the root and the bite noted, and the crown is then finished by making cusps of porcelain and fusing a second time. When completed, the outward appearance of this crown is as represented in Fig. 2. The platinum foil is allowed to remain.

Dr. W. W. FLORA, Colorado Springs, Colo. "Casting Gold Against Porcelain Without Fracturing the Porcelain."

Some metallurgists claim that the contraction of porcelain under heat renders it impossible to cast gold against it without cracking the porcelain, yet the clinician's demonstration proved conclusively that it may be done if just a few principles are observed.

If a large pin is embedded in the porcelain, as in a Logan crown, it is necessary to place the crown in the investment in such a position that the pin will be farther from the metal ring than the porcelain; the heat should be applied very slowly, but carried to almost incandescence. The sprue should be so placed that the molten metal will first come in contact with the investment, backing up on porcelain. If these simple rules are observed, no difficulty will be experienced in casting against porcelain successfully.

ORTHODONTIA.

Dr. E. S. BUTLER, New Rochelle, N. Y. "Orthodontia."

This clinic consisted in the demonstration of Angle's new appliances for moving the teeth bodily by gentle stimulation of bone-growth, and their adaptation and technique. Some of the advantages claimed for these appliances are the practical abolition of pain, more perfect control over the distribution of the force, elimination of all danger of displacement of the appliance, lesser frequency of appointments, and elimination of the necessity of prolonged retention.

Dr. C. G. BELL, Ashland, Ky. "Shortening and Rotating Teeth by Excising."

The tooth to be shortened is devitalized. A small portion is resected at the gingival portion of the tooth and a platinum post is used in the same way as if an artificial crown were to be used, bringing the incisal edge to the normal incisal line.

In rotating a tooth, the same procedure is used in regard to the post and devitalization, but no tooth is resected unless the tooth to be rotated is also elongated.

Dr. SINCLAIR TOUSEY, New York, N. Y. "Radiographic Measurement of the Permanent Teeth Before the Loss of the Deciduous Teeth, to Provide for Preliminary Regulation of the Arch, If Required."

Imperfect development of the teeth is not only a disfigurement, but renders proper mastication impossible and the proper action of the saliva unlikely. The immediate effects are starchy indigestion and irritation from unmasticated meat, with auto-intoxication from both.

In the young child, as Dr. Strang remarks—"The nasal passages are lined below, in front, and on both sides by the germs of the teeth," and imperfect development of the teeth and of the maxillary bones supporting them occasions maldevelopment in the bony walls of the nasal passages and the accessory pneumatic sinuses of the face; and the effect of underdevelopment may even extend to the cranial cavity and the brain.

Deviations of the septum and mouth-breathing unrelieved by the removal of adenoids and tonsils are among the results of maldevelopment of the teeth with a too narrow and too highly arched hard palate.

The object of the clinician's most recent work has been to determine beforehand the presence and position, and especially the size, of the permanent teeth before the loss of the deciduous ones. The latter may be quickly and easily trained to a curve of the proper radius, and will then guide the permanent teeth into proper position.

Actual measurements of the deciduous teeth bear no fixed ratio to actual measurements of the permanent teeth. In a series of seven cases shown in table *A*, the ratio varied thirty per cent. In the same cases untreated, the curve of the deciduous arch, whether suitable for the permanent teeth or not, was reproduced in the permanent arch. X-ray measurements of the width of the unerupted permanent upper and lower central incisors at the age of five or six years correspond within one-hundredth of an inch with the actual measurements of the same teeth five years later, after eruption (see table *B*).

The clinician's technique is as follows: The deciduous centrals are measured

(*A*)

PERMANENT CENTRAL INCISORS:

Measured radiographically before eruption, and actually, some years later, after eruption.

(In 100ths of an inch.)

NAME.	Tooth (central)	Radiograph (unerupted)	Actual (after eruption)
Matthew Sweeney .	Lt. up.	39	38½
Clara Tucksmith .	Rt. up.	36	36
" " .	Rt. low.	22	22
Cecelia Leonard .	Rt. up.	34 oblique	33
Gretchen Winter .	Rt. up.	29	29
Florence Fox . .	Rt. up.	35	34
Sissie Reilly . .	Lt. up.	36	36
Jeanette Stevens .	Lt. up.	32	32
" " .	Rt. low.	21½	22

(*B*)

DECIDUOUS AND PERMANENT CENTRAL INCISORS:

Actual width. (Permanent incisors measured some years later.)

(In 100ths of an inch.)

NAME.	Years of age—1st measurement	Years of age—2d measurement	Weight in lbs. at 2d measurement	Right upper central—*deciduous*	Right upper central—*permanent*	Ratio 1 to	Left lower central—*deciduous*	Left lower central—*permanent*	Ratio 1 to
			(lb.)						
Matthew Sweeney .	6	8	. .	25	38	1.52	15	24½	1.63
Clara Tucksmith . .	5	10	85	24	36	1.50	15½	22	1.42
Cecelia Leonard	7	9	. .	21	33	1.30	. .	21	. .
Gretchen Winter . .	5	10	73	25	29	1.16	14	19	1.36
Margaret Frutchy .	5	10	72	25½	33	1.25	16½	21	1.28
Florence Fox . .	5	10	63	25	34	1.36	14	21	1.50
Sissie Reilly	5	10	60	23	36	1.57	11	23	2.09
Jeanette Stevens . .	6	8	. .	22½	31	1.38	. .	.	. .
Nora Ferguson . .	6	6	. .	. .	35	. .	. .	. .	. .

with a sharp-pointed caliper square with a screw adjustment, and graduated in one-hundredths of an inch. A wax impression of the curve of the deciduous upper and lower arches is made. Radiographs or X-ray pictures (Figs. 1, 2, and 3) are made of the unerupted upper and lower central incisors, and the width of the images of these teeth is measured (see Fig. 4). A curve suitable for permanent teeth of this size is calculated by a modification of Hawley's and Bonwill's tables. The deciduous bite is photographed with the actual curve formed by the cutting edges of the incisors, the cusps of the canines, and the buccal cusps of the bicuspids and molars, and upon the same photograph is drawn the correct curve (Fig. 5) to accommodate permanent teeth of the size determined by the X ray. The orthodontist may regulate the deciduous teeth to this curve, and so guide the permanent teeth into proper position as they erupt. Fig. 6 shows the same case as Fig. 5, in which the deciduous curve was too small for permanent teeth of the size shown by the X ray. The case was untreated, and five years later the curve formed by the erupted permanent teeth was a contracted one of the same radius as that originally formed by the deciduous teeth.

Fig. 1.

Fig. 2.

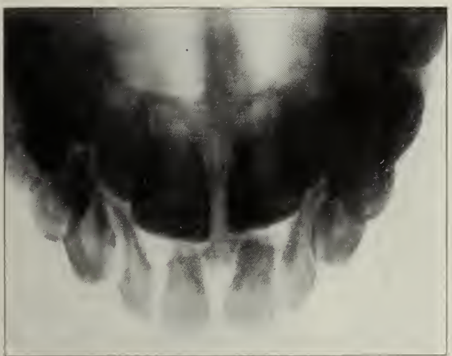
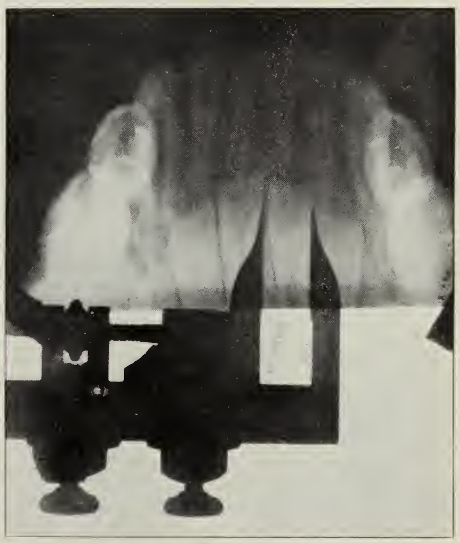


Fig. 3.

Fig. 4.



The work shows the size that the permanent teeth will have, and the radius

FIG. 5.

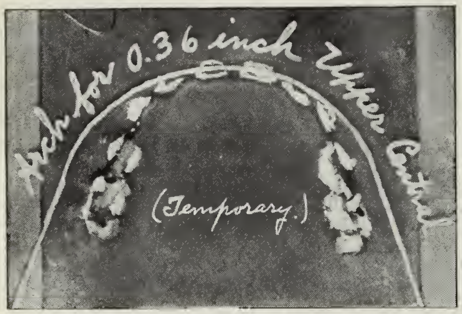
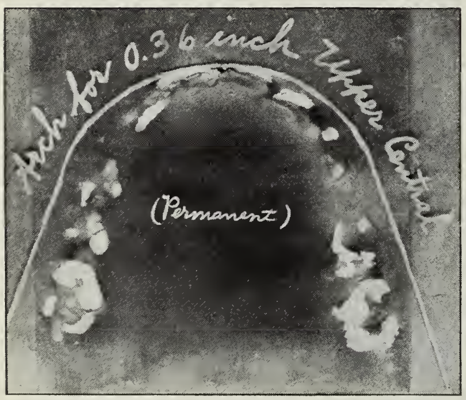


FIG. 6.

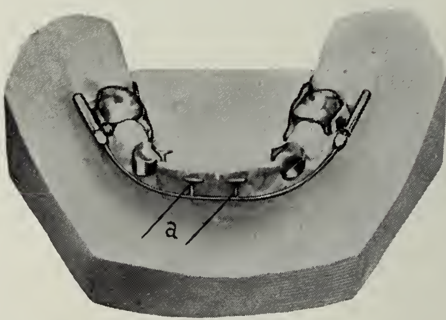


of the curve required to accommodate them.

Dr. HORACE L. HOWE, Boston, Mass. "(I.) An Appliance for Making Badly Inclined Teeth Perpendicular. (II.) An Appliance for Retaining Class II Cases. (III.) Band with Inclined Plane for Retention."

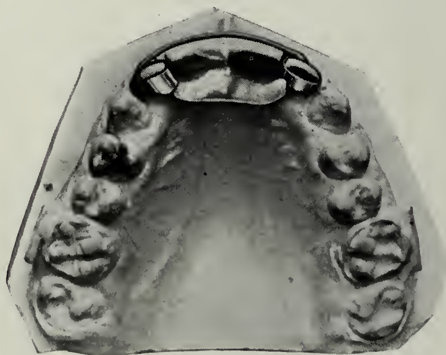
I. Fig. 1 illustrates the arch wire and appliance in position. In class II cases the lower incisors are usually badly inclined. To overcome this, T's are soldered to the arch wire so that the horizontal parts of the T's rest against the upper part of the labial surface of the teeth with the arch wire away from the necks of the teeth. Ligatures are applied to the teeth and arch as usual, with the result that the crowns are forced lingually, and the roots of the teeth carried labially. If desirable to force the crowns considerably lingually, the nuts may be turned away from the tubes on the anchor teeth. If rotation of a tooth is desired, the horizontal part of the T

FIG. 1.



may be bent with pliers so as to bear harder on the part of the tooth to be turned. These T's are most effective, and are designed to take the place of the double arch in front, which the clinician used for the same purpose and brought out in 1904. (See DENTAL COSMOS,

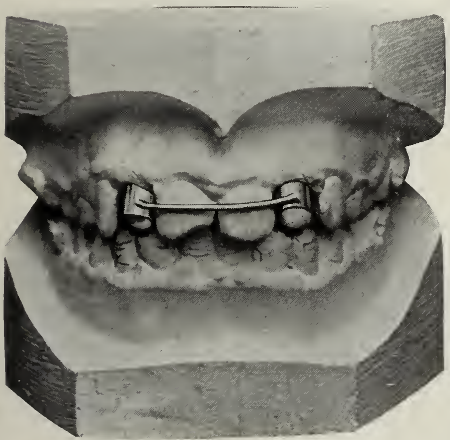
FIG. 2.



December 1904.) The T's may also be used upon the upper arch. I find them very useful in aligning the upper laterals that have been carried considerably forward. With the T, the tooth may be made more perpendicular, and the mesial corner may be forced inward, which is so often desirable. It is sometimes desirable to band the tooth to be moved, to prevent the ligature from slipping.

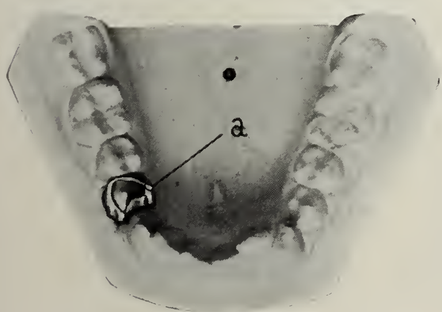
II. An appliance for retention in class II cases (Fig. 2) illustrates an inclined

Fig. 3.



plane adjusted to the laterals to receive the lower incisors. A retaining wire must be adjusted to the lower incisors to prevent any labial movement. Fig. 3 shows the labial aspect of the appliance in position. This appliance is a modifi-

Fig. 4.



cation of the Ainsworth principle, which is so useful in retention.

III. Fig. 4 shows an inclined plane soldered to a band on the lower first bicuspid. This is designed to maintain normal occlusion in unilateral distal occlusion cases. A sharp incline, a, is built up to strike mesially to the palatal cusp of the upper first bicuspid.

Dr. T. P. Sullivan, Fall River, Mass. "Casts Showing Supernumerary and Supplemental Teeth and Peculiar Positions of the Same."

Dr. Sullivan exhibited thirteen models, five showing supplemental laterals and eight showing supernumerary teeth; in three of the latter cases there were two supernumerary teeth in each case.

Dr. M. F. Finley, Washington, D. C. "Orthodontia."

Dr. Finley demonstrated the use of the Jackson system in rotating centrals, bands being cemented to central teeth, using the double U or staple, which is removable; also the moving of a single tooth by means of finger springs. The clinician also showed again the case presented at the Denver meeting, in which there was absence of all the bicuspids, and in which there were no germs for the second and third molars, leaving the patient with a permanent denture of sixteen teeth and four deciduous molars.

Dr. C. W. B. Wheeler, New York, N. Y. "Technique of Making the Jackson Appliance of Precious Metals."

Dr. Wheeler's clinic consisted in showing how the Jackson appliance could be made of precious metals, thus forming a cleaner, stronger, and more springy appliance in the parts where the spring is most essential.

The clinician also demonstrated the ease and rapidity with which a repair can be made, or an extra wire added.

The metal recommended is pure gold containing a trifle of platinum, the same metal being used in making gold and platinum arches.

The technique follows closely that of making a Jackson appliance with base metal, with the exception that 22-karat solder is used, and the parts are tacked together by means of an orthodontic blowpipe on a green model. After this is done, the appliance can be removed, its body waxed up, then invested, and in a few minutes soldered, letting the solder flow into the parts that are essential to give strength.

These appliances can be made much lighter and also more compact than those of base metal, owing to the strength of the gold alloy.

Dr. ARTHUR ZENTLER, New York, N. Y. "Inherited Malalignment."

FIG. 1.

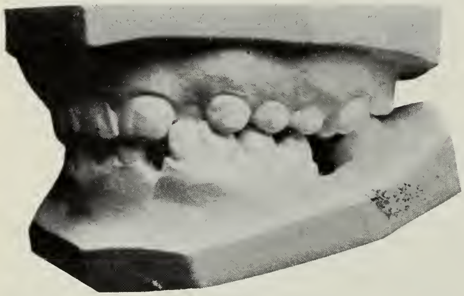


FIG. 2.

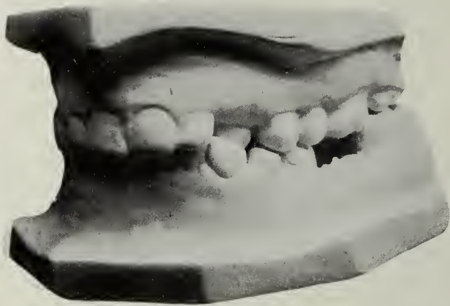


FIG. 3.

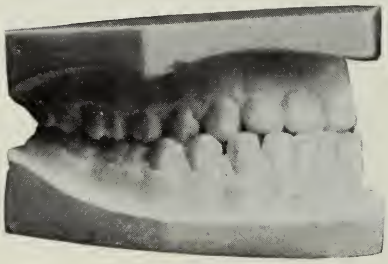
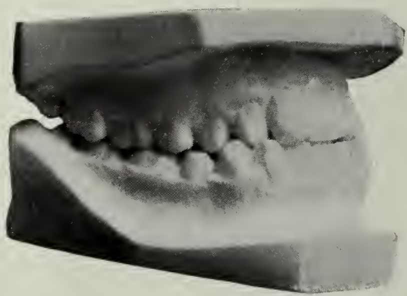


FIG. 4.



The clinician's object in exhibiting casts (Figs. 1, 2, 3, and 4) was to substantiate the belief that the etiological factors with which orthodontia is concerned are not postnatal only, but often prenatal. It would otherwise be difficult to explain the influences bringing about similar faulty alignment of teeth in children of the same parents.

Figs. 1 and 2 represent casts of the mouths of two sisters, one of seventeen years, the other twenty-five, both showing, on the left side of the mouth, one upper front tooth, in one the lateral and in the other the canine inlocked by the lower teeth, interfering with proper occlusion.

Figs. 3 and 4 represent casts of the mouths of two sisters, one twenty-six years of age, the other sixteen, showing each the same faulty tooth alignment, producing pronounced malocclusion.

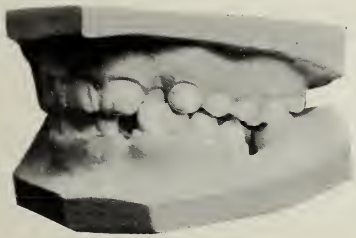
The family histories in both these and in several other cases under the clinician's observation point to similar malalignment of teeth in one or the other parent.

Dr. ARTHUR ZENTLER, New York, N. Y. "Improving Occlusion of Posterior Teeth Through Correcting One Malaligned Front Tooth."

The upper left lateral in the cast shown (Fig. 5) having been brought into proper alignment, the improved occlusion of the posterior teeth is seen in Fig. 6, showing the left side of the mouth, as well as in Fig. 7, showing the right side of the corrected case in contrast with Fig. 8, showing the same side before correction.

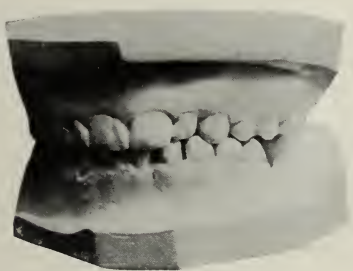
Fig. 9 shows the appliance *in situ* in a different case, similar to the one used in case Fig. 5, and its construction is plainly visible.

Fig. 5.



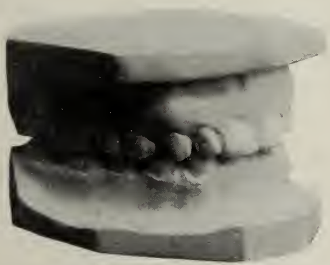
For the purpose of bringing the tooth into proper alignment, the free end of the retracting spring wire is bent out

Fig. 6.



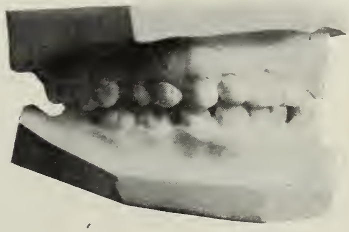
of the line of the dental arch to a point representing twice the distance between where the malaligned tooth stands and

Fig. 7.



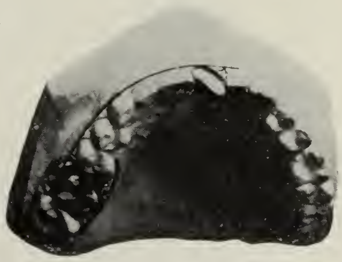
where it is desired to move it to. Then the retracting spring wire is sprung close to the dental arch and tied to the tooth by passing a wire ligature through a tube soldered vertically in the center of the labial side of the band cemented on the tooth to be aligned, and engaging the retracting spring wire. This manner of ligating promotes a complete carrying out into alignment of the entire tooth, avoiding a mere tipping of the crown.

Fig. 8.



When the malaligned tooth needs not only to be retracted, as in case Fig. 5, but also rotated, as in case Fig. 9, the attachment is made lingually, and according to the direction in which the tooth must be rotated the tube is soldered nearer to

Fig. 9.



the linguo-distal or linguo-mesial part of the band.

CROWN AND BRIDGE WORK—PORCELAIN WORK—CASTING.

Dr. J. C. Reed, Harrisburg, Pa. "Special Dentures made with the Aid of the Casting Process."

This clinic consisted in the demonstration of the clinician's method of retaining difficult lower dentures, also his method of making bridges with inlay abutments. The clinician also showed a large gold inlay with removable core, insuring ease of access in root-treatment.

Dr. Emerson R. Sausser, Philadelphia, Pa. "The Insertion of Two Porcelain Inlays."

The patient presented two cervical cavities, one in the upper left lateral incisor, the other in the upper left canine. These cavities had been prepared painlessly under novocain local anesthesia by the operator in his morning clinic. In preparing the cavities, the operator secured depth, shaping the walls almost perpendicular with the floor and with no bevel on the margins. The matrix was filled with porcelain while it was still in position in the tooth, which procedure eliminates the necessity of reburnishing the matrix after the first bake. The clinician emphasized that there is little or no doubt in his mind that distortion of the matrix is due to the handling, and not to the baking.

Dr. C. B. Brownell, Sandwich, Ill. "Cast Retaining Appliance Carrying Missing Teeth."

Cavities were prepared by the clinician with gem stones and cross-cut fissure burs, in the lingual surface of teeth involving the mesio-lingual and disto-lingual embrasures, extending the cavity across the incisal edge by removing the lingual plate of enamel. On the gingival margin the enamel is cut away to make a shoulder or base, while the enamel over the pulp is not disturbed. Retention is secured by slightly undercutting the central portion of the enamel over the pulp. The wax model is to be drawn toward the incisal edge. Inlays are then cast separately and replaced in the mouth. An impression is taken, and the appliance is invested and soldered in the usual way. Any style of tooth can be used for replacing the ones lost. When completed the appliance is set with cement as in the case of any inlay.

Dr. E. E. Cruzen, Baltimore, Md. "Exposing the Margins of Inlays Used as Abutments in Bridge Work."

The object of this clinic was to demonstrate a method of assembling bridge and inlay abutments in such a manner that the margins of the inlay are as free and accessible for cleansing as though they were individual fillings.

Proper cavity preparation for the inlay in regard to outline and walls is presupposed.

The technique consists in inserting a post of 14-gage iridio-platinum or clasp gold wire into the canal, and bending it at a right angle at a point corresponding to the natural contact point of the approximal surface. Inlay impression wax is shaped about the bend of the pin, and the pin is inserted in the canal, the wax pressed into the cavity, the occlusion obtained, and the wax carved to the form desired. The angle of the pin should protrude 1/16 of an inch or more through the wax on the approximal surface. The impression is removed by grasping the angle of the pin, or by a sprue wire, and a casting is obtained. The inlay is to be polished, but the pin projecting through is not to be disturbed. The inlays are then placed in the cavities, the bite is taken, and an impression obtained in plaster. This is done by using a cup that is smooth and free from scars, so it will come away easily from the plaster. After the plaster has hardened so that it will break with a clean and sharp fracture, it is removed in sections. The sections are brought together, and the inlays placed in position and tacked with a small bit of wax.

The model obtained from the impression is to be made of the same investing material as is used for soldering.

In this way a model is obtained with the inlays in position, and the projecting points. A piece of 24-karat gold plate of from 30 to 35 gage, such as is used for backings, is cut to the size of the approximal surface of the filling or tooth, and a hole punched through it corresponding to the size and position of the projecting pin, over which it is placed and tacked with a little sticky-wax, but no wax is to be allowed to flow between the filling and the gold plate.

This little gold plate should be contoured as desired before it is waxed to place, as it is to represent the approximal surface of the bridge tooth, and should be spaced at the gingival margin as desired, so as to represent the interproximal space.

The dummy is then adjusted in any manner that judgment may dictate, whether it be a saddle, so-called self-cleansing space, or a compromise. In any case, the margins of the inlay abutments, when the piece is completed, will be as fully exposed for cleansing as though they were individual fillings.

The model is invested with the appliance waxed in place, care being taken to insure that the investing material fills the space between the inlay and the little plate of gold, in order to avoid any possibility of solder flowing on the face of the inlay and defeating the object.

Dr. C. P. Grosby, St. Louis, Mo. "Inlay Attachments and Root Preparation; Illustrating (*a*) Cavity Preparation for Inlay Abutments with Dowel Attachment. (*b*) Saving Badly Broken-down Roots."

(*a*) The clinician demonstrated the advantage of a bridge having inlay abutments with dowel attachments, by showing various models and a bridge mounted on an articulated form. The success of the inlay abutments depends largely upon the careful preparation of the cavities, consisting of a flat base from which the axial margins should be trimmed at right angles or very slightly diverging toward the periphery. Care should be taken in the preparation with the view of creating a self-cleansing area, and the attachments should be well supported by threaded iridio-platinum dowels, No. 14 gage.

Fig. 1 shows the preparation of the abutments.

Fig. 2 shows the occlusal surface of the inlay, with the bridge in position.

Fig. 3 shows the side view of an inlay bridge in position.

Fig. 4 shows the buccal view of an inlay bridge in position.

(*b*) Dr. Grosby also showed several badly broken-down roots, many of which are being daily sacrificed by extraction. He demonstrated that by using careful judgment, these roots may be saved and rendered useful for several years. The procedure adopted by him is as follows: After being properly treated, the tissues

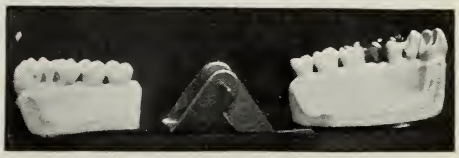
Fig. 1.

Preparation of abutments.

Fig. 2.

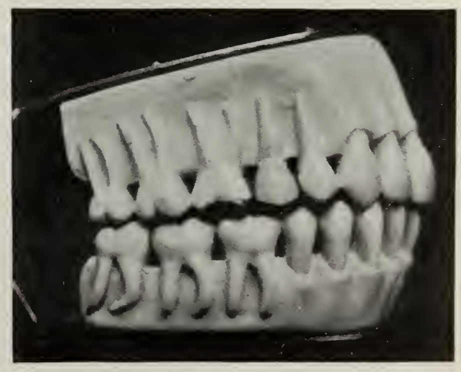
Occlusal surface of inlay bridge in position.

Fig. 3.



Lingual view of bridge in position.

Fig. 4.



Buccal view of bridge in position.

are gently pressed back, and the carious portion is carefully excavated, shaping the cavity as nearly to a step formation as possible. An inlay cast in some metal and attached to a 16-gage iridio-platinum dowel, the post extending well into the canal when cemented to place, forms a strong abutment for either a crown or a bridge.

Dr. Geo. S. Tignor, Atlanta, Ga. "Steele's Facings in Bridge Work; Illustrating Construction of a Bridge."

The clinician showed one upper four-tooth bridge with gold inlay abutments in the first bicuspid and in the second molar, with iridio-platinum pins in the root-canals; also one lower four-tooth bridge with iridio-platinum pins in the bicuspid root-canals, and a saddle under the end of the extension.

SEVENTH AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

Forty-fourth Annual Union Convention.

The forty-fourth annual union meeting of the Seventh and Eighth District Dental Societies of the State of New York was held in the Seneca Hotel, Rochester, N. Y., November 14, 15, and 16, 1912.

The meeting was called to order on Thursday afternoon, November 14th, at 2.30 P.M., by Dr. C. L. Brininstool, Rochester, president of the Seventh District Society.

Dr. Brininstool introduced Rev. Dr. Henry H. Stebbins, Rochester, who invoked divine blessings on the deliberations of the meeting.

Mr. Roland B. Woodward, secretary of the Rochester Chamber of Commerce, then welcomed the two societies to the city of Rochester.

Dr. C. F. Baylis, Oneonta, president of the Dental Society of the State of New York, next addressed the societies on behalf of the State Society.

Dr. Walter H. Ellis, Buffalo, president of the Eighth District Society, addressed the union meeting on behalf of the Eighth District Society.

Dr. H. J. Burkhart, Batavia, was called to the chair, and introduced to the audience Dr. Edward C. Kirk, Philadelphia, Pa., who read a paper entitled "The *Locus Minoris Resistentiæ* in Pyorrhea Alveolaris."

[This paper is printed in full at page 577 of the present issue of the Cosmos.]

Discussion.

Dr. Egbert T. Loeffler, Ann Arbor, Mich. It is, indeed, a great privilege to listen to a paper that comes from the pen of such a distinguished essayist. The logical and comprehensive manner in which the subject has been treated leaves but little room for additions except by way of emphasis. Very much has been written upon the treatment of pyorrhea alveolaris, while the question of etiology has been left almost untouched.

I have always been a great admirer of Dr. Black and all his valuable contributions to dental literature. I am very much in sympathy with the theory advanced by the essayist that these glands or remnants of embryonic tissue cells are weak points in the structure of the peridental membrane, but whether they should be designated as *the* weak points requires further investigation. These glands of Serres, so called by some, are very generally found in all peridental membranes, but their function or purpose is still an unsettled question. As Dr. Noyes says: "Sufficient work has not been done upon this subject to know whether this is a constant arrangement, or whether it is found only in certain animals, or even whether it may not be pathologic."

Some have made the statement that the peridental membrane is one of the most vulnerable tissues in the human body, and it has always seemed reasonable to me to suppose that there must be some specially weak points that are more liable to break down under unfavorable conditions.

May I call your attention at this time to a very important communication by the essayist entitled "The Dental Relationships of Arthritism," published in the DENTAL COSMOS for July 1909, an article that every broadminded practitioner should read; also to a paragraph on page 504 of the "American Text-book of Operative Dentistry," in which the author says that "The close relationship of arthritic malnutrition to pyorrheal involvement of the retentive tissues of the teeth is now clearly recognized, and the constitutional predisposition induced by arthritism to bacterial invasion is found to be dependent upon a diminished tissue resistance, with lowering of the opsonic index, which in many cases is amenable to autogenous vaccine therapy, under which treatment the opsonic index has been raised to normal, with cure of the local lesion."

I have always been a firm believer in the statement that, in the treatment of pyorrhea alveolaris, the question of malnutrition or faulty metabolism must be considered as a very important etiological factor.

Dr. Kirk states at the close of his paper that in his judgment the data presented are meager, to a certain extent unsatisfactory, and fall short of being conclusive. This is simply another illustration of the charitableness of our distinguished essayist in all his original communications.

To my mind, the most important point brought out in this paper is that in the treatment of the various diseases of the oral cavity, the question of the susceptibility of the tissues involved, or of their resistive forces under unfavorable conditions is not at present sufficiently emphasized.

In closing, I wish to join the essayist in the hope that this paper may be a means of stimulating greater enthusiasm for further research in this most interesting subject.

Dr. R. H. HOFHEINZ, Rochester. The unfortunate feature of the essay is that it cannot well be discussed, nor can even the great point around which the paper focuses. The subject of pyorrhea in dentistry corresponds very vividly with those of theology and of politics in our daily life—there is no end to its discussion. It seems rather lamentable for both the suffering patient and dental science that so much discrepancy still exists regarding the etiology and cure of this unfortunate disease.

We still have with us the men who cure every pyorrhetic condition with the scaler, pumice, and the orange-wood stick. There are but a few left who attempt to cure exclusively by air, water, and cathartics. The *locus minoris resistentiæ* of pyorrhea remains the delicate fibrous connective tissues, known as the peridental membrane.

What has puzzled us poor daily practitioners has been the question: *Ubi est causa?* We know that salivary and sanguinal secretions form a great part of the disturbance. Are they the primary or secondary causes?

Bell tells us in his "Diseases of the Teeth," as early as 1837: "In cases of great irritability of constitution and want of tone in the system, the irritation which is caused by salivary calculus frequently leads to more serious conditions. Although the gradual loss of substance in the gum and alveolar processes occasionally takes place without any obvious local or constitutional morbid action, it is much more frequently produced by derangement of the digestive organs, or some other constitutional cause, either immediate or remote." Chapin A. Harris, in his "Dental Surgery" of 1839, says: "I am led to believe that no matter how great soever may be the constitutional tendency to the disease, it would never manifest itself were it not for some cause of local irritation." Nathaniel Chapman, in his "Dental Surgery" of 1829, says: "Similar causes, *ceteris pari-*

bus, in general, produce similar effects, and as the organization of the human frame is the same everywhere, so, if exposed to similar causes of disease, similar diseases will follow, especially if those diseases have a specific character, and this explains the reason why inhabitants of opposite countries have similar diseases, because exposed to similar causes of disease." We see that the old writers, with few exceptions, recognize both the local and constitutional factors in the disease known as pyorrhea alveolaris.

Dr. Kirk, at the very beginning of his paper, lays special stress upon bacterial infection as the principal cause of the disease. The question arises, Does pyorrhea not manifest itself until pathogenic bacteria have ingress into the peridental membrane and the *locus minoris resistentiæ.* Does not pyorrhea already exist when the peridental membrane is in an incipient stage of inflammation—though inflammation is only too much blood in a part with motion of that blood partially increased or partially diminished, as an old pathologist expresses it. The essayist alludes to the action of the phagocytes in the peridental membrane. It would be interesting to know to what extent the phagocytes do their work in cases of peridental disease, compared with their relative action in other infected tissues of the body. It seems to me that their field must be restricted by the vascular supply of the pericemental tissue, which, though rich, is not so much so as other parts of the body. The fibrous structure of the peridental membrane and its increase with age makes it less vascular, and thus shuts off more and more the vascular supply, and diminishes the freedom of action of the phagocytes.

The point of relative susceptibility has been well emphasized. It is equally well illustrated in cases of syphilis, typhoid, etc. The remarkable part is that a man in health and of good tonicity may be one of the most generous distributers, in fact a reservoir of the disease, though himself immune and utterly unconscious of the fact that he carries the typhoid bacteria. You may all remember the case of "Typhoid Mary," who distributed the germs to numerous families by whom she was employed as cook.

The end-organ theory of Dr. Talbot always had some fascination for me. Though we do not all lose our teeth nor all lose our hair, every peridental membrane becomes more fibrous, all hair grows gray, both a sign of senile change and destruction. Senility is not necessarily a question of years; some are old at thirty, and the so-called end-organs are the first ones to suffer.

The reasoning of the medical man that caries of the deciduous teeth was nature's method of getting rid of these teeth is certainly not based on any scientific facts, and does not fit into this argument. Nature certainly takes advantage of congenital defects, but the lodgment of micro-organisms in the fissures of deciduous teeth is simply incidental.

Dr. Kirk gives auto-intoxication a most prominent place in his paper. Though we do not know what the bloodstream carries to those parts, we do know that the expressions of auto-intoxication continually change. I have seen some of the most remarkable results after a Carlsbad cure, change of diet, mode of chewing, or change from sedentary habits to outdoor life. Automobiling has cured many sufferers from auto-intoxication—though many feel intoxicated when the monthly bills are presented. This is not only demonstrated and proved in man; it characterizes the life of the dog with equal force and truth. The more highly civilized he becomes, the nearer he reaches the ladies' lap and heart, the more certain he is to gain admission into the aristocracy of pyorrhetics.

We now have reached the pivotal point of Dr. Kirk's paper. Dr. Black, who has left an immortal imprint on everything pertaining to dentistry, tells us that what he termed "phagedenic pericementitis"—the Western Union would have doubled its rates on transmitting this title if telegraphed as a night message—has its principal seat in the lymphatic glands of the peridental membrane. Von Brunn and others who have made a special study of the peridental membrane do not, as Dr. Kirk tells us, recognize these bodies as being glandular. They call them epithelial rests, débris of the epithelial sheath of Hertwig, the embryonal tissue of the enamel organ. In hurriedly looking over Dr. Black's article and the splendid illustrations of Dr. Noyes which accompany it, I find that Dr. Black himself was not quite sure as to the glandular character of these organs. He tells us that when he first discovered these glands, he naturally expected to find ducts leading to the gingivæ. Later on he found occasional cell groups, indicating the possible presence of ducts. He was unable, however, to so connect them as to make them out as ducts. This led him to the opinion that they were lymphatics, an opinion with which he was never fully satisfied, because of the character of the cellular elements of these bodies. If these bodies, as it has been stated by later investigators, are but useless remnants of other organs, they act more or less as foreign bodies and are pre-eminently susceptible to pathologic influence. This is the vital point of Dr. Kirk's paper.

If the studies of Black and Kirk mean anything at all, they mean that a concerted treatment, both local and systemic, is the only logical method of treatment. Dr. Kirk might, at this opportunity, tell us something of his studies on salivary tartar formation based on the known experiments of Rainey. As I wrote in my review of the "American Text-book of Dentistry" —"It was left to Dr. Kirk to apply these researches in a most original manner to the formation of tartar, and supplement them with his own original thought." Although Dr. Black wrote his famous contribution in 1899, it may have been largely forgotten by the multitude of practitioners, and the profession must be grateful to Dr. Kirk for its emphatic repetition. The value and force of many of our great thinkers' statements are lost in passing, and it frequently takes other authorities to imbue them with new life and truth.

Dr. Geo. V. I. Brown, Milwaukee, Wis. The last paper I heard Dr. Kirk read on this subject was a very exhaustive one, and undoubtedly one of the best presentations that has thus far been given of the essential findings of scientific investigators in the broader fields of pathology applied to pyorrhea alveolaris, at the same time giving due consideration to the local manifestations more particularly observed by mental writers in descriptive treatment of this affection. He has evidently designed this essay along somewhat different lines, in appreciation of the difficulty, almost uselessness, of trying to deal with all phases of such a subject within the necessary limits of a single article, and has endeavored to keep in view one particular division. The usual tendency is to complicate this subject too much in its discussion, and to consider the disease pyorrhea alveolaris as an entity quite different from other pathologic processes. That view I am not in sympathy with. We all know that whatever the physical condition of the tissues may be, by placing a foreign body of some kind at the neck of a tooth where it will crowd down and irritate surrounding tissues—whether the irritating substance be a strip of rubber tubing, a ligature, calculus, or anything else of like nature—we can artificially produce all the symptoms which are recognized in pyorrhea. On the other hand, we also know that by the administration of mercury or other mineral poison, in spite of all oral prophylactic or other local treatment one can cause eversion of the gums and destruction of the alveolar structures in a similar manner. What does this mean? It signifies that all of these etiologic factors, both local and constitutional, are important, and as the essayist states—"Tissual derangements induced by toxic substances in the blood plasm warrant us in holding to the belief in the sufficiency of auto-intoxication as a cause of this form of pyorrheal disorder."

With the admission of auto-intoxication as a primary etiologic factor in lowering resistance of the organism by weakening the defensive bodies of the blood, all the influences which find their expression in malnutrition as described bear an important significance, which demands that they be reckoned with in the etiologic consideration of this disease.

Since auto-intoxication may be general as well as local in effect, it is manifest that there must be some reason why the pericementum and its surrounding structures should be so frequently selected to give evidence of such functional disturbance. It is for this reason, then, that particular interest attaches to suggestions such as the "end-organ" theory of Talbot's which is referred to, and the possibility of the gland-like bodies described by Black as being of embryonic origin, offering points of least resistance because of the degenerative type of their cellular elements rendering them perfectly susceptible to bacterial influences, and thus constituting a "*locus minoris resistentiæ*" as suggested by the essayist.

I believe that no modern histologist would agree to the drawings of these glands as they were originally outlined by Black, because they do not seem to be in harmony with our present understanding of the histological structure of the pericementum. On the other hand, there is no reason to believe, so far as I know, that the pericementum does not do its part in lymphatic activities the same as other tissues. The question of embryonic rests is one that has received a good deal of attention, as we all know, particularly in relation to Virchow's theory accounting for the origin of neoplasms. Clinically we recognize that these growths have a tendency to appear very frequently on the sites of chronic inflammations. Whether they are really due to embryonic rests—and these more widely distributed than we have believed, as suggested by the essayist—and therefore subject to the excitant activity of inflammatory influences, so that in these conditions there is a tendency to multiplication of embryonic cells in the mouth, as in other parts of the body, with neoplasms as a result, or whether they are infectious in character, are matters that are still debatable and now very actively under consideration. It would seem to me, however, in applying this point of view to our present subject, that if these embryonic rests really were so frequently present as to be accountable for so common an infection as pyorrhea alveolaris, that if there be any truth in the embryonic theory of cancer, and embryonic rests were so uniformly present in the pericementum, there would be a tendency for cancer to begin more frequently in this region; whereas in my experience the pericementum is not often primarily the seat of neoplasms in their incipience, for the neoplasm usually has its beginning elsewhere and the pericemental tissues appear to be secondarily involved in the course of destructive processes.

There is, however, one other matter which is important, to which I desire to call your attention, and that is the possibility of a selective tendency in bacteria. For example, I recently saw seventeen hearts each with a similar lesion upon exactly the same valvular portion. These seventeen hearts were gathered in one hospital, and study of these cases had led to recognition of the affection as due to a bacterium that had been isolated and definitely proved. For the want of a better descriptive term its discoverers called it a vibrillum. When I asked where this micro-organism gained entrance to the body, it developed that this was not known, but it was believed to be through the mouth. This example merely emphasizes the vital importance of mouth infections, and secondly, another not sufficiently considered element, the selective tendency of the micro-organisms in influencing bodily conditions.

The suggestions of the essay have brought to my mind in a somewhat forcible way the important bearing of two things Dr. Kirk has kept before us for years. First, the question of faulty metabolism in its relation to arthritism and other affections as well as pyorrhea alveolaris; second, the discovery that acid in the mouth precipitates the mucin of the saliva. When considered from a purely dental aspect, the possibilities of this action would appear to be merely relative to dental caries, but if one keeps in mind what it might mean to conditions of ill health along the line of the mucous membrane of the digestive tract to have a medium of that character thrown down which undoubtedly would hold the pathogenic micro-organisms in contact with tissue surfaces, and protect them from those forces which have been provided for their destruction, its pathologic significance becomes one of vastly greater import. For example, we know that in ulcer of the stomach, the acidity of the secretions of that organ is an important factor. We also know in many other diseases that under hyperacid conditions of the general system—to which the somewhat objectionable term acidosis is applied—there is a direct and very vital influence in relation to many kinds of disease. Personally, I believe all these things should have a bearing in the consideration of salivary mucin precipitation, and that this is particularly true in all forms of local oral infection, whether its expression be in one form or another. When a man like Murphy, the great surgeon, publishes illustrations showing cases in which he has resected knee and ankle joints and other portions of the extremities and has found the primary etiological factor could be traced directly to mouth infection, we can no longer question the importance of mouth infection in the pathology of any region of the body, nor can we continue to doubt the susceptibility to circulatory conditions of the so-called end-organs, whether in the teeth or in the extremities.

The vital issue is, after all, a question of resistance, and this depends upon antibodies and various other conditions of the blood that are being actively studied by research workers at the present time. Naturally the diminished circulation of the more remote parts renders them more susceptible to infection. The same principles must apply not only to the pericementum and its diseases, but equally as well to the extremities and their diseases, and to organs that may by chance be weak in the individual.

These are the points that the paper suggests to me today. Dr. Kirk has shown much that leads to the consideration of the etiology and pathology of pyorrhea alveolaris in a direction which is toward unification with the already known laws of general pathology, and in harmony with the developments of modern research workers in this field, and I am so deeply impressed with the valuable and far-reaching possibilities of the salivary mucin precipitations that he has called attention to—if the pathologic effect of this influence could be rightly understood and applied to the prevention and treatment of disease—that this must be my excuse if it should appear that I have traveled too far afield in the course of this discussion, and have in consequence overlooked some of the important features of the paper.

Dr. J. O. McCall, Buffalo. It requires a good deal of temerity on the part of a youngster like myself to come forward and speak on a subject of this character, especially after men like Dr. Kirk, Dr. Brown, and Dr. Hofheinz. I wish, however, to emphasize one or two points that I think of considerable importance, and that perhaps have not been emphasized sufficiently.

Dr. Kirk assumes that we have in most cases of pyorrhea an infection by bacteria, and he gives us to understand that the bacterial infection is the prime cause of the disorder; that is to say, that it is the principal factor in bringing about the destruction of the peridental membrane. Dr. Brown, on the other hand, tells us that this disease is simply a question of resistance—and that is the point I wish to emphasize. We know that wherever a tissue may be, whether in the mouth or in some other part of the body, no bacteria can gain entrance to it and bring about pathological effects unless the resistance of that tissue is lowered. In other words, healthy tissue does not become infected. Dr. Kirk has spoken of the effect of auto-intoxication, the collecting of the various products of auto-intoxication in this tissue. He has spoken also of the accumulation of tartar, and various other phenomena which may bring about a mechanical irritation. To my mind, the mechanical irritation which has lowered the tone of the tissue to such a degree that bacteria can gain entrance to it is an important factor to consider. The essayist's contributions to the consideration of these glandular structures in the pericementum are very interesting, and point out a new field; yet we must consider these cell rests—or whatever they be—as part of this tissue not only in mouths affected by pyorrhea, but also in all probability in mouths which are healthy. In other words, it is no more nor less a portion of the pericemental tissue than the peridental fibers themselves. The question of resistance, therefore, applies to that tissue as well as to any other. Tissue resistance concerns all tissue fibers, whether they be embryonic rests or vital parts of the tissue itself. Therefore we have to consider primarily the irritation which permits the invasion of this tissue by bacteria. That phase has been given much prominence in late years by such men as Dr. Skinner, Chicago, who have formulated a law in dealing with the problem of instrumentation and the maintenance of the tissues in a healthy condition through prophylactic treatment, their idea being that any irritation which may have brought about the lowering of the tone of the tissue must be removed, and the tissue then stimulated so that it may not suffer from further invasion of bacteria. The factors we must carefully bear in mind in considering this subject are the removal of irritation and subsequent stimulation of the tissues.

Dr. N. S. Jenkins, Dresden, Germany, It would be most presumptuous on my part to attempt to criticize with any degree of intelligence such a paper as has been presented to us today by our esteemed Dr. Kirk, for I have not had the privilege of reading the paper beforehand, and moreover it is not a subject which has in any very great degree occupied my attention of late years. I have had, however, a rather rare opportunity of observing the great confusion which obtains throughout Europe in particular in the treatment of this distressing disorder. I have seen all the modern methods of treatment, constitutional and instrumental, from the vaccine treatment—at one time somewhat more in effect in Great Britain than perhaps it *is* today and *was* throughout the whole continent of Europe—to its treatment with reliance only upon instrumentation, and I have been struck with this one remarkable fact: Whatever may have been the theories upon which these various operators have carried on their treatment, wherever there has been complete and thorough instrumental treatment, the result has always been the same.

Dr. Louis Meisburger, Buffalo. I am unfortunately one of the operators who treat this disease with instruments, wood points, and pumice, as Dr. Hofheinz said, but at the same time I appreciate the value of fresh air, water, and cathartics. I am to discuss Dr. Skinner's paper, and what I will have to say on that occasion is what I should say at this time if I attempted to discuss this paper fully.

The question of etiology has been very thoroughly gone into by the essayist, but I do not believe that the idea of prevention has taken hold of the profession as strongly as it should. There seems to be no doubt that the original cause is one of malnutrition followed by auto-intoxication. If food is properly assimilated and eliminated, and the system uses only the amount required for sustenance, no pyorrhea will ensue. As we all know, it is a filth disease, but in my opinion it is due to the tissue being in a state of lowered resistance. A few patients, however, exhibit large collections of tartar and still do not have pyorrhea. Therefore all such mouths should be thoroughly cleaned. Thorough instrumentation, no matter what the systemic conditions be, produces an improvement in cases of so-called pyorrhea, and I believe that true pyorrhea, in which pus is present, is found in people of lowered resistance, usually in hospitals.

I like very much the term used by Dr. Fletcher, in an article published in the *Dental Summary,* in which he refers to the beginning of pyorrhea as initial alveolitis. This is the condition which we are most often called upon to treat in our offices, and if we recognize and treat this condition early enough, we can prevent the distressing symptoms of true pyorrhea.

Dr. Edward C. Kirk (closing the discussion). In making this little effort to present to you in this paper a section of the study of pyorrhea alveolaris, I feel that I have accomplished a triumphant success in at least one direction, and that is the presentation of pyorrhea from the humorous standpoint—for it has always been regarded as a rather serious and solemn affair. Ordinarily, when I have attempted to talk about pyorrhea from the point of view from which I have presented it today, I have noticed that there has been a sudden outpouring of the audience toward the exhibit room, therefore I take it that the humorous suggestions which the discussion has aroused have rather served to pleasantly sugarcoat this rather bitter scientific pill.

In a general survey of the discussion I have observed certain things that always come out in connection with pyorrhea. Men ask what is its cause, and what is its treatment? Is it constitutional or is it local? Now, I want to answer these queries from my point of view, by saying that it is not "it" at all; that the man who asks what is the cause of "it" advertises the fact that he has not gotten hold of the first fundamental proposition—viz, that pyorrhea is not "it" at all, but is "they." Pyorrhea is a group of diseases; it must be a group of diseases, because we do have certain gingival lesions that we group as pyorrhea that are not pyorrhea according to the definition of the word pyorrhea; that is to say, we recognize certain gingival disorders as pyorrhea though they may have no pus accompaniment. We have certain destructive conditions in the retentive structures of the teeth by which they are exfoliated, so far as we can see, without the visible objective production of pus, while pyorrhea alveolaris means the flowing of pus from the alveolus. Therefore that atrophic form which we call pyorrhea is not pyorrhea in a literal sense, but a condition which we have grouped under a general classification of destructive gingivo-alveolar disorders, and to which for convenience' sake we have applied the generic term of pyorrhea alveolaris.

I am glad that somebody has found a definition that pleases Dr. Meisburger—"initial alveolitis,"—that is, literally, the beginning of an inflammation of a hole. I do not know how we can have inflammation of a hole; so I think we shall have to go farther than that for a comprehensive terminology. We have many names for these disorders; many have had a hand in baptizing them, but we will never get a proper terminology to describe these conditions until we first recognize that they are members of a group of disorders having the common factor of causing loss of teeth, that they must be classified according to the symptoms, etiology, and pathology involved, and that they cannot rationally be called by anybody's name. There is a movement to prevent the dental nurse from treating Riggs' disease in Massachusetts, and I have asked what in Heaven's name is Riggs' disease. I think they will prevent her from treating Riggs' disease, because there is no such thing.

The next difficulty is in our conception of the real cause. Sir William Osler said, in his book on the Practice of Medicine, something like this: "Very few people die of the disease from which they have been suffering most of their lives,"—for the reason that we have predisposing conditions of ill health dependent upon or resulting in malnutrition which lead us up to the point where a terminal infection by some kind of pathogenic bacterium sets up a disease process of fatal character and the individual dies. The question is, What is the cause of his death? Was it the terminal infection? or was it the condition preceding the bacterial invasion? We must include the predisposing factor as well as the immediate exciting factor in our conception of the cause, and because that is the proper attitude of mind toward the question of cause, we must take that view into consideration before we can answer the question as to whether it is local or constitutional. My own opinion is that it is both, and I have tried to express it as a local manifestation or a local lesion which is symptomatic of the predisposing constitutional cause, for the reason that these things must be considered together.

Let us get away from the idea that this group of diseases is necessarily either local or else constitutional. We cannot have a local condition without constitutional relations. I do not know of anything in the category of diseases—not even corns—that may not be in some degree the cause or the result of some form of malnutrition. A tight boot which presses on a corn long enough to disturb your appetite for dinner may upset your digestion and start a condition which will bring about for the time being malnutrition, then reduced resistance, and ultimately an infection—all, in a general sense, because your boot has been too tight. That is not a "far cry," but is a possible case.

I want to speak of the importance, to my mind, of determining the nature and character of this particular tissue in the peridental membrane which Dr. Black in the beginning spoke of as lymphatic glands, later expressing a modification of that view by saying that they were lymphatic in character. However, Black still makes the statement that they are not epithelial—and that point is important, because in that statement he ranges himself on the opposite side of the question from those who have preceded him in the embryological study of these structures. Black's investigations are quite independent of those of Malassez, Magitot, and Von Brunn, but the groundwork was very thoroughly gone over by these men. I was surprised to see what a large amount of literature there was upon the question of this phase of the histology of the peridental ligament. A large number of men who have studied the subject from the embryonal beginnings of the tissue up to complete formation of the structure of the peridental membrane regard these gland-like bodies as being of epiblastic origin. Now, it seems to me that above all things the fundamental question to determine is just that point—whether these cells are epithelial in origin or endothelial; that is important in relation to the question of their pathogenic relationship to not only pyorrhea but to a number of other pathological processes, and particularly the etiology of certain neoplasms.

Dr. Brown has spoken of the selective character of certain types of bacteria for certain tissues, and I wish he had gone farther. I am not disposed to doubt that view of the subject, but what I am trying to look at is the selective character of the tissue for the bacterium—if I may put it that way. We have examples of this selective action everywhere. We may expose a pint of milk and a pint of cider to the air, and the two will in time be decomposed into their ultimate end-products, one by putrefaction and the other by fermentation. Now, what makes the difference? Both are sifted full of bacteria of various types, which produces mixed infection, and certain bacteria survive and certain others die, and here we have shown the selective quality of the medium for the particular organisms that can thrive upon it. One view of this fact, that of Dr. Brown, implies intelligence on the part of the bacterium and the other implies the absolute, unassisted, unintelligent action of natural selection, which is the point from which I prefer to view it—and that is what I mean when I speak of the selective character of the tissue. If these peculiar bodies found embedded in the peridental ligament are epithelial, as I believe them to be, and they are degenerative in character, as in the condition to which Dr. McCall referred, when there is a depression of the whole organism and these relatively weak tissues become first infected, they become infected in the order of their relative power of resistance.

The other point which Dr. Brown brought out, and which I had hoped he would elaborate still further, is the question of the relation of these bodies, these cells, to neoplasms. I do not believe we have yet satisfactorily accounted for the thing which he has observed and which I have observed; that is, the development of leukoplakia buccalis from the first symptom, that milky whiteness that appears on the surface of the buccal mucosa, through that fishskin condition which marks the gradual inroad of the invasion of the neoplasm and its subsequent evolution into epithelioma. I would like to have Dr. Brown's view with reference to the possibility of certain types of epithelioma arising from the peridental ligament membrane. I have been looking for these cases with the hope of determining whether or not these so-called rests may not under certain stimuli take on a morbid growth and develop into the neoplasm of epithelioma.

The question was raised by Dr. Hofheinz as to whether pyorrhea might not be produced, at least in its early stages, by auto-intoxication before the infection by bacteria.

Dr. HOFHEINZ. My question was whether it only becomes true pyorrhea after the bacterial invasion.

Dr. KIRK. I do not see how it could be anything else. Dr. Black, even before I was born, laid down the axiom that, in referring to scientific matters, we must use words with precision, and we cannot call it pyorrhea without the "py," which means a result of infection by pyogenic organisms.

Dr. HOFHEINZ. But, as you said before, we must speak of "them," not "it." We classify a number of conditions, for instance, atrophic pyorrhea, where we do not have pus, and yet we call it pyorrhea.

Dr. KIRK. But for the time being we are limiting the discussion to the one in which there is pus infection.

I regret that Mr. Hopewell-Smith is not here, but I believe that this discussion will act as a prolog for the study of the relation of these gingival tissues to pyorrhea, which I understand is the subject of his paper, and I am glad to know that we are to have the benefit of his skilled observations and mature judgment upon this particular thing. It was a coincidence, without the slightest prearrangement, that what I have said is merely a "curtain-raiser" for what he will present, and which may either destroy the fabric of my paper or strengthen it.

I want to thank you for your patient hearing of this timeworn topic.

The meeting then adjourned until the evening session.

THURSDAY—*Evening Session.*

The meeting was called to order at 8 o'clock Thursday evening by Dr. Louis Meisburger.

The first order of business for the evening session was the reading of a paper by Dr. H. J. BURKHART, Batavia, entitled, "The Proposed Plan of Reorganization of the National, State, and District Societies."

Dr. Burkhart in his paper outlined in detail the plan of reorganization of the National Dental Association and the proposed plan on which the state and district societies were to be affiliated with the National.

Following Dr. Burkhart's paper, Dr. William A. Howe, Albany, N. Y., deputy health commissioner of the State of New York, gave a talk on "Oral Hygiene from the Viewpoint of the State Department of Health," in which he spoke of the work of the health department of the state along dental lines. Dr. Howe spoke very highly of the valuable work that the dental lecturers were doing in connection with the work of the board of health, and expressed the hope that more of this work would be done in New York as well as in other states.

The meeting then adjourned until Friday morning.

FRIDAY—*Morning Session.*

The meeting was called to order at 9.30 o'clock Friday morning by Dr. W. A. White, Phelps, N. Y.

The first item on the program for the morning session was the reading of a paper by Dr. J. V. CONZETT, Dubuque, Iowa, entitled "Cavity Preparation for the Gold Inlay."

[This paper is printed in full at page 587 of the present issue of the COSMOS.]

Discussion.

Dr. D. H. SQUIRE, Buffalo. It is extremely difficult to discuss an essay from the pen of a man whose ability as an operator has a national reputation, as every phase of the subject has been well presented. The essay deals with the fundamental principles rather than with the technique of cavity preparation, and an attempt will be made to emphasize a few of the important items mentioned.

Dentistry has passed through a state of evolution; a new era has dawned, and its rays of knowledge have penetrated the darkness of empiricism, and in the light of its advancement we see the necessity of delving deeply into the cause and effect of the processes which are taking place in the oral cavity. We recognize at least the results which our unskilful operations upon the teeth have had upon the health of the surrounding soft tissues. We have learned that we are not always a contributing factor toward the health of those tissues upon which we operate, because we have failed to recognize the great value of recorded observation. This fact has wrought a complete change in the operative treatment of dental caries.

Today the attention of the practitioner is called to the important influence which mouth hygiene has upon the inception and progress of caries, and in recognition of this fact the surfaces of the teeth have been divided into two general classes, according to their environment, as clean and unclean areas.

We are all aware, from our knowledge of the progress of caries, that the bacteria must have protection in order that their acid products may percolate through the enamel structure, and by dissolving the calcium salts, eventually attack the dentin. The rapidity of this process is augmented by the conditions present in the mouth. Therefore any surface of a tooth which, owing to its size, shape, position, or lack of development, is protected from the methods employed in cleansing, or scouring produced by the excursions of foods which pass over its surface during mastication, is a favorable place for the colonization of the bacteria of dental caries. This fact must be considered in the planning of the outline form, and all of the defective tooth structure must be incorporated within the cavity formation.

The essayist asks the question, What is extension? and says that there is no fast rule regarding it, which is amply proved by the observation of every dentist. In mouths which are comparatively clean, and where the teeth are carefully brushed, little caries will be present, and extensive cutting of the cavity walls is not indicated. In such cases it is quite sufficient to bring the extension of the outline form into the embrasures, either by cutting or by increasing the contact. On the other hand, if much caries is present and an utter lack of hygienic conditions exist, extension of the outline form is not only necessary, but imperative. The permanence, then, of all outline forms of cavities will depend solely upon the conception of the existing conditions which are present in the mouth. The direction and the amount of stress exerted upon the teeth during mastication bear the same relation to the cutting of the resistance and retention forms of cavities, as the law of cleanliness bears in determining the outline form.

The essayist calls attention to the tendency which the force of attrition has in dislodging an improperly seated filling, or one which is retained principally by the aid of cement. If we have not at hand a scientific apparatus with which to determine the amount of stress in pounds, a careful observation of the conditions of the crowns of the teeth will give us some idea, at least, of the amount of this force. Broken corners, abraded surfaces, burnished fillings coupled with well-nourished pericementum, indicate hard usage, and while a patient may have strong and well-developed jaws and muscles of mastication, still it is a fact that his full crushing force only becomes exercised in direct ratio to the health of the pericementum. Mechanical retention means a flat seat and step, with frictional resistance along the side walls of the cavity. If inlays are to be serviceable, the castings must have the mechanical support of the dentinal walls. It is of vital importance in the construction of all fillings to have the steps made broad enough and sufficiently deep to hold an adequate amount of material for strength. The essayist's point is well taken that a great many failures are due to carelessness in the cutting of the step formations. The explanation of depending upon cement to retain the inlay needs no further comment.

My own observation in testing the adaptation of cast gold to the cavity walls bears out the essayist's condemnation of butt joints. A mesio-occlusal cavity in an extracted lower first molar, was prepared with flat resistance and retentive forms and perpendicular side walls, with all line angles acute. Gold inlays were made from the cavity by the direct and indirect methods, they were cast by the Taggart, vacuum, and centrifugal processes. The dentin was then removed from the central portion of the body of the crown of the tooth, leaving the gingival seat, the buccal and lingual walls of the approximal portion, and the distal wall of the occlusal step intact. Then the cast fillings were seated firmly in the skeleton cavities. The rays of light were first directed against the mesial surface and exposures made of the several castings; then the light was directed against the internal parts of the crown of the tooth and the inlay, and exposures were again made from the mesial aspect. The microphotographs showed that the gold did not remain in close adaptation to either the gingival seat or to the distal end of the occlusal step. The casting was also deficient all along the side walls of the cavity, from their junction with the gingival seat to the distal margin of the occlusal step, the contraction being greatest along the gingival wall and the distal wall of the step. It is impossible to make a butt joint which is watertight, and in order to overcome the contraction of the gold, the enamel wall must be so cut that a flange of gold will protect the rods and can be burnished over the cavo-surface angle in order to seal the cavities.

In the restoration of the surfaces of the teeth, one should be well acquainted with their anatomic features. The study of dental anatomy is the foundation of all operative procedures. We cannot expect ideal results without a comprehensive knowledge of this subject. I am of the opinion that the essayist considers occlusal restoration of equal importance with approximal. The cusps, triangular ridges, sulci, and developmental grooves may be easily carved in the wax model with properly shaped orange-wood sticks. The alignment of the teeth is greatly impaired by a total deficiency in the reproduction of the anatomic features of this surface.

Orthodontists have been unable to hold an established occlusion because of utter disregard of the importance of properly restoring the occlusal surfaces of the bicuspids and molars.

The proper size of a contact point on the approximal surface may be determined by the following measurement:

A silk ligature, about 2½ or 3 inches in length, is passed between the approximating teeth; the ends of the strands are held parallel with each other and pulled tight. If the distance between the strands is not more than 2 mm. when held in the direction of the horizontal and vertical planes of the teeth, its size will be sufficient to protect the septal tissues from injury.

If 5 per cent. of platinum is added to the pure gold, a much harder metal may be obtained, and stretching of the casting will not occur. Malleted gold will stand more stress than cast pure gold on account of its molecular tension being raised by hammering. If either 20-karat or coin gold is used, the individual movement of the teeth during mastication will wear away the contact; therefore it would seem best to make all contact points of gold of a lower karat.

In the finishing of the enamel margin in the region of the gingiva, I have used the Wedelstaedt chisels, which the essayist recommended at the Chicago clinic last year, and which are a great adjunct to the gingival marginal trimmers. The portion of the finished casting which covers the gingival area must be smooth and well polished, and great care should be exercised in removing every portion of cement. Injury to the septal tissues during the operation, or irritation of these parts afterward, will not only change the reaction of the secretion of the mucous follicles, but, if continued, will eventually destroy the tissue itself. Under normal conditions, the alkalinity of this fluid and the presence of the septal tissues in the interproximal space plays an important part in the preservation of the tooth structure from caries.

Dr. J. W. Cowan, Geneseo, N. Y. The essayist has stated that cavity preparation has become a science within the last twenty years—it has been an applied science for forty years or more. I will admit that the great majority of dentists in the old days did not have a clear comprehension of the correct principles of cavity preparation. But a great many who understood these principles were capital operators, and they contributed their full share toward the work upon which Dr. Black of Chicago put the finishing touches. I do not want to detract one particle from the credit due to Dr. Black, but the other operators shall not be denied the credit that is due them.

Over twenty years ago, I came into possession of a lot of correspondence that passed between Dr. W. C. Barrett of Buffalo and Dr. Franklin E. Howard, then of Geneseo, in which this question of extension for prevention was thoroughly discussed and clearly defined. The letters were written away back in 1879.

Dr. Black has developed a terminology for the details of cavity preparation and reduced the whole question to a thoroughly teachable science, and for that he has our most sincere gratitude. But, as I said before, I want to have the other operators receive the credit to which they are entitled.

In describing his method of preparing the gingival seat, Dr. Conzett said that he uses an inverted-cone bur, and usually with one sweep across can level off the floor of the cavity satisfactorily.

In my hands, an inverted-cone bur in an angle handpiece is the most unmanageable device in my armamentarium. It gets out of hand, it runs amuck and rips out between the teeth, doing a little extension on its own account, but we could hardly call that extension for prevention. I have memories, and I believe some of my patients have painful recollections, of my exploits in this particular detail. I have, therefore, abandoned these deeds of daring with an inverted-cone bur, and use, instead, the safe-sided, end-cutting instrument alluded to by Dr. Conzett.

In his description of marginal preparation, the essayist has alluded to the instruments he uses, among which I prefer the two small spade-shaped chisels, which are simply Rhein approximal trimmers, the file faces being ground flat. I use these for the preparation of the pulpal walls generally. Four, which I have labeled 1, 2, 3 and 4, are made from small straight chisels of the regular S. S. White set, by putting the blade in a small vise, directing the flame of a blowpipe on the neck of the instrument, bending to whatever angle desired, and retempering them to the utmost hardness of steel.

Dr. H. L. Wheeler, New York. I want to ask Dr. Conzett if I understood him to say that the force or stroke in mastication is directed upward and forward in the lower jaw? I cannot see, from my knowledge of the anatomy of these parts, where he gets that idea. I will try to show on a blackboard the path of the condyle and its relation to the eminentia articularis, also that it is impossible to get a forward and upward stroke when the lower jaw is brought up.

It requires some little courage to question the essayist's statements. I believe only partially in extension for prevention. I know that no one here has any desire to question the accuracy of Dr. Black's experiments and researches. We all appreciate that he is probably one of the greatest, if not the greatest living member of the profession, and the amount of work which he has done and the success he has made are simply staggering to me. Nevertheless, in my opinion, this theory of extension for prevention is sometimes overdone. In a case where there is practical immunity or little tendency to dental caries, with perhaps an occasional approximal cavity, I see no reason to assume, if the cavity is not already extended to the lines advocated by the average enthusiast for Dr. Black's theory, that the carious process will extend farther after a filling has been inserted. I cannot see why I should cut away a lot of tooth structure to conform with a theory in an instance of that kind. When it comes to a cavity on the cervical margin which extends on the buccal surfaces of a bicuspid or molar and around the entire buccal margin without involving the approximal space, where are we to extend it to?

Dr. Conzett. Only to the angles.

Dr. Wheeler. A good many cases of that kind have puzzled me to such an extent that I accept this system only partially. The greatest adverse argument is, Why, if an individual of fifty or sixty years develops a small approximal cavity, should we assume that this cavity should extend over a very much greater area. On the other hand, in a mouth with an evident tendency to extensive caries, and with cavities invariably extending into the interproximal space, I believe that extension for prevention can be used intelligently.

If I remember correctly, Dr. Conzett assumed that the preparation of the cavity should be the same in all cases, but later he qualified that statement, much to my satisfaction. I believe it is essential for every operator to consider the phenomenon of immunity and the health conditions as reflected by the teeth. I must confess that the older I grow, the less I find myself inclined to decide a case until after I have observed the patient for some years, and have concluded as to what is the best course of treatment to follow in his mouth, because I find it desirable to adjust treatment to the general conditions presented. For that reason I find myself unable to accept the general rule regarding extension for prevention.

In regard to cavity preparation, however, I think Dr. Conzett to be correct.

I wish now to show in a rough way the movement of the mandible. [In making this demonstration Dr. Wheeler showed the movement of the mandible of one of the audience.] The condyle fits in the glenoid fossa, and is unable to move back in this direction except slightly, in compressing the cushion where the condyle sits in the glenoid fossa. The general direction of the condyle path where the condyle slides when the lower jaw opens is downward and forward; when it opens in the least, the condyle slides downward and forward. The lingual surfaces of the incisors and canines are on an angle which opens forward and inward, for the reason that, when the jaw is opened, it slides down here [illustrating], and when it closes, it slides backward and upward, and the anterior teeth slip backward and upward against the superior incisors. It is impossible, therefore, in most cases, for the lower jaw to go shut except backward and upward, and the angle of the condyle path depends on the prominence of the eminentia articularis. How Dr. Conzett makes it possible to get the greatest stress with the jaw moving in the opposite direction, I cannot understand.

Dr. Conzett. Because it does move in the opposite direction. A hinge, as it goes upward, has to go forward, and we cannot have a hinge joint that goes backward as it closes. We have with us today an authority on occlusion, Dr. Wilson, and I would like to hear his opinion on this subject. As the hinge goes forward, with the bolus between the teeth, stress is exerted upon that bolus before the teeth are entirely closed, and when it strikes the occlusal planes of the incisors there is a slight backward movement,. but the major movement is forward and upward. Everyone has had the experience of having fillings forced out of the mesial surfaces of upper teeth and the distal surfaces of the lower teeth, the reason—which is a question of mechanics—being that, as the hinge goes forward, it goes up. Am I right, Dr. Wilson?

Dr. Wilson. I hardly think you are right. The condyle is hardly like a hinge—the head goes back when the jaw closes. The mandible really is pulled back when the mouth closes.

Dr. Conzett. Nevertheless the fact remains that we have fillings forced out on the mesial surface of the molars.

Dr. Wilson. Is there not some other reason for that?

Dr. Conzett. I know no other reason. We find fillings with insufficient anchorage forced out of the distal surfaces of the lower teeth, but never find them to be forced out in any other direction. Therefore, while there may be a slight amount of force due to the movement of the condyle, the major portion of the stress is directed upward and forward.

Dr. WHEELER. This is the basis upon which all anatomical articulators are constructed: Arrangement is made so that the artificial teeth execute the same motion, when the jaws are brought into occlusion, as we have in the natural jaw, and invariably this is the proposition [illustrating]. It is impossible otherwise, because the mandible is not a hinge, it is a joint, which, when it moves, has to slide forward, and, when the jaw is open, it slides clear to the eminentia articularis, and when it closes it slides back, and you can see that in closing these teeth can be brought together in the anterior portion of the mouth, and when they are so brought together the condyle invariably slides downward and forward, and the molars cannot be brought together again without bringing the condyle back into the glenoid fossa, the lower teeth sliding on the interior planes of the upper jaw.

I do not question the statement of Dr. Conzett that fillings are forced out in the direction mentioned, but I believe he is incorrect in regard to the reason. Perhaps we will today be able to give him a problem of this kind to solve. While I have unbounded admiration for the technical part of Dr. Conzett's paper, he has, in my opinion, misinterpreted the movement which dislodges fillings, and a careful study of the relation of the mandible, the glenoid fossa, and the condyle path will convince him of that.

Dr. G. H. WILSON, Cleveland, Ohio. I do not feel competent to discuss the subject of the paper, as it is entirely out of my line. In regard to occlusion, however, Dr. Wheeler seems to be correct, because the head of the condyle is not like an ordinary hinge. The temporomandibular articulation does not work from a solid center; the center of working is below the neck of the condyle down at this point [illustrating], that being the fixed point and the head of the condyle the short arm working forward and backward, the eminentia articularis guiding the mandible backward. The incline of the lingual surfaces of the incisors, and probably the preponderance of force of the muscles of mastication is backward; therefore it is more than probable that Dr. Wheeler is right in his statement.

Dr. L. M. WAUGH, Buffalo. The question has been raised regarding the direction of the movement of the head of the condyle in its path in opening and closing the jaw. The head of the condyle is not a fixed point, like the hinge joint; it moves in its path, as anyone can prove by placing the finger on the jaw and feeling the point of movement of the mandible and its movement in opening and closing the teeth. We can feel this movement here [illustrating] forward and backward; it varies in individuals from ten to thirty degrees, also on either side of the jaw of the same individual. Dr. Conzett's contention as to the dislodgment of fillings I think is correct. We do not find normal occlusion of human teeth very often, and I think his observation is correct that fillings are dislodged in the directions stated. This is due to malocclusions and deviations from normal occlusion; these bring about such dislodgment of fillings. While his observation based on the movement of the jaw is not quite right, I think the practical side of his statements is correct, because we find normal conditions only in a few cases. Since the teeth are arranged very closely to one another, a very slight change in their relative positions can bring about this dislodgment of fillings.

Dr. Squire stated that it is absolutely necessary to pay strict attention to the occlusal form of restorations. We can do quite as much, I believe, toward retention by so arranging the occlusal planes in a filling that, each time the jaw is opened and closed, it will strike an inclined plane which will drive the filling into the cavity rather than out of it. If the metallic inlay had merely given us the opportunity of studying these occlusal contacts, it would have been worth while for that reason alone.

By way of digression, I would briefly take up the relative points of merit in the direct and indirect methods of making inlays. To my mind, it is not a question of whether an operator can make a good inlay by the direct or the indirect method; if he masters the technique, he will be capable of making a well-fitting inlay by either method. But the indirect method, in my opinion, offers superior possibilities in regard to the occlusal topography of our fillings, which alone is sufficient cause for its universal adoption. We can take an impression of the cavity and reproduce it by an amalgam die, take the bite, form the occlusal surface of the filling and fit the wax form to this cavity in such a way that all the occlusal contacts are established, thereby not only retaining the teeth in proper relationship, but also insuring valuable retention for the filling itself. If looked at from this standpoint, I believe the indirect method offers possibilities for better work and greater durability of fillings than any direct method.

Dr. Conzett (closing the discussion). There are two or three points which have been brought out in the discussion and which I would like to elucidate. The first one concerns the butt-joint shrinkage of the inlay. While I do not wish to go into the subject of the casting of different metals and their shrinkage, which is too big a problem to open up at this time, I want to say that there is shrinkage in the casting of any metal, and, in the butt joint, this is particularly observable. It will be found in making a butt joint at the gingival angle that there is no macroscopic appreciable discrepancy between an inlay and a filling, but there is a microscopical discrepancy, and we are dealing with microscopy when dealing with bacteria.

As to the occlusal step cavity, the cavity is so shaped that it is leaning toward the gingival aspect of the cavity, so that before we introduce the metal, we trim off a slight portion of the occlusal step, and when the finished inlay is set in the cavity, it can be malleted down that much farther in the cavity, and set upon the gingival and occlusal steps. Then the cavity is perfectly sealed all over, and the margin, which has been made with a flange, can be burnished down so that a microscopically perfect joint is obtained. I do not believe it possible to obtain a perfect joint, but one that is almost perfect, so that there is no danger.

I do not wish to claim for a moment that Dr. Black originated all the facts which makes cavity preparation a science today. We recognize that great work had been done by men in the past, and I tried to guard in the paper against any misunderstanding by saying that we do not wish to arrogate to Dr. Black or to ourselves all the credit for scientific cavity preparation. Dr. Black systematized the work which other men did—Taft, McKellops, Barrett, Webb, all of these men did wonderful work, and Dr. Black simply gathered up their work and then, by his remarkable genius, combined and systematized it. Of course, he did a lot of original research himself, and then gave us the science of cavity preparation. I still adhere to the statement that, previous thereto, we had no science of cavity preparation.

In regard to Dr. Wheeler's stricture upon the theory of extension for prevention, I want to say that I tried to guard against that too. We do not have any hard-and-fast rules, we have to exercise judgment, and study, and meet the conditions which the case presents with the fundamental principles laid down by the science of cavity preparation. It would be foolish, of course, to cut some teeth as far as others, and all teeth alike, but we must use intelligent judgment, and must cut cavities in teeth in such a way that will be able to best preserve the teeth for future usefulness. I agree with much that Dr. Wheeler has said, but, at the same time, in all cases the lines of a cavity should be carried to safe territory. There is a difference in that territory in different mouths. In some mouths certain territories are kept clean that are unclean in others, and we have to differentiate in the individuals as well as in the teeth we are operating upon.

I hardly dare to answer the other question, because while my observation is correct that fillings placed in mesial and occlusal surfaces of upper teeth and in distal surfaces of lower teeth are displaced, I had supposed this to be owing to the forward and upward movement of the mandible, and I dislike to contradict Dr. Wheeler and Dr. Wilson. Dr. Brady of Kansas City once said that when we get the perfect operative dentist, orthodontist, and prosthodontist, we shall have the perfect occlusionist. I am an operative dentist, know little of prosthodontia and orthodontia, and have much to learn along these lines, and for that reason I am glad of Dr. Wheeler's remarks. As soon as I get home, I shall study Dr. Wilson's book, and perhaps I can make up for my shortcomings in this field. I am glad that Dr. Waugh gave such a clear explanation of the question at issue. I insist, however, that my observations have been correct, although my deductions may have been incorrect.

The next order of business was the reading of a paper by Dr. F. H. Skinner, Chicago, Ill., entitled "A Few Suggestions on Oral Prophylaxis."

The meeting then adjourned until the afternoon session.

(To be continued.)

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EDITORIAL DEPARTMENT.

WHY NOT TELL THE TRUTH?

The ethical sense—when it is a sense at all—appears to be an evolutional product. Indeed, in its broad signification as the science of right conduct, ethics is distinctly an outgrowth of the social or communal life of a man, involving his conduct in a relative sense to the rights of others; hence there can be no such thing as ethics as an individual endowment, any more than there can be such a thing as sound upon an uninhabited island—the term "sound" involving as it does not only atmospheric vibrations of a given amplitude and intensity, but their appreciation by an intelligent mentality.

Among the fundamental ethical conceptions earliest in the order of evolution is that which recognizes the harmfulness to others of misrepresentation of certain categories of fact. One may cause the death of another by inducing him to drink poison by misrepresenting the draught to be wholesome or harmless. One may also destroy the faith of the community in a given individual by misrepresentations as to his character, or as to his acts as indicative of character; and in both instances the harm done, be it material or spiritual, direct or remote, constitutes an offense against the ethical sense of the community. Such offenses have become embodied in the ethical or moral codes of peoples, and constitute the standards or norms by which conduct in its social relations is gaged, and departures from which constitute offenses punishable in accordance with established communal standards of their relative magnitude.

Notwithstanding the fundamental importance of correctly stating the truth, and the recognized harmfulness of distorting the truth, and notwithstanding the fact that "Thou shalt not bear false witness against thy neighbor" is as clearly an established provision of the accepted ethical code of our social organization as any other item of the decalogue prohibiting crimes and misdemeanors against persons or property, it nevertheless appears that infractions of the prohibition against bearing false witness are more prevalent and are regarded more lightly than the breaking of any other prohibition of the venerable code. The peculiar and seemingly inconsistent thing about it all is that less flagrant wrongs of less importance to the individual or communal welfare are promptly punished or the offender is indignantly ostracized; whereas the liar, the perverter of the truth for his own selfish ends—not to speak of the ordinary ignoramus and egotist who distorts the truth in order to enhance his importance and flatter his own vanity—often goes on his misguided way unscathed and unrebuked until Nemesis in the form of outraged truth overtakes him and shows him up in all of his naked depravity.

There is a form and kind of misrepresentation that lacks the positive motive of dishonesty and self-interest, which therefore excludes it from the category of plain ordinary lying, but which nevertheless is negatively harmful in that it conveys false impressions, and thus constitutes an obstacle to the propagation of the truth—viz, the form of misrepresentation commonly called exaggeration. The tendency to overstate things is a natural human peculiarity, and it is just that tendency which constitutes and probably always will constitute the greatest obstacle to scientific progress; for it is the business and end of scientific research to ascertain the exact truth, which when ascertained and systematized into an organized grouping of data is what constitutes science. Every misrepresentation of fact, therefore, impedes the growth of science, and the tendency to misrepresentation prostitutes the intellect of the scientific worker so afflicted, and advertises his incompetency for such work.

Exaggeration may be wilful or it may be thoughtless and unintentional, but in either case its effect is harmful because it is misleading.

How often do we read—for a concrete example—that in some paper on dental education its author asserted that the colleges are to blame because they do not teach this or that subject? or that the colleges are responsible for the low standard of ethics of the young men who are now coming into the profession? or that the colleges do not do this or that thing that they ought to do, and that the colleges do this or that thing that they ought not to do? —with the implied conclusion that "there is no health in them." The same criticisms are made collectively of state examining boards, and of everything in general, by the type of individual who has a penchant for exaggeration, and whose experience is usually limited to the observation of a single instance or two upon which he bases his sweeping and inclusive generalization that the wrong of which he complains is epidemic in scope.

It is highly probable that if our whole scheme of dental education as well as of dental legislation were critically examined in detail, it would be found that in the half-hundred or more faculties and examining boards respectively engaged in the work there would be found here and there enough deficiencies in kind and degree to collectively warrant active attempts at reform. On the other hand, the sweeping generalizations made by individuals who base their criticisms of our colleges upon what they actually know from an experience of one or two observations constitute examples of the widespread tendency to draw upon the imagination for data—a tendency which may not mean wilful misrepresentation, though its effects are often equally pernicious. Would it not be worth while, in this time of social reform movements, for some inspired individual to start a propaganda of plain ordinary truthfulness as an ethical motive just for the sake of testing out its practical usefulness to society.

Review of Current Dental Literature.

[*Correspondenz-Blatt fuer Zahnaerzte*, Berlin, October 1912.]

THE ACTION OF ARSENOUS OXID UPON THE PULP AND PERICEMENTUM. By PROF. DR. H. SCHROEDER, BERLIN.

[*Oesterreichisch-ungarische Vierteljahrsschrift fuer Zahnheilkunde*, Vienna, January 1913.]

THE INFLUENCE OF ARSENOUS OXID UPON THE PULP TISSUE. By PROF. DR. JULIUS SCHEFF.

As the result of his own observations and those of numerous other investigators regarding the action of arsenous oxid upon the pulp and pericementum, and illustrating his deductions by a series of beautiful photomicrographs, Schroeder arrives at the following conclusions: The most conspicuous and ever-present phenomenon following the application of arsenous oxid to the pulp is the remarkably pronounced fulness of the bloodvessels and the presence of multiple hemorrhages, especially from the capillaries. Numerous thrombus-like formations are found in the vessels, varying in appearance according to the more or less advanced decomposition of the red blood corpuscles. The changes are to be ascribed to an elective effect of the arsenic upon the bloodvessel walls, and may be observed almost simultaneously in all parts of the pulp, so that one cannot speak of a gradual advance toward the root-apex, there being no areas of abrupt transition or special zones of demarcation. This rapid progress of alteration of the vessels involving the whole pulp is to be attributed to the ready resorption of the arsenic. In a like manner the change occurring in the nerves is to be explained by the direct chemical action of the arsenic, which is even more rapid here than in the vessels. In the same way the cell elements, including the odontoblasts and the connective tissue substance, are affected by the toxic action of the arsenous oxid; so that the necrosis of the pulp is to be attributed neither to the superficially caustic action of the arsenous oxid nor to its precipitating action upon albumin, but rather to its character as being a plasma poison.

Concerning the action of the arsenous oxid beyond the apex, the writer finds that the necrotic effect of the drug is considerably checked at that point, presumably by the anatomical conditions, which are unfavorable to resorption. Experiments conducted in dogs, in whose canines the acid was sealed for a week and longer, showed that the drug had lost its toxic effect upon its journey from the place of application to the root-apex to such a degree that it no longer destroyed the apical tissue and the pericementum directly, but only set up an inflammation aggravated by the masses of necrotic pulp tissue. A great number of leucocytes are found to penetrate from the deeper layers of the periapical tissue into the vessels that enter the pulp, these leucocytes proving the strongly chemotactic action of the necrosed masses of pulp saturated with arsenic. Of the other phenomena which have been observed as marking the direct action of the arsenic, multiple hemorrhage and cell changes are not observed in the pericementum, neither can any changes be observed in the nerve fibrils ramifying from the inferior dental nerve to the root-apex. This does not exclude the possibility of a destructive necrotic action of arsenous oxid upon the pericementum and surrounding periapical tissues in cases of wide foramen, in young teeth, and under favorable conditions of resorption. Such cases have been reported, and we also know that if an idiosyncrasy is present, extensive necrosis may occur in the vicinity of teeth that have been treated with arsenic.

The pericementitis which frequently follows the application of arsenous oxid is set up and maintained by the products of decomposition in the pulp tissue that are saturated with the acid. The hypersensitivity generally ceases soon after the pulp has been removed. If the acid acted directly upon the pericementum, the pain could not possibly last for several days, as is so often observed, since the nerves of the pericementum would surely succumb as readily as those of the pulp to the action of the acid. In most cases, therefore, the painful inflammatory irritation of the apical pericementum following the application of arsenous oxid can be attributed not so much to the direct chemical action of the drug, as to irritation produced at the apical foramen by the decomposition of the pulp.

Scheff's investigations upon this subject have led him to the following conclusions, which are interesting when compared with those of Schroeder: The action of arsenous oxid upon the pulp consists in a pronounced hyperemia observable within a few hours, followed by edematous infiltration of the connective tissue of the pulp. On the third and fourth days the vessels and capillaries are filled to the utmost capacity, on the sixth day thrombosis of all the vessels bordering the necrotic portion is observed. At the same time ensues the emigration of polynuclear leucocytes into the pulp tissue, the elements of which exhibit clear signs of beginning necrosis, starting from the point of application of the arsenic and gradually progressing downward. Even after fifteen days of arsenical application, the pulp is not fully necrosed, reparatory processes, viz, proliferation of the connective tissue elements, being set up from the central portions, which are more or less clearly separated from the necrotic periphery of the pulp by a wall of leucocytes and lymphocytes. The arsenous oxid employed in these observations was combined with oil of peppermint, this paste acting in the same manner as pure arsenous oxid. Other admixtures, however, to the oxid, the author admits, may produce phenomena in the pulp tissue different from those observed by him.

[*Le Journal Dentaire Belge*, Brussels, November 1912.]

WHY THE ARABS SO FREQUENTLY CLEAN THEIR TEETH AND MOUTH.

According to their religion Mussulmans must, before prayers, give themselves up to ablutions of the entire body in order to purify it. The care of the mouth is a part of these ablutions. Tradition relates that Mohammed cleaned his mouth after meals with a stick of licorice wood, which had previously been masticated, so that one of the extremities consisted only of woody fibers which formed a kind of brush, and was used as a tooth-brush. If, at the time of his ablutions, the Arab had not ready those substances with which he is accustomed to clean his teeth, he simply rinsed his mouth, and if he had no water he confined himself to simulating the ablution. Here is an extract from the Arab precepts as regards hygiene, taken from the philosophy of Sidi Khalil: "It is necessary that every Wednesday a man should perform ten things revealed by our Father Abraham, or at least some of them if he is not able to accomplish all; one of these ten instructions is to use *souak* for the mouth."

Souak is used by the Arabs for the care of the mouth, but some, especially among the women, like to use this drug for cosmetic purposes. The Arab woman takes a fragment of bark three or four centimeters long and a centimeter broad, and chews this substance for half an hour, after which she uses it to rub the teeth and gums. Under the action of this product the teeth become very white and the gums and lips take on a beautiful red color. Certain Arab women in order to perfume the breath and to complete this cleansing of the mouth masticate for a portion of the day a resinous gum which is known in Tunis by the name of *elloubane*. This resinous gum of which we have received a specimen is no other than olibanum (frankincense). Souak is used in many of the countries of Northern Africa, such as Tunis, Algeria, and Egypt, in Asia Minor, etc. In all these countries it is an important article of commerce; its cost varies from Fr. 3.00 to Fr. 8.00 a kilo. Arabs chiefly use it, but other people living in contact with them, having learned to appreciate its advantages, also make use of it.

Throughout the East betel is used, especially as a masticatory. It is a complex product whose principal constituent is the leaf of a climbing plant of the family of piperaceæ mixed with lime and areca nut. This substance has a certain physiological action which orientals cannot dispense with without the risk of bringing on a cachexia.

Among the Senegalese *sotiou* is used; it is a real natural tooth-brush. This brush, or sotiou, is nothing more than a little stump of a branch or root obtained from certain trees or bushes; its length is usually 10 to 15 centimeters, and it is about as thick as a pencil. In order to make a sotiou the bark is removed from a part of the little branch and its end is chewed until it is quite clean, so that one has a kind of brush with very short (about 2 centimeters) but very stiff bristles, with which the teeth are vigorously rubbed from right to left and from above downward. A great number of trees furnish this brush; they chiefly belong to the family of leguminosæ, examples of which are acacias, tamarinds, etc. The use of this preliminary toothbrush has spread throughout Central Africa, even to the western side, and is found in Nigeria, the Congo, etc.

The Malgaches take great care of their teeth, and use a powder made from rice, which is calcined and pounded. The negros of the Antilles also use, for the preservation of their dentition, little branches and roots of certain plants.

This brief review shows how the custom of some still savage or half-civilized nations leads one to think that they all take the greatest care of their teeth, and that the cleanliness of the mouth and teeth appears instinctive among these primitive races. It might be added that it is disquieting that it is not always so among civilized people.

[*New York Medical Journal*, January 11, 1913.]

PYORRHEA ALVEOLARIS AND THE VACCINES. [EDITORIAL.]

The disease to which the symptomatic name of pyorrhea alveolaris has long been given forms the subject of a valuable contribution to the DENTAL COSMOS, in its issues for January and February 1913, from the pen of Dr. Leon S. Medalia. The value of the paper lies in the advice as to treatment of this resistant affection, which the writer prefers to call chronic alveolar osteomyelitis, advice which seems likely for the first time to lead to definite and permanent remedial results. Dr. Medalia has treated 115 cases in all stages with a percentage of cures in the incipient stage of ninety-two per cent., in the moderately advanced stage of ninety-three per cent., in the far advanced stage of forty-three per cent. These results are of particular interest to our readers, not only on account of our repeated emphasis on the importance of the condition as a symptom of certain constitutional dyscrasiæ, but because the curative results were obtained by the use of vaccines, to which we have recently devoted a large amount of space. The coincidence is interesting, in view of the impartial discussion we have presented as to the relative merits of the stock heterogenous vaccines and the clinical autogenous, that the Boston writer uses a mixture of the two.

Local measures formed an important part of this new treatment, but these were along the old lines and have never by themselves producd results at all encouraging; they were carried out by the various dentists who sent the patients to Dr. Medalia, and in many cases sent with them the statement that used alone they would be hopeless. We believe that no more striking testimony of the value of vaccine therapy could be adduced than the encouraging outcome in these cases of a disease which has hitherto resisted absolutely the most painstaking and ingenious oral surgery.

Among the author's conclusions are that the tooth sockets are enlarged medullary spaces, while the so-called peridental membrane is in reality a ligament which holds the tooth suspended in the alveolar cavity; mechanical causes are responsible for starting chronic alveolar osteomyelitis, while the pyogenic bacteria, particularly the pneumococcus in chains, are responsible for keeping it up; again, and this is where our repeated opinion is corroborated, a great many rheumatic diseases, so called, are directly related to the osteomyelitis, and vaccine treatment, together with the proper dietary regimen, cures or relieves the systemic disease as well as the local trouble.

The neglect of this foul and obvious condition has long been a reproach to diagnosticians. Here the dental surgeon's work can take its proper place in relation to the physician's as an inseparable section of general medicine, working toward a result of the highest importance to the health and satisfaction of the victim. The physician will no longer carelessly turn the patient over to the dentist, to the latter's despair, but labor with him to the great comfort of the individual and the protection of the community against one of the most contagious and obstinate of pathological conditions.

[*Oesterreich.-ungarische Vierteljahrsschrift fuer Zahnheilkunde*, Vienna, No. 4, 1912.]

THE ETIOLOGY OF DENTAL CARIES. By Professor Matti Ayrapaa, Helsingfors.

The writer reviews the theories advanced by more recent writers on the etiology of dental caries. His own views regarding this important question can be summed up as follows: The chief etiologic factors in the production of dental caries are—

First: Lack of use, due partly to lack of opportunity, partly to bad habit, indolence, or inability to masticate.

Second: Poor or unsuitable food, which either does not contain the constituents necessary for the development and the life of the teeth, or from which these constituents have been removed, or which has been prepared, viz, softened in such a way that the teeth have no opportunity to carry out their functions.

Third: Defective cleanliness, due either to lack of natural cleansing by mastication and the concomitant liberal flow of saliva, or to lack of artificial cleansing by brushing and rinsing. It must not be overlooked, in this connection, however, that artificial cleansing is of little efficiency if compared with nature's own cleansing process.

Fourth: The abuse of stimulants, such as alcohol, absinthe, opium, etc., exert a degenerating influence on the human organism and possibly upon future generations.

In the matter of prophylaxis the chief stress is to be laid upon vigorous mastication, which is nature's most efficient means of preserving the integrity of the teeth. This must be constantly reiterated in our communities of hyper-refinement, and subsisting on a dietary deficient in mineral salts.

[*New York State Journal of Medicine*, November 1912.]

AN ELABORATION OF A PREVIOUSLY REPORTED DEATH WHILE USING NITROUS OXID AND OXYGEN AS AN ANESTHETIC. By P. J. Flagg, M.D., Yonkers.

In a paper read before the Westchester County Medical Society, January 16, 1912, and published in the *New York State Journal of Medicine* for April, a series of one hundred cases of nitrous oxid-oxygen anesthesia were reported. Case No. 77 is reported to have died. Space did not permit of a detailed report of this case, but as deaths on the table while using nitrous oxid and oxygen as an anesthetic are of importance and interest at the present time, this report perhaps deserves more than a passing notice.

It is an open question as to whether or not this death occurred as the result of the use of nitrous oxid-oxygen ether as an anesthetic. The reader may judge for himself from the following facts:

Patient, a large, fleshy colored woman, aged twenty-five. She had been bleeding almost continuously for a period of four or five months. Two years ago her right tube and ovary were removed. Before the operation a tentative diagnosis of uterine fibroid was made. The enlargement upon the body of the uterus which gave rise to this diagnosis proved later to be occasioned by adhesions about the proximal end of the tube, which had been tied off by a heavy silk ligature. No fibroid of the uterus or appendages could be found.

The patient was reported to have had an attack of syncope shortly before the operation. About twenty minutes before being anesthetized she received ¼ gr. morphin and 1-150 gr. atropin hypodermically. When she entered the operating room she was in a very nervous frame of mind. The examination of her heart had been negative. The apex beat, however, was heaving and forceful. Anesthesia was induced at 4 P.M. The patient went under quietly. As there was evidence of shallowness in her anesthetic state ether was given to the extent of about one dram. Shortly after this the respirations were obstructed by masseteric spasm. The cervix was dilated and the uterus curetted. The respirations then were irregular and obstructed. The operator made the remark that the blood looked dark (the black skin made it difficult to properly judge the normal color). The ether and gas were stopped and a large proportion of oxygen was given. The patient was replaced in the dorsal position and the breathing immediately improved. When the abdominal incision was made the tissues looked extremely anemic. Moderate muscular relaxation was present. The pulse was of good quality but variable, rapidity about 120. The corneal reflex was active and the pupils were contracted. During the course of the operation (which occupied 1.17 hr. from the induction to the cessation of the respiration), the breathing was irregular, slowing to from three to four a minute and then increasing in rapidity. While the abdominal work was being done it was thought that this condition was due to pulling on the viscera, there being an absence of signs of deep anesthesia. Toward the end of the operation the cheeks and forehead became cold, as though the patient were suffering from shock. This condition was not warranted by the nature of the operation or the loss of blood. The mask was removed several times from the face, and the patient rapidly came out. When the mask was replaced a large proportion of oxygen was given. Several times the corneal reflex was lost, only to reappear again almost immediately. The breathing improved as the operation was concluded. When the patient was raised from the Trendelenburg it improved markedly. At this time the operator said: "She is pretty rigid." As the patient had been behaving badly no ether was given her, but oxygen instead, in the hope that the rigidity was of an asphyxial nature. While the old scar in the skin was being cut out the patient showed the effects of peripheral stimulation by breathing more deeply and more rapidly. The corneal reflex was active and the pupils were contracted. Suddenly irregular breathing, simulating that which had frequently occurred during the operation, again made its appearance. The patient made a low crowing sound as though about to come out. This was followed by slow, deep respirations. The respirations ceased. As this had occurred several times before, it was not in itself particularly disturbing. The pulse could no longer be felt, however, the pupils dilated suddenly and the corneal reflex completely disappeared. In the presence of these signs artificial respiration was immediately begun, accompanied by every possible form of stimulation. The attempted resuscitation was entirely unsuccessful.

The following facts were noted:

The slow pulse of asphyxial rebreathing did not occur.

Patient was in a light anesthetic state when she died.

She showed evidence of shock some twenty minutes before.

The color was difficult to make out, but seemed satisfactory.

There was masseteric spasm with ether. This did not appear to seriously hamper the respirations, but it showed a tendency to persist even when air and oxygen was given in abundance.

The rigidity appeared to be due to shallow anesthesia, not to asphyxia.

Death is thought to have been due to cardiac failure, the remote cause being previous protracted hemorrhages, the immediate cause being the strain thrown upon the vasomotor system by respiratory obstruction incident to a badly accepted anesthetic.

[*Zahnaerztliche Rundschau*, Berlin, March 23, 1913.]

MERCURY CONTAINED IN THE AIR SURROUNDING MEDICAL MEN AND DENTISTS, AND ITS DANGER. By Dr. Arvid Blomquist, Stockholm.

Blomquist has found that in the Physiologic Institute of Stockholm every 4000 liters of air contained from 0.1 to 0.3 mg., in the laboratories from 0.5 to 1.0 mg., and in the Medico-chemical Institute from 0.3 to 0.4 mg. of mercury. Specimens of the dust collected in the last institution yielded 0.07 per cent. of mercury. The urine of persons employed in these institutes also contained mercury, the quantity of the metal resorbed per person in a day of eight working hours amounting to from 0.4 to 1.0 mg., which observation clearly shows the great danger of intoxication. As early as 1909, in persons connected for some length of time with the same institutes, Goethlein had observed symptoms of intoxication, 80 per cent. of these cases exhibiting great fatigue, 65 per cent. stomatitis, 50 per cent. lack of appetite, and 45 per cent. affections of the stomach and intestines. In other institutes and hospitals similar phenomena were observed.

Dentists, of course, are especially exposed to the risk of chronic mercurial infection, particularly if, for the sake of convenience, the excess of mercury is squeezed out in the palm of the hand or between the fingers—which practice cannot be too severely condemned from practically every point of view. Blomquist found that the urine of one dentist contained no less than from 3.0 to 4.0 mg. of mercury per liter of urine. These observations clearly show the necessity of great care in the manipulation of mercury by dental practitioners.

Periscope.

Avoiding Air-spaces in Pouring Impressions.—To prevent air-spaces in pouring impressions, a medium-sized, rather coarse paint-brush should be used, and the plaster painted on the impression, as in inlay work. After use, the brush is immediately immersed in water and a few shakes will leave it ready for the next use.—W. I. Prime, *Dental Digest.*

Cleaning Rubber Files.—Files used in the laboratory for finishing vulcanite work soon become clogged by the rubber wedging in the depressions between the teeth. Pouring chloroform over the file causes this rubber to curl up and loosen, so that it can be readily removed by any kind of a brush, thereby making the file cut like a new one.—Dr. W. H. Craft, *Dental Brief.*

Easy Method of Repairing Defects in Gold Crowns and Bridge Work.—Mercury and filling gold are mixed in the same way as amalgam. The mixture is packed over the hole in the crown or the defect in bridge work to be repaired. With soldering pliers the crown is held high over the gas flame so as to heat very slowly. As the mass reaches 350 C. the mercury volatilizes, leaving the pure gold covering the hole or filling the defect. This gold is burnished to a smooth surface, and the operation is complete.—C. O. Dobson, *Dental Summary.*

Method of Strengthening Partial Plates.—We often have trouble from the breaking of partial plates. Leaving the outer rim off weakens the piece, and wires and bars recommended by supply houses for this purpose are usually of very little use, for the reason that rubber does not adhere to the metal. Victoria metal seems to fill a long-felt want for this work, and strengthens the denture very much, because the rubber passing through holes countersunk on the lingual side forms rivets, thereby adding great strength to the denture and allowing it to be made of a minimum thickness.—L. G. Beerbower, *Dental Summary.*

Replacing a Broken Facing on a Bridge.—The old pins left in the bridge are burred out, and a new facing is fitted. A piece of gold tubing is made with the hole small enough so that, when sprung over the pins in the new facing, the seam in the tube will open enough to admit a minute piece of solder. The pins are cut off on the new facing, leaving just enough to hold the tubes upright. A small ball of asbestos fiber is wet, and the facing is pressed into it. The asbestos is thoroughly dried, and the tubes are soldered to the facing. The facing is refitted to the bridge, reaming out holes of the desired size, and cutting off the tubes so that they extend just through the backing. Then holes are countersunk on the lingual side of the bridge. The facing is cemented into place, and the tubes are spread on the lingual side and burnished.—C. M. Roberts, *Dental Digest.*

Replacing a Lateral by Bridge Work.—The palatal side of the canine is trimmed just sufficiently to level the surface, and a slight space is left between it and the occluding teeth. Three holes, No. 20 gage, are then drilled directly in the line of the root. The holes at the approximal sides are to occupy that section of the tooth structure—such as is generally included in cases of approximal caries—which does not expose the pulp. At the cervical palatal section, the hole can be only a shallow one. The angle at which these pins are placed in the tooth structure should be such that the line of pressure in use will prevent their displacement. A little plate of platinum, 38 gage, is swaged and fitted, and the pins are then soldered in position with pure gold. The plate is again fitted, the edges are trimmed to the proper size and shape, and a little more pure gold is flowed over the entire surface. Next the plate is again fitted, the porcelain tooth properly adjusted, removed with the plate and connected with solder, some of which is flowed over the plate to additionally strengthen it. A spur may be allowed to rest on the central.—G. Evans, *Items of Interest.*

Repairing a Gold Filling.—Difficulty is usually experienced in attempting to repair a gold filling when retention of the added portion depends upon welding it to the old filling. Carefully washing the surface with alcohol, chloroform, or other cleansing agent and roughening it, will at times prove effective, especially if the surface is large. Where this fails, annealing the surface by means of a tiny alcohol flame—when it can be done—usually insures a reliable union between the old and the new layer of gold. A pellet of cotton wrapped on the end of an instrument, dipped in alcohol and ignited, will furnish sufficient heat. Where they can be made without weakening the old filling, carefully placed and properly shaped retaining pits or grooves are always desirable, and form by far the most reliable bond between the old and the new gold. The difficulty is not entirely due to deposits upon the surface of the old filling or infiltration through its mass of some constituent of the oral fluids. A well-consolidated gold filling that has become wet with oral secretions is not receptive to additions depending upon welding. While the gold can be built upon it and be sufficiently well retained to withstand shaping and polishing, the more severe test of actual use, in spite of all precautions, may cause a separation later. Repaired fillings may last for years, nevertheless they are always objects of suspicion, and every precaution possible should be taken to make the bond of union secure.—W. H. Trueman, *Dental Brief.*

Post-Operative Treatment Following the Extraction of Teeth.—The after-treatment of extraction is purely surgical. Any laceration of the soft parts should be trimmed smooth, and any areas which might slough should be cut away. All loose particles of process should be cleared away, and any exposed bone should be cut away with the bone-forceps, and a gauze dressing applied if indicated. A dressing will be indicated if the operation has been at all severe, that is, if the parts have been so disturbed that healing by first intention would not be likely. When a dressing is used from the first, we seem less likely to encounter the sluggish condition known as dry socket, which is only a step removed from necrosis. When dry socket exists, the packing should of course be maintained with irrigation at regular intervals, and stimulating medicaments, either silver nitrate or aromatic sulfuric acid, should be applied occasionally.

The treatment of abscessed teeth after extraction is a point which deserves special attention. The tooth socket should be thoroughly irrigated with a non-irritating solution, after having used a curet and scraped the abscess cavity in order to remove any pyogenic membrane or débris which might remain after the extraction. The socket having been thus cleansed, it should be lightly packed with 5 per cent. iodoform gauze, and the dressing renewed and the socket irrigated with an antiseptic solution in from twenty-four to forty-eight hours, and as often thereafter as may be necessary, according to the severity of the infection from the abscess.—J. F. Hasbrouck, *Items of Interest.*

Excision of Diseased Roots and Molars.—Sometimes it is advisable to save part of a molar, rather than lose the whole tooth. This can be accomplished by excising the diseased root. The crown of the tooth will, of course, have to be trimmed accordingly, or reshaped by means of a crown or inlay. In cases of lower molars, the crown can be cut in halves, thus making a bicuspid of the remaining part of the tooth, and the excised portion can be replaced by means of a bridge.

The conditions that call for a complete excision of a root are—

(1) When one root has become completely denuded of its pericemental attachment, caused by (*a*) pyorrhea on the lingual root or one of the buccal roots of an upper molar, or on one of the roots of a lower molar; (*b*) chronic alveolar abscess of one of the above-mentioned roots; (*c*) interproximal abscess; (*d*) abscess from adjoining tooth.

(2) When there is a chronic alveolar abscess, with a sinus from one root which will not yield to treatment, and when it is not wise to amputate the end of such a root.

(3) When one root-canal has been accidentally perforated and it is impossible to close the perforation.

(4) When one root has already been cut off through extensive caries, which occurs sometimes under an ill-fitting crown.

(5) When from some cause or other an abscess is located between the roots of a molar, and it is impossible to cure it.

In such cases the technique and treatment will of course be according to the operator's judgment as regulated by his experience.—A. W. Ellis, *Dominion Dental Journal.*

A Method of Overcoming Shrinkage in Cast Inlays.—The cavity for the reception of the inlay is prepared in the usual manner. An impression of the cavity is taken by the use of a small tray of German silver bent to conform to the tooth, and modeling compound softened with dry heat as an impression material. Before removing the impression, a blunt instrument is forced between the tray and the adjoining tooth to insure an accurate impression of the gingival margin. Before being dismissed, the patient is requested to bite into a cone of inlay wax; this furnishes a guide to the occlusion and contour of the finished inlay.

The impression of the cavity is invested in a cone of soft plaster, or in plaster held by the rubber ring of the Melotte outfit, deeply enough to give the model strength and to make it of convenient size to work with.

Amalgam is packed carefully into all parts of the impression, to insure a model with good sharp margins. The wax inlay is then placed in the amalgam model, and the carving completed. The inlay, after casting, is again carried to the model for the final burnishing of the margins to the model. The inlay is polished with stones and disks, always polishing toward margins.

The inlay is then ready to be cemented, very little work for the fitting being required, and polishing after cementation being avoided. Working on models provides a margin to burnish and spin the gold against, thus overcoming the little inequalities caused by the shrinkage in casting. In the event of a failure in casting, another inlay can be made.

This impression method is particularly useful in inaccessible cavities for both gold and porcelain. A Chase forceps, which will hold an ordinary copper rivet carrying softened modeling compound, is used in labial cavities, enabling the operator to secure a very accurate impression. The amalgam model is made, a matrix swaged, and the inlay baked. By this method the rocking movement so frequently noticed in these difficult and tedious cavities is overcome.—W. H. Scherer, *Dental Brief.*

Hints, Queries, and Comments.

WARMING ALCOHOL FOR APPLICATION ON COTTON.

To the Editor of the Dental Cosmos:

Sir,—In "Hints, Queries, and Comments" for April, is not the elaborate method of warming alcohol so as to apply on a pellet of cotton to a cavity, a waste of time, and entirely unnecessary? A very simple and time-saving method would be to dip the pellet in alcohol, then touch it to the flame of the lamp and immediately blow out the flame on the pellet; the alcohol and pellet are then as warm as desired. Time consumed, less than one second.

Geo. A. Maxfield, D.D.S.

Holyoke, Mass.

To the Editor of the Dental Cosmos:

Sir,—In the April Cosmos, Dr. Fischler, alluding to the pain provoked by applying cold alcohol to a cavity, suggests a method of warming it by putting a few drops of alcohol into a heated metal receptacle—an aluminum thimble. For many years I have adopted a much simpler plan, though whether the hint was given me by someone else or not, I cannot remember.

A pledget of wool is dipped into absolute alcohol and passed rapidly through a flame, where it ignites. It is carried quickly toward the patient's mouth, and during the passage I blow it out. The alcohol is burning for perhaps one second, and is heated sufficiently to make its application unnoticeable to the patient. One or two trials will teach the operator exactly the length of time that the alcohol should be alight. This plan, besides being an enormous saving in time and trouble over that suggested by Dr. Fischler, has the still greater advantage of insuring that the alcohol always has the proper temperature, which I do not think will be the case in his method.

J. H. Gibbs.

Edinburgh, Scotland.

Obituary.

DR. THOMAS W. CLEMENTS.

Died, at his home, Brookline, Mass., on Sunday, April 13, 1913, Dr. Thomas W. Clements.

The dental profession, as well as humanity at large, has sustained an irreparable loss by the death of Thomas W. Clements, D.M.D., which occurred at his home, in Brookline, Mass., on April 13, 1913.

Dr. Clements was born in Weymouth, N. S., and as a child moved with his parents to Calais, Me., where he lived until the outbreak of the civil war. He enlisted in company K, 12th Maine Infantry, and was later commissioned as first lieutenant. He served under Butler in New Orleans, being at one time officer in charge of the mint. He served the government during the whole period of the war, and, after being honorably discharged, took up the study of dentistry.

In 1872, the deceased was appointed professor of operative dentistry in the Boston Dental College. In 1891 he was elected a member of the Executive Board of the American Academy of Dental Science, and was afterward president of its alumni association for three years. He was also for many years librarian of the Massachusetts Dental Society.

Dr. Clements was a member of Beth-Horan Lodge, F. and A. M., being its Worshipful Master for two years; also Past Commander of C. L. Chandler Post, G. A. R.

In every relationship of life the deceased proved himself a model citizen, and he was greatly loved by all who knew him.

"His was a gentle life,
And the elements so mixed in him
That Nature might stand up
And say to all the world: This was a man."

"IN MEMORIAM" RESOLUTIONS.

Dr. Wm. P. Richards.

The following resolutions were passed by the Central Dental Association of Northern New Jersey on the death of Dr. William Price Richards:

Whereas, Dr. William Price Richards, an honored member of this society, has been removed from us by Divine Providence, it is fitting that we should, at this time, make record of the event, and of the great loss thereby sustained; therefore be it

Resolved, That by his genial disposition, estimable character, and love for his chosen profession, he has endeared himself to his associates and won their lasting esteem and affection by his untiring efforts in their behalf and for the advancement of dentistry; as a true friend and earnest worker he will never again take part in our proceedings; never again will the warm grasp of his friendly hand be felt; no more will his cheery words be heard, nor will his smile help to brighten our meetings; and be it

Resolved, That our sympathies and condolence be extended to his family in their bereavement; while such a loss is irreparable, we cannot but be grateful to the Giver of all good that our friend was permitted to live such a long and useful life, by which we have all profited; and be it further

Resolved, That these resolutions be incorporated in the minutes of our society, and that a copy be transmitted to the family of the deceased, and also to the dental journals.

W. F. Barry,
H. S. Sutphen,
G. W. Wakeley,
N. M. Chitterling,
Ralph Waldron,
Committee.

Dental Legislation.

DENTAL LAW OF THE STATE OF ARIZONA.

AN ACT

To Regulate the Practice of Dentistry, and to Provide for the Issuance and Revocation of Licenses Therefor.

Be it enacted by the Legislature of the State of Arizona:

Section 1. Any person shall be deemed to be practicing dentistry who for a fee, salary, or reward, paid directly or indirectly to himself or to some other person, shall attempt to or shall perform an operation of any kind upon, or treat diseases or lesions of, or correct malpositions of, the human teeth or jaws.

Nothing herein contained shall prevent any person duly licensed to practice medicine or surgery in the State of Arizona from extracting teeth in the practice of oral surgery or the treatment of diseases of the mouth.

Sec. 2. It shall be unlawful for any person who is not duly licensed to practice dentistry in the State of Arizona to practice dentistry in the state, or by the display of a sign or in any other manner advertise himself as being engaged in the practice of dentistry in the state.

Any person who shall violate any of the provisions of this section shall be guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not less than one hundred dollars nor more than three hundred dollars, or by imprisonment in the county jail for not less than three months, nor more than six months, or by both such fine and imprisonment.

It shall be the duty of the county attorney of each county of this state to prosecute any violations of this section in the courts of their respective counties in which such violations occur.

In any prosecution under this section a certificate under the hand and seal of the Secretary of State stating that he has examined the list of licensed dentists on file in his office, and that the name of the defendant does not appear thereon, shall be competent evidence and *prima facie* evidence that the defendant is not and was not at the time of the commission of the alleged offense a licensed dentist.

Sec. 3. Only the following persons shall be deemed licensed to practice dentistry in the State of Arizona:

(*a*) Persons duly licensed and entitled to practice dentistry in the State of Arizona at the time of the taking effect of this act;

(*b*) Persons duly licensed to practice dentistry in the state after the passage of this act.

Sec. 4. A Board of Dental Examiners, to consist of five duly licensed, resident, practicing dentists, is hereby created, whose duty it shall be to examine all applicants for license to practice dentistry in the State of Arizona, and to recommend the licensing of all such applicants as in their judgment are qualified to practice dentistry in the state.

It shall be the duty of the board to adopt such rules and regulations for the conduct of such examinations as in its judgment may seem proper; to report to the proper officers all violations of the law whenever the same shall come to its knowledge; to keep a true and correct list of all the duly licensed dentists practicing in this state, with the address of each; to recommend the revocation of any license whenever, in its judgment, there appears to be sufficient cause therefor, and to furnish such evidence as it may have in its possession to substantiate such recommendation; and to perform such other duties as may be imposed by law.

Sec. 5. The members of this board shall be appointed by the Governor of the state for a term of five years; provided, however, that the members of the first board, if otherwise qualified as herein provided, shall be the present Board of Dental Examiners, whose terms shall be so made and arranged by the Governor that one term shall expire January 1, 1914; one January 1, 1915; one January 1, 1916; one January 1, 1917, and one January 1, 1918. All vacancies occurring in said board shall be filled by appointment by the Governor.

No person shall be eligible to serve on said board unless he be a qualified elector of Arizona, and has been duly licensed to practice dentistry in Arizona for five years next preceding his appointment, and of good moral character; and the recommendation of the Arizona Dental Society shall be taken and considered by the Governor as *prima facie* evidence of such eligibility in making appointments to said board.

SEC. 6. It shall be the duty of said board to organize by the election of one of its members as president, and one as secretary; to adopt a seal which shall be the official seal of the board; to meet at least once, but not more than twice, in each year, at such time and place in this state as the board may designate, for the purpose of examining applicants and transacting such business of the board as may be required. Written notice of the time and place and object of such meeting shall be mailed by the secretary of said board to all members thereof, and to all persons whose application for examination shall be on file with the Secretary of State, as provided in Section 8, at least fifteen days before the time of meeting.

Three members of said board shall constitute a quorum for the transaction of the business of said board, and for the purpose of examining applicants for license to practice dentistry in the state.

The secretary of the Board of Dental Examiners shall keep a record book, into which he shall transcribe and keep a true record of all proceedings of the board.

It shall be the duty of the Board of Dental Examiners at its first meeting to ascertain and determine the names of all persons who are duly licensed and entitled to practice dentistry under the provisions of this act, and to file with the Secretary of State a true and correct list thereof.

The Secretary of State shall keep a record book, into which he shall transcribe and keep a true list of dentists licensed to practice in this state, and necessary records of all proceedings relating to revocation of licenses.

SEC. 7. The Governor shall have the power to remove from office any member of said Board of Dental Examiners, at any time, for the continued neglect of duty, or for incompetency, or for dishonorable conduct.

SEC. 8. Any person who shall desire to begin the practice of dentistry in the State of Arizona, after the passage of this act, shall file a sworn statement of his qualifications and shall make application to the Secretary of State for an examination by the Board of Dental Examiners, on a blank furnished by the Secretary of State, and shall pay the Secretary of State an examination fee of twenty-five dollars, which examination fee shall in no event be refunded if the applicant is eligible for examination; provided, that any applicant failing to qualify for license upon his first examination shall be entitled to one additional examination by the said Board of Dental Examiners at any subsequent meeting thereof, without charge.

SEC. 9. No person shall be eligible for examination by the Board of Dental Examiners who shall not—(1) Have been duly licensed to practice dentistry elsewhere in the United States; or (2) have a diploma from some reputable dental college, or dental department of a university.

SEC. 10. Examinations by the Board of Dental Examiners shall be of two kinds, viz—(1) theoretical, and (2) practical. The theoretical examination shall be written in the English language and consist of questions and answers upon such subjects as are included in the curriculum of reputable dental colleges; provided, that the board may conduct additional examination, orally, on such subjects, and no member thereof shall be prevented from examining any applicant on all such subjects. The practical examination shall consist of demonstrations in skill in operative and mechanical dentistry.

In grading all examinations the theoretical examination and the practical work shall be graded at fifty per cent. each; provided, that the board may allow applicants who have been engaged in the practice of dentistry for five years, sixty-six and two-thirds per cent. for their practical work, and thirty-three and one-third per cent. for their theoretical examination.

It shall be the duty of the Secretary of State, upon presentation to him of a certificate by the Board of Dental Examiners, certifying under the seal of the board that the person named therein is possessed of the necessary qualifications and is entitled to practice dentistry in the state, to indorse thereon under the seal of the State of Arizona, a license to practice dentistry in the state.

SEC. 11. Whenever it shall appear to the Secretary of State that any licensed dentist practicing in the State of Arizona has been guilty of fraud, deceit, or misrepresentation in obtaining a license; or of gross immorality, habitual use of intoxicants or drugs, rendering him unfit for the practice of dentistry; or of malpractice, gross ignorance, incompetency, or wilful negligence in the practice of dentistry; or of employing unlicensed persons to perform work which, under this act, can only be legally done by persons holding a license to practice dentistry in this state; or of committing any crime involving moral turpitude, either before or after conviction in court; or of practicing deceit or other fraud upon the public or individual patient, in obtaining or attempting to obtain practice; or of false advertisement, publication, or circulation of exaggerated claims, or fraudulent, or misleading statements of his art, skill, or knowledge, or of his methods of treatment or practice, he shall revoke the license of such person.

Sec. 12. An accusation may be filed with the Secretary of State charging any licensed dentist with the commission of any of the offenses enumerated in the preceding section.

Such accusation shall be in writing, signed by the accuser and verified under his oath, and corroborated by at least two reputable citizens of the state, likewise under oath, who are familiar with the facts.

Whenever such accusation is filed the Secretary of State shall set a day for hearing, and shall transmit to the accused a true copy of all papers filed with him relating to such accusation, and shall notify the accused that on the day fixed for hearing he may appear and show cause, if any, why his license to practice dentistry in the State of Arizona should not be revoked. And for the purpose of such hearing the Secretary of State is hereby empowered to require the attendance of witnesses, administer oaths and hear testimony, either oral or documentary, for or against the accused. And if, after such hearing of the accused, the Secretary of State shall be satisfied that the accused has been guilty of the offense charged in the accusation, he shall thereupon without further notice revoke the license of the person so accused.

Sec. 13. The Governor, the Superintendent of Public Instruction, and the State Auditor shall be and they are hereby constituted a board of review, with power and authority to review any and all actions of the Secretary of State in revoking or refusing to revoke any such license; and the determination of the said board of review upon any and all matter submitted to it shall be final.

Any person who may feel himself aggrieved at the revocation of his license may have the action of the Secretary of State in revoking the same reviewed by the board of review in the following manner: The person seeking such review shall file with the Secretary of State his affidavit, verified in the manner required by law, setting forth the fact of the revocation of his license, and that there has been a miscarriage of justice or error committed by the Secretary of State, or that the decision of the Secretary of State was contrary to law, or was not supported by the evidence adduced at the hearing.

In the same manner the Board of Dental Examiners may have the action of the Secretary of State in refusing to revoke the license reviewed by the board of review.

When such affidavit has been filed with the Secretary of State it shall be his duty within ten days thereafter to transmit the same, together with all the papers, records, and documents pertaining to the case, to the Governor, who shall at such reasonable time as he may determine, and upon proper notice to all parties interested, convene the board of review at such place as he may determine.

Sec. 14. All expenses incurred by the Board of Dental Examiners for rents, lights, supplies, and other necessary disbursements in holding the meetings of said board shall be paid in the same manner as the compensation of the members of said board. Upon the presentation of an itemized statement of such expenses, verified by the secretary of said board, to the State Auditor, he shall draw his warrant on the State Treasurer, payable to said secretary of said board, for the amount specified in such statement.

Sec. 15. The compensation of the members of the Board of Dental Examiners shall be ten dollars *per diem* each, while actually engaged in the business of said board, and necessary traveling and hotel expenses incurred by them in the discharge of their duties. Upon a verified statement of the State Auditor of the amount due each member of this board, the State Auditor is hereby authorized and directed to draw his warrant on the State Treasurer for such amounts, and the State Treasurer is hereby authorized and directed to pay the same.

Sec. 16. All duly licensed dentists shall be exempt from jury duty in any of the courts of this state.

Sec. 17. All acts and parts of acts in conflict with the provisions of this act are hereby repealed.

Society Notes and Announcements.

DENTAL SOCIETY MEETINGS:

June and July.

JUNE.

ALABAMA DENTAL ASSOCIATION. Birmingham. Three days: June 10th to 12th.

AMERICAN MEDICAL ASSOCIATION—STOMATOLOGY. Minneapolis. June 17th to 20th.

AMERICAN SOCIETY OF ORTHODONTISTS. Chicago, Ill. Three days: June 30th to July 2d.

CALIFORNIA STATE DENTAL ASSOCIATION. Oakland. Four days: June 2d to 5th.

COLORADO STATE DENTAL ASSOCIATION. Manitou. Three days: June 19th to 21st.

DISTRICT OF COLUMBIA DENTAL SOCIETY AND MARYLAND STATE DENTAL ASSOCIATION. Washington, D. C. June 12th to 14th.

FLORIDA STATE DENTAL SOCIETY. Atlantic Beach. Four days: June 24th to 27th.

GEORGIA STATE DENTAL SOCIETY. Columbus. Three days: June 12th to 14th.

MAINE DENTAL SOCIETY. Portland Harbor. Three days: June 25th to 27th.

MARYLAND STATE DENTAL ASSOCIATION AND DISTRICT OF COLUMBIA DENTAL SOCIETY. Washington, D. C. June 12th to 14th.

MINNESOTA DENTAL ASSOCIATION. Minneapolis. Two days: June 13th and 14th.

MISSISSIPPI DENTAL ASSOCIATION. Meridian. Three days: June 24th to 26th.

MONTANA STATE DENTAL SOCIETY. Butte. Two days: June 13th and 14th.

NEW HAMPSHIRE STATE DENTAL SOCIETY. Weirs. Three days: June 18th to 20th.

NORTHERN OHIO DENTAL ASSOCIATION. Cleveland. Three days: June 5th to 7th.

PENNSYLVANIA STATE DENTAL SOCIETY. Philadelphia. Three days: June 24th to 26th.

SOUTH CAROLINA STATE DENTAL ASSOCIATION. Isle of Palms. June 25th to 27th.

SOUTHERN WISCONSIN DENTAL ASSOCIATION. Delavan Lake. June 13th and 14th.

TENNESSEE STATE DENTAL ASSOCIATION. Nashville. Three days: June 5th to 7th.

WASHINGTON STATE DENTAL SOCIETY. Seattle. Three days: June 16th to 18th.

JULY.

DELTA SIGMA DELTA FRATERNITY. Kansas City, Mo. [During N. D. A. meeting.]

NATIONAL ASSOCIATION OF DENTAL EXAMINERS. Kansas City, Mo. July 7th.

NATIONAL ASSOCIATION OF DENTAL FACULTIES. Kansas City, Mo. July 4th.

NATIONAL DENTAL ASSOCIATION. Kansas City, Mo. Four days: July 8th to 11th.

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH, AND VIRGINIA STATE DENTAL SOCIETY. Old Point Comfort, Va. Four days: July 22d to 25th.

NEW JERSEY STATE DENTAL SOCIETY. Asbury Park. Three days: July 16th to 18th.

XI PSI PHI FRATERNITY. Kansas City, Mo. [During N. D. A. meeting.]

VIRGINIA STATE DENTAL SOCIETY AND NATIONAL DENTAL ASSOCIATION, SOUTHERN BRANCH. Old Point Comfort, Va. Three days: July 22d to 24th.

Examiners' Meetings.

ALABAMA BOARD OF EXAMINERS. Birmingham. June 5th.

CALIFORNIA BOARD OF EXAMINERS. San Francisco, June 7th; also Los Angeles, June 20th.

CONNECTICUT DENTAL COMMISSIONERS. Hartford. June 12th to 14th.

FLORIDA BOARD OF EXAMINERS. Tampa. June 21st to 24th.

IDAHO BOARD OF EXAMINERS. Boise. July 17th.

ILLINOIS BOARD OF EXAMINERS. Chicago. June 4th.

INDIANA BOARD OF EXAMINERS. Indianapolis. June 9th to 14th.

IOWA BOARD OF EXAMINERS. Iowa City. June 2d.

MASSACHUSETTS BOARD OF REGISTRATION. Boston. June 4th to 6th.

MICHIGAN BOARD OF EXAMINERS. Ann Arbor. June 16th to 21st.

MISSISSIPPI BOARD OF EXAMINERS. Jackson. June 17th.

MONTANA BOARD OF EXAMINERS. Helena. July 14th to 17th.

NEBRASKA BOARD OF EXAMINERS. Lincoln. June 16th to 18th.

NEW JERSEY BOARD OF REGISTRATION. Trenton. June 30th to July 2d.

NORTH DAKOTA BOARD OF EXAMINERS. Fargo. July 8th to 11th.

PENNSYLVANIA BOARD OF EXAMINERS. Philadelphia and Pittsburgh. June 11th to 14th.

RHODE ISLAND BOARD OF REGISTRATION. Providence. June 24th to 26th.

SOUTH CAROLINA BOARD OF EXAMINERS. Isle of Palms. June 20th.

TEXAS BOARD OF EXAMINERS. Houston. June 23d.

VERMONT BOARD OF EXAMINERS. Montpelier. June 30th to July 3d.

VIRGINIA BOARD OF EXAMINERS. Richmond. June 10th.

WISCONSIN BOARD OF EXAMINERS. Milwaukee. June 16th.

WYOMING BOARD OF EXAMINERS. Cheyenne. July 1st to 3d.

GOLDEN JUBILEE OF PHILADELPHIA DENTAL COLLEGE.

THE assertion in the circular letter of invitation sent out for the above celebration that "as fifty years of uninterrupted business activity was a notable achievement in the life of an individual, even more important was the continued prosperity of an educational institution during a similar period," was verified by the interest shown on the part of alumni who came from far and near to participate in the exercises of the semi-centennial of the above institution.

Invitations were sent to all of the three thousand and more graduates whose names and addresses on the college register could be verified, and while several hundreds were present in person, others who could not attend sent greetings and well-wishes by letter, telegram, and cablegram. Responses were received from half the states in the Union and a score of foreign countries, signed in some cases by groups of alumni in certain sections and in others by officers representing dental associations. The interest shown was highly appreciated by those at present responsible for the well-being of the institution, and indicated in an unmistakable manner the loyalty of those who had secured their professional training within its walls.

The Philadelphia Dental College was organized and began its first term in the fall of 1863, graduating its first class of six members in the spring of 1864. Dr. John H. McQuillen of Philadelphia was the originator and dominant spirit of the new institution, which was the fourth then in existence in the United States. Its first faculty consisted of Drs. McQuillen, Kingsbury, Flagg, Wardell, and Morton, all able and influential men, the last of whom, Professor Flagg, died some fifteen years ago. Of the first class graduated, one is still living; of the second class two survive, one of whom, Dr. Jas. McManus, was present and took an active part in the exercises.

Two days were set apart for the celebration. April 15th was devoted to a general reception, reunions of various classes, inspection of the teaching facilities of the institution, and a surgical clinic; followed in the evening by a theater party tendered to the visiting alumni. On the following day the commemorative exercises were held in the college ampitheater in the morning, and after luncheon a purely dental clinic, occupying more than thirty operating chairs and tables, occupied the afternoon. The evening was devoted to a banquet, which was largely attended and at which different classes occupied separate tables.

The morning and evening events of this second day were the most interesting from an historical and social point of view.

Dr. Conwell, president of Temple University and by consequence the head of the Dental College, which since 1906 has been a department of the said university, opened the morning exercises with an address entitled "Our Affiliation with Temple University, and What it Means for Us."

Dr. Jas. McManus (class of '65), Hartford, Conn., followed with a paper on "The Genesis of the P. D. C. and Its First Faculty" in which, as one of the oldest living graduates he gave his impressions of the men who founded the school and established the first course of instruction in the institution, and paid a high tribute to their ability and zeal.

Dr. Chas. S. Butler ('76), Buffalo, N. Y., had as his subject "Some of the Men whose

Character and Teaching have Made the P. D. C. Famous." The address was illustrated with the lantern, and slides were shown of Drs. McQuillen, Kingsbury, Flagg, Garretson, Stellwagen, Burchard, Dorr, and many others—the special qualifications and accomplishments of each being dwelt upon as the pictures appeared.

Dr. M. H. Cryer ('76), Philadelphia, followed with an address upon "How the Hospital of Oral Surgery Came into Being." Dr. Cryer's intimate association with Professor Garretson in establishing the first Hospital of Oral Surgery enabled him to give a very interesting account of the crude beginnings of the infant hospital and its beneficent work up to the time of Dr. Garretson's death in 1895.

Dr. H. L. Gilmour ('67), Philadelphia, in his paper on "The Early Struggles and Also the Good Times We Had at Tenth and Arch" was in lighter reminiscent vein and was liberally punctuated with the droll humor which always enlivens his public and private utterances.

Dean Guilford was scheduled for a paper, "A Review of Some Worthy Accomplishments of the P. D. C. in its Half-century of Existence," but as the morning hours had passed the paper was not presented.

After luncheon the large clinic held the attention and interest of the visitors during the entire afternoon.

In the evening, as many as could remain gathered at Kugler's for the Alumni Banquiet, and were feasted and entertained for four or five hours. Dr. Butler of Buffalo presided as toastmaster, and after a welcoming address in his happiest style introduced the speakers.

Dr. Conwell spoke to the toast "The Lessons of Fifty Years." Briefly reviewing the advances in dental practice during a half-century, he dwelt at greater length upon the development of dental education during the same period, speaking with enthusiasm of its present status as compared with that of years gone by. He also took occasion to point out to the older alumni the manner in which the old Philadelphia Dental College had become affiliated with Temple University, and the great advantages to both institutions accruing therefrom. He predicted a great future for the dental department and promised a new building for its sole use in the near future.

Dr. J. W. Moffitt ('72), the next speaker, responding to the toast "How the P. D. C. Obtained Its Charter," told of the difficulties encountered in obtaining a charter from the state legislature in the early days, and how he (then living in Harrisburg, Pa.) had been instrumental in aiding Dr. McQuillen to secure the P. D. C. charter in 1863.

Dr. J. N. Wunderlich ('66) followed with an account of "Fitting-up the First Hospital of Oral Surgery"—in the old building at Tenth and Arch sts., when Dr. Garretson decided that such a hospital was needed in connection with a dental school.

Professor Guilford, in forecasting "The Future of the P. D. C.," first reverted to the eminent teachers he had been privileged to associate and work with in the thirty-two years of his connection with the college, and then after explaining the policies which had guided the institution in the past, told of the plans and provisions which he expected would lead to greater efficiency in dental instruction in the future.

Prof. Inglis ('86), in his reply to the toast "Thirty Years Ago and Now," took occasion to point out in detail some of the advances made in dental instruction since the time when he was a student, and emphasized the advantages enjoyed by the dental student of today.

Other toasts were then offered and responded to by the president of the present Senior class and by the president of the Garretsonian Society.

As a fitting close to the speech-making, and an unusual feature as well, came short addresses by members of the graduating class from foreign countries. Eight countries were represented, and in each instance but one the remarks were made in English, much to the credit of those who could not be expected to be overfamiliar with a language foreign to their own. The evening ended with the singing of college songs and an interchange of greetings between the various classes.

Throughout the entire exercises of the two days' celebration there was manifested a strong feeling of loyalty to the college on the part of the alumni, and a frequently expressed satisfaction with the work being done along the lines of advanced dental education.

S. H. G.

NATIONAL DENTAL ASSOCIATION.

The 1913 Session of the National Dental Association will be held in Kansas City, Mo., July 8 to 11, 1913. The reorganization of the association should make this the most important meeting in its history. Every state society that has met since the new constitution and by-laws were adopted—at the Washington meeting—has voted to become a constituent society, and we can all appreciate the influence of such an organization if all the state societies take similar action.

Program.

The officers and committees have been active in preparing an exceptionally interesting program. At this date the following literary program is tentatively announced:

Dr. Frank O. Hetrick, Ottawa, Kansas: President's Address.

Dr. Adolph Fenchel, Hamburg, Germany: Subject to be announced later.

Dr. Weston A. Price, Cleveland, Ohio: "Scientific Foundation Fund."

Dr. Roscoe A. Day, San Francisco, Cal.: "Orthodontia and Its Relation to Dentistry."

Dr. Marcus L. Ward, Ann Arbor, Mich.: "Metallurgy."

Dr. Richard L. Simpson, Richmond, Va.: "Unbanded *vs.* Banded Crowns."

Dr. Percy R. Howe, Boston, Mass.: "The Saliva."

Dr. Arthur D. Black, Chicago, Ill.: "Something of the Etiology and Early Pathology of Diseases of the Peridental Membrane, with Suggestions as to Treatment."

Dr. Hermann Prinz, St. Louis, Mo.: "A Preliminary Report on Action of As_2O_3."

Dr. Howard R. Raper, Indianapolis, Ind.: "The Value of the Radiograph in the Practice of Modern Dentistry."

Dr. G. S. Junkerman, Cincinnati, Ohio: "Dental Educational Harmony."

Dr. Clarence J. Grieves, Baltimore, Md.: "Periapical Infections."

Dr. Burton Lee Thorpe, St. Louis, Mo.: "Prophylaxis."

Dr. H. B. Tileston, Louisville, Ky.: "Diagnosis and Treatment of Diseases of the Dental Pulp."

The Clinic Committee has been very energetic in preparing their program, and we have every reason to expect that they will present a very strong list of clinicians.

Information regarding transportation from any point may be secured from any local railroad agent, as they have full information with reference to all rates granted by various passenger associations in their particular territory.

All reputable practitioners of dentistry and medicine are cordially invited to attend this meeting.

Hotels.

The Local Committee of Arrangements are providing ample facilities for a large meeting, and have selected the Baltimore Hotel as headquarters. Those desiring to make hotel reservations in advance should address the Baltimore Hotel, or the chairman of the Local Committee of Arrangements, Dr. Charles C. Allen, 507 Rialto Bldg., Kansas City, Mo.

Below is given a list of the principal hotels, with their rates:

S = Single, without bath. *Sb* = Single, with bath.
D = Double, " " *Db* = Double, " "

Hotel Baltimore: *S* $1.50 and $3.00 per day, *Sb* $2.50 and $6.00 per day, *D* $2.50 and $3.00 per day, *Db* $4.00 and $7.00 per day.

Sexton Hotel: *S* $1.00 per day and up. *Sb* $2.00 per day and up.

The Coats House: *S* $1.00 to $2.00 per day, *Sb* $1.50 to $3.50 per day.

Hotel Savoy: *S* $1.00 to $1.50 per day, *Sb* $1.50 to $2.50 per day.

Hotel Victoria: *S* $1.00 and $1.25 per day, *Sb* $1.25 and $1.50 per day, *D* $1.50 and $2.00 per day, *Db* $2.00 and $2.50 per day.

Hotel Kupper: *S* $1.00 and $1.50 per day, *Sb* $1.50 and $2.50 per day, *D* $2.00 and $2.50 per day, *Db* $2.50 and $4.00 per day.

Densmore Hotel: *S* $1.00 per day, *Sb* $1.50 per day, *D* $1.50 per day, *Db* $2.00 to $2.50 per day.

Hotel Edward: Rates $1.00 per day and up.

Hotel White: Rooms—running water, hot and cold, $1.00 per day; shower or tub bath, $1.50 per day; outside rooms, bath with tub, $2.00 per day.

Frank O. Hetrick, *President*,
Ottawa, Kans.
Homer C. Brown, *Recording Sec'y*,
185 East State st., Columbus, Ohio.

[At Kansas City.]

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The next annual meeting of the National Association of Dental Faculties will take place at the Hotel Baltimore, Kansas City, Mo., beginning at 10 A.M., on Friday, July 4, 1913. The Executive Committee will meet at 9 o'clock on the same morning, at the same place.

B. Holly Smith,
Chairman Exec. Com.

[At Kansas City.]

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The thirty-first annual session of the National Association of Dental Examiners will be held at the Baltimore Hotel, Kansas City, Mo., beginning July 7th, at 10 A.M., and continuing until adjournment.

Every state board holding membership in the association is earnestly requested to have at least one representative present at this session. Members of all state boards are invited. Hotel reservations should be made immediately.

John P. Stiff, *President*,
Fredericksburg, Va.,
T. A. Broadbent, *Sec'y*,
15 E. Washington st., Chicago, Ill.

[At Kansas City.]

DELTA SIGMA DELTA FRATERNITY.

The twenty-ninth annual meeting of the Supreme Chapter of Delta Sigma Delta Fraternity will be held at the Hotel Baltimore, Kansas City, Mo., Monday, July 7, 1913, at 10 A.M.

Business of importance and initiation has been arranged for the day, to be followed by the annual banquet in the evening.

R. Hamill D. Swing, *Supreme Scribe.*

[At Kansas City.]

XI PSI PHI FRATERNITY.

There will be a meeting of the Xi Psi Phi Fraternity during the session of the National Dental Association, at Kansas City, Mo., July 8 to 11, 1913.

Headquarters for the members of the Xi Psi Phi Fraternity will be established at the Baltimore Hotel, Kansas City, Mo. Special accommodations have been made for train service from Chicago, and all members of the fraternity east of Chicago are invited to avail themselves of this service. For further information address

C. C. Markey, *Sec'y*,
1740 Greenleaf ave., Chicago, Ill.

AMERICAN SOCIETY OF ORTHODONTISTS.

The thirteenth annual meeting of the American Society of Orthodontists will be held in Chicago, Ill., June 30, July 1 and 2, 1913.

Frederick C. Kemple, *Sec'y*,
576 Fifth ave., New York City.

PACIFIC COAST ORTHODONTISTS.

Organization of Angle Graduates.

Following the three days' invitation clinic recently held in Los Angeles by Dr. Edward H. Angle for the benefit of the graduates of his school now practicing on the Pacific coast, there was organized an association to be known as the Pacific Coast Society of Graduates of the Angle School of Orthodontia, the object of this society being: (1) The promotion of knowledge in all that pertains to orthodontia, and the advancement and establishment of the science as a distinct specialty; (2) fraternal and professional association of orthodontists, and especially of graduates of the Angle School of Orthodontia; (3) mutual, cordial, and helpful relation with the Alumni Society of the Angle School of Orthodontia and other societies composed of Angle men.

The following, who were in attendance, constitute the charter membership: Wm. Bolton, Seattle; W. A. Smith, Wallace, Idaho; Robt. Dunn, San Francisco; Wellslake Morse, Los Angeles; James D. McCoy, Los Angeles; Genette Harbour, Los Angeles; John R. McCoy, Los Angeles; Wm. W. Wilson, San Diego, and Wm. C. Smith, Pasadena.

At the initial meeting officers were elected for the ensuing year, as follows: Dr. Robt. Dunn, San Francisco, president and John R. McCoy, Los Angeles, secretary-treasurer.

The next annual meeting will be held in San Francisco during February 1914.

John R. McCoy, *Secretary.*

AMERICAN MEDICAL ASSOCIATION.

Section on Stomatology.

FOLLOWING is the program of the American Medical Association, Section on Stomatology, to be held in Minneapolis, Minn., June 17 to 20, 1913:

(1) "Fields for Research in Oral Surgery." (Chairman's Address.) Virgil Loeb, St. Louis, Mo.

(2) "Social Ethics." E. M. Wooley, Winona, Minn.

(3) "Mouth Lesions." Stewart L. McCurdy, Pittsburgh, Pa.

(4) "A Safe, Efficient, Easily Administered General Anesthetic for Minor Operations." Wm. H. DeFord, DesMoines, Iowa.

(5) "The Correction of Impediments of Speech in Our Public Schools." H. F. McBeath, Milwaukee, Wis.

(6) "The Pathology of Root-findings." Vida A. Latham, Chicago, Ill.

(7) "The Responsibility of the Dentist and Physician in Regard to Mouth Infections, and Their Relation to Constitutional Effects." Thomas B. Hartzell, Minneapolis, Minn.

(8) "Bachelor of Medicine: The Need of this New Degree." Wm. C. Fisher, New York.

(9) "The Etiology of Trifacial Neuralgia or Tic Douloureux and Clinical Treatment." Nelson T. Shields, New York City.

Discussion—John A. Bodine, New York, and G. V. I. Brown, Milwaukee, Wis.

(10) "A Method of Closing a Sinus Between the Antrum of Highmore and the Mouth." L. W. Dean, Iowa City, Iowa.

(11) "Treatment of Teeth Loosening in Their Sockets Through Inflammatory Degeneration of the Gums and Alveolar Process." Joseph Head and Claude P. Brown, Philadelphia, Pa.

(12) "Bacteria of the Mouth." A. H. Levings, Milwaukee, Wis.

(13) Infective Cysts of the Jaws." F. B. Moorehead, Chicago, Ill.

(14) "Arrested Development of the Superior Maxillæ in relation to Mental and Physical Efficiency." Joseph S. Evans, Madison, Wis.

Discussion—Nelson M. Black, Milwaukee, Wis., and John S. Kirkendall, Ithaca, N. Y.

(15) "The Relation of Mouth Disease to Bodily Health." Edward H. Baker, Chicago, Ill.

(16) "The Surgical Treatment of Post-operation Lip and Palate Defects." George V. I. Brown, Milwaukee, Wis.

(17) "Interstitial Gingivitis and Pyorrhœa Alveolaris." Eugene S. Talbot, Chicago, Ill.

All those interested in the program are invited to attend the meetings and take part in the discussions.

EUGENE S. TALBOT, *Sec'y.*

DISTRICT OF COLUMBIA DENTAL SOCIETY

AND

MARYLAND STATE DENTAL ASSOCIATION.

THE sixteenth union meeting of the District of Columbia Dental Society and the Maryland State Dental Association will be held in Washington, D. C., on June 12, 13, and 14, 1913.

F. F. DREW, *Cor. Sec'y.*

TENNESSEE STATE DENTAL ASSOCIATION.

THE Tennessee State Dental Association will hold its annual meeting in Nashville, Tenn., on June 5, 6, and 7, 1913, with the following officers in charge: F. W. Meacham, president; W. C. Gillespie, first vice-president; J. L. Manire, second vice-president; C. Osborn Rhea, recording secretary; W. G. Hutchinson, treasurer; C. E. Hines, corresponding secretary.

C. OSBORN RHEA, *Sec'y.*

ALABAMA DENTAL ASSOCIATION.

THE Alabama Dental Association will meet in Birmingham, Ala., June 10, 11, and 12, 1913.

We earnestly solicit every good dentist in Alabama who is not now a member to join. It will enhance your efficiency, because in the doctrines we teach we incorporate the best of professional principles and within our ranks we encompass the best of professional men.

G. F. PETREY, *Sec'y,*
Florala, Ala.

MONTANA STATE DENTAL SOCIETY.

The next annual meeting of the Montana State Dental Society will be held in Butte, June 13 and 14, 1913.

T. T. Rider, *Sec'y*,
Missoula, Mont.

CALIFORNIA STATE DENTAL ASSOCIATION.

The next annual meeting of the California State Dental Association will be held on June 2, 3, 4, and 5, 1913, in the Hotel Oakland, at Oakland, Cal.

E. E. Evans, *Sec'y*,
Oakland, Cal.

WASHINGTON STATE DENTAL SOCIETY.

The Washington State Dental Society meets June 16, 17, and 18, 1913, in Seattle, Wash.

A. D. Remington, *Sec'y*,
Seattle, Wash.

MISSISSIPPI DENTAL ASSOCIATION.

The thirty-eighth annual session of the Mississippi Dental Association will be held at the Great Southern Hotel, Meridian, Miss., June 24, 25, and 26, 1913.

A determined effort is being put forth to make this meeting our best. There will be a fine clinic, excellent papers, a banquet, and a fine exhibit.

L. B. Price, *Sec'y*,
Corinth, Miss.

MINNESOTA STATE DENTAL ASSOCIATION.

The thirtieth annual meeting of the Minnesota State Dental Association will occur in Masonic Temple, Minneapolis, Minn., Friday and Saturday, June 13 and 14, 1913.

Every phase of dentistry will be presented by men of unquestioned ability, from Dr. Raper of Indianapolis with stereopticon lectures on treatment of root-canals, to the effect of pathological conditions of the mouth on systemic conditions, which will be presented by Dr. C. H. Mayo of Rochester, whose name is familiar wherever medicine is practiced. A large manufacturers' exhibit will round out what we expect to be an unusually large meeting of the organization.

For information, address

Benjamin Sandy, *Sec'y*,
636 Syndicate Bldg., Minneapolis, Minn.

MAINE DENTAL SOCIETY.

The forty-eighth annual meeting of the Maine Dental Society will be held at the Ottawa House, Cushing's Island, Portland Harbor, Me., on June 25, 26, and 27, 1913.

I. E. Pendleton, *Sec'y*.

FLORIDA STATE DENTAL SOCIETY.

The next meeting of the Florida State Dental Society will be held at Atlantic Beach, Fla., June 24, 25, 26, and 27, 1913. Papers and clinics of unusual merit will be presented, and it is confidently expected that this will be one of the largest and most instructive meetings ever held by the society. A most cordial invitation is extended to all ethical practitioners.

Jesse L. Williams, *Cor. Sec'y*,
Jacksonville, Fla.

SOUTHERN WISCONSIN DENTAL ASSOCIATION.

A New Departure.

The nineteenth annual meeting of the Southern Wisconsin Dental Association will be held at Hotel Highland, Delavan Lake, June 13 and 14, 1913.

Having decided to combine business with pleasure, we will hold our session in the afternoons only, consisting of a few of the best papers and clinics obtainable. The morning and evening can be spent boating, fishing, bathing, or automobiling.

Hotel Highland and Delavan Lake are seldom equaled and never surpassed as a place for such a gathering. It is our purpose to take our wives with us, and together enjoy the Lake as well as the beautiful hills and valleys surrounding Hotel Highland. Bring the young folks with you; they will enjoy the outing.

All ethical dentists are cordially invited to attend.

C. W. Collver, *Sec'y*,
Clinton, Wis.

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH AND VIRGINIA STATE DENTAL SOCIETY.

The fifteenth annual meeting of the Southern Branch of the National Dental Association will be held at the Chamberlin Hotel, Old Point Comfort, Va., July 22 to 25 inclusive, 1913. The Virginia State Dental Society will meet conjointly with the Southern Branch at that time.

Thos. Moore, Jr., *Cor. Sec'y, N.D.A.So.Br.*
C. B. Gilford, *Cor. Sec'y, Va. Dental Soc.*

NORTHERN OHIO DENTAL ASSOCIATION.

The fifty-sixth annual meeting of the Northern Ohio Dental Association will be held at Cleveland, Ohio, June 5, 6, and 7, 1913.

C. D. Peck, *Sec'y,*
Sandusky, Ohio.

NEW HAMPSHIRE DENTAL SOCIETY.

The New Hampshire Dental Society will hold its annual meeting at Hotel Weirs, Weirs, N. H., June 18, 19, and 20, 1913. The profession are invited to attend.

Fred F. Fisher, *Sec'y.*

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

The forty-third annual meeting of the South Carolina State Dental Association will be held on the Isle of Palms, June 25, 26, and 27, 1913.

W. Busey Simmons, *Recording Sec'y,*
Piedmont, S. C.

GEORGIA STATE DENTAL SOCIETY.

The forty-fifth annual meeting of the Georgia State Dental Society will convene at Columbus, Ga., June 12, 13, and 14, 1913, beginning Thursday, June 12th, at 11 A.M. Some very interesting lectures and papers will be presented; also an elaborate clinic has been secured.

Further information will be cheerfully furnished upon request from ethical practitioners of other states contemplating a visit to the meeting, to whom we extend a cordial invitation.

M. M. Forbes, *Sec'y,*
Atlanta, Ga.

WEST VIRGINIA STATE DENTAL SOCIETY.

The seventh annual meeting of the West Virginia State Dental Society will be held in the assembly room of the Chancellor Hotel, Parkersburg, W. V., August 13, 14, and 15, 1913. Opening session 2 P.M., Wednesday, August 13th. A cordial invitation is extended to all ethical members of the profession to attend our meeting.

Frank L. Wright, *Sec'y,*
Wheeling, W. Va.

NORTHERN INDIANA DENTAL SOCIETY.

The twenty-fifth annual meeting of the Northern Indiana Dental Society will be held at the Great Steel City of Gary, September 23, 24, and 25, 1913.

W. Leroy Myer, *Sec'y,*
Rensselaer, Ind.

NEW JERSEY STATE DENTAL SOCIETY.

The forty-third annual convention of the New Jersey State Dental Society will be held in the Beach Auditorium, at Asbury Park, N. J., July 16, 17, and 18, 1913, beginning on Wednesday, July 16th, at 10 A.M.

The exhibits of modern dental appliances and the latest in office and laboratory equipment will be in charge of Dr. William H. Gelston, 40 N. Thirtieth st., Camden, N. J., who will be glad to furnish information regarding rates and space still available. Early application from those desiring to exhibit with us this year will be greatly appreciated.

The clinics will be in charge of Dr. Henry

Fowler, 114 N. Fourth st., Harrison, N. J., and will be comprehensive and of a very high order.

Further announcements will be made from time to time.

EDWIN W. HARLAN, *Sec'y*,
47 Crescent ave., Jersey City, N. J.

MICHIGAN BOARD OF EXAMINERS.

THE next regular meeting of the Michigan State Board of Dental Examiners will be held at the dental college, Ann Arbor, commencing Monday, June 16, at 8 A.M., and continuing through the 21st. For application blanks and full particulars address

F. E. SHARP, *Sec'y*,
Port Huron, Mich.

VIRGINIA BOARD OF EXAMINERS.

THE regular annual meeting of the Virginia State Board of Dental Examiners will be held in Richmond, Va., on June 10, 1913, at 9 A.M.

This meeting will be held for the examination of applicants and the routine business of the board.

For further information address

J. P. STIFF, *Sec'y*,
Fredericksburg, Va.

CONNECTICUT DENTAL COMMISSIONERS.

THE Dental Commissioners of the State of Connecticut hereby give notice that they will meet at Hartford, on Thursday, Friday, and Saturday, June 12th, 13th, and 14th, to examine applicants for license to practice dentistry, and for the transaction of any other business proper to come before them.

On receipt of application blank, filled in and sworn to and accompanied with fee of twenty-five dollars, each applicant will be sent a number, which number will represent the applicant during the examination.

The practical examination will take place at Putnam Phalanx Armory, corner Haynes and Pearl sts., on Thursday, June 12th. All prosthetic pieces should be tagged with the applicant's number, and handed to the Commissioners at nine o'clock Thursday morning. Applicants whose numbers range from 1 to 20 inclusive will be examined in operative dentistry at 9 A.M. Those whose numbers are above 20 will be examined in operative dentistry at 12 M. All applicants whose credentials are accepted shall be entitled to take both the practical and theoretical examinations. Credentials will be examined at the Hotel Heublein, Wednesday evening, June 11th, at 8.30, and at Putnam Phalanx Armory at 9 o'clock on Thursday morning.

On Friday, June 13th, the theoretical examination will be held from 9 to 11, 11.30 to 1.30 and 3.30 to 5.30. Theoretical examination will be held at the State Capitol.

By order of the Commission.

D. EVERETT TAYLOR, *Recorder*,
Willimantic, Conn.

MASSACHUSETTS BOARD OF REGISTRATION.

A MEETING of the Massachusetts Board of Registration in Dentistry, for the examination of candidates, will be held in Boston, Mass., June 4, 5, and 6, 1913.

G. E. MITCHELL, *Sec'y*,
14 Water st., Haverhill, Mass.

PENNSYLVANIA BOARD OF EXAMINERS.

THE next regular examination of the Pennsylvania State Board of Dental Examiners will be held in Philadelphia and Pittsburgh, on Wednesday, Thursday, Friday, and Saturday, June 11, 12, 13, and 14, 1913. Application blanks can be secured from the department of Public Instruction, Harrisburg.

Further information can be obtained from

ALEXANDER H. REYNOLDS, *Sec'y*,
4630 Chester ave., Philadelphia, Pa.

RHODE ISLAND BOARD OF REGISTRATION.

THE Rhode Island Board of Registration in Dentistry will meet for the examination of candidates at the State-house, Providence, R. I., Tuesday, Wednesday, and Thursday, June 24, 25, and 26, 1913.

Application blanks and particulars may be obtained from

ALBERT E. SEAL, *Sec'y*,
27 Tyler Bldg., Pawtucket, R. I.

IOWA BOARD OF EXAMINERS.

The next meeting of the Iowa State Board of Dental Examiners for the examination of candidates will be held at Iowa City, Iowa, commencing Monday, June 2, 1913. For application blanks and particulars write

J. A. West, *Sec'y*,
417 Utica Bldg., Des Moines, Iowa.

FLORIDA BOARD OF EXAMINERS.

The Florida State Board of Dental Examiners will meet in Jacksonville, June 21, 23, and 24, 1913, for the examination of applicants to practice dentitstry. Applicants for examination must be graduates of a reputable dental school. Examinations will be both practical and theoretical. The practical examination will be one gold filling, one amalgam filling in the mouth, one post crown, and upper and lower set of teeth, set up and articulated. The theoretical examination will be in all the branches taught in the dental college. Applicants must furnish all instruments for the work, except soldering appliances and articulators.

The secretary will be glad to meet all applicants at the Seminole Hotel at eight o'clock on the evening of June 20th, for the purpose of examining credentials.

W. G. Mason, *Sec'y*,
Tampa, Fla.

ALABAMA BOARD OF EXAMINERS.

The Alabama State Board of Dental Examiners convenes at the Metropolitan Hotel, Birmingham, Thursday, June 5, 1913.

Applicants must be twenty-one years of age and hold a diploma from a reputable dental college. Written examination—Operative dentistry, orthodontia, oral surgery, anatomy, physiology, chemistry, materia medica, anesthesia, pathology, therapeutics and etiology, histology, prosthetic dentistry, metallurgy, and oral hygiene. In practical work—inserting one gold and one amalgam filling, construction of bridge using first molar shell crown and canine Richmond crown as abutments; porcelain dummies 1st and 2d bicuspids, one posterior Steele facing accepted. Assembling and soldering in presence of members of the board. Inserting one approximo-occlusal gold inlay in first molar either in the mouth of the patient or on an articulator; natural tooth set in model with occluding teeth, cavity prepared in presence of board. Fee ten dollars. Address

W. E. Proctor, *Sec'y*,
Lock box 113, Sheffield, Ala.

NEBRASKA BOARD OF EXAMINERS.

The Nebraska Board of Dental Examiners will hold examination on June 16, 17, and 18, 1913, beginning at 9 A.M. on the 16th.

Address inquiries to

J. S. Pierce, *Sec'y*.

ILLINOIS BOARD OF EXAMINERS.

The semi-annual meeting of the Illinois State Board of Dental Examiners, for the examination of applicants for a license to practice dentistry in the state of Illinois, will be held at the Chicago College of Dental Surgery, corner of S. Wood and W. Harrison sts., Chicago, beginning Wednesday, June 4, 1913, at 9 A.M.

All applications, together with the fee, twenty-six dollars, must be filed with the secretary at least five days prior to date of examination. Address all communications to

T. A. Broadbent, *Sec'y*,
705 Venetian Bldg., Chicago, Ill.

CALIFORNIA BOARD OF EXAMINERS.

The next examination by the Board of Dental Examiners of California for license to practice dentistry will be held in San Francisco, Cal., beginning on June 7, 1913. This will be followed by an examination in Los Angeles, beginning on June 20th. All applications, accompanied by the fee of twenty-five dollars and the necessary credentials—a diploma or license from some other state—must be filed with the secretary of the board on the morning of the date set for examination—June 7th in San Francisco and June 20th in Los Angeles. Said application must be accompanied by a recent unmounted photograph of the applicant.

C. A. Herrick, *Sec'y*,
San Francisco, Cal.

SOUTH CAROLINA BOARD OF EXAMINERS.

The next meeting for examination of applicants for license will be held Friday, June 20, 1913, at 3 P.M., at the Isle of Palms, Hotel Charleston, S. C.

J. M. Quattlebaum, *Sec'y.*

WISCONSIN BOARD OF EXAMINERS.

The Wisconsin State Board of Dental Examiners will convene in Milwaukee, at Marquette University, on June 16, 1913, at 2 P.M., for examination of applicants to practice in Wisconsin.

High-school diploma, application, and fee of $25.00 must be filed with the secretary fifteen days prior to above date. Dental diploma to be presented in advance of examination.

F. A. Tate, *President,*
W. T. Hardy, *Sec'y,*
422 Jefferson st., Milwaukee, Wis.

VERMONT BOARD OF EXAMINERS.

The next meeting of the Vermont Board of Dental Examiners for the examination of candidates to practice in Vermont will be held at the State-house, Montpelier, Vt., continuing four days, commencing at 2 P.M., June 30, 1913.

To be eligible for examination a candidate (1) must be twenty-one years of age; (2) must be a graduate of a high school of the first class; (3) must be a graduate of a reputable dental college.

Applications must be in the hands of the secretary not later than June 20th.

For further information apply to

Geo. F. Cheney, *Sec'y,*
St. Johnsbury, Vt.

The following have been appointed as members of the Vermont Board of Dental Examiners: J. D. Bachand, St. Johnsbury, for five years; E. O. Blanchard, Randolph, for four years; G. F. Cheney, St. Johnsbury, for three years; G. O. Mitchell, St. Albans, for two years; K. L. Cleaves, Montpelier, for one year.

J. D. Bachand.

MISSISSIPPI BOARD OF EXAMINERS.

The Mississippi State Board of Dental Examiners will meet at the State Capitol, Jackson, on the third Tuesday in June, at 8.30 A.M.

All applicants must be graduates of reputable dental colleges or schools of dental surgery.

Ruel May, *Sec'y,*
Jackson, Miss.

IDAHO BOARD OF EXAMINERS.

The next meeting of the Idaho Board of Dental Examiners will be held in Boise, beginning Monday morning, July 7, 1913.

Albert A. Jessup, *Sec'y,*
Boise, Idaho.

TEXAS BOARD OF EXAMINERS.

The next regular meeting of the Texas State Board of Dental Examiners will be held in the high-school building, Houston, Texas, beginning Monday, June 23, 1913, at 9 A.M. Official application blanks and other necessary information will be furnished candidates upon application to the secretary.

All applications, accompanied by a fee of $25.00, should be in the hands of the secretary at least five days before the examination.

Address all communications to

C. M. McCauley, *Sec'y,*
Abilene, Texas.

INDIANA BOARD OF EXAMINERS.

The next regular meeting of the Indiana State Board of Dental Examiners will be held in the State-house at Indianapolis, beginning Monday, June 9th, at 9 A.M., and continuing until Saturday, June 14th. All applicants for registration in this state will be examined at this time. No other meeting will be held until November; no temporary licenses are issued.

The new law requiring annual registration will be in effect about May 15th. The first registration will take place in December of this year. For application blanks and further information apply to

F. R. Henshaw, 507-8 Pythian Bldg.,
Indianapolis, Ind.

MONTANA BOARD OF EXAMINERS.

THE Montana State Board of Dental Examiners will hold the annual session in Helena, Mont., July 14, 15, 16, 17, 1913. Address all communications to

G. A. CHEVIGNY, *Sec'y*,
Butte, Mont.

NORTH DAKOTA BOARD OF EXAMINERS.

THE next regular meeting of the North Dakota State Board of Dental Examiners will be held in Fargo, July 8, 9, 10, and 11. For further information address

F. A. BRICKER, *Sec'y*,
Fargo, N. D.

NEW JERSEY BOARD OF REGISTRATION.

THE New Jersey State Board of Registration and Examination in Dentistry will hold their semi-annual examination in the Statehouse, Trenton, N. J., beginning on Monday, June 30, and continuing Tuesday, July 1, and Wednesday, July 2, 1913.

Practical work Monday, June 30th, 8 A.M. sharp; theoretical examination Tuesday, July 1st, and Wednesday, July 2d, promptly at 8 A.M. The business meeting of the board will be held at 10 A.M., Tuesday, July 1st, and anyone having business with the board may have an audience. Applications must be in the hands of the secretary five days prior to the examination. For further information address

CHAS. A. MEEKER, *Sec'y*,
29 Fulton st., Newark, N. J.

WYOMING BOARD OF EXAMINERS.

THE Wyoming State Board of Dental Examiners will meet for examination of applicants on July 1, 2, and 3, 1913, at Cheyenne.

An examination is required of all applicants, and only holders of diplomas from reputable dental colleges are eligible to such examination. The board does not interchange with other states, nor issue any temporary permits. All applications must be completed and in the hands of the secretary fifteen days prior.

The written examination consists of anatomy, physiology, histology, bacteriology, chemistry, metallurgy, oral surgery, anesthetics, operative and prosthetic dentistry, materia medica, therapeutics, prophylactics, and orthodontia. Hand instruments for operating will be all the candidate need furnish.

For further information and application blanks, address

PETER APPEL, JR., *Sec'y*,
Cheyenne, Wyo.

ARMY DENTAL SURGEONS.

MEMORANDA OF CHANGES.

For the week ending April 19th:

First Lieut. George I. Gunckel granted ten days' leave of absence.

First Lieut. Edwin P. Tignor granted five days' leave of absence.

For the week ending April 25th:

First Lieut. John R. Ames arrived at Fort McPherson, Ga., April 19th, for duty.

For the week ending May 2d:

Lester C. Ogg, ACT.D.S., is relieved from duty at the Letterman General Hospital, Presidio of San Francisco, Cal., and will take the August 5th transport, sailing from San Francisco, Cal., for the Philippine Islands.

Charles E. Sherwood, ACT.D.S., is relieved from duty at the Presidio of Monterey, Cal., and will take the transport sailing from San Francisco, Cal., July 5th, for Hawaii, H. T.

B. C. Warfield, ACT.D.S., is relieved from duty at Madison Barracks, N. Y., and will take the transport sailing from San Francisco, Cal., about July 5th, for the Philippine Islands.

Albert R. White, ACT.D.S., is relieved from duty at Fort Des Moines, Iowa, and will take the transport sailing from San Francisco, August 5th, for Honolulu, H. T.

Arthur T. Knoderer, ACT.D.S., left Philadelphia, Pa., April 25th, *en route* to San Francisco, and will take the transport to sail from that place on or about May 5th for the Philippine Islands.

J. W. Smith, ACT.D.S., left Fort Sam Houston, Texas, April 20th for Marfa, Texas; Columbia, N. M.; Douglas, Ariz., and Fort Huachuca, Ariz.

For the week ending May 9th:

First Lieut. R. E. Ingalls arrived at his station, Fort Liscum, Alaska, April 21st.

READING (PA.) DENTAL SOCIETY—

Its Work in the Public Schools.

At a recent meeting of the Reading Dental Society a copy of the appended resolutions, passed by a committee of the teachers of the public schools, was received, and on motion the secretary was instructed to send a copy to the Dental Cosmos for publication.

Otto J. Specker, *Sec'y.*

Resolutions.

Whereas, the city of Reading and the school children of the city have been benefited beyond measure by the Reading Dental Society's gratuitous dental inspection of the children in the grades; and

Whereas, we, the teachers of the schools, knowing of the marvelous improvement in the health and physical development of these children through their magnanimity; therefore be it

Resolved, That we, the teachers of the city, in institute assembled, do express to the Reading Dental Society our sincere thanks, and in this way show our earnest appreciation and full realization of the great amount of good they have done; and be it further

Resolved, That a copy of these resolutions be sent to the secretary of the society.

[Signed] George Beggs, *Chairman,* Mary H. Mayer, Esther M. Evans, Emma C. Houder, Elizabeth Piper, Anna Fink, Josephine Murray, Carrie Lotz, Martha Goodenough, Margaret Gossler, *Committee on Resolutions.*

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING APRIL 1913.

April 1.

No. 1,057,450, to Yoshekazu Okamiya. Sanitary brush.

No. 1,057,974, to Benson L. Miller. Combined teeth separator and mirror.

April 8.

No. 1,058,234, to Harry F. Hamilton. Device for cleaning teeth.

No. 1,058,381 to Michael J. Murray. Manufacture of artificial tooth crowns.

April 15.

No. 1,058,743, to Edmund D Gilbert. Cap-crown slitter.

No. 1,058,745, to George W. Grant. Dental pliers.

No. 1,059,300, to Fernando O. Jaques, Jr. Dental swaging block.

April 22.

No. 1,059,426, to Henry Barnes. Tooth-brush.

No. 1,059,508, to James A. Watt. Tooth-brush.

April 29.

No. 1,060,242, to Bernard Feldman. Dental forceps.

No. 1,060,243, to Bernard Feldman. Dental forceps.

No. 1,060,568, to Harry A. Ward. Denture support.

DR. D. J. McMILLEN.

THE

DENTAL COSMOS.

VOL. LV. JULY 1913. No. 7.

ORIGINAL COMMUNICATIONS.

STUDIES OF ANTERIOR AND POSTERIOR OCCLUSION OF THE TEETH, WITH SUGGESTIONS AS TO TREATMENT.

By M. H. CRYER, M.D., D.D.S., Philadelphia, Pa.,
PROFESSOR OF ORAL SURGERY, UNIVERSITY OF PENNSYLVANIA.

(Read before the Eastern Association of the Graduates of the Angle School of Orthodontia.)

IT gives me great pleasure to be with you tonight, and to have this opportunity of hearing your interesting views and discussions on various matters connected with orthodontia. If you will permit me to make a little personal reference in regard to my relations with the Angle graduates, I should like to state that, while my opinions are apt to be rather positive, and those who do not agree with me are equally firm in their convictions, there is no reason why we should not discuss these differences of opinion in a thoroughly friendly spirit with mutual benefit and good-fellowship—for the purpose of all of us is the betterment of our profession and the welfare of our patients.

Some years ago, in criticizing a paper of mine, one of your members called his article "Definite *versus* Indefinite." He may be tempted to say the same of this paper, as I fear it is a most indefinite effort. In fact, the upper and lower jaws, I find, are decidedly indefinite, as they absolutely refuse to conform to any fixed type or classification, each jaw being different from any other, and necessitating a treatment peculiar to its own anatomy.

INFINITE VARIETY IN OCCLUSION.

In making a study of any portion of the human body, especially when comparing a large number of specimens, the student is inclined to think that the particular region he is studying exhibits more variations than can be found in any other part. Thus, in looking up material for this paper, I have examined many skulls but cannot find any two occlusions alike; and I doubt if one could find, in any collection of skulls, ancient or modern, a mandible which would give the same dental occlusion if taken from its own skull and placed on another. With all the variations that we find throughout both the vegetable and the animal kingdom, there is some function or "vital instinct" which endeavors to bring these variations into harmonious relations with the whole, and usually accomplishes this design if not interfered with by disease, misalliance of parents, or traumatic disturbances. The unerupted tooth germs develop and find their proper position in the jaws through this vital instinct, the lower and upper teeth finding their normal occlusion by the same compulsion. If we accept this vital instinct of construction, we must also realize that it gives the power of repair, which the surgeon must consider and call to his aid in all his endeavors to cure disease or correct deformity.

Fig. 1.

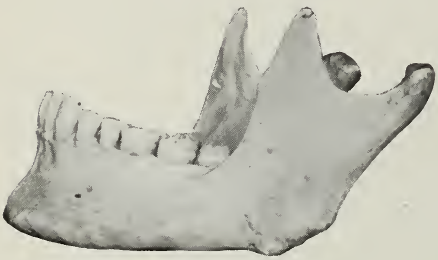


Fig. 2.

DESCRIPTION OF THE UPPER AND LOWER JAWS, AND THEIR RELATIONS TO EACH OTHER.

In order to understand the best method of diagnosing the cause of abnormal conditions of the jaws, for their treatment, it will be advisable to give a brief description of the upper and lower jaws and their relations to each other.

Lower jaw. The mandible is made up of the body, the ramus, the teeth, and their alveolar processes. At the upper and posterior end of the ramus is the condyloid process, which normally articulates in the anterior portion of the glenoid fossa of the temporal bone. The ramus joins the body at a little more than a right angle. The angle of the mandible at birth is very obtuse, in some cases being as much as 140°. As the bone increases in size, and the teeth with their alveolar processes develop and take their places, the jaws are forced apart, and the angle loses its marked obtuseness, making at full maturity an angle of about 120°, and even less in some cases of powerful jaws.

The bones throughout the body have large tuberosities, spines, ridges, etc., for the attachment of ligaments and muscles. The mandible is not an exception to this rule, there being strong attachments at or near the angle. As the muscles grow and increase in strength, that portion of bone to which they are attached also increases in size, giving the ramus a sort of square appearance, especially in strong, muscular persons, As time passes, after full maturity, the muscular action becomes less and less, and the tuberosities, etc., throughout the body become smaller. The same condition takes place at the angle of the jaw, and it becomes more obtuse as age advances. When the jaws can be kept apart with good teeth and proper, full mastication, there is not so much change in the angles. Anatomically speaking, the above description answers for ordinary purposes. The surgical consideration of the relation of the ramus to the body will be referred to farther on.

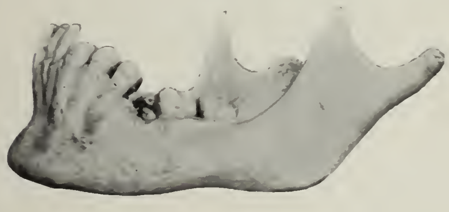
The teeth and their alveolar processes are placed on the upper portion of the body of the bone. The third molar is partially posterior to the anterior margin of the ramus, and a line can be drawn between the first and second premolars to the mental foramen. The mental process gives prominence to the chin and lower part of the face. The incisors are about normal, and having neither lingual nor labial inclination.

The above is a rather good description

of a fairly typical mandible as shown in Fig. 1, also in the skull Fig. 16.

Fig. 2 is made from a mandible of a South African negro (see Figs. 10 and 17). The body of the mandible is fairly typical, except that the angle is nearer a right angle. The prognathous features of this mandible are caused by the position of the teeth and their alveolar

FIG. 3.



processes, which are set forward on the body of the jaw. It will be noticed that the third molar is in advance of the ramus about the width of a molar, and that a line drawn downward between the premolar teeth would pass across the body of the jaw a full width of a molar tooth in advance of the mental foramen. The canine and incisor teeth are placed in front of the jaw proper, with considerable labial inclination of the incisors. The mental process is not so prominent as in Fig. 1, due in part to the carrying forward of the teeth and alveolar process.

Fig. 3 is made from a skull (see Figs. 11 and 18) showing prognathous jaws. Upon examination it will be seen that the prognathism in Figs. 2 and 3 is produced by quite different anatomical arrangements. In Fig. 2 it is evidently caused by the malposition of the teeth and their alveolar processes upon the body of the bone. In Fig. 3 the principal cause of prognathism is in the relation of the ramus to the body, which carries the body of the jaw so far forward that the mental process is much more prominent than in Fig. 2, and the anterior teeth have lingual inclination. To correct this forward protrusion would require quite a different method from the procedure illustrated in Fig. 2. Here the angle should be changed sufficiently to allow the body of the jaw with the teeth to be carried backward to a position nearer the typical.

Fig. 4 is made from the mandible of a very heavy skull with large massive teeth in excellent alignment (see Figs. 13 and 19, A), and when articulated with its skull there is fairly good occlusion. The marked feature of this mandible is the relation of the ramus to the body of the bone: its external angle is nearer a right angle than any mandible I have measured, being 103° on the right side and 100° on the left.

Fig. 5 is made from a mandible of a peculiar skull (see Figs. 12 and 22). It is a great contrast to the mandible shown in Fig. 4. The angle of the ramus with the body of the bone is 135°. Age should be taken into consideration in this comparison, as the angle usually increases as age advances. There is a difference, however, of about 6 mm. in the distance from the condyloid process to the lower portion of the symphysis in these two mandibles.

Fig. 6 is made from the mandible of a skull having a very flat face (see

FIG. 4.

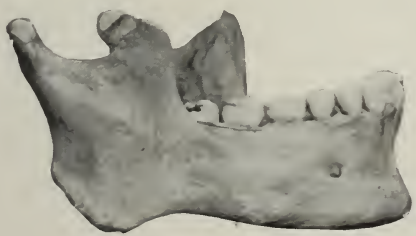


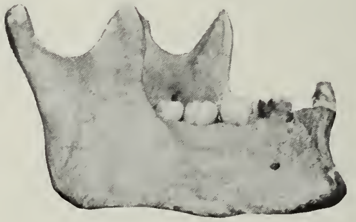
FIG. 5.

Figs. 15 and 20). There is a slight anterior occlusion. The angle of the jaw is obtuse, viz, 133°.

Fig. 6A is made from the mandible of a Chinese skull. (See Figs. 14 and 19, B.)

FIG. 6.

FIG. 6A.



The rami are rather square and unite with the body of the bone at an angle of 107°, which makes the mandible short. On the left side of the mandible there is an impacted lower third molar.

FIG. 7.

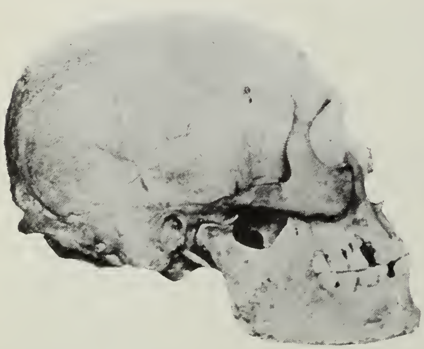


FIG. 8.

(From the collection in Peabody Museum, Cambridge, Mass.)

Taking it for granted that the upper jaw with its teeth is of normal character, the protrusion of the mandibular teeth can be traced to at least four causes. First, a comparatively normal jaw can be so situated that one or both condyles will rest upon the eminentia articularis, which throws the whole jaw forward, as shown in Figs. 7 and 8. Second, the teeth and their alveolar processes can be placed forward upon the true bone, as in Fig. 2, while the mandible in other respects is fairly typical and is normally articulated in the glenoid fossa. Third, the condyloid process may be abnormally long from the sigmoid notch to the head of the condyle, and extend more backward than usual, thus throwing the jaws forward (see Fig. 25, X-ray picture). The fourth cause of protrusion, the most common, is the abnormal shape of the mandible (see Figs. 3 and 5). When the ramus and the body form an angle that is very obtuse, the body of the mandible is bound to be carried forward in proportion to this obtuseness.

Upper jaw. From a surgical standpoint the upper jaw includes the two maxillæ and all the other facial bones except the mandible, also part of the sphenoid and ethmoid bones of the cranium.

MEASUREMENTS OF THE BASE AND THE PHARYNGEAL DOME OF SEVEN SKULLS.

In former studies of the skull I have endeavored to find a fixed point from which to make measurements or comparisons without satisfactory results. In these studies I have chosen the center of the anterior border of the foramen magnum, and we find some interesting measurements.

The first measurement is from the cutting edge of the incisor teeth to the free margin of the hard palate.

The second measurement is from the free edge of the hard palate to the anterior border of the foramen magnum.

The third measurement is from the anterior border of the foramen magnum to the vertical line at the posterior part of the skull.

Fourth, the triangle of the pharyngeal dome is obtained by lines drawn from the free edge of the hard palate (A) to the anterior border of the foramen magnum (B), from the foramen magnum to the highest part of the basilar process of the occipital bone (C), and from that point to the free border of the hard palate A, the height of the dome being from C to D.

harmony with the rest of the skull, and will be used in comparison with other illustrations of the same general character. The distance from the cutting edge of the incisors to the free border of the hard palate is 60 mm., from the hard palate to the foramen magnum 42 mm., from the foramen magnum to the vertical plane of the back part of the skull 93 mm., the total length of the skull 195 mm.

Fig. 10 is made from the most prognathous skull I have measured (see Figs. 2 and 17). It is in great contrast with the typical skull (see Figs. 9 and 16). The distance from the cutting edge of the incisor teeth to the free margin of the hard palate is 71 mm., a difference of 11 mm. between this and the typical skull; from the hard palate to the foramen magnum, 46 mm., a difference of 4 mm., from the foramen magnum to the back point of the skull, 104 mm., a difference of 11 mm. The total length of the skull is 221 mm., a difference of 26 mm.

Fig. 11 is made from a skull with a prognathous face (see Figs. 3 and 18). Its measurements are as follows: From the cutting edge of the incisor teeth to the free margin of the hard palate, 62 mm.: from the hard palate to the foramen magnum, 48 mm.: from the anterior border of the foramen magnum to the back of the skull, 95 mm.; total length of skull, 205 mm.

Skulls as Illustrated.

	1st meas.	2d meas.	Total (from teeth to F. magn.)	3d meas.	Total length of skull.	Height of dome.
No. 9. Typical skull	60 mm.	42 mm.	102 mm.	93 mm.	195 mm.	21.5 mm.
" 10. Prognathous skull	71 "	46 "	117 "	104 "	221 "	16.0 "
" 11. Mixed skull	62 "	48 "	110 "	95 "	205 "	16.0 "
" 12. Deformed ramus	48 "	37 "	84 "	109 "	193 "	22.0 "
" 13. Heavy skull	65 "	47 "	112 "	100 "	212 "	15.0 "
" 14. Chinese skull	60 "	40 "	100 "	94 "	197 "	16.5 "
" 15. Misplaced upper premolars	56 "	36 "	92 "	105 "	197 "	21.0 "
Diff. longest to shortest	(23 ")	(12 ")	(33 ")	(16 ")	(28 ")	(7.0 ")

Fig. 9 is an illustration taken from the under surface of a typical skull. It is not necessary to go into the general description of the base of this skull other than to say that the relation of the shape, size, and position of the upper jaw is in

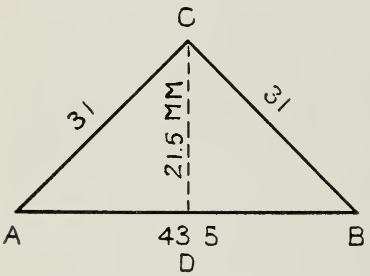
Fig. 12 is made from a very short skull (see Fig. 22), the distance from

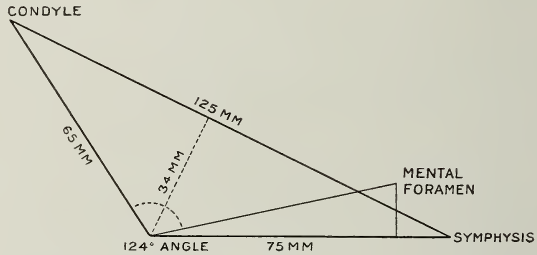
Triangles Showing Height of Pharyngeal Dome and Angles of Mandible.

NOTE.—No. 9 triangle, in *heavy lines*, is made from the pharyngeal dome of skull shown in Figs. 9 and 16, which is nearly a typical skull. The others are taken from skulls that are atypical and are described under Figs. 10 to 15 inclusive. These triangles have a great deal to do with the occlusion of the teeth and the general shape of the lower part of the face, and must have their influence in modifying the whole face. The triangles in *light lines* are those of the mandibles of the same skulls.

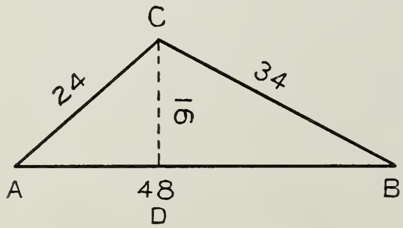
HEIGHT OF PHARYNGEAL DOME. ANGLES OF MANDIBLE—REDUCED ONE-HALF.

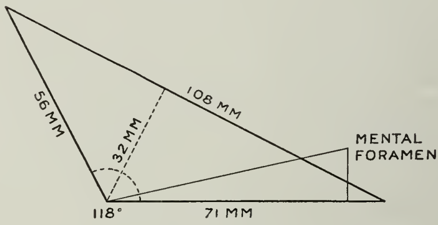
No. 9.



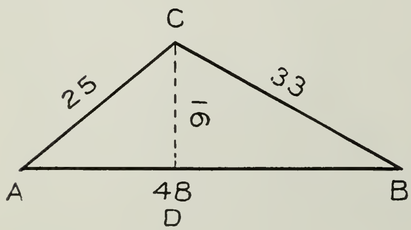


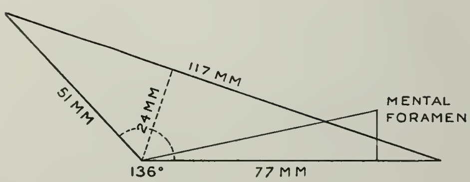
No. 10.



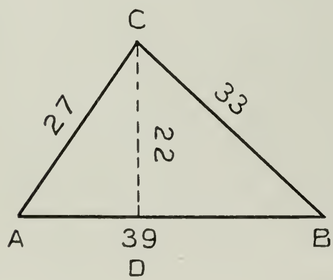


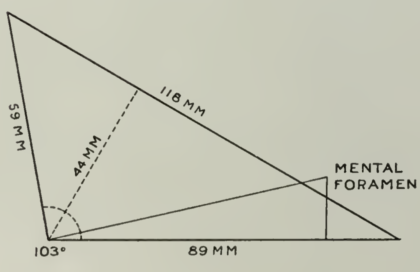
No. 11.



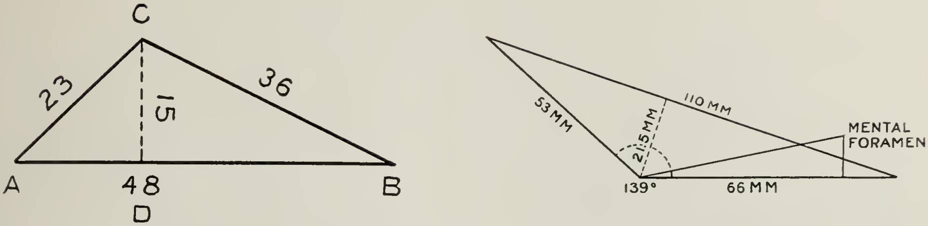


No. 12.

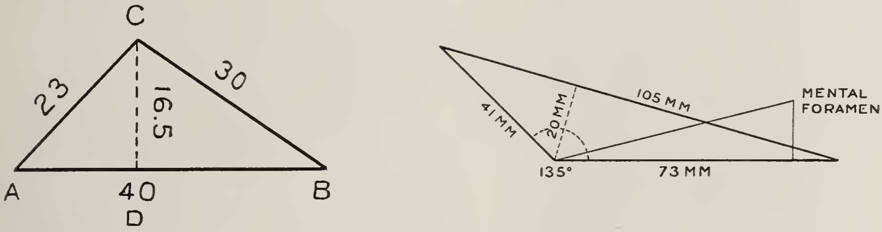




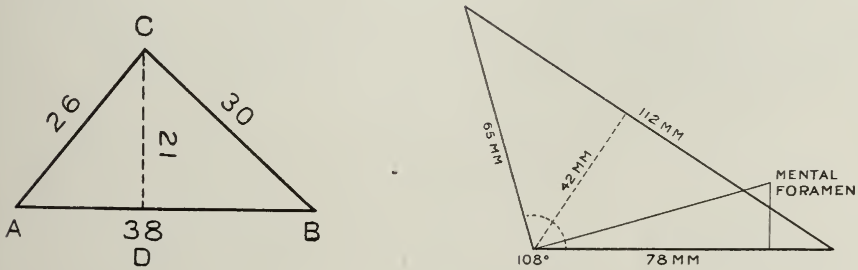
No. 13.



No. 14.



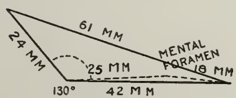
No. 15.



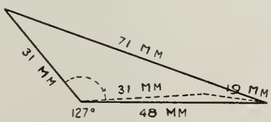
ANGLES OF MANDIBLE—REDUCED ONE-HALF.

(For description of these triangles, see page 689.)

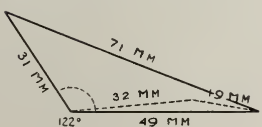
No. 16. Age eight months.



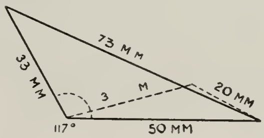
No. 17. Age fifteen months.



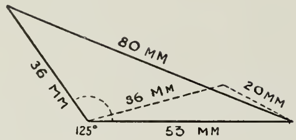
No. 18. Age eighteen months.



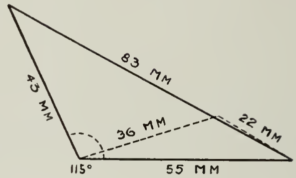
No. 19. Age two years.



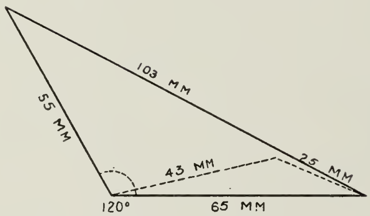
No. 20. Age four years.



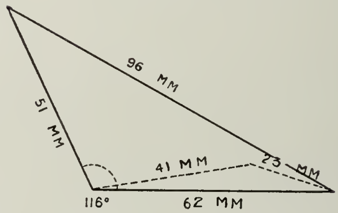
No. 21. Age five years.



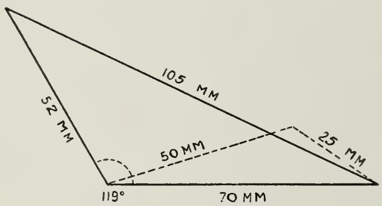
No. 22. Age seven to eight years.



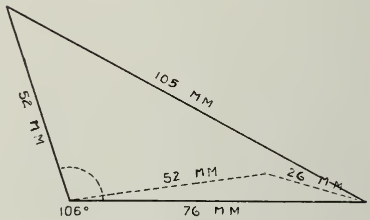
No. 23. Age eight to nine years.



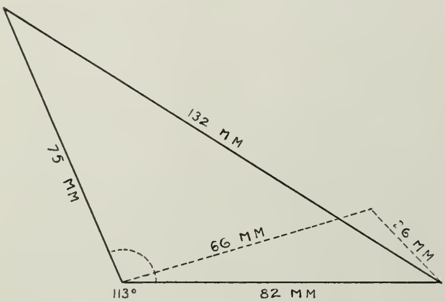
No. 24. Age thirteen years.



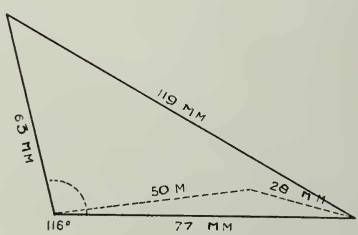
No. 25. Age eighteen years.



No. 26. Adult.



No. 27. Old age.



the incisor teeth to the free border of the hard palate being 48 mm., from the hard palate to the foramen magnum 37 mm., from the foramen magnum to the back of the skull, 109 mm.; total length of skull, 193 mm. The most important feature of this picture is that on the left side it shows evidence of three different points of articulation of the condyloid process, as will be described under Figs. 23 and 24.

Fig. 13 is made from the base of a very heavy skull (see Figs. 4 and 19, A) with the following measurements: From the cutting edge of the incisors to the free border of the hard palate, 65 mm.; from the hard palate to the foramen magnum, 47 mm.; from the foramen

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

magnum to the back of the skull, 100 mm.; total length of skull, 212 mm.

Fig. 14 is made from the base of a Chinese skull, showing a general roundness of form.

Fig. 15 is made from the under surface of a skull in which there is a slight anterior occlusion and open bite (see Fig. 20). The distance from the cutting edge of the incisor teeth to the free border of the hard palate is 56 mm.; from the hard palate to the anterior border of the foramen magnum 36 mm., from the foramen magnum to the vertical plane of the back of the skull, 105 mm.; total length of the skull, 197 mm. It is evident that in this skull the principal cause of anterior occlusion is the short distance from the cutting edge of the incisor teeth to the hard palate, and also to the foramen magnum, being only 92 mm., viz, 10 mm. shorter than typical. It will be noticed that the two second premolars—perhaps they are the first—are out of line, caused also by the smallness and shortness of the whole upper jaw. An additional cause of the anterior occlusion is that the angle of the mandible is unusually obtuse, measuring 134°. If correction were made by slowly forcing the upper premolar teeth into position, it should lengthen the arch, which would also assist in the improvement of the position of the anterior teeth. This might be all that could be accomplished in the upper jaw. The fault of the lower jaw is at the angle, and if surgery can find any safe means of changing this angle, this would be the proper procedure.

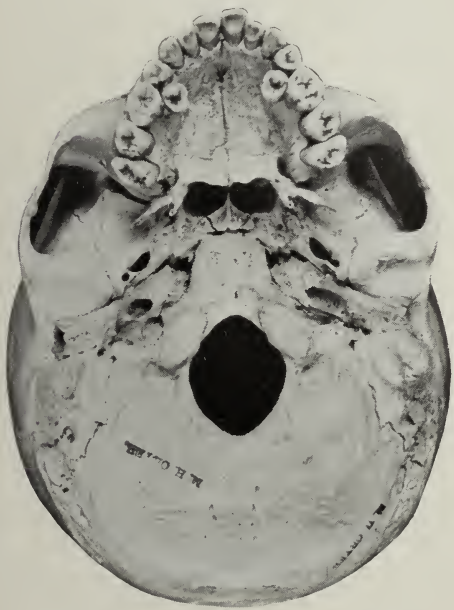
Fig. 13.

Fig. 14.

Side view of skulls. The following illustrations are taken from various side views of the skulls, shown with the mandible in position.

Fig. 16 shows a typical skull of a white person of about twenty-five years of age (see mandible in Fig. 1, and base of skull in Fig. 9) which I have taken as the foundation for nearly all my studies of the face, it having been used by Gray, Gerrish, Angle, and many others, as a generally typical skull. It is an ideal model for the surgeon to have before him when correcting irregularities, provided the patient's face and teeth possess the same characteristics and formation that we see in this skull. One of the greatest mistakes made by some orthodontists is that they are too liable

FIG. 15.



to take as models any good-looking jaws where the teeth are in regular alignment, shape, and occlusion, regardless of the fact that these regular types may not suit the special case. The teeth of this skull (Fig. 16) may be absolutely correct for an individual of about twenty-five years, but would not be so for the same individual much before that time. The surgeon should remember that both teeth-germs and teeth change position from the time they begin to develop until they are lost. Every tooth has a normal position, changing from day to day, which must be taken into consideration when changing position for better occlusion. I wish to draw special attention to the position of the condyle in the anterior portion of the glenoid fossa, and the relation of the ramus with the body of the bone,

FIG. 16.

the angle being 125°; the teeth are in typical position and occlusion.

Fig. 17 (see mandible in Fig. 2, and base of skull in Fig. 10) is of quite a different character. It is taken from the skull of one of the West African tribes,

FIG. 17.

the specimen belonging to Dr. E. T. Darby's collection. The skull would be classified by nearly all as prognathous. If, however, this man had lived until all of his teeth and their alveolar processes had been lost, it is doubtful if the jaws, especially the lower one, would then be considered prognathous. If we accept this, we must admit that this prognathous character was caused by the forward position of the teeth and their alveolar processes. The distance of 71 mm. from the cutting edge of the incisor teeth to the hard palate is greater than in any other skull I have measured.

Fig. 18 (see mandible in Fig. 3, and base of skull in Fig. 11) is made from a rather peculiar skull. From the anterior border of the foramen magnum to the vertical plane at the back of the skull it is similar to a typical Caucasian skull. The prognathous character is produced by the upper and lower jaws; the distance from the foramen magnum to the hard palate is 48 mm., 12 mm. longer than in the typical skull, so this abnormal protrusion of the upper jaw extends anteriorly from the foramen magnum. The protrusion of the lower jaw is caused by the obtuse angle of 135°, which is ten degrees greater than the typical. The teeth and alveolar processes are placed but slightly forward on the body of the bone, if we take the mental foramen as a fixed point. In this skull we have the two jaws abnormally forward of the typical position. The skull in itself is not of a prognathous character, although the basilar process of the occipital bone is longer than it should be.

Fig. 18.

It would give me much pleasure to hear the members of this society discuss the cause of the forward arrangement of the face as shown in Fig. 18. Is it the "result of mechanical stimulation"? I would also like to know how they would treat such a case. I am on record as to my method of treating the teeth and alveolar processes, if the upper jaw only were involved. (Dental Cosmos, September 1904, page 727, Fig. 22.) If the lower jaw were to be treated under similar conditions for anterior occlusion, I would change the angle from its present shape to one that would bring its anterior portion into the desired position. This I will refer to farther on.

Fig. 19, A (see mandible in Fig. 4 and base of skull in Fig. 13) is made from a heavy skull, with unusually large, strong jaws and heavy teeth, which are in fairly good occlusion, except that the left laterals are a little out of place. The extraordinary size of the jaws and the teeth produces a general appearance of prognathism, but the position of the teeth and their processes does not carry out this idea.

Fig. 19, B, is a side view of a Chinese skull, showing general roundness. On the left side there is an impacted lower third molar; in the upper jaw of the same side there is no evidence that the third molar ever developed.

We often hear that ancient skulls seem to have better teeth and belong to a more powerful race than exists to-day, but I am inclined to think that this is a mistake, as it has, thus far, been possible to duplicate almost any ancient skull I have ever seen by a modern one showing similar characteristics. Of course, I do not mean such jaws as are found in the Heidelberg or Sussex skulls, which are supposed to be anywhere from two to four hundred thousand years old.

Fig. 19, D, is made from the upper and lower jaws of an Australian aborigine, belonging to the collection of Dr. Edward C. Kirk, who kindly allowed me to use them. There is no caries in the teeth, but there is strong evidence of pyorrhea alveolaris. The arches are of good width, and more than likely the occlusion has been good, except that the bite has been about even, or edge-to-edge, especially in front.

Comparison of Fig. 19, C, made from the mandible of the modern jaw, with the aboriginal jaw, D, will show them to possess fairly similar characteristics, especially of the ramus and angle.

Many years ago Dr. Kirk discussed the change in the temporo-mandibular articulation which would be necessary to bring the teeth into occlusion, exhibiting a skull from which Fig. 21 is made.* This shows that in this deformed mouth, caused by disease and loss of teeth, it had been necessary for the left side of the mandible to move forward until the articulation was on the eminentia articularis, which permitted the few teeth remaining to come into occlusion. This action may have been partially volun-

FIG. 19.

A B C D

Fig. 20 is a side view of a skull (see base of skull in Fig. 15).

The occlusion of the six molars and the two bicuspids is fairly good, but the rest of the teeth are not in proper alignment, or occlusion, and there is an open bite. As pointed out under Fig. 15, this case should elicit an interesting discussion as to treatment.

* *Trans.* Dental Society of the State of New York, 1892, p. 111.

tary on the part of the individual, but I believe it was largely assisted by the force of vital instinct.

Another case may be interesting which will require three illustrations. Fig. 22 (and see mandible in Fig. 5, and base of skull in Fig. 12) gives a view of the right side of the skull. It will be seen that the three molars and one premolar of the upper jaw are missing. In the lower jaw, all the teeth except the lateral and central incisors have been lost.

Fig. 23 shows the interesting phase of this specimen; it gives a view of the left side of the skull, showing the upper and lower teeth in occlusion. The remarkable characteristic is the abnormally small ramus, a portion of the body of the bone being also unusually small. The condyloid process, instead of articulating in the glenoid fossa, articulated partly on the squamous portion of the temporal bone, and partly on the great wing of the sphenoid. There seem to be two ways by which this deformity could occur. One is by the lack of growth in the ramus and body of bone; the other theory is that the bone grew to its normal size, as there is evidence of its having articulated in the glenoid fossa. Some time after this an atrophied condition may have occurred which reduced the size of the ramus and part of the body; in order to keep up occlusion of

Fig. 20.

Fig. 21.

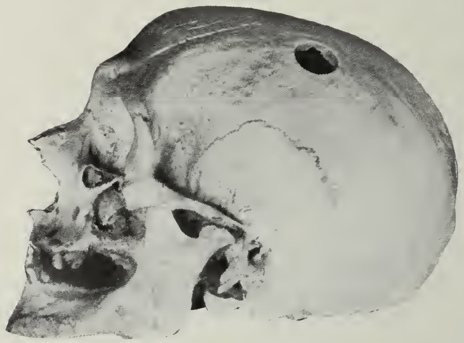
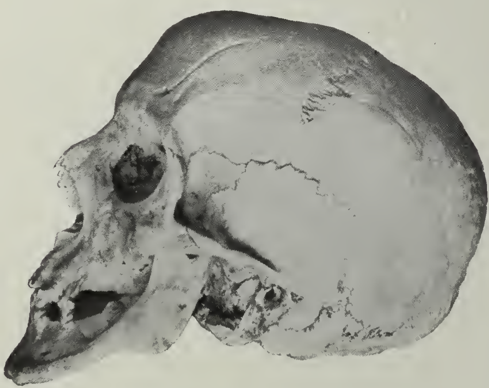


Fig. 22.

Fig. 23.



the teeth, the great vital instinct would cause the condyloid process to move forward, first articulating on the eminentia articularis, and, as the atrophy progressed, moving still forward to keep the occlusion, until the condyloid process reached the position shown in the illustration.

Fig. 24.

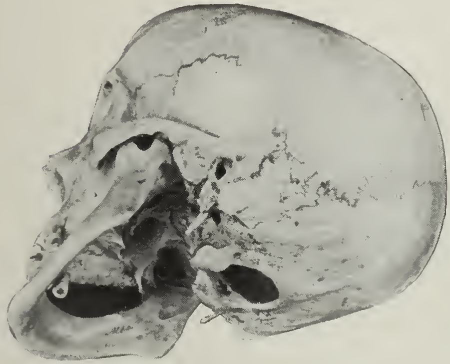


Fig. 24 gives an under view of the articulation shown in Fig. 23.

SOME OF THE CAUSES INFLUENCING PROTRUSION OR RETRUSION OF THE UPPER AND LOWER JAWS.

It is evident that the position of the upper jaw is more or less governed or influenced by the surrounding bones. For instance, the length of the basilar process of the occipital bone, the length of the body of the sphenoid bone, and the position of the pterygoid processes may cause variations in the distance of the teeth from the center of the base of the skull, or produce protrusion or retrusion of the jaws. Another influence as to position of the jaws lies in the greater or less degree of the height and curvature of the pharyngeal dome of the base of the skull. If this dome be of the height

Fig. 25.

shown in the diagram No. 9,* the face will be fairly typical.

In this diagram, No. 9, the height of dome, C to D, is about the average, viz, 21.5 mm.; in such cases the base of the dome or triangle will usually be short, in this case 42 mm., making the average typical face. (See Fig. 16.)

In diagram No. 11 the dome is but 16 mm. and the base of the triangle 48 mm., which proportion belongs to a greater or less degree to a face that is protruded. (See Fig. 18.)

Fig. 26.

The character of these pharyngeal triangles or domes will influence the lateral triangle of the mandible. These triangles are made by lines drawn from the condyloid to the angle, then to the symphysis menti and then back to the condyle.

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* For further description of the triangles of pharyngeal dome and triangles of the mandible, see pp. 677–679.

Besides giving the lateral triangles of the mandibles of the skulls under consideration in this paper, I have incorporated those of a number of skulls of various ages commencing at eight months. (See pages 679 and 680—triangles reduced one-half—Nos. 16 to 27.)

Posterior occlusion. In posterior occlusion there are several factors that assist the orthodontist in bringing about satisfactory results. We have noticed that the vital instinct shows a strong tendency to carry the jaw, with the teeth and their alveolar processes, forward in search of occlusion. This must help greatly when force is applied to move the teeth anteriorly by bringing the jaw forward. I also believe it is possible to change the angle of the jaw, to a certain extent, by mechanical force applied to the teeth, which will allow the body of the bone to be carried forward.

Fig. 27.

Anterior occlusion. The extreme deformity of anterior occlusion is perhaps the most difficult to correct of all abnormal conditions that are likely to come to the orthodontist's notice. These variations in the lower and upper jaws should suggest the study of a skull which has that particular deformity which is to be found in the patient whom the surgeon is called upon to treat. A great many practitioners are quite satisfied to study and work from plaster casts of the mouth, which may be all that is necessary for the correction of ordinary irregularities, but I fear that it is not enough when one wishes to correct very marked anterior or posterior occlusion. Another important aid in making a diagnosis consists in obtaining a good X-ray examination, which should show the position of the condyle in the glenoid cavity, and indicate the general shape of the ramus and its relation to the body of the jaw. It will also show the relations of the teeth in both upper and lower jaws.

Fig. 28.

Fig. 25 is made from an X-ray picture of a living subject having a marked anterior occlusion. It can readily be seen that the angle of the mandible is at fault, and that the condyloid process is curved somewhat backward, naturally throwing the balance of the mandible forward.

Fig. 29.

Fig. 26 is made from an X-ray picture of the left side of a patient, showing extreme anterior occlusion.

SURGICAL OPERATION FOR ANTERIOR OCCLUSION.

In conclusion, I wish to suggest an operation for anterior occlusion which cannot be otherwise corrected by ordinary orthodontic procedure. Several cases have been reported in which a section of the bone was removed from each side of the mandible, although there was no evidence shown that the length of the body of the bone was at fault. There was also a case reported where the angle had been changed by making a straight incision at the angle. Many of the illustrations in this article show a normal condition of the condyle, as well as of the teeth and alveolar process, but digital as well as X-ray examination demonstrates that the cause of the anterior occlusion, in many cases, exists in the angle of the jaw. Wishing to experiment with a skull that had a marked anterior occlusion and an obtuse angle, and failing to find one, I selected a skull that exhibited fairly normal occlusion, and had its original capsular ligament in place. By cutting semicircular incisions through the angles of the jaw, I was able to carry the body with the teeth forward, producing anterior occlusion and open bite. Fig. 27 is made from a photograph of the right side of the skull, showing the position of the teeth. The mark of the incision at the angle is shown, with two wire sutures to hold the ramus and body together. In carrying the body of the jaw forward, the angles are increased in proportion.

FIG. 30.

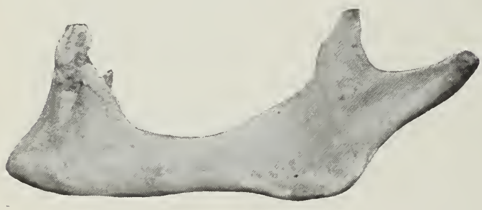
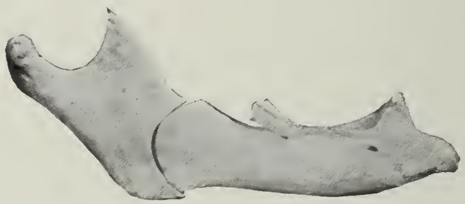


FIG. 31.



If the wire sutures be cut, the jaw can be pushed back to its original position and occlusion, as shown in Fig. 28. Fig. 29 shows the opposite side of this jaw. The advantage in using a semicircular incision instead of the straight one, consists in that it does not necessitate the removal of a V-shaped section or leave an open space (see Fig. 32). If the artificial deformity of the jaw had been natural, then the cutting of the semicircular incision, as described, would make a successful correction.

FIG. 32.

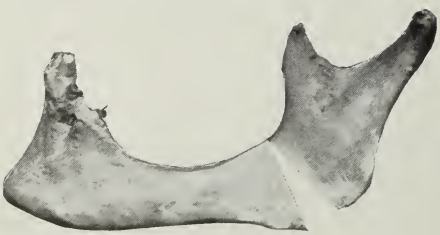


FIG. 33.

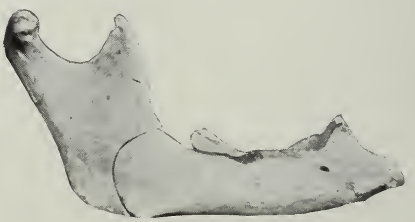


Fig. 30 shows an unusually large obtuse angle, viz, of 135°.

Fig. 31 shows a semicircular cut at the base of the ramus. By carrying the body forward, a greater obtuse angle is made.

Fig. 32 shows the same mandible as Fig. 30, showing the effect of a straight incision across the base of the ramus. The body of the bone is pushed back to lessen the angle to 110°, but it leaves an ugly V-shaped space, while in Fig. 33, showing the semicircular incision, there is no space left, and we still get the same reduction of the angle. In making this semicircular incision, I would recommend the use of a large fissure bur or a small spiral osteotome driven by the surgical engine; or it might be even better to use an ordinary cranial trephine with three-fourths of the circumference and the side cutting teeth taken away; then, by a to-and-fro motion, the bone can be cut through. In adjusting the jaw to its new position, any necessary removal of a little of the bone on either side of the incision could be made by a small spiral osteotome. It may be possible in some cases to make the incision high enough in the ramus to avoid cutting the inferior dental nerve and vessels, or, if the incision were made so that the center of the curve could come above the inferior dental foramen, the severing of the nerve might be avoided. The parts could be held together by wire sutures, assisted by a maxillo-mandibular splint, which should be made before the operation. There would be no danger of septic conditions if the operation were performed with surgical care, but when a section is removed from the body of the bone it is impossible to avoid infection.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

SYPHILITIC HYPOPLASIA OF THE TEETH.*

By JOHN BETHUNE STEIN, M.D.,

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(A synopsis of a demonstration upon "Syphilitic Hypoplasia of the Teeth," before the Academy of Stomatology of Philadelphia, at its monthly meeting, held at the College of Physicians, Philadelphia, February 24, 1913.)

HYPOPLASIA (misnamed "erosion" and "atrophy") of the teeth takes first place among the stigmata caused by heredo-syphilis. It appears in 39 to 47 per cent. of cases, according to such an authority as Fournier, who maintains that 80 per cent. of all cases of hypoplasia are caused by heredo-syphilis.

Syphilitic hypoplasia of the teeth is of great diagnostic importance, and although it has been recognized for many years, the interest in this affection seems of late to slumber in No-man's-land, concerning apparently neither physician nor dentist.

Some forms of hypoplasia of the teeth are certainly syphilitic, others may be attributed to syphilis, and others are certainly not caused by syphilis. Non-syphilitic hypoplasia of the teeth has been observed in the bull and the dog, as well as in man. The hypoplasia which affects the teeth at hazard and without method, depending upon some local accident or affection, and apparently having no significance, or a significance at present unknown, resembles in no way the marked characteristics of a syphilitic hypoplasia.

Syphilitic hypoplasia of the teeth appears to be caused not directly by the *Treponema pallidum* in the tissues of

* I am indebted to Dr. Francis Óváry for his drawings of specimens and diagrams.—J. B. S.

Fig. 1.

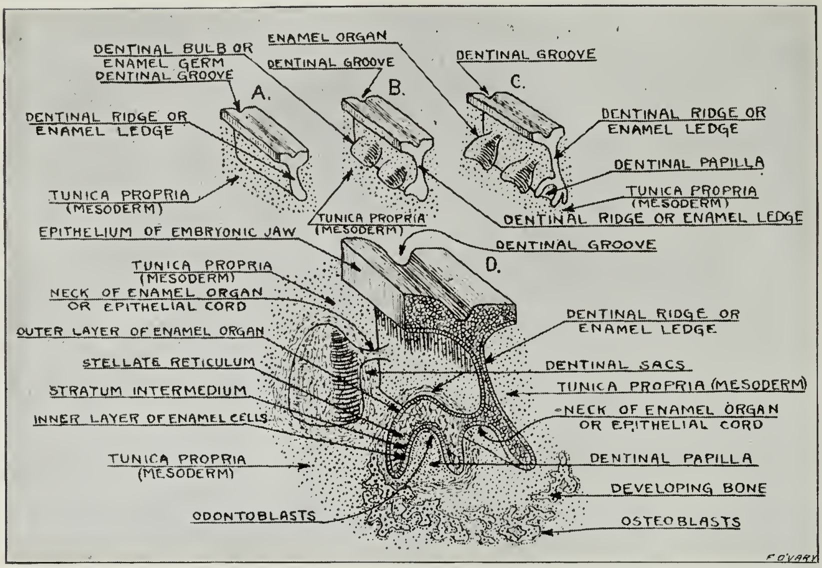
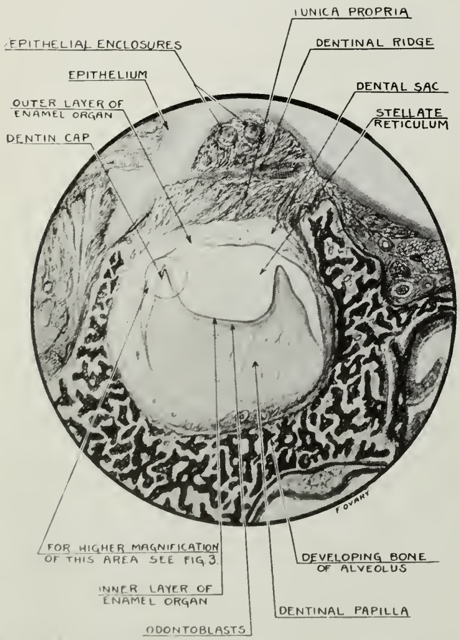


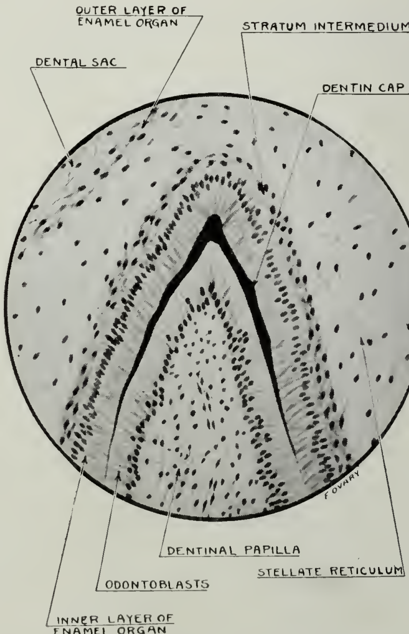
Diagram illustrating the earlier periods in the development of the tooth.

Fig. 2.



A longitudinal section of the left upper deciduous first molar from a human fetus of about four and a half months, showing the early formation of the dentin cap. (Leitz, oc. III, obj. 1.)

Fig. 3.



Higher magnification of the contents of the circle in Fig. 2. Notice that the enamel has not begun to form. (Leitz, oc. IV, obj. 5.)

the embryo, fetus, or young child, but indirectly by the severe disturbance in the metabolism of the young organism brought about by the syphilitic infection —the extent of the hypoplasia depending upon the seriousness of the disturbance, which in turn is determined by the amount and duration of the infection. The syphilitic infection may be so great, and the disturbance in metabolism so severe, that the cells of the embryo, fetus, or young child are unable to resist it, and, instead of stigmata being produced, death results. Heredo-syphilis is syphilis acquired *in utero* from the mother, and is essentially the same as self-acquired syphilis.

In recognizing the syphilitic stigmata referred to in this article, and in understanding the significance of each, the reader will be assisted by his knowledge (*a*) of the development of the teeth, especially regarding their several periods of calcification (dentinification) and eruption, (*b*) of the fact that dentin always begins to form at the summits of dentinal papillæ, so that the dentin caps are formed before amelification takes place, (*c*) that, later on, dentinification and amelification proceed synchronously, and (*d*) that the process of dentinification, which is remarkably regular, proceeds from the summit of the dentinal papillæ, and gradually forms the crown, neck, and root. (See Figs. 1 to 3.)

The time of the inception of calcification of the teeth as given by Peirce is not altogether correct.

Dentinification, however, takes place much earlier than is generally supposed. According to Magitot and Legros, the dentin caps of the teeth begin to form approximately as follows:

DECIDUOUS TEETH. *Incisors and canines:* 16th to 17th week of intra-uterine life. *First and second molars:* 17th to 18th week.

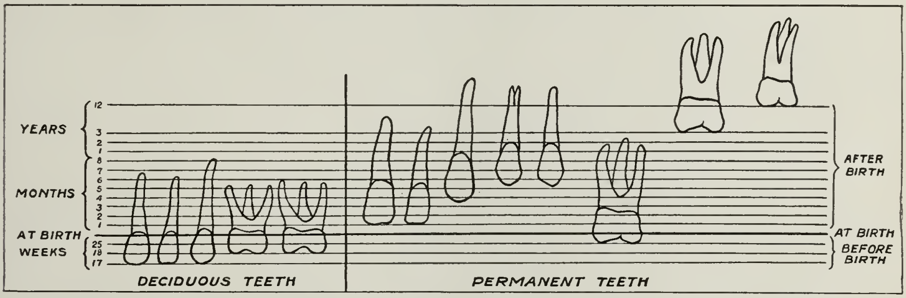
PERMANENT TEETH. *First molars:* 6th month of intra-uterine life. *Incisors :* First month after birth. *Canines:* 3d to 4th month. *Bicuspids:* 6th month. *Second molars:* 3d year. *Third molars:* 12th year.

(Black, Noyes, Hill, Redier, Zinsser, Dieulafé, Herpin, Fournier, Debrirre, Pravaz, Röse, and others have accepted as correct the chronology of Legros and Magitot.)

At birth no permanent teeth have begun to calcify except the first molars.

Fig. 4 shows the time of the inception of calcification (dentinification) of the teeth.

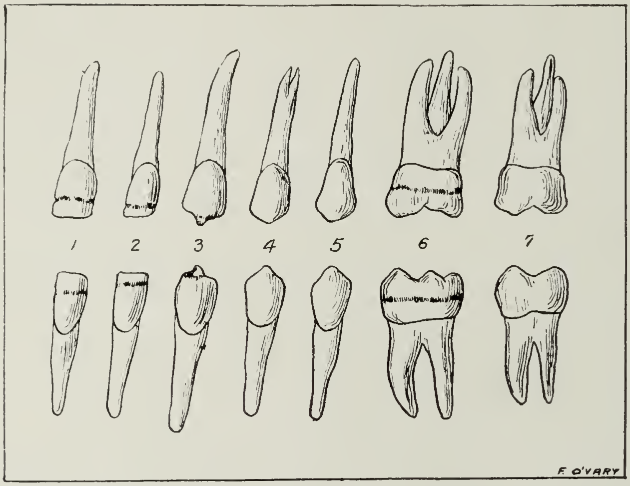
FIG. 4.



The time of the inception of calcification (dentinification) of the teeth.

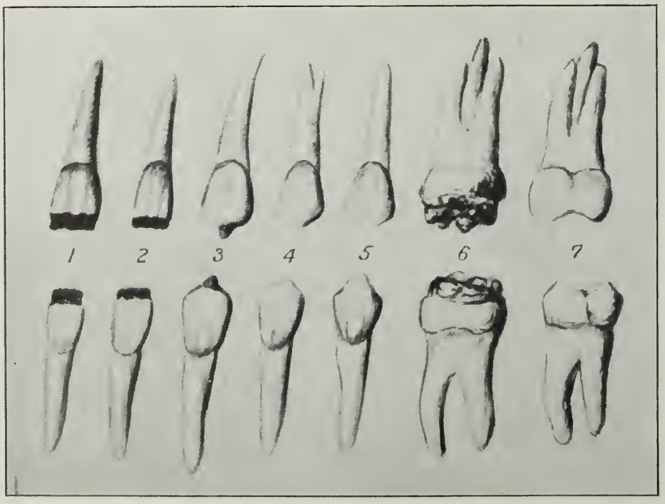
A tooth unaffected during its development by the morbid influence of syphilis erupts complete in form and structure. Syphilitic stigmata upon the teeth can be produced only during the development of the teeth, and are the result of some interruption in the process of calcification. Suspended or imperfectly performed calcification produces irreparable stigmata which may appear on any part of the tooth, from its morsal surface to its gingival margin, depending upon the time when the syphilitic infection is sufficient to produce them. If the disturbance caused by the syphilitic infection is sufficiently active at the time when dentinification is about to begin, the hypoplasia will be upon the morsal surface of the tooth; but if the syphilis is active later on, the stigma may show itself at a higher level, upon the facial, lingual, and mesial surfaces of the tooth —upon that part of the tooth which is then undergoing development. Thus it

FIG. 5.



A semi-diagrammatic representation of a systematized hypoplasia of several kinds of upper and lower teeth (incisors, canines, and molars). The general systemic disturbance which must have caused these stigmata occurred about the fourth month after birth. (The third molars have not been inserted in the drawing.)

FIG. 6.



A semi-diagrammatic representation of a systematized hypoplasia of several kinds of upper and lower teeth (incisors, canines, and molars). The general systemic disturbance which must have caused these stigmata commenced about the twenty-fifth week of intra-uterine life and continued up to about the fourth month after birth. (The third molars have been ommitted.)

is possible to tell, from stigmata on the teeth, the time when some vicious disturbing influence attacked the embryo, fetus, or newborn child.

The apparent relationship, already referred to, between the degree of syphilitic infection and the degree of syphilitic hypoplasia is indicated by the fact that the syphilitic hypoplasia of the dentin and the enamel may be slight, or, extending through various degrees, very marked. The dentin may be covered with but poorly differentiated enamel or no enamel, or the tooth, the cells of its dentinal germ having been destroyed, may not be formed at all.

Syphilitic hypoplasia of the deciduous teeth rarely occurs, because the beginning of dentinification for these teeth takes place, as we have said, from about the seventeenth to the eighteenth week of intra-uterine life, and a fetus infected with syphilis at this time usually dies. Syphilis is a potent abortionist. It is possible, when the syphilitic mother is given anti-syphilitic treatment, that the life of the fetus may be saved.

The permanent first molar, incisor, and canine teeth are the ones which show most frequently the evidences of heredo-syphilis, because the first molars are beginning to undergo dentinification during the last months of fetal life, and the incisors and canines during the first three or four months after birth. (See Figs. 4 and 6). It is at this time that the syphilitic process is most intense, frequently causing the death of the fetus or child.

Suppose the syphilitic infection, theretofore not sufficiently active to interfere with the process of calcification, is most intense at the fourth month after birth. Calcification of the deciduous teeth having already taken place, no evidences of syphilis will be seen upon them. But because, at this time, only about 1.5 to 2 mm. of the crowns of the incisors have undergone dentinification, the stigmata will, after the eruption of these teeth, be evident on them and at the same level, viz. 1.5 to 2 mm. up on the crowns. Dentinification of the canines is beginning at this period, consequently the summit (about 1 mm.) of these four teeth will be affected. The bicuspids will not yet be affected, as dentinification has not yet begun. But the first molars, at the fourth month after birth, have considerable dentin (one-half or two-thirds) formed for their crowns, consequently the lesions will appear about halfway up, or two-thirds the way up, on the crowns of these teeth. (See Fig. 5.)

The second and third molars cannot be affected, as dentinification does not occur until some years later.

The stigmata of developmental syphilitic hypoplasia are usually found upon the same class of teeth at about the same level on their crowns.

Some general morbid influence produces the hypoplasia, for a local cause would produce a more or less local result, *i.e.* a periosteitis of the left half of the mandible might interfere with the development of the teeth on that side, but not upon the other side nor with the teeth of the maxilla.

A general disturbance in metabolism occasioned by a severe general systemic syphilitic infection of the embryo, fetus, or young child, might produce—though a local cause could not produce it—the following:

(1) Multiple and disseminated stigmata of the teeth, both in the maxilla and the mandible.

(2) Symmetrical stigmata here and there upon homologous teeth.

(3) Systematized stigmata at the same level on teeth of the same kind, but at a different level on different kinds of teeth.

The most characteristic stigmata of the teeth of heredo-syphilis are—

(1) Hypoplasia of the four first molars.

(2) A systematized hypoplasia upon the several upper and lower teeth.

(3) Hutchinson's teeth.

HYPOPLASIA OF THE FOUR PERMANENT FIRST MOLARS.

The morsal surface of the four permanent first molar teeth is completely changed. In infancy and adolescence, two-thirds or three-quarters of each tooth, nearer its morsal surface, is hypoplasic, diminished in all its diameters, eaten away, and marked off from the rest of the tooth by a circular constriction so that there appears to be a small stump-like tooth—a stump of undeveloped dentin—emerging from the remaining, apparently normal, crown. This surface is extremely irregular, with rough, conical, pointed eminences, which are at times markedly anfractuous, exhibits fissures which are more or less deep and penetrate even the dentin, and has a yellow, brown, dirty gray, or black appearance. This hypoplasic stump, partially covered with enamel, is gradually worn away and crumbles to pieces, so that it finally disappears, and, with the crown of the tooth thus shortened, the morsal surface becomes flat, yellow in color, and surrounded by a zone of white enamel. This symmetrical hypoplasia of the morsal surfaces of the four permanent first molars is of the greatest importance in the diagnosis of heredo-syphilis. Later on, caries attacks the central portion of the morsal surface of these teeth, frequently destroying them. Thus, the heredo-syphilitic may have either a hypoplasia of the crowns of his first molars, or caries at the center of the remainder of the crowns of three or four of his first molars, or a loss of some or all of these through caries, or a combination of these conditions in the first molars. (See No. "6" in Fig. 6, also Figs. 8, 9, 11, and 12.)

The hypoplasia of the morsal surfaces of these first molar teeth, which must have begun at some time after the beginning of the sixth month of intra-uterine life, proves that the fetus has been attacked by some disease at this time, and syphilis appears to be the disease.

Fig. 7.

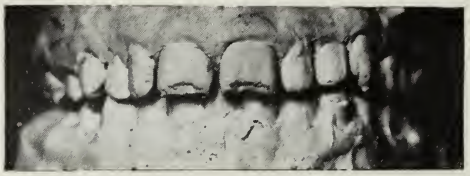
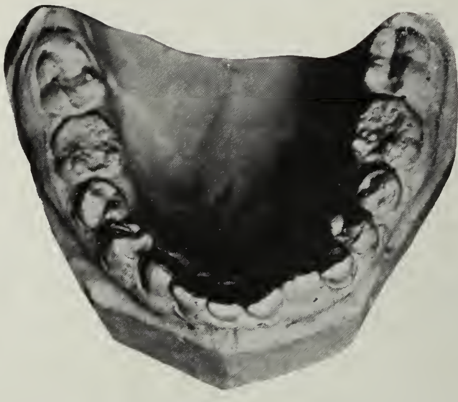


Fig. 8.

Fig. 9.



Figs. 7, 8, 9. Heredo-syphilitic, eighteen years of age, with interstitial keratitis, hypoplasia of four first molars, Hutchinson's teeth with crescents not completely formed. Delayed dentition. Supernumerary upper left lateral incisor.

The case shown in Fig. 13 is most important.

I quote from "Diseases of the Mouth" (F. Zinsser–J. B. Stein):

hypoplasia of the morsal surface. The canine and bicuspid teeth show on their surfaces slight erosions and transverse furrows.

This is the result of a condition existing

FIG. 10.

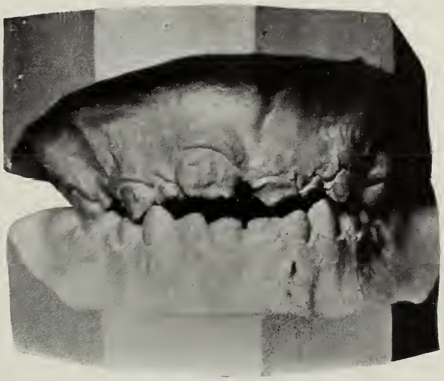


FIG. 11.

FIG. 12.

FIGS. 10, 11, 12. Teeth of an heredo-syphilitic, thirteen years old, whose father, mother, sister, and two brothers were also syphilitic, all giving a positive Wassermann reaction excepting the youngest brother (two months old). An examination of his blood was not made because the treponema pallidum was found by means of the dark-field microscope in the exudate taken from the mucous patches about his mouth. (Case of Dr. Otto Lowy.)

This case shows delayed dentition, hypoplasia of three of the first molars (the left upper first molar not having erupted), persistence of all the deciduous molars in the mandible and the second deciduous molars in the maxilla, a saw tooth, microdontism, amorphism of teeth, Hutchinson's crescents on the upper lateral incisors, and an "open bite," or absence of the "sign of the artichoke."

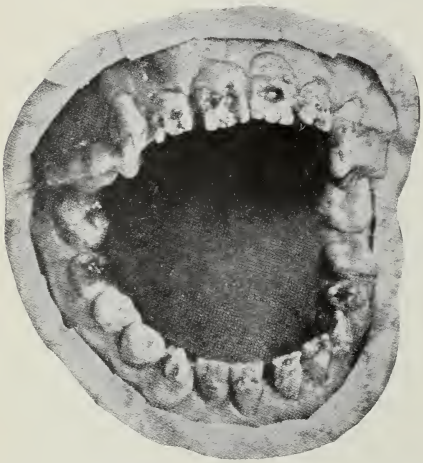
On the facial surfaces of all the upper and lower incisor and canine teeth are several furrows and cuplike erosions, and all their morsal surfaces are notched in several places. All the first molars are missing except the lower right one, in which there is a central caries, apparently following a developmental before birth and continuing to the end of the first or part of the second year of life.

The history of this case is very instructive. The patient, a boy twelve years old, had been treated a year and a half for a parenchymatous keratitis. The diagnosis of syphilis was not made, and anti-syphilitic treatment was not energetically applied because the keratitis did not react well to mercury. The Wassermann reaction was negative, there were no other symptoms of heredo-syphilis, and the condition of the teeth was attributed by me (Zinsser) at that time, to rhachitis.

A year later the boy returned with a severe syphilitic perforation of the hard palate and a positive Wassermann reaction. If the hypoplasia of the lower right first molar had been recognized as a sign of heredo-syphilis and energetic anti-syphilitic treatment resorted to, the patient would have been spared the severe disfigurement.

Although the Wassermann reaction is usually negative in heredo-syphilis,

FIG. 13.



Showing a more or less general hypoplasia of the teeth.

Noguchi and others claim that the luetin reaction of Noguchi is valuable in detecting heredo-syphilis.

SYSTEMATIZED HYPOPLASIA UPON THE SEVERAL KINDS OF UPPER AND LOWER TEETH.

This form of hypoplasia affects several kinds of teeth—the teeth of one kind at one level, and those of another kind at another level. The hypoplasia is multiple, being found as a rule on—

(1) All the incisor teeth (upper and lower).

(2) All the canines (upper and lower).

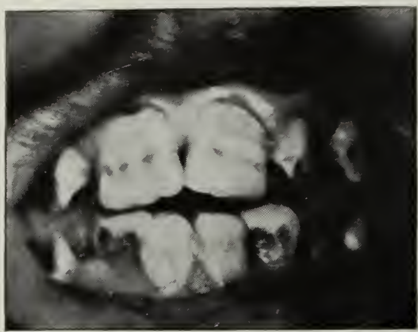
(3) All the first molars (upper and lower).

It does not seem to affect the bicuspids or second and third molars. (See Figs. 5 to 12.)

STIGMATA OF CROWNS OF TEETH IN THE FORM OF PITS AND FURROWS, AND HONEYCOMBED TEETH.

The "pits" in the teeth vary in size; they may be very small, like the depression made in soft wax with the point of

FIG. 14.



This case shows pits on the teeth, saw-teeth, hypoplasia of morsal surfaces of the upper lateral and all the lower incisors and upper left canine, and microdontism and amorphism of teeth. The patient was thirteen years of age, and but 4 ft. 1 in. in height, showing all the signs of general infantilism, and a persistence of the deciduous upper second molars, hypoplasia of the two upper and loss of the two lower first molars, and delayed dentition of three second molars, an heredo-syphilitic chorioiditis, and a positive Wassermann reaction.

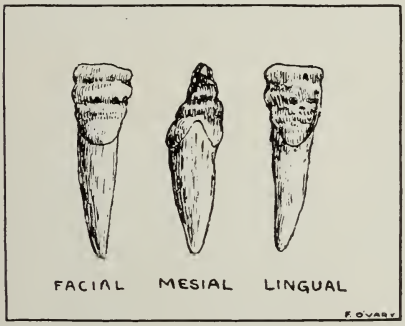
a pin, or they may be large, deep, and similar to a depression made in soft wax with the head of a match. The surface of these pits is irregular, and in young teeth is white, but later becomes gray, brown, or even black. These pits, varying in depth, may be very superficial, with a slight covering of enamel, or may extend a considerable distance into the dentin. They involve by preference the incisors, especially the upper central incisors. (See Figs. 13, 14, 15, and 22.) They vary in number, and when several exist they are usually disseminated without order, but at times are arranged in a horizontal line, and more rarely in two superimposed horizontal lines separated from each other by one or two millimeters.

Stigmata in the form of "furrows" (see Fig. 15, where the pits as well as furrows are shown) are more common than pits upon the crowns of teeth. The tooth appears as if it had been scratched transversely, and the scratch, furrow, or sulcus encircles the tooth horizontally. The furrow may be so superficial that it is likely to escape notice, and resembles a line on a sheet of paper made by the pressure of one's finger-nail. This lesion, which is not very evident, gives one the impression that it is a transverse line, not a groove, crossing the tooth. The existence of the groove, however, is proved by scratching the crown of the tooth with the finger-nail. Sometimes the groove may be from one-quarter to one-half a millimeter deep, with little or no enamel covering. This form of lesion later becomes gray or black, and so more striking and evident.

Instead of the stigma taking the form of a single groove traversing the circumference of the tooth horizontally, there may be two, three, or more of them. The multiple grooves, which are superimposed horizontally on the crowns of the teeth, are located nearer the morsal surface than the gingival margin of the tooth. The grooves are separated by bands of enamel, which form light ridges between them. Such teeth have been called by the French *dents en étage, dents en escalier,* or *dents en gradin.* We might call them "graded" or "intermittently affected" teeth. The grooves, alternating with the ridges, indicate alternating periods of exacerbations and remissions of the disease. (See Fig. 15.) The morsal surface of such teeth, where the first grade or step of the hypoplasia appears, is usually thin, rough, irregular, brownish in color, and without any enamel covering. It rapidly falls to pieces and disappears, so that in adolescence or in young adult life the tooth is deprived of its morsal surface, and the shortened crown of the tooth appears as if this morsal surface had been cut off transversely. Stigmata in the form of furrows usually appear on the incisor teeth, but they may appear also upon the canines or first molars.

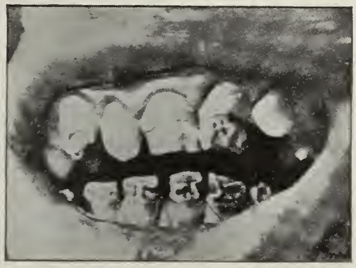
Sometimes a third, a half, or three-fourths of the crown of the tooth is hypoplasic, so that its surface is uneven, rough, and at times anfractuous, and appears grayish yellow, even grayish black. Fournier calls such a lesion *erosion en nappe.* Tomes calls the teeth "honeycombed." (Fig. 16.)

Fig. 15.



Typical syphilitic stigmata in the form of transversely arranged furrows and pits on the facial, mesial, and lingual surfaces of incisors.

Fig. 16.



Honeycombed teeth, amorphism of the teeth, microdontism, hypoplasia of upper canines. (Fournier.)

Among the numerous forms of hypoplasia of the morsal surfaces of the incisor teeth, the following are the most

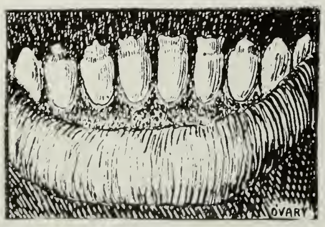
Fig. 17.

Teeth of heredo-syphilitic (?), eleven years of age. Hypoplasic flattening of the morsal surfaces of the upper central incisors, hypoplasia of canines, amorphism of teeth. Absence of upper right lateral incisor. Patient had a hypoplasia of the morsal surfaces of the first molars, more or less general venous ectasia, general infantilism, a high and contracted dental arch, adenopathy of epitrochlear lymph nodes, and had undergone two operations for adenoids.

frequent types: (1) Flattened. (2) Saw-like. (3) Stunted.

In the flattened type, the summit of the tooth is flattened on its facial and lingual surfaces, resembling somewhat a

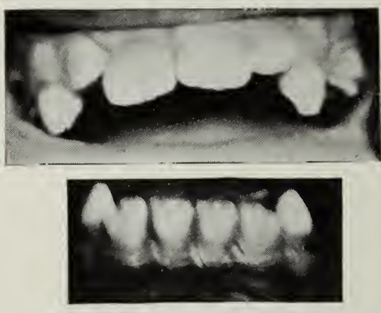
Fig. 19.



"Stunted" and "clove" teeth.

tooth which had the summit of its crown compressed on its four sides in a vise. This hypoplasic surface appears yellow, gray, or even black at some points, and is irregular, uneven, and roughened with more or less vertical furrows. (Fig. 17.) I have seen a case where this stigma extended on the crown of the tooth to the height of 3 mm. from the morsal surface. It is evident that this portion of the

Fig. 18.



Saw teeth, microdontism, and amorphism of teeth.

tooth is friable and easily falls to pieces. Fournier compares it to "a sheet of heavy paper."

The "saw teeth" have morsal surfaces which are irregular and rugged as if fine vertical incisions or little grooves had been filed on them. (Figs. 10, 13, 14, and 18.)

The teeth with "stunted" morsal surfaces have circular grooves about 2 or 3 mm. from their summits, from which emerge amorphous yellowish caps. Sometimes these caps appear like small teeth

Fig. 20.

Characteristic syphilitic hypoplasia of the morsal surfaces of two upper canine teeth. Typical Hutchinson teeth. (Fournier.)

placed upon larger ones, at other times the caps have small buds upon their summits, giving the caps the appearance of a clove. "Stunted" teeth with such caps are sometimes called "clove teeth." (Fig. 19.)

Syphilitic hypoplasia of the canine teeth occurs nearer the morsal than the gingival margin of these teeth. A circular constriction is evident near their morsal surface, the hypoplasic portion appearing somewhat like a teat upon the end of the teeth. (Figs. 5, 6, 16, 17, 19, and 20.)

HUTCHINSON'S TEETH.

Jonathan Hutchinson was the first to describe this extraordinary dental stigma and explain its pathological significance. This form of dental hypoplasia is charac-

FIG. 21.

Typical Hutchinson teeth. (Fournier.)

terized in its most typical form by a marked crescentic indentation of the morsal surfaces of the two upper central incisor teeth. (Fig. 21.) The term Hutchinson's teeth has been misapplied to any other tooth having a similar depression upon its morsal surface. This form of hypoplasia has also been seen in heredo-syphilitics upon the four lower incisor teeth, and even upon canine teeth. According to Hutchinson this term is to be applied to the upper central incisor teeth of the second dentition presenting a semilunar depression on their morsal surfaces, the teeth being "screwdriver-shaped" (wider at the neck and narrowing toward the morsal surface) and converging obliquely. Any other dental stigma, or this stigma upon any other tooth than an upper central incisor "—is not my tooth," says Hutchinson. (Figs. 7, 21, 22, 23, and 26.)

This lesion, when typical, has such an individuality that no other dental lesion can be confused with it. It can be recog-

FIG. 22.

Typical Hutchinson teeth in a patient twenty-two years of age. Here the crescents have nearly disappeared, but the beveling on the facial surface of the teeth is still evident. Notice the pits on these teeth, especially the upper left central incisor. The cause of this patient's condition, facial paralysis, was first recognized through these two upper central incisors. His blood afforded a positive Wassermann reaction, and examination of his eyes revealed an heredo-syphilitic chorioiditis.

nized at a glance. It is impossible to misunderstand it, although it varies in character with the age of the heredo-syphilitic. When the tooth erupts, the

FIG. 23.

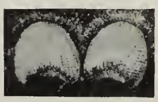
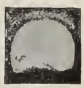


FIG. 24.

FIG. 25.



FIGS. 23, 24: An early stage of Hutchinson's teeth, showing the crescents before hypoplasic tooth structure has been wholly worn away. (Fournier.) FIG. 25: A Hutchinson's tooth at about twenty-eight or thirty years, when the crescent had disappeared entirely. (Fournier.)

characteristic semilunar indentation upon its morsal surface does not exist. The place where the future crescent is to form is filled in with hypoplasic tooth structure, either in the form of acuminate buds, points, spicules forming a sort of fine denticulation (Fig. 24), or in the form of a more or less homogeneous lobular mass (Figs. 7 and 23). This hypoplasic dentin, which is not covered with enamel, is non-resistant, friable, and rapidly crumbles and wears away, so that after a few years it entirely disappears, and in its place we have the crescentic notch.

During adolescence, the morsal surfaces of Hutchinson's teeth change, and at maturity lose their characteristic appearance. The arcs on these morsal surfaces gradually diminish, at from twenty

Fig. 26.

Hutchinson's teeth and Hutchinson's crescents on the lower incisors. (Fournier.)

to twenty-two years (Fig. 22) are noticeably effaced, and at about the twenty-fifth year the characteristic crescents disappear entirely, and the morsal surfaces become rectilinear. But at the twenty-fifth year an important characteristic of the lesion—the beveling of the inferior facial surfaces of the teeth—still persists, for the crescents of Hutchinson involve not only the morsal surface of the tooth, but also the facial surface, in that a beveling extends from above downward, slanting from the facial to the lingual surface of the teeth, and so involving more of the facial surface. These bevels which crown the crescentic notches are the last of the stigmata to be effaced through usage of the teeth, and they are the last vestiges of Hutchinson's teeth, and disappear at about the thirtieth year. (Fig. 25.) The teeth then are shorter, and have lost all their diagnostic significance.

Hutchinson's "triad," viz, Hutchinson's teeth, an interstitial keratitis, and otitis media, is pathognomonic of heredo-syphilis.

The so-called "crescentic notch" of Hutchinson may also be seen upon the following permanent teeth:

(1) The upper lateral incisors. (Fig. 10.)

(2) All the lower incisors. (Fig. 26.)

(3) Very exceptionally upon the canines.

Legros, Hutchinson, Moon, and Fournier report having seen Hutchinson's crescent upon one upper central incisor tooth, the other being perfectly normal.

The upper incisor teeth, especially the central incisors, may have a screwdriver shape, but neither converge nor have crescentic notches upon their morsal surfaces. Such teeth have not been conclusively shown to be of heredo-syphilitic origin.

DENTAL INFANTILISM.

Microdontism or persistence of the deciduous teeth may serve as a stigma of heredo-syphilis. Microdontism of all the teeth is rare, but a number of teeth—mostly the upper and lower incisors, and occasionally single teeth—exhibit this condition. (See Figs. 10, 11, 12, 17, and 18.)

The so-called *persistence of the deciduous teeth,* i.e. their non-replacement by the permanent teeth, occurs more frequently than is generally supposed—in one-third of the cases of heredo-syphilis, according to one observer, Chompret. (See Figs. 11 and 12.) Few physicians or dentists have recognized this condition in heredo-syphilis. It is a very important diagnostic sign. The deciduous teeth which remain in the mouth for a longer time than is usual are, in order of frequency, the following: (1) The second molars, (2) the first molars, (3) the canines, (4) the incisors.

The persistence of the deciduous tooth appears to be due to the absence or arrested development of the tooth which should displace it.

ABSENCE OF CERTAIN TEETH.

The absence of certain teeth is a stigma which occurs in heredo-syphilis, implying a non-formation or complete arrest in development of the dentinal germ. (See Figs. 17 and 26.)

Conditions frequently attributed to heredo-syphilis are: (1) Abnormalities in the position of teeth. (2) Amorphism of the teeth (Figs. 10, 17, and 18)—teeth with crowns somewhat resembling sharks' teeth, piano-keys, pebbles, squares, twisted teeth, pegged-shaped teeth, uni- or tri-horned teeth, or teeth with numerous small eminences upon them; and less frequently—

(1) Vulnerability of the teeth and marked liability to caries, resulting in premature edentation.

(2) The "open bite," or, as Fournier called it, the absence of "the sign of the artichoke." (Fig. 10.)

(3) Asymmetry of the superior maxillary bones. Prognathism and deformities of the palate. Supernumerary teeth. (See Figs. 7 and 8.)

What diseases are met with during intra-uterine and first months of extra-uterine life, which would profoundly affect the cells of the entire organism, and the cells of the dentinal germs in particular?

Rhachitis rarely occurs during the first six months of life, but usually in the second year. Today, variola is seldom met with. Scarlatina, measles, diphtheria, and typhoid fever are rarely observed during the first year of life. Rheumatism seldom occurs before the fifth year. Can it be said that a disturbance in metabolism occasioned by gastro-enteritis could cause hypoplasia of the morsal surface of the permanent first molar teeth?

Has an authentic case been recorded either of hypoplasia of the crowns of the four permanent first molars, or of Hutchinson's teeth, or of a systematized hypoplasia of certain kinds of teeth which was caused by any disease other than syphilis.

Heredo-syphilis is essentially a dystrophic disease, and exercises its morbid influence especially during intra-uterine life and the first months after birth, at a time when dentinification and amelification is beginning and progressing.

The diagnostic significance and economic importance of syphilitic hypoplasia of the teeth should be appreciated by all interested in dental, oral, moral, social, and mental hygiene.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

CHRONIC ALVEOLAR OSTEOMYELITIS (PYORRHEA ALVEOLARIS) —ITS TREATMENT WITH VACCINES.

By LEON S. MEDALIA, M.D., Boston, Mass.

(An address delivered before the Merrimack Valley Dental Association, at Haverhill, Mass., May 14, 1913.)

IT is indeed a great pleasure to address you this evening on this important subject. This disease, alveolar osteomyelitis or pyorrhea, cannot be discussed too much, owing to its prevalence, the hopelessness of the old method of treatment in curing it, as well as to its far-reaching sequelæ—the consequent oral sepsis and the systemic diseases.

I shall endeavor in my address this evening to give you in as simple language as possilbe a brief *résumé* of my personal work on this subject, the underlying causes of this disease, the theoretical reasons for the vaccine treatment, and a brief summary of the clinical results obtained with this new method of treatment.

Those of you who are specially interested will find a thorough discussion of the subject and a detailed description of my studies and observations of 115 cases in the article which I read before the National Dental Association last September and which was published in the DENTAL COSMOS of January and February of this year.

The bacteriological investigation of the already reported cases, together with the results obtained with the vaccine treatment, especially with autogenous vaccines, helped to establish the etiological or causal relation of the bacteria isolated from the pus to the disease "pyorrhea," and at the same time it established the value of the vaccine method of treatment in this disease.

INAPPROPRIATE NOMENCLATURE.

The large number of different misnomers by which this disease has been designated, I found, could be attributed to the prevalent erroneous anatomical description of the tissues immediately surrounding the root of the tooth and its relation to the socket. This has also been at the bottom of our incorrect conception of the etiology of this disease. Thus, for instance, while almost all authorities and text-books refer to that tissue as the periosteum or peridental membrane, Malassez showed this to be nothing but an alveolo-dental ligament, and not an enveloping membrane or periosteum, its function being that of a ligament and not of a "cushion." We thus have a circular ligament which keeps the tooth suspended in the alveolar cavity.

Between the ligament bundles emanating from the root of the tooth, and which are attached to little bony spicules in the alveolar process, there are spaces filled with loose cellular tissue or medullary tissue communicating with other neighboring medullary spaces of the spongy bone of the alveolar process. According to him, also, the alveolar process is not a bone distinct from the maxilla, but it is nothing more than the thinned-out edges of the maxillary bones and their bony offshoots, and instead of the socket being lined by a thin, smooth plate of compact bony substance, it really is an enlarged marrow space of the maxilla.

His description and plates of the anatomy of this part are so conclusive that I personally could not help but side with him.

Now, since the disease, though it begins with an inflammatory process of the gum margin, involves the alveolar bone and tooth socket, which become necrotic, this socket being an enlarged medullary space of the maxillary bones, the only name for such an affection would be an alveolar osteomyelitis. It being a chronic disease as a rule, I therefore refer to it as a chronic alveolar osteomyelitis.

ETIOLOGY.

As to the causes of this disease, I found that the mechanical causes are by far the most important ones in starting the disease, but on the whole less so in keeping it up; while the local infectious causes, on the other hand, I found more important in keeping up the disease. Among the local mechanical causes, tartar deposits and calculi are the most important. The local infectious causes comprise the group of bacteria capable of pus production which are practically always in the mouth, "laying for" a chance to attack tissues that have lost their natural resistance due to mechanical irritations, etc. The most important ones are pneumococcus (in chains), staphylococcus, streptococcus, and M. catarrhalis. They are the ones responsible for keeping up the disease.

I have emphasized in the already mentioned paper the importance of sterilizing the instruments after treating an affected tooth and before beginning the scaling or cleaning of an unaffected tooth in the same patient. This being so important, and so commonly overlooked, I feel that I cannot emphasize it too strongly. The prophylactic importance of this procedure is perfectly obvious. (The best way of sterilizing instruments during the progress of an operation is to dip them in a jar of alcohol and then burn off the alcohol. This can be readily done by bringing the alcohol-saturated instruments in contact with the flame of the alcohol lamp which is almost always found on your operating table.)

As to systemic causes, they are more in the nature of predisposing causes. By that I mean a general lowered resistance, and particularly lowered to the various organisms capable of causing infection with the formation of pus; while most of the systemic disturbances as a rule follow the local troubles and in turn may be responsible for keeping up the latter.

Having established the causes of this disease, the treatment resolves itself into —(1) Local mechanical treatment by the dentist and local antiseptic application. (2) Systemic treatment—attention to general health and correction of faulty hygiene and faulty mode of life; and finally (3) Vaccine treatment—the direct raising of the patient's blood resistance to the infecting agent by means of an active immunization.

LOCAL MECHANICAL TREATMENT.

The local mechanical treatment you are all familiar with. I have, however, noticed a difference in the mechanical treatment as done by different dentists—the difference being more a matter of the conscientious way and the time spent in cleaning and scaling. Those of you who practice among the poor or in rural districts are thoroughly familiar with the difficulty of getting a patient to appreciate a thorough conscientious cleaning. I therefore always explain to patients that the public should compensate dentists for their time, and not for the "job."

The thorough cleaning, periodically done, once every three to six months, together with the sterilization of instruments on the part of the dentist during the act of cleaning between teeth—nay, even from one root to another, especially if a root happens to be at all diseased, would go far in the prevention of this disease. Of course, each individual patient has to be looked after as to his general condition. Thus the dentist, through the condition of the gum, should be in a position to tell the patient to look for advice from his family physician, although the patient is not, as a rule, sick enough to be forced to do it of his own accord.

At times you may meet cases with marked loosening of teeth—too loose to attempt a thorough scaling. In such cases I have found that a few treatments with vaccine would help to sufficiently tighten up those very loose teeth and allow local mechanical treatment.

The local antiseptic treatment is followed up with dilute Lugol's solution (1 part to 3 parts of water) which acts as a mild antiseptic and astringent, but its more important action is an indirect one; by virtue of its staining the tartar and other deposits on the teeth, it stimulates the patients to have the proper cleaning and scaling done by their respective dentists.

I have also met patients who applied for the treatment of "pyorrhea," whose gums were perfectly healthy as to inflammation and sponginess, with no pus and no looseness of teeth, but with marked recession. The recession was so marked that it laid bare the roots of the teeth in front up to the very top. Upon a thorough investigation I found that the patients used constantly an injurious tooth-paste, one containing a high percentage of potassium chlorate. One patient in particular, whom I have in mind, not only used this injurious paste twice daily, but also used it by pasting it on the gums over night. Her gums showed very marked recession and the enamel of the teeth was grooved in ridges in places where she used the paste most. This injurious action is probably due to the free chlorin liberated from the potassium chlorate. When this ingredient is used medicinally in the form of a gargle, physicians always advise rinsing the mouth thoroughly with water because of its injurious effects on the teeth. In this connection I wish to say that the simpler the tooth-paste the better. Anything that will saponify the food-remains will do. Plain Castile soap and hot water with a clean tooth-brush will do as much good. It will at least never do harm.

SYSTEMIC TREATMENT.

The systemic treatment depends upon the condition of the patient. Each patient receives a thorough physical examination, examination of feces and urine. Whatever in the way of faulty diet, faulty hygiene, or any other abnormality is discovered during the examination, is attended to. Special attention is paid to the condition of the stomach and bowels, kidneys, and blood.

VACCINE TREATMENT.

We now come to the most important of the direct treatments of this disease —vaccine treatment. This is in reality, as said before, the production of an active immunization against the bacterium with which the patient is affected. An understanding of the principles of immunity is necessary in order to intelligently and successfully treat patients by this method.

Generally speaking, immunization is carried out therapeutically by means of biologic products, either vegetable or animal. It may be classed under two general headings: Passive immunization and active immunization.

Passive immunization. The principal treatment which falls under this heading is that of the antitoxin against diphtheria, in which case the antitoxin is prepared by means of inoculation with diphtheria toxins (poisons) in horses. The horses elaborate anti-bodies in response to these inoculations, which anti-bodies or antitoxins circulate freely in their blood and are found capable of neutralizing diphtheria toxins wherever they are met. That is, the blood serum of the horse into whose tissues diphtheria toxins have been introduced contains substances which will overcome or neutralize the diphtheria poisons when injected in the child or if mixed in a test tube.

Other therapeutic serums depending upon passive immunity have been found successful, chiefly that of tetanus.

In the case of passive immunity, therefore, the child who receives the diphtheria antitoxin takes no active part in that immunization. It is the horse, through the activity of his tissues stimulated by the inoculation of the toxins, that takes an active part in the immunity. This passive immunity is of course ideal, if we could carry it out in every one of the bacterial diseases; and, as a matter of fact, at the time diphtheria antitoxin was first discovered by Von Behring and Kitasato (1890) the medical profession hoped for a general panacea against all bacterial diseases. It was soon found, however, that only a small group of pathogenic bacteria are capable of producing free toxins when grown in bouillon—*i.e.* when the bacteria grown in the bouillon for from three to five days are then filtered out, the bacteria-free filtrate is found to contain the products of the bacteria, *i.e.* the recognized toxins. It is the latter which are necessary for the production of antitoxins.

Unfortunately, however, most of the pathogenic bacteria have been found to be incapable of producing similar free toxins when grown in bouillon, *i.e.* if the bouillon in which bacteria other than diphtheria or tetanus have been grown, and then filtered, the bacteria-free filtrate was found not to contain the poisonous products or toxins as they are to be found in the case of diphtheria and tetanus. It is therefore obvious that no antitoxins can be prepared from any of those bacteria, since the toxins are necessary to inoculate the horse which will produce the antitoxin.

No successful results have therefore been attained through the attempts at the therapeutic application of various so-called antitoxin sera—anti-pneumococcus serum, streptococcus serum, etc. It was only when the application of killed cultures or bacterial vaccines was resorted to in an attempt at the production of an active immunity, that successful results were obtained in such infections.

Active immunity. This active immunity resorted to therapeutically is distinctly in contrast to passive immunity. Here the tissues and cells of the patient take an active part in the production of his own immunity to the bacteria with which he is infected, in response to inoculations of the corresponding bacterial vaccine. The tissues of the patient thus elaborate, in a way unknown to us, inimical substances, in response to the killed bacterial vaccines, inhibitory to the growth of the living bacteria wherever they are found. This inhibitory action or immunity affects the whole body, since the blood containing these substances is distributed throughout the entire body. Thus, for instance, if in a patient suffering from staphylococcus infection, boil or carbuncle, a staphylococcus vaccine be introduced subcutaneously in the proper doses, the tissues of the patient proceed to elaborate substances—which will be found in the blood—that will prohibit the further growth of the infecting bacteria, and thus cure the boil or carbuncle. The process presumably has also an antitoxic effect, overcoming whatever poisonous products have already been elaborated by these organisms in the boil.

While the effects of the antitoxin in the case of passive immunity is greatest at the time immediately following the injection of the immune or antitoxic serum, wearing off as time goes on, in the case of active immunity, on the contrary, the immunity is actually lessened slightly for from a few hours to a day immediately following the injection of bacterial vaccine, increasing gradually after that until it reaches its height at the end of from two to three days to a week or so, then declining gradually. Repeated inoculations are therefore necessary in order to keep pushing the immunity up as long as the infection persists.

PREPARATION OF THE VACCINE AND TECHNIQUE OF INJECTION.

It is this method of active immunity by means of bacterial vaccines, first employed therapeutically by A. E. Wright, London, in 1903, which is resorted to in the treatment of chronic alveolar osteomyelitis. For the preparation of the vaccine the bacteria are first obtained from the pus of the gums, and are grown on solid culture media (glucose agar) for twenty-four hours. The growth is then washed off with sterile salt solution and placed in a sealed test tube submerged in water kept at 60° C. for one hour, which kills the bacteria. This suspension, tested culturally for its sterility, is then standardized by counting the number of bacteria present in the suspension, and diluted to the desired number, usually 200 million per cc. or 15 drops. It is then used for the treatment of pyorrhea.

The vaccine as prepared by myself is kept in 10 cc. amber-colored bottles covered with a rubber cap and sealed with paraffin. The following is the method for the administration of the vaccine:

The rubber cap is not removed. It should be washed off with a wad of absorbent cotton soaked in alcohol just before using. The hypodermic syringe is sterilized by boiling. The bottle of vaccine is shaken thoroughly. The hypodermic needle is thrust through the rubber cap—the bottle being inverted—and the requisite amount for the dose is withdrawn. Upon withdrawal of the needle the cap will reseal itself. The skin of the patient (*e.g.* of the fleshy part of the back of the upper arm) is prepared by scrubbing with a wad of absorbent cotton saturated with alcohol. The vaccine is injected subcutaneously in the deep subcutaneous tissue.

The following general rules I observe during the treatment with vaccine with reference to dose and interval of repeated injections:

I start with the minimum dose (30 to 50 million of autogenous vaccine), increasing the dose in succeeding inoculations at an interval of forty-eight hours by 12 to 25 million (to a maximum of 400 million), until the patient shows a local reaction. The local reaction is temporary and consists of an inflammatory area of swelling and redness about the size of a half-dollar at the point of the injection, with some tenderness on pressure. This usually lasts from eight to twenty-four hours, subsiding gradually without leaving any mark or sign. It does not produce the suppurative process which follows the vaccination against smallpox.

The severity of the reaction is directly related to the dose administered and is indirectly related to the state of resistance of the patient. When present it is most marked following the first injection of the vaccine, and is progressively less with succeeding doses. The treatment should not be repeated unless the reaction of the previous injection has partially or totally subsided, and if the local reaction of the previous injection was marked, the one following should never be increased, but rather decreased by 12 to 25 million. No general reaction (general malaise and fever) should ever occur. When it does it is a sign of an overdose, unless due to some other intercurrent disturbance (intestinal indigestion, etc.). The average interval between treatments is two to four days, in the beginning; later, when improvement takes place, once every five to seven days is sufficient.

"STOCK" AND "AUTOGENOUS" VACCINE.

A word as to the difference between stock and autogenous vaccines properly belongs here. "Stock" vaccines are vaccines made up from bacteria obtained from sources other than from the patient himself, and as found on the market they are supposed to be made up of pure cultures of bacteria of whatever denomination, without regard to the source (as to the disease) from which the bacteria are obtained. To the best of my knowledge they are usually obtained by the manufacturing druggists from typical infectious cases. For instance, the pneumococcus vaccine as found on the market is probably isolated from a case of pneumonia; staphylococcus aureus vaccine from a case of boils, etc., without regard to the number of strains and variety of diseases in which this pneumococcus or staphylococcus is generally found. Such a pneumococcus stock of vaccine, for instance, if used for the treatment of alveolar osteomyelitis, would not, in my opinion, yield the same results as the stock pneumococcus vaccine made up from a number of sources, including several strains from this disease. (When speaking in this paper of stock vaccine I always refer to the latter kind.)

"Autogenous" vaccines are made up from the bacteria obtained from the pus of the alveolar disease of the individual patient. This should give, theoretically, the best results. Practically, however, I found that the autogenous if mixed with the stock vaccine yields the very best results.

The reason why the autogenous alone does not at times work as well in this disease as when mixed with stock vaccine might be explained by the fact that in chronic diseases the patient becomes more or less tolerant to the infecting bacteria. The bacteria in such cases live somewhat in harmony with their host and therefore cause a chronic disease and not an acute disturbance. For that reason, too, such organisms are incapable of readily exciting an active immunity, while some of the strains in the stock vaccine presumably contain organisms capable of doing so, and therefore if mixed with the autogenous vaccine yield the better results in these chronic diseases.

In the incipient cases of alveolar osteomyelitis where no pus can be obtained, but where there is beginning recession and sponginess of the gums, I have used with good results the stock vaccines made up from a number of strains including several strains from this disease.

I have no personal knowledge of, nor have I found anything in the literature with reference to results obtained in this disease with stock vaccines, so called, as found on the market.

It might be well to say here that no animal product is mixed with the bacterial vaccines, that it is not a serum like the antitoxin of diphtheria, and that it therefore cannot produce "serum sickness" (anaphylaxis).

The data relating to the bacteriological findings in the 115 cases that I studied, and reported in the article already mentioned, would be of value in connection with choosing the particular stock vaccine to be used in those cases where for various reasons no autogenous vaccine can be obtained. The bacteriological findings were as follows:

	Times.
Pneumococcus (streptococcus lanceolatus pneumoniæ)	26
Pneumo. and staphylo.	67
" " strepto.	3
" staphylo., and strepto.	10
" and M. catarrhalis	1
Staphylo. " " "	2
" aureus	2
Strepto. and staphylo.	1
Sterile	3

Thus we find that in the majority of cases (67 out of 112) we are dealing with a pneumococcus and staphylococcus infection, while the most frequent single organism met with (107 times out of 112), either alone or mixed with other bacteria, is the pneumococcus in chains (streptococcus lanceolatus pneumoniæ). Bacteria other than these two kinds were practically of a negligible proportion. The stock vaccines, therefore, that I use most—usually either in combination with the autogenous or by themselves—are pneumococcus and staphylococcus vaccines, in both which vaccines strains obtained from chronic alveolar osteomyelitis are present.

As to the results of the treatment with vaccines in this disease, I will say that it differs according to the severity and stage of the disease. For that reason I found it expedient to classify all the cases under three headings: (1) Incipient; (2) Moderately advanced; and (3) Far advanced.

Group I, "Incipient stage"—are those cases where the gums and teeth taken as a whole are in fair condition, with two or three teeth containing pockets, with little visible, if any, pus present, and slight inflammation and recession of the gum margin with discoloration. The teeth are not loose in this stage, but the necks of the affected teeth are unclean, surrounded by food débris and tartar deposits. There is no special complaint on the part of the patient, except perhaps of bleeding and slight aching on mastication.

Group II, "Moderately advanced stage"—are those cases where the disease is much farther advanced. The gums are congested and inflamed at the margins with marked recession or sponginess. Visible pus that can be squeezed out on pressure is present in all these cases with a varying number of teeth affected. The looseness of teeth is not marked, but the discomfort and tenderness on chewing is present in all the cases of this group.

Group III, "Far advanced stage"—are those cases the symptomatic picture of which you are all familiar with. Marked looseness of teeth, deep sinus formation and marked suppuration, sponginess, or recession, necrosis and destruction of the alveolar process, and displacement of teeth. In a few cases the disease is marked by a series of acute exacerbations in individual teeth, with marked swelling and excruciating pain, coming on suddenly and continuing until the affected teeth have to be removed. Such patients have lost three to five teeth in this way before they were referred by their dentists for vaccine treatment. The majority of the cases in this group, however, are of the slow, insidious, chronic type, with little pain except on mastication. All of these cases have systemic disturbances of one form or another.

The following percentage of cures, improvement, and no improvement are the results obtained with the vaccine treatment in these groups (table A):

cavity. It is the dentist who should call the attention of the physician in charge of the case to the possible consequences of the disease in question.

To emphasize the importance of the systemic diseases that accompany alveolar osteomyelitis, I need only mention the large number of patients who suffer from various forms of infectious arthritis or "rheumatism," so called, the great number who have gastro-intestinal disturbances (50 per cent.), skin affections (14 per cent.), and the other systemic diseases. Perhaps the most common of the systemic disturbances that accompany this disease is the particular susceptibility to acute coryzas or colds, at times sufficiently severe to lay the pa-

(A)

Stage.		Percentage		
		Cured.	Improved.	No. impr.
Incipient	(Group I)	92	8	—
Mod. Advanced	(" II)	93	7	—
Far "	(" III)	43	47	5

(B)

Stage.		No. of Treatments.			Duration.		
		Aver.	Max.	Min.	Aver.	Max.	Min.
Incipient	(Group I)	6	11	2	$6\frac{1}{2}$ wks.	12 wks.	3 wks.
Mod. Advanced	(" II)	12	22	3	$3\frac{1}{2}$ mo.	7 mo.	2 "
Far "	(" III)	17	38	3	$4\frac{3}{4}$ "	9 "	5 "

(C)

Stage.		Percentage—			
		Rheumatism.	Gastro Intestinal.	Skin Affections.	Chronic catarrh.
Incipient	(Group I)	35	50	14	7
Mod. Advanced	(" II)	38	50	12	6
Far "	(" III)	53	50	13	5

The average duration of treatment and the number of treatments necessary will of course be of interest to you. I found them as here shown (table B).

The systemic diseases which accompany this affection are of great importance. They should be taken into consideration by the dentist because of the lack of attention at the present day paid this disease by the medical profession generally, since it is left to the dentist. This is the cause for a great many mistaken diagnoses in diseases of the oral

tient up in bed. It is quite apparent that the severity of the systemic disorders, especially those of the rheumatic disturbances, are directly related to the severity of this disease, increasing both in severity and frequency as the disease goes on. These systemic diseases have improved or have been cured side by side with the improvement or cure of the alveolar osteomyelitis. Table C gives the exact percentages of the important systemic diseases that I found accompany this disease.

To recapitulate: Pyorrhea alveolaris, so called, I have pointed out to be really a chronic alveolar osteomyelitis, because of the fact that the sockets are enlarged medullary spaces and the disease affects the bony offshoots lining the sockets and medullary spaces.

As far as the causes of the disease are concerned, I have called attention to the mechanical causes as being responsible for starting the disease, while the pus-producing bacteria are responsible for keeping it up. The most common of these are pneumococcus, staphylococcus, streptococcus, and M. catarrhalis.

The systemic diseases do not, I believe, play an important part in starting the alveolar disease. On the contrary, I believe them to be caused by it, and in turn possibly help in keeping it up. Vaccine treatment of this disease cures or relieves the systemic disturbances or symptoms.

And finally: The vaccine treatment together with local mechanical treatment yields by far the best results in chronic alveolar osteomyelitis.

THE PERFECT PORCELAIN INLAY.

By N. S. JENKINS, D.D.S., Loschwitz, Dresden.

(Read before a union meeting of the Seventh and Eighth District (N. Y.) Dental Societies, held at Rochester, N. Y., November 14, 1912.)

THE practice of dentistry, while everywhere identical in essential principles, differs in each country in its methods and in its standards. Such differences are determined not only through varieties in educational systems, but also by social conditions and temperament. It has therefore not been simply chance which has caused Europe, and in a special degree Germany, to aid so largely in the development of the perfect porcelain inlay. Permit me to refer to some points in the history of this development.

ESTHETIC NON-COHESIVE GOLD FILLINGS, AS MADE BY DR. ABBOT.

When in 1866, I first went to Europe as a young man, somewhat inflated by the belief that I knew all there was to know about making elaborate gold fillings, and half believing that this knowledge was almost all that was necessary for the practice of operative dentistry, I had still sufficient sense to ask my friend Dr. Abbot of Berlin to show me what he could of the methods of managing a European practice. This noble, generous, skilful, gifted gentleman stood at the head of his profession in northern Europe, honored and beloved to a degree which has seldom been the lot of any man. I had thought he would give me simply general information, which indeed he gave, but to my amazed delight he did much more. He insisted that I should come every day to his office and stand by his chair while he was operating, introducing me to many of his most important patients and explaining the reasons for his methods of treatment in each case. I was astonished at the pains he took to conceal his art, but I subsequently discovered that other able American and native dentists practiced with the same purpose.

Abbot was very skilful in the use of non-cohesive foils, but he took great precaution to preserve intact, as far as possible, frail labial or buccal walls, so that the gold might be invisible except as it sometimes showed through thin enamel.

Perhaps some of the older New York practitioners may remember the marvels wrought by Gunning and Dunning, and many others of the pre-cohesive gold period, in restoring shape and contour with non-cohesive foil, but I recall no instances in America where such trouble was taken to conceal the gold. Indeed, often it was quite unnecessarily in evidence, as if the operator wished his skill to be recognized by all men.

TIN AND GOLD FILLINGS, AND THEIR ADVANTAGES.

Another surprise awaited me in discovering that amalgam was prohibited in Abbot's practice, and that its place was occupied by tin and gold. This method, which never became popular in America, consisted in rolling together non-cohesive gold and tin foil No. 4, and packing it by lateral pressure in either strips or pellets, according to the preference of the operator. It was discovered by a British dentist whose name seems to have been forgotten, but the process became known to the world through Abbot and his followers. Its advantages consisted in the rapidity with which it could be worked, its comparative insusceptibility to thermal changes, the possibility of packing it securely under moisture, and the striking molecular change which occurred some time after the filling was finished. This change was caused through the acids of the mouth exciting electric action in the two metals, resulting in forming oxid of tin, which caused the filling to increase in bulk, thus pressing it more closely against the walls of the cavity. The filling also then became crystallized and formed into a seemingly homogeneous mass of great density, resembling amalgam in appearance, except that it did not discolor the teeth, and also it did not wear nor flow under the stress of mastication, as does amalgam. Its field of usefulness was very wide, and I believe no other method of filling teeth has ever had a record of such endurance.

It was largely employed for patients coming from distant lands, where at that time no dentist could be found. In such cases not only was the loss of dental tissue by caries often very great, but it was usually necessary to do many operations within a limited space of time, and with great thoroughness, since the patient could generally not return for further treatment for a series of years. It was extremely rare that such fillings were lost, or that there was evidence of secondary caries. I have seen many such fillings made in every position in the mouth, before the advent of the rubber dam, which were still perfectly preserving the teeth after a lapse of from thirty to fifty years.

REASONS FOR REVOLT AGAINST MALLETED GOLD FILLINGS.

I found Abbot also using the same care to preserve natural conditions in employing this material as he exercised in the use of gold, and at last it dawned upon me that here was a method of practice new to me, but founded in righteousness, and teaching the sacred duty of preserving the patient from unnecessary disfigurement. Presently I found that almost all dentists practicing in Europe were usually observant of this duty, and that it was encouraged and perpetuated by a *clientèle* very susceptible to départure from the harmony of nature.

About twenty years ago there occurred a revolt against the tyranny of gold fillings. It affected both dentists and patients, and arose largely from the tremendous strain of endurance necessitated by the favorite methods of that time. You remember how the brilliant Marshall Webb went down to an untimely grave under this awful strain.

There once came to me a frail American girl with a dislodged gold filling, and having compassion upon her condition, I very gently replaced it with another, which I packed by hand pressure. Upon concluding the operation, I asked the patient's mother to present my compliments to her family dentist when she again took her daughter to him, and say how much I admired his beautiful work. Thereupon the girl burst into tears, and cried, "Mother, you promised me I need never go to that man again." Then the mother told me that the nervous prostration from which her daughter was suffering was caused by a five hours' sitting for the building-up of a certain splendid gold monument which I had specially admired. Thank Heaven that through the porcelain inlay and the famous discovery of Taggart such barbarities have passed away forever!

THE ADVENT OF THE PORCELAIN INLAY.

If the influence of this revolt was felt in America, it was felt still more in Europe, where many futile efforts had been made to find some less distressing, more esthetic, and equally enduring method of filling. These efforts were chiefly expended upon various forms of gutta-percha and zinc phosphate. Their utter failure to fulfil these conditions incited the men practicing under the influence of the method popular in America to still more elaborate gold-malleted restorations, until the patience even of the most stolid clients became overstrained. It was for these reasons that the announcement of the successful making of porcelain inlays was everywhere hailed with so much enthusiasm.

In America this enthusiasm was more widely disseminated and more demonstrative than in Europe. In the former case it appears, for the most part, to have been like seed sown upon stony ground, which had no depth of root. I have been told that in America the use of porcelain has for some years steadily decreased, whereas in Europe, even during the delusive period of the silicate cements, it has held its own, and the methods have steadily improved, until at last seeming perfection has been reached.

The reasons for these dissimilar conditions are too various to be considered at length upon this occasion. Some of them, however, I may be permitted to touch upon.

PERSISTENT POPULARITY OF THE PORCELAIN INLAY IN EUROPEAN PRACTICE.

The characteristic European dentist possesses, both through temperament and education, much patience, a quality which he displays notably in trying to master the details of any new method. I remember how the late Professor Hesse of Leipzig once spent a week with me to convince himself of the value of porcelain inlays. After his return to Leipzig for a month he sat up every night until nearly morning, working at the technique of the process, until he felt that he was capable of practicing it and of teaching it to his pupils. It was in this spirit that German dentists who cared for it at all worked at the new art, and they reaped an abundant reward. I have never known a European dentist who became thoroughly capable in porcelain work who did not, by its practice, considerably increase his reputation and his income.

THE GOLD MATRIX AND ITS MANIPULATION.

Fortunately, Europe generally accepted and remained loyal to the gold matrix. It was evident that the weak point of the process was the edge of the filling; not that a defective edge always weakened the inlay materially, but it was liable to cause a dark line, which was sometimes very disfiguring. This defect was far less frequent with inlays made with gold than with platinum matrices, and many efforts were made to improve the gold matrix in consequence. To this end innumerable devices were employed, such as rubber points, burnishing over gold-beaters' skin and thin rubber dam; burnishing with agate and highly polished steel burnishers, stamping with various machines designed for the purpose, insisting upon having cements devoid of nodules, improving in cavity preparation, and securing a polished surface throughout the cavity, especially at the edges. Indeed, there was a great amount of ingenuity displayed in improving methods throughout all Europe, with the result that there is now no part of that continent and no class of society where there are to be seen such displays of disharmony in the mouth as, even after the magnificent discovery of Taggart, one finds frequently elsewhere.

DR. WEBER'S SUGGESTION OF GLASS INSTRUMENTS FOR BURNISHING THE GOLD MATRIX.

The final improvement was very simple and came with no flourish of trumpets. It was the discovery of Weber, a Swiss colleague, who is also an American graduate, and is known as one of the most ingenious and skilful dentists in Paris. Some years ago he began to use glass burnishers for the final polishing of the gold matrix, and he felt that he had reached perfection. For some two years he kept his secret to himself, testing it constantly in practice, and when convinced that the system had enduring merit he demonstrated it before the American Dental Club of Paris.

Since then, the men who have adopted this method report the same results. Given a cavity properly prepared with exact and polished edges, a gold matrix may be burnished with glass instruments, either by the direct or the indirect process, until every fold and wrinkle has been smoothed away, and a perfect matrix has been secured.

This process does not tear the gold, and greatly increases its rigidity, so that its removal from the cavity is made easier than by the old method. Moreover, the gold separates from the surface of the fused inlay with great facility, and when the inlay is placed in the cavity it is at once evident how imperfect were the former methods.

This system was immediately adopted by the Postgraduate School at Berlin. This is a government institution, attached to the Dental Institute of the University, and to it come dentists from over all northern and central Europe. Mamlok, who is at the head of the porcelain inlay department, showed me last year a considerable number of patients who had been treated by this method during a period of two years. The operations were of all classes, many of them being extremely complicated, but among them all I could not detect a single black line nor any defect of edge. When you consider that these operations had all been made by male and female dentists who were learning and practicing this beautiful art for the first time, the importance of this result is evident.

ADVANTAGES OF THE PORCELAIN INLAY.

It seems scarcely necessary to recapitulate the advantages of the porcelain inlay, but still I venture to remind you that it is not from the esthetic standpoint alone that it surpasses all others.

It is to the patient the least distressing method of restoration. It requires less loss of structure than is regarded as essential with the gold inlay, and it is exempt from the discomfort often occasioned by a large gold inlay in a vital tooth. From the moment that a porcelain inlay is set, the patient forgets that the tooth containing it was ever defective; neither heat nor cold affect it, and it can be used in eating or drinking or can be brushed with either cold or hot water with impunity. The large gold inlay, despite its film of protecting cement, remains a body which conducts caloric changes.

It is the duty of the dentist not only to restore lost tissue, together with contour and indestructible masticating surface, but also to give his patient complete exemption from subsequent discomfort. This can be permanently accomplished with porcelain alone, and, speaking from the results of wide experience, I wish to add that there is no position in the mouth in which the skilful dentist may not, if he sees fit, successfully place a porcelain inlay which will bear unimpaired the strain of mastication.

The well-made porcelain inlay also renders the tooth practically exempt from secondary caries. It does not shrink in cooling, as does the cast inlay, and has no edge to be dubiously burnished over defective cervical margins.

It may be known before setting whether a porcelain inlay fits, and if it is defective anywhere, it is better to make another rather than hazard an ultimate failure.

But it is in its esthetic aspect that the porcelain inlay is most attractive. It is a great achievement to place a mouth, ravaged by dental caries, in a comfortable and sanitary condition; but to add restoration of the original beauty of the teeth is a supreme triumph, and one worthy of the wonderful age in which we live.

In America the porcelain inlay was born; in Europe it has attained to its highest development. These facts are of much significance—for our profession is no longer provincial, but it is everywhere working upon the same problems in a generous spirit of fraternal rivalry, and for the good of all the world.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

THE PROGRESSIVE DENTAL CLINIC.

By WESTON A. PRICE, D.D.S., Cleveland, Ohio.

BECAUSE many of the most serious disadvantages of the ordinary dental convention clinic are quite satisfactorily overcome by the Progressive Clinic plan inaugurated by the writer at the Northern Ohio Dental Association meeting held at Cedar Point, June 1912, and because of the many inquiries asking for information regarding details for conducting such a clinic, together with the fact that the National and some other associations, when they meet in the near future, will use this plan, the following detailed outline is given. When this plan was first used, practically everyone present pronounced it a great improvement, and none were more enthusiastic than the clinicians themselves. It has since been used with the same general satisfaction in other places.

THE WRITER'S PLAN.

The plan of the Progressive Dental Clinic contemplates the greatest possible advantage and convenience to the greatest possible number, and is based upon the dividing of the audience into groups or classes of equal size, and distributing them thus equally to each of the clinicians.

At regular and pre-arranged intervals—of fifteen minutes for instance—at the sounding of a loud gong, or a series of buzzers, preceded by a one-minute signal, each class proceeds to the next clinician, there being the same number of progressions as clinicians. Each person on entering the hall is given a serial number which determines which class he shall start in. Suppose, as was the case at Cedar Point, there are thirteen star clinicians distributed, seated at small tables on slightly raised platforms, each with two rows of chairs surrounding his table, thus seating from twenty to thirty dentists. The clinics are numbered from 1 to 13. Numbered tickets with stick-pins are previously prepared, running from 1 to 13, and repeating in order. These are handed to the audience as they enter the clinic room, and their numbers will determine the clinic at which the auditors will first congregate and start. Since there are as many progressions as clinicians, every man sees every clinic from beginning to end, and each clinician has a new audience to repeat his complete clinic to. This distribution is equally as convenient if the clinicians are placed in adjoining rooms, which are provided with buzzers for signals, while outside each door is a sign with the number of the clinic. Each leader of a class can carry a standard, giving the number of his class to late-comers, and, if separate rooms are used, this class number should be left outside.

If two men wish to go together, they are given corresponding numbers, and since there is an equal number of each of the numbers from 1 to 13, it is very easy to keep the classes all of the same size.

Each class has a chairman or leader who is instructed to change the number for any man wishing to change his class to see a clinic repeated, etc. These chairmen or leaders of the classes are selected beforehand; each is instructed to keep his crowd together and progress them promptly. A copy of such an outline as this is put in the chairman's hands.

By public and program announcement, the clinicians and audience must be instructed to be in place promptly at a stated time. In order to carry out this plan successfully, all clinics should be *first-class,* and only men should be invited who are able to keep an audience for that period of time.

For large audiences with divided interests, the clinics should be divided into two or three series—say, mechanical, operative, and therapeutic—and each series should progress independently or simultaneously as desired, or have entirely different time periods for progressions.

Specially long clinics, if worthy, can have a double period accommodating two groups or classes at once, or several short clinics—such as can be grasped at sight without explanation—can be so arranged in one clinic as to use together one period of time.

At Cedar Point there was not a hitch from beginning to end, nor was there a single complaint that reached the management, and a little deluge of expressions of satisfaction came from both the audience and clinicians. The clinicians had not been notified as to the amount of time they should plan their clinics for. This should be done.

PRACTICAL ADVANTAGES.

Some of the practical advantages are:

(1) Each visitor can see each clinic from beginning to end, but only for his full share of time.

(2) Each clinician has a full audience at all times, and can tell each and every man his full story, and never repeat to a single one. He can plan his time to cover his ground, and place emphasis where he sees fit.

(3) Each clinician has an opportunity to rest for a minute or two regularly.

(4) Obtrusiveness and crowding of a popular clinic is entirely prevented.

(5) Practitioners generally get into ruts, and wish to stay there. They often do not choose or desire to see strictly educational clinics, but select only those that show short cuts to earning a dollar. With this method, men unconsciously get to see good educational clinics, and are broadened, thus being more greatly benefited than by the purely practical clinic that appeals to their narrow interest or pertains to their specialty.

(6) Argument and discussion with clinicians, and interruption, is entirely prevented.

(7) Visiting in the clinic room is practically prevented, except during progressions.

(8) Every man has an equal opportunity to see and learn everything in the entire clinic with the greatest possible convenience and comfort to the clinician and himself.

(9) This plan is a great incentive for clinicians to make a worthy preparation, and they will feel it an honor to be called upon as *star* clinicians.

SOME COMMENTS.

The accompanying letters, alphabetically arranged, give the viewpoints of the clinicians, also the viewpoint of one of the dentists in the classes, viz, Dr. Geo. H. Wilson.

These letters were sent in reply to the inquiry asking the writers' criticisms, opinions, and suggestions.

Dr. Russell W. Bunting, University of Michigan, Ann Arbor, Michigan, states:

Your letter at hand asking my opinion of the manner in which the clinics were held at the Northern Ohio meeting.

In reply would say that it was the most

successful clinic that I ever attended. From the standpoint of the clinician, the method used saved him time and energy, besides relieving him of the petty annoyance of interruptions and repetitions. He had an opportunity to tell his story, make his points clear to those who were interested, and then give the same matter to the next group. From the standpoint of those who wish to see the clinics, it must be a great relief to have the undivided attention of the clinician for a short time free from interruption.

In case this method is used in a larger meeting, I would suggest that the clinics be divided into groups as to subjects, and also as to time. Many clinics can be given in this way in five minutes, while others need fifteen. I think the scheme is an excellent one, and should be adopted wherever it is possible.

Dr. A. J. Bush, Columbus, Ohio, states:

My opinion of the progressive clinic can be briefly stated as follows: First, The clinic is indorsed as first class; second, The clinician receiving the indorsement is honored thereby, and accordingly strives to give a high-class clinic; third, The respectful attention accorded a clinician, under these circumstances, is a positive benefit and works to the advantage of all. It is the first clinic that I ever gave that someone did not try to interrupt my clinic in order to give a clinic of his own, and in thinking this over later, I came to the conclusion that perhaps someone's views had been broadened, even if my own had not. I say this to describe the complete change from former experiences.

Dr. M. H. Fletcher, Cincinnati, Ohio, states:

I am pleased to commend the progressive clinic idea. It certainly must be more gratifying to the audience than the old method. Fifteen minutes may not be as much time as some would like, yet such persons have the opportunity of returning, so everyone has a chance, which they do not have in the old way.

In the progressive plan, the clinician may not have all the time he may desire, but by proper condensation the whole story can be told in fifteen minutes. I like the plan, as a clinician, better than any I have tried.

Dr. Geo. B. Harris, Detroit, Michigan, states:

The scheme is very advantageous to the clinician. By that means it becomes possible for the clinician to go from start to finish without interruption and with the least amount of duplication.

Under the progressive method, as used at Cedar Point, I would not answer any questions until through with the clinic. I then devoted the last five minutes to answering questions and found this to be very satisfactory to all concerned. The advantage of it is that the clinician does not have to give a clinic to one or two and then repeat to twenty or thirty. It is a good idea, and should be adopted at the coming National meeting.

Dr. Wm. O. Hulick, Cincinnati, Ohio, states:

I desire to say to you that in fifteen years of clinic work in our state and many others, I have never had as satisfactory an arrangement as the one at your meeting. It gave the clinician an opportunity to do justice both to himself and to his audience, or class, as you termed it.

Dr. G. D. Laymon, Indianapolis, Ind., states:

The progressive clinic idea, as employed by the Northern Ohio Dental Association at their last meeting, impressed me very favorably. As far as disadvantages are concerned, the only one of importance is that certain clinicians must hurry through their clinics in order to finish in the allotted time, while others may have time to spare.

As to the advantages there are several: (1) The audience is so subdivided that crowding is eliminated; (2) order is maintained, which is gratifying to the clinician; (3) this arrangement permits each dentist to comfortably see and hear every clinic; (4) the interest of the clinician is maintained by the periodical change of audiences, and (5) the number of dentists attending each clinic is always constant, so that no clinician is embarrassed by having small audiences.

Dr. Andrew J. McDonagh, Toronto, Ont., states:

From a clinician's standpoint, I would say that the progressive clinic of the Northern Ohio Dental Association was a great success. It kept the clinician busy every moment, and he had the satisfaction of knowing that he was not repeating himself to the same individuals. However, all clinics in a circuit must, necessarily, require the same time to complete. Allow me to congratulate you on the success of this novel feature.

Dr. Frederic A. Peeso, New York City, states:

I think the idea one of the best that I have ever seen worked out so far, but it seems as though it might be modified in some way to make it still more satisfactory. As you know, in some of the clinics there are intricacies requiring more time in explaining or demonstrating than others which are so simple and plain that they demonstrate themselves almost at a glance. As to what changes might be made or whether any could be made to work this out, is up to you to think out, but the plan was so successful and so far ahead of anything I have ever seen, that it could be carried out as it is with great satisfaction and profit to the profession.

Dr. H. Carlton Smith, Boston, Mass., states:

I consider it the best system I ever saw used. It leaves nothing to be desired, unless possibly, in case of an all-day clinic, a recess in the middle of the forenoon might make it a little easier for the clinician.

Dr. Edward Spalding, Detroit, Mich., states:

I like the idea of limiting the number of people around the clinician, as being much pleasanter and more profitable to the clinician and the listener, but do not believe that you can make the same period of time suitable to all clinics. I think it possible to give some clinics one period of time, and others two periods, or possibly three. In my own case, I needed two periods of time, and could have used three to advantage. Then I was told by a number of men that they wished to see the same thing over.

Dr. Marcus Ward, Ann Arbor, Mich., states:

From the standpoint of a clinician I was much pleased with your progressive clinic after the first section had passed by me. Previous to this time, I was uncertain about the ground that I could cover in the time allotted to me. The first section left me almost in the middle of one section of my clinic, but the succeeding ones were handled with ease. From the standpoint of the dentists, I observed that all of them visited all the clinics. Oftentimes, a man or group will become interested in one or two clinics and will not leave them at all, to the detriment of both clinician and dentist. In your progressive clinic they *all have to see it all.*

Dr. George H. Wilson, Cleveland, Ohio, states:

I consider the clinic of the 1912 Northern Ohio Dental Association by far the most unique, successful, and gratifying of any I have ever attended. The success of that clinic should revolutionize the clinics of the entire country, and I predict it will so do. The method will create a demand for fewer and better clinicians, and everyone will have an equal opportunity to get everything presented. In a word, I consider it—CLINIC PERFECTION.

SOME REMARKS ON THE REMOVAL OF TROUBLESOME TONSILS OF INTEREST TO DENTISTS.

By HENRY GLOVER LANGWORTHY, M.D., Dubuque, Iowa.

ALTHOUGH a discussion of diseased tonsils and adenoids in their relation to mouth affections has been a common one in dental literature for a long time, there is one vital feature in connection with their surgical treatment which should be kept in mind by the dentist, and which is as applicable to his own as to other people's children. The above statement, therefore, is sufficient excuse for the creation of a special paper which has to do solely with the question of the actual removal of tonsils, and purposely omits any extended references to the causation of symptoms with which all are more or less familiar. Indeed, the entire subject of symptomatology may be briefly dismissed by saying that tonsillectomy in the main is performed for the relief of three general classes of cases: (*a*) Frequent sore throat, and the prevention of quinsy; (*b*) chronic throat catarrh where there is troublesome pocket formation in and about the tonsil causing excessive irritation, secretion, or the formation of concretions; (*c*) the ordinary run of enlarged tonsils in children which cause impediment in breathing or swallowing, and are usually associated with adenoids.

IMPERFECTIONS IN TONSILLECTOMY AS PRACTICED IN THE PAST.

In taking up the removal of tonsils it is pertinent to inquire, first, What really constitutes the removal of tonsils? and second, Have not we—meaning all departments of the medical profession—been substituting the word for the deed many times when we speak of tonsils as having been removed in all of our cases? I think it is a fair statement of fact to say that up to three or four years ago, tonsils were not taken out as thoroughly as they are at present. In other words, the situation was somewhat analogous to that of pre-appendix days, so far as knowledge and up-to-date surgical action was concerned; twenty-five years or so ago, a diagnosis of inflammation of the bowel or peritonitis and inadequate medical treatment was really the best treatment known. Somewhat the same condition, but relating to the tonsils, has been in existence not so long since. Men who were considered competent, and were, moreover, really experts in their specialties, were not always removing the tonsils when they spoke of the average case as having had the tonsils removed. Today, all such physicians not only have voluntarily changed their ideas and technique along this line, but what is more important, are this year and this week doing thorough and satisfactory work. To many of us the situation has suddenly presented somewhat the nature of the cancer picture. *Just as we expect a recurrence of cancer, so can we expect a continuance of some of the troublesome tonsil symptoms if they are not removed thoroughly—and by this I mean the entire organ as contained within the sinus tonsillaris.* When I see a throat case previously operated, with the history of the throat trouble continuing, and observe a good deal of honeycombed tonsil plastered on the lateral pharyngeal wall behind the anterior pillars, I do not and cannot honestly find fault, but tell the patients that they have had most of the tonsil removed, all at least that was thought necessary at that time, but that even the little left in their particular case is still causing trouble. This is an honest statement, and leaves us able to meet our responsibility with clear eyes.

THE WRITER'S TECHNIQUE.

Tonsillectomy or the complete removal of all of the tonsil is not an easy operation, for a great many reasons. First of all, the tonsil must be well dissected almost completely around so as to free it from the sides, or it is impossible to slip a snare over the organ and satisfactorily enucleate it. Just the past few years have brought home to the writer, who has performed this operation in over eight hundred cases, the fact that it is almost impossible to dissect the tonsil carefully and get it ready for removal without spending considerable time at this vital preliminary work. Also it is becoming more evident every day that occasionally it is most difficult to properly dissect out tonsils in young adults, and get every bit of them out even under a general anesthetic. Gagging, uncontrollable throat movements, which tightly stretch the pillars over the tonsils, excessive blood obscuring the operative field, and a flat position of the body, all conspire at times to make the tonsil operation a trying one. Personally I am finding myself doing more and more of these operations in adults, when possible under local cocain anesthesia, being careful to cocainize the regions back and under the pillars by means of angular swabs as I work along, and then following the patients for several weeks to make sure of a good operation. By spending most of the time on dissection, and taking out the tonsil only when it is ready, with scissors or a wire snare, I feel that my operative technique is materially improved. A vacuum suction apparatus which constantly sucks out saliva and blood may also be used to great advantage in patients under ether or chloroform. At present, one difficulty I have experienced with such an apparatus is that it occasionally gets out of order, but this will be remedied in a new apparatus which I am at present perfecting. Before one finishes a case, in any instance, it is highly necessary that the assistant pull the anterior pillar back, while we both make sure that the former side of the tonsil presents a clean bed showing only the lateral pharyngeal wall.

TONSILLECTOMY A MORE SERIOUS OPERATION THAN COMMONLY REGARDED.

Owing to the attention which this operation is being given, it is safe to add that, from now on, tonsils are going to be entirely taken out, no matter how much it may cost in equipment, assistant fees, etc., and no matter if it be necessary to operate a second time, if for any reason it is found unwise to complete the operation when first starting out. The day of the $25.00 tonsil operation is past. Physicians cannot do good work, especially a piece of work which often requires an assistant when done under cocain, and an etherizer and an assistant when done under a general anesthetic, without being paid a good price. The profession as a whole, both dental and medical, is going to regard the removal of tonsils as a more serious operation than formerly, and will realize then, and then only, that the results will be far superior to what they have been even in the past. The operator who cannot look back at unsatisfactory work, and has not had to repeat an operation once or twice, is one who has done little throat work. Fortunately, however, even the failures, with their evident reasons, often help us more than would marked successes.

REASONS FOR DIFFICULTIES IN TONSILLECTOMY.

Some of the chief reasons why partial decapitation or partial removal of the tonsils cannot be satisfactory in the average case are as follows:

(1) The crypts of the tonsils are little more than deep fissures, which frequently extend entirely through the organ to the outer side, or may open into large communicating spaces. Therefore anything short of complete removal still leaves crypt fissures to catch food, lodge bacteria, and cause continued irritation by the presence of septic material at the bottom.

(2) The tonsil does not completely fill its triangular bed, as there is a large space above and behind the tonsil, at the sides and, in fact, more or less all around the outside of the organ, which spaces continue to exist unless purposely eradicated.

(3) As some of the crypts open on to surface regions of the tonsil covered by such structures as the anterior pillar in front, plica tonsillaris below, palate margin above, etc., it is evident that the trouble in these places is not even touched unless attention is directed to them.

(4) As, regularly, two-thirds of the tonsil is concealed and out of sight, it is almost folly to attempt an opinion as to its possible pathogenic factor without the use of a bent probe for exploring crypts and pockets.

Lastly, if one will but consider a few of the evil results of enlarged or degenerated tonsils or adenoids from either a local or a general standpoint, also the results from badly contracting scars and lacerated pillars in the throat from poor operations, it can be easily figured out just why it is necessary to perform these operations so carefully, and to remove tonsils completely when they are removed at all.

CORRESPONDENCE.

A CORRECTION.

To the Editor of the Dental Cosmos:

Sir,—The following appears in the Dental Cosmos for May 1913 (p. 516):

> Another point in this connection: The Black followers always select bicuspids or molars to demonstrate their principle of cavity preparation on. Why? Because their preparation of a cavity in an incisor or canine would be very difficult to follow indeed, and I venture to say few of them could ever insert a perfect filling in an incisor and have it last, unless they had produced a wide separation beforehand.

The above statement is at such variance with the facts in the case that the attention of the profession is called to them, and to the following, viz:

Nineteen of the members and friends of the G. V. Black Dental Club operated at the clinic of the Fourth International Dental Congress which was held at St. Louis in 1904. These gentlemen made thirty-seven gold foil operations. But eighteen of them were reported. (See *Trans.* Fourth International Dental Congress, pp. 524-526.)

Number of gold foil operations reported	18
" " " " " made in bicuspids and molars	13
Number of gold foil operations made in other teeth	5

The following year, 1905, some of the Black Club men and their friends operated at the N. D. A. clinic which was held at Buffalo. The total number of operations made by these gentlemen was twenty. They were divided as follows:

Gold foil operations in bicuspids and molars	10
Amalgam operations in molars and bicuspids	2
Gold foil operations in other teeth	8

At the N. D. A. meeting which was held at Minneapolis in 1907, the members and friends of the Black Club made the following operations:

Total number of gold foil operations	35
Gold inlay operation	1
Gold foil operations made in molars and bicuspids	26
Gold foil operations made in other teeth	9

Summary.

Total number of operations made	76
" " " gold foil operations made in bicuspids and molars	51
Total number of gold foil operations made in other teeth	22
Total number of amalgam operations made in bicuspids and molars	2
Total number of inlay operations	1

From this summary the reader may judge for himself whether or not the men belonging to the Black Club always select molars and bicuspids in which to demonstrate their cavity preparation.

During the past sixteen years, at any and all of the annual clinics of the Black Club, there have always been clinical operations made on the incisor as well as bicuspid teeth. Beyond this, it is not necessary to say more.

E. K. Wedelstaedt.

St. Paul, Minn., May 22, 1913.

Proceedings of Societies.

SEVENTH AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

Forty-fourth Annual Union Convention.

(Continued from page 644.)

Friday—*Afternoon Session.*

The Friday afternoon session was called to order at 2 o'clock by Dr. J. Edward Line, Rochester, who presided at this meeting.

Dr. R. H. Hofheinz, on behalf of the members of the Seventh District Dental Society, presented to Dr. E. G. Link, Rochester, chairman of the Business Committee, a very handsome loving-cup in recognition of his very valuable services to the societies.

Dr. Link, in a few appropriate words, thanked the societies for their appreciation of his efforts.

Dr. Link then introduced the first essayist of the afternoon, Dr. N. S. Jenkins, Dresden, Germany, who read a paper entitled "The Perfect Porcelain Inlay."

[This paper is printed in full at page 711 of the present issue of the Cosmos.]

Discussion.

Dr. R. H. Hofheinz, Rochester. It is not difficult to discuss a subject when presented by an authority. There is no one man in the profession who is better equipped by ability and esthetic taste to present this subject than Dr. Jenkins, who was helped by the surroundings of Dresden and Meissen, a porcelain atmosphere *comme il faut.*

It is quite a revelation to hear anything said on porcelain inlays at present. In the eyes of some of the coming geniuses of dentistry, this subject needs an apologetic prelude. Not long ago I heard it stated at one of our meetings that "the porcelain era had passed out of existence." This is interesting, if amusing. A more important question arose with me, namely—Upon how many has the porcelain era ever dawned?

The very delicateness of this work, the necessary esthetic consideration, the frequent failures in producing the exact shade, the disappointment of the patient because the inlay looked different in artificial light, and last but not least, the dark line around the inlay, have made porcelain inlays not quite so popular as are rubber plates and amalgam fillings.

The principal question arises, Is this all to be charged to porcelain itself? If a man like Dr. Jenkins could devote all of his time to the making of porcelain inlays and succeed as well as many of us know he has, we must look elsewhere for the many disappointments enumerated. Dr. Jenkins in his introduction speaks of Dr. Abbot of Berlin, and his skill as a non-cohesive gold worker. It may please the essayist to know that Rochester had some of the most marvelous manipulators of this special material.

The essayist refers to the tyranny of gold fillings. It certainly was a tyrannical necessity to keep patients from two to six hours in the dental chair, but after all, the gold filling was a great maker of personality. One of my old patients for whom I made a large gold inlay recently said: "If you dentists could ever do slovenly work, you can do it now. Who knows what is under this cement?" There is certainly more truth than poetry in this statement. This fact, however, does not detract from the value of cemented fillings. I only mention it as a warning to the younger practitioner. A poorly placed gold filling soon reveals its deficiency; a cemented filling is unfortunately kinder to the unskilful and slovenly operator.

The essayist says—"In America the enthusiasm was more widely disseminated and more demonstrative than in Europe," etc. I have been told that in America the use of porcelain has steadily decreased, whereas in Europe, even during the delusive period of the silicate cements, it has held its own, and methods have steadily improved, until at last seeming perfection has been reached. Our national temperament accounts for that. We readily embrace the new and exchange it with American alacrity for something newer, frequently to our advantage, frequently to our detriment.

The example of Professor Hesse which Dr. Jenkins has cited thoroughly explains the German and, to a large degree, the general European tendency. The essayist tells us that Europe accepted and generally remained loyal to the gold matrix. I thoroughly agree with him that the dark line around the inlay was the essential cause of dissatisfaction to both patient and operator. This should not convey the idea that no perfect inlays have been made with the platinum matrix.

I have with me a broken-off crown of a lateral in which a porcelain filling had been placed some six or eight years ago, and yet it had never developed the dreaded dark line, and I know that the matrix was made of platinum. The making of a platinum matrix is an infinitely more tedious process, however, and for that reason, if for no other, the gold matrix is preferable.

The French papers take great delight in attributing the Turkish disaster to their use of the Krupp guns. It is not the gun, but the man behind it, who decides the battle. If all the dentists who attempt porcelain inlays had the wonderful patience, say nothing of skill, which I know Dr. Jenkins to possess, fewer dark lines would be visible around their inlays, even when platinum matrices were used. Let me give you an example: Some eight years ago, when the essayist was still in full practice, I called at his office in Dresden. He invited me to his chair with his customary hospitality and professional courtesy. He prepared for a woman patient a mesio-disto-incisal cavity in a central incisor. After he succeeded in making what we both called a perfect matrix, he handed it to the assistant for investment and completion. I was asked to return at 3 P.M. to see the finished product. I did not fail to appear. The inlay, though a most difficult one to make, looked perfect. In placing it into the cavity, we noticed a discrepancy at the cervico-lingual angle. Most of us would have cemented it in place, and filled the slight deficiency with gold at some other time. Not so Dr. Jenkins. With a most gracious smile he said, "Fräulein, this is not a perfect inlay; if you can come tomorrow at 10 o'clock, I will make another one for you." Ah, there's the rub! It was the wonderful personality and love for perfection that has made Dr. Jenkins such a force in dentistry.

Two years ago, when I visited the essayist in Paris, he showed me a patient's mouth, filled with porcelain inlays burnished with glass burnishers. They certainly appeared to me the most perfect I had ever seen. The greatest surprise, however, was the fact that many of them were inserted in the incisal edges of the anterior teeth, which were continually shortened by an edge-to-edge bite. They showed no signs of chipping or breaking, though they must, of necessity have been very thin.

The greatest surprise to me regarding both porcelain and gold inlays is the fact that so many do remarkable service though but little of the law of cavity preparation has been obeyed. I pass a sample of an inlay placed in a bicuspid with a very unfavorable bite, some eight years ago. Four years ago part of the lingual wall broke off. I filled it with cement and amalgam, and you now can scrutinize the lack of cavity preparation.

In enumerating the advantages of the porcelain inlay, Dr. Jenkins tells us that it requires less loss of tooth structure than the gold inlay. I do not agree with him, and unfortunately this is one of the few points in which I differ with him. An approximal cavity properly extended to the line of immunity requires as much loss of tooth structure preparatory to the insertion of a porcelain inlay as for that of a gold inlay—and there is no reason why such extension should not be made in either case. The essayist tells us that the porcelain inlay has no edge to be dubiously burnished, like the gold inlay, over defective cervical margins. The man who burnishes gold inlays over defective cervical margins is no better than the one who fills a tooth with gold and later fills the deficiency at the cervical margin with amalgam. There is no reason for a deficient edge in the gold inlay, when perfectly finished.

It can be decided with equal certainty whether a gold inlay fits the cavity. Unfortunately, the temptation with the average dentist is too great when he sees an imperfect inlay, and he relies upon cement to fill the deficiency. The man who cements a poorly fitting gold inlay would certainly not try to improve an imperfect porcelain inlay by making a new one. All other advantages I heartily second.

Some fifteen hundred years ago, the good people of Japan and Honduras put inlays of green jade nephrite into labial surfaces of front teeth. The skulls are preserved to this day, as an eloquent testimony for the lasting quality of such inlays, and these people had neither Ames nor Petroid cements.

Dr. Jenkins has spoken of the illusive period of silicate cements. I agree with him, and yet, if used with proper judgment and discretion, these cements serve a purpose which may be increased by a more thorough understanding and compatibility of the fluids of the mouth and the silicate cement.

This remains a question of evolution. If we are willing to devote more time, skill, and patience to our labor, we can all achieve what Dr. Jenkins has termed the perfect porcelain inlay, which is without a doubt the most ideal filling in the realm of dentistry.

Dr. C. K. Buell, Buffalo. When asked to discuss this paper, I readily accepted the honor, knowing that our distinguished essayist would leave little to be said upon the subject, and feeling assured that that little would be said by the gentleman preceding me in the discussion.

I wish to congratulate the essayist upon bringing before us the porcelain inlay in such a manner that we are sufficiently enthused to again take it up with renewed interest, and a determination to strive after the ideal that he has so beautifully described.

Before receiving the paper, I began to make a mental note of some of the essentials of a perfect porcelain inlay, with the following result:

The inlay must have sufficient bulk to be able to withstand the strain placed upon it during mastication. The marginal edge must be of sufficient thickness and be placed at such an angle with the line of stress that it will not fracture or chip away; also the cavo-surface angle must have the same requirements followed out in its preparation.

The cavity must, whenever possible, be so shaped that the cement alone is not depended upon for the retention of the inlay, *i.e.* labio-approximal cavities must not be saucer-shaped.

The finished inlay should fit the cavity so well that a drop of water placed in the cavity will hold the inlay in position, while, if it does not fit perfectly, the inlay drops out or becomes loose. I know of no test equal to this.

Last, but not easiest to obtain, the color should match the tooth perfectly, no matter from what direction it is viewed. Can all of these requirements be fully realized?

Almost anyone can fulfil the first two requirements mentioned—bulk, marginal thickness, and angle; but can we so prepare compound cavities in molars and bicuspids, with less destruction of tooth material than for a gold inlay, and at the same time expect the margins of the cavity and inlay to remain intact under stress? Since one of the requirements for a perfect porcelain inlay is that the cavity be perfectly prepared, I hoped that the essayist would describe his method of cavity preparation for molars and bicuspids, as these cavities seem the most difficult.

The material for a matrix, gold, and its successful adaptation to the polished cavity walls and the tooth surface, has been touched upon in such a manner that I am certain we will all be using the glass burnishers, and thus make our work more perfect. I would like the essayist to give his opinion of the direct as compared with the indirect method.

The color problem has been the most difficult for me to solve. What has helped me most have been the Jenkins' cements and their shade guide. Nevertheless I still find that color is a problem.

I would like the essayist, in closing, to tell us how he selects his shades for labial cavities that extend underneath the gum, labial cavities that do not extend underneath the gum, approximal cavities, both mesial and distal, that do not involve the incisal angle, and approximal cavities that involve the incisal angle and perhaps one-third of the incisal width.

Does he match the tooth each time perfectly, or does he allow for the change due to the refraction of light-rays by the cement? Does he allow for the size of the inlay in selecting the shade? These are some of the conditions that I find make the color of the finished product a difficult task. To mention more would only weary you.

Since we have the opportunity, let us sit at the feet of the master porcelain inlay-maker and learn, so that we too may produce porcelain inlays that shall be perfect.

Dr. B. S. Hert, Rochester, N. Y. I have read Dr. Jenkins' paper, to which we have listened with both pleasure and profit. The first portion, relating to his early experiences in Europe, the variations in the methods of practice in different countries and their causes, is informative reading.

The use of tin and gold, which was practiced so generally in Europe, was practiced in America to some extent, and its advantages were understood. I well remember when I attended the University of Pennsylvania, how much stress Professor Darby placed on the value of tin and gold as a tooth preserver, and how strongly he advocated its use, especially at the cervical margins of the posterior teeth. I used it many times before the advent of the gold inlay, and always with most satisfactory results.

In regard to the porcelain inlay, it is perhaps well to bear in mind that the essayist can almost be called the father of porcelain inlays, as he was mainly instrumental in its being used so extensively, and naturally is enthusiastic in its use. The virtues of the inlay probably loom up so large in his eyes as to throw into shadow some of its defects, and to obscure the valuable qualities of some other materials. For a number of years I used porcelain inlays very much and advocated the adoption of this method for many teeth. I used them, however, mainly in anterior teeth, and only occasionally in molars and bicuspids, and I am well pleased that I did not use them oftener in the posterior part of the mouth. "The use of porcelain is only limited by the ability of the operator," is an expression which was heard quite often a number of years ago, when porcelain had been used by many for only a short time. I have not heard it for a long time, because experience has shown that this method of filling teeth has inherent faults which no amount of skill can overcome. Only two of these will be mentioned:

First, the friability of porcelain. If the margin of the inlay is laid on the incisal edge or occlusal surface, in a large number of cases the edges will fail in a comparatively short time, the filling will become dislodged, or the tooth begin to decay again near the filling.

Then there is the cement problem, and the question, Of what consistence is it best to use cement? If it be mixed but a little too thickly, one dares not exert sufficient pressure to force out the excess, as one can with a gold inlay, for fear of breaking the porcelain or chipping the edge, and if the cement is thin enough to allow the porcelain to be perfectly seated in the cavity, it will not harden to its best strength, will dissolve out in time, and permit caries to recur around the filling. For myself, the making of porcelain inlays was the most trying class of work that I have done in dentistry, although, after becoming thoroughly familiar with the technique, the final results in approximo-labial cavities in the anterior teeth were quite satisfactory. For a number of years I have gradually done less porcelain work, and while some American dentists have experienced a "delusive period of silicate cements," as Dr. Jenkins has said of the European dentists, this, so far, has not been my lot, as this material has in my practice replaced porcelain for fillings. After several years of use of silicate cements, I am able to say that I obtain results which compare favorably with porcelain both in durability and color, with less destruction of tooth substance, much less discomfort to the patient, and greater ease for myself.

The method of making porcelain inlays as practiced by myself, as well as the majority of dentists in this country, consisted in the employment of high-fusing porcelain and platinum matrix, and I have seen fully as good results obtained by this method as by that of low-fusing bodies and the gold matrix. Some dentists who had used both low- and high-fusing bodies told me that they could obtain a better fit with the high-fusing body, and after a time entirely discarded the low-fusing.

It may be that, with the use of the glass burnishers mentioned by Dr. Jenkins and invented by Dr. Weber, a perfect fit can always be secured with the gold matrix and low-fusing body, and, if this is so, it should prove a boon to those dentists who are still using porcelain, the number of whom, even in America, is still quite large.

Dr. Jenkins says that cavity preparation for a porcelain inlay requires less destruction of tooth substance than that for a gold inlay. I cannot see why this should be so, and am satisfied that sometimes the contrary is true. As for conducting thermal changes: If caries has not progressed to the pulp, and the pulp is properly protected with cement before the inlay is made, or the inlay is made hollow, usually no trouble will ensue from that source. If durability be the paramount quality desired in a filling, gold is still the first of all the materials used for filling teeth. No single filling material, however, is best for all the various cavities which are to be filled, and the dentist should use his best judgment and select that material which is best fitted for each operation as he performs it.

Dr. A. E. Sager, Rochester. Like Dr. Hert, I have used porcelain a great deal, and with success. I had the pleasure of seeing two inlays the other day made eight years ago, which are still doing good work, but like many of my *confrères* I have abandoned the use of porcelain inlays. I never used the gold matrix, but now, with the enthusiasm inspired by Dr. Jenkins, I shall look into the gold matrix idea, and see if I cannot resume this work where I left off.

Dr. H. L. Belcher, Seneca Falls, N. Y. I would like to ask Dr. Jenkins to tell us something in regard to the selection of the proper color of the cement to be used with the porcelain inlay. I took up porcelain work a year ago, but the great trouble we beginners find is that, after we have a perfect match of porcelain, the color will change when the inlay is cemented in. I am in the habit of using Ames' pure white cement, and I find that this produces less change in the inlay than any other cement. In fact, there is practically no change in the shade of the inlay, and if the color of the inlay has been properly matched to begin with, it will still be perfect after cementing. I should like to have an expression of opinion from Dr. Jenkins in that respect. I have obtained the best results by using the Ames pure white cement with all inlays, regardless of color or shade.

Dr. A. McAlpin, Bradford, Pa. While not wishing to depreciate the value of the artistic qualities of the porcelain filling, it may not be out of place to say a word in defense of silicate cements.

There is no question of the esthetic effect of the porcelain filling, but the average practitioner is probably incapable of obtaining the same average of high quality work with porcelain as with silicate cement. Personally, I have had experience with both, and while I recognize the value of a perfect porcelain inlay, I have great respect for the esthetic effect and all the other good features of the silicate cements as perfected within the last few years. In order to offset in a measure the effect that the depreciation of silicate cements might have on the minds of some who are not familiar with their use, I would say that the silicate cements have qualities that appeal to the average practitioner and insure him better average success than the attempt to perform operations with porcelain inlays exclusively. There is no question, however, that the porcelain inlay has its place, and if inserted by a competent operator, answers all the requirements of a filling, but there are limitations to porcelain, and some of the better silicate cements really are a very good substitute for porcelain.

Dr. D. H. Squire, Buffalo, N. Y. I have felt, like many others, that the porcelain inlay is not the most desirable filling, as its technique is so difficult. The examination of many porcelain inlays made by European dentists has convinced me that when this work is well done, it is the most beautiful of all tooth restorations.

Perhaps it is because of our faulty technique and lack of practice in this art that we do not obtain the same good results as the dentists abroad. There is no question, with all due respect to gold, that an acceptable porcelain filling gives us the keenest satisfaction.

I wish to thank Dr. Jenkins for stimulating us once more to renewed effort in this work.

Dr. C. S. Butler, Buffalo. There is one phase of the subject of inlays about which I have thought much. In the past few years porcelain has been developed to a high degree of efficiency, but I doubt whether the development of the cements or the cementing media has advanced in the same relative proportion, and I feel that in the near future the cementing media must receive more attention from practical men. If we could interest the practical man in the development of the cement, just as Dr. Jenkins has been interested in the development of porcelain, I apprehend that some of the difficulties that confront the profession today would be largely eliminated. In the first place, we must have not only a medium that will withstand stress, but it must also be sterile or germicidal in character. It seems to me that if we are to attain the degree of efficiency and permanence that has already been attained with porcelain, efforts must be made in the direction of improving the cementing media.

Dr. Henry H. Tompkins, Utica. We have all listened with a great deal of interest to the paper which has been presented by Dr. Jenkins, and to the discussion which has followed. I feel, however, that many of us would like to have a little more light thrown on this topic. The essayist seems to assume that we understand how to make a perfect porcelain inlay. Yet there is something more to the making of perfect porcelain inlays than the mere use of glass burnishers, which Dr. Jenkins mentions. I should therefore like to hear more of the details of construction. For instance, does Dr. Jenkins still use asbestos investment material? My observation leads me to believe that this has a great tendency to shrinkage, as has porcelain itself. I know that many of us would be very glad to have Dr. Jenkins in his closing remarks go into all the details which enable him to produce a perfect porcelain inlay.

Dr. Jenkins (closing the discussion). I am very grateful to the gentlemen who have done me the honor of discussing this paper in such a kindly manner.

I was much interested that Dr. Hofheinz referred to, or rather took exception to, my assertion that less sacrifice of tooth substance is necessary in porcelain than in gold-inlay work. I have not, however, expressed myself quite accurately in that respect. In many instances it is necessary, in making porcelain inlays, to observe the general rules with which we are all familiar in the formation of cavities for gold inlays; but there are cases where, by reason of the physical quality of the porcelain, less extension for prevention may be allowed with the porcelain inlay, partly because the surface is so smooth that it can be kept perfectly clean, and partly because a porcelain inlay in a vital tooth is more readily brushed without discomfort of any kind. All of you have had instances, sufficiently numerous, in which it has been difficult to induce patients to keep large gold fillings or gold inlays clean because of the sensitiveness of the teeth to thermal changes; and that danger is eliminated in the case of the porcelain inlay. It is also true that, by using the direct method, one is able to preserve here and there some important portion of the tooth, which, with the indirect method, or with the method of making a wax model and casting a gold inlay, one is often obliged to sacrifice. There are many such instances of sufficient importance to deserve mention.

As for the question of the indirect method, I may say, I believe that in all cases where, without too great sacrifice of substance, one can obtain a perfect model of the cavity with wax, this method is to be preferred, because it is much easier for the patient and for the operator. A perfect impression of the cavity may be put into the hands of a laboratorian who does that work, and a model may be made—I may say that personally I much prefer the cement model—into which the gold matrix may be burnished at one's convenience. One can be absolutely certain, befoie embedding that matrix, that it is an exact duplication of the cavity. Under all circumstances, every matrix for porcelain inlays should, in my opinion, be embedded.

One of the gentlemen has asked for some information about the technique. I may say that there is nothing relative to this work which has not been the subject or occasion of a great deal of thought and experiment. It is essential that the matrix should be embedded in asbestos or some other material which will neither expand nor shrink. The returning of the nearly finished porcelain to the cavity for additional burnishing is something which I believe to be under all circumstances pernicious or unnecessary, and therefore to be avoided. The embedding of the matrix in the platinum or nickel cup is of great importance. The mere mixing of the asbestos requires a little care and skill, if the ideal consistence is to be obtained, and unhappily there are a great many kinds of asbestos which either contract or expand through the process of removing the moisture. For years I have been endeavoring to discover the source of a certain asbestos, which I believe to be in the island of Sicily. It is with great difficulty that any considerable quantity can be obtained from the dealers, but this asbestos, like some others we find in Europe, will neither contract nor expand. When the matrix is placed in an investment of this asbestos, and the moisture is removed by heat, no change whatever in the size or shape of the investment or the matrix occurs during the process of fusing.

As to the question of adapting the color of the cement to that of the inlay, I am very glad that one of the gentlemen said he used in his own practice only one kind of cement. I may say that my experience is quite the same as his. I find no reason whatever for using a multitude of different colors. In the perfectly prepared porcelain inlay, except at certain points, it is necessary to have only a thin film of cement, and whenever the color of the inlay has been properly selected, and when it has been baked true to color, it looks all right when put into the cavity for trial, but after that, when the rubber dam is put on and the tooth is bleached through dryness, the inlay is not exactly the color of the tooth, and the setting with cement appears to increase still more that disharmony of color. After a short time, however, the tooth comes back to its normal condition, and the inlay then assumes its proper color again, which thereafter it never loses.

I was also very much pleased to hear what good success some of you have had in the use of silicate cements. That is also largely a question of skill and temperament. The objections which we have found in Germany to the use of silicate cement, except for temporary purposes, are its structure, which is not sufficiently resistant; its lack of adhesion to the cavity—often accompanied by shrinking—and its tendency to discolor and become rough on the surface. The porcelain inlay—and I hope this will prove to be the case with the gold inlay also—is, so far, the only kind of filling which continually improves in the mouth. If it is once properly placed in position and has no serious defects, it becomes constantly firmer as the years pass by.

Dr. HOFHEINZ. To what do you attribute this. To the physical property of the porcelain itself?

Dr. JENKINS. To the continued hardening of the cement, not to the porcelain, for the cement, being protected from moisture, finally assumes a hardness as great as that of the porcelain itself. I have had occasion to remove a few porcelain fillings, made many years before, because I was discontented with the color, and it has been one of the most difficult tasks I have ever performed to remove the porcelain and then cut out the cement beneath it. One can cut ordinary porcelain with greater ease than this cement.

It is quite true that the inlay must have sufficient bulk to be able to withstand the stress placed upon it by mastication. That goes without saying, and there are cases where one sometimes deliberately runs a little risk; but one fact I have established to my own satisfaction is that, under favorable conditions, if one has two millimeters of thickness of a good low-fusing porcelain, such bulk is sufficient to endure the strain of mastication. Of course, one ordinarily takes as much bulk as one can get, but in many delicate cases I am convinced that two millimeters' thickness is sufficient for the integrity of the properly fused porcelain inlay. I should also like to add that there is far less danger of spoiling a low-fusing porcelain than a high-fusing one, even though one has an excellent furnace and an accurate pyrometer; for one can far more easily control the low than the high temperature, and at high temperatures sudden changes very quickly occur. I will say also that one great advantage of using the low-fusing porcelain, in my opinion, is that it may be more rapidly fused and more rapidly cooled. Moreover, the rapid cooling of low-fusing porcelain in the open air never seems to injure its texture or cause it to be more fragile.

One of the gentlemen emphasized that the cavity must, whenever possible, be so shaped that the cement will not be depended upon for retention; that is, that labial cavities must not be saucer-shaped. Of course they must not be. All cavities, as far as possible, must have parallel walls. The ideal cavity we can never form—at least almost never; but when the cavity has sufficient depth and some strong parallel walls, a step is never necessary for the security of a porcelain inlay.

Color is something that one learns chiefly by experience. There are places where one has to modify the color, and not have the exact color of the tooth itself. For instance, in labial cavities the tint of the tooth should be preserved, but the color should be slightly darker than in an approximal cavity. An approximal inlay in the incisors may be made distinctly lighter than the tooth itself.

Dr. BUELL. Mesial or distal cavities?

Dr. JENKINS. Either.

Dr. BUELL. The same degree of lightness in both cases?

Dr. JENKINS. Not always the same. In distal cavities the color may be lighter than in mesial cavities.

I hope I have answered all the questions asked. I thank you very much for your courteous consideration of my paper.

The meeting then adjourned until Saturday afternoon.

(To be continued.)

EASTERN ASSOCIATION OF GRADUATES OF THE ANGLE SCHOOL OF ORTHODONTIA.

Monthly Meeting, held at Philadelphia, March 29, 1913.

The regular monthly meeting of the Eastern Association of Graduates of the Angle School of Orthodontia was called to order by the president, Dr. Milo Hellman, New York, in the assembly room of the Hotel Stenton, Philadelphia, on Saturday evening, March 29th, at 8 o'clock.

The first item on the program was the reading of a paper by Dr. M. H. Cryer, Philadelphia, entitled "Studies of Anterior and Posterior Occlusion of the Teeth, with Suggestions as to Treatment."

[This paper is printed in full at page 673 of the present issue of the Cosmos.]

Discussion.

Dr. H. C. Ferris, New York. I wish to ask Dr. Cryer if he will not help us in clarifying one point; that is, the relation between the first measurements that he gave of the skull and the angle of the mandible. Has he made any comparison between these two measurements?

Dr. Cryer. Yes.*

Dr. Ferris. I note in a number of the essayist's illustrations that he rather treats these skulls as if they were finished products in normal development, but they are abnormal. In a few, lack of function is noted rather than normal function in occlusion during the developmental period. The change of the angle of the ramus, according to my interpretation of the slides, had a great influence upon the development of the maxilla, and that is one point that I believe would be of great assistance to us, if we could gain some idea of the normal in different types. We have heretofore failed to compare the angle of the ramus with the length of the first measurement mentioned by the essayist. I believe this would help us in our work, by giving us some idea of the normal development of the maxilla.

The essayist's suggestion for the surgical treatment and the subsequent movement of the jaw is intensely interesting, and I believe that this operation could be performed by skilful operators. This also explains to my mind the puzzling condition which I have encountered in many cases of that particular type. I believe that the angle of the ramus is subject to influence, and that I have modified this angle by moving the molars distally. I have a case of class II, division 1, at the present time, where I am convinced, after observation, that I have brought about normal mesio-distal relation, but there is a prominence in the chin which indicates that I have not altered the mandible in its angle. It is in such a case that the relation between the essayist's first measurement in the angle of the ramus would be of assistance in the diagnosis as well as the treatment of our cases.

Dr. Cryer. The object of this paper is to bring out discussion. I am here to learn, and want to study these conditions with you who are constantly dealing with the changing of the positions of the teeth and the jaws. In the first place, however, Dr. Ferris has misunderstood me in regard to the normality of the skulls. I only give one figure as being fairly typical. (See Figs. 6, 9, and 16.) The other illustrations are all of abnormal character in one form or another.

* [Details regarding these measurements have been inserted in the body of Dr. Cryer's paper.—Ed.]

Dr. Ferris. You noted that you had made comparison between that first measurement and the angle of the ramus?

Dr. Cryer. Yes. In the skull which I call the "mixed skull" (Fig. 11), we have the measurements of 62 and 48, making the great length of 110 from the cutting edge of the teeth to the foramen magnum; in connection with this we have one of the most obtuse angles. 135°. We can obtain these relations between the angle of the jaw and the length of the skull in the living subject to a certain extent. We can judge where the foramen magnum is by its relation to the pharyngeal wall, and, with the aid of a straight probe, can approximate the distance from the incisors to the foramen magnum, and with the aid of X-ray and digital examination we can tell the character of the angle.

Speaking of the surgical treatment of the angle, I have not done this operation, but shall probably do so, and would recommend it to a competent surgeon. The one point to keep in mind is to avoid disturbing the inferior dental nerve, if possible, and I believe that with proper instruments the circular incision can be made in such a way that it will not injure the nerve. Nevertheless the operation would be justifiable under any circumstances, as the collateral circulation will take care of the tissues, and the nerve would more than likely re-unite in a short time, if it should be severed accidentally.

Dr. J. Lowe Young, New York. I do not propose to discuss skulls with Dr. Cryer, because it would be absurd for me to attempt such a discussion with a man who has made such a close study of skulls as he has. It seems to me, however, that the difference in what he has presented to us tonight and our work, is that our work is principally done on children, whereas he has shown skulls principally of adults, and, as Dr. Ferris says, many of them have undoubtedly developed abnormally. The problem of greatest interest to the orthodontist is the development of the organism, and regarding this I would like to ask one or two questions. First, is the shape of the temporo-mandibular articulation in the child at five and six years of age the same as in the adult? To make myself clear, is it possible for a child of this age to voluntarily or involuntarily slip the mandible distally in order to get the teeth in better occlusion? According to the vital instinct, the child wishes to masticate food as much as possible, and if for some reason the upper dental arch has not widened sufficiently to accommodate the lower teeth, can the child's mandible be slipped back so as to get these teeth in such a position that he can masticate better? If that is true, then does it not follow that, if the child is allowed to go on in that condition until adult life, he would have abnormal development of the temporo-mandibular articulation of the bones surrounding the teeth and in both the upper and lower arches.

Dr. Cryer. In regard to the teeth of children coming into occlusion, I believe that the vital instinct will place the mandible backward or forward to a certain extent to allow the child to obtain the best position for mastication, because good chewing and insalivation are necessary to life and health. The change of the temporo-mandibular articulation during childhood is very great. At birth, the glenoid fossa is rather flat or shallow; posteriorly the external auditory fossa is not formed, there being only a ring with its external tympanic membrane stretched on it; anteriorly the eminentia articularis is very slight. The condyles are round and short. As the auditory process and the eminentia articularis develop, the glenoid fossa becomes deeper until near adult life. Therefore the mandible is more at liberty to change its position in early life. If changed to a forward position, there is little danger of doing harm, but if it be carried backward, either by the vital instinct or by mechanical means, there is great danger to the organ of hearing. Does that answer your question?

Dr. Young. That is what I was after.

Dr. Cryer. You will find in the Transactions of the American Society of Orthodontia for 1908 several illustrations showing the glenoid fossa at various ages.

Dr. Young. You spoke about changing the shape of the mandible where it forms an obtuse angle. With your knowledge of the anatomy, do you believe that it is possible for the orthodontist with any mechanical appliance to really change the angle of the mandible?

Dr. Cryer. You can surgically do so.

Dr. Young. No, but by mechanical pressure applied for a long period of time?

Dr. Cryer. I believe the angle can be made more obtuse, but bringing it nearer a right angle would be rather difficult.

Dr. Young. You spoke of the obtuse angle or straight mandible, and asked whether the orthodontist could make that mandible more of a right angle.

Dr. Cryer. I do not think he could, but do not want to dispute that point, and hope that some of you will show it.

Dr. Young. I do not think anybody will ever show it.

Dr. C. A. Hawley, Washington, D. C. Would there not be quite a different result, so far as the auditory canal is concerned, if this vital instinct were allowed to exert itself gradually over a period of three or four years? Is it not true that there would be no danger then, because of the fact that all of the tissues would change in conformity to the new relationship of the parts?

Dr. Cryer. If the vital instinct, or if mechanical appliances were allowed to force the mandible backward, it would come into contact with the auditory process which forms the anterior wall of the external auditory canal. This wall has often become resorbed by the pressure of the condyloid process against it. This would interfere with hearing. Of course the ear cannot change its position to accommodate any movement of the mandible posteriorly. Illustrations of these conditions are given in the Transactions spoken of in answer to Dr. Young.

I believe, as I did years ago, that bone can be bent, and with the ingenuity that you orthodontists show, I believe you can bend the angle, especially in the direction of which I speak. This can be done because none of the tissues are absolutely solid. It was argued recently in a paper, as though it were a new discovery, that bone is pliable. Of course this is possible; even the rocks of the mountains are pliable. Every tissue is subject to change, and is to a certain extent pliable. If constant force is applied to it, the mandible can be bent, but I should not like to see it forced back on the auditory canal; that must always be avoided.*

Dr. H. E. Kelsey, Baltimore. This discussion reminds me of a case which indicates effectively to my mind that the bones of the mandible can be bent.

No doubt many of you have seen the report of this case published in the January 1913 Cosmos,† and will remember that the deformity of the jaw which required treatment was caused by an appliance which had been used previously in the treatment of spondylitis.

A leather strap or sling had been worn under the mandible and carried up on each side of the head, to be attached to a support above which projected upward from a plaster frame which rested upon the shoulders. The purpose of this appliance was to elevate the chin and keep the neck straight.

The result on the patient's jaw was to compress it laterally and bring it into lingual and distal occlusion, while the anterior portion of the upper arch was much protruded.

If this very great alteration in the shape of the mandible of an adult could occur as the result of wearing a mechanical appliance, it seems to me that,

* Since reading the paper on March 29th, I have had a patient referred to me whose mandible has apparently changed in shape in the last few years by the action of the hyoid group of muscles. In the anterior portion of the mouth, the occlusion is gradually opening. This was first noticed by the patient when she lost the power of biting a thread. So far, there is no other explanation than the fact that the muscular action is opening the bite. The patient has been examined and studied by many eminent men without any other cause being found—M. H. C.

† "Deformity of the Jaws Caused by the Extension Bandage in the Treatment of Spondylitis." By G. Lind, Dental Cosmos, January 1913, p. 13.

on the same principle, force when properly applied to a deformed jaw might bring about desirable changes, such as bending it at the angle, and thus reducing its protrusion. That we will ever be able to apply sufficient force to do that I do not contend, but I believe that if sufficient force is applied, the bone will respond, and changes will take place, and I have no doubt that the angle can be made obtuse or acute; but whether this will ever be a practical procedure, I do not know as yet.

The dangers which Dr. Cryer points out might make such an effort inadvisable, but the illustrations of the article that I speak of are very convincing as to the alteration which could take place in the jaw.

Further than that, I saw a similar condition in which a sling had been passed around the jaw somewhat like the Angle chin-cap, and pressure applied backward and upward, and the lower jaw of this patient was forced back perhaps half an inch distally to the upper.

The relations of the incisal region of the upper and lower jaws at least indicate that much change, and though I have not yet had an opportunity to make a careful examination of this case, there can be no doubt that, in two years' time, the jaw has been considerably altered in shape and possibly displaced by this pressure. What took place I do not know, but if I have an opportunity to take X-ray pictures of it I shall do so, and study the effects of the appliance upon the jaw. It will be interesting to know just what changes have occurred.

Dr. W. B. Weinburger, New York. I have examined a case of class II, the patient being one of seventeen or eighteen years, who seems to be normal in profile, the incisors having normal inclination and the lips also being normal. The question which interests me in this case in regard to the angles of the condyles is—Were the angles in the same position at the age of fourteen, or have the jaws shifted since then?

Dr. Cryer (showing slide Fig. 17). The angle of this mandible is nearer a right angle than usual, especially when belonging to a skull with so much protrusion of the teeth. The angle is 118°, while in the typical skull it is 125°. It is interesting to note how the mandibular teeth were carried forward to form occlusion with those of the upper jaw, which were placed so far forward of the foramen magnum. The vital instinct carried the mandibular teeth and their processes forward the width of a molar, which also gave the anterior teeth a labial inclination.

Dr. Hawley. Was the first skull an inherited type?

Dr. Cryer. I think it was an inherited type, as it is supposed to be the skull of a cannibal of the West African Fan tribe.

Dr. Strang. Can we not say that this is just as much a normal skull for that race as the Caucasian skull was for that race?

Dr. Cryer. I should say so. Yes, I think it is a normal West African skull.

Dr. Strang. Then would it be necessary to treat that case?

Dr. Cryer. Not this particular case. It was shown only for the purpose of studying such a conformation, which might be found in a more modified degree in some abnormal case. We have, in this country more than in any other of the world, the mixing or blending of different types.

Dr. Stanton. What would result from breeding the orthognathous with the prognathous type?

Dr. Cryer. Unfortunately, I have not tried it.

Dr. Stanton. Do we not have this on all sides when we see the black and white races mixing?

Dr. Cryer. No, hundreds of negro skulls can be produced, showing no two alike. Hundreds of negros are to be found who are not prognathous, while, on the other hand, many of the white race have protruding jaws.

Dr. F. L. Stanton, New York. If it is true that a child may inherit jaws in which the disharmony of size and form is produced by the intermarriage of different types, would it not be possible to examine the jaws of the father and mother, and ascertain the relation of the types of the father and mother to the deformity in the child? The bone of contention is whether or not the intermarriage of races with different facial angles can produce deformities of the jaws. I was reading today in the DENTAL COSMOS of November 1906* a quotation from one of the essayist's articles: "The intermarriage of German, Italian, and Hebrew races will in time produce a distinct type. At first the offspring of such unions may possess some of the characteristics of the father and some of the mother. These may not always harmonize with each other, with the result that the teeth are not in harmony with the face, or the mandible with the maxilla." From this I would infer that the essayist thinks it possible for the child to inherit the mandible of one parent and the maxilla of the other. I want to suggest that it would be more convincing if he would present models of the jaws of the father and the mother after he has seen a child with these deformities, rather than assume that disharmonies of the jaws and teeth may be produced by the intermarriage of different types.

Dr. CRYER. We can perhaps obtain measurements for one or two generations, but if a man today is going to breed a racehorse, he may have a horse and mare that have great racing ability, but no thoroughbred breeder will attempt to breed a racehorse unless he goes back many years and through many generations. We can readily see animals modified by great-great-great-grandparents, and we have to go back that length of time, because peculiarities are inherited from ancestors all the way back. I cannot give up the idea that these characteristics are reproduced in the offspring of animals, of human beings, and of plants, and, if there is a misalliance, there results in the offspring a mixture, to a certain extent, of attributes that do not harmonize with each other, as the teeth may not harmonize with the face, or the mandible with the maxillæ, though I would not call these attributes deformities.

Dr. DESNOES. Would we not have a blending rather than a mixture?

Dr. CRYER. There is quite a difference between blending and mixing in animals and plants. The color of the offspring of a union of the black and white human races is usually a blending of the two, as a mulatto; the features may be of a mixed type. In breeding the white hog with the black one, however, there is seldom a blending of color, the litter consisting generally of pure white and pure black, excepting little white patches on the face or the feet, as in the case of the Berkshire hog, and occasionally a black-and-white is produced, though not often, as a result of the first crossing.

Dr. F. T. MURLLESS, Jr., Hartford, Conn. In discussing this matter, it may be interesting to refer to the fact that it has been found that the atmosphere of personal freedom and education which is characteristic of our national life has changed the cranial dimensions of the descendants of our immigrants. It is said that the Sicilians with long heads have changed in one generation, and in occasional instances this is true of children born on the other side and brought to this country at an early age, the dolichocephalic type becoming mesocephalic. Also, at the same time, under this favorable environment, the Slavonic types, with their brachycephalic crania, show in their descendants the mesocephalic type. That has naturally led to the conclusion that, at least in a general way, cranial proportions depend upon mentality, food supply, and physiological influences, and that the best of these tend to produce mesocephalic crania.

In the slide shown by Dr. Cryer, in which the mandible has slipped forward, the jaw rests at but two points, upon a few of the anterior teeth and upon the condyle, and the pull of the masticatory muscles is abnormal. This would no doubt produce special tension in the region of the insertion of the masseter muscle, and tend to make the angle of the lower jaw progressively more obtuse.

The question of correcting the angle would really depend very largely upon the points where the force could be

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* See DENTAL COSMOS for November 1906, vol. xlviii, p. 1074.

applied, and because of the very uncertain base upon which such an experiment could be conducted it would probably be impossible to reduce the angle. The abnormal stress of the masseter muscle upon the bone has tended to thicken it at the point of insertion, and has perhaps contributed to the apparent obtuseness of the angle, and its continued use would doubtless interfere greatly with any correction which one might undertake at that point.

Dr. CRYER. I fully agree with Dr. Murlless as to the modifying effects of environment. Improved conditions and education will change cranial dimensions. This condition we notice particularly in our immigrant class and their descendants. The stand taken by Dr. Murlless in regard to the action of the masseter muscles having influence in modifying the angle of the mandible is certainly worthy of consideration, and I wish to thank him for his remarks.

Dr. I. B. STILSON, Providence, R. I. If I understood Dr. Cryer correctly, he spoke of the teeth in the mandible adjusting themselves so to meet the teeth of the upper jaw as to improve the occlusion. The question which arises in my mind in this connection is—Are the upper teeth placed in their position more constantly, and earlier, and do the lower teeth meet them? or, Do not, as I had supposed, the lower teeth erupt first and form the mold over which the upper teeth are formed?

Dr. CRYER. That is a debatable point, as a rule, but I think you can quote me as saying that the mandible is the frame upon which the upper teeth are placed in position—I believe you will find a statement to that effect somewhere in my writings. The upper teeth and jaws are fixed, in one sense. The upper jaw is not made up only of the two maxillary bones, but of all the bones of the face excepting the mandible, including a part of the sphenoid and the ethmoid of the cranium. It is the articulations with these bones that help to fix the upper jaw and make it comparatively firm, barring a spring in the bones by some mechanical or muscular action. The lower jaw can be pushed forward, but the upper one stays comparatively still, because it is braced there. If you will recall, I showed in Fig. 9 and other figures the manner in which the jaw is braced, not only by its own articulation, but at the sides, by the articulation of other bones.

Dr. STILSON. Would not the facts that the lower jaw-bone can move, and that the teeth are not embedded in bone but in the process, indicate that the lower teeth and the process of the lower jaw move less, and the upper more?

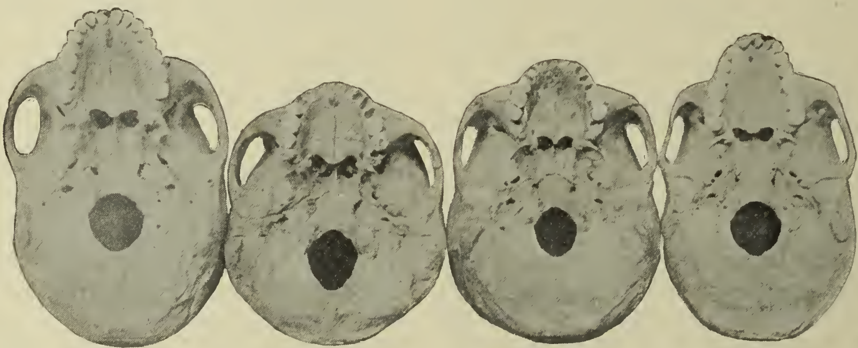
Dr. CRYER. I do not quite understand.

Dr. STILSON. The upper jaw-bone being fixed and the lower movable, would not, in adapting themselves in their relationship, the process and teeth of the upper change more than the process and teeth of the lower?

Dr. CRYER. I do not think so, judging from my experience and from the skulls I exhibited tonight. The lower teeth are, as a rule, not so firmly situated as the upper. The lower teeth extend down into the cancellated bone, and are but little associated with the cortical bone, while the upper teeth are, to a very great extent, closely associated with the cortical bone, which is comparatively solid.

Dr. MILO HELLMAN, New York, N. Y. It seems to me that this evening's paper has not been quite in harmony with the sentiment of the meeting, or *vice versa*. I wish to say first, that orthodontia of today is essentially based upon a knowledge of normal development, and secondly, that the modern practice of this specialty depends upon the recognition of any deviation from the normal. Furthermore, as orthodontic procedures necessarily involve the correction of certain maldevelopments, it is imperative, in diagnosis, to recognize any disturbance of those forces which, by their harmonious co-operation, govern the normal.

If we examine the specimens presented by the essayist, it would be well-nigh impossible to answer his question pertaining to the treatment of this or that abnormal skull, simply because the conditions present could only be diagnosed by assumptions. On the other hand, Dr. Cryer has shown us a prognathous skull belonging to the African Fan tribe, and asked how it would be treated. In my estimation that skull would require no treatment, as the condition is normal for that type. It is singular that we are still inclined to consider a prognathous type as an abnormality; some authors even designating it as "bimaxillary protrusion." It is as normal for the type mentioned above as the so-called orthognathous skull is for the European type, both depending on the inclination of the alveolar process in relation to the face and head.



Negro. Mexican Indian. Thibetan. Australian.
—*Osburn.*

Although anthropologists classify the gnathic index as prognathous, orthognathous, and opistognathous, all races are in fact prognathous (Topinard), the difference being in the degree of the inclination of the alveolar process. This difference, however, is not ascertained in the manner described by the essayist, but by the construction of a triangle, employing as the three points the nasal spine, the incisal point, and the center of the external auditory meatus.

The application of the method advanced this evening involves an increase in the source of error, for there is but one dimension that is resorted to, the horizontal, while in the architectural construction of the head three dimensions are covered. The maxillary portion of the head may vary in its relative position to the foramen magnum in any of those dimensions, diminishing the horizontal distance, and yet remaining prognathous. Again, if these skulls in the illustration from Osburn be observed, it will be seen how the form and position of the foramen magnum may vary in different skulls. In addition to this, the level of the foramen magnum is so different in individuals that it may be on the horizontal plane in one, as in the skull shown by Dr. Cryer, or at an angle of 45° in another, which of course will change the measurement as presented, though not the index.

In conclusion, I wish to thank Dr. Cryer for his highly instructive paper.

Dr. CRYER (closing the discussion). I do not quite understand Dr. Hellman's contention. I ask how would you treat the abnormality in skull No. 18, and Dr. Hellman says it would be impossible to treat this skull, because we cannot get at the deviations of the normal, but must only study normal skulls in order to base conclusions thereupon. I disagree entirely with this view, as in my opinion one must be familiar with as many variations from the normal as possible in order to understand the causes of an abnormality, and to treat it intelligently. I do not ask how one could treat the skull of the African Fan negro, as you will see by referring to Fig. 17 in my paper. It is in regard to Fig. 18 that I ask your opinion, as it represents a type which you may have to deal with and treat.

I wish to say in closing that I appreciate very much the invitation of this society, because there are many questions in regard to this subject that I have wanted to consider with orthodontists.

The meeting then adjourned.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

Regular Monthly Meeting, held February 25, 1913.

The regular monthly meeting of the Academy of Stomatology of Philadelphia was called to order by the president, Dr. Joseph Huggins, in the lecture hall of the College of Physicians and Surgeons, Tuesday evening, February 25, 1913, at 8 o'clock.

The President introduced Dr. J. Bethune Stein, New York, N. Y., who read the paper of the evening, entitled "Syphilitic Hypoplasia of the Teeth."

[This paper is printed in full at page 691 of the present issue of the Cosmos.]

Discussion.

Dr. Otto E. Inglis. The studies permitting the placing before us of such evidence as has been given this evening have no doubt been the result of arduous labor, and too much praise cannot be bestowed upon an investigator who has gone to the facts for his knowledge of the subject. It is really wonderful how a few demonstrated facts relegate to the mortuary a great mass of theory based upon clinical evidence alone.

Though syphilographers of wide practical experience have related certain sequelæ of almost constant attendance upon known primary lesions of syphilis—for example, such secondary lesions as eruptions upon the skin and oral mucous membranes and the mucous patch and sore throat resulting therefrom, and such tertiary lesions as the gummata, etc.—and while they were all but certain of its exact etiology, it seems that not until the discovery of the spirochæta pallida or treponema pallidum as a constant and exclusive accompaniment of syphilitic lesions could they fix upon the contagion which passed from individual to individual. This led others to trace the germ into the placenta and embryo and other organs, and also into the subject of hereditary syphilis. A most satisfactory and in many respects conclusive *résumé* of this part of the subject was given by Cavallaro in an article in the Dental Cosmos, running from November 1908 to February 1909 inclusive, entitled "Syphilis in Its Relation to Dentition." This writer showed that the fetus can be contaminated by the spermatic fluid, the ovum, or by way of the placenta from a mother infected extragenitally.

Cavallaro further called attention to the fact that the clinical evidence of syphilis may appear in the newborn child within a few days or weeks, within a few years, or as tertiary lesions at about the age of puberty. Whether the clinical manifestations be mild or severe is beside the question, for it is now evident that the treponema is transmitted, and the child really has syphilis and its manifestations.

As to the relations of syphilis to dental embryology, the clinical evidence in hypoplasic teeth has, from the time of Jonathan Hutchinson, Sr., in 1868, been a disputed question. It has always been an open question whether syphilis or malnutrition or eclampsia, or, most important, the various exanthemata produce the stigmata of pits or grooves or other hypoplasic evidence of permanent character upon the teeth. This is a question which could only be settled in the way in which the more characteristic lesions of syphilis have been related to the primary infection, namely, by finding the treponema in the child, or, better, in the developmental organs of the teeth. The discovery of the presence of the treponema in the dental organs is credited by Cavallaro to Pasini of Florence, Italy, and he claims to have himself found them there in quantity. From his studies of interrupted hypoplasias, or as he terms them, dystrophies, he deduces that the effect of the treponema upon the developmental tissues is to destroy them or cause atrophy, so that constrictions in the organs exist corresponding with the defects in the teeth. He deduces that, when sound tissue is found between the stigmata, the treponema has been active in the individual at different periods. This destructive or atrophic action can readily be comprehended when we regard the dental organs as of dermal origin, and, as such, readily affected by any germ that would produce skin eruptions.

Cavallaro also pointed out clearly the fact that syphilitic lesions of the teeth occur upon the same level of homologous teeth; he also noted the predilection of the attack upon special groups, as the incisors, particularly the upper—Hutchinson's teeth—and the cuspal portions of the first molars—Fournier's teeth—these being the teeth in process of calcification at their tips in the early period at which the clinical evidence of hereditary syphilis is most manifest. The molar tip is calcified first, and therefore when Hutchinson's teeth are found, Fournier's teeth are also found. He also points out that the infection of the fetus may produce dystrophies in the deciduous teeth, and that many other defects of the maxillæ and palate may be attributed to syphilis.

Dr. Stein in his lecture showed dystrophies in the lower teeth of a Frank attributed to about 400 A.D. Considering that it could not be syphilis, though in another case illustrated, of known syphilitic origin, an almost identical dystrophy of lower teeth is shown, Dr. Stein accordingly attributes some of these cases to syphilis, while he states that others are not due to that affection.

It is just at this point that I seem to lose clear vision of the cause of these various dental stigmata—*i.e.* whether they are of syphilitic or exanthematous origin. Which of them presenting in an adolescent patient may be due to syphilis? The true Hutchinson's notch is seldom seen.

If the treponema can exist at any age, why could it not have produced the dystrophy? A positive Wassermann reaction would of course be some proof, but a negative one might merely mean the absence of the treponema after the damage was done.

Dr. Stein also seemed to give the impression that the enamel is formed in the first year. True, its deposition is begun, but it would seem to continue much longer than even the second year in the permanent tooth, and many of these hypoplasias have some deposit of enamel next the dentin while that which should be external to it is lacking. This means a disturbance at a later period, that at which the enamel is first deposited.

So instructive are Cavallaro's statistics relative to the associated signs of hereditary syphilis that I cannot resist quoting his offering of six hundred cases of known hereditary syphilis observed by Sidler-Huguenin and the Fourniers, of which approximately fifty per cent. had some ocular disease, from forty to forty-five per cent. dental dystrophies, and from fourteen to eighteen per cent. auricular lesions. Hutchinson's triad of dental dystrophy, disease of the middle ear, and interstitial keratitis has been modified to some extent by additional ocular and auricular symptoms, which Cavallaro epitomizes in his article.

In a case of my own, Hutchinson's teeth, interstitial keratitis, and nasal catarrh with sunken nasal bridge in a boy of twelve could well be taken as evidences of tardy hereditary syphilis.

In all these cases presenting in dental practice, the practitioner is in a peculiar position, and, as the exact condition of the patient may not be known, either secretions from present associated lesions may be examined by the now known methods for the presence of the treponema, or the Wassermann test may be made. G. V. I. Brown quotes Baum as stating that this reaction occurs also in scarlatina, pellagra, Hodgkin's disease, and leprosy, and does not always occur in syphilis. It should preferably be performed by one accustomed to frequently perform the test. If the finding is positive, one should consult the family physician, as the treatment will fall into his province, and family peace must always have the utmost consideration.

As it is not certain to what extent natural vitality may have overcome the treponema, strict sterilization is a wise precaution after dental operations upon patients exhibiting these dystrophies.

Dr. G. M. Dorrance. This has been a very interesting and instructive lecture. While there are a number of minor points with which I take issue, I agree in the main with the essayist. I was impressed very much by his remark that the teeth are only one diagnostic factor, and that we should always look for other signs.

In regard to oral symptoms of syphilis, one should be very careful to remember that hypoplasia of the teeth can be due to other causes. The differential diagnosis of syphilis of the mouth from early leucoplakia, malignancy, etc., is frequently very difficult, and many complications are likely to arise from a careless diagnosis. In malignancy, for instance, the best time for treatment is lost by delay.

How is one to determine whether a lesion is due to syphilis or not? Clinical experience usually directs us, but in the borderline cases we frequently fail, and this is where the Wassermann test and examination of the tissue for spirochetes are very valuable. There are a certain number of conditions in which the Wassermann reaction will not be of much value. First, the test is usually negative in the primary stage; second, the patient may have taken mercury or other medicine which will interfere with the reaction; third, some authorities claim that large quantities of alcohol cause differentiation in the test.

It is very difficult to obtain a history of the infection, and it is almost impossible to secure a history of congenital lues.

The changes that have been described tonight as occurring in the teeth are undoubtedly due to changes of nutrition of the entire body, and not to any local action of the spirochete. The same changes, in a modified form, can be found in the bones. They may be due to conditions other than syphilis, such as tuberculosis, etc., but in most cases, syphilis is the cause. Children may become infected with the spirochete at any time before or after birth, the date of the infection, of course, producing a different type of syphilitic teeth.

The question of treatment was not included in the lecture, but a few remarks along this line may be interesting. The newer remedies of salvarsan and neosalvarsan have improved our methods of treatment; nevertheless most men are still using mercury and the iodids in combination with these arsenical preparations. The indications for continued treatment are controlled by the results of the Wassermann test.

More important than the cure of syphilis is the prevention, which is a very easy matter. First, let us clearly understand that there are three distinct stages of syphilis and that all are infectious. I know, personally, of six cases in which the victims had become accidently infected. You will all remember the series of infections from a kissing game, in which one boy, not knowing that he had a mucous patch, took part, thereby infecting six or seven people.* There are many other similar instances, including that of a very prominent dentist in this city, who contracted syphilis from one of his patients. He was under the false impression that it was not infectious in the tertiary stage.

The method of preventing infection by the spirochete consists in the use of rubber gloves and twenty per cent. calomel ointment. The ointment is applied before putting on the gloves, and when finished with the operation the gloves are removed, the hands scrubbed, and again the calomel ointment is applied.

A Member. Do you leave it on the hands?

Dr. Dorrance. Yes, it does no harm to leave it on. This method has been thoroughly tried out by rubbing the skin

* See "An Epidemic of Chancres of the Lip from Kissing." By Dr. J. F. Schamberg, Dental Cosmos, January 1912, p. 123.

of a monkey with the calomel ointment, and then trying to infect him with syphilis.

In regard to the question of the Wassermann test, I would say that if the patient can be absolutely prevented from taking mercury, iodids, or other patent remedies for syphilis, then the Wassermann findings can be relied upon.

Syphilis is now curable, but one can become reinfected.

Dr. Robert H. Ivy. With regard to Profeta's and Colles's laws, I think the Wassermann reaction rather explains these laws than disproves the fact that the mother can be infected by a syphilitic child and *vice versa.* A positive reaction in the child of a syphilitic mother shows that it has syphilis in a latent form, and therefore the child cannot be infected by the mother. Wassermann's reaction in scarlet fever, as Dr. Inglis said, has been found positive in a few cases, but only during the febrile stage, so that there is no confusion in those cases. It seems to me that the whole question as to whether dental stigmata should be ascribed chiefly to syphilis depends on which theory we accept as to the period of time occupied by calcification of the teeth. If calcification only proceeds or is complete in the first few months after birth, then syphilis is undoubtedly the cause of a great majority of these defects. If, however, we are a little more conservative, and regard calcification as proceeding for two or three years after birth, then a great many of the other eruptive fevers, such as scarlet fever and measles, must play a more important part in these lesions. If calcification occupies only the first few months, then syphilis must be practically in all cases the cause of the hypoplasic lesions, because calcification is complete at the age when other diseases are common. It is by no means certain, however, that the enamel is thoroughly calcified at this early age.

Dr. Pickerill, in his new book on stomatology, in opposition to the theory that syphilis is the common cause of dental hypoplasia, cites the fact that in New Zealand, where hereditary syphilis is comparatively infrequent, these dental defects are rather common. The results of the Wassermann tests that he has been making have supported his view.

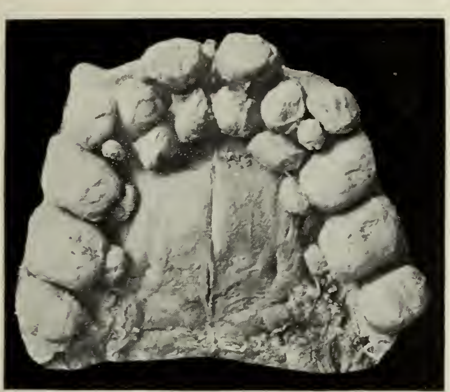
Today I saw a girl nine years of age with typical honeycombed hypoplasia of the permanent incisors, with central caries and poor development of the cusps of the first molars, but who gave no history of syphilis. I questioned the mother in regard to miscarriages, etc., but could get nothing from the history suggestive of syphilis. I took the blood for the Wassermann reaction, but unfortunately will not be able to find out the result until tomorrow. It will be interesting to note whether this case shows a positive reaction to the Wassermann test. If so, the chain of evidence will be complete that this is a case of hereditary syphilis. A negative test may not be of great importance, because these defects may simply be the results of syphilis, and not mean that the disease is active at present.

Cavallaro, who has already been referred to, claims that he can make a diagnosis of syphilis on the dental lesions alone, and that they are of sufficient importance to warrant putting the patient on anti-syphilitic treatment. Whether his views have been modified by our experience with the Wassermann reaction, I do not know.

Dr. I. N. Broomell. One surprising phase of this discussion is that any question should be raised as to the time at which calcification of the teeth begins, and how long this process continues. Dr. Ivy, particularly, has dwelled on this, evidently treating it as though there were some doubt as to whether calcification is a continuous process, or whether it is complete in a short period. It is quite a simple matter to make dissections and find out the extent to which calcification has taken place at a certain time, either before or after birth. By request I brought some slides showing dissections, which may add something to the argument as showing the manner of calcification.

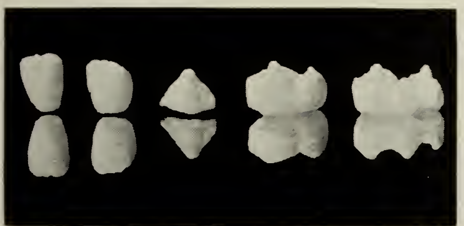
The first slide (Fig. 1) shows a dissection recently made, and similar to one made years ago, the mucous membrane and the periosteum having been dissected away from the hard palate of a child one month after birth. By turning the soft tissue over, we expose to view, as shown in the illustration, the dental follicles, not only those for the deciduous teeth but also those for ten of the permanent teeth. The study can be very easily con-

Fig. 1.



tinued by opening up the follicles (Fig. 2), and noting the extent of calcification as it appears at about birth, or perhaps one month after birth. This illustration shows the incisors, in which almost the entire crowns have calcified; scarcely one-half of the canine, but a large proportion

Fig. 2.



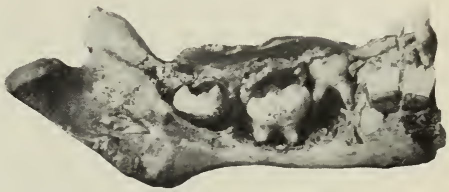
(Reflected picture.)

of the crowns of the first and second deciduous molars have undergone calcification.

Fig. 3 shows a similar dissection on the lingual side of the mandible, made a little later on. Here we can see evidences of the two incisors being almost fully erupted, and we can consider this child to have been about six months old.

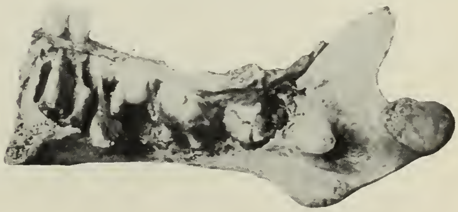
We can note here the various teeth in their follicular coverings. The sacs containing the permanent incisors are

Fig. 3.



shown, giving evidence of the extent of calcification of these teeth at this time. The lateral incisor has developed almost to the same extent, while the canine,

Fig. 4.



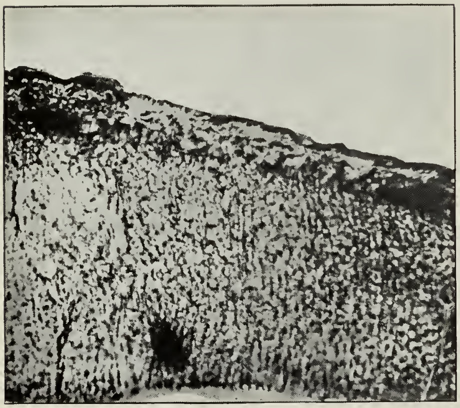
which rests close to the base of the bone, shows one-third of its crown calcified. Nestled between the roots of the deciduous molar we have a sac containing the

Fig. 5.

bicuspid, and at another point the beginning of the second bicuspid.

In the next slide (Fig. 4) we have the follicles open. There is no question as to the age of this child, the two central incisors being almost fully erupted. We see the permanent incisors calcified to about two-thirds of the length of the

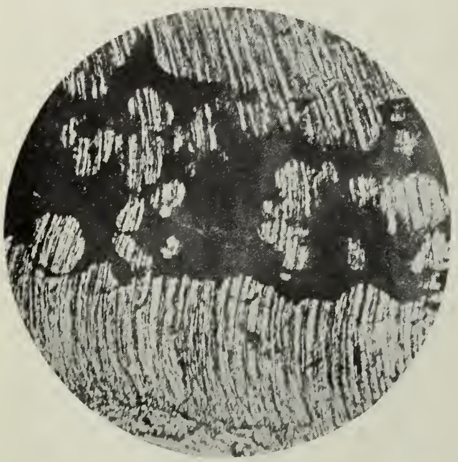
Fig. 6.



crowns, as are also the first and second deciduous molars.

Attention should be called to the defective development of the second molar. It will be noted that while there is no

Fig. 7.



defect in the enamel of the first molar, there is a decided defect in the enamel development of the second molar, showing that there has been some pathological disturbance, resulting in hypoplasia of the tissue.

A Member. What age is that?

Dr. Broomell. About six months.

A Member. What would be the stage of the enamel development at that time?

Dr. Broomell. The enamel would not be complete so long as the tooth is unerupted. It does not rupture the enamel organ until it breaks through the epithelial layer of the mucous membrane.

A Member. Would not that have something to do with the question of hypoplasia?

Dr. Broomell. It certainly would. That is what I am trying to get at, the possibilities of these teeth becoming affected before they are erupted.

The next illustration (Fig. 5) shows two deciduous molars under a higher magnification. The first molar is perfect, the second defective so far as the enamel development is concerned. It is possible that the pathological condition which caused the death of the child is responsible for the defects in the enamel. Had the child recovered, these defects might have been repaired by a secondary deposit of enamel, and we would have had that peculiar pigmentation effect frequently noticed in enamel.

To carry out this study farther, two or three other slides were made. These showed a disarrangement of the enamel rods and a peculiar pigmentation, as well as a disarrangement of the dentin.

Fig. 6 is another specimen under higher magnification, which is quite typical of the effect of hypoplasia of the enamel. There is no definite arrangement between the enamel rods, a complex tissue with no definite structural arrangement. There has evidently been a discontinuance of development at this point [demonstrating]. Here and there are breaks in the structure which show an attempt at repair which has not been carried out.

Fig. 7 shows a microscopic section of the dentin of these teeth, exhibiting the characteristic so-called interglobular spaces usually present in that structure when hypoplasia is present.

Dr. Nathaniel Gildersleeve. The important point in connection with this whole subject lies not only in the diagnosis of syphilis itself, but in the differential diagnosis from other conditions as manifested in the oral cavity, as well as in different parts of the body.

Today in the laboratories we are relying to a great extent upon the Wassermann reaction, but we are paying altogether too little attention to the use of the staining methods for determining the presence of the treponema pallidum, and to the use of the dark-field illuminator. When the dark-field illuminators were first put on the market, they were extremely unsatisfactory, and, as a matter of fact, we obtained better results from some of the old paraboloid condensers made by Beck in London and Zentmeyer in Philadelphia, but the later types of the dark-field illuminators are very satisfactory, if one has the proper light and knows how to manipulate them. It requires, however, not a little experience to handle one of these devices properly to get the best results, and some experience is needed in taking material from the lesions so as to be sure that the material contains the organisms.

It is important to bear in mind that there are conditions other than syphilis which will cause inhibition in the development of the fetus *in utero*, and many other dystrophies besides a dystrophic condition of the teeth, and that other pathologic conditions in the mother may affect the fetus.

There are a good many cases that have been diagnosed as syphilis through examination of the teeth without taking into consideration the fact that the condition of these teeth may have been due to some other pathological condition.

Dr. Stein (closing the discussion). Several points which are of interest have been brought out in the discussion.

Syphilis is such a broad subject that it has been said that—"If a fourth-year megalo-cephalic medical student knew syphilis, he would not have much trouble in carrying the rest of medicine in his head."

Syphilitic hypoplasia of the teeth is usually symmetrical, affecting certain types of teeth at a given time, and, as I have said, is due to a disturbance of metabolism in the cells of the tooth germ caused by the syphilitic infection. The mere presence of the treponema pallidum in a tooth germ would not be likely to cause such symmetrical lesions on the same kinds of teeth in both the maxilla and the mandible.

Scarlatina may give a positive Wassermann reaction, but the differential diagnosis of syphilis and scarlatina is easy.

The Wassermann reaction may be positive in certain tropical diseases and in tuberculosis—in the latter about 1 per cent. of cases. How do we know that the patient is not suffering from both tuberculosis and syphilis?

I have no knowledge of the special diseases in New Zealand which cause a positive Wassermann reaction. I do not know what kind of diseases they have in New Zealand.

The Wassermann reaction is not always positive in heredo or latent syphilis. Some of the worst cases, that never get well and where neither mercury, iodin, or salvarsan seem to have any effect, give a negative reaction. In such cases the syphilitic probably possesses no syphilitic anti-bodies. The Wassermann reaction, nevertheless, is of great worth in the detection of syphilis.

A positive Wassermann reaction is a valuable symptom of syphilis; a negative reaction is only of value at the time when it is obtained. The Wassermann reaction is not only of use in detecting syphilis, but helps to determine the degree of the syphilitic infection at a given time. I had ample opportunity of studying the effect of anti-syphilitic treatment upon the positive Wassermann reaction at the sero-diagnostic station at Finger's Clinic in Vienna, which was conducted by Dr. Rudolph Müller, under whom I served, and up to the time I left Vienna in September 1911, over 36,000 suspected cases of syphilis and controls had been examined.

The dark-field microscope is of great use in the diagnosis of a chancre or mucous patches; for after having found the treponema pallidum in the exudate from one of these lesions, we can place the patient at once under treatment and heal these lesions, which are very infectious.

It is important to know where to look for the treponema pallidum in the chancre, as it is rarely found upon the surface of the lesion, but beneath the surface at the side of the erosion. The chancre should be washed with saline solution, and its edge scraped with some sharp instrument until the serum exudes. After the lesion has been squeezed, some of this exudate is to be taken for examination. One man may search for the treponema pallidum in a lesion and never find it, while another may find it at once.

Prof. R. W. Taylor, under whom I served for twelve years in the department of genito-urinary diseases at the College of Physicians and Surgeons, Columbia University, New York, was in the habit of saying that lying was a symptom of syphilis.

I am glad to hear what has been said at this meeting regarding salvarsan, for it has received some hard knocks, but it is mostly from those who have had no experience with it, and have read the writings of prejudiced individuals. The discovery of salvarsan is one of the greatest discoveries in medicine.

Incidentally I might mention the fact, as proved by Gerber, that salvarsan is the only disinfectant that kills all the spirochetes in the mouth.

The statement has been made that there is much syphilis in our midst. I remember Prof. Herman Knapp, the ophthalmologist, making the statement that—"Many persons have syphilis; never believe a patient who you think has syphilis when he denies having the disease." Lesser says, if I remember correctly, that 14 per cent. of the population of Berlin have syphilis.

The treponema pallidum has been found in the ovocyte, but infection *ab ovo* has not been proved.

The treponema pallidum has not been found in either the spermatozoa or the semen of syphilitics, but the semen of syphilitics in the secondary period of the disease has been proved infectious, because it produced a chancre upon apes which were inoculated with it.

I have attempted to show that hypoplasia of certain teeth is simply one point in the diagnosis of syphilis. We should keep in mind that the triad of Hutchinson—viz, Hutchinson's teeth, otitis media, and interstitial keratitis—is diagnostic of heredo-syphilis.

As I stated before, the stigmata upon the teeth are at times the only signs of the disease.

The meeting then adjourned.

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Devoted to the Interests of the Profession.

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PHILADELPHIA, JULY 1913.

EDITORIAL DEPARTMENT.

SCIENTIFIC RESEARCH.

FROM all directions, generally speaking, come the expressions of a desire for more results in the way of research into the unsolved problems that confront us as a profession, a demand for more knowledge of underlying conditions upon which to base a more rational system of practice. The demand is not new, for ever since Miller demonstrated what might be accomplished in a practical way by systematic scientific research the illuminating effect of his example and the brilliancy of the results which he attained have acted as a sort of intellectual ferment in the creation of the general desire for more light, and a recognition of the fact that the light may be had if it be properly and persistently sought.

It is only within comparatively recent years that scientific research work has had any recognizable standing in the court of dental professional opinion. The self-styled "practical man," who sneered at the scientific laboratory worker as a dreamer and theorist, held the center of the stage and proclaimed the superiority of his empirical methods as the only type of practicality worthy of serious consideration. But the dental profession, under the convincing logic of demonstration after demonstration, is re-defining the term "practical," and is beginning to use with more and more discretion and precision of application and meaning such terms as "practical," "scientific," "theory," "hypothesis," and other terms expressive of relative orders of thought and phenomena. We are realizing more and more that science is knowledge, or ascertained truth, organized into systematic order; that "scientific" is descriptive of a precise method of thinking or doing, and that a "theory" is, within its proper meaning, one of the most practical conceptions with which humanity, by and large, is enabled to conduct its most practical affairs.

The growing recognition of the importance of all these things has brought about with marked insistence the demand for scientific research into unsolved dental questions during the past several years. Nearly everybody wants somebody to take up scientific research and find out something useful about things concerning which we now know but little or nothing. Funds are being collected—indeed, have been collected—for the purpose of "endowing scientific research," or "establishing a chair of scientific research," or paying someone to "carry on" or "carry out" "original re-research." Besides the encouraging recognition of the value of scientific research upon the part of the general dental profession which these tendencies manifest, there are certain other implied characteristics of this movement that need to be taken into thoughtful consideration if the most fruitful results are to be attained thereby. First, it may be seriously questioned whether, in its best expression, scientific research is something that can be bought at all, or that the true scientific worker is one whose work can really be subsidized upon a commercial basis, any more than it is possible to buy a wife. Scientific work is a labor which must be performed *con amore*, and the man who sells his services to science deludes not only himself but his public into believing that the output of his labor is veritable science rather than a commercial imitation thereof. Moreover, the very attempt to subsidize the scientific worker involves another fundamental misconception—viz, the idea that fitness for scientific research is a divine endowment given only to the especially favored few; that the scientist is somehow a special creation different to ordinary or unscientific humanity because of his fitness to unravel the mysteries of nature and interpret the language of the unknown into terms of the known.

We have already called attention to the meaning of the terms "science" and "scientific" as representing in the first place organized knowledge or truth, and in the second place a mode or method of dealing with truth and knowledge—the vital essence of the mode or method being precision and accuracy, resulting in the elimination of error. If the foregoing view may be accepted as fairly correct in principle, then the scientific method of research, as reduced to its lowest terms, becomes simply the accurate and precise method of thinking and doing with respect to any given category of phenomena. It is a matter of common knowledge that untrained human testimony upon any subject or with respect to any phenomena is, generally speaking, wholly untrustworthy. It is the purpose and object of the scientific method to eliminate the factor of observational error by developing the ability to observe and report with accuracy. Is not this type of culture—with the discovery of truth as its objective purpose—a worthy and noble goal of self-education?

It is clearly recognized that certain types of mind are by natural endowment and educational training pre-eminently fitted for original research work. Such individuals are, however, comparatively rare; Huxley placed their number, as related to society in general, at about the ratio of one in four hundred thousand. Moreover, researchers of this particular type are their own justification; they need no external stimuli to insure their productiveness, and our present contention, therefore, does not apply to their case. The purpose of this article is to emphasize the fact that the average practitioner of dentistry must, in order to keep abreast of the advances of his professional work, devote some of his time to study and self-education; and therefore, to the degree that he brings to bear upon the study of his problems habits of accurate observation, logical thinking, and precise reasoning, he is not only cultivating scientific methods of thought, but is in no small degree contributing to the accumulation of professional knowledge as an original researcher.

If, then, scientific research is but the result of precise observation and reasoning upon the part of the trained worker, it is evidently within the capacity of each of us to contribute a quota to the sum-total of our professional knowledge, and the sooner we let go of the fetish that to see the truth and correctly reason about it is a special divine endowment, and arrive at a belief that these things are our common human heritage, to be cultivated by systematic training, we shall have more scientific researchers, more seekers for the truth among us, and less need to buy the services of the few than we shall then have to applaud the attainments of the many.

REVIEW OF CURRENT DENTAL LITERATURE.

[*Lancet*, London, March 15, 1913.]

THE ABUSE OF HYPNOTIC DRUGS IN AMERICA. ANNOTATIONS.

The increase in the habit of self-drugging is going on in many parts of the civilized world. It is perhaps less marked in the British colonies, where people live more natural lives, and is probably most pronounced in America. In England, and more successfully on the continent of Europe, it is kept in check by the proper administration of the several poison laws. In the United States, in every state, the sale of poisons is the subject of legislation, some of which is very drastic on paper, but is not properly enforced. The United States Public Health Service has recently issued an official publication (*Public Health Bulletin* No. 56) in which figures are given to show the extent to which the drug habit has grown in America. This report shows that since 1860, when the various forms of opium and its alkaloids were separately enumerated in the tariff schedules, there has been 351 per cent. increase in the importation and consumption of all forms of opium as against 133 per cent. increase in population. During the last ten years there has been an annual importation and consumption in America of over 400,000 lbs. of opium, and it is stated that fully 75 per cent. of this is manufactured into morphin, 80 per cent. of which, it is estimated, is used by victims of the drug habit. The report goes on to say that—"In addition to the tremendous amount of opium unnecessarily consumed annually in the United States, it has been estimated that 150,000 oz. of cocain are illegitimately used each year"; and further—"Hundreds of pounds, probably tons, of chloral and other hypnotic drugs are consumed annually by the people of this country, who, it has been asserted, are rapidly becoming hopelessly addicted to the habitual use of narcotic drugs of various kinds." The remedy for this abuse is not easy to find, but it is possible that much good might be effected by a greater uniformity in the poison legislation of the several states, and by a more careful administration of it. The report also deals with other forms of legislation designed to protect the public health. The laws relating to the misbranding of drugs and foods are of comparatively recent origin, and the differences in the requirements with regard to the labeling of foods and drugs suggest the need for greater uniformity in the several state laws.

so as to provide for the ample protection of the public, and yet avoid as much as possible unnecessary requirements that tend to hamper trade, increase the cost of production, and greatly enhance the cost of food and drugs to the consumer.

[*Boston Medical and Surgical Journal*, Boston, February 13, 1913.]

SYMPOSIUM ON THE RELATIONS OF DENTAL AND ORAL HYGIENE TO HEALTH.

THE TEETH AND THEIR RELATION TO THE BODY. BY G. H. WRIGHT, BOSTON.

ORAL PROPHYLAXIS. BY H. W. ADAMS.

SCHOOL INSPECTION AND DENTAL CARIES. BY W. J. GALLIVAN, BOSTON.

THE PURPOSE OF THE FORSYTH DENTAL INFIRMARY. BY T. LEARY, BOSTON.

A WORD ON THE SCIENTIFIC, ECONOMIC, AND SOCIAL PROGRAM OF THE FORSYTH DENTAL INFIRMARY. BY H. DEW. CROSS.

The dental papers published in this issue of the *Journal* call renewed attention to the public importance of oral hygiene and instruction for children, and to the approaching completion of the Forsyth Dental Infirmary, which will make possible the realization of some of our ideals in dental care and prophylaxis. The infirmary, whose beautiful marble building is an architectural as well as a sociological adornment, has recently issued a pamphlet, prepared for the International Congress of Hygiene and Demography at Washington, in which are outlined not only the plans for the institution, but the nature of the work which it will have to do and the spirit in which the work is to be undertaken.

"The acute dental needs of the children have never been fully recognized outside of the profession; their importance has never been acknowledged. Until municipalities recognize these needs and their obligation to meet them, the work must be carried on by independent foundations. The Forsyth Dental Infirmary represents the first attempt on an adequate scale to satisfy the requirements. This is a plea for recognition of the right to develop children physically as well as mentally at the public expense. The private dental clinic would eventually obtain public support in freely giving expert advice and dental treatment to pupils in the schools. It is an aim that should be encouraged to the extent of providing for children in poverty whose parents cannot pay for the treatment needed. Public support and all charity support should stop here."

The work is indeed of great importance, and rightly administered should be capable of accomplishing immense good in the community.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, February and April 1913.]

WHICH IS THE BEST METHOD OF CLEANSING THE ORAL CAVITY? BY PROF. KUESTER AND W. WEISBACH.

THE MECHANICAL CLEANSING OF THE ORAL CAVITY. BY J. GOLDHAMMER.

After most painstaking and elaborate investigations into the cleansing and bactericidal effects of a great many of the dentifrices and mouth-washes popular abroad and in the United States, Kuester and Weisbach come to the conclusion that disinfection of the oral cavity by rinsing with the solutions usually employed seems an impossibility. Cleansing with tooth-brushes and all sorts of chemical compounds that are not detrimental to the organism, never reduces the oral flora more than 50 per cent. The same reduction in the oral flora can be obtained by the employment of ordinary white clay in conjunction with physiological salt solution. This common table salt solution, which is isotonic, is the most indifferent mouth-wash, that is not in the least irritating, while white clay is an excellent mechanical cleanser and a good therapeutic agent in case of angina, diphtheria, etc. From the standpoint of popular hygiene the cleansing of the mouth with these agents is recommended for economic reasons.

Goldhammer also strongly indorses the use of white clay and physiological salt solution, but objects to the taste, which, in his opinion will not tend to popularize these simple preparations. He therefore proposes the substitution of argilla for white clay, which is frequently impure and unduly hard. In combination with catechu, which is astringent, it gives a cheap, fine aromatic tooth-powder, which has been recommended by the International Commission for Public Oral Hygiene in 1912.

[*L'Odontologie,* Paris, March 30, 1913.]

APPLIANCE FOR REGULATING SEVERAL ROTATED TEETH AT ONCE. By L. Ruppe, Paris.

Frequently, after a successfully completed regulating operation for the widening of the dental arch, the teeth are still in malposition toward one another, and require more or less rotation upon their axes. For this operation bands with spurs or tension screws are usually employed. The writer suggests the following simple appliance for this purpose: A plaster impression of the widened arch is taken, and, before the model is poured, a pin is placed in the long axis of each tooth. After pouring the model, each tooth is sawed off without disturbing the pin, and the plaster teeth are replaced on their respective pins in the positions which they are to occupy after the regulation, and fastened on the model with sticky-wax. One lingual and one facial splint are then swaged or cast, and the portions in the interdental spaces are reinforced and notched with a fine round file. The splints are then polished, their edges rounded off, and are fixed in place with strong Angle ligatures, which are tightly twisted on the labial side. The teeth are thus put in a sort of vise, which should be tightened as often as feasible.

[*Deutsche Monatsschrift fuer Zahnheilkunde,* Berlin, February 1913.]

EXPERIMENTAL INVESTIGATIONS REGARDING THE CAUSE OF DEATH OF THE DENTAL PULP UNDER SILICATE CEMENTS, WITH THEORETICAL AND PRACTICAL STUDIES ON CEMENTS AND OTHER FILLING MATERIAL. By Dr. Proell, Koenigsberg.

Proell has subjected a great many cements and other plastic filling materials to very accurate tests under a great variety of different conditions, the results of which he summarizes as follows: Death of the dental pulp under zinc phosphate and silicate cement fillings is more of an infectious than a chemicotoxic character, resembling in its clinical aspect gangrene with subsequent osteitis and purulent pericementitis in case of hidden caries. The cause of infection is not to be attributed to the lack of antiseptic action of cements, for freshly mixed cements possess at least an inhibiting action upon the growth of bacteria, nor must it be attributed to the perviousness to bacteria of the cements commonly in use. Doubtless a considerable quantity of liquid penetrates dental cements, but their permeability by water and ether has so far not been proved experimentally. Many silicate and zinc phosphate cements exhibit considerable changes in volume in the oral secretions at body temperature—generally a contraction which impairs marginal adaptation. This volumetric change is the most probable cause of gangrene of the pulp under cement fillings. In the air, fresh as well as old silicate cement fillings dry out quickly and contract. The changes in volume observed in silicate cements render the application of these cements impractical in anterior teeth, especially in places that are not continually flooded by the oral secretions. In every case the cavity must be carefully prepared for a silicate cement filling, and by the aid of a very tenacious agglutinant a firm union of the silicate cement with the cavity walls must be obtained so that marginal adaptation is preserved despite contraction. The drying of fresh or old silicate cement fillings after setting must be carefully avoided. The absolute advantage of the customary two methods of varnishing the cavity interior or inserting a zinc phosphate lining cannot be proved experimentally. The silicate cements employed in dentistry exhibit physical properties similar to those of Portland cement as employed in building operations, while chemically they are perhaps nearer to the zinc phosphate cements. In order to arrive at final criteria for the quality of cements, the author urges further scientific tests and the establishment of definite, simple and expedient methods enabling the practitioner to decide upon the merits or shortcomings of a cement.

Periscope.

Sharpening Pyorrhea Instruments.—In sharpening pyorrhea instruments, the corners should be rounded off to avoid cutting any grooves in the roots of the teeth.—*Dental Review.*

Contra-indications to Antipyrin.—Antipyrin is contra-indicated in persons with cardiac trouble, owing to the depressing effect of this drug upon the heart with subsequent circulatory disturbances.—*La Odontología Colombiana.*

Treatment of Hypertrophied Gingivæ.—The following remedy can be highly recommended for combating hypertrophy of the gingivæ so common in pregnant women: Zinc chlorid, 2 parts; peppermint water, 250 parts.—*Anales de la Soc. Dental de Habana.*

Desensitizing Sensitive Dentin.—Hypersensitive dentin at the cervical margin is best treated with a concentrated solution of sodium bicarbonate in glycerin, thus avoiding discoloration as produced by silver nitrate.—*Odont. Tidskrift*, per *Oesterreich. Zeitschr. f. Stomatologie.*

Seventy per cent. Alcohol Best for Disinfection.—According to the investigations of Beyer, as published in the *Muenchener Med. Wochenschrift*, 1912, p. 1408, the maximum disinfectant powder of alcohol is at 70 per cent., while absolute alcohol is a weaker disinfectant.—*Deutsche Monatsschr. f. Zahnheilkunde.*

Preventing Nausea in Taking an Impression.—If the patient has a tendency to nausea, a little of the following solution should be painted on the soft palate: Cocain hydrochlorid, 0.25; menthol, 0.10; phenol, 1.00; distilled water, 50.00; alcohol enough to make a 90 per cent. solution.—*Revista Odont. Paulista.*

Vinegar for Softening Plaster.—Vinegar is a very good means for removing hardened plaster of Paris from the hands, or from flasks. Plaster models can be easily removed from an articulator by pouring a little vinegar upon the portion where the bow is embedded in plaster.—*Oesterreich. Zeitschr. f. Stomatologie.*

Preparing a Gold Inlay Wax Pattern for Investment.—When the wax model for a gold inlay has been trimmed to correct form, and the surface has been carefully gone over with a very small quantity of oil of cajuput, it is carefully washed off in water and gone over with liquid soap and water. Besides giving a beautiful finish to the wax, it will be found that this treatment enables the operator to paint the investment on the wax much more readily.—E. S. Best, *Dental Review.*

Removing Nickel-plating. — Before replating nickel-plated articles it is often necessary first to remove the remains of the old plating. This is sometimes done by means of a so-called stripping bath. The results of this method are not always satisfactory. The *Keystone* recommends its mechanical removal by means of a polishing wheel and an abrasive powder whenever it can be done. This leaves the surface in better condition to receive the new deposit.—*Dental Brief.*

Disinfection by Iodin Before Extractions.—In order to prevent infectious matter from being carried by the forceps from the neck of the tooth into the alveolus, thus frequently setting up post-operative infection, the neck and surface of the tooth or root to be extracted should be carefully cleansed with a cotton wad dipped in iodin. This method of disinfection of the field of operation is very simple and efficient, and insures freedom from infectious sequelæ.—*Deutsche Zahnaerztliche Wochenschrift.*

Nitrous Oxid and Oxygen Analgesia.—The technique required to produce and maintain the analgesic stage with nitrous oxid and oxygen is not difficult to acquire, but unless it is perfectly mastered, good results will not be obtained. Most operators make the great mistake of keeping their patients too far under the anesthetic, and then trying to work upon them during the excitable or second stage of anesthesia. This stage is entirely too deep and unsatisfactory, both to the dentist and the patient. The latter must not be carried to the unconscious stage, but must be left in control of his mental faculties at all times.—A. E. Smith, *Oral Hygiene.*

Means for Determining Vitality of the Pulp.—A useful test for determining the vitality of a pulp is the temperature test. For it, a small instrument is heated and applied to the crown of the tooth, or to a metal filling if one be present. If the pulp is vital, momentary pain will be felt on applying the heat. Cold may be applied by dipping a tightly rolled pledget of wool into some very volatile substance, like ether or ethyl chlorid, and applying to the crown of the tooth. A positive result is conclusive, but a negative one is not.—*Journ. Laryng., Rhin., and Otology*, per *N. Y. Med. Journal.*

Removing Broken Burs and Broaches from a Root-canal.—The following method has proved very efficient: A small pellet of cotton saturated in sulfuric acid is laid over the broken instrument, and carefully sealed with gutta-percha and left in the cavity for several days. The pellet is then removed, the cavity flushed with water, and an attempt is made to pass a barbed broach between the root-canal wall and the instrument, and to lift out the latter. If this is unsuccessful, the sulfuric acid application is repeated. Usually the instrument can be removed on second trial. The root-canal is then cleaned and bleached with pyrozone, and the filling inserted.—*Arch. für Zahnheilkunde.*

Liquid Celluloid and Its Uses.—Liquid celluloid is obtained simply by dissolving small pieces of clear celluloid, such as is used for covering photographs, pictures, etc., in acetone, making a varnish of more or less thick consistence. This varnish is very suitable for assembling plaster impressions or mending broken plaster casts. A thin solution of celluloid is excellent for varnishing the plaster model, also the upper half of the flask after separating and boiling out the wax in vulcanite plate work, thereby insuring a smooth and brilliant surface to the plate. To exhibition models this solution imparts a glossy, beautiful appearance, and greater durability. It is preferable to keep a thin solution, and if desirable apply several coats. The celluloid solution may also be used for lining cavities.—*La Odontologia*, per *Journ. Zahnheilk. u. Zahntechnik.*

Care of the Operator's Hands.—In surgical cases, the operator's hands and arms are brushed thoroughly with hot water and tincture of green soap. Particular attention is given to the nails, which are pared and cleansed with a nail-file and orange-wood stick. The hands are then rinsed in sterile water, bathed in alcohol, and immersed for some time in a sublimate solution. If rubber gloves are worn, the hands are dried in a sterile towel and powdered with sterile talcum powder, and the sterile gloves are put on. If there are any cuts or abrasions upon the fingers, these are painted with a coat of collodion. In daily dental practice the thorough brushing of the hands and fingers with a good soap and hot water is sufficient. If an operator is treating a syphilitic patient and should injure the skin, the immediate and very thorough massage of the wound with $33\frac{1}{3}$ per cent. calomel ointment is a prophylactic measure against infection. The hands must always be very thoroughly dried before going out, to prevent chapping.—W. J. LEDERER, *Dental Digest.*

Exercise for the Deciduous Teeth.—Emphasis is to be laid upon the importance of efficient mastication during early childhood for the proper development of the jaws and accessory parts, as well as for the prevention of dental disease in later life. The deciduous teeth should be exercised by chewing. In addition to a diet made up largely of milk, such articles as a smooth-ended chop or chicken bone should be given the child to chew. Dry crusts, toast, or rusk, well buttered, may also be given. Unable to swallow these in the dry state, the child chews them, thus exercising the jaws and causing a sufficient secretion of saliva. The milk is given separately. This method is vastly preferable to giving the child food sodden in milk or gravy, such as soft porridge deluged with milk.—*Journ. Laryng., Rhin., and Otol.*, per *N. Y. Med. Journal.*

Treatment of Alveolar Abscess.—In all alveolar abscesses evacuation of the pus and extraction of the offending tooth, if too badly decayed to be preserved, should be carried out early; delay in these cases is dangerous. After opening such an abscess, or extraction of the tooth, the use of hydrogen dioxid to wash out the cavity should be avoided. This remedy has very frequently been the direct cause of extensive destruction of bone. If, in spite of this treatment, the infection progresses, the further care of the case depends on the course of the disease. In the early stages the application of an ice-cap to the affected side of the face, together with pressure by a gauze pad and bandage, will tend to reduce pain and swelling, and possibly limit the extent of the infection. When there are indications that pus is present, it should be evacuated, through the mouth if possible, and if not, by as small an external opening as is necessary to give thorough drainage.—R. H. IVY, *Dental Brief.*

Hints, Queries, and Comments.

HEATING ALCOHOL: DR. FISCHLER'S REPLY TO HIS CRITICS.

To the Editor of the Dental Cosmos:

Sir,—In answer to the criticism in your June issue of my suggestion for warming alcohol (printed in the April issue) I would like to state as follows:

Passing the saturated cotton over the flame and letting it burn for one second does not heat the alcohol sufficiently. It has to burn a good deal longer than that—with the result that most of the alcohol on the surface of the cotton is consumed.

By holding the heated thimble containing the alcohol close to the patient's mouth, the distance one has to carry the saturated cotton is so short that it will not cool off. The cotton is thoroughly saturated with warm alcohol, and when touched to the cavity flushes it effectively. A pellet of dry cotton is introduced immediately afterward.

I believe that my method, although it takes a few seconds longer, is more effective.

Bernard Fischler.

Brooklyn, N. Y.

GOLD FILLINGS IN ARTIFICIAL TEETH.

To the Editor of the Dental Cosmos:

Sir,—I notice that in the May issue of the Cosmos, page 528, a clinic is reported in which the clinician demonstrates a method of putting gold fillings in artificial teeth by means of grooves and cement. I think the following procedure, which I have been using for certainly ten years, to be much better for the purpose.

Grind a small depression where the gold filling is to be placed; cover this with Jenkins' inlay body mixed to a thin cream. Press in the piece of crystal gold, the size of the depression, and fuse in an electric furnace. When cold, more gold can be malleted to the gold base, using the same care as with a gold filling. I have never yet seen one of these fillings come away from the tooth. I trust this will interest your readers.

C. Every Brown, L.D.S.

Dundee, Scotland.

Obituary.

DR. DRURY J. McMILLEN.

Died, at his home, Kansas City, Mo., on April 2, 1913, Drury J. McMillen, M.D., D.D.S., of heart disease, in his sixty-eighth year.

The passing of Dr. McMillen, dean of the Western Dental College of Kansas City, Mo., closes the career of one of the most noted dentists in the West and Southwest. Both as a dental teacher and as an indefatigable worker in dental society matters, the deceased won for himself the love and admiration of many student generations, and notably appreciated was his conservative and considerate attitude as a member of the National Association of Dental Faculties—so as to render his demise a severe loss to the dental profession.

Dr. McMillen was born in Bracken county, Kentucky, in 1846. At the age of fifteen he moved to Chillicothe, Mo., during the early days of the civil war, and during that most critical period was made deputy sheriff, in which capacity he saw much active service and took part in many exciting and dangerous events, being once severely wounded by a gunshot. Following the close of the war, although he had not yet reached his majority, the deceased was appointed collector of internal revenue by the government, and again exhibited that courage and energy that characterized his activity during manhood.

In 1868, Dr. McMillen married Miss Sallie Poindexter, and a few years afterward he took up the study of dentistry under the preceptorship of Dr. J. W. Greene of Chillicothe. After practicing dentistry for a time in Brunswick, Mo.—from 1874 on—he felt the need of perfecting himself in his profession, and subsequently attended the Missouri Dental College in St. Louis. Following his graduation from this college in 1877, he returned to Brunswick, Mo., where for seven years he conducted a very lucrative practice. In 1882, Dr. McMillen moved to Kansas City, Mo., and quickly succeeded in establishing a good practice. He was materially interested in the organization of the Western Dental College in 1890, being elected to the deanship, to which office he devoted his undivided energy after retiring from active practice in 1896. He held the chair of operative dentistry throughout his connection with the college, and, in 1895, had the degree of M.D. conferred upon him by the University Medical College of Kansas City, Mo.

Dr. McMillen was a progressive in every field of dentistry, and his early demonstrations of bridge work as well as his mastery of continuous gum work and non-cohesive gold technique eminently fitted him for his teaching position, and made his presence at dental meetings an ever-welcome event.

The deceased was a member of the Kansas City Dental Society, the Missouri State Dental Society, and at one time president thereof, also a member and late president of the National Association of Dental Faculties, an active member of the National Dental Association, and an honorary member of many state and district societies.

As a loving father of his own immediate family, and a devoted friend and generous adviser of generations of students, Dr. McMillen set a high example, and, though it seemingly terminated before his life's work was fully crowned, his career was one of genuine usefulness and lofty inspiration.

DR. JAMES A. HALL.

Dr. James A. Hall died at Collinsville, Ala., July 24, 1912. He was born in Oneida county, N. Y., January 15, 1841.

Dr. Hall had reached a little more than threescore and ten years of life. He received his early training in the public schools, from which he went to Rome, N. Y.; later to Gloversdale Seminary. He taught school three years, and then renewed his studies in New York City, choosing dentistry as his vocation. He practiced there about six years, when his health failed, and he moved South, in 1867. In order to build up his health he went into the railroad business, in which he continued for nine years. December 29, 1874, he married Miss Josie C. Nicholson. Seven children survive from this union.

In the year 1876 Dr. Hall settled in Collinsville, Ala., and resumed the practice of dentistry, in which he was most successful. He early identified himself with the Alabama Dental Association, of which he was a lifelong active and progressive member. It was the rarest thing that he failed to attend its meetings, and although suffering from ill health was present at the last meeting in June, just a few weeks before the end. In 1894 he was elected a member of the Alabama Board of Dental Examiners. A few years later he was chosen president of that body, which position he filled until his death. His work on the board was epoch-making. He instituted the practical phase in the examinations. Being a man who kept abreast with the times, in addition to his affiliation with his state societies he was a member of the National Dental Association and the National Association of Dental Examiners, also a member of the Southern Branch of the National Dental Association. It was his custom to represent the Alabama board at the annual meetings of the National Board of Dental Examiners, and a few years ago he was elected vice-president of that body. He was elected honorary vice-president of the Fourth International Dental Congress, held at St. Louis in 1904. He represented the state of Alabama at the Lewis and Clark Dental Congress, and was one of its vice-presidents.

The death of Dr. Hall removes one of the most conspicuous and remarkable characters of the dental profession. He was not an ordinary man, and cannot be judged by the standards of ordinary men. He was aggressive in all things, and fearless of consequences in the prosecution of his endeavors. Criticism was to him a stimulus to renewed activity, failure a thing which did not enter into his calculations as a possibility. His chief ambition was the advancement of dentistry.

Brief Necrology.

Dr. JOSIAH OXFORD KELLER of Chicago, Ill., on April 9, 1913.

Dr. ARTHUR W. MINAKER of San Francisco, Cal., on April 16, 1913.

Dr. WILLIAM R. WATTERSON of Pittsburgh, Pa., on April 21, 1913. Deceased was a graduate of the School of Dentistry, University of Pittsburgh.

Dr. M. ORDWAY DALY of Boston, Mass., on April 7, 1913, in his forty-seventh year. Deceased was a graduate of the Tufts College Dental School.

Dr. CHARLES EDWARD MOORE of Brooklyn, N. Y., on April 6, 1913, of acute kidney trouble, in his fifty-fourth year. Deceased was a graduate of the New York College of Dentistry, and a member of the New York Dental Society.

Dr. J. AUSTIN DUNN of Chicago, Ill., on April 10, 1913, of acute indigestion, in his sixty-second year. Deceased was a graduate of the Chicago College of Dental Surgery, and a member of the Chicago Dental Society, the Illinois State Dental Society, the National Dental Association, and a past president of the Odontographic Society.

DENTAL COLLEGE COMMENCEMENTS.

LINCOLN DENTAL COLLEGE.

THE fifteenth annual commencement exercises of Lincoln Dental College were held in University Temple, Lincoln, Nebr., on May 15, 1913.

The doctorate address was delivered by Dr. J. S. Leonhardt.

The degree of Doctor of Dental Surgery was conferred by the dean, Dr. Clyde Davis, on the following graduates:

Stephen C. Adkins	Raleigh A. Gibson	Harry T. Olson
Clarence M. Brookman	Robert V. Nicholson	Walter H. Thomas

UNIVERSITY OF SOUTHERN CALIFORNIA, COLLEGE OF DENTISTRY.

THE thirtieth annual commencement exercises of the University of Southern California, College of Dentistry, were held in Los Angeles, Cal., on June 12, 1913.

The commencement address was delivered by Robert J. Burdette, D.D., of Pasadena.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Harold Anderson	Lawrence F. Haseltine	Robert W. Norris	Hugh M. Swift
Earl R. Andrews	Jerry V. Holcombe	Herbert L. Noxon	Almon D. Siewert
Milton F. Bailey	Clement W. James	Albert H. Osborne	Francis F. Tanaka
Wilbur E. Bedford	Emmett C. Kesling	Chas. H. Pool	Herman G. Thomas
Chas. E. Bokay	John F. Lynch	Geo. G. Powers	Samuel H. Thompson
Frank W. Chandler	Percy H. F. McKay	Fred A. Ross	Harvey E. Walter
Duane S. Coffin	Hubert B. Nall	Harry E. Senseney	Roy B. Wells
Chas. LeR. DeCou	Ulysses H. Nicholson	Carrick W. Symmes	John W. Witly
Nathan Hale			

BARNES DENTAL COLLEGE.

The annual commencement exercises of Barnes Dental College were held on Monday, June 2, 1913, at St. Louis, Mo.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Lucien Duguay	Missouri
Anton A. Gitchoff	Macedonia
William N. McAtee	Illinois
Paul D. Saum	Missouri
Ernst L. Steward	Missouri
William A. Tevis	Illinois
Robert L. Turley	Missouri

KANSAS CITY DENTAL COLLEGE.

The thirty-second annual commencement exercises of the Kansas City Dental College were held in the First Presbyterian Church, Kansas City, Mo., on May 17, 1913.

An address was delivered by Rev. Frank S. Arnold.

The degree of Doctor of Dental Surgery was conferred by the president, Dr. John Deans Patterson, on the following graduates:

James M. Alley
Audy G. Ames
Ray H. Barnes
William E. Beard
Oscar O. Beattie
Raoul L. Beland
Sidney S. Block
Wilton W. Cogswell
Clyde F. Davidson
Otto R. Docekal
George L. Dodson
Forrest D. Fischer
Charles A. Furrow
Grover C. George
Albert R. Harold
William T. Hope
John S. Ingram
Clifford S. Kile
Forrest Kutz
Samuel J. Lamoreaux
Roy A. Long
Leonard F. McGrath
Francis P. Meyer
John R. Moore
Frederick R. Muller
Warren E. Need
Elmer H. Neighbors
Clifford J. Palmer
Nelson C. Paro
Jesse A. Ringold
Clarence W. Roberts
Peter W. Schwartz
Hugh H. Scott
Homer M. Shelden
Paul G. Spencer
Joseph E. Stark
Ray E. Tibbetts
Francis S. Williams
James H. Wilson
Edward A. Wohlgemuth
Sylvester J. Wooldridge

LAVAL UNIVERSITY DENTAL SCHOOL.

At the annual commencement exercises of Laval University Dental School, held in Montreal, Que., the degree of Doctor of Dental Surgery was conferred on the following graduates:

T. Asselin	Pr. Quebec
E. Bourgeois	Pr. Quebec
A. Comeau	Pr. Quebec
M. Dérome	Pr. Quebec
A. Deshênes	Pr. Quebec
A. Dionne	Pr. Quebec
R. Doucet	Pr. Quebec
M. Fleury	Pr. Quebec
A. Girard	Pr. Quebec
P. E. Kieffer	Pr. Quebec
J. Lantier	Pr. Quebec
L. LaRocque	Pr. Quebec
A. Lavigne	Pr. Quebec
T. Lavoie	Pr. Quebec
A. Lebrun	Pr. Quebec
T. Lefort	Pr. Quebec
L. Plante	Pr. Quebec
P. E. Poitras	Pr. Quebec
O. Rajotte	Pr. Quebec
W. Saint-Pierre	Pr. Quebec
A. Voisard	Pr. Quebec

The degree of Bachelor of Dental Surgery was conferred on the following graduates:

J. De Montigny
E. Desroches
M. Durand
E. Farrell
P. Fleury
J. H. Fontaine
P. Hamel
E. Hébert
E. Jobin
J. Labrecque
L. Lafond
A. L'Archevêque
A. Melady
F. Rhéaume
V. Rondeau
E. Turgeon

VANDERBILT UNIVERSITY, DEPARTMENT OF DENTISTRY.

The annual commencement exercises of Vanderbilt University, Department of Dentistry, were held in Nashville, Tenn., on May 26, 1913.

An address was delivered by John Stewart French, D.D.

The degree of Doctor of Dental Surgery was conferred by the vice-chancellor, Wilbur F. Tillett, A.M., D.D., LL.D., on the following graduates:

Hayden G. Austin	Tennessee
George A. Braly	Tennessee
Young M. Brown	South Carolina
Lee W. Bryant	Tennessee
Jesse M. Buddin	South Carolina
Samuel F. Call	Texas
Ewing B. Connell	Tennessee
Henry L. Crow	Tennessee
Sidney A. Crumbley, Jr.	Georgia
Thomas W. Gillis	Mississippi
Landis L. Graham	Tennessee
Edmund B. Hammond	South Carolina
Claude C. Harris	Tennessee
Thomas C. Harris	Tennessee
Robert L. Houston	Alabama
William F. Jones	North Carolina
Henry G. Kennedy	Tennessee
George P. Kumpe	Alabama
Elvis O. Mansker	Louisiana
Herman F. Martin	Tennessee
Johnson G. McDowell	Texas
Robert L. Morris	Tennessee
Jake H. Park	Tennessee
William P. Rea	Tennessee
Walter E. Reeves	Mississippi
William A. Spence	Mississippi
William C. Steele	Tennessee
Ralph E. Stevenson	South Carolina
James C. Taylor	Tennessee
Garland V. Taylor	Tennessee
George F. Tenison	Tennessee
Mitchell Thomas	Tennessee
William O. Thomas	Tennessee
Joseph H. Turner	Arkansas
James J. Vaughn	Tennessee
George Wheeler	Alabama
Levert E. Wilson	Alabama

Society Notes and Announcements.

DENTAL SOCIETY MEETINGS:

July, August, and September.

JULY.

American Society of Orthodontists. Chicago, Ill. June 30th to July 2d.

Delta Sigma Delta Fraternity. Kansas City, Mo. [During N. D. A. meeting.]

National Association of Dental Examiners. Kansas City, Mo. July 7th.

National Association of Dental Faculties. Kansas City, Mo. July 4th.

National Dental Association. Kansas City, Mo. Four days: July 8th to 11th.

National Dental Association—Southern Branch, and Virginia State Dental Society. Old Point Comfort, Va. Four days: July 22d to 25th.

New Jersey State Dental Society. Asbury Park. Three days: July 16th to 18th.

Rhode Island Dental Society. Providence, July 24th.

Xi Psi Phi Fraternity. Kansas City, Mo. [During N. D. A. meeting.]

Virginia State Dental Society and National Dental Association, Southern Branch. Old Point Comfort, Va. Three days: July 22d to 24th.

AUGUST.

West Virginia State Dental Society. Parkersburg. August 13th to 15th.

SEPTEMBER.

Northern Indiana Dental Society. Gary. September 23d to 25th.

Examiners' Meetings.

Idaho Board of Examiners. Boise. July 17th.

Montana Board of Examiners. Helena. July 14th to 17th.

New Jersey Board of Registration. Trenton. June 30th to July 2d.

North Dakota Board of Examiners. Fargo. July 8th to 11th.

South Dakota Board of Examiners. Sioux Falls. July 8th.

Vermont Board of Examiners. Montpelier. June 30th to July 3d.

Wyoming Board of Examiners. Cheyenne. July 1st to 3d.

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH AND VIRGINIA STATE DENTAL SOCIETY.

The fifteenth annual meeting of the Southern Branch of the National Dental Association will be held at the Chamberlin Hotel, Old Point Comfort, Va., July 22 to 25 inclusive, 1913. The Virginia State Dental Society will meet conjointly with the Southern Branch at that time.

Thos. Moore, Jr., *Cor. Sec'y, N.D.A.So.Br.*
C. B. Gilford, *Cor. Sec'y, Va. Dental Soc.*

[At Kansas City.]

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The thirty-first annual session of the National Association of Dental Examiners will be held at the Baltimore Hotel, Kansas City, Mo., beginning July 7th, at 10 A.M., and continuing until adjournment.

Every state board holding membership in the association is earnestly requested to have at least one representative present at this session. Members of all state boards are invited. Hotel reservations should be made immediately.

John P. Stiff, *President*,
Fredericksburg, Va.,
T. A. Broadbent, *Sec'y*,
15 E. Washington st., Chicago, Ill.

N. D. A. Meeting at Kansas City.

Seventeenth Annual Session—July 8 to 11, 1913.

THE 1913 Session of the National Dental Association will be held in Kansas City, Mo., July 8 to 11, 1913. The reorganization of the association should make this the most important meeting in its history. Every state society that has met since the new constitution and by-laws were adopted—at the Washington meeting—has voted to become a constituent society, and we can all appreciate the influence of such an organization if all the state societies take similar action.

CONVENTION HALL, KANSAS CITY—MEETING-PLACE OF N. D. A.

The officers and committees have been active in preparing an exceptionally interesting program. It is impossible to incorporate the clinical program in the journal announcements; however, the Clinic Committee does not expect to present the number of clinics which have been listed for the past few years, but have planned to present a smaller number, which are classified so that they will be most interesting.

Program.

Dr. Frank O. Hetrick, Ottawa, Kansas: President's Address.

Dr. Weston A. Price, Cleveland, Ohio: "Scientific Foundation Fund."

Dr. Roscoe A. Day, San Francisco, Cal.; "Orthodontia and Its Relation to Dentistry."

Dr. J. L. Howell, Denver, Colo.: "Crown and Bridge Work."

Dr. Gail W. Hamilton, Council Bluffs, Iowa: "The Missing Steps in Platework."

Dr. Percy R. Howe, Boston, Mass.: "The Saliva."

Dr. Marcus L. Ward, Ann Arbor, Mich.: "Conflicting Opinions Concerning the Manufacture and Use of Alloys for Dental Amalgams."

Dr. Hermann Prinz, St. Louis, Mo.: "A Preliminary Report on Action of As_2O_3."

Dr. Carl G. Parsons, M.D., Denver, Colo.: "Physiological Action of Nitrous Oxid-Oxygen Analgesia and Anesthesia."

Dr. Arthur D. Black, Chicago, Ill.: "Something of the Etiology and Early Pathology of Diseases of the Peridental Membrane, with Suggestions as to Treatment."

Dr. Howard R. Raper, Indianapolis, Ind.: "The Value of the Radiograph in the Practice of Modern Dentistry."

Dr. G. S. Junkerman, Cincinnati, Ohio.: "Dental Educational Harmony."

Dr. Burton Lee Thorpe, St. Louis, Mo.: "Prophylaxis: Illustrated with Lantern Slides."

Dr. H. B. Tileston, Louisville, Ky.: "The Application in Practice of What is Known Concerning the Diagnosis and Treatment of Diseases of the Dental Pulp."

Dr. Edward D. Coolidge, Chicago, Ill.: "The Etiology and Progress of Dental Caries."

Dr. Clarence J. Grieves, Baltimore, Md.: "Periapical Infection."

All reputable practitioners of dentistry and medicine are cordially invited to attend this meeting.

Railroads.

The Central passenger association, the Western passenger association and the Southwestern passenger association have granted an open rate of two cents per mile in each direction in their territory, with a minimum excursion fare of $1.00. Tickets on sale from the 5th to the 8th of July, and good returning up to July 20th. The Trunk-line association has declined to make any concessions.

Information regarding transportation from any point may be secured from any local railroad agent, as they have full information with reference to all rates granted by various passenger associations in their particular territory.

Hotels.

The Local Committee of Arrangements are providing ample facilities for a large meeting, and have selected the Baltimore Hotel as headquarters. Those desiring to make hotel reservations in advance should address the Baltimore Hotel, or the chairman of the Local Committee of Arrangements, Dr. Charles C. Allen, 507 Rialto Bldg., Kansas City, Mo.

Below is given a list of the principal hotels, with their rates:

S = Single, without bath. *Sb* = Single, with bath.
D = Double, " " *Db* = Double, " "

Hotel Baltimore: *S* $1.50 and $3.00 per day, *Sb* $2.50 and $6.00 per day, *D* $2.50 and $3.00 per day, *Db* $4.00 and $7.00 per day.

Sexton Hotel: *S* $1.00 per day and up. *Sb* $2.00 per day and up.

The Coats House: *S* $1.00 to $2.00 per day, *Sb* $1.50 to $3.50 per day.

Hotel Savoy: *S* $1.00 to $1.50 per day, *Sb* $1.50 to $2.50 per day.

Hotel Victoria: *S* $1.00 and $1.25 per day, *Sb* $1.25 and $1.50 per day, *D* $1.50 and $2.00 per day, *Db* $2.00 and $2.50 per day.

Hotel Kupper: *S* $1.00 and $1.50 per day, *Sb* $1.50 and $2.50 per day, *D* $2.00 and $2.50 per day, *Db* $2.50 and $4.00 per day.

Densmore Hotel: *S* $1.00 per day, *Sb* $1.50 per day, *D* $1.50 per day, *Db* $2.00 to $2.50 per day.

Hotel Edward: Rates $1.00 per day and up.

Hotel White: Rooms—running water, hot and cold, $1.00 per day; shower or tub bath, $1.50 per day; outside rooms, bath with tub, $2.00 per day.

FRANK O. HETRICK, *President*,
Ottawa, Kans.

HOMER C. BROWN, *Recording Sec'y*,
185 East State st., Columbus, Ohio.

[AT KANSAS CITY.]

XI PSI PHI FRATERNITY.

THERE will be a meeting of the Xi Psi Phi Fraternity during the session of the National Dental Association, at Kansas City, Mo., July 8 to 11, 1913.

Headquarters for the members of the Xi Psi Phi Fraternity will be established at the Baltimore Hotel, Kansas City, Mo. Special accommodations have been made for train service from Chicago, and all members of the fraternity east of Chicago are invited to avail themselves of this service. For further information address

C. C. MARKEY, *Sec'y*.
1740 Greenleaf ave., Chicago, Ill.

[At Kansas City.]

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The next annual meeting of the National Association of Dental Faculties will take place at the Hotel Baltimore, Kansas City, Mo., beginning at 10 A.M., on Friday, July 4, 1913. The Executive Committee will meet at 9 o'clock on the same morning, at the same place.

B. Holly Smith,
Chairman Exec. Com.

[At Kansas City.]

DELTA SIGMA DELTA FRATERNITY.

The twenty-ninth annual meeting of the Supreme Chapter of Delta Sigma Delta Fraternity will be held at the Hotel Baltimore, Kansas City, Mo., Monday, July 7, 1913, at 10 A.M.

Business of importance and initiation has been arranged for the day, to be followed by the annual banquet in the evening.

R. Hamill D. Swing, *Supreme Scribe.*

[At Kansas City.]

NATIONAL MOUTH HYGIENE ASSOCIATION.

Second Annual Meeting.

The second annual meeting of the National Mouth Hygiene Association will be held in Kansas City, Mo., July 9–12, 1913.

The board of governors will meet at the Hotel Baltimore at 9 A.M. on July 9th, 10th, and 11th, to consider questions to be presented to the general body. These meetings are open to members of the association, and those having matters which they wish to present to the association for consideration must present them to the board at one of these meetings.

The regular meeting of the association consists of three sessions (open to the general public): Friday, 1.30 P.M. and 8.00 P.M.; Saturday, 9.00 A.M. A very interesting and instructive literary program is to be presented.

The association has charge of the Mouth Hygiene Section of the Fourth International Congress on School Hygiene, and the board of governors' plan is to have, in so far as possible, the program duplicated at both the National meeting and the Congress.

The most important subject to be presented to the association will be the question of "Ways and Means for Conducting the Campaign of the Association in Its General Presentation of Mouth Hygiene to the Public." A complete, practical, economic and co-operative plan, which will permit every section of the country to begin an active appeal to the general public, will be presented for consideration. It is desirable that every member be present when this important subject is presented for discussion.

W. G. Ebersole, *Sec'y-Treas.*,
800 Schofield Bldg., Cleveland, Ohio.

FOURTH INTERNATIONAL CONGRESS ON SCHOOL HYGIENE.

The most important Health conference that has ever been held in this country is the Fourth International Congress on School Hygiene, which will take place in Buffalo, August 25–30, 1913.

This congress will deal with every phase of school hygiene, and will be attended by the leading hygiene and educational people throughout the world. An entire section has been devoted to Mouth Hygiene, with a large amount of floor and wall space set aside for an exhibit dealing with the same subject. The organization of both the literary program and the exhibit has been placed under the supervision of the National Mouth Hygiene Association. This is the greatest opportunity that has ever been accorded the dental profession to present in an effective manner the important relation that mouth hygiene bears to the general hygiene of the body.

To make a showing in keeping with the importance of this subject it is vital that the members of the organized dental profession throughout the country do their duty both as members of the various organizations and as individuals. A few individuals cannot make an impressive showing. It is therefore imperative that, in addition to a literary program and the presentation of an exhibit, a large number of dentists unite with the congress and attend the meeting, thus establishing the dental profession's interest in and right to participate in the hygiene conferences of the world.

An elaborate literary program has been prepared and an extensive exhibit is being arranged, committees having been appointed representing each state in the Union.

W. G. Ebersole, *Ch'man, Div. Mouth Hyg.*, 200 Schofield Bldg., Cleveland, Ohio.

AMERICAN SOCIETY OF ORTHODONTISTS.

The thirteenth annual meeting of the American Society of Orthodontists will be held in Chicago, Ill., June 30, July 1 and 2, 1913.

Frederick C. Kemple, *Sec'y*, 576 Fifth ave., New York City.

RHODE ISLAND DENTAL SOCIETY.

The Rhode Island Dental Society are arranging for their summer meeting, which will be held at the Pomham Club, Providence, R. I., Thursday, July 25, 1913. The meeting will be a combination of outing, field-day, and business meeting. The feature of the day will be a famous Rhode Island shore dinner. The Pomham Club is one of the most beautifully located clubs in New England, situated high above the picturesque Narragansett Bay. The Executive Committee in charge of the affair consist of Dr. C. N. Williams of Providence, chairman, Dr. Frank P. Duffy of River Point, and Dr. A. L. Midgley of Providence.

NEW JERSEY STATE DENTAL SOCIETY.

The forty-third annual convention of the New Jersey State Dental Society will be held in the Beach Auditorium, at Asbury Park, N. J., July 16, 17, and 18, 1913, beginning on Wednesday, July 16th, at 10 a.m.

The exhibits of modern dental appliances and the latest in office and laboratory equipment will be in charge of Dr. William H. Gelston, 40 N. Thirtieth st., Camden, N. J., who will be glad to furnish information regarding rates and space still available. Early application from those desiring to exhibit with us this year will be greatly appreciated.

The clinics will be in charge of Dr. Henry Fowler, 114 N. Fourth st., Harrison, N. J., and will be comprehensive and of a very high order.

Oral hygiene and prophylaxis will be made a special feature. There will be essays on nitrous oxid and oxygen anesthesia and analgesia and extraction of teeth. These essays will be illustrated with moving pictures and stereopticon slides, and will be further exemplified in the clinics.

All ethical practitioners of dentistry and medicine will be accorded a hearty welcome.

The programs will be ready July 1st, and will be mailed to all those sending their names and addresses to the secretary.

Edwin W. Harlan, *Sec'y*, 47 Crescent ave., Jersey City, N. J.

WEST VIRGINIA STATE DENTAL SOCIETY.

The seventh annual meeting of the West Virginia State Dental Society will be held in the assembly room of the Chancellor Hotel, Parkersburg, W. Va., August 13, 14, and 15, 1913. Opening session 2 p.m., Wednesday, August 13th. A cordial invitation is extended to all ethical members of the profession to attend our meeting.

Frank L. Wright, *Sec'y*, Wheeling, W. Va.

NORTHERN INDIANA DENTAL SOCIETY.

The twenty-fifth annual meeting of the Northern Indiana Dental Society will be held at the great Steel City of Gary, September 23, 24, and 25, 1913.

W. Leroy Myers, *Sec'y*, Rensselaer, Ind.

ILLINOIS STATE DENTAL SOCIETY.

The Illinois State Dental Society held its forty-ninth annual meeting at Peoria, Ill., May 13 to 16, 1913. The following officers were elected for the ensuing year: Wm. H. G. Logan, Chicago, president; W. A. Hoover, Gibson City, vice-president; H. L. Whipple, Quincy, secretary; T. P. Donelan, Springfield, treasurer; I. B. Johnson, Onarga, librarian.

The 1914 meeting will be the golden jubilee of the society, to be celebrated in Chicago. Date to be announced.

Henry L. Whipple, *Sec'y*, Quincy, Ill.

EASTERN DENTAL SOCIETY OF THE CITY OF NEW YORK.

The thirteenth annual meeting of the Eastern Dental Society of the City of New York was held on Thursday, May 1, 1913.

The following officers for 1913-14 were unanimously elected: A. G. Hindes, president; Henry Schwartz, vice-president; Victor Ettinger, treasurer; A. LeWitter, general secretary.

A paper, entitled "Orthodontia and Facial Orthopedia," was read by Prof. Victor H. Jackson, M.D., D.D.S.

On Friday, May 2nd, at 2 P.M., four clinics were held by the society, viz: (1) The preparation of cavities for inlays, Dr. S. W. A. Franken. (2) The treatment of pyorrhea alveolaris, Dr. W. F. Spies. (3) Dental radiographic exhibit, Prof. Geo. Miller Mackee, M.D. (4) Oral surgery clinic, Dr. Wm. J. Lederer.

An elaborate banquet was given to members and guests in the evening at Café Boulevard. Dr. R. Ottolengui, Dr. Alfred R. Starr, and Dr. George Evans were among the guests present.

A. LeWitter, *Sec'y.*

IDAHO BOARD OF EXAMINERS.

The next meeting of the Idaho Board of Dental Examiners will be held in Boise, beginning Monday morning, July 7, 1913.

Albert A. Jessup, *Sec'y,*
Boise, Idaho.

NEW JERSEY BOARD OF REGISTRATION.

The New Jersey State Board of Registration and Examination in Dentistry will hold their semi-annual examination in the Statehouse, Trenton, N. J., beginning on Monday, June 30, and continuing Tuesday, July 1, and Wednesday, July 2, 1913.

Practical work Monday, June 30th, 8 A.M. sharp; theoretical examination Tuesday, July 1st, and Wednesday, July 2d, promptly at 8 A.M. The business meeting of the board will be held at 10 A.M., Tuesday, July 1st, and anyone having business with the board may have an audience. Applications must be in the hands of the secretary five days prior to the examination. For further information address

Chas. A. Meeker, *Sec'y,*
29 Fulton st., Newark, N. J.

MONTANA BOARD OF EXAMINERS.

The Montana State Board of Dental Examiners will hold the annual session in Helena, Mont., July 14, 15, 16, 17, 1913. Address all communications to

G. A. Chevigny, *Sec'y,*
Butte, Mont.

NORTH DAKOTA BOARD OF EXAMINERS.

The next regular meeting of the North Dakota State Board of Dental Examiners will be held in Fargo, July 8, 9, 10, and 11, 1913. For further information address

F. A. Bricker, *Sec'y,*
Fargo, N. D.

SOUTH DAKOTA BOARD OF EXAMINERS.

The South Dakota State Board of Dental Examiners will meet at Sioux Falls, S. D., Tuesday, July 8, 1913, at 1.30 P.M. For application blanks and further information apply to

A. L. Revell, *Sec'y,*
Lead, S. D.

WYOMING BOARD OF EXAMINERS.

The Wyoming State Board of Dental Examiners will meet for examination of applicants on July 1, 2, and 3, 1913, at Cheyenne.

An examination is required of all applicants, and only holders of diplomas from reputable dental colleges are eligible to such examination. The board does not interchange with other states, nor issue any temporary permits. All applications must be completed and in the hands of the secretary fifteen days prior.

The written examination consists of anatomy, physiology, histology, bacteriology, chemistry, metallurgy, oral surgery, anesthetics, operative and prosthetic dentistry, materia medica, therapeutics, prophylactics, and orthodontia. Hand instruments for operating will be all the candidate need furnish.

For further information and application blanks, address

Peter Appel, Jr., *Sec'y,*
Cheyenne, Wyo.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending May 17, 1913:

First Lieut. F. L. K. LaFlamme arrived at Fort Hamilton, N. Y., May 9th, for duty (from leave, by way of Europe).

Harry M. Deiber, act.d.s., will proceed to Fort Thomas, Ky., for duty.

Lowell B. Wright, act.d.s., will proceed to Fort Porter, N. Y., for duty.

James G. Morningstar, act.d.s., will proceed to the Letterman General Hospital, Presidio of San Francisco, Cal., for duty.

Claude G. Baker, act.d.s., will proceed to Fort Oglethorpe, Ga., for duty.

Eugene Milburn, act.d.s., will proceed to Columbus Barracks, Ohio, for duty.

For the week ending May 23d:

E. Milburn, act.d.s., reported for duty at Columbus Barracks, Ohio, May 15th.

First Lieut. George D. Graham is relieved from duty in Hawaii, and will sail on the steamer leaving the Philippines about September 15th for the United States via Honolulu, for San Francisco, Cal.

For the week ending May 31st:

C. G. Baker, act.d.s., arrived at Fort Oglethorpe, Ga., May 21st.

H. M. Deiber, act.d.s., arrived at Fort Thomas, Ky., May 23d.

For the week ending June 7th:

J. G. Morningstar, act.d.s., joined station, Letterman General Hospital, San Francisco, Cal., May 26th.

L. B. Wright, act.d.s., is relieved from duty at Fort Porter, N. Y., and will proceed to Madison Barracks, N. Y., and report in person to the commanding officer of the latter post for duty, and by letter to the commanding general, Eastern department.

L. B. Wright, act.d.s., left Fort Porter, June 1st, for Madison Barracks, for duty; arrived June 2d.

Albert R. White, act.d.s., is relieved from further duty with the Second Division, Texas City, Texas, and will return to his proper station, Fort Des Moines, Iowa.

United States Patents

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MAY 1913.

May 6.

No. 1,060,962, to David Weiss. Tooth-brush.

No. 1,061,161, to Sidney G. Brown. Apparatus for use in administering anesthetics.

May 13.

No. 1,061,398, to Samuel Newman. Tooth-measuring instrument.

May 20.

No. 1,061,976, to William S. Breeden. Tooth-brush holder.

No. 1,062,048, to Carroll J. Spain. Tooth-crown.

No. 1,062,233, to H. A. Gollobin and N. A. Bornstein. Removable bridge for teeth.

No. 1,062,480, to Nazaire E. Larocque. Tooth-brush attachment.

May 27.

No. 1,062,961, to Daniel C. Funcke. Combined tooth-brush and prophylactic container.

No. 1,063,109, to William W. Bolls. Dental instrument.

THE

DENTAL COSMOS.

VOL. LV. AUGUST 1913. No. 8.

ORIGINAL COMMUNICATIONS.

SOME STUDIES OF THE JAWS IN HEALTH AND DISEASE.

By A. HOPEWELL-SMITH, L.R.C.P.Lond., M.R.C.S.Eng., L.D.S.Eng., London.

(Report of a lecture delivered before the union meeting of the Seventh and Eighth District Dental Societies of the State of New York, Rochester, N. Y., November 16, 1912.)

INTRODUCTORY.*

THE study of disease of the jaws is a very important one, especially in relation to "pyorrhea alveolaris." In the treatment of any special disorder one has to know something of the pathology of disease, and in order to know something of this, one must know something of the anatomy of the parts. I am bound to say that I am not yet satisfied with my own knowledge of the anatomy of the parts concerned with "pyorrhea alveolaris," and the parts of the jaws known as the gingival region of the alveolar process. That is perhaps a sweeping statement, but personally I am a great skeptic about many other things. I regard it from the point of view of trying to find the truth—believing that we are still students and anxious to gain more knowledge of the principles of pathology and many facts of vital importance. So the first thing I studied was the anatomy of the parts with which we are dealing in connection with the gingival tissues,

* [This lantern lecture was intended (1) to explain the importance of ascertaining the anatomical characteristics of the sockets of the teeth of man, and of comparing them with those of the higher mammals, thereby demonstrating that absorption of the margins of the alveolar processes of the jaws is a normal condition, even in children; and (2) to point out that the prognosis with regard to the saving of teeth affected by "pyorrhea alveolaris" is greatly affected by the persistence or otherwise of the *lamina dura*, or *linea dura*, as revealed by the use of Roentgen-ray photography. It included descriptions of the anatomy of the bone of the alveolar processes of the jaws of the higher mammals and of man in childhood, adolescence, and middle age; the anatomy of the soft parts adjacent to the cervical regions of the teeth; the nature of the gingival trough and its contents; the physiological, as apart from the pathological, absorption of bone, "pyorrhea alveolaris" being a symptom, not in itself a disease: and was illustrated by numerous photographs, radiographs, and photomicrographs of various conditions—the conclusion being that treatment should be based on anatomical and pathological and surgical considerations, and not on clinical symptoms alone.]

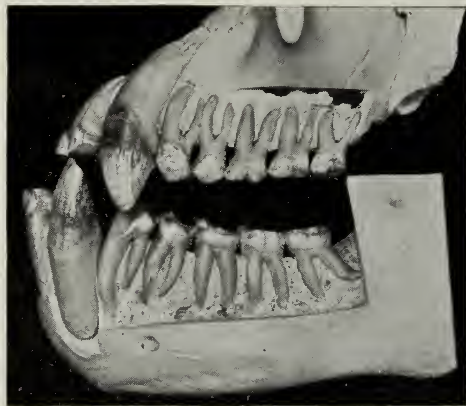
and I went to the lower animals, the carnivora and the anthropoid apes, to find out, in the first instance, the structure of the jaws of animals like the lion, the bear, the hyena, and the orang-utan, in normal circumstances. I studied the polar bear which eats fish, and the orang-utan which mainly eats fruit, and the hyena, which has possibly the best teeth of all and the strongest of alveolar processes—because, as you know, the hyena eats anything. He has a special protection (the cingulum) around the necks of the teeth to prevent injury to the gums when biting bones, etc. (See Fig. 3, c, c.)

FIG. 1.

COMPARATIVE ANATOMY.

I will begin the demonstration of these unique lantern slides by showing the jaws of the lion, a specimen in which the external alveolar plate has been chiseled away, displaying the nature of the bone in which the teeth are developed and fixed in their anatomical articulations. This shows the alveolar process and the gingival margin. The bony tissues are very cancellous in the upper jaw (Fig. 1, A), and almost equally so in the lower jaw. The same thing occurs in the case of the polar bear. One can easily tell the difference in the teeth by the presence of the human-like molar in this animal. Here is cancellous tissue in the maxilla and also in the mandible. In this specimen it is seen that the edge of the process is not so close to the necks of the teeth as in the lion. These are points that I wish you to carry in your mind's eye a few minutes this afternoon, viz, the anatomical features of these bones and the edge of the alveolar process. The polar bear does not do such hard masticatory work as the lion, and the teeth are provided with sockets of more friable bone than the harder ones of that animal.

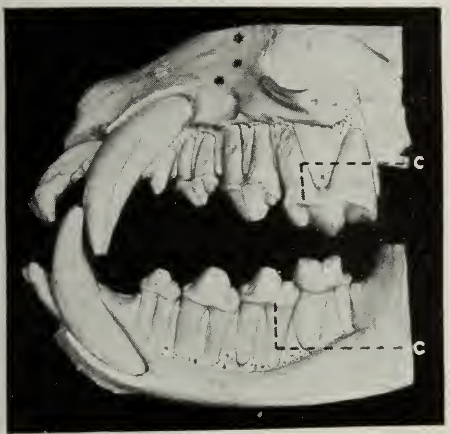
FIG. 2.



The next slide shows a condition in which there is a good deal of absorption of the terminal margins of the bone at the gingival region. (Fig. 2.) This is the jaw of the orang-utan, rather an old skull, and of course it is obvious that the orang-utan is a fruit-eater generally speaking, but its dentition emphasizes the point that a physiological absorption. or normal wasting, or natural atrophy of the bone is going on, which must be taken into consideration in connection with the pathological absorption of the bone which occurs in acute and extensive "pyorrhea."

Here, I think more and more, there has been some absorption of the edge of the bone, which normally must terminate at the necks of the teeth in this particular instance. Animals, as they get old, lose their teeth by physiological means; they shed their teeth the same as man, if exposed to disease of the gums, but they also lose their teeth by senile changes in the jaws, which is mainly a physiological process. I shall show you shortly photographs of the jaws of a man forty-five years of age who had about as good a set of teeth as one could meet if he looked through the museums throughout the country. In human skulls you will find numbers of instances in which the bone does not come to the necks of the teeth as it did at an early period. In the Red-

Fig. 3.



path Museum of the McGill University of Montreal, the other day, I inspected the skulls of certain Eskimos—who, as you know, are renowned for the soundness of their teeth—and I found that even here there was this physiological resorption of the bone.

The next slide is one in which we have the best condition obtainable in the mouth with regard to the shapes and sockets of the teeth. It shows what obtains in the hyena. (Fig. 3.) Here the bone comes to the necks of the teeth in every instance; the bone is not so cancellous but more compact than that of other animals, and the teeth are provided with that ridge of enamel which is known as the cingulum, which protects the edge of the gums and soft parts from being damaged by the food the animal eats.

THE SOCKETS OF THE HUMAN TEETH.

Then we come to man, and similarly examine the conditions when the external alveolar plate has been removed. (Fig. 4.) This is supposed to have been a normal skull, with teeth fairly normal, although it is the most difficult thing in the world to find a typical skull with typical teeth and bony attachments about them.

You see how marked these bones are, and how very much this terminal edge has become absorbed, and how cancellous

Fig. 4.

the nature of the bone appears to be, both in the upper and lower jaws. Now, I do not say, and it is impossible for anyone to say, whether or not the owner of that skull ever had "pyorrhea alveolaris." Of course you see this is where certain difficulties come in. If one could follow the individual through life, and be positive that he had had no gingivitis, no caries, and no oral disease, we would then have an established fact in this respect.

The next slide shows a similar skull, in which a section has been taken vertically through the teeth themselves and through their sockets, thus exposing the pulp cavities, and showing very clearly, again, the cancellous character of the bone. This disappearance of the free margin of the bone is perfectly obvious. Why does it disappear? I think there is no reason to question the opinions given by Talbot and by Znamensky of Moscow, who point out that the terminal edges of the alveolar plate are of poor quality, that they are feebly supplied with blood, and very liable to undergo degenerative changes—physiological resorption, in other words. Now I will show you certain lines in some radiographs, and you will see at once, I think, what I am driving at, because I am still dealing with the normal conditions. I think it is highly important to look at that aspect of the question, because the day before yesterday you heard Dr. Kirk's paper in which he spoke of practically the same thing from a different point of view. Unfortunately I arrived too late to hear his paper, although I know practically the gist of it; but there are many sides to a question like this, and particularly in regard to the etiology of "pyorrhea."

Fig. 5.

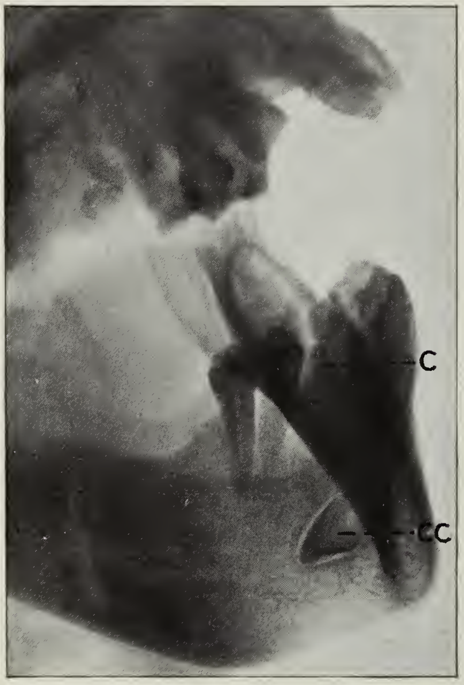
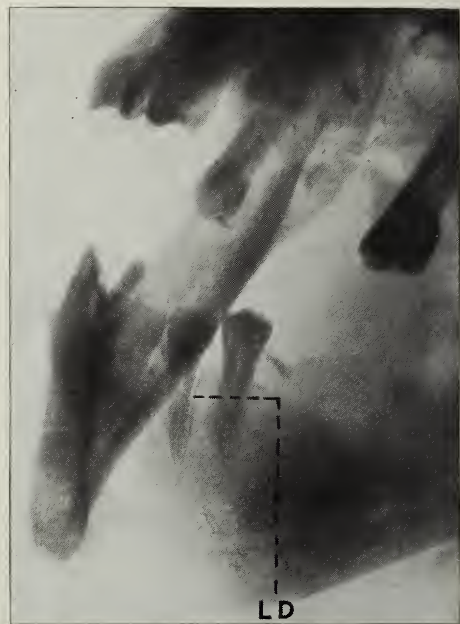


Fig. 6.



NORMAL CONDITIONS.

Case I. (Woman, aged twenty-seven.)

Here is a radiograph of the jaws of a woman twenty-seven years of age, in which, incidentally, a unique condition prevailed. (Fig. 5.) I put this on the screen for two reasons: First, to draw your attention to an unerupted canine the crown of which is directed toward the angle of the jaw. Here is the radiograph of the crown of the canine, and beside that is a white line which of course corresponds to the dental sac or follicular crypt of the tooth; then, outside that, is a dark line which is distinguished from the other portions of the bone—and you will see this occurring very frequently. A very interesting condition in connection with this slide is that here there are two canines on the right, one partially erupted (c), the eruption not being completed on account of the position of the crowns of the neighboring teeth, and the other embedded in the jaw in an inverted position, the crown leaning backward (cc). On the other side of the same mouth there was no canine at all. There were two canines in the mandible, but both were on the right side.

Again, in Fig. 6 we see the clear space

around the first premolar root, then the dark line beyond, L D, as revealed by the radiograph. I give this line the name of the "linea dura,"* this dark, extremely thin lamina of bone, much more compact than the rest, which surrounds the roots of the teeth. (See also Figs. 32 and 33.)

Case II. (Boy, aged ten.)†

Another case in which an unerupted first incisor in the maxillary bone shows the same. *This* is the incisor which had failed to erupt, and *here* is the deciduous incisor which was retained, having beneath it the permanent maxillary incisor, not erupted on account of the existence of this deciduous tooth. Here is visible the linea dura, which exists as a normal condition of the sockets of all teeth.

Case III. (Boy, aged ten.)†

Here is a radiograph of the jaws of a boy ten years of age. (I have arranged the slides mainly from the point of view of the age of the patients.) This is a photomicrograph of what I have called the linea dura. Here is the root of the tooth, and here the extreme apex of the root; this dark line is the periodontal membrane, that normal membrane which measures about six times less in width than when affected by periodontitis. And then, beyond that, is this line, which stands out as a delicate hard line around the roots of the tooth. This portion being cancellous tissue is filled with bloodvessels, connective tissue cells, etc.

Fig. 7.

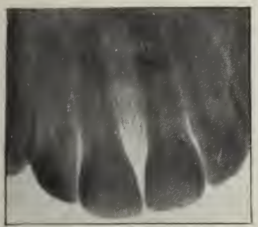


Fig. 8.

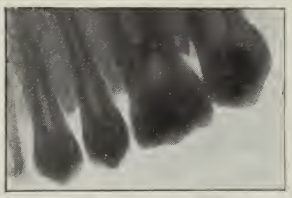


Fig. 9.

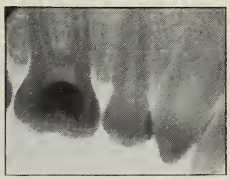


Fig. 10.

Fig. 11.

Fig. 12.

(*A*) The Jaws in Health.

Case IV. (Boy, aged fourteen.)

I wanted to learn what was the nature of the sockets of these teeth in children, and here you see the radiograph of a child of fourteen, in which this edge comes up to this point of the bone, and, in every instance, the linea dura is seen surrounding the substance of the root. This (Figs. 7, 8, 9, 10, 11, and 12) is as normal a case as it is possible to get in a boy of fourteen, but the free edge is somewhat atrophied, and I believe there is here a certain physiological absorption

* The term "linea dura" is obviously applicable only to radiographic subjects. It should be known anatomically and clinically as the "lamina dura."

† Lantern slides not reproduced.

beginning. To my mind, that edge ought to have extended a little nearer the necks of the teeth. I do not know positively where the bone ends—I mean the anatomical position of the bone; we do not know exactly where the periodontal membrane ends, but I show this to demonstrate the fact that, to my mind, there is physiological absorption beginning without any symptoms of inflammation near, with no gingivitis, and with no caries.

Incidentally I may point out that here you see a sort of double edge to the shadow of that tooth, which is due to the tilting of the radiographic film. It is most important that radiographs should be taken in every case of "pyorrhea" to show the relations of the parts, and the radiographs must be taken in a proper manner so as to admit of no errors of diagnosis.* The next picture shows some other portions of the same mouth in which the linea dura is perfectly clear, but here you see it is very thin in the incisor region (Fig. 10), and there is a certain amount of loss of this edge of the bone. In Fig. 9 a deep potential pocket can be noted on the mesial surface of the neck of the first maxillary molar. No tartar is present.

Case V. (Boy, aged fifteen.)*

Next there are two radiographs of the mouth of a boy of fifteen years of age who has never had a particle of dental caries, although he does not pay any particular attention to oral hygiene. He has had no gingivitis or any dental disease. I have had this case under observation for nine or ten years, and he has always had a normal mouth, except that the second maxillary incisors have been suppressed, which is, in this case, hereditary. Here again appears the linea dura on each side; it can also be discerned on the other side of the mouth; but again there are appearances of the beginning of the shrinkage of the edge of the alveolar process, which can be nothing but a physiological absorption of the bone.

Case VI. (Boy, aged nineteen.)

The next lantern slide shows some films of the mouth of a boy, nineteen

Fig. 13.

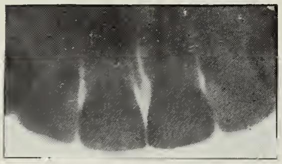


Fig. 14.

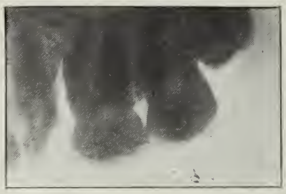


Fig. 15.

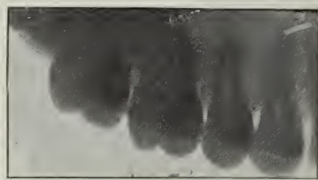
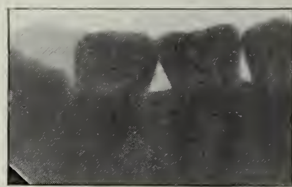


Fig. 16.

Fig. 17.

Fig. 18.



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* In relying upon radiography as a help to prognosis, it must be remembered that there are radiographs *and* radiographs. In order to avoid a false and obtain a true conception of the conditions under examination, the vacuum tube must be of recent manufacture, and not exhausted; the plates or films must be new; the films must not be tilted while held in position in the oral cavity; the length of the exposure must be normal, and the developer fresh and its powers not exceeded.

* Lantern slides not reproduced.

years of age. (See Figs. 13, 14, 15, 16, 17, and 18.) Here is a condition in which there were clearly two lines, produced, I believe, by the junction of two lineæ duræ. In the middle line of the face there are four of these distinct lineæ duræ, both in the upper and lower jaws. That, I take it, is normal; but here I think you will agree with me that there is a certain amount of loss of bone. This patient had what I believe to be a normal mouth. He came to me complaining about the difficult eruption of a third molar which was giving some trouble in the way of neuralgia—that is why he came to me in the first place. The next slide shows another portion of the same mouth and exhibits exactly the same condition of things.

Case VII. (Girl, aged twenty.)

The next two radiographs are those of a normal, healthy patient twenty years of age. (See Figs. 19, 20, 21, 22, 23, 24, and 25.) Here you can see clearly, I believe, that there has been loss of bone. There may have been some tilting of the film—as it is a little difficult to determine in the incisor region—but I think there is a certain amount of absorption of this alveolar border even here, particularly in the premolar region. The two lines are clearly seen in this portion of the jaw,

Fig. 19.

Fig. 20.

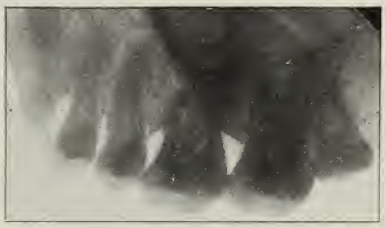


Fig. 21.

Fig. 22.

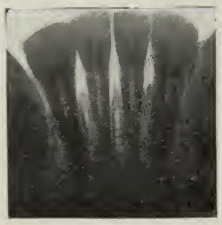


Fig. 23.

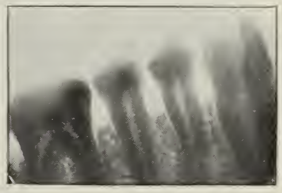
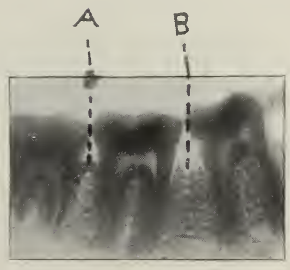


Fig. 24.

Fig. 25.



the middle line (marked *a* in Fig. 19). The next slide shows another part of the same mouth; and here, curiously enough, is a very condensed, compact condition of that portion of the bone (marked A in Fig. 25; *cf.* with B on the mesial aspect of the same tooth, where the edge is absorbed), which probably is, if we only knew it, the real normal condition in the molar region. It may be perhaps a little exaggerated if compared with this portion between these two molars. So far as I could make out, there was absolutely

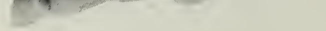
Fig. 26.

no diseased condition in connection with that mouth.

Case VIII. (Woman, aged twenty-nine.)

The next photograph is that of the left jaw of a woman twenty-nine years of age.

Fig. 28.



(Fig. 26.) There is a history attached to it, because it was sent to me from a hospital in London to be examined microscopically after removal from the mouth. It was believed to be a case of syphilitic ulceration of the palate by one surgeon, and by another a malignant disease, and the specialist who thought it was an epithelioma excised it. I found that a cystic adenoma of the antrum had caused its enlargement, and of course the jaw should not have been excised! I show this specimen because it exhibits a fairly normal dental condition. I think

Fig. 27.

you will agree with me that there is a fairly normal condition of the interdental papillæ. There is a certain amount of tartar on some of the teeth, because the teeth were thrown out of use

Fig. 29.

for some time, and functionless teeth are teeth in a state of degeneration, but, on the whole, I think we may assume that this is a fairly representative normal gingival margin.

The radiograph reveals the condition of the bone. (Fig. 27.) You see here the loss of the bony edge of the process, absorption in the molar region being particularly well marked.

Case IX. (Man, aged forty-seven.)

The next photograph was taken from a man forty-seven years of age. (Fig. 28.) Here is a portion of the upper jaw. What is the nature of the alveolar process of these teeth? The radiograph in the next slide will show that condition. (Fig. 29.) This, as I said, is in a man of forty-seven. There is absorption of the bone, but the linea dura is pretty well intact in some situations and at several

FIG. 30.

points. These three teeth have sockets which are in a normal condition.

Case X. (Man, aged about forty-five.)

Next I show you photographs and radiographs of the finest jaws that I have ever seen (see Figs. 30 to 33), occurring in a man of about forty-five, an Irishman who for many years smoked a pipe and had attrition of four teeth. (Fig. 30, A.) His jaws are as typically normal as possible. Note the porous nature of the edge of the alveolar process. Here is a radiograph of the incisor region of his mouth, and the linea dura is clearly distinguished, but there is some absorption of the bone, which is associated, in places, with the presence of a few nodules of tartar. Here again is one side of the jaw showing the linea dura and a certain amount of absorption of the bone. To repeat, this was the jaw of a man of middle age, and naturally the bone was beginning to be absorbed, and ultimately the teeth would have loosened from physiological causes. This is the other side of the mouth—that is to say, the right side—and here you see these sockets of the teeth clearly defined by the lineæ duræ, but here again there is a certain amount of absorption of the bone.

Now, so far I have been dealing with what I believe to be normal conditions (with one possible exception), and if anybody can come across the skull of an *adult,* say of twenty years or over, which shows the retention of the external alve-

FIG. 31.

olar plate about the margins of the necks of the teeth just below the free edge of the enamel, then I shall be glad to examine such a specimen. I do not believe such a one exists!

THE GINGIVAL TROUGH.

Here is the photomicrograph* of the jaw of a kitten, showing the internal and external alveolar plates and the anatomical differences between them. The external is quite thin, but the internal is thicker, but over the termination of the edge of the jaw it is again very blade-like. That is absolutely normal; it cannot be otherwise in the jaws of this young cat. The relative proportion in size of the periodontal membrane to the pulp tissue and the dentin of the tooth and the cementum is apparent. In this external plate there are spaces filled with soft tissue, but at the extreme margin these medullary spaces are practically absent,

* Lantern slide not reproduced.

and the bone is liable to be ill-nourished in that situation as a consequence.

The next is a radiograph of a patient ten and one-half years of age, and this

Fig. 32.

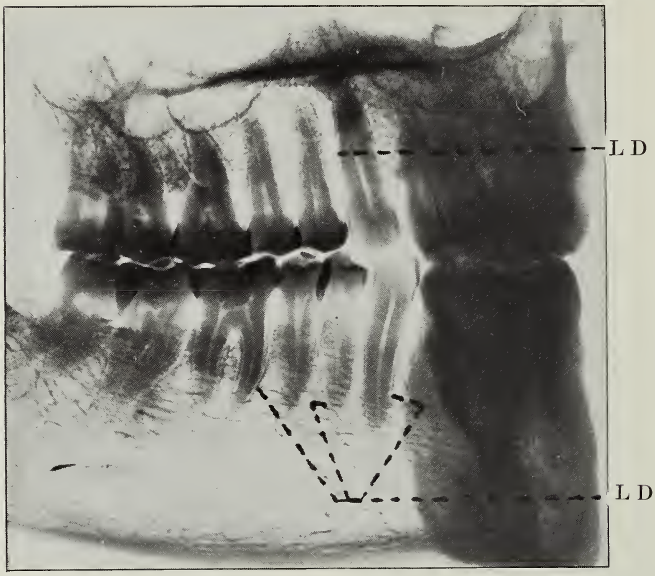
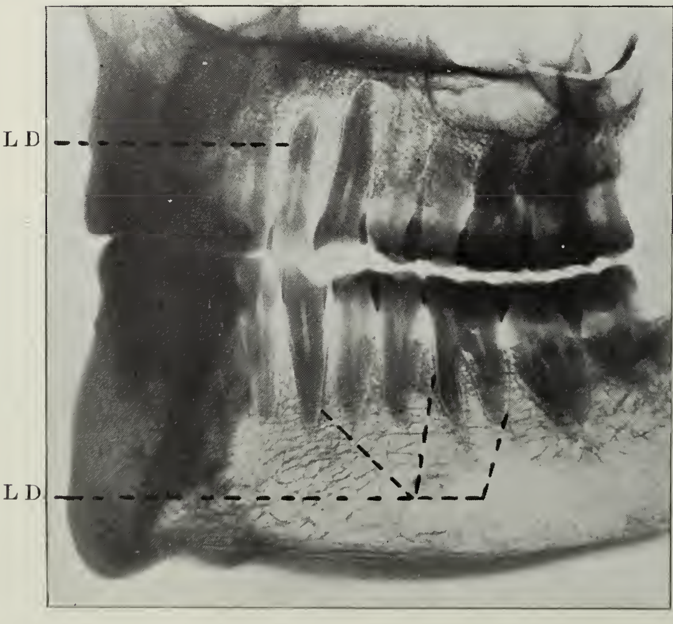


Fig. 33.



(*B*) The Jaws in Disease.

Case XI. (Girl, aged ten and one-half.)

little girl had "pyorrhea" at the age of eight years. That is to say, she had a flowing of pus from the necks of the teeth in the incisor region of the lower jaw at about that time.

She had had chickenpox followed by anemia at about three years of age. She was a fairly healthy child, but unfortunately she had this pyorrheal affection around the necks of the incisors, and here you see the bone has become absorbed, not physiologically, but pathologically. Here is no linea dura. (Fig. 34.) The character of the bone had changed from compact bone to tissue that has undergone decalcification and other osteoid or fibroid changes through halisteresis. The "pyorrhea" in this case was stopped in eighteen months. I managed to get rid of the pus in that time, and from that point of view the case is cured; but ultimately hypertrophy of the gum occurred, and she had to have

FIG. 34.

an operation in the incisor region. She was operated upon just a short while before I left England.

Case XII. (Man, aged twenty-one.)*

A case of chronic general gingivitis in a man of twenty-one years of age forms the next subject. When the X-ray photograph of the jaw was taken, I tried to learn the condition of the sockets of the teeth, and I think in cases of gingivitis one should often do that, if there is any doubt about the condition of the parts. I now show another portion of the jaw, which I am sorry to say is not a particularly good photograph, because of the fact that the film was tilted; but it leads up to what is coming.

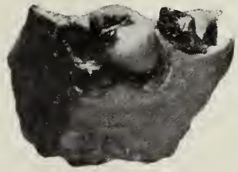
Case XIII. (Man, aged thirty-six.)*

This is the jaw of a man of thirty-six years with chronic periosteitis following "pyorrhea alveolaris." The teeth are broken down, and the next picture shows the condition of the roots of the teeth. Here it is obvious that this enlargement of the root is due to hyperplasia of the cementum. The linea dura has entirely disappeared.

Case XIV. (Man, aged thirty-nine.)

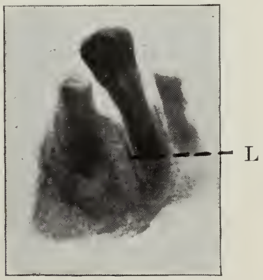
The jaw of a man of thirty-nine years with local chronic periosteitis, due to tartar, is the next specimen (Fig. 35),

FIG. 35.



but in this case it was most difficult to determine whether there was any condition of "pyorrhea." That is to say, after the tartar was removed there was no continuation of that unceasing flow of pus which is a symptom of that condition. The next is a radiograph of these

FIG. 36.



parts, and shows here (Fig. 36, L D.), even in a man of thirty-nine years, that these lineæ duræ are present, but in portions of the jaw there was absorption of the bone.

One can have a deep pocket without having any purulent exudation from it. Here is a photomicrograph* which appeared in the DENTAL COSMOS for September 1911, showing this condition. The dentin of the tooth, the cementum,

* Lantern slides not reproduced.

* Lantern slides of the cases referred to in this and the following paragraphs are not reproduced.

and the soft gum tissue are shown. The gum should be attached to the edge of the cementum. The specimen is so decalcified that the enamel is dissolved away, but normally that should be attached to the free edge of the cementum.

This was a case in which the bone was beginning to be absorbed—as you can see by this margin, this dark area here and there—showing, from the staining of the specimen, the decalcification of the bone. Here is the periodontal membrane. There is no inflammation, but it is hyperplastic, thus showing the destruction of the bone, in a case in which no pyorrhea was present. The bone becoming decalcified is probably due to senile conditions.

Here is a photomicrograph again showing the parts around the apices of the roots of the teeth in cases of pyorrhea which have persisted for some time. The periodontal membrane is thicker, sometimes five or six times thicker than it ought to be. Here is the apical space in which the bone has been altered in character; and here is a small sequestrum of bone in the soft parts.

The next slide is another picture showing the apex of the root of a tooth beginning to become absorbed; here is the apex, and here are deep cavities produced by the osteoclasts, which have arranged themselves around the bone in various places while absorbing the bone. Here is a portion showing periodontal inflammation, and below is a portion no doubt due to hyperplasia. You will see in the next photograph this same thing highly magnified. The upper portion of the photomicrograph shows inflammatory periosteitis, and the lower portion a hyperplastic condition of the cementum. You will remember one radiograph that I showed you in which there was an involution, at the neck of the tooth, of the soft tissues, and this is the gingival "space" as described by Black, but which is really a trough. I was not so sure in my mind as to the structure of this gingival trough, and I made a few investigations, and found some astonishing things. I found that, in every instance, I could pass a sterilized explorer into something deeper than a mere space; that an instrument would extend in the normal mouths of children of six, seven, and ten years of age, a distance of two and one-half millimeters. That was a point that struck me as very important. I then proceeded to examine this trough a little more carefully. I carefully sterilized the mouth, applied the rubber dam, and found micro-organisms, chiefly of the micrococcus catarrhalis group, with streptococcus brevis. This is a thing that anybody can do in ten minutes by observing all the rules in regard to exclusion of alien bacteria—one can prove the existence of hundreds of germs in the normal trough, or what appears to be a normal trough, by sterilizing the mouth and with an explorer removing the germs, making a film on a cover-glass, and staining and examining the latter under a microscope. As I say, we found micro-organisms, and after a few days, by cultivating out, managed to separate these, and found streptococcus brevis and micrococcus catarrhalis.

Here is a photograph of the jaw of a man of forty in which we have "pyorrhea" beginning in the early stage. You see the appearance of the gum, which is in good condition; and then, by means of the radiograph, we find the pathological changes which you see in the next slide.

This is a radiograph of this condition and the linea dura is clearly defined; although pyorrhea is present, there is a persistence of the linea dura, which is a hopeful sign. And that is the next point I want to make—first ascertaining the normal condition, and secondly the conditions which may give rise to encouraging prognosis in these cases.

Case XV. (Man, aged forty-two.)

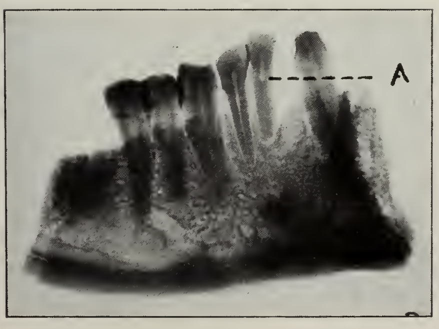
Here is the mandible of a man forty-two years of age, showing the external appearance on the labial side. (Fig. 37.) The next is the same jaw looked at from the lingual side (Fig. 38), showing the appearance of these teeth and the character of the gingival region round about.

Here is a slide showing an incisor affected by "pyorrhea" (Fig. 39, A), and other teeth apparently unaffected by that condition.

Fig. 37.

Fig. 38.

Fig. 39.



Case XVI. (Man, aged forty-five.)

The next slide shows the jaw of a man of about the same age—that is, forty-five —showing a chronic condition of gingivitis, a most marked condition there. (Fig. 40.) A radiograph shows the condition. (Fig. 41.) Here is the linea dura, and the premolar itself is firm. The laminæ duræ were absent from the other portions of the jaw.

Fig. 40.

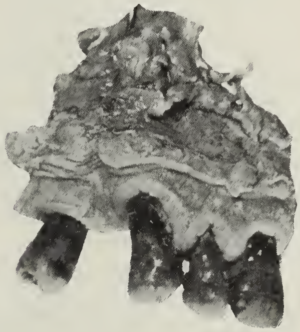


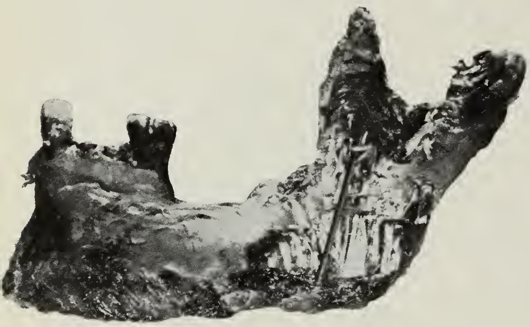
Fig. 41.

Case XVII. (Man, aged forty-eight.)

Here is the jaw of a man of forty-eight. It demonstrates how a molar and two premolar roots appeared when we examined to find out the condition of the roots of these teeth. (Fig. 42.) In the radiograph (Fig. 43) the molar appears as though it were hanging by a hair, so to speak, nevertheless it was firm, and this other tooth was also fairly firm. Note the premolar abscesses.

A photograph of the right side of the same mandible (Fig. 44) shows the condition of the roots of these teeth. Here, you see, the bone is gone, and the socket of the tooth has entirely disappeared (Fig. 45), but it is itself comparatively firm and might have been useful for

FIG. 42.



some years if the man had not died of lobar pneumonia.

Case XVIII. (Woman, aged fifty.)*

Then I wanted to find out what were the conditions in the case of marginal gingivitis, and the opportunity occurred

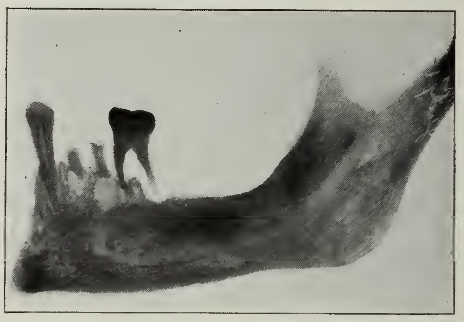
FIG. 44.

in the case of a woman of fifty years of age who had acute gingivitis. In order to be sure about the condition, I called into consultation two house surgeons, and they both agreed it was marginal gingivitis. We then removed the teeth and made some sections in order to ascertain

* Lantern slides not reproduced.

the condition of the bone; and you see it here *in normal condition.* The bone has become physiologically absorbed, but in no sense was it pathological absorption

FIG. 43.

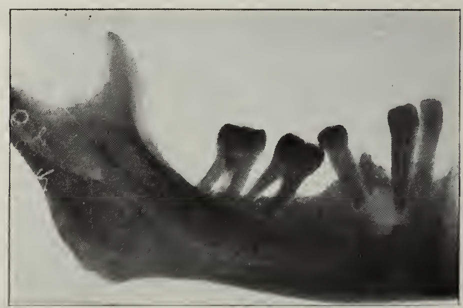


in that case, although and in spite of the fact that there was an inflammation of the gum.

Case XIX. (Man, aged fifty-two.)

Here is the mandible of a man of fifty-two—the labial surface (Fig. 46);

FIG. 45.



and it is obvious that these teeth are covered with tartar, while "pyorrhea" is present in a marked degree, and the case is a particularly bad one. The next slide shows on the lingual side of the jaw the same condition in a more marked degree and tartar developed more markedly. (Fig. 47.) The different radiographs, of course, show accretions of tartar on the teeth, together with the loss of tooth sockets by pathological absorption. (Fig. 48.)

Fig. 46.

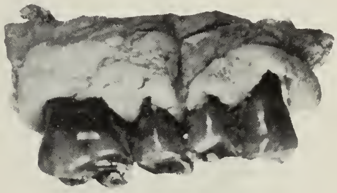
Fig. 47.

Fig. 48.

Case XX. (Man, aged fifty-four.)

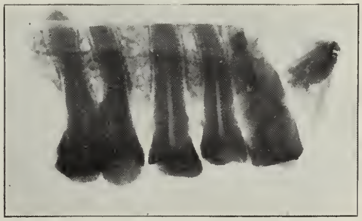
This is the case of a man of fifty-four, in which the interdental papillæ are well marked (Fig. 49)—I think you will agree with that—showing to the naked eye some disease in the gingival region.

Fig. 49.



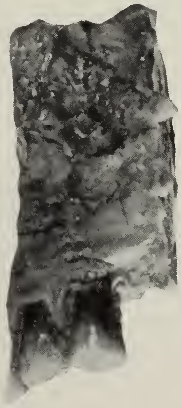
There was a slight amount of "pyorrhea," not particularly marked, but when a radiograph was taken (Fig. 50) we

Fig. 50.



found that there was a good deal of bone absorbed. Here is absorption of the bone, but not much more than would be expected physiologically in a man of his age.

Fig. 51.



Case XXI. (Man, aged sixty.)

Here is the jaw of a man six years older (Fig. 51), which shows slight gingivitis and a hyperemic, senile periodontal membrane. The photograph shows that there has not been so much

FIG. 52.

absorption of the soft tissue around the necks of the teeth, but we will next ascertain what the radiograph reveals.

Here is the radiograph (Fig. 52), and it is remarkable to notice that in this man of sixty the lineæ duræ remain, probably due to an effort on the part of nature to resist injury, and even in this patient of sixty, in whom there was a slight gingivitis, the protection in the form of the lineæ duræ is present.

Case XXII. (Woman, aged forty-two.)

Next are radiographs of the jaws of a woman of forty-two years who has every tooth in her mouth loose, and whom I have had under observation for fifteen years and never have known of any "pyorrhea" occurring in her mouth. She has frequently visited my consulting rooms, and I have seen her several times each year, and she has always had a particularly clean mouth. All the same there is much absorption of the bone, physiological absorption, or wasting, and her teeth are loosened, and I learned from her that her mother's and her brothers' teeth are similarly affected, so that one may say that it is an hereditary condition. (Figs. 53, 54, 55, 56, and 57.)

FIG. 53.

FIG. 54.

FIG. 55.

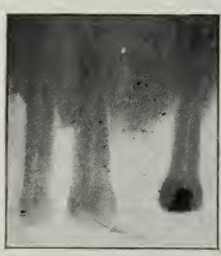


FIG. 56.

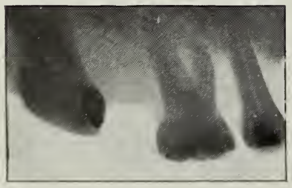
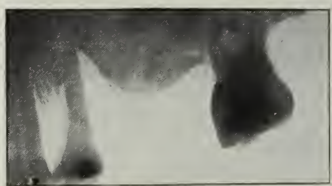


FIG. 57.



Here are other portions of the same mouth showing absorption of the bone and absence of the lineæ duræ. (Figs. 58, 59, 60, and 61.)

Case XXIII. (Man, aged forty-five.)*

Finally we have a case of a man, forty-five years or so, who, in July of last year, overworked during the hot spell of weather, and became "run down," and had an affection of the mouth, and then had "pyorrhea" in three teeth only in the mandible, viz, the left canine and two first incisors. Another film of the same mouth exhibits a condition where there is no "pyorrhea," in contradistinction to this, where "pyorrhea" is present. Now, I believe, the "pyorrhea" has ceased. I treated this patient, looked after him carefully, and as far as I am able to tell the "pyorrhea" has ceased. I will not say that the case is cured, but the pus has ceased, and I think there is hope for these affected teeth on account of the persistence of the lineæ duræ in this particular case.

Fig. 58.

Fig. 59.

Fig. 60.

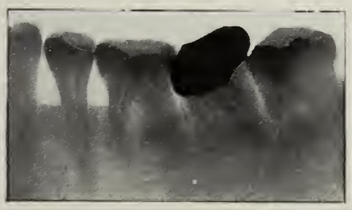
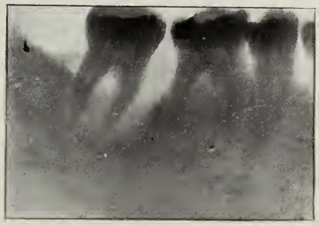


Fig. 61.



A CASE OF HEREDITY.

I will conclude by referring very briefly to a case of heredity, of which I have models on the table and which I can explain in a few words. I only introduce this to emphasize the influence of hereditary conditions and to show to you a very remarkable case. This [exhibiting] shows the upper and lower jaws of a woman of twenty-one years, who came to the Royal Dental Hospital of London a few years ago to be operated upon for bilateral empyema of the antrum. I examined her mouth, and found no crowns on the teeth in either the upper or the lower jaw. The teeth looked as though they had been filed off level with the gum. She informed me that her sister had the same condition, and I asked to see her sister. She came to the hospital too, and I took an impression of the mouth. She was ten years older than the original patient, and there has been absorption of the bone going on, but these conditions existed ten years ago in this mouth—practically the same as in the mouth of the first patient. There was no attrition, no erosion, no abrasion, nothing but an hereditary absence of formation of the crowns. I was careful to make inquiry as to caries. I was then informed, further, that her

* Lantern slides not reproduced.

mother had the same condition, that her grandfather had, that his father had, and that his father had, also that two of her brothers and a nephew suffered similarly. I was sufficiently interested in this case to go into the country to see as many of these people as I could, and here are exhibited the casts of the mouth of the brother, who was the oldest of the family represented by these models, a man of thirty-eight years of age; and you see the same condition existing there. This is the model of his son, eight and one-half years of age, and these are permanent teeth which have been erupted. They, too, show the same leveling of the crowns of the teeth, and the same yellow, hard surface of their roots.

The last two are the two younger brothers—a boy of nineteen, with exactly the same condition, and a boy of sixteen, in whose case there was a distance of eight millimeters between the two jaws in the incisor region. I may say that the other dermal appendages were apparently unaffected, but there was a certain amount of mental deficiency in two of the boys.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

INDICATIONS OF DENTAL RADIOGRAPHY.

By E. J. EISEN, D.D.S., and PAUL EISEN, M.D., Milwaukee, Wis.

THE value of radiology to dentistry is becoming more manifest every day. It elevates dentistry at once to a higher plane as a branch of medicine, and opens ways whereby we can make of our work a more exact science. It is possible, with the necessary equipment at hand, to make one's work easier, and infinitely more satisfactory.

When the use of the Roentgen rays becomes more general, it will not only prove an aid in revealing changes in tissue density due to pathological conditions as such, but will enable one to estimate the possibility of future trouble. In this respect, the writers have in mind many conditions which may determine the feasibility of certain remedial measures, such as possible surgical procedures in relation to pus accumulations, and, in a general way, means for determining the advisability of mechanical replacement of lost teeth. Many times a roentgenogram, taken as a mere diagnostic guide, will reveal conditions entirely unrecognizable by methods heretofore at our disposal, and therefore unsuspected. Again, pathological conditions often find expression in a radiograph, but are unrecognized because the interpreter cannot read the plate.

In this connection it is here recommended that, wherever possible, a plate in preference to a film be resorted to. Not only does a plate cover a larger field for observation, but it has other advantages in judging different tissues according to their respective degrees of density. The different degrees of density of the tooth as compared with the surrounding bony tissue of the alveolus, as well as with the soft tissue of the gum, is brought out just as sharply in a film, but the field is very limited. This is the more important when one considers the real value of radiology. It should not only give us information of the condition of the bony, inaccessible tissue in the near neighborhood of the field of investigation, but should disclose any possible relation with more distant tissue; in other words, one expects a complete roentgenological diagnosis. This is only an aid to the clinical diagnosis. Both help us estimate the underlying pathological condition, but neither reveals this condition; that can be done solely by the microscope.

Again, conditions in the mouth are such that they may be either magnified or minimized by false interpretation of a radiogram. This is the more apparent to those who are using the radiograph as a basis for operative as well as post-operative procedures. The fundamental basis of both, however, must be built upon a knowledge of pathology.

Indications for Roentgenological Classification.

The indications for employing the Roentgen rays may be classified into fields distinguished according to different pathological conditions, or according to their clinical phases. The former is more scientific, the latter often more practical. A distinction may also be drawn between the intra- and extra-oral method of exposure or technique. Since none of these, however, meet all requirements, a strictly roentgenological classification has been decided upon here, which obviously calls for the following indications:

Fig. 1.

I. Location.

The first consideration, and the pre-eminent point of interest, is the location of the trouble. The lesion will either be found in the suspected area or removed from it upward or downward, backward or forward, to the right or the left, as revealed by the radiograph.

A patient complained of soreness (at point A, in Fig. 1) unaccompanied by any clinical symptoms of inflammation. The radiograph reveals a canal filled almost to the apex, nevertheless an area of diminished density to one side (black on the film, light on the print). At the margin of this area may be seen a very dense area of irregular shape. The cause of this was found to be a piece of gutta-percha, probably remaining in the tissues following extraction of the intervening tooth.

II. Position.

Having ascertained the location, the next factor to be determined is the position which the object has in the tissue. This has been somewhat difficult to ascertain with the three planes projected on to one plane. Thus the accompanying film shows only one of these planes, and that incorrectly, as it is impossible to have the tooth parallel to the film. (See Fig. 2.)

Fig. 2.

Here is the acknowledged field of stereo-radiography, as shown in the accompanying stereo-radiogram, in which the exact position of a tooth can be actually seen in space. The view is distorted only in so far as the binocular rotation of the focus was sidewise instead of up-and-down—bringing a hairpin into the projected area. (See Fig. 3, A and B.) Nevertheless the position comes out well when viewed in a parlor stereoscope.

III. Relation to Surrounding Tissue.

The next important step to ascertain is the relation of the lesion to the surrounding tissue. This can only be shown with a plate—if possible, stereoscopically. The relation of cavities, containing pus, to the teeth as well as to the superficial tissues, the relation of growths, benign or malignant, to the adjacent tissues, and the involvement of surrounding tissues, must be looked for. Such visible changes shown up by the X rays are destruction of cancellous bone tissue, especially noticeable around the roots of teeth, irritative apposition of calcifying pericementitis and calcifying periosteitis.

The accompanying radiograph (Fig. 4) is that of a patient referred by Dr. G. V. I. Brown, with a tumor of the lower jaw, being external but not movable upon the lamella, egg-sized, round, and firm. Its origin, the involvement of tissue, and its etiological nature, were sought for. The radiograph shows involvement of cancellous tissue, but ill-defined in its limitation, protrusion of a calcifying nature into the soft tissue, spreading out in fan-shape, lifting a piece of the bone-lamella and causing a zone of reactive calcification around the border, not involving the molar, however, or originating from any sub-involved tooth root, as at first surmised. These characteristics justify one in assuming a malignant growth of a bony nature, involving a large area of the lower jaw. The operative removal disclosed an osteo-sarcoma of unknown origin.

IV. SHAPE.

The first factor apparent in a radiograph is the shape presented by an object or area. By comparison with a known form of an object, the probable nature can at once be recognized. Thus the shadow of a molar in the antrum can be recognized by the shape of the tooth with its crown and roots. By its shape alone, an unerupted canine is revealed as such. The hyoid bone, when its shape is once noted, can be recognized, even if projected into areas above it. The shape of the dense shadow at the angle of the mandible in the accompanying print (Fig. 5) leaves little doubt as to its being an unerupted tooth, its location justifying one in assuming it to be the lower third molar. The patient had the corresponding one of the other side extracted under identical conditions.

V. SIZE.

Generally, the size of the teeth is of little diagnostic value, but when an enlargement or diminution, viz, by apposition or absorption, has taken place, it becomes important to determine the real size of a tooth. Its length and breadth can be accurately ascertained only in cases where there is no distortion. As an illustration the accompanying film (Fig. 6) is shown. The question of replacing these ill-fitting crowns arose; the radiograph, however, shows the length and breadth of the roots greatly undersized. Besides, destruction of the roots at the gingival margin is evident. Under these circumstances a different procedure than at first thought feasible was decided upon.

VI. DISTANCE FROM SURFACE.

In locating foreign substances or bodies, it is essential in operative work to know beforehand how far distant labially or palatally the object is from the surface.

The accompanying film (see Fig. 7) was made in a patient complaining of soreness in the region of the upper right canine, without any visible manifestations of inflammation. Between the lateral incisor and canine roots a circular area of decreased density is seen on the palatal side of the alveolus, overlapping the canine, surrounding an oval area of marked density, both being sharply outlined against each other and the surrounding cancellous tissue. To approach this area it is valuable to know beforehand its depth from the surface.

VII. EXTENSION.

In a growth which is of an inflammatory nature a knowledge of the extension in both directions is absolutely necessary to fulfil the requirements of a diagnosis. This can only be done on a

Fig. 3B.

Fig. 3A.

plate. The lesion, however, is only recognized in so far as it shows progression of the area of altered density into that of surrounding tissue, viz, protrusion of a growth or destruction of surrounding bony tissue. The destruction which involves soft tissue cannot be recognized by any gradation of density in the radiograph, but can be brought out by injecting bismuth paste. The radiograph in Fig. 8 shows the extension of destruction of cancellous tissue in the mandible, originating from the anterior root surface of the lower molar, in a patient presenting a fistulous opening under the jaw, discharging pus. The course of the fistula in the cancellous tissue is shown in a broad line of lessened density leading from the anterior root downward and forward to a round area, being a larger cavity, then backward and downward to an opening at the margin of the mandible. The further course of the fistula in the soft tissue to the skin surface is not shown here, but could be brought out by filling with bismuth paste. In this way the total extension of a lesion is made visible by a radiograph from its origin to its termination.

Fig. 4.

VIII. OUTLINE.

In order to obtain the finer definition, a magnifying glass will be found a great aid. The outlines, whether sharp or indistinct, smooth or rough, showing protrusions or indentations, may all have their importance. In this way the apposition in exostosis is defined. Therefore only such radiograms should be considered as show absolutely sharp outlines in parts not involved. Any fogging or

Fig. 5.

Fig. 6.

Fig. 7.

false projection must be eliminated beforehand. It is especially essential to have the tips of the roots sharply outlined, as they are in the field mostly involved.

FIG. 8.

FIG. 9A.

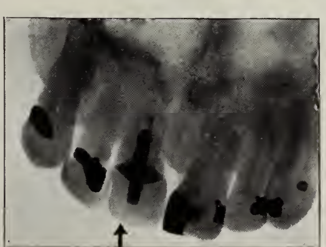


FIG. 9B.

Faulty technique is to be blamed for wrong diagnosis. The film (Fig. 9, A) and extracted tooth (Fig. 9, B) are evidence that the radiograph shows details in outline which may easily be overlooked at first glance. Upon closer examination, however, the outline of destroyed tooth substance is shown in accordance with that of the tooth.

The outlines of all the lower teeth

shown in Fig. 10 are sharply defined, with the exception of the roots of the apices in the nature of exostosis, preventing its successful elevation.

Fig. 10.

lower first molar. This tooth was being subjected to force in order to bring it to place. Failure to accomplish this led to an X-ray examination. The case was referred by Dr. G. P. Brenner. Following the course of the roots, one sees apposition of a dense tissue around their

IX. DENSITY.

The most difficult part of roentgenology for the novice is the judgment of density of tissue. Here physical laws alone prevail, nothing being left to the imagination. Air shows the least density, because no rays are absorbed, and therefore reach the plate with full intensity, blackening it deeply. Water and soft tissue, skin, muscle, etc., have the same density—that is, absorbability for the Roentgen rays. They allow only a certain amount of rays to penetrate them, and act chemically upon the plate; the area is accordingly of higher density. Bone tissue has the density of the quantity of mineral (calcium) salts in its composition, the degree of density varying with the atomic weight of the mineral. Therefore decalcified bone shows less density, and eburnated or ebonized bone greater density. The first will be found in rhachitis and tuberculosis, in arterio-sclerosis, etc., the second in certain stages of syphilis or osteomyelitis. Enamel shows even greater density than the last-mentioned alteration. Proper exposure, therefore, can be recognized by comparing the density of the teeth to cancellous tissue. It must be remembered, however, that in metals density does not equal firmness—lead, being of higher atomic weight, offering more resistance, *i.e.* being absorbed to a greater extent, than iron. To get the greatest contrast a tube is therefore preferred having the greatest variation in the penetration of the rays emanating therefrom. The softer the tube, the more contrast in the different tissues.

FIG. 11.

It is next to impossible to show in a print the different degrees of density shown on the original negative, but the accompanying print (Fig. 11) may serve to give an illustration. The high-lights are no denser than the antrum—neither offering resistance, as they are air.

The soft tissue shows the next degree

of density, then the cancellous tissue of the alveolus, and then the unerupted tooth; still greater density is exhibited by the enamel of the teeth and crowns of the artificial plate, while the plate itself, consisting of hard rubber with a certain percentage of sulfur, the pins in the artificial teeth, and the metal tooth-fillings appear, of course, darkest of all. This case was referred by Dr. C. W. Hall.

FIG. 12.

X. NATURE.

The exact nature of a lesion cannot be definitely shown radiographically, but by following the before-mentioned signs a conclusion as to the probable nature can very often be reached. For instance, on taking into consideration its location and its degree of density, a pulp-stone can be recognized as such.

Of all bone lesions, whether they be neoplasms or of some specific origin, none give so clear a Roentgen diagnosis as bone-cysts, a case of which is shown. (See Fig. 12.) This case was referred for radiological diagnosis by Dr. Carl Case. The area of diminished density is located in the mandible; it is of oblong shape and nut size, and the area is so dark (light on the print) that it must contain air, with clear-cut outline, sharply marked off from the surrounding tissue of unimpaired density. These characteristics justified one in assuming the area to be that of a bone-cyst, and of benign nature. The subsequent curetment and microscopical examination by Dr. G. V. I. Brown bore out this diagnosis.

XI. ETIOLOGY.

Most men unaccustomed to the interpretation of radiograms fall into the error of trying to make an etiological diagnosis from the plate. Just as the expression "kidney stone" is heard in medical parlance, so in dentistry the word "abscess" is employed, when the only conclusion which can be drawn from a radiograph is that of an area, or in a stereo-radiogram, of a cavity of lesser density of tissue. The nature of the contents must find clinical explanation. The word syphilitic, tuberculous, etc., should not be heard in making a Roentgen diagnosis.

Fig. 13.

Fig. 14.

Fig. 15.

The two films, Figs. 13 and 14, show how a radiograph may nevertheless help clear up the obscure etiology of a cavity filled with pus. In this case, pus was exuding at a point above the first bicuspid. The radiograph shows the location, extension, and relation of the cavity to the adjacent teeth, but not, of course, the source of infection. Removal of the crown, also root-filling of the first bicuspid, and drainage through this root giving no relief, the tooth was extracted, under the belief that necrosis at the apex was the cause. This extraction also having no effect, the second bicuspid was drilled into and found to contain a dead pulp. Suitable treatment now cleared up the diseased area, and established the etiology.

XII. ACUTE OR CHRONIC CASES.

Similar faulty phraseology is often used in trying to express whether a lesion is acute or chronic, recent or old, there being no roentgenological points of differentiation to warrant any such term.

The accompanying radiograph (Fig. 15) was taken to determine the cause of irritation following the filling of a root-canal. It shows clearly an area of lessened density around the apex, with a line of increased density in continuity with the root-canal. In other words, the root-filling was forced out through the apical foramen, causing local irritation, visible in the area of decalcified cancellous tissue. Here an acute stage without infection is underlying, the irritation being due to formalin in the root-filling material. A chronic irritation will naturally give the same picture.

Fig. 16.

XIII. PROBABLE CLINICAL COURSE.

Very often the Roentgen findings help one in estimating the probable clinical course, supplementing the other clinical findings heretofore out of the field of observation. In this way the clinical course may be followed by means of the rays, as for instance the resorption of an area of inflammation showing less density than the surrounding tissue. Likewise it is possible to follow the restitution of normal tissue in an area of destruction —for instance, of an abscess cavity after drainage. Even the exact size in diminution can be demonstrated by inserting bismuth paste into the cavity.

In illustrating one of the probable clinical courses of treatment, the following case is cited: The patient, a man of thirty-four years, had bridge work inserted, as shown in the radiograph, Fig. 16, as an aid in the treatment of pyorrhea. The appliances did not take into consideration the proper laws of mastication, hence an extensive destruction of

Fig. 17.

alveolar tissue was the result, as recognizable in the plate. With proper mechanical appliances, having lateral support, it is to be assumed that no further destruction of cancellous tissue will ensue, or will at least be minimized.

FIG. 18.

XIV. NEGATIVE AND POSITIVE DIAGNOSIS.

A negative diagnosis, based on Roentgen findings alone, is absolutely unwarranted. Inflammations in the nature of round-cell infiltration find no radiographic expression. On the other hand, a positive diagnosis must in every case be in accord with the clinical data, if the dental roentgenologist would avoid bad pitfalls. Far from bringing the value of the Roentgen rays into disrepute, this exact limitation to its designated field only enhances its application, and makes of it a real diagnostic art.

Roentgenologists will be able to say at a glance that the print in Fig. 17 has been made in a case of acromegaly. The partially destroyed sella turcica, the encroachment on the sphenoid sinus, the protruding frontal sinus, and especially the protruding upper and lower jaws, with the separation of teeth, is too characteristic to need further comment. The enlargement of the tongue and of the hands and feet, with menstrual disturbances, etc., bear out the clinical diagnosis.

The following two prints (Figs. 18 and 19), however, present a good illustration of how careful one must be in making a positive diagnosis, even if the clinical symptoms seem to bear it out. The first print (Fig. 18) is one of the upper left side—the print reversing the sides—of the jaw of a boy suffering with dementia præcox. This came on in his last year at college, he being then about sixteen, and suffering from an intense trifacial neuralgia of unknown origin. A roentgenological exploration of his denture, at the age of twenty-three, revealed dark shadows back of and above the upper third molars, as shown in the print of the upper left side.

In looking over all previous exposures, a similar area of density in this identical position was found but once—in the second plate (Fig. 19), the case of an insane woman. Naturally the conclusion was drawn that this might be the focus of irritation, inasmuch as unerupted or misplaced teeth are well-known factors in the etiology of cases of reflex neuroses and psychoses. To make a long story short, the patient was turned over to the family dentist, Dr. Kuhnmuench, who extracted what proved to be unerupted supernumerary upper third molars, one on each side. The extraction, which

Fig. 19.

was made two years ago, was followed by some improvement but no cure. The dementia still persists, in spite of the correct diagnosis of both physician and dentist.

TECHNIQUE OF DENTAL RADIOGRAPHY.

Penetration of tube. A correct dental radiograph demands a suitable X-ray tube. For intra-oral exposures, employing dental films, the penetration should not exceed 6.5 Wehnelt—4 Benoist, equaling a terminal spark gap of 6 to 12 cm., or $2\frac{1}{2}$ to $4\frac{1}{2}$ inches. The focus must be sharp and absolutely steady during exposure (the cathode terminal of the tube, held up, must not rattle when shaken), and the penetration must also be stable during the whole time of exposure. Exposure must be interrupted as soon as the vacuum changes. This is discernible with the millimeter. Short, frequent exposures are the best to keep up the vacuum. For extra-oral exposures, employing a plate, the penetration should not be over 7.5 Wehnelt—5 Benoist, corresponding to a terminal spark gap of 7 to 15 cm. or 3 to 6 inches.

Distance. The distance from the target of the tube to the film or plate should be standardized in dental work at 20 inches. This will not only facilitate a correctly timed exposure, but will insure a correct reproduction of the desired area, thereby minimizing distortion.

Time of exposure. The time of exposure depends upon the amount of current at disposal. If the following rules are adhered to, even a small machine will give excellent results. Exposures of one second or less are convenient, but in no case a necessity.

Time of development and developing solutions. The time of development must be judged by the time it takes for the desired area, not the high-lights, to appear. This time is multiplied by the factor of the developer in use. For instance, having hydroquinone as a developer, the developing factor is 5. The solution may be put up as follows: Solution A—Dissolve 2/3 oz. or 20 cc. hydroquinone in 33 oz. or 1000 cc. of distilled water; add $2\frac{1}{3}$ oz. or 66 cc. of dry, or $3\frac{1}{3}$ oz. or 100 cc. of crystallized pure sodium sulfite, and add 15 minims or 1 cc. of crystallized potassium bromate. Solution B—Dissolve 5 oz. or 150 cc. of crystallized sodium carbonate in 33 oz. distilled water. The filtered solutions are taken in equal parts. The roots of the teeth, being the area desired, appear in 90 seconds; this is multiplied by the factor 5 of hydroquinone, making 450 seconds, or $7\frac{1}{2}$ minutes. This completes the development, the films being washed,

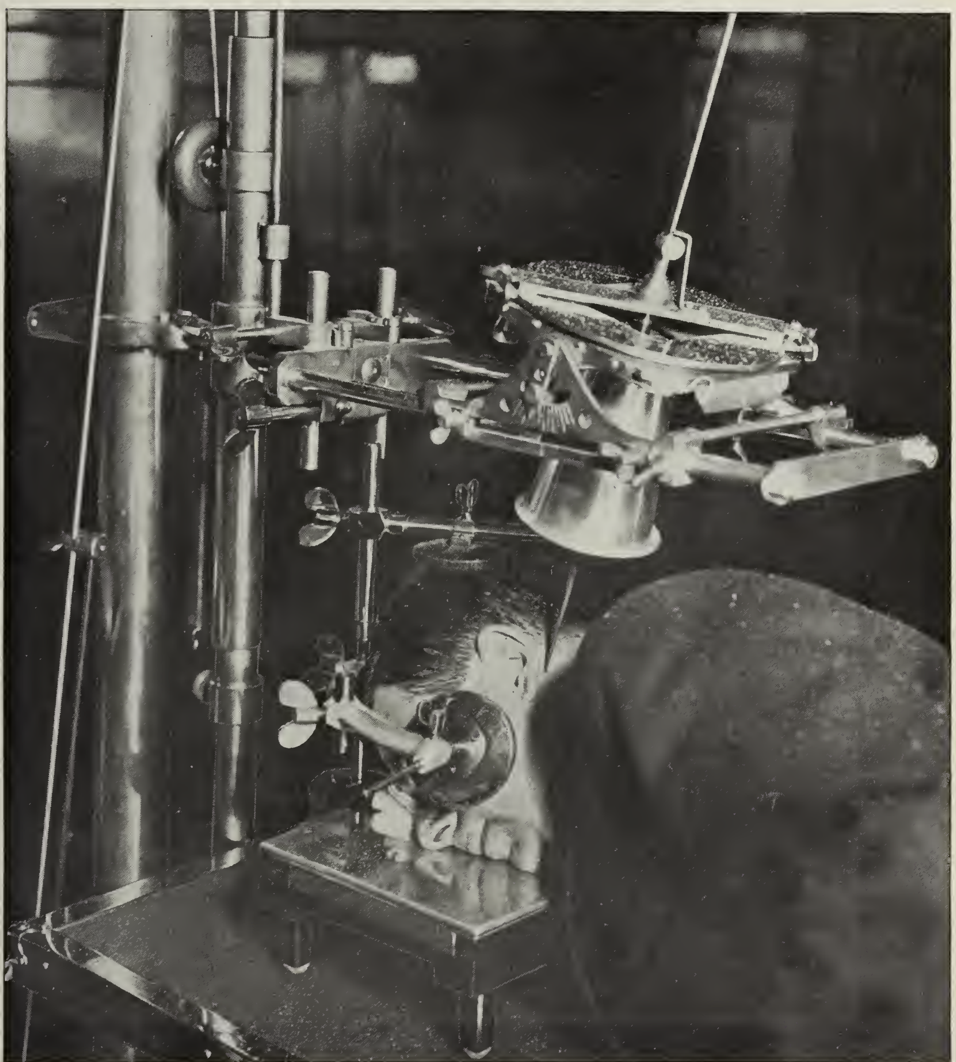
Fig. 20.

fixed, washed, and dried in the usual way.

Obtaining contrast. Greater contrast may be obtained if a sheet of lead, 1/16 inch thick and of the size of the 5 x 7 plate, be placed underneath its glass side and inside of the enveloping black paper. Films must not be over three months old, and must be kept in a dry state, else they will show fogging and a black margin on developing.

Contact and immobility of film or plate. The film or plate must be brought into closest possible contact to the desired area, and absolute immobility be maintained during exposure. With the film in the mouth this is accomplished satisfactorily by the patient holding the film as placed by the operator. In using plates the face is brought down upon the head-rest holding the plate, the patient lying on the same table as the head-rest.

Fig. 21.



Position of the head. The position of the head not only demands perfect immobility, but must be so adjusted as to allow correct focusing of the central ray upon the part desired. While padded head-rests serve to immobilize the head, they also prevent the slightest movements from respiration, arterial palpitation, or tremor, which blur the outline. The proximity of the desired area to the plate is made possible by rotating the head to the necessary angle and bringing this area down upon the center of the plate, the center of the plate having previously been brought into the area of the focal ray. This minimizes distortion. In the case of a tooth, the apex should be in the center of the focus; this also brings the apex into the center of a film.

Fig. 22.

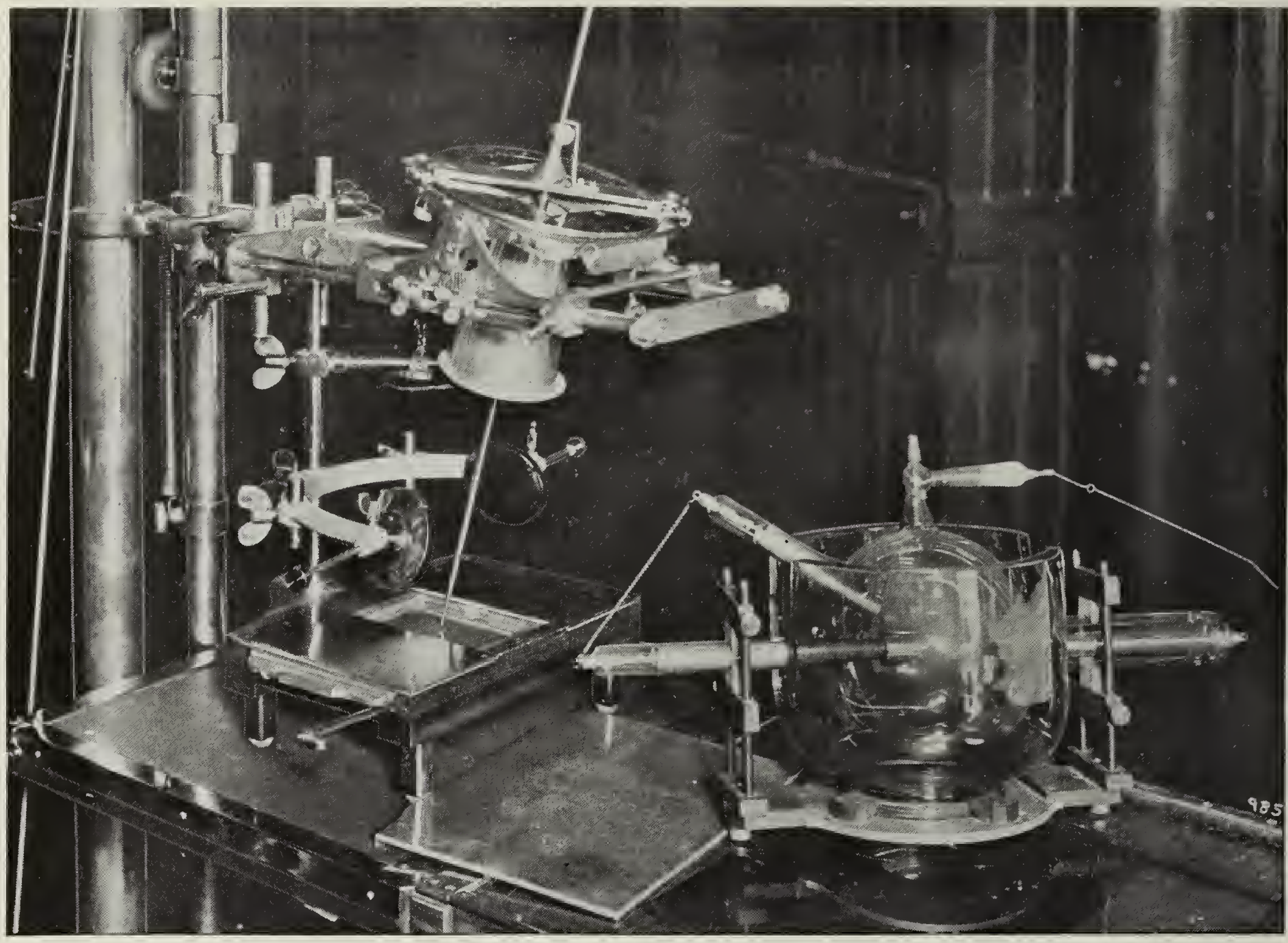
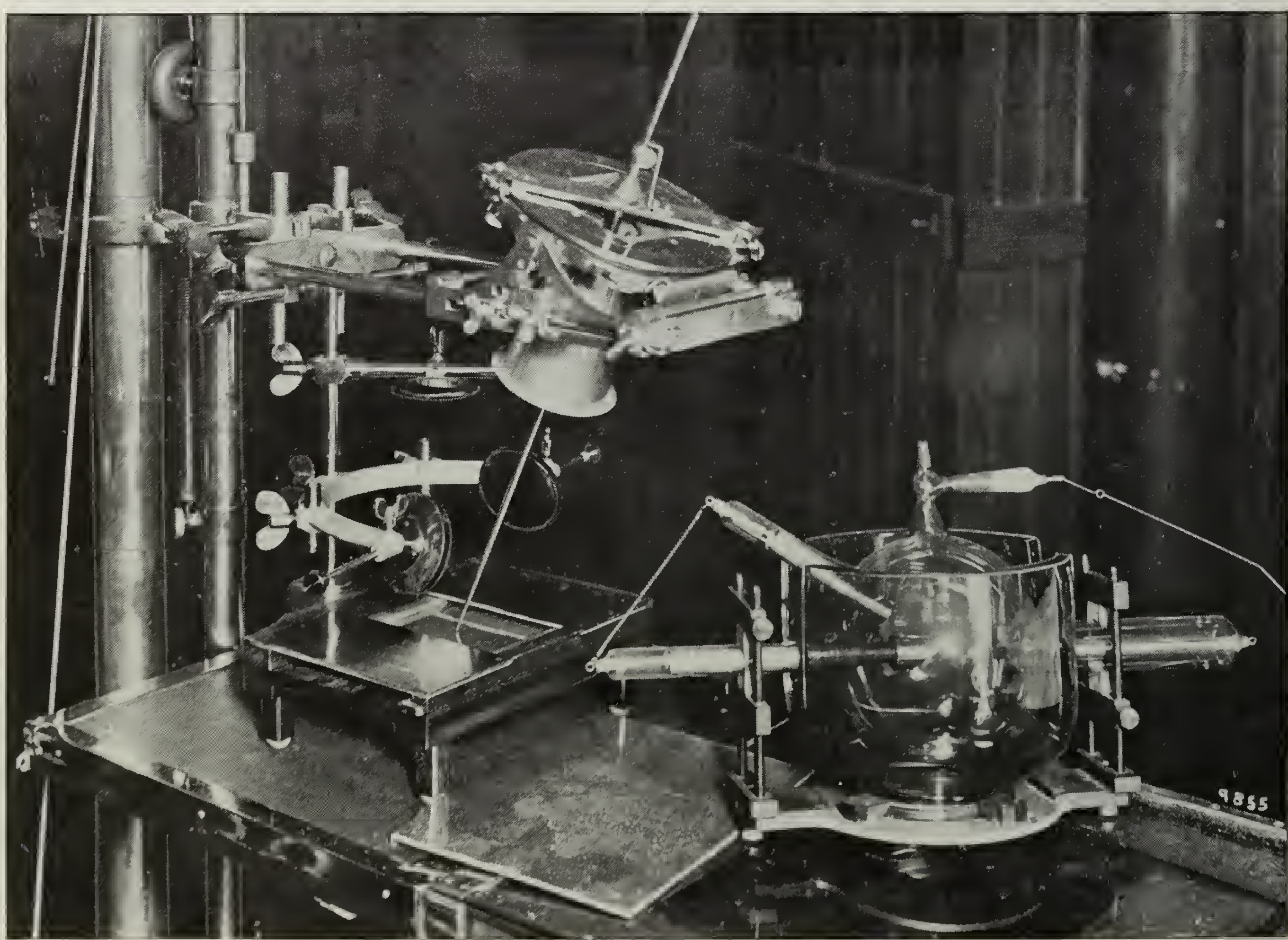


Fig. 23.



After centering the required area by rotating the head, the central or focal ray is rotated to strike this center in such a way as to avoid the opposite ramus. For this step, besides taking note of the position of the head as a whole, certain landmarks come into consideration. The focal ray is adjusted correctly, if it passes behind the ascending ramus of the mandible and at a point just below and behind the external auditory meatus, ahead of the mastoid process, as shown in the accompanying tracing and photograph. (Figs. 20 and 21.)

Besides avoiding the opposite ramus. the cranium, with its thick occiput and inner ear parts, is projected out of the field. The angle of rotation of the head is 70°, the angle of rotation of the focal ray is between 65° and 70°, the two stereoscopic angles being 73° and 75° respectively, as shown in the accompanying plates. (Figs. 22 and 23.)

STEREO-RADIOGRAPHS.

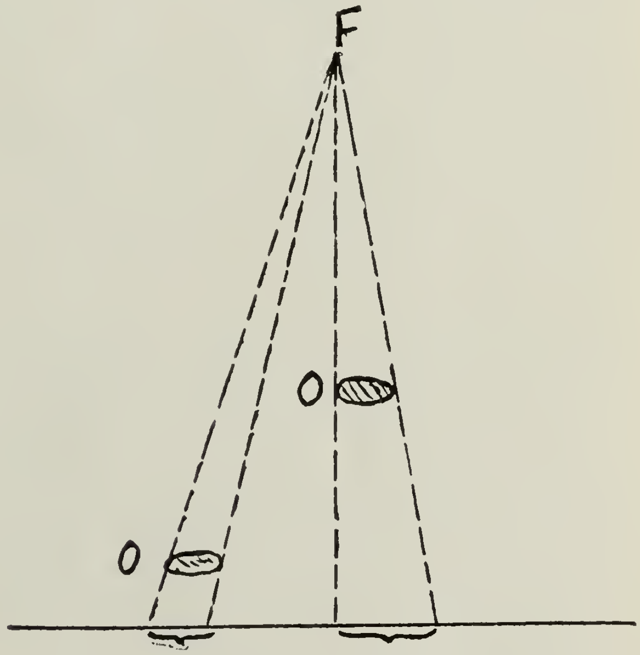
In some cases it is desirable not only to get the projected parts on a plane, but also actually to see their position, their extension, and their relation to the surrounding tissues. This is accomplished by taking two separate exposures of the same area, with shifting of the exposed half of the plate and binocular rotation of the focus between exposures. The two views, each covering half of a 5 x 7 inch plate, are viewed in a common parlor stereoscope. This places the parts and objects viewed into space. The two separate exposures, at the same time, eliminate the necessity of taking two exposures at right angles, showing the proper depth in themselves. They may also clear up any misconception of a defect in one of the plates. In no part of the human body is stereo-radiography of more value than in unraveling the confusing lines of views of the facial skull.

LAWS OF PROJECTION.

To understand a plane radiograph, though, it is most essential to recall some necessary laws of projection. Why does one take such pains in bringing the desired parts into such close contact to the film or plate? Simply because the nearer the object to the plate or film, the less the distortion, when the rays emanate, as in a Roentgen tube, from a focal point. The accompanying drawing (Fig. 24) illustrates this.

Of course, the distance from the focus to the film or plate is taken equal, also

Fig. 24.



F, Focus. *O*, Object.

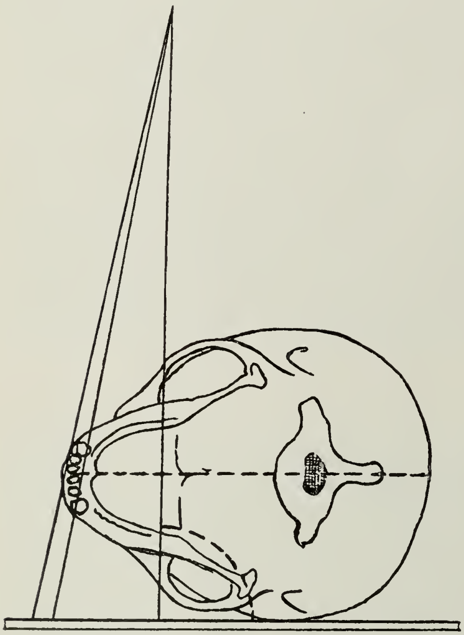
the plane of the two equal-sized objects is assumed to be in a plane parallel to the plane of the film or plate. One avoids at the same time the harmful secondary rays originating in the space between the object and film from fogging the latter; this insures sharper outline and clearer detail.

ASCERTAINING RELATION OF APICES OF UPPER MOLARS TO FLOOR OF ANTRUM.

Exception to this rule is taken advantage of in ascertaining the relation of the apices of the upper molars to the floor of the antrum. Here we can neither rotate the head nor the focal ray, but must have the middle plane, represented by the nasal septum and the protuberantia occipitalis, parallel to the plate, the ray striking the latter perpendicularly, passing transversely through the floor of the antrum in the region of the molar desired, as shown in the accompanying tracing and photograph. (Figs. 25 and 26.)

The distance of the focal point to the plate is not twenty inches as in all other dental work, but is minimized to twelve inches. This not only enlarges the teeth of the distal side, but also makes them

Fig. 25.



indistinct enough, so that their shadow does not interfere with reading the relation of the area of the side next to the plate. The accompanying drawing (Fig. 27) illustrates this, the focus being brought down from F to F_2, the distal teeth being in the plane a–b, and enlarged to a_2–b_2.

SHOWING ACTUAL LENGTH OF A TOOTH IN RADIOGRAPHY.

In dental radiography it is impossible to eliminate distortion, but distorted lengthening or shortening should not exceed one-tenth of the actual length of the tooth, as demonstrated by Cieszynski. The latter has shown by constructive methods, as seen in the following drawing (Fig. 28), that the actual length of a tooth can be shown in a radiograph.

But it is practically out of the question to fulfil the requirements of bringing the rays and the film into correct angular relationship, although this is theoretically possible—the slightest movement of film, the patient's head, or the focal ray, frustrating all our previous painstaking efforts. When size, position, and location in space are essential, a stereo-radiogram will far better meet the requirements.

As previously mentioned, we have two ways of producing a dental radiograph. One is to have an X-ray photographic plate external to the mouth—the extra-oral method; the other, to have an X-ray film, suitably trimmed, bent, and adjusted, in the mouth—the intra-oral method. The latter being the older, convenient, and more easily understood, it will be discussed first.

COPING WITH DISTORTION IN THE INTRA-ORAL, OR FILM METHOD.

Why is it impossible to bring the tooth next to and parallel to the film? Because we must strive to have the apex of the tooth in the center both of the focus and the film. Further, the film must be pressed against the alveolar process and palate, and is not only bent, but is at an angle to the root-canal of the tooth. The intervening space or angle should be divided, and the focal ray brought down vertically through the apex upon this plane, as shown in the accompanying drawing. (Fig. 29.)

In this way we minimize the unavoidable distortion. Practically this is quickly brought about by adjusting the plane of the open side of the cone, which touches the mouth parallel or nearly so to the film or the plane it is held in. According to the height of the palate, this will be found more or less easy to do. Following this advice, the dental regions of the upper jaw are quickly and accurately focused, the rotation of the head and of the focal ray being readily accomplished. A focal pointer is of great aid, doing away with any tedious construction and angular measuring.

antrum. The accompanying drawings, from Cieszynski, explain this error. On the film picture (Fig. 30), J J is the outline of the malar bone J S; the line A the lingual line of the alveolar process.

Fig. 26.

Errors of interpretation are many to those unaccustomed to tracing an elevation from a projected area. One of the most common is the one of supposing the labial roots of a molar to be in the antrum, being above the line K representing its floor. But the frontal section below (see Fig. 31) shows how p

cess. One might be led to believe that the palatal root p of the first molar was in the antrum, being above the line K representing its floor. But the frontal section below (see Fig. 31) shows how p

is projected above *a*, the latter corresponding with K.

Fig. 27.

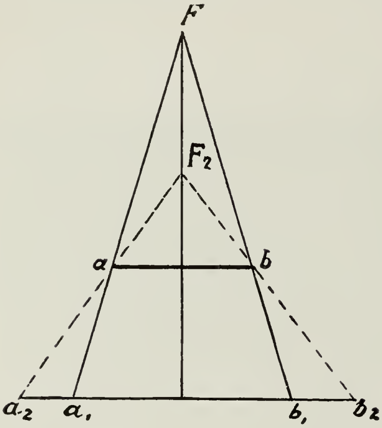


Fig. 28.

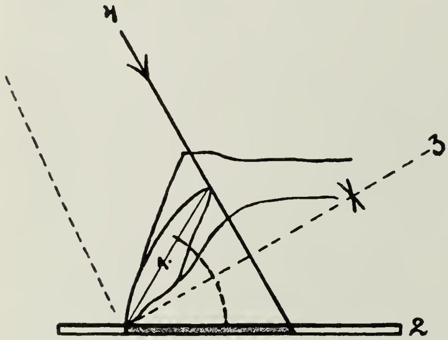
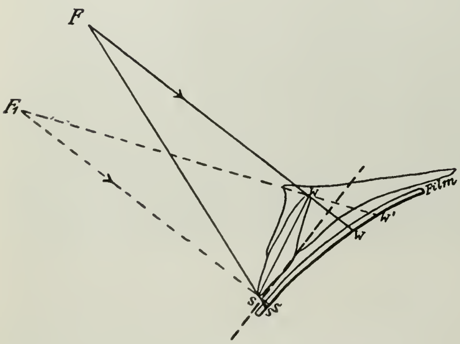


Fig. 29.



A similar error to which Cieszynski called attention is the presumption that a root-canal is not filled to the tip, while in reality it is—the planes overlapping, however, as shown in the accompanying illustration. (Fig. 32.)

Fig. 30.

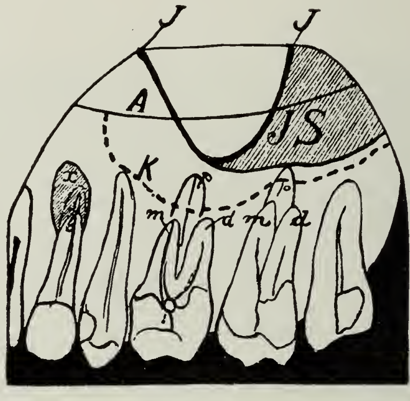


Fig. 31.

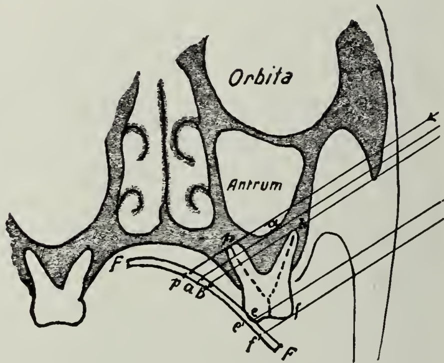
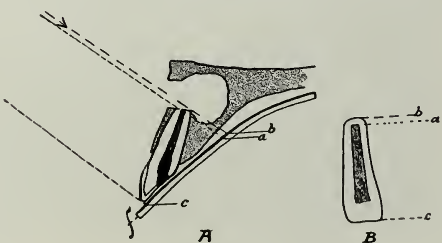


Fig. 32.



INDICATIONS FOR THE EXTRA-ORAL, OR PLATE METHOD.

Should repeated intra-oral exposures leave any doubt, an extra-oral radiogram will quickly clear up the situation. The lower jaw offers less advantages for intra-oral exposures, the lower incisors alone furnishing a suitable field. The correct angle is difficult to maintain, as the film cannot be pushed down far, and will even move when held between the teeth, by upward pressure of the underlying

Fig. 33.

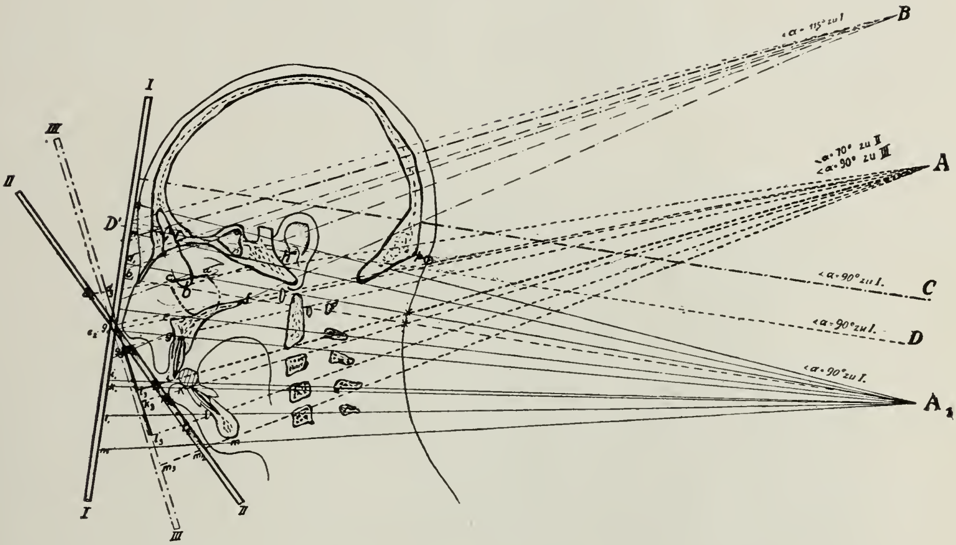


Fig. 34.

tongue. The lateral teeth give poor results with this method, and the extra-oral method is always the method of first choice.

The extra-oral method, although more difficult for the beginner, nevertheless gives results so far superior in most cases to the intra-oral method that it should be resorted to in all cases where the least doubt remains.

Radiographing lower incisors. The incisors of the lower jaw are taken in the following manner: The patient lies face downward on the plate in such a way that the chin and tip of the nose are the resting-points. The head must be centered and laterally steadied by head-rests or sand-bags. The rays are focused, as in the diagram in Fig. 33, from A perpendicularly upon the plate, II.

If this or any view subsequently described be taken stereoscopically, the shifting of the focal point should be done vertically, not sidewise, in order to correctly bring out the horizontal planes of the facial skull. Even the antrum is taken best in this way, stereoscopically. It will be noted that the focal ray strikes the neck from two to three inches below the protuberantia occipitalis, and goes through the piece of cork inserted between the teeth.

Fig. 35.

Posterior lower teeth. For all the other teeth of the lower jaw the head is gradually rotated, but also the focal ray, so that the distal jaw is projected out of the area of the proximal one. In this way the hyoid bone is also projected upward, and often into the lower ramus shadow; it must therefore be recognized as such.

Upper incisors. To take the incisors of the upper jaw, the patient lies likewise face downward, but resting on the tip of the nose and forehead. The rays should be directed, as shown in the aforementioned diagram (Fig. 33), from A I perpendicularly upon the plate I, the focal ray entering at the same point of the neck, but directly upward through the antrum.

Frontal antrum picture. For a frontal antrum picture the manner is the same, but the third molars will project into the area of the antrum.

Upper posterior teeth and canines. For teeth from the canine posteriorly the head and focal ray are again rotated in the aforesaid manner. For the canines the nose is flattened sidewise on the plate, as shown in Fig. 21.

Unerupted teeth. In unerupted teeth, a stereo-radiogram offers opportunity for correctly estimating the position of the tooth in the tissue in a way for correctly adjusting the lines of traction to be employed.

Growths. In case of a growth, the destroyed area can be accurately estimated in its extension in the three dimensions. With sufficient rotation of the head, the styloid process can be brought into view and recognized as such. All earrings and combs should be removed before exposure.

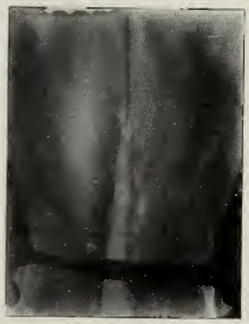
Antrum cases. The antrum, for dental purposes, is best taken laterally, the focal rays parallel with its floor. The accompanying plate (Fig. 34), taken in this manner, shows in addition a probe in the antrum.

The adjustment of the head and ray must be done with painstaking care, the least angulation of either producing false projections. The stability of the head is especially difficult, as it rests on the malar bone alone. Here also a stereo-radiogram is essential in doubtful cases. If, however, a tooth is within the antrum, the head is rotated to great advantage, but not the focal ray. The tooth is in both cases equally distant from the plate, making its outline somewhat indistinct, as the accompanying view shows. (Fig. 35.) One tooth is seen *in toto* and another partially in the antrum. A cavity in the lower jaw, showing a deposit, will also be noticed.

The frontal view of the antrum has the advantage over the transverse view that it allows of comparison of the two sides in case of empyema.

Hard palate. The hard palate offers an easily accessible field of investigation. If a film is held against it, and the rays are directed vertically down upon the plane of the film, the breadth of the separated palatal suture is readily revealed. This estimation is of value in the course of treatment in appropriate cases, as shown in the film in Fig. 36, which was made in a case referred by Dr. G. V. I. Brown.

FIG. 36.



SUMMARY.

To summarize, the indications for using the intra-oral method are few, being limited to the lower incisors in some, to the upper incisors in most cases, to the upper canines, bicuspids, and upper molars in many cases. A negative film, however, should never be taken as conclusive evidence of normal conditions except in rare instances. In all doubtful cases, a plate—and if still doubtful, a stereo-radiogram—should be resorted to. And if even this leads to no definite conclusion, examination of the other jaw should be made. In cases involving the angle of the lower jaw, a film should not even be taken into consideration; the same holds good with the rear portion of the upper jaw. A plate alone should be employed in determining the origin and extension of cysts, tumors, osteomyelitic processes, necrotic areas, fractures of the maxilla or the mandible, and in the location of foreign bodies and teeth, or in disease conditions of the antrum and nasal cavities.

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ALBAN KOEHLER. Fortschritte, vol. xvii, p. 319.

G. E. PFAHLER. Fortschritte, vol. xvii, p. 369.

ENLARGED CERVICAL GLANDS, WITH SPECIAL REFERENCE TO THE MOUTH AS AN ETIOLOGICAL FACTOR.

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(Read before the Academy of Stomatology of Philadelphia, at its monthly meeting, April 10, 1913.)

BEFORE discussing the question of the cause of the glandular enlargement, it would be well to rapidly review the position of the different cervical glands and the regions drained by their tributaries. The chief group of glands is situated along the course of the internal jugular vein. It consists of a large number of nodes, and is a continuous chain extending throughout the entire length of the neck, but for convenience it is divided into superior and inferior deep cervical groups. In addition to these, some smaller chains occur more superficially, forming the superficial cervical group, so that there are three main groups in this region. The superficial group may be divided into two subgroups, the external jugular and anterior cervical group. The external jugular nodes, situated along the external jugular vein and resting upon the outer surface of the sterno-cleido-mastoid muscle, are few in number, ranging usually from four to six; they receive tributaries from the pinna and parotid region and empty into the superior deep cervical group by passing over the anterior border of the sterno-cleido-mastoid muscle. The anterior cervical chain is situated beneath the depressor muscles of the hyoid bone, resting upon the anterior surface of the larynx and the anterior lateral surfaces of the trachea. These drain the larynx and the trachea and empty into the superior deep cervical chain. (The tributaries of the deep cervical chain are the posterior, auricular, occipital, retropharyngeal, parotid, submaxillary, submental, and the superficial and anterior cervical chains.) The regions drained are the occipital portion of the scalp, upper part of the back of the neck, tongue, palate, nasal and buccal membranes, tonsils, teeth, pharynx, larynx, and upper portions of the esophagus. The inferior deep cervical chain—supraclavicular—is situated in the supraclavicular triangle of the neck and rests upon the scalene muscles. The tributaries, in addition to the superior deep chain, are those from the integumentary and muscular tissues of the lower part of the neck and the pectoral regions and the axillary groups. The jugular trunk on the left side empties into the thoracic duct, and on the right side into the right lymphatic duct.

The lymphatic system consists of lymphatic glands and lymph channels. The glands are situated in the course of the channels, and act more or less as filters. By the action of the leucocytes contained in them, they assist in the absorption of the infection, and unless overpowered by a very severe or long-continued source of irritation are able to overcome the infection. The so-called lymph glands are peculiar to the lymphatic apparatus; they are inappropriately designated glands, for they really represent only many-branched lacunar labyrinthine spaces.

THE PATHOLOGICAL AND BACTERIOLOGICAL STUDIES OF INFECTED GLANDS.

The cervical glandular enlargement may be only a part of a general glandular enlargement which in turn is due to a constitutional disease, such as syphilis, tuberculosis, Hodgkin's disease, leukemia, typhoid fever, or the infectious diseases of childhood. If the glandular enlargement is localized in the neck, it may be unilateral or bilateral, and caused by pus-forming micro-organisms, tubercle bacilli, or malignancy—carcinoma or sarcoma. Many authorities claim that practically all the chronic glandular enlargements of the neck not due to malignancy are due to the tubercle bacilli. Dr. P. A. Lewis reported a careful study of fifteen consecutive cases; in nine of the glands he found tubercle bacilli of the bovine type and in the remaining six tubercle bacilli of the human type. W. Leterer (*Southern Medical Journal,* January 1911) reported a study of eleven consecutive cases; in five cases the human type was isolated, in six the bovine. A. H. Tubby mentions a fact which is very interesting in this condition, *i.e.* that the human type flourished better in well-oxygenated tissue, such as the lungs, while the bovine requires less oxygen. Possible infection by milk would better explain the problem as far as the cervical glands are concerned.

The tuberculin test is of little value in determining whether a gland is tuberculous or not. A negative tuberculin test is of value in that it usually excludes the presence of tuberculosis in the entire body. A positive reaction, on the other hand, may be due merely to the presence of an arrested tuberculous process elsewhere in the body, and have no bearing at all upon the actual lesion under observation. Another interesting factor in this connection is heredity. Until recently the question of immunity has neither been adequately discussed nor sufficiently understood, but as Kelynack states—"Recently, clinical and pathological researches have shown that the character of the soil is of almost equal importance to that of the seed"—and he mentions the striking examples of family tuberculosis related by Sir William Whitla. (These, I think, are cases of house or direct infections.) On the other hand, investigations such as those of Stick, Schnitzlein, and Cornet, demonstrating the rarity of tuberculosis in orphan asylums, show that the heredity factor cannot be very large.

CHANNELS OF INFECTION.

The most frequent starting-point of the infection in children and young adults in my experience is the tonsil. The tonsillar involvement in such cases is usually associated with adenoids. Those who have examined tonsils and adenoids after removal have found in small percentages—3 to 10 per cent.—tubercle bacilli deposits therein. Sewell (*Journal of the American Medical Association,* September 9, 1911) reports the result of a histological examination of 772 pairs or 1544 tonsils, of which 6.2 per cent. were tuberculous. He was able to follow 160 patients who had been operated upon for diseased tonsils, and found that 92 had no enlarged glands and 68 had enlarged glands. Fifty-seven of these glandular enlargements disappeared permanently following the removal of the tonsils. If tubercle bacilli are found in the tonsils and in the cervical glands, it is natural to infer that the latter formed the avenue of invasion.

The teeth as a mode of invasion are frequently overlooked, although as an avenue of infection they are second in importance to the tonsils. As these glandular enlargements occur most commonly at the shedding of the first teeth and the eruption of the second set, one frequently finds very imperfect teeth. Stark, in *Revue de la Tuberculose,* July 1896, was the first to demonstrate clearly that the bacilli in the case of tuberculous glands may gain entrance through carious teeth. He cites the case of a youth who had always been healthy previous to his eighteenth year, when he developed enlarged glands. Carious molars were present on both sides. The glands were removed and the teeth extracted. The glands proved to be tuberculous and the cover-slip preparations from the teeth revealed tubercle bacilli. I have twice found the tubercle bacilli present upon the teeth and in the glands in the same case.

Interesting in this connection are the statistics of Odenthal. Among 987 children examined he found glandular enlargement present in 697—70.7 per cent. Carious teeth were also present in more than one-half of the children. Only 7.7 per cent. of the children showed carious teeth without the glandular swellings. He found that when dental caries existed on both sides, glandular enlargements were present on both sides. Of the 267 children—28.6 per cent.—who had no glandular enlargements, only five had carious teeth. Hoppe of Leipzig, in an examination of 269 cases, found glandular swellings in 73 9 per cent.; in nearly all the cases it was associated with dental caries. The percentage of children with carious teeth and without glandular swellings was 21.5 per cent.; 44 per cent. had neither carious teeth nor glandular swellings.

I wish to lay special emphasis upon the tonsils as the most common source of infection, but in most cases it has been shown that carious teeth are associated with them.

It is essential to have a complete physical examination made of the patient, to rule out the constitutional diseases before seeking for the local source of infection. On examining the mouth, the tonsils should be carefully gone over, and if diseased their removal advised, together with any adenoids that may be present. The teeth should be carefully cleaned well up on the roots and subsequently treated with five per cent. iodin and alcohol, and all the cavities of the teeth noted. The subsequent course of treatment of these teeth will of course be influenced by the social standing of the patient. In children, if it is not near the natural time for their shedding, it is advisable to have them filled, in this way preserving the natural arch and preventing any secondary deformity in the eruption of the second or permanent teeth. If this is not possible, they had best be extracted. It is of course understood that all diseased roots should be removed at once. It is advisable to save as many teeth as possible in the case of the permanent teeth, and care should be exercised in examining these teeth to see that no apical abscesses exist. The best method of ascertaining this is to have an X-ray examination made. Any localized tumors of the tongue and gums which resemble carcinoma are of course not within the province of this paper, as they demand immediate radical surgical operation. The most important consideration in the treatment of any cervical glandular enlargement is the removal of the source or sources of infection. No variety of treatment will permanently cure a glandular enlargement, if the primary source of infection is not removed. After the removal of the source of the infection, the general condition of the patient should be considered and the diet, method of living, etc., regulated.

METHOD OF TREATMENT OF THE GLANDS THEMSELVES.

If the glandular involvements are moderate or small in size, a large percentage of them will disappear within a few weeks or months after the removal of the source of the infection, but there are a number of cases that will require further treatment. Just which cases are going to clear up without this further treatment, it is impossible to say. Much too frequently the glands have been attacked first and the source of the infection entirely neglected. This is particularly true of the teeth as the source of infection. A surgical removal of the glands is in my opinion not justified in the cases of moderate size, or at least until several other methods for their removal have been attempted, as much too frequently these glands recur after their surgical removal. In fact, it is not a rare occurrence for these patients to have three or four operations. Under the assumption that they are all tuberculous, tuberculin has been injected subcutaneously, both the bovine and human type having been used. The literature upon this treatment is very uncertain, some noting very promising results, and others none. My personal experience with tuberculin has not been satisfactory, but many competent men have obtained excellent results by its use. I have not seen results that would not have occurred without the use of tuberculin, but I have seen two cases in which I think I set up an acute tuberculosis of the lungs from its use. One cannot of course be positive upon this point, as the tuberculosis may have been simply quiescent, and any other treatment might have had the same effect. Local applications of ointments cannot act otherwise than as a poultice. The application of collars, plaster jackets, etc., are of very little value. A series of X-ray treatments have given the best results in my cases. This consists in a series of treatments—about twenty—given twice a week, being careful to regulate the dosage as you would in any drug, and to carefully filter the rays to prevent burning. If suppuration occurs, puncture the abscess and allow the abscess to drain. If, when the case is first seen, a sinus exists, give the treatments as in any other case. If they are removed surgically, a subsequent course of the ray will prevent a recurrence.

The treatment which I advocate is the removal of the source of the infection, careful attention to the hygienic condition of the mouth, and a course of X-ray treatments.

BACTERIOLOGY AND VACCINE THERAPY OF PYORRHEA ALVEOLARIS.

By JEWELL M. GOMPERTZ, D.D.S., New Haven, Conn.

(Read before the Connecticut State Dental Association, at its annual meeting, Waterbury, Conn., April 15, 1913.)

MUCH attention has been directed lately toward the bacteriology of pyorrhea alveolaris, a condition which is not only extremely disagreeable, but also has an important bearing upon the general health of the patient. That this condition does not respond to conventional treatment cannot be disputed.

ETIOLOGY.

Pyorrhea alveolaris is considered by many to be a purely local disease, affecting the teeth, and in its early stages I believe this to be true. After the irritative stage has existed, however, for an indefinite period, production of pus may take place, and absorption of toxins occur as a result. It must then be regarded as a constitutional disorder.

This course of the disease depends largely upon the degree of resistance which the individual may possess, as it is a well-known physiological fact that some patients may be able to withstand disease to which others fall easy victims.

In some cases the irritative condition can exist indefinitely, and never progress to the pus-producing stage, but this must not be considered as true pyorrhea alveolaris. After pus has appeared, with all its unpleasant symptoms, patients consult the dentist, seeking relief.

Micro-organisms. Among the organisms probably engaged in producing pyorrhea alveolaris are the staphylococcus aureus and albus, the streptococcus pyogenes, and the pneumococcus. These have all been found in cultures made from cases of pyorrhea; they are found singly or in combination, and just which group produces this condition has not been definitely determined, as no specific organism has been isolated.

While the local manifestations consist of the breaking down of the tissues adjacent to the pus pocket, a more serious condition arises in the effect produced upon the general health from absorption of pus, which certainly takes place in this disease in the same way as when pus is present in other parts of the body.

The literature on pyorrhea alveolaris is abundant, and a great deal has been said about the predisposing constitutional causes of the affection, such as anemia, malaria, etc. Likewise, many other disorders have been mentioned as causative factors in producing this condition. From our knowledge of infectious diseases it is fair to assume that these conditions may be due to toxic materials, first finding lodgment in the irritated alveolar tissues, producing pus, these toxic materials being subsequently absorbed into the system from the infected alveolar tissues.

Rheumatoid arthritis. I wish to call attention to various so-called rheumatic symptoms in persons subject to pyorrhea alveolaris, particularly in the case of rheumatoid arthritis. In a number of cases of this joint-affection under my observation, careful inquiry was made for infective foci. In the majority of the experimental cases, some inflammation of the mouth existed, but only those cases in which definite pus was to be found were recorded as pyorrhea alveolaris. To sum up these cases, a large number of cases of arthritis deformans are now recognized to be of infective origin.

Mouths that are unclean or in a septic condition may be the starting-point of any infectious disease. We have a very striking example of this fact in the case of infective arthritis. When the diagnosis has been made and vaccine therapy instituted, accompanied by local cleanliness, the results have been surprisingly gratifying.

The association of the mouth with rheumatoid arthritis and certain other forms of rheumatism will be referred to at some future time.

VACCINE TREATMENT.

The routine method of treatment that has been followed for a number of years in pyorrhea alveolaris is familiar to you all, and I will therefore not discuss it.

The more modern method of combating this disease is by the use of vaccines, and in order to treat pyorrhea alveolaris successfully by this method it is important to ascertain in every case the organisms most actively engaged in breaking down the tissues bounding these pus pockets.

By removing the tartar from the teeth and preserving the strictest cleanliness, relief has been obtained, but no permanent cures have taken place.

During the past two years the writer has treated a number of pyorrhea cases by the use of vaccines, and the results have been very encouraging. While I do not wish to be considered over-enthusiastic, I am optimistic enough to believe—and this belief is borne out by facts—that these cases can be considered permanently cured. I therefore am of the opinion that the vaccine treatment of pyorrhea alveolaris is one that will prove to be of extreme value in competent hands.

Autogenous and stock vaccines. The vaccines used were of the autogenous character, which give the best results. For the benefit of those who have not given special attention to different vaccines, a word regarding them will not be amiss.

When the vaccine is made from the bacteria obtained from the patient, a so-called autogenous vaccine results. A vaccine thus produced must necessarily correspond to the bacteria causing the disease. Vaccines obtained from any other source than that of the patient under consideration are termed stock vaccines. Such vaccines may consist of bacteria morphologically similar to those causing the disease.

Unfortunately, their being morphologically similar does not guarantee that they will correspond exactly to the bacteria at fault, for the reason that many of the great groups of bacteria have a large number of subdivisions.

The methods of procedure in obtaining the material for the preparation of a vaccine may be described as follows: One method consists in exerting gentle pressure on the gums to procure some of the pus, which is received on a sterile loop and *plated immediately.* The other method consists in the use of a sterile swab. From these cultures the vaccines are obtained.

As I expect to demonstrate the different methods later, I will not go into detail at this time.

Dosage. The dose of a vaccine varies with the manner of its preparation, and also with its bacterial content.

I have made no attempt to measure the effects of the vaccine by taking the opsonic index. The technique is too elaborate, and the results vary too much to justify the time and labor required. Clinical symptoms, plus the aid of general rules, afford a sufficient guide as to dosage, intervals between doses, etc. In reference to doses of autogenous vaccines, I cannot recall a single instance where any evidence of harm resulted.

I claim the virulence of the pus found in pyorrhea pockets to be very low compared to that found in other pus disorders of the body—which is due either to long standing or the general surroundings in the mouth.

Recording-charts. For the sake of control, charts indicating the respiration, pulse, and temperature are marked every four hours for a period covering fifteen injections of an autogenous vaccine. These charts, which are familiar in the routine of every hospital, show surprisingly slight changes, if any, following the several injections.

Injection. In my practice, the upper arm is selected as the site of injection. The usual measures for surgical cleanliness are followed.

ILLUSTRATIVE CASE.

The following case will serve as an illustration:

The patient was a man, forty-eight years of age, who had been a sufferer from pyorrhea for a number of years. He had received the usual local treatment for this condition without benefit.

A vaccine was made, and on December 2d he was given an injection of 50,000,000 streptococcus, and successive injections of 100,000,000 were made at five days' intervals. General improvement followed each injection. Then injections of 200,000,000 were given one week, two weeks, and three weeks apart. Slight local reactions followed these injections. A new vaccine was made, and injections of 75,000,000 and 100,000,000 were given at five days' intervals. The soreness in the gums subsided, and the pus discharge disappeared entirely, no inflammation being noticeable. At the end of six weeks, granulations appeared and continued during the treatment.

At the end of ten weeks the treatment was discontinued.

ADJUVANT LOCAL TREATMENT.

I might mention that appropriate local treatment should also be employed in conjunction with the vaccine, and I believe that the more thorough this treatment, the more permanent the results.

The case above described may serve to illustrate the value of vaccine therapy in the treatment of pyorrhea alveolaris. While my experience has been limited, I repeat my belief that this method of treatment gives promise of results that have not been obtained by any other means.

TECHNIQUE OF PREPARING AUTOGENOUS VACCINE.

In what follows I wish to demonstrate the initial steps in the making of an autogenous vaccine, and show the finished product, also the method of injection, demonstrating pure cultures of from twenty-four to forty-eight hours' growth made on agar, milk, and potato, and their cultural features; also pure cultures of different bacteria as found in pyorrhea cases on slides stained by the Gram method as seen under the microscope. I shall also show suspensions of definite quantities of bacteria killed by heat in a 0.9 per cent. normal salt solution, and demonstrate the method of determining the number of bacteria by the Thoma-Zeiss blood-counting chamber.

Three tubes of sterile agar are placed [demonstrating] in a water-bath, and the water is brought to the boiling-point; it is then reduced to about 38° or 42° C., a temperature which is just above the solidifying point of agar, and not injurious to bacteria.

It must be understood, of course, that it is impossible to carry out the technique, which is a very important factor in the making of an autogenous vaccine, in such a brief demonstration; to insure success this procedure must be carried out in the laboratory. An improper procedure means danger, or no results at all.

The platinum loop is one of the most important instruments used in bacteriological work. After freeing it from all septic matter by placing it over a Bunsen burner, the pus is pressed on this platinum loop with the aid of a piece of sterile cotton or gauze, by applying slight pressure on the gum, and tube No. 1 is inoculated with a loopful of the material to be plated.

The cotton plug is then replaced in the mouth of the tube, and the contents of the tube are mixed by carefully tilting it back and forth and rotating the tube on its long axis. From this tube, two loopfuls are transferred to tube No. 2, and, after mixing, two more loopfuls are carried from tube No. 2 to tube No. 3.

The contents of the several tubes are then poured into Petri dishes. As soon as the cotton plug is removed, the mouth of each tube should be passed through the flame and inserted under the edge of the lifted Petri dish cover, and the agar be quickly poured out. The covered dish may then be tipped cautiously back and forth in order to distribute the agar evenly before it solidifies. If there are a great many bacteria in the original material, the plate from tube No. 3 will probably contain the organisms in small enough numbers to develop well-isolated colonies; contrariwise, if there are very few bacteria in the material inoculated, plate No. 1 will probably present more satisfactory conditions. Gelatin plates are made in the same manner as agar plates, except that gelatin may be cooled as low as 25° C. without solidifying. These are placed in a thermostat for from 24 to 48 hours. If the platinum loop is not used, the pus is collected in the same fashion as described, but the tube is inoculated by the use of a sterile swab. I am in the habit of making two sets of plates; when both upper and lower jaws are affected, swabs are taken of each.

By using the Gram method of staining, one is able to ascertain whether the tubes we intend to use for the vaccine contain a pure culture. After selecting tubes, a small amount of sterile 0.9% sodium chlorid solution is poured into tube No. 1, and by gently tilting the tube from side to side, the bacteria are washed off. This normal salt solution is poured from tube No. 1 to tube No. 2, and from tube No. 2 to tube No. 3, etc. The solution is then poured into a sterile bottle, which is placed in an automatic mixer for one-half hour, in order to break up the clumps.

The next step consists in the killing of the bacteria, which is accomplished by immersing the bottle in a water-bath at 60° C. for one hour.

Two control specimens are then obtained by pouring a little of the sterile solution into test tubes containing agar. These are placed in a thermostat for 24 hours. If the appearance of these test tubes gives rise to doubts as to the sterility of their contents, stains are made to ascertain the possible presence of an active bacterial colony. If the solution proves to be sterile, the vaccine is distributed in sterile bottles, containing 50, 250, 500, and 1000 million to the cc. I generally start by the use of 50 million and increase the dose, injecting it in the upper arm. Iodin is applied to sterilize the point of injection, and thorough attention is paid to the sterility of the hypodermic syringe and accessories, such as pliers, cotton, etc.

The determination of the number of bacteria is made by the Thoma-Zeiss blood-counting chamber. This chamber is manufactured by Zeiss for counting blood plates by the Helber method, and should be supplied with an especially thin cover-glass (No. 146). The blood count is made by the use of a high-power dry objective. The chamber is ruled like the Thoma-Zeiss blood-counting chamber, the ruling having the same value, except that the chamber is 0.02 mm. deep instead of 0.1 mm.

For counting, the suspension of bacteria is diluted with distilled water. 1 : 200, with the aid of the red-blood corpuscle pipet of the Thoma-Zeiss apparatus.

By a simple calculation, it will be apparent that the product of the multiplication of the average number of bacteria per square by 4,000,000,000 will be the number of bacteria per cc. mixed with sterile 0.9 per cent. saline solution, to give a dilute suspension of the volume of 50 cc. containing the required number of bacteria per cc.

To recapitulate: A small flask containing 50 cc. of 0.9 per cent. saline solution, closed with a rubber nipple, and the whole sterilized, is prepared, the quantity of the suspension necessary to give the desired number of millions of bacteria per cubic centimeter in a volume of 50 cc. of saline solution having been determined by calculation. This quantity is withdrawn from the flask by means of the sterilized hypodermic syringe, the needle of the syringe being plunged through the rubber nipple while the flask is inverted. Then the calculated quantity of the suspension is drawn up into the syringe and injected into the saline solution by passing the needle through the rubber nipple as before.

Following this, 0.15 cc. of lysol is similarly injected into the flask through the rubber nipple, and after shaking, this diluted suspension constitutes the vaccine. Before injecting it should have been proved sterile.

A local reaction at the site of the injection is the rule. A typical reaction consists of an indurated, tender area at the site of the inoculation. This area varies in size, depending upon the amount of vaccine used, from that of a dime to that of a silver dollar, and presents the appearance characteristic of a burn.

THE NEW DENTAL ERA.

By S. BLAIR LUCKIE, D.D.S., Chester, Pa.

(Read before the Philadelphia Auxiliary Chapter of Delta Sigma Delta Fraternity, April 10, 1913.)

AS this old world moves on in the lathe of time, its social, economic, and political conditions change. We become more complex as we advance in years. Government of the body politic and of the individual must at times be subjected to a new order, and this often produces what appears to be a severe strain or a threatened disruption of the usual, well-established and "good-enough-for-our-fathers" way. At these periods of stress, men arise known as insurgents—the word is an antonym of stand-patters—who, like Lowell, recognize that—

New times demand new measures and new men.
The world advances, and in time outgrows
The laws that in our fathers' days were best.

NEW TIMES, NEW PROBLEMS.

Even the constitution of the United States is being attacked by a large and growing body of students of economic and industrial affairs, who declare that it is no longer sufficient as a guide to our national progress or a lamp to our social advancement. Alexander Hamilton had the foresight to recognize this, for in discussing its adoption he gave expression to these words: "So long as we are a young and virtuous people, this instrument will bind us together in mutual helpfulness, but when we become old and corrupt it will bind us no longer."

Today, more than ever, at least in the lives of us present, new duties and new measures are making demands on our attention. The last presidential campaign forcefully indicated that an unrest was abroad, and that the time had come to adopt new measures. We have municipal problems to solve. There is the child-labor question, shorter hours for women, equal franchise, sex hygiene, purity of the ballot, conservation of national resources, conservation of health, efficiency of the worker and the machinery with which he produces, the education of the young so that they may be prepared in the most efficient way to meet requirements in the various pursuits of life, and, not the least to many of us, the high cost of living—or perhaps better, the cost of high living.

These are but a few problems that confront us as citizens. In every activity of life, secular, religious, and professional, it is the same. Problems unheard-of or unthought-of a few years ago are pressing for solution. These problems are not only up for solution, but they must be solved in the best possible way for the best interest of all concerned. This means that we who are now on the scene must get busy and study conditions, get the milk of truth out of the cocoanut, and start with new methods.

THE NEW PROBLEMS OF DENTISTRY.

But what of our own beloved profession? Even a myopic eye can see that we are pressed for a change of measures that in our fathers' days were really best. All that dentistry is today—and it is a grand profession—is due to what was done by the fathers. Today we are recognized to such a degree that it is a question, unless we arouse ourselves to the exigencies of the situation, whether we can fulfil the demand. This recognition has been going on for years, slowly but surely. Dr. Oliver Wendell Holmes, with keen sense of observation, defined dentistry in these words:

> It has established and prolonged the reign of beauty; it has added to the charms of social intercourse, and lent perfection to the accent of eloquence; it has taken from old age its most unwelcome features, and lengthened out enjoyable human life far beyond the limit of the years when the toothless and purblind patriarch might well exclaim—"I have no pleasure in them."

Could a more truthful and highly deserved tribute be paid to any calling? Has any other such a record?

Brothers, you who are giving thought to the etiology of dental and oral diseases, you who are practicing filling and crown and bridge operations according to the theories of immunity and hygiene, you who are teaching and practicing prophylaxis, and you who are correcting facial and maxillary deformities, are contributing to this humane work.

Municipalities are establishing dental clinics for the treatment of the teeth of poor children, boards of education are allowing clinics to be conducted in the public schools, industrial concerns and life-insurance companies are recognizing the importance of having the mouths of their employees and policyholders attended to by trained experts, hospitals are adding dentists to their staffs, and physicians and surgeons are proclaiming that a clean and healthy mouth is necessary to assist in preserving health and curing disease. Aye, one who is an authority has spoken with a challenge in these words: "The next great step in medical progress in the line of preventive medicine should be made by the dentists. The question is, Will they do it?"

Are we going to accept this challenge? If we do—and I believe we will—it will be done in the spirit uttered by Cardinal Richelieu in his address to the young man—"In the lexicon of youth, there is no such word as 'fail.'"

I am no pessimist, but as a good optimist, who belongs to that large club of optimists without officers or dues, I must see things from the pessimist's angle.

NEW RESPONSIBILITIES FOR THE DENTAL PROFESSION.

Education, both preparatory and collegiate, must be given attention. This is being well and ably attended to, and in due course of time will be worked out in a manner that will produce trained dental practitioners who will meet future requirements. There is, however, a duty, a responsibility resting on each member of the profession, that cannot be shirked. We who are in the activities of practice must assume responsibilities, take up the duties, even making it our prerogative to see that the profession will take up the next great question in medical progress, viz, preventive medicine.

There is much to combat; the commercial spirit is abroad. A professional life has a commercial side; we cannot get away from this fact. We must live in a manner commensurate with our social environments, we must have the means with which to acquire knowledge and keep up with progress, be prepared with a foster-nurse when old limbs lie lame; health must be husbanded and physical efficiency be kept up to the top notch. These are the arbitrary demands that the individual must meet first—for self-protection and self-preservation. Then, if we accept the dictum of Bacon that every man is a debtor to his profession, the life of a dentist must be full to overflowing, and when Dr. Charles H. Mayo puts the question, "Will they do it?" no one better than the man who stands in one corner of a room by the side of patient after patient all day, taxing his ingenuity and vital force, sees and understands the enormity of the proposition.

But it is up to us, it has been put up to us, and we must not fail. How shall we keep from failing? I will not formulate a plan, but let us tonight consider this great question, and see if this representative body cannot contribute its share toward the solution.

DENTAL ETHICS, AND THE QUESTION OF PUBLICITY.

It might be suggested that the individual see that he be imbued with the ethical spirit. I use the word in the broadest sense—duty, responsibility to self, the profession, and the public. Dentists too long have been keeping their knowledge under a bushel—which sordid measure should be kicked aside, not to be used again for such a purpose.

There is a necessity for the public to know more about us, not as craftsmen, but as healers of disease, correctors of deformities, and hygienists.

Commercial men with printer's ink and glaring showcases have been and are doing more to impress the public about dentistry—fakes, to be sure—than the average ethical practitioner. Especially is this the case outside of the centers of population.

Facts concerning the causes and prevention of dental and other oral diseases, the relation of mouth conditions to other parts of the body, and their significance for the community, should become common knowledge. This requires reading, study, and investigating as a preparation; then going out and mingling in the various channels for the dissemination of knowledge that fortifies and helps humanity in the struggle against the enemies of health.

TOO LITTLE READING AND RESEARCH AMONG DENTISTS.

A better and more universal conception of what dentistry is must be established. A few years ago a gentleman who waited on me in a publishing house in this city made this remark—"Dentists are not readers; they are not book-buyers." The remark stung, for I feared it was true, and you know it is the truth that hurts. To show that I thought he was mistaken, I made a defensive remark. He immediately quoted figures to show the amount of money that had been expended on certain works in the way of advertising which did not repay him, and closed his argument by saying that his firm had concluded to be very careful in investing in advertisements designed to attract dentists.

Brothers, this should not be so. There is plenty of valuable material offered by those who do research work for us, worthy at least of reading, and there are many problems yet unsolved to which to turn our attention.

SOLIDARITY URGED.

There is not a phase of dentistry, from the education of the student to the smallest detail of practice, that does not merit the attention of the professional, ethical body, and it is as much the duty and responsibility of the units of our calling to be interested and alert as it is the duty of the college professor or the editor of a journal.

The profession is itself a large fraternity: the fraternity life and fraternity spirit should be cultivated, and the members of the dental profession be brought together into one solid, strong, and vital body.

AN INDEX OF THE WORLD'S DENTAL LITERATURE.

By THEO. VON BEUST, D.D.S., M.D., Dresden.

FARSEEING promoters of dental learning have long recognized the value of an index embracing all dental publications. Few dentists have the privilege of receiving more than four or five dental journals, excepting those connected with dental schools and large university libraries. As a matter of fact, there exist upward of one hundred and fifty dental journals, and besides these a great many articles related to our profession appear in medical journals.

Every dentist has a field of work which interests him specially, and eagerly seeks the writings of other investigators on his favorite topic. The orthodontist favors articles on orthodontia, often to the exclusion of all others; for the prophylactist the publications on prophylaxis are of prime interest. In view of the great number of periodicals, it is an absolute impossibility for the individual practitioner to glean from this mass of literature that which appeals to him, even if he should have access to all publications. The inevitable result is a loss to the student, to whom the greater part of the contributions touching upon his specialty are inaccessible. A loss is also suffered by the author, who has taken great pains to present his valuable ideas to anticipated readers, few of whom, really, will ever learn of the existence of his article. A third loss is suffered by the scientist, who finds, after devoting weeks or months to a certain subject, that he has been wasting his time and energy upon already explored territory. A further and by far the greatest loss is inflicted upon dental science, since progress is impeded by the inability of the world's dental investigators to remain in steady communication with one another.

The first attempts, to our knowledge, to establish an index were made by the American Academy of Dental Science between 1839 and 1849. Then followed the work of J. Oakley Coles of London, who published a list of works on dentistry in 1882. At about the same time, Taft and Crowley gave their lists of books and periodical literature to the profession.

At a meeting of the Institute of Dental Pedagogics, held in December 1908, it was decided to establish a classified card index of the leading dental journals, and a committee composed of prominent members of the American profession was appointed to take initial steps for the realization of this idea. This has since led to the organization of the Dental Index Bureau, which has been fully described in the DENTAL COSMOS and other journals. In Germany an attempt at bibliography was made by Professor Port of Heidelberg, whose tabulation was discontinued in 1902. During the Fifth International Congress, held in Berlin in 1909, much time was devoted to the discussion of the value of a permanent index, which could be issued regularly and if possible monthly. This led to the establishment of the index in the *Ergebnisse der Gesamten Zahnheilkunde.* This index was edited by the well-known author, Dr. Paul de Terra, Zollikon-Zürich. After a short period, however, it was transferred to the *Deutsche Zahnärztliche Zeitung,* where its continuation was prevented by a sudden change in the management. Now it has been given a place in the *Archiv fuer Zahnheilkunde,* Dresden, a monthly magazine published by the Society of American D.D.S.'s Practicing in Germany, which will endeavor to do all in its power to supply the material necessary for its maintenance, and to make the *Archiv* its permanent home. Dr. de Terra, who is endowed with exceptional capability and large experience, has access to over a hundred dental journals, and over two hundred medical periodicals.

The journals that are used in the compilation of this index represent all the civilized countries of the globe, to wit: Germany 16 periodicals; Austria 13 (7 German, 4 Hungarian, 1 Bohemian, 1 Polish); Switzerland 2 (1 German, 1 French); Belgium 3; Holland 1; France 11; England 8; Italy 3; Spain 1; Sweden 2; Norway 1; Denmark 1; Russia 4 (3 Russian, 1 Polish); North America 12 (in English); South America 11 (10 Spanish, 1 Portuguese); Australia 1.

In the subsequent issues of the *Archiv,* starting with the June 1913 issue, the headings of the various chapters will be translated into English and French, thus making the index useful for those unacquainted with the German language.

There is little doubt that the index, as at present instituted in the *Archiv,* with its 300 to 350 subject titles monthly, will meet all the requirements demanded for a serviceable index by the essayists of the Fifth International Dental Congress.

THE IMPORTANCE OF DENTAL EXAMINATION FOR LIFE INSURANCE.

By ALONZO MILTON NODINE, D.D.S., New York, N. Y.

"A MAN should not practice the art which he attempts to criticize." Matthew Arnold's third tenet, in his essay on "Criticism," gives me my license to criticize life insurance medical examination.

Medical examination for life insurance ignores or forgets that teeth and gums play both a direct and an indirect part in the causation of organic and systemic diseases.

Diseased teeth and gums are the most considerable, consistent, insistent menace to health to which a person is exposed; they are a serious source of insidious infection in the individual, and a dangerous depot for the dissemination of disease to others.

If the great function of medical examination for life insurance is to secure selected lives, and to furnish the company with an estimate of the applicant's physical condition, if it is to guard the company against insuring any applicant having any illness, disease, disorder, or condition that mortality tables or medical observation show tends to shorten life, then the condition of the teeth and gums must certainly be included in that estimate.

The examination of teeth and gums should be made to enforce and re-enforce the medical examination, otherwise the medical examinations are far from reasonably complete and trustworthy.

Judging from a great number of experiments and observations made in England, France, Germany, and the United States, bearing upon the improvement in health and cure of disease that follow dental attention and personal hygiene of the mouth, surely the medical examiners are neglecting to consider a very prolific source of infection in diseased teeth and their faulty artificial substitutes! Over one hundred life insurance companies have shown some interest in the proposal which the essayist has made for dental examination for life insurance.

Dr. Ramsey's latest book on "Medical Examination" points out that it is the undeveloped and immature symptoms that are of greatest importance, and the examiner must use his ability and medical knowledge to recognize them. Such immature and obscure conditions it will be a part of the dentist's work to look for, and of dental service to guard against.

It is well to note that insurance companies like the Metropolitan, the Postal, and the Equitable are including, in their educational campaigns of personal hygiene, the presentation of the subject of mouth hygiene and dental attention. These conservation departments start with a very sound economic end in view, based upon the experience of a number of years, which shows that the spread of the knowledge of personal hygiene and sanitary measures has extended the average duration of human life several years.

The proposal, the institution, and the development of dental examination is the reasonable and logical sequence and extension of the medical examination. Dental defects and disease conditions of the oral cavity are so frequently the cause of many serious systemic and organic disturbances, that only a dental expert is able to discover the original source of such trouble, particularly infectious diseases, arthritis deformans, rheumatic fever, septic infection of the alimentary canal, liver, kidneys, heart, and nervous system.

It has been estimated by Mr. Hyram J. Messenger, actuary of the Travelers' Insurance of Hartford, Conn., that if the companies were to expend the sum of two hundred thousand dollars a year for the purpose of spreading information in regard to personal hygiene and in co-operating with other agencies in health movements, also extending to policy-holders the privilege of frequent medical examination, and if the result should show a decrease in the losses of the companies amounting to the insignificant sum of 16/100 of one per cent., they would save enough to cover the cost! If this plan were carried out under good business methods, with all the companies working together, he would expect a decrease of one per cent. of the death claims. This decrease of one per cent. of the death claims would result in the saving to the companies of $1,005,000, or seven times the amount expended. It is also the expressed opinion of an insurance man and newspaper editor that the institution of dental examination would decrease the losses more than two per cent.

From the dental standpoint it is recognized that diseased, decayed, deformed, and deficient teeth and their faulty artificial substitutes are important contributors to any number of diseases that might be named. A septic, disorganized masticatory apparatus is a depot for harboring, propagating, and disseminating micro-organisms, and the manufacture of toxins, ptomains, and other poisons; it provides for their absorption into the blood and the lymph and their distribution to the structures of the mouth, accessory cavities, and the gastro-intestinal and respiratory tracts.

Defective dental conditions are known to produce profound effects on the nervous system, respiratory apparatus, and digestive apparatus; they also contribute to the etiology of cancer and sarcoma in the mouth, stomach, and small intestine. Further, defective dental conditions make possible the putrefaction of undigested food in the intestine, which produces all grades of symptoms from simple headache to epilepsy and endocarditis.

Dr. Key's very striking experience in the St. Vincent Orphan Asylum of Boston is worthy of our serious attention. Six months after the beginning of the dental treatment in this institution of 325 inmates, there was a decrease in the number of infectious diseases of fifty-nine per cent. over that of the previous year. In the second year of its establishment the number of infectious diseases was reduced to less than two per cent., and at this date there has not been an infectious disease in twenty months—a record not yet equaled.

The medical profession, except in isolated examples, have a defective and deficient appreciation of the true value of a clean and correct masticatory apparatus. For this reason, perhaps, life insurance companies have not had their attention directed to the oral cavity. It seems just and reasonable that a policy-holder having sound, clean, normal dental organs is a better risk than one having disorganized and diseased ones, and should pay a smaller premium, or else the client with a poor masticating apparatus should pay a larger one.

The problem of conserving health and prolonging life is one that cannot be solved solely by the efforts of the individual, so far as his own particular mode of life is concerned. It requires the concerted action of entire communities toward the improvement in those manifold activities embraced by the term "public health." In order to make this campaign an effective one, the insurance companies must enlarge their scope by directing their efforts not merely toward the individual, but toward the community.

The institution of the dental examination for life insurance will do more than any other single measure to raise high the standard of dentistry in technical achievement and the just appreciation of its great field by the profession, individually and collectively, as it will equally and as surely raise high the appreciation of dentistry by the public.

No other one influence will act in any degree so forcefully in discouraging and checking that type of dentistry—American or Abyssinian—that Hunter and others flay so mercilessly and so justly. No other positive influence will stimulate and increase that type of dentistry which is scientifically sound and mechanically correct as the fact that the operations and restorations will come under the inspection and scrutiny of a disinterested and capable judge.

Every dentist who believes in the benefits of the service he renders, and every dentist who believes in the good of mouth hygiene, every dentist who would like to see his services appreciated justly, will recognize that the institution of a dental examination will bring this about, and that he may add his influence to have the companies consider it. No other one force will do so much to safeguard the health of the nation as will the institution of this dental examination. The life insurance companies are in a position to render a great public service, and at the same time to make an investment that will return a substantial profit.

Focus your attention for a moment upon dental examination! Consider what it would mean should even but one company require that all applicants for life insurance have sound and sufficient teeth or correct artificial substitutes before they will be accepted for life insurance.

The army, navy, national guard, police and fire departments require sound and sufficient teeth—consider the educational value of such a requirement for life insurance! What more forceful argument could be evolved than that a great business—whose very foundations rest upon health—require sound teeth or proper artificial substitutes in order to render that health more secure and the menace of disease less fatal?

It is the opinion of men like Dr. Dwight of Boston, Dr. Egbert of Philadelphia, Professor Fisher, Dr. Wells, and others, that tangible and practical results already in evidence warrant the prediction that the conservation and public health departments of life insurance companies are a permanent and growing field of usefulness, and that the privilege of periodical examinations is being increasingly taken advantage of and valued by their policy-holders. There will be a growing tendency to employ physicians as inspectors and regulators of human machinery rather than as necromancers who are expected to work the cure of progressive and established disease. The same may be said of dentists.

The appointment of dental inspectors, to examine the masticating apparatus upon the soundness of which depends the proper working of the rest of the human system, will constitute practical co-operation in a field where it is needed most.

The medical examiners are neither trained for such examinations nor do they desire to undertake them. It remains for dentists to call consistently the attention of the insurance companies to the great good to the policy-holders, the profit to the companies, and the public-health benefit to the community that dental examination for life insurance would bring.

Further information on this subject of the influence of dental conditions on systemic and organic disturbances may be gained by reading some of the many books and articles which the writer has perused in view of his endeavor to convince the medical profession as to the contribution that diseased and disorganized mouths make to the sum of the causes of constitutional disease. Particularly, Collier's latest book on "Dental Disease and Systemic Disease," and papers published in the DENTAL COSMOS, November 1912,* the *Items of Interest* for September 1912, the *Oral Hygiene* magazine for May, June, July, August, and September 1912, contain interesting contributions to the study of the constitutional effects of oral sepsis.

Rose and Careless, in "Manual of Surgery," one of the latest books published, devote many pages to the subject of oral sepsis, as do Wylie, in *British Dental Journal* for 1912, page 246, and Niles, *American Journal of the Medical Sciences* for February 1912.

All these articles show convincingly that the mouth is one of the most important parts of the human organism, and that dental examination for life insurance is a subject which must necessarily engage the attention of the most skilful and the best-informed men of our profession, also that every policy-holder is concerned very intimately with this phase of preventive medicine. The protection of the company in which the policy-holder is insured against insuring people with these conditions is his protection.

The great social unrest is effecting changes in the adjustment of the social and economic relations of every man toward his neighbor, of every neighbor toward the community, and of every community toward the central government. The economic and social adjustments started by Bismarck in Germany operate in Switzerland, Belgium, Denmark, and Sweden. This wave has been augmented by Mr. Lloyd George and Earl Grey in England, and it has now reached the United States, Australia, and New Zealand. However it may clash with personal ideas, we shall soon have industrial workmen's insurance, old age insurance, and accident insurance for the working-men in the United States, and dentists will be called upon to enter the great calling of public health in connection with these enterprises.

Dr. Murphy of Chicago, the great surgeon, who has just returned from Germany, tells us that there are few charity patients in the German hospitals. They are all pay-patients, and paid out of the workmen's insurance, to which they have contributed. This is a far better condition than exists in this country, which we consider the most progressive in the world. Further, the great prosperity of Germany during the last thirty years has been ascribed in part to these insurance provisions and factory regulations.

As dental practitioners we have a part to play, because of our special knowledge, experience, observation, and skill, in adding to physical and mental efficiency and to human happiness.

* "Oral Sepsis from the Physician's Standpoint," by J. Daland, p. 1221; and "Mouth Infections: Their Etiology, and a Consideration of What Effect They May Have on the Vital Organs and Other Tissues," by M. L. Rhein, p. 1237.

Proceedings of Societies.

SEVENTH AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

Forty-fourth Annual Union Convention.

(Continued from page 729.)

SATURDAY—*Afternoon Session.*

The meeting was called to order Saturday afternoon at 2 o'clock by Dr. R. H. Hofheinz, Rochester, who presided at this meeting.

Dr. Hofheinz announced as the first item on the program for the session a paper by Mr. A. HOPEWELL-SMITH, London, England, entitled "Some Studies of the Jaws in Health and Disease."

[This paper is printed in full at page 765 of the present issue of the COSMOS.]

Discussion.

Dr. EDWARD C. KIRK, Philadelphia. Mr. Chairman, it must be evident that it is quite impossible to discuss this address; it is not a discussable thing. When one brings before us a presentation of data of this sort, it seems to me that there is nothing to discuss. This has been a very beautiful exhibit of "things as they are," but of course the question of our deductions from these phenomena is of importance, and quite another matter. Therefore, while I cannot discuss this exhibit, I may make some running remarks upon it. In the first place, I am filled once more with the desire to go immediately to England. I want to go there because I have been hunting for specimens of this sort, and I gather from the rich collection of teeth *in situ* in connection with their surrounding tissues, and from the very particular specimen in which we have one-half of the maxilla removed by a surgeon for cystic adenoma of the antrum—"which should not have been removed"—that they have no difficulty over there in cutting the jaws out of living Englishmen for scientific purposes. We are not permitted to remove jaws in that way over here—when we do, we remove the surgeon. Seriously, I do not know of a place where such a wealth of material for investigation can be obtained, and I want to get close to that source of material for scientific study.

I am interested mainly in what seems to me to be the essential feature of the paper, the one that impressed me most strongly, and, I believe, the one which the essayist emphasizes more than anything else, and that is the question of absorption of the margins of the bony alveolus. I wish he had been a little more specific, and I hope he will be when he comes to the discussion on the subject—more specific as to his use of the terms physiological and pathological as he applied them in respect to the process of absorption that we see there. When he talks about absorption of the edges of the alveolar borders in youths, children, and adults of early or middle life, he speaks of it as physiological, and I am rather inclined to raise an interrogation point after it. I am not sure that it is physiological. Then he has spoken of the absorption process, which he says is an indication of senility. We recognize that senility is not by any means a question of years, but when senility appears early in life, can we regard that as physiological? Is it not pathological then, as it is later? I would therefore like to have a little more precise definition from the essayist, and know his point of view with reference to the use of these terms with respect to these processes or manifestations of processes which he has shown us as occurring at different periods in life.

Then, again, with reference to the absorption of the alveolar border and the emphasis that he lays upon the significance of the linea dura in his radiographs as indicative of the process, I would like to have him interpret or explain a little more fully his thought with reference to where that linea dura terminates at the alveolar border in so far as it is demonstrated by the radiographs. As I read the radiographs, the linea dura is transparent. These pictures which the essayist has shown are photographs, I believe, of a radiographic film, therefore the linea dura is shown in the photographs as being transparent, and the gingival space is also represented as being transparent in these pictures, and there is no line of demarcation limiting the extreme end of the linea dura, defining it from the appearance of the gingival space. Is it not possible that that tissue which has recurved over the edge of the bone exists as tissue there which is not represented in the photograph of the radiograph?—there is no line of demarcation visible between them, while there is between the teeth and alveolus.

Of the specimens that were supposed to show decalcification of the bone—atrophy of the bone, as I remember it—each was a photomicrograph of a specimen that had decalcified afterward. Without wishing to question the accuracy of the result, I should like to have the essayist explain whether certain appearances of the bone texture were not possibly artifact, due to the decalification of the specimen itself.

The other point that impressed me strongly is what may be called the practical application of this matter to operative dentistry. It is true that the anatomical neck of the tooth and its relationship to the peridental ligament is a movable thing, not unlike the feast of Easter, and there are changes going on in the tissues which retain the teeth *in situ,* and there is a tendency to constant shrinkage, we may say, of the tissues at the cervical border, and in view of the fact that the gingival margin is a movable quantity, I should be glad to have someone who is an exponent of extension for prevention decide what technique is best to be followed in fixing the location of cervical margins of cavities with reference to the movable gingival attachment.

Dr. H. E. Friesell, Pittsburgh. Later on in the discussion I shall, if necessary, try to explain to some of the audience how the location of the gingival margin, the gingival outline of the cavity, can be decided upon according to the teachings of extension for prevention. I doubt very much whether I shall now or hereafter be able to convince Dr. Kirk in this matter, for the reason given by the greatest of teachers nineteen hundred years ago, namely, that there is "none so blind as he who will not see." If somebody, therefore, can devise a method for enabling Dr. Kirk to desire to see, then perhaps the rest of us may be able to convince him.

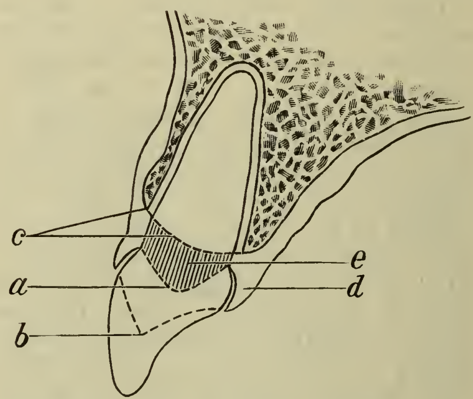
I am very much pleased to attend this meeting and to make the personal acquaintance of Mr. Hopewell-Smith, because I have studied his writings ever since they have severally appeared. He has given us in his first edition a textbook which, in the field of dentistry, has greatly simplified the technique for histology and pathology. A little later, in 1903, when he issued his larger volume of histology and patho-histology of the teeth, he gave us something that will stand as a classic in our literature. Many of the slides shown could not have been better, and I know that we are all glad to have seen them.

Mr. Hopewell-Smith has said that the establishing of facts in anatomy, physiology, or pathology is an important step in scientific study, and also that the inferences drawn therefrom may be entirely different from the facts themselves; that correct interpretation of these established facts is something entirely different from the establishing of the facts. As far as the establishing of facts is concerned, of course we all must agree with the essayist, but so far as the interpretation of quite a number of these facts is concerned, I take a different view from that of the essayist and Dr. Kirk. In the first place, perhaps some of the differences of opinion may be due to inability to transmit to each other the inferences drawn from the study of the facts. We need in dentistry something that I fear Dr. Kirk will also disagree with, because he despises the term I am going to apply to it. We need a standardized nomenclature. Both the preceding speakers used a number of terms which I feel conveyed obscure ideas to this audience. I believe that a standardization of our nomenclature is as necessary as the establishing of facts and their correct interpretation—for of what benefit is it to establish a fact, and to interpret it correctly, if one is unable to communicate his interpretation intelligibly?

I am glad that Mr. Hopewell-Smith has applied the term linea dura to the condition which he has pointed out. He has shown an important condition, an important fact, in the radiographs of the tooth tissues and the bones of the jaw. The linea dura, I take it to mean, is a line indicating a harder, denser portion of the bone. We know that the bone of the alveolar process is composed of cancellous and cortical bone; that the outer portion of the bone is denser and harder, does not contain as many spaces, and is therefore known as the cortical bone; that the inner portions contain many air-cells and spaces, are much less dense, and are called the cancellous portion. We know also that the reason why we can make radiographs is that the light is transmitted differently through these bony tissues, and this linea dura interferes with the passage of the X ray through the cortical portion of the bone. The socket in the alveolar process in which we find the root of the tooth is a natural cavity, lined with bone that is cortical in character as compared with the cancellous portion of the bone, and it is this condition that gives the effect on the radiograph which the essayist terms the linea dura.

The term "neck of the tooth" was used, also the term gingival margin. What is the neck of the tooth? I know of at least four interpretations—or misinterpretations—of the term "neck of the tooth," and about four for "gingival margin."

Fig. 1.



a, Gingival line, occlusal extremity of cementum; apical extremity of enamel. *b*, Gum line, occlusal extremity of gingiva; *c*, Crest of the alveolar process, or socket. *d*, Gingiva, or free margin of the gum; *e*, Neck of the tooth (shaded portion of root).

If we are to understand definitely what a speaker means, we must understand the language he speaks, and in technical, scientific language a term should mean one thing only. There should be no question of its meaning any one of three or four things.

If we examine a cross-section of the jaw-bone, we find a condition as illustrated in Fig. 1. We have here the root of the tooth covered by cementum to the point *a*. The enamel also extends to this line, forming the cemento-enamel junction. The gingiva or free margin of the gum is also attached at this point, and for that reason the term "gingival line" is given to the cemento-enamel junction by the man whom we must recognize as our authority in dental anatomy, Dr. Black.

The term gingival line refers to the junction of the enamel and cementum. The term gum line refers to the occlusal extremity of the free margin of the gum as seen at *b*. We may examine any number of skulls, and will find in every one that the alveolar process does not envelope the root of the tooth occlusally as far as the gingival line, but that in the average jaw three millimeters approximately of the root extends above the crest of the socket. The portion of root that lies between the gingival line and the crest of the socket, and which is not enveloped by the alveolar process, should, in my estimation, be called the neck of the tooth. (See *e*.)

While I shall not discuss the four or five definitions of the neck of the tooth as applied to different portions of that organ, I think the part that lies between the crest of the socket and the gingival line should be called the neck of the tooth. Why? Simply because it is necessary to designate this particular portion by name—just as necessary, when we understand all of its relationships, as it is to call the portion that is covered by enamel the "crown," and to know that by crown we refer to the portion covered by the enamel and not solely "the portion of the tooth that protrudes above the gum and that we see when the patient's mouth is open," as the term is defined in some of our text-books. It is just as necessary for scientific exactness to name this portion of the tooth the neck, or "cervix," if we want to call it that, as it is to name the line Dr. Hopewell-Smith has referred to as the "linea dura," in order that we may know definitely what portion of the tooth is referred to when we use the term.

What condition do we find in the neck of the tooth to distinguish it from the remainder of the root? It is covered by peridental membrane, just as is the rest of the root. But, whereas the principal fibers of the peridental membrane covering the alveolar and apical portions of the root have their origin in the cementum and their insertion in the cortical portion of the socket, the principal fibers of the membrane covering the neck of the tooth have four different points of insertion, namely, (1) in the wall of the socket, (2) in the periosteum on the outer side of the alveolar process, (3) in the cementum of the approximating tooth, and (4) in the free margin of the gum or gingiva.

These fibers of the peridental membrane, which extend into the free gum margin, hold the free gum against the crown of the tooth very firmly, and as long as the gingiva is being held firmly to the crown of the tooth, which it will be as long as this tissue is normal, there will not be any pyorrhea nor any absorption of the alveolar process. When anything interferes with the attachment of the principal fibers of the peridental membrane and that attachment is broken, the first condition results in a relaxation of the free margin of the gum, and then, instead of hugging the crown of the tooth firmly, excluding food matter and preventing the ingress of infection from the mouth, the gingiva is relaxed. This relaxation of the gum is the first step in the formation of a pocket. Many of the cases which the essayist showed as gingivitis are typical cases of pyorrhea; they had this relaxation, pocket formation, and consequently infection, which of course could be demonstrated by bacteriological tests as well as by clinical observation.

The mouth is lined with mucous membrane, which protects the deeper tissues from infection, just as the skin protects the subcutaneous structures. We can operate in the mouth, and, if the surface of the mucous membrane is not broken, we shall not have any infection; but if we expose the deeper tissue, we are likely to have infection. The same condition exists in the peridental membrane, which is covered and protected at its gingival border by the free margin of the gum, and as soon as it is exposed, an infection sets in which it is practically impossible to cure. Why? Simply because the peridental membrane is a deeper tissue which has not acquired the same power of resistance, and a wound in that tissue lies in a field that cannot be kept sterile, and is always liable to infection, because there is no dirtier cavity than the mouth, and micro-organisms are always there. When this fold of the gum becomes lifted, and the gingival trough which the essayist referred to forms, a pocket results for infectious material, which is held in contact with the gingival margin of the peridental membrane, and pyorrhea ensues.

What, then, is pyorrhea? Probably each of us has his own opinion. I believe that it is nothing more nor less than infection of the peridental membrane. A tissue that nature did not intend to be subjected to infection is exposed through some condition, frequently caused by the dentist by improper operative procedures, by lack of knowledge of anatomy, or by lack of scientific knowledge of the pathology of caries of enamel, the foundation stone of which is extension for prevention.

What the essayist has spoken of as physiological absorption of the alveolar process does not exist, in my opinion, for the reason which I have tried to show here, viz, that we never find, in any human skull, the alveolar process grown up to the gingival line.

In the skull of an animal like the hyena, a strictly carnivorous animal, that not only eats meat but crushes bones, what do we find? The facts shown by the essayist are that the cancellous portion of the bone in jaws of that kind is much narrower than the cortical layer as compared with the condition present in animals like man, and the bone is much denser, for the reason that the hyena, or any animal of that type, exerts a good deal more force in mastication. Imagine one of us biting through the femur of some animal as the hyena does—what would happen to our jaws, to say nothing of our teeth? The hyena's jaws are built by nature to enable that animal to live on food that it can seize. Another evidence thereof lies in the condition that the essayist showed in his illustration of the hyena's skull, viz, the cingulum on these teeth forms a very prominent ridge. If man had to live for a few ages on the same kind of food as the hyena does, the chances are that the cingulum in his teeth would assume the same form and location as found in the teeth of the carnivora. Horizontally engirdling the crowns of human teeth we have a pronounced ridge, which protects the gingivæ from injury during mastication. This is analogous to the cingulum on the hyena's teeth, and I have frequently called attention to it under the name of "height of contour." The crest of this height of contour on the approximal surfaces is the contact point.

The essayist illustrated the denture of the Eskimo, and we know that the Eskimo has probably the best set of teeth of any modern race of men, because his life or station requires vigorous use of the teeth, jaw-bones, and muscles of mastication. The jaw-bones of the Eskimo skulls preserved in the museum at Washington are very different from the jaws of the more civilized races. The essayist says we often find the crest of the alveolar process absorbed between the teeth. I do not believe that it ever extended any farther occlusally than we find it in the Eskimo, and I think that is where nature intended it to reach.

In regard to the casts and models shown by the essayist today, I believe personally that the condition exhibited is a marked example of hereditary malnutrition; "hereditary atrophy," Dr. Black would call it, and Mr. Hopewell-Smith would perhaps call it "hereditary hypoplasia." We see these conditions in teeth with defects in the formation of the enamel, viz, grooves, pits, etc., and in some cases entire absence of the enamel from the occlusal half of the crown of the tooth. We recognize that condition as atrophy, or, as our friends across the water would call it, hypoplasia of the enamel. I think the phenomenon exhibited by the essayist is simply an exaggerated case, hereditary in character. I have seen one case exactly like it, and three or four not quite so bad. In the most marked case, the patient, male, age twenty-six, presented with all of his teeth worn even with the gum line. There was no infolding of the lips or marked prominence of chin or nose, as is the case when the teeth are extracted, and the patient reported that his teeth had always been even with the gums. His sisters, brothers, mother, and mother's aunt have the same condition; his father had fine teeth. When this patient's teeth were extracted, some of the roots were only one-eighth of an inch, and none over a quarter of an inch in length; the root-canals seemed to have been obliterated by secondary dentin.

Dr. L. G. LeRoy, New York, N. Y. It is with a great deal of pleasure and profit that I have listened to the excellent paper of the essayist, whose writings we have known for a long while. Those who have been observers have seen conditions which they have interpreted in their own way, and with the assistance of others who have been investigators in this field. Mr. Hopewell-Smith spoke of the orang-utan and the disappearance of the alveolar process, and interseptal bone, and showed slides of cases among the carnivora where apparently the alveolar bone, too, had disappeared to some extent, but not in the same degree as it does in man. He also showed the marked changes that may take place in the mouth of man. Much depends in the latter upon his habits and environment, and the peculiar pathological changes that he is subjected to through them. It is conceded that there is no other portion in the human body where bacterial invasion is so pronounced as the oral cavity, which is the port of entry, so to speak. Because of this peculiar condition, it is extremely difficult in case of lowered resistance to establish a quarantine against pernicious bacteria, and to prevent the establishment of so-called pyorrhea, or even the lesser manifestations of oral disease. I concede, with Mr. Hopewell-Smith, that all these conditions are pyogenic in character, consequently the generic term should not be "pyorrhea alveolaris." In a recent article I endeavored to get away from that term by adopting the nomenclature which has been spoken of today, namely, "atrophic alveolitis." In whatever way these conditions are studied, we find that atrophy does take place in individuals where there is no pus. In other words, there can be atrophy of the alveolar tissue without infection of this tissue or of the peridental ligament. In these cases we have true atrophy, but in most cases there is bacterial invasion. In either instance, impairment of function is present, which makes for the resorption of the poorly nourished end-organ, permitting a condition which brings about loss of tissue and consequently of function. Mr. Hopewell-Smith practically corroborates this by referring to the preponderance of bacteria in the mouths of children. Most gingival and alveolar diseases have their inception in childhood. We can prove clinically that pyogenic organisms are the cause of the degenerative processes that take place about the soft tissues, and in due order and time degeneracy of the hard tissues must come about by lowered resistance and impaired function. I think Dr. Waugh is correct when he says that just in proportion as local conditions are the cause, so will local treatment of pyorrhea succeed in curing the disease. He is simply affirming the irrefutable law of cause and effect. I have never felt, at least in recent years, that local conditions alone cause pyorrhea alveolaris, and I will go a step farther, and say that precipitation of lime salts about the necks of the teeth is not due to local conditions. Some preceding constitutional disorder must have brought about that pathological peculiarity, and unless there is lowered resistance constitutionally, there cannot and will not be any local symptoms. Local symptoms cannot obtain in the mouth of an individual with normal saliva, for the reason that the normal saliva has an immunizing value and exerts its germicidal property, preventing the proliferation of bacteria about the dental ligament. There will be no precipitation of the mucin to act as a medium for the incubation of bacteria. The point I wish to make is that these local evidences of atrophy or disease are primarily constitutional, and what has been responsible for the *cause* of these conditions must be sought for elsewhere than in the oral cavity, if we are to establish and maintain *cures.*

Mr. Hopewell-Smith (closing the discussion). I find it extremely difficult to reply. I have never listened to a more illuminating and really interesting discussion than that which we have just had. I have learned a great deal from it, because my work, as I said in my introductory remarks, is in a transitional stage. I am groping for the light. I am very pleased to note that what I have said has been the cause of such an interesting discussion.

One or two questions have been asked particularly which I will try to answer. There seems to be a little difficulty in the understanding of the term *linea dura.* The cortical portion of the alveolar process, such as pointed out by Dr. Friesell, is composed of a thin plate of compact tissue, and the hard dense sheath of compact bone on the outer edge of each socket is the *lamina dura,* which is probably physiological. In a radiograph, it is the *linea dura.*

In regard to the "glands" of Serres, I believe that they are an embryological product found under the gum margins in fetal states, but certain epithelial cells in the periodontal membrane are often erroneously called the glands of Serres. The glands of Serres are merely epithelial cells in the gum margin in an early stage of development, but the bodies in the periodontal membrane are the epithelial remains of the epithelial sheath of Hertwig, which probably has something to do with the formation of the root of the tooth. If portions of this sheath persist, they remain as small masses of epithelial tissue.

I perhaps do not agree fully with Dr. Kirk when he thinks that the periodontal membrane itself is infected before these cells are infected; that would, of course, produce periosteitis; but they are not always found in connection with "pyorrhea alveolaris." Before I can reply to Dr. Kirk, I will have to think it over very carefully.

Dr. Kirk. This is not a theory of Kirk's, the question of the infection of these epithelial rests that I am calling attention to, but the result of a definite statement of Black's observation that these bodies were the seat of phagedenic periosteitis and filled with micro-organisms. This seems to me a significant observation, which I mentioned for the sake of further study. It is an open question in my mind.

Mr. Hopewell-Smith. I myself consider it an open question, because I have scores of times looked for these bodies in human teeth, and have seldom found them. Dr. Black described them in the teeth of sheep. I admit that they are fairly largely developed in these animals, but in man they seldom occur. In the average section they are small and insignificant, and the little masses one finds occasionally are, of course, the same thing as Dr. Black described, but I do not think they have so much importance as Dr. Black ascribes to them. Of course, I am not absolutely positive on this matter; we need more light on that point.

Dr. Waugh. Is it your opinion that it is epithelial tissue?

Mr. Hopewell-Smith. Yes. I think they are epithelial remains of the unatrophied portion of the sheath of Hertwig, when traced down in vertical sections of the jaw as it passes down and turns up again, and these are the unabsorbed portions of the epithelium. That is the only way they can get into that tissue.

Dr. Waugh. Do you not think they are endothelial?

Mr. Hopewell-Smith. They might be, but I think they are epithelial. As to whether they are glands or not, I do not know. Most glands require ducts, and I have seen no ducts in these bodies. I have not paid any special attention to them, having thought of them as parts of the periodontal membrane, but I should like to know more about these bodies themselves.

The physiological absorption that I have talked about, I believe to be atrophy of the bone due to local senile conditions. Some may say that, if this condition is senile, it would not be found in a child of ten years of age. I have studied plenty of cases of children where there were senile conditions in the deciduous teeth. Many people have senile conditions of the hair and other parts without being themselves old.

I agree with Dr. Friesell largely in

what he said as to the need of more definite nomenclature on this subject. I myself would like to see a clearing up of the nomenclature. About sixteen terms for pyorrhea exist, which is very confusing, but I think we must retain the term pyorrhea alveolaris, because it is known all over the world, and this term, to my mind, means nothing more nor less than the flowing of pus from the alveolar process. If we could agree upon an exact terminology for the gingival anatomy, and would clearly define the neck of the tooth and the surrounding hard and soft tissues, we should have our way clear to perform a great deal more work, and I hope that somebody on this side will elaborate this subject and elucidate these debatable points for us.

Dr. Belcher referred to the case in which the patient was forty-two and had lost all the teeth. I would not call that a case of pyorrhea, because no pus was ever present around the necks of the teeth, to my knowledge. I have another patient who has the same condition—a disease which is called by some "phagedenic pericementitis," that is to say, deep pockets, loosening of the teeth with the formation of pockets. That is what I believe Dr. Black thinks is phagedenic pericementitis.

A MEMBER. Were there any observations of calculus?

Mr. HOPEWELL-SMITH. No. Simply degeneration of the periodontal membrane, from I do not know what, but I think from constitutional causes; in one case I am not sure but that mercury was the cause. That is another factor which I think should be taken into consideration with regard to bone absorption—the use of drugs.

Dr. KIRK. When you do have what we agree is a senile condition affecting the natural conditions early in life, do you regard that as pathological or physiological? Of course a senile condition in old age is physiological, but when it occurs early in life, do you then regard it as physiological?

Mr. HOPEWELL-SMITH. That is just the point. I think you are right, but I am not sure.

Dr. KIRK. That is a lovely straddling of the question! I do not know this myself, but I am glad to know that I am right!

Motion was made and carried to adjourn until the next annual session.

CONNECTICUT STATE DENTAL ASSOCIATION.

Forty-ninth Annual Convention, held at Waterbury, Conn., April 15 and 16, 1913.

TUESDAY—*Morning Session.*

THE forty-ninth annual meeting of the Connecticut State Dental Association was called to order at 11 o'clock, Tuesday morning, April 15, 1913, by the president, Dr. E. J. Abbott, Waterbury, in Buckingham Hall, Waterbury, Conn.

The first order of business was the reading of the minutes of the last meeting, which was, on motion, dispensed with, because of the fact that they had been published in book form, and sent to each member of the association.

TUESDAY—*Afternoon Session.*

The meeting was called to order on Tuesday afternoon, April 15th, at 2.30 o'clock, by the president, Dr. Abbott.

The first item on the program for the afternoon was an address of welcome to the society by the mayor of Waterbury, Hon. FRANCIS D. REEVES.

The next item for the afternoon session was an "operative clinic" by Dr. E. J. GREENFIELD, Wichita, Kans., on "Implantation of Artificial Roots."

The next order of business was the reading of a paper by Dr. J. M. GOMPERTZ, New Haven, Conn., entitled "Bacteriology and Vaccine Therapy of Pyorrhea Alveolaris."

[This paper is printed in full at page 811 of the present issue of the COSMOS.]

Discussion.

Dr. C. J. BARTLETT, New Haven, Conn. I have been interested for some years in vaccine therapy, and have practiced it in a variety of conditions. I wish to congratulate Dr. Gompertz on the very great success he has obtained in his work in treating pyorrhea. I must disclaim, however, any special knowledge of the local conditions present in this disease. As a medical man, I have not had occasion to study these at first hand. To me, as a pathologist, this disease appears to be a localized condition in which pus is being formed for a more or less prolonged period. To the pathologist such a condition always signifies two facts: First, that bacteria are present, and secondly, that resistance to the action of these bacteria is lowered; and these two factors immediately suggest the question, Can we increase the resistance to these bacteria, and so destroy them? That bacteria are always present in conditions in which pus is formed is now well recognized. It is possible to produce pus experimentally without bacteria, but in more than ninety-nine cases out of a hundred of pus produced in animals or in human beings, it is due to bacteria. That the growth of bacteria in living tissue is due to lowered resistance is evident in a great majority of cases. The time of year when we see boils, for example, is in the spring, when persons are "run down," as we call it, viz, when the resistance is lowered. A hundred people may be exposed to typhoid bacilli and some of them will contract the disease, while others will not. In other words, the resistance of the former is lessened, and for that reason bacteria can become virulent. As a general rule, when bacteria grow, systemic resistance is lessened. Is it possible to increase this resistance so that the bacteria will be destroyed? Generally it is impossible to administer any drug that will kill bacteria in the tissues. When the physician gives medicine in typhoid or pneumonia, he does not hasten the recovery of the patient at all; he cannot in any disease administer any drugs that will kill bacteria, with one or two exceptions—a notable example of this being salvarsan in syphilis. The result is that, until a specific chemical is found capable of killing disease agents, we have to try some other means of increasing the resistance of the tissues themselves, so that they can destroy the germs. This is done in typhoid fever and in pneumonia; the body itself is stimulated by the toxins produced by the typhoid bacillus in the tissues, and the same is true in pneumonia, or in abscess formation. The reason why an abscess does not spread is that there is a locally increased resistance in the tissues inhibiting the process.

When we apply these findings to pyorrhea alveolaris, we recognize beyond question that bacteria are present—in fact, almost always, one or two varieties of bacteria. The streptococcus viridis is the most common. Less frequently, the hemolyzing streptococcus is present. I am not sure whether we may be able to show eventually that one single microorganism is the cause of this disease, but certainly there are only a small number of bacteria to be looked upon as producing it.

Dr. Gompertz has justly emphasized the value of making plates from pyorrheal pus as soon as possible after it has been obtained. After such pus has been obtained, it must be ascertained which bacteria are present in the largest numbers, but such a culture may be contaminated by oral bacteria, some of which grow so fast that they may outgrow the micro-organism that really produced the disease. Hence the necessity of at once isolating them by the plate method. In making a plate, the object is to spread the bacteria over the surface so that, wherever one lodges, it will grow and produce a mass of bacteria big enough to be seen by the naked eye. This is called a colony, and if these colonies are nearly all alike, it may be assumed that they are of a single micro-organism. Very often, however, different cultures are found. One of these colonies is then detached, and planted on agar-agar, thus producing a pure culture.

It is absolutely essential to know just what organism is producing the disease, as Dr. Gompertz has stated. There is no more reason to expect good results from a vaccine made from one organism in case the trouble is produced by another, than it is to expect to grow corn when we plant beans. Vaccine immunity means a specific immunity against one particular bacterium, and none other, and for that reason the particular organism causing the disease must be isolated, else the desired immunity cannot be produced.

In certain patients pus is produced for a considerable period of time around the roots of the teeth, which indicates a lessened resistance to the germ causing the pus production. We can ascertain this, of course, by the opsonic index, but this is so complicated that it is not of much practical use in ordinary cases.

The question arises whether it is possible in pyorrhea to increase the resistance of the tissues by means of vaccines? Theoretically it is. We can increase the resistance of a person to the typhoid bacillus. We are now injecting typhoid vaccines to protect individuals against typhoid fever, and the results are excellent. Resistance to the ordinary germs that produce boils can be increased by isolating these germs, growing them, and then killing them by heat and injecting the vaccines thus made into the person, with excellent results. Theoretically we should be able to obtain as good results in pyorrhea; I see no reason why this should not be possible, and the results obtained by Dr. Gompertz are what I would naturally expect. A few cases that I have observed personally have been satisfactorily treated by this method.

In regard to the question of dosage, I would take a slight exception to the essayist's statement. I think the initial dose should be smaller than indicated in the paper. It seems to me that a dose of 25 million is safer than 50 million at first. I have even had two cases in which I found that 25 million of streptococcus was too large a dose, and in which I obtained undesirable results. In one case the susceptibility was so great that, when I administered a very few millions, the reaction was still too pronounced. On the other hand, I wish to emphasize that the results of too large a dose are not injurious. An overdose may produce discomfort for a day or two, but there is no danger, such as is produced by overdoses of morphin or other strong drugs.

The danger to the constitution arising from a chronic disease combined with pus production requires great emphasis. Every now and then the physician notes a case of pernicious anemia, and he always expects to find a history of bad teeth, pyorrhea alveolaris, or some similar condition. In pyorrhea not merely is the chewing of food done improperly, but the prolonged swallowing of pus and its absorption through the stomach and intestines is very injurious to the body as a whole, and this vicious combination, in later life, when resistance is lowered, gives rise to chronic constitutional disease.

Dr. G. B. Vroom, New Haven. I have had rather special opportunities of seeing Dr. Gompertz' work and his results, and perhaps that is the reason why I have been chosen to take part in this discussion. This subject seems a very large one, and the more I look into it, the more different aspects it presents to me. For a time it was a question with me whether such work as Dr. Gompertz presented to us would be of any benefit to us in our work. I have thought for a long time and still think that pyorrhea is not a local trouble, and that in our treatment we shall have to reach the general system in order to produce a cure. The essayist's results that I saw not only very much surprised, but very much pleased me, and had I his energy and his ambition, I would not be as modest as he is, but would try to convince you of the wonderful superiority of vaccine treatment.

Pyorrhea is not a local disease, but simply a local expression of a general disorder. The tartar accumulations around the teeth are the most prolific cause of the trouble and are due to a precipitation from the saliva that is unnatural, showing disordered function. It has been the habit of the physician to look at the mouth and mucous membrane of the tongue for signs of general trouble, and there is hardly a more exaggerated sign of trouble than pyorrhea. When the resistance is so lowered that the irritants precipitated from the saliva or secreted from the blood, or any injury to the gums, produce pyorrhea, these factors act simply as exciters; the system being in a state of lowered resistance, pus is formed, and this pus being taken in by the system day after day, produces pus-poisoning, the result being an increase in the trouble already present.

I have brought up the question of whether this is a local disease caused by micro-organisms, or whether it is due to a lowered condition of the system, because I wish to have suggestions made as to whether it is not better for us to use something besides our local treatment to raise the resisting power—that is, whether we should use also remedial measures in conjunction with the physician, or take up the cudgels by ourselves and administer medicines.

Dr. A. C. FONES, Bridgeport. I am opposed to the vaccine treatment—from the standpoint of an impressionist. A man has no right to an opinion unless he has investigated both sides of a question, and tried a therapeutic agent practically and scientifically; if it has failed in his hands, he may then have reason for being opposed to it. Therefore, never having tried the vaccine treatment, I cannot have an opinion, but as an impressionist I am opposed to the vaccine treatment in dentistry, because I can produce a cure of pyorrhea, as anyone can, by the simple method of treatment of which I will speak later.

Without wishing to be discourteous, this method of treatment which Dr. Gompertz advocates reminds me of an occasion upon which some people were propounding riddles. Someone asked—"What is it that has no teeth, goes around on two legs, and barks like a dog?" No one could guess the answer, and finally the propounder said, "A chicken." The objection was immediately raised that a chicken did not bark like a dog, and the one who offered the riddle said: "No; I just put that in to make it harder." That is my impression of the vaccine treatment.

I do not doubt that Dr. Gompertz and Dr. Bartlett can produce a condition of health in the mouth by vaccines. I believe they can stop the flow of pus, but they must also be thorough in instrumentation and cleanliness, in the same way as any of us must. Pyorrhea is not cured merely by arresting the flow of pus. Dr. Gompertz must be as thorough with his instrumentation as you or I. No dentist alone ever cured pyorrhea. The dentist's failure to produce a cure is due to the fact that two-thirds of the cure lies in the hands of the patient. How many of you gentlemen have ever seen a case of true pyorrhea alveolaris in a person sixteen years of age, or under? [Three hands were raised.] How many have seen dozens of cases of true pyorrhea in persons over thirty-five years of age? [Many hands were raised.] There are so many hands that it is not necessary to count them. What is the cause? There are filthy conditions in the mouths of children, such as carious deciduous and permanent teeth. Frequently the first permanent molars are destroyed by caries to the gingival border. All such conditions are ideal for local infection. Many of these children are anemic, sickly, and of lowered resistance, but do we find pyorrhea alveolaris? Most of us do not. And why? The pericementum in youth and up to thirty years of age is so thick, so vascular and so resistant that it resists any action of decomposing food or bacteria around the gingival border of the gums and the necks of the teeth. After that period, the membrane gradually grows thinner, becomes less vascular, less resistant, and more susceptible to the irritating action of decomposing food particles around the necks of the teeth and to the action of bacteria. In a majority of cases, when a person has reached the age of thirty-five or forty, and the mouth has been neglected, there will be a gradual death of the pericementum at its border, the margin of the alveolus will be absorbed slightly, and small pockets, in which food will lodge, will be formed. If the resistance in these tissues is then low enough, it is a simple matter for infection to take place.

What, then, are the necessary conditions for the development of pyorrhea? First, the tissue must be susceptible to infection; second, there must be exciting causes, which are decomposing food and bacteria. In correcting these conditions, cleanliness is one essential, but not the only one; it is equally important that the resistance of the tissues be raised. Such resistance may have been lowered by faulty metabolism produced by improper food supply, under or overeating, lack of exercise, excessive drinking, and various other dissipations. There are a number of conditions besides senility that may have brought about a lowered vitality. Irrespective of what the constitutional conditions may be, the resistance of these tissues can be raised. How? By vaccines?

Dr. Bartlett, will you kindly tell me how long the action of vaccine lasts in the system of these patients after injection, so as to render them immune from further infection of bacteria?

Dr. Bartlett. Two years seems to be the limit in typhoid. I am not sure as to pyorrhea, but I should say several months at least.

Dr. Fones. The resistance of the tissues in the mouth can be raised by artificial stimulation in the form of gum-brushing. This measure is so simple that the patient, if he is taught how to use the tooth-brush, can develop perfect circulation. Satisfying results are obtained so easily that other methods seem difficult and complicated by comparison. This measure calls for the brushing of the teeth and gums four times a day. If I were to do this convention one service, it would be to show you how I believe the gums and teeth should be brushed; and in doing so, I am of the opinion that I would be showing you three-quarters of the cure of pyorrhea. The other quarter rests in your own hands—it consists in the thorough removal of deposits on the roots and around the necks of the teeth, and the thorough cleaning and polishing of all surfaces.

I believe Dr. Gompertz can stop the flow of pus, and I am in sympathy with vaccine treatment in cases of deep infection, which would require a considerable operation to get at the seat of infection. Vaccine treatment under such conditions may be warranted, but, as dental surgeons, everyone of us must know how to control pyorrhea, and it is within our power to do it. When we speak of pyorrhea being constitutional and incurable, and send patients away, telling them that this disease cannot be cured, we do them a great injury. It is curable, it can be controlled, but the dentist cannot do it alone; he must have the co-operation of his patient. It is for you, then, to teach your patients how to brush their gums, thereby raising their resistance. I am not theorizing in making these statements: I have followed this procedure time and again, and anyone can adopt it. It requires no special skill, merely an appreciation of the two fundamental facts that the exciting causes are decomposing food and the susceptibility of the tissues due to lowered resistance.

Dr. Gompertz (closing the discussion). Dr. Fones maintains that it is within our power to "control" pyorrhea alveolaris, and that no dentist should send a patient who is suffering with pyorrhea away from his office with the idea that it cannot be cured. Gentlemen, all a dentist can do without the assistance of vaccine is "control" the disease, but, according to my interpretation, that does not mean a cure.

Dr. Fones has asked the question as to how long immunity will last in the case of vaccine treatment. We have a number of cases which have been immune for two years and more. We have had cases in which extraction has been advised by several dentists, and these cases are in good condition today. Something which was more than simple control of the disease took place in these patients. It was the success of the vaccine treatment and nothing else. Furthermore, Why is it that dentists, as long as I can remember, have been puzzling over pyorrhea, and have never done anything more than "control" it? The question of the permanence of cures, of course, is at the present time not absolutely settled.

Dr. Fones. Can you cure caries by vaccines?

Dr. Gompertz. Caries is an entirely different process. There is no blood supply involved in caries. We are looking for results. I have no reason to question Dr. Fones' results any more than he has to question mine; these results are before you, and they have been demonstrated in a great many instances. I have no doubt that Dr. Fones can train patients in the correct way of brushing their teeth, and there is no question that this helps. I have had patients who have had the same training—I do not say that they came from Dr. Fones, because I think he has the ability to keep his patients, and I am trying to follow his example—but, in all seriousness, no permanent results have been obtained in pyorrhea alveolaris previous to the vaccine treatment.

Dr. Bartlett spoke of dosage, and I think he is correct; it is just as well to commence with small doses, perhaps 25 million. Even if no marked reaction be obtained, the patient gains confidence, and no harm is done by gradually raising the dose. If one should, however, give too large a dose at first, no great harm is done by it.

Someone has asked about the local reaction. The local reaction is generally produced in twenty-four or thirty-six hours. It has the characteristic appearance of a burn of the first degree—this may continue for forty-eight or fifty-six hours but the patient is unaware of soreness.

There is just one more point that I would like to emphasize before closing, and that is the regulation of the dose. This, in my opinion, is one of the important factors toward getting good results in vaccine treatment of pyorrhea alveolaris, but this can be obtained only by careful observation and clinical experience.

I want to thank the members of the society for their courteous reception and interesting discussion of my paper.

The meeting then adjourned until the evening session.

(To be continued.)

DENTAL FACULTIES ASSOCIATION OF AMERICAN UNIVERSITIES.

Fifth Annual Meeting, held at Boston, Mass., April 22 and 23, 1913.

First Session.

THE fifth annual meeting of the Dental Faculties Association of American Universities was called to order on Tuesday, April 22, 1913, at 10.30 A.M., by Dr. Eugene H. Smith, president, in the faculty room of the Harvard Dental School, Boston, Mass.

The secretary, Dr. Edward C. Kirk, called the roll, and the following representatives responded: Dr. Alfred Owre, University of Minnesota, College of Dentistry; Dr. W. S. Hosford, University of Iowa, College of Dentistry; Dr. Eugene H. Smith, Harvard University, Dental School; Dr. N. S. Hoff, University of Michigan, College of Dental Surgery; Dr. W. E. Sharp, University of California, College of Dentistry; Dr. Edward C. Kirk, University of Pennsylvania School of Dentistry. Others present at the meeting were Drs. W. E. Boardman and L. P. Hall.

The next order of business was the reading of the minutes of the previous meeting by the secretary, Dr. Kirk.

Motion was made and carried that the minutes be accepted as read.

The next order of business was the Address of the president, Dr. EUGENE H. SMITH, D.M.D., Boston. Dr. Smith, asked the vice-president, Dr. N. S. Hoff, to occupy the chair, while he read his address, as follows:

PRESIDENT'S ADDRESS.

Gentlemen, honored members of the Dental Faculties Association of American Universities,—It is a great privilege, permeated with much pleasure, to welcome you in the name of Harvard to our university.

The dental department has courageously striven to keep abreast of the time, to increase dental education, and to advance the standard of the profession.

Since the memorable meeting of the National Association of Dental Faculties at Asheville, when Harvard felt it necessary to withdraw its membership, followed shortly after by the several dental departments of universities here represented, our united efforts have made this advance steady and safe. This step, however, indicates only a beginning—a good beginning, to be sure—and also a danger of contentedly hovering around our beginnings rather than the investigating of the newer problems in education, with a determination to adopt whatever may seem to be in the line of progress.

Let us, then, consider in the first place what we have accomplished, and in the second place, what our progressive problems are and how we are to solve them.

We have accomplished a sodality of six university departments whose aims are identical, and whose purpose is to bring about a higher standard in the profession.

PREDENTAL REQUIREMENTS.

To that end we are united in a predental requirement of four years' training in an accredited high school.

This uniformity of requirements means, I hope, that for the moment only we may rest while considering further advancement in predental training. I find, however, that while in the main our entrance requirements are the same, we differ somewhat in details. For instance, the Harvard Dental School definitely states the courses that a student must take during his four years in high school.

Those courses must include English, algebra, physics, chemistry, the study of a foreign language for at least two years, and history, if the student has not taken Latin. He may elect geometry, botany, zoölogy, anatomy, wood-working, blacksmithing, chipping, filing, fitting, or machine-tool work. If one or two of the required subjects have not been taken by the applicant during his high-school course, he may be admitted with a condition in these two subjects, but must remove the conditions previous to being admitted to the senior class.

Other schools, however, in our association make a different statement in the interpretation of a four-year high-school course, namely—

The University of Minnesota makes obligatory English, algebra, geometry, chemistry, and manual training; the University of Iowa does not seem to make it clear what obligatory subjects are required; the University of California, after August 1913, requires four years of high-school plus two years of college work; the University of Michigan makes obligatory English, algebra, geometry, physics, Latin, and chemistry; in the University of Pennsylvania, chemistry seems to be the only obligatory subject, coupled with a large field of electives.

Such a wide latitude of obligatory subjects among us is not, I think, desirable.

As above stated, the College of Dentistry of the University of California has already committed itself to a requirement of two years of college training and the College of Dentistry of the University of Iowa is contemplating a similar change. It therefore seems to me to be expedient and wise to have more uniformity in this matter, especially in regard to the obligatory subjects.

Further steps along these lines must, I think, be taken with great care, not so much owing to the fear of lessening the number of our students, as to the fear that men may be unwisely trained for the duties required of the dentist.

It therefore becomes one of our most important problems to decide how much of college or academic training shall be required of men entering upon the study of our profession. Shall it be one, two, three, or four years of academic work, and what subjects shall be required from the elective field now offered in academic work?

PROBLEM OF STANDARDIZING THE DENTAL CURRICULUM.

While the predental training required by our several schools, as I have pointed out, is not quite the same, we are much more at variance in the sequence of our curriculum. It would help to standardize the professional training which we give to our students, and make easier the transfer of students from school to school if we could bring about a uniformity in the sequence of subjects taught, and I recommend that we take this matter into consideration.

FOURTH-YEAR ELECTIVE COURSE RECOMMENDED.

I think we all realize that the professional education necessary for a dentist today cannot well be met in a three years' course, and that a fourth year is most desirable.

I do not feel that the time is ripe for an obligatory fourth year, but I do think and recommend that we offer at once a fourth-year elective course. Such a course, if well planned, would prove attractive not only to our students, but to practitioners, who would be glad to avail themselves of the opportunity such a course would offer.

Certificates of various grades might be granted for attendance upon such a course, depending upon the courses taken, the time spent in such courses, etc.

Our profession has not done, nor is it now doing what it should in the way of scientific research and preventive dentistry, and steps should at once be taken to bring about inter-school action to foster a spirit of research among our student body.

RESEARCH SOCIETIES URGED.

Such steps have already been taken in the Harvard School, where some two years ago a students' society for dental research was formed, and named after Mrs. Harriet N. Lowell, whose generous gift to the school made the formation of the society possible. This society is under the management of a research committee appointed by the administrative board, and is made up of men who are giving a portion of their time to research work, and who are also interesting young students in scientific work.

It would be highly advantageous if similar societies could be formed in our several schools, thus bringing about an inter-school society of dental research, and, through such co-operation, an exchange of scientific endeavor.

RATING OF STUDENTS FROM FOREIGN SCHOOLS.

We are still lacking the knowledge necessary to properly rate students coming from foreign schools, and in order that there be a clear understanding in regard to these schools, I recommend that a special committee be appointed to investigate the matter thoroughly and report at our next meeting.

RELATIONSHIP WITH THE NATIONAL BOARD OF EXAMINERS.

There has always been, and there appears still to be, somewhat of a reciprocal alliance between the National Board of Examiners and the National Association of Dental Faculties, and, if in the judgment of the society such co-operation is to the benefit of higher dental education, steps should be taken to bring about a similar arrangement between our association and the National Board of Dental Examiners.

CARNEGIE FOUNDATION.

In the last report of the president of the Carnegie Foundation mention is made of the intention of the Foundation to investigate the standards of the dental schools.

This is a hopeful sign and if carried out will prove, I believe, to be as great a service to dental education as the Foundation's investigation of the medical schools has been to medical education.

In this connection I would recommend that we send to the Carnegie Foundation our appreciation of its intention to investigate the method of dental education in America, and to express our hope that the investigation will be made at an early date.

Dr. KIRK moved that the report be received, and that time be set apart for discussing the special recommendations made in the report. [Motion carried.]

Dr. Smith then resumed the chair.

The next order of business was the report of the secretary, Dr. EDWARD C. KIRK, as follows:

REPORT OF THE SECRETARY-TREASURER.

Mr. President and Members of the Dental Faculties Association of American Universities,—I have to submit for your consideration certain communications of an official character which have been received through the secretary's office since the last meeting of our association.

The first is a letter from Dr. M. Chiwaki, dean of the Tokyo Dental College, inquiring as to what action, if any, had been taken upon the application made by him on behalf of the Tokyo Dental College for admission of graduates of his institution on advanced standing to the senior year in schools of our association. As this question has been debated at two preceding meetings, it seems only right and proper that this official inquiry should receive an official reply. This matter of the official recognition of the Tokyo Dental College was, I believe, referred to the committee of which Dr. Owre is chairman, and I understand that the committee will be able to make a definite report on their findings at this meeting.

I have also to submit for your consideration a letter from Dr. Newill Sill Jenkins of Dresden, Germany, relative to a suggested interchange of professors between German university dental schools and the schools of this association.

I have to present the formal application of the Washington University Dental School for membership in the Dental Faculties Association of American Universities; also a letter from Dean Hosford of the Dental Department of the University of Iowa, transmitting the report of the consolidation of the dental departments of Drake University and the University of Iowa.

I have to report also that, following the instructions of this body, I officially transmitted to the administration of the Carnegie Foundation the text of the resolution of our association suggesting that the Carnegie Foundation investigate and report upon the conditions of education in the dental schools holding membership in this body. The text of the secretary's letter, together with the acknowledgment of its receipt by the Carnegie Foundation, are herewith submitted for your information.

Your secretary has received a communication from Dean Hoff relative to the status which may be accorded in the Dental Department of the University of Michigan to a graduate of the Nippon Dental College; likewise an inquiry from Dean Hoff with respect to the status of an applicant from the dental school in Odessa, Russia, and a similar inquiry from Dean Owre relative to the status of graduates of American dental schools settling in the British colonies, all of which, with the replies thereto, are herewith submitted.

The secretary has received the printed report of the Educational Council foı 1912, which is also herewith submitted for your information and consideration.

The authorities of the Panama-Pacific Exposition Company have transmitted, through your secretary, an invitation to this association to hold its annual meeting in San Francisco in 1915 during the holding of the Panama-Pacific Exposition.

The financial condition of our association is set forth in the treasurer's report, containing a detailed exhibit of receipts and expenditures, and is herewith submitted.

The secretary would call attention to the fact that the Sixth International Dental Congress will be held in London during August of 1914, and although no official invitation from the Committee of Organization has been received inviting this body officially to participate, it would seem that the occasion is one which should enlist the interest and co-operation of all who are related in any way to the advancement of our professional interests, and it might be well that we should, if only in an informal way, endeavor to further the interests of dental education with which all of us are concerned not only in a national but an international way, and to do our part toward advancing the interests of dental education, particularly at the time of the holding of the congress.

All of which is respectfully submitted,

EDWARD C. KIRK,
Secretary-Treasurer.

The next order of business was the report of the Executive Committee. Dr. Hoff, chairman, reported that nothing had been referred to the Executive Committee during the year to be acted upon, and therefore there was no report to make.

Dr. KIRK suggested that the application of the Washington University Dental School be referred to the Executive Committee.

Dr. SMITH suggested that it would probably be best to refer this application to the Educational Committee.

Dr. KIRK moved, and Dr. Owre seconded, that the question of the application of the Washington University Dental School be referred to the Executive Committee, with full power to act thereon. [Motion carried.]

Dr. KIRK asked for final action by the association on the status of graduates coming from the Tokyo Dental College and asking for admission into any school of this association.

Dr. OWRE reported that the Educational Committee had had considerable difficulty in finding out the status of such students, but from such information as the committee had been able to obtain, he did not think they should be admitted to senior advanced standing.

After considerable discussion of the question Dr. KIRK moved and Dr. Owre seconded that the standing resolution governing the admission of students of schools not members of this association to advanced standing in schools of this association be applied to the case of the students from the Tokyo Dental College as it applies to students from other schools. [Motion carried.]

Dr. Kirk asked for instructions on informing Dr. Chiwaki with regard to this tentative disposition of the matter, until we have further details regarding the Tokyo School; also that he might instruct him with regard to the desire of the association to grant unconditional admission to advanced standing only in relation to university schools; that we do not understand his school to be a university school, and could not treat him any better than our own people.

Dr. Owre moved that the secretary be so instructed. [Motion carried.]

After further consideration of the Nippon School, it was the sense of the association that this resolution also apply to the Nippon School.

Dr. Kirk then asked for final action on the proposition contained in the letter from Dr. Jenkins with regard to the interchange of professorships with the German universities. Dr. Kirk read again the letter from Dr. Jenkins making this proposition.

Dr. Kirk then presented the following resolution:

Resolved, That it is the sense of this meeting that the faculties represented in the Dental Faculties Association of American Universities view with sympathetic favor the suggestion for an interchange of teachers with the German university dental schools.

Dr. Hoff seconded the resolution, which was carried.

Dr. Smith then declared the meeting adjourned until the afternoon session.

Second Session.

The meeting was called to order at 3 o'clock by the president, Dr. Smith.

The Secretary then presented to the association the communication from Dr. Hosford regarding the consolidation of the Drake University Dental School with the University of Iowa, College of Dentistry.

Dr. Hosford explained that it was the wish of the University of Iowa to have this action ratified by the Dental Faculties Association of American Universities.

Dr. Kirk moved and Dr. Hoff seconded that this action be ratified. [Motion carried.]

The Secretary next presented a letter from Dr. Hoff regarding application for admission by a student from Odessa, Russia, asking what standing should be given such a student.

The subject was discussed by Drs. Hoff, Smith, Kirk, and Owre, after which Dr. Hoff moved that the association accept credentials from dental schools in Russia, not to exceed advanced standing in time only of more than one year, and this only when the applicant has shown by such credentials or examination that he is entitled to this amount of credit.

Dr. Sharp seconded the motion, which was carried.

Dr. Kirk then presented to the association an invitation from the Panama-Pacific Exposition Company to the association to hold the 1915 meeting in San Francisco during the time of the exposition. This invitation was supplemented by an invitation to the same effect from the University of California.

Dr. Hoff moved that the association accept the invitation of the University of California and of the Panama-Pacific Exposition Company to meet in San Francisco in 1915. [Motion carried.]

The question of the time and place of the next annual meeting was next considered. Dr. Kirk invited the association to meet next year in Philadelphia, at some time to be agreed on later.

Dr. Sharp moved that Dr. Kirk's invitation to meet in Philadelphia in 1914, at a time convenient to the association, be accepted. [Motion carried.]

Dr. KIRK then presented the Treasurer's Report, as follows:

TREASURER'S REPORT.

Receipts:		
Balance from 1911-12	$97.49	
Receipts for dues 1912-13 ...	300.00	
Total receipts		$397.49
Expenditures:		
Jan. 1, 1913. Printing Transactions	$59.00	
Jan. 1, 1913. Clerical services	100.00	
Nov. 1, 1912. Stationery ...	5.25	
April 18, 1913. Postage and envelopes	3.33	
Total expenditures		$167.58
Balance 1912-13		$229.91

Dr. HOSFORD moved that the report of the Treasurer be accepted. [Motion carried.]

Dr. SHARP moved that one member of the Executive Committee be delegated as a committee of one to inspect the Washington University Dental School, in order that the Executive Committee could more intelligently pass upon the application for membership in the association.

The motion was seconded by Dr. Owre, and passed.

Dr. KIRK moved that the Executive Committee select one member of the committee to do this at the expense of the association. [Motion carried.]

The Executive Committee announced Dr. Hosford as its selection for this work, and Dr. Smith suggested that Dr. Hosford be equipped with proper credentials by the secretary.

Dr. SHARP spoke of an effort being made to establish a dental department in connection with the University of Illinois, and after some discussion of the question, offered the following resolution:

Whereas, The members of this association have learned that it is the intention to establish a dental school in connection with the University of Illinois; therefore be it

RESOLVED, That this body views with great satisfaction this movement toward the placing of dental education in the state of Illinois upon a university basis, it being the belief of the association that the interests of dental education will be best conserved by such a relationship, and that the final outcome of dental educational progress must be determined through the fostering care of the universities constituting the higher institutions of learning of this country; and be it further

RESOLVED, That a copy of this resolution be forwarded to the president of the University of Illinois as an official expression of the interest of this association in the proposed plan of creating a dental school as an integral part of the educational system of the University of Illinois.

Dr. KIRK moved the adoption of the resolution. [Motion carried.]

Dr. SHARP asked advice with regard to what to do with an application from a student from the University of Texas, stating that he had the B.S. degree and had taken two years in dentistry, and asked if he could be allowed credit for two years.

It was the sense of the meeting that this applicant could be allowed one year time-credit, but should be required to take two years in dentistry.

Dr. KIRK raised the question as to giving undergraduates in medicine any allowance for time in the dental course.

Dr. HOFF suggested that it would be fair to give such men credit for one year in dentistry when they have taken two years in medicine. After further discussion of the subject,

Dr. KIRK moved that Dr. Hoff be appointed a special committee to bring in a report at the next meeting of the association on the question of granting advance standing to undergraduate medical students in the dental course—that is, undergraduates from medical departments of universities. [Motion carried.]

Dr. SHARP suggested that consideration of the President's address be made the first order of business for the morning session.

The association then adjourned until Wednesday morning at 10 o'clock.

Third Session.

The meeting was called to order at 10 o'clock Wednesday morning by the president, Dr. Smith.

Dr. Sharp brought up the question of considering a course in oral hygiene and dental economics, and asked the consensus of opinion as to the advisability of giving this as a regular course, and giving specified time to the subject. The question was discussed by Drs. Smith, Kirk, Owre, and Sharp, but no action was taken on the matter.

Dr. Smith submitted the application for advanced standing of a student from the North Pacific Dental College who had matriculated at the Harvard school, but whose credentials were not up to the standard. Dr. Smith said this student had not been allowed to continue his second year because of his not satisfying the educational requirements, which were difficult to establish.

The sense of the meeting was that this man be not allowed to continue his course until he meets the preliminary educational requirements.

The next order of business was the consideration of the recommendations in the President's address.

The first question to be considered was with regard to the differences of the members of the association with regard to obligatory subjects in the curriculum. Considerable discussion of the subject was entered into by Drs. Smith, Owre, Kirk, and Hoff, after which,

Dr. Kirk moved that each member of the society be requested to express his views on the subject and forward them to the chairman of the Educational Committee, and let him, from that, systematize a report that will give a definite record as to how near the different college curricula are together, and formulate from that a plan that would tend to unification; this to be discussed at the next meeting of the association.

Dr. Hosford seconded the motion, which was carried.

The next recommendation in the President's address was that in regard to the standardizing of the curriculum.

Dr. Hosford suggested that a minimum requirement of hours for each subject be made standard in the schools.

Dr. Owre suggested that each member of the association send each year a member of the clinical staff of the institution, that they might become conversant with the views of the association in regard to educational matters, clinical work, etc.

Dr. Sharp moved that this question be referred to the Educational Committee, to make a report and recommendation. [Motion carried.]

The next question considered was that of a fourth-year elective dental course.

Dr. Owre moved that that question be referred to the Educational Committee.

Dr. Owre moved that the recommendation in the President's address, to the effect that the secretary be instructed to write to the Carnegie Foundation and express the appreciation of this association of their intention to investigate the methods of dental education in America, and to voice the hope that the investigation be made at an early date, be adopted. [Motion carried.]

The next order of business was the election of officers for the ensuing year.

Dr. Sharp moved that the present officers be re-elected to their present positions. [Motion carried.]

Dr. Hoff moved that Dr. Hosford be re-elected to the Executive Committee for two years. [Motion carried.]

Dr. Hoff moved that Dr. J. G. Sharp be re-elected to the Educational Committee for three years. [Motion carried.]

The final reading of the minutes for approval was, on motion, dispensed with.

Dr. Sharp moved that the association extend its thanks to the president of the association, also to the Harvard Dental School, to the Harvard Odontological Society, and to Mr. Forsyth, of the Forsyth Dental Infirmary, for courtesies extended to the association during the meeting. [Motion carried.]

Motion made and carried to adjourn, subject to the call of the president.

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Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S., Sc.D.

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PHILADELPHIA, AUGUST 1913.

EDITORIAL DEPARTMENT.

CONCERNING EDUCATIONAL STANDARDS.

WE have from time to time directed the attention of our readers to the question of educational preparation for the professional practice of dentistry as a matter of prime importance in relation to our position and future advancement as a profession. We have felt called upon to keep the educational issue prominently in view, because in the very nature of the case it is education in the literal sense of the term upon which all fitness for intelligent dental practice depends. While the general truthfulness of the foregoing proposition is doubtless conceded by all, it too often happens that narrow-minded or partial definitions of the meaning and scope of the phrase "educational preparation" tend to interfere with its efficient and practical application.

The annual sessions of our professional schools are now ended; classes have been graduated, and preparations are now in progress for the enrollment of a goodly aggregate number of new recruits fresh from the preparatory schools into the ranks of dental college students. This transitional stage or period of readjustment in the cycle of dental college activities affords excellent opportunity for those in touch with the work to observe with some particularity the character and grade of educational fitness that has been attained by these novitiates both as the result of their preparatory school training and of their dental college curriculum as well.

The experience of dental teachers in dealing with the product of the preparatory schools for the past fifteen years or more has developed a concurrence of opinion as to the need for better educational preparation for the clear understanding of the specialized subjects of the dental curriculum, and this opinion has had its practical expression in the general and insistent demand for a higher standard of entrance requirement for our dental colleges, so that the unfit may be effectively separated in the beginning from those qualified to enter upon the dental professional course of training. In response to the demand for higher entrance qualifications the matriculation standards for our dental schools have been progressively raised from the indefinite plane called "a competent common school education" to "satisfactory evidence of the completion of four years of standard high-school preparation," with the result that even yet the matriculants who are the product of four years of completed high-school training do not in an average sense manifest that grade of educational efficiency which they should possess in order to intelligently proceed with the studies of the professional course. The medical schools, or at least a goodly number of them, have demanded two years of special collegiate preparation in addition to the four years of high-school work as a matriculation requirement, and one, if not more, in the endeavor to secure properly prepared medical students, demanded for a time the attainment of a bachelor's qualification in arts or science as a matriculation standard for admission to the medical course, which standard was later abandoned because of the limited number of applications for admission that followed its adoption. It will thus be seen that there has been a constant effort to secure a better qualified class of students by the device of demanding a longer period of preparatory study, and that when this plan was carried to its ultimate expression it was found to be self-limiting, that is to say, when the limit of collegiate preparation was finally reached at the baccalaureate there were no students to be had by the medical schools. The analogy between this plan and the unrestrained application of the axiom of "extension for prevention" is too obvious to need elucidation.

The evil of insufficient preparatory training still exists; the device of more time in preparation has not cured the evil, and as we have indicated is self-limiting in its action—What, then, is to be done about it? We have on former occasions pointed out that mere quantity or bulk of education is not the end to be attained in preparation for entrance upon the professional course of study, nor indeed should it be an end of the professional course itself; what is of far greater importance as an educational ideal is kind and character or quality of education and it is when measured in these terms that the American high-school education manifests its inherent weakness and inefficiency as a system of preparation for entrance upon our courses of dental professional instruction. Any dental college teacher having a background of experience that would render him competent to express a trustworthy opinion on the subject would be able to testify that in the vital essential of language training the American high-school graduate is, generally speaking, much below the grade of efficiency that he should be considering his average age and the time he has spent in acquiring a working knowledge of his mother tongue, Moreover, he is less efficient than he should be in reasoning power, in precise methods of critical analysis, and the ability to comprehensively grasp the meaning and relationships of the problems that ordinarily confront him in his professional course. He has a superficial smattering of a considerable number of studies, and rarely knows any one of them well enough to put his knowledge to effective use. It is just this state of intellectual inefficiency that has constituted the *raison d'être* of the demand for higher matriculation standards, a demand that we have attempted to satisfy by asking for more and more of an inherently defective thing in the way of preparatory education.

Comparison of the systems in vogue in Europe with the American preparatory school system is to the very evident disadvantage of our own. Europe has found that an intensive method of training whereby the student is progressively drilled in a well selected but limited group of studies is productive of the best educational results. Our American system is too diffuse, superficial, and lacking in intensiveness, and in our anxiety lest we debilitate the mental machinery of our on-coming population by inducing brain fag in the rising generation, we are eliminating the drudgery of study, the mental exercise of work, and substituting predigested information in sugar-coated tabloid form for real education.

It is time that we re-defined the meaning of the phrase "higher standards" as applied to education and more clearly recognize that it is the factor of quality rather than quantity that counts in education as well as in all other things that deserve the designation good as descriptive of their character. But it may be asked, What has the dental profession to do with the business of preparatory school training, the answer to which is that inasmuch as the preparatory school training is the foundation upon which the dental college training is built, the efficiency of the professional course of instruction is in a large degree dependent upon the integrity and thoroughness with which the foundation is laid. So self-evident does the proposition appear to be that until the professional schools concentrate their energies upon the correction of the present defects of our system of preparatory school training, any material progress in the elevation of entrance standards and likewise in the standards of educational efficiency of the graduates of our professional schools of both medicine and dentistry will be impossible.

Any manufacturing industry that had continuously delivered at its doors raw material relatively as defective for its purposes as that which the preparatory schools are furnishing to the dental and medical colleges to be turned out ultimately as professional men, would either improve its system of inspection or establish such relations with the producers as to bring about extensive improvement in the character, quality, and fitness of the raw material. The connection between the professional and the preparatory school is a vital one, therefore a sound professional education can never be built upon a defective preparatory educational foundation, nor can an intelligent practitioner be made out of an uneducated schoolboy. It is exactly the case of the silken purse and the aural appendage of the *sus scrofa feminina.*

Bibliographical.

Anatomy and Histology of the Mouth and Teeth. By I. Norman Broomell, D.D.S., Dean and Professor of Prosthetic Dentistry, Dental Anatomy and Histology, Dental Department, Medico-Chirurgical College of Philadelphia, and Phillipp Fischelis, M.D., Associate Professor of Histology and Demonstrator in Embryology, Medico-Chirurgical College of Philadelphia. Fourth Edition, revised, with 368 illustrations. 469 pages. Philadelphia: P. Blakiston's Son & Co., 1913. Price, $3.00 net.

The present fourth edition of this work, which in the review of its forerunner we have elected to our "Five-foot Dental Library" (see review of third edition, April 1910 Cosmos, p. 492), marks another step in advance in a subject the fundamental importance of which, in the more modern specialties of dentistry, especially orthodontia, local anesthesia, root resection, pyorrhea and vaccine treatment, is being more fully recognized. While what has been said before in these columns about the quality of the text and the illustrative material offered by the authors continues to hold good, new valuable additions have been made in the present edition, chief of which are a comprehensive description of the present status of our knowledge of blood and lymph, of the structure of the circulatory apparatus, and the structure of the various forms of glands. The subject-matter of the various chapters has been rearranged, and some novel illustrations have been incorporated. The value of this book to the dental student, and even more so to the graduate of dentistry, whose memory in regard to details of this important subject is only too often allowed to remain without refostering and restocking, much to the detriment of his progress in efficiency, needs no emphasis. The authors' appeal, published in the preface to the third edition, so fitly expresses a present need of the dental profession that it bears repeating: "It has been justly brought forward within recent years that there is a lack of interest and enthusiasm for collateral reading, special studies, and original investigation, not only among students but also among graduates in dentistry. The experience gained in teaching has suggested to the authors that this is due to the fact that dental students use to a great extent text-books on anatomy, histology, and embryology, chiefly intended for medical students, and they generally believe that most of the matter which is contained in these books is not intended for them, having no practical application. Their attention is therefore limited to those chapters which seem of importance to them, and thus an intelligent understanding of the subject is not obtained. Recognizing this fact, it seemed advisable to include in this dental text-book a description pertaining to general cytology, general embryology, and histogenesis, and a further presentation of the significance of the facts thus gained for an intelligent understanding of the formation of the organs of the mouth." This statement is in direct line with the contention that is being so loudly voiced at present in regard to the indifference of a large contingent of the dental profession to advanced reading, and with the efforts being made in dental schools, societies, and notably by the National Dental Association, to induce dentists to engage in original research.

The mechanical execution of the book, especially that of the new illustrations, is excellent, though some of the cuts, especially those in the original chapters on the anatomy of the individual teeth, would bear freshening up.

How to Collect a Doctor Bill. By Frank P. Davis, M.D., Secretary Oklahoma State Board of Medical Examiners, 1908–11; Superintendent Oklahoma State Institution for Feeble Minded, 1910–11, etc. 93 pages and index. Price $1.00. Enid, Okla.: Frank P. Davis, 1913.

A great deal has lately been said and written about the business side of dentistry, so much so that in some quarters the consideration of the theoretical requirements of dental practice proper has been unduly neglected, and the dentist's profession has been discussed in much the same way as a horse deal or a gold-mining enterprise. There is no doubt that the average professional man needs to study more intimately the business side of life, and this little book, though it was written mainly for the medical profession, applies equally as well to the dentist. The topics discussed, such as attitude toward debtors, proper time to collect, books and bookkeeping, letters and forms, statutes of limitations, and exemption laws and their application, are treated briefly and to the point, without the verbose, tiresome prolificacy usually encountered in discussions of this subject. The extracts from exemption laws as valid in every state of the Union is a specially valuable feature. If the methods advised in these pages will aid every reader to collect over ninety per cent. of his accounts, as the author claims them to have done for him, the purchase of this book will be a first-class investment.

Kulturgeschichte der Zahnheilkunde in Einzeldarstellungen. Herausgegeben von Curt Proskauer. (I) Der Zahnstocher und Seine Geschicte. Eine Kulturgeschichtlich - Kunstgewerbliche Studie. [Cultural History of Dentistry in Monographs. Edited by C. P. Proskauer. (I) The Tooth-pick and Its History. A Study in Cultural History and Applied Art.] By Dr. Hans Sachs. With 86 illustrations and one colored plate. Pp. 52. Berlin: H. Meusser. Subscription price *M*. 5.00 and 6.00. Single copy *M*. 6.00 and 7.00.

Since the National Dental Association published Dr. V. Guerini's History of Dentistry in 1909, the interest in the past of our profession, which theretofore was confined to a very small circle of dental bibliophiles, has been considerably enlivened in this country, and a great many interesting facts regarding the beginnings of dental practice in America have been brought to light. This is not surprising, for every progressive science has the desire to establish its historical foundations, and to contribute to this end is the aim of the present series of monographs on the cultural history of dentistry. The first monograph that has so far appeared, from the pen of Dr. Hans Sachs, certainly makes him who finds recreation in cultural history, art, and applied art anxious for the promised forthcoming issues on such subjects as "The Legend of Sainte Apollonia," "The Dentist in Art," "The History of Extracting Instruments," etc. The wealth of information regarding such an apparently prosaic instrument as the tooth-pick as offered by Dr. Sachs, who has traced its origin from the ancient and through its various metamorphoses to our own times, is as surprising as pleasing, and the liberal offer of high-class art illustrations, which have been culled from heretofore inaccessible private collections as well as large and small art museums all over Europe, will surely endear this genuine work of art to the reader. The principle expressed that—"Pictures are the most ideal competitors with words; the more pictures, the more easily art can save words; at all times pictures have been preferred to text, images to ideas"—will make this book valuable and enjoyable even to those who are not well versed in the German language, and if left for the patient's casual perusal in the waiting room, it will favorably reflect upon the owner's good taste. As for the excellence displayed in the art of reproduction, it is no exaggeration to say that the loose, colored plate alone—"The Tooth-pick Seller"—by Smith-Knight, is worth the price of this handsome book.

R. H. R.

Review of Current Dental Literature.

[*Oesterreichische Zeitschrift fuer Stomatologie*, Vienna, No. 4, 1913.]

HOW SHOULD ROOT-CANALS BE FILLED? By Dr. A. Mueller, Vienna.

Mueller makes the following demands upon a good material for root-canal fillings: It must be as nearly permanently antiseptic as possible; it should harden but little, so that it can always be easily removed from the canal if subsequent treatment should become necessary; it should act as a dehydrater, styptic, and mummifier upon the pulp remnants, and should absorb any secretions entering through the apical foramen; it should allow of easy introduction into the narrowest root-canals; it must not produce any discoloration of the tooth; it must not produce mechanical or chemical irritation of the pulp remnants or the pericementum; if forced out through the apical foramen, or into the antrum of Highmore, a fistulous tract, or into an abscess sac, it must not produce any irritation; it must not develop any notable amount of vapors or gases; it must not have a disagreeable odor or taste; it must not decompose in the air; it must be of such consistence that it can be applied without coming in contact with the fingers; it must be applicable in a root-canal that contains a broken broach which cannot be removed. All these requirements can be fulfilled only by an antiseptic soft paste which can be introduced under pressure into the root-canals. The paste employed by the author is of the following consistence: Xeroform 5.0; zinc oxid 15.0; glycerin enough to make a soft paste; thirty minims of concentrated carbolic acid. The root-canals are enlarged at their entrance by a suitable bur, and the paste is gently inserted with a syringe, all excess to be removed by cotton pellets, and the root-canal entrance to be closed with a sterilized asbestos disk. If desirable, especially after gangrene of the pulp, a small crystal of thymol may be pressed into the paste at the canal entrance.

The writer employs paraffin to which 30

per cent. iodoform has been admixed only in root-canals of teeth the apex of which is to be resected, also in perforated canals, and as a capping material for exposed pulps that have not been injured so as to produce hemorrhage.

[*New York Medical Journal*, New York, March 8, 1913.]

TEETHING AS A CAUSE OF DISEASE IN INFANCY. By Dr. Charles Herrman, New York.

Notwithstanding the remarkable progress that has been made in the science of medicine during the last fifty years, certain traditional beliefs remain as deeply rooted as ever. Not the least noteworthy is the important rôle which teething is supposed to play in the etiology of the diseases of infancy. As Holt says—"The physician who starts out with the idea that in infants dentition may produce all symptoms, usually gets no further than this in his etiological investigations."

The present views with regard to teething are three: First, there are those who believe that very many disturbances may be due to teething; second, those who believe that none are due to teething; and third, those who take a middle course, believing that a few disturbances may be caused by teething. To the first group belong a large part of the laity and some physicians. In a recent paper, Neumann has shown in graphic form that in Berlin, from 1877 to 1910, the number of certificates giving teething as a cause of death in infants has diminished from fourteen to three per 1000. The number of certificates giving teething as a cause of death is an index of the intelligence of the physicians, their knowledge of pediatrics being in inverse proportion to the number of such certificates submitted.

The chief danger in believing that many disturbances are due to teething lies in the fact that valuable time may be lost. For example, in cases of acute gastro-enteritis, the disease, falsely attributed to teething, is allowed to progress, and when the child is dangerously ill, possibly beyond all medical help, it is brought for treatment.

The second view is that "teething produces nothing but teeth," that the eruption of the teeth is a physiological process similar to the growth of hair and nails. This view, expressed by Politzer and Fleischmann forty years ago, and more recently by Kassowitz and others, is not incompatible in a somewhat modified form with the third view. So, modified, it would read, teething produces nothing but teeth in normal, healthy infants. In such individuals the hair and nails are of normal appearance; but just as in certain constitutional diseases, such as syphilis and cretinism, these parts may show changes, so in infants with certain constitutional peculiarities the eruption of teeth may be sometimes associated with certain disturbances. The fact that an infant has such disturbances may be considered a proof that it is not normal.

It must be remembered that during the period of dentition many other changes are taking place; it is a time of rapid development of nearly all the structures of the organism. In this connection it is noteworthy that the manifestations of the exudative and spasmophilic diathesis, called "Zahnpocken" and "Zahnkrämpfe" by the Germans, have a tendency to diminish or disappear as the child grows older. "Outgrowing a disease" is not merely a phrase; in these conditions it actually takes place.

Many of the symptoms attributed to teething are met with in the early months, before the eruption of teeth has begun. Many mothers consider an increased flow of saliva and putting the fingers in the mouth indications of the onset of teething, but countless babies can be observed in which both these symptoms are present quite independently of dentition. The eruption of the permanent teeth is occasionally attended with some disturbance, but how often would one attribute a skin eruption, a diarrhea, or a convulsion in an older child to teething? At a time when teething was considered the cause of a number of infantile disorders, the gums were frequently lanced. Why has this operation been so largely given up? Obviously because it did not meet the indications. It is still done occasionally, and probably often, just as is the cutting of the frenum of the tongue, to ease the mind of the mother.

It is admitted that a few slight disturbances may be caused by teething; that requires no emphasizing. What should be emphasized in the writer's opinion is that, in the presence of a disease in an infant, teething should not be diagnosticated as a cause except as a last resort, after every other possible explanation has been excluded.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, January 1913.]

HISTOLOGICAL INVESTIGATIONS ON THE TOOTH GERM IN THE CONGENITALLY SYPHILITIC. BY L. KOEHLER, DARMSTADT.

Referring to the investigations of Cavallaro and Pasini, Koehler explains the origin of Hutchinson's teeth in the following manner: It is possible that the cells engaged in the formation of epithelial tissues are directly injured by the presence of spirochetes. Still the presence of spirochetes does not necessarily mean a luetic degeneration of tissues, since, apparently, an accumulation of spirochetes is necessary to produce a tissue reaction, the spirochetes being able to exist in rather innocuous symbiosis with tissue cells. On the other hand, the correlation of spirochetes with the parathyroid glands may influence the faulty formation of enamel, since it has been possible to prove the existence of spirochetes in otherwise normal parathyroid glands. While rejecting Pasini's view of a purely local influence of the spirochetes, Koehler assumes that the constitutional effect of syphilis and the toxins formed by the spirochetes produce a general injury to the tissues which is characteristically reflected in the dental tissues.

[*American Journal of the Medical Sciences*, Philadelphia, June 1913.]

A STUDY OF CASES OF ACTINOMYCOSIS. BY F. E. MCKENTY, MONTREAL.

From a study of the clinical histories and subsequent course of the cases of actinomycosis in the Royal Victoria Hospital of Montreal, during the past twelve years, McKenty concludes that this disease is more common than is generally believed, especially in rural communities. It is frequently mistaken for tuberculosis or a newgrowth. There are certain characteristics about the cases from each locality which lead to suspicion of the nature of the disease. The usual situations are the jaw, cheek, appendix, and cecum, with thoracic involvement. Infection cannot occur without a lesion in the skin or mucous membrane. Jaw cases are more frequent in the fall of the year, abdominal and thoracic cases in winter and spring. The onset is often acute. Abdominal actinomycosis shows peculiar liability to fistula formation and tendency to heal at the site of the initial lesion, appearing elsewhere. Abdominal and thoracic forms show high mortality, while in skin and jaw cases the prognosis is satisfactory. Excision is the best method of treatment where possible; otherwise, free incision, curetting, washing with weak iodin solution, packing with iodoform gauze, associated with large doses of potassium iodid internally, should be adopted. The relation between cattle and human actinomycosis is closer than that between human and bovine tuberculosis.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, January 1913.]

ROOT SECTION, AN OPERATIVE METHOD FOR THE REMOVAL OF BROKEN INSTRUMENTS FROM ROOT-CANALS. BY E. SCHUSTER, LEIPZIG.

Recognizing the difficulties of removing the fragment of an instrument from a root-canal—especially if it has become embedded in the apical third—and the inadequacy of the generally advised means for removal, Schuster recommends section of the root, guided by the aim of saving as much tooth structure as possible and impairing the function of the tooth as little as possible. His method of operation consists in turning over a flap of mucous membrane under local anesthesia, and making a window-like opening in the alveolus with the aid of a fine, sharp chisel, the location of this opening to be determined by the X-ray picture. The root thus exposed is opened in its long axis with a fine rosehead bur, the embedded instrument is quickly exposed to view, and pushed out in the direction of the pulp chamber with stout, curved sounds. In order to avoid an oversight or swallowing of the broken instrument, a pellet of cotton has been previously introduced into the pulp chamber in order to engage the fragment upon removal. The incision in the root is then filled with tin-gold or amalgam, the lumen of the canal being preserved by a sound previously introduced into the canal. If the canal has been opened up to the apical foramen, this sound is superfluous, as an hermetic sealing of the canal is desirable. The field of operation is carefully cleansed and sterilized, and the wound in the mucous membrane closed by a suture. This operation is, of course, most favorably indicated in single-rooted teeth. It has the advantage over resection of the root apex as recommended by Williger (see DENTAL COSMOS, November 1912, p. 1289) that the amount of injury inflicted upon the tooth is very small, a slit of 1 mm. breadth being sufficient, and that a very small portion only of alveolar bone need be removed, since the broken instrument is removed by way of the pulp chamber.

[*Le Laboratoire et le Progrès Dentaire*, Paris, March 9, and June 1, 1913.]

THE USES OF RADIUM IN DENTISTRY. BY H. LÉGER-DOREZ.

THE TREATMENT OF PYORRHEA ALVEOLARIS WITH RADIUM. BY PROF. DR. WARNEKROS.

[*Oesterreichisch-Ungarische Vierteljahrsschrift fuer Zahnheilkunde*, Vienna, January 1913.]

THE TREATMENT OF ORAL DISEASES, ESPECIALLY OF PYORRHEA ALVEOLARIS, WITH RADIUM. BY DR. F. TRAUNER, GRAZ.

Despite the difficulties connected with the employment of radium in therapeutics, chief of which is its exorbitant price, a great many experiments have been carried out in an effort to determine its efficiency in dental disease. Léger-Dorez employs an applicator, invented by Danlos in 1905, which consists of a small metal plate, of five square centimeter surface, that bears the radium salts—composed of one centigram of sulfate of pure radium mixed with three centigrams of barium sulfate—and is covered by a coat of specially prepared varnish or rubber sheets to exclude moisture. This applicator develops 50,000 units per 0.04 centimeter square, and is applied to the mouth, the palate, or the lips for about one-half hour. Radium treatment is particularly effective in pulpitis following a filling operation, in reducing the sensitiveness of carious dentin at the neck of a tooth, and in congestion of the gums due to trauma or infection. Artificial dentures which have caused pain by pressure can be tolerated after one application, epulis and benign tumors are favorably influenced, and incipient pyorrhea is radically cured by radium radiation, while in long-standing pyorrhea the mucous membranes are restored to health, and hypersensitive teeth can be scaled without trouble. Léger-Dorez cites ten cases of incipient and fairly advanced cases of pyorrhea alveolaris in which radium brought about a complete cure.

Warnekros, following Trauner's example, recommends radio-active water for rinsing purposes as an effective means for curing pyorrhea alveolaris and preventing dental caries to a great extent. Root-abscess yields to massage with radio-active cocoa-butter pluglets, as the radiograph has proved conclusively. Warnekros also describes an apparatus for the emanation of radium gas, by the means of which this gas can be introduced directly into the root-canal of a tooth, into inaccessible cavities, and areas of suppuration. He advises for his patients the purchase of a radium apparatus which will charge water with the emanations of radium, and ascribes great prophylactic value to the habitual use of this rinsing-water. In pyorrhea patients it is necessary, of course, to have all tartar thoroughly removed, for only then can a complete cure be effected. Radioactive water can also be used for the cleansing of tooth-brushes, sponges, and artificial dentures.

Trauner reports very good success from radium treatment, which he employs in much the same way as Warnekros. He finds that odontalgia, fetor, and suppurations are cured in a remarkably short time. Gingival pockets heal readily, the gums receding only to a small extent, and the formation of tartar seems to be retarded. If concentrated solutions of the rinsing-water are employed, a venous hyperemia of the gingivæ and intermittent hypersensitivity of the teeth are noted in some patients. Trauner warns against too optimistic expectations from radium treatment, which will not regenerate lost tissue or take the place of surgical or other measures, such as the establishment of drainage for pus, or orthodontic procedures in pyorrhea caused by malocclusion.

[*Correspondenz-Blatt fuer Zahnaerzte*, Berlin, April 1913.]

DENTAL CONDITIONS IN NORTH AMERICA. BY DR. K. COHN, BERLIN.

Cohn describes his impressions received during the visit to the United States of the German Association for Medical Study Travel last summer, in which a number of representative practitioners and teachers of dentistry took part. While medicine has been imported from Europe to America, this country is the cradle of dental practice and science, and it is interesting to note how the writer, though sincerely admiring American dental institutions, believes that in some respects the children have outgrown the foster-mother. In regard to preliminary education, he notes a certain laxity, especially a regrettable ignorance of the classic languages. He believes that the practice of obliging men to attend a prescribed annual course of studies is incompatible with the idea of academic freedom that governs German universities, and is detrimental to the development of character and self-reliance in the student. The lack of reciprocity in the license to practice dentistry in the various states is criticized as provincial, undignified, and detrimental to a uniformally high professional standard. The great number of demonstrators in the various institutions is recommended on the one hand; on the other, however, the fear is expressed that the instruction suffers in uniformity. As an illustration, the acknowledged inefficiency of orthodontic treatment is cited, the instructor in orthodontia in one of the leading colleges being alleged to have confessed to the writer that hardly two per cent. of the students have any knowledge of orthodontia upon graduation. The lack of knowledge in the field of local anesthesia, of the surgical treatment of pericemental abscess, or surgical prosthesis, and of X-ray work comes in for a large share of censure. The prevalence of the practice of general anesthesia—usually nitrous oxid and oxygen anesthesia—does not meet with the author's approval, and the lack of interest for surgical prosthesis in cases of fractures and deformities, and for the making of obturators with a view to esthetics and phonetics, appears as startling to the writer as the lack of X-ray apparatus or of efficient appliances for the sterilization of dental instruments in most of the dental schools. These impressions are summarized in the rather left-handed compliment that "If we had come to America twenty-five years ago, before we had our institutions in Germany, the American schools would have made a wonderful impression upon us."

Cohn admires the loyalty of the American patient to his dentist, the practical arrangement of dental offices, and the absence of advertising by ethical practitioners. In regard to the manufacture of dental supplies, he remarks that within the last twenty-five years enormous steps in advance have been made in Germany, so that in a short time the German dentist will no longer be dependent upon the American market. The efforts at public oral hygiene, notwithstanding the Forsyth foundation, seem to be still rudimentary as compared with the institutions established for this purpose in even very small German communities.

All in all, this report is most instructive to the critical and progressive American dentist who is willing to profit from the way in which "others see us," all the more so since the sting of criticism is mitigated by a most charming acknowledgment of the courtesies and hospitality bestowed upon our German colleagues during their sojourn here by federal and municipal authorities, universities, schools, physicians, dentists, and dental dealers and manufacturers.

[*Sud-Est Dentaire*, Marseilles, January 1913.]

A METHOD OF ANESTHESIA OF THE PULP AND DENTIN IN UPPER INCISORS AND CANINES BY TOPICAL APPLICATIONS IN THE NASAL FOSSA. By Th. Raynal.

Rhinologists have often observed that local anesthesia produced for the purpose of nasal operations establishes simultaneous anesthesia of the upper teeth. Profiting from this observation, Raynal deposits on the floor of the nose on the side where the dental operation is to take place a pellet of cotton saturated with the following solution: Cocain hydrochlorid, 1 gram; 60 per cent. alcohol 2 gram; sodium bicarbonate 1 gram; salol 0.05 centigram; freshly boiled distilled water 8 gram. This is allowed to remain from five to ten minutes, when a second application is made, the cotton this time being saturated with the following solution: Menthol crystals, stovain, carbolic acid, āā enough to make 5 centigram; cocain hydrochlorid 0.25 centigram; pure adrenalin 5 milligram. Care is to be exercised in this second application not to use too much of the mixture, as any excess flowing down into the throat produces disagreeable effects. For this reason, the patient's head is inclined forward as in taking a plaster impression. After from five to ten minutes an anesthesia is obtained sufficient for the proper excavation of a sensitive cavity or the extirpation of a pulp. It is important not to introduce the tampon too deeply into the nose, owing to the situation of the anterior superior dental nerve. The patient notices a peculiar sensation of dilatation of the nasal fossa which, however, wears off after a few hours. The author prefers this method to hypodermic injections, but considers it as being contraindicated in highly nervous and asthmatic patients.

Periscope.

Atropin to Relieve Iodism.—Atropin will relieve the symptoms of iodism in a remarkable expeditious manner.—*St. Louis Med. Review*, per *Amer. Journ. Clin. Medicine.*

Removing Plaster from a Denture.—The last particles of plaster which may adhere to the unpolished surface of a vulcanite plate can be entirely removed without any difficulty by placing the plate, when polished, into a solution of lysol. The stronger the solution, the less time required for removal of the last trace.—*Edwards Dental Quarterly.*

Avoiding the Splitting of a Root in Removing a Post.—In removing a post from a root with a post-puller, a piece of German silver is cut to fit over the end of the root and punctured, and the post is allowed to pass through and then removed. This eliminates the possibility of splitting the root in case the end should be uneven.—E. T. Tinker, *Dental Review.*

Postanesthetic Accidents from Chloroform.—Nicloux and Fourquier, after extensive experimentation on animals, have decided that postanesthetic accidents from chloroform are due to profound diminution in the alkalinity of the blood and rapid subtraction of its mineral constituents. Administration of sodium bicarbonate gave negative results, but the authors think they are on the right track.—*Presse Médicale* per *N. Y. Med. Journal.*

An Aid in Burnishing Platinum Matrices for Porcelain Inlays.—In burnishing a matrix for a porcelain inlay cavity, when it is difficult to prevent the platinum from shifting, one part is burnished thoroughly, and slightly warmed temporary stopping is forced into that part of the cavity. This holds the matrix firmly in place and permits the completion of the burnishing without any distortion.—E. S. Best, *Dental Review.*

Holder for Polishing Gold Shell Crowns.—Many crowns are bent out of shape in polishing because they cannot be held firmly. An ordinary clothespin may be used to advantage by pressing the two beaks together and slipping on the crown. The beaks are convex, and conform with the walls of the crown, and serve as an excellent holder. One may have to sharpen the beaks to fit small crowns.—F. F. Schwartz, *Dental Review.*

A Simple Method of Polishing Instruments.—Strips of emery and rouge cloth of the finer grades, one and one-half inch wide, folded once lengthwise, and held securely with one end in a small vise or a close-fitting workbench drawer, provide one of the best means for quickly and effectively polishing all kinds of instruments. A stroke similar to that employed in stropping a razor is used, at the same time turning the instrument between the thumb and finger. These strips last a long time, and improve with use.—G. A. Bowman, *Pacific Dental Gazette.*

Protecting the Skin from X Rays.—Silk fabric impregnated with certain lead salts is impervious to X rays, and may be used to protect portions of the body of the subject or of the operator from the untoward effects of the rays. Silk treated with lead phospho-stannate and other salts contained 68 per cent. of mineral matter, including 34 per cent. of lead oxid, 24 per cent. of tin oxid, 8 per cent. of phosphoric anhydrid, and 2 per cent. of quicklime and other alkalies. Slight discharges of X rays were particularly arrested by two layers of this fabric, while six layers were found ample to protect the skin against the action of an ordinary discharge of medium strength. This fabric had the same protective effect as a sheet of copper 0.044 mm. thick, with the advantage of flexibility even when used in several layers.—*Knowledge* per *Dental Scrap Book.*

Chronology of the Eruption of the Deciduous Teeth.—After examining over 1200 children, Dr. Pont suggests the following chronology for the eruption of the deciduous teeth, which is fairly accurate and easy to remember: Lower central incisors, 8th month; upper central incisors, 10th month; lower lateral incisors, 12th month; upper lateral incisors, 14th month; lower first molars, 16th month; upper first molars, 18th month; lower canines, 20th month; upper canines, 22d month; upper second molars, 24th month; lower second molars, 26th month.—*Le Laboratoire et le Progrès Dentaire.*

Porcelain Molar Crowns.—The root is prepared in the same way as for a Davis or a Logan crown, at least two of the root-canals are enlarged, an S. S. White counter-sunk tooth is ground to fit approximately the end of the root, the pins having been removed, leaving room for a cast base. After fitting the posts, an impression of the root is taken in inlay wax, using the crown to force the wax to place. All surplus wax is carved off, the crown removed, and the wax, with pins attached, invested and cast. The crown is cemented to the finished casting, and a very naturally appearing crown is obtained.—C. L. Haywood, *Dental Summary.*

Cementation of Inlays.—Great care should be exercised in the cementation of inlays. Many inlays are failures because of the fact that the operator used a cement totally unfit for this purpose. The cement should have very fine granules, for there are some cements on the market the granules of which measure about 0.05 of an inch. If, however, a cement of proper consistence is used, and a portion of the cement is smeared in the cavity as well as on the inlay, and the inlay pressed in and held firmly, the margins being thoroughly burnished with a smooth burnisher during the hardening process, we can expect to produce an inlay that is ideal. —T. P. Hinman, *Journal of Allied Societies.*

Setting of Porcelain Crowns or Inlays.—In the setting of porcelain crowns or inlays an assistant should, whenever possible, mix the cement and apply it to the inlay or crown to be inserted, while the operator is drying the tooth or root and covering all of its surfaces with the cement, so that, when the cement is right, no delay or chance of interference by moisture or air-spaces may occur. The patient, too, should be required to remain in position until a sample of the cement that has been retained is completely set. Attention to detail is requisite in porcelain work, and the operator must be prepared to exercise it to the utmost—and he will find himself well repaid for his efforts.—J. J. Moffitt, *Dental Brief.*

Hydrogen Dioxid in Local Anesthesia for Dental Work.—G. Mahé and P. Vanel report the results obtained with an anesthetic mixture consisting of equal parts of five volume hydrogen dioxid solution and one per cent. cocain or four per cent. novocain solution. The chief advantage of such mixtures is avoidance of the untoward effects of epinephrin, while the bloodless operative field and increased anesthetic power of cocain or novocain effected by epinephrin are nevertheless retained. The injections should be made superficially and slowly, with a tepid solution, and stopped as soon as the tissues become pale. The solutions referred to are especially indicated for the extraction of teeth in nervous individuals, children, old persons, diabetics, and pregnant women.—*Presse Médicale* per *N. Y. Med. Journal.*

Bridge Attachment.—If, in posterior bridges, the teeth to be used as abutments are so far out of the parallel as to make construction of the bridge in the ordinary way impossible, a hook is cast to the posterior crown, the upper or bent portion of the hook being set parallel with the anterior abutment. The hook is made with rectangular sides, which converge slightly from below upward. This hook is used as the posterior abutment, being made to lock accurately into the casting which supports Steele's facings, and is attached to the anterior crown. In mounting, the posterior crown with attachment is first cemented into position, the other portion of the bridge being immediately afterward temporarily pressed into position, to insure correct assemblage of the parts. Finally, the anterior portion is firmly cemented to the anterior abutment, and also to the attachment on the molar crown.—P. Parker, *New Zealand Dental Journal.*

Sweating Bands.—The band is cut in the same manner as for soldering, edge-to-edge contact—not a lap joint—clean surfaces, and close adaptation being essential. Very little borax is used, and a thin blowpipe flame is applied until a white heat is obtained. The surface of the metal will melt, and the molten metal will run into the joint of the band. At this point great care must be exercised not to burn the band, because brittleness of the band will result, if too much heat is applied. After a little practice, a band can be sweated as easily as soldered. Sweating is far preferable to soldering, for the following reasons: No seams can be detected in the sweated band; a sweated joint is stronger than a soldered one; in bridge work, no solder will be drawn out of the joint of the band in filling-in the dummies; the scrap gold is not contaminated with solder, and can be used for inlay work; a considerable sum is saved on 22-k. solder.—C. S. CUDEN, *Dental Summary.*

Treatment of Vincent's Angina.—T. H. Halstead states that in his experience the best results were obtained by the use of trichloracetic acid in the mild cases of Vincent's angina. He begins by removing the membrane with hydrogen dioxid solution and wiping off with a cotton swab. A ten per cent. solution of cocain hydrochlorid is then used to anesthetize the ulcer, and a few minutes later the trichloracetic acid is applied. Three or four applications, at intervals of two or three days, are sufficient; in fact, sometimes but one is required. Tincture of iodin is preferable to the acid in the presence of extensive ulceration. An important feature in the treatment is that the general condition of the patient must be improved. The teeth must, in particular, be cared for, as no progress can be expected while caries and the accompanying ulcerations are allowed to remain.—*Lancet-Clinic* per *N. Y. Med. Journal.*

Compensating for the Expansion in Plaster Models.—The inherent tendency of all varieties of plaster is to expand in setting. When confined by the sides of the impression and tray, warpage of the model results, the palatal portion of the latter rising to a slight extent. To obviate this difficulty, the impression is removed as soon as possible after the plaster constituting the model has set. This can usually be done in from ten to fifteen minutes after pouring the impression. Although this method obviates warpage, it does not control expansion, which goes on for twenty-four hours or more. The expansion is compensated for by scraping a shallow, rounded groove around the labial and buccal periphery, and a sloping but definite groove across the disto-palatal portion of the model at the point where the distal margin of the denture will terminate.

Models should be of sufficient thickness to withstand stress exerted in closing the packed flask, viz, they should be usually not less than 8 mm. thick in their thinnest part. —J. H. PROTHERO, *Dental Summary.*

Treatment of Trifacial Neuralgia by Electrolysis.—A. Réthi has obtained excellent results in three obstinate cases of trifacial neuralgia by electrolysis of the infraorbital or supra-orbital nerve. The needle employed, of the thickness of a sewing needle, was covered to within three-quarters to one centimeter of its extremity with a thin layer of insulating material, in order to preserve the skin and deeper healthy tissue from injury. One half-hour before the electrolysis, a subcutaneous injection of 0.01 gram—1.6 grain—of morphin hydrochlorid was given, and fifteen minutes later the skin was asepticized, and a deep injection of morphin into the nerve-canal made in order to insure anesthesia of the nerve. At the expiration of the half-hour, the electrolytic needle, constituting the negative pole, was introduced into the canal, the other electrode, suitably moistened, being applied to the side of the face. A current was then passed, gradually increased to twenty, twenty-five, and thirty milliampères, for a period of fifteen minutes, after which the strength of the current was reduced. The procedure was well borne, and the skin remained quite intact, except for a slight evanescent swelling on the day following.—*Semaine Médicale* per *N. Y. Med. Journal.*

Technique of Root-Amputation.—Having fully determined upon the necessity for a partial root excision—and this presupposes that said root has undergone the proper and necessary preliminary treatment, with a final filling inserted therein—the already established sinus is to be increased in diameter by making a slight lateral incision in opposite directions to the opening, this to be followed with a few packings of gauze, which will usually bring into view very distinctly the end of the root. The amount of tissue to be removed will have some influence in determining as to how it can best be accomplished expeditiously. If only a minute portion of the end of the root is to be removed, it can best be done with a suitably selected stone run by the dental engine; if, however, a greater area is involved, I would first use a diamond-shaped drill, passing it through the root, and succeed this with a fissure bur, cutting both ways until the end is severed from its parent. Final smoothing of the roughened end left by the bur can best be done with a fine Arkansas stone. Thorough flushing of the cavity with a warm, normal salt solution immediately following the operation places the surrounding tissues in a most favorable condition for future recovery. —J. G. REID, *Dental Review.*

Cleanliness of the Cement Slab an Important Factor in Mixing Cements.—The first requisite for a proper mix of cement is a perfectly clean glass slab, from which every trace of cloudiness from previous mixes has been removed. This can best be accomplished by allowing the slab to remain for several hours in water to which a few drops of hydrochloric acid have been added. In order to do this, it will be necessary to have more than one slab, and it will be a great convenience to have a number—say from two to three dozen. These can be used freely, there being always a clean one, and at a convenient time all the used ones can be cleaned at once. I have not found it necessary to use the large, beautiful glass slabs which the demonstrators at clinics use, but cut mine from ordinary window glass. By so doing, expense and bulk need not prevent the dentist from having all the slabs he desires. I keep an acid bath in a glass dish in the laboratory, and from time to time the used slabs are dropped into it, those that have been in the bath being taken out, rinsed and dried, and placed back in the cabinet ready for use.—G. C. Poundstone, *Dental Review.*

Restoring Dry-Cell Batteries.—Numerous methods of restoring to usefulness worn-out dry cells have been given in the semi-scientific journals, especially since the advent of the autocar and autoboat. The idea of restoring an inactive cell, one that has ceased to give out current, is based upon a misunderstanding of the principles underlying the construction of a dry cell. Dry cells, when in good condition, are not dry. The electrolyte is held by an absorbent material, and the cell sealed so that it can be handled freely in any position without leakage. Sometimes the electrolyte is lost by evaporation, the cell becomes "dry," and is then inactive. If when in this condition a new supply of electrolyte is introduced the cell again becomes active, and is said to be "restored," and so it is, to a certain extent. A cell so treated may continue to be useful for an uncertain period, but as its life depends upon the chemical agent whose decomposition supplies the electric energy, and this is not renewed by the treatment, the continued usefulness is a very uncertain quantity. Within the last few years the manufacture of dry cells has been very much improved; they are more reliable, they are better made, and more attention is given to the character and quality of chemicals used. These are now so accurately apportioned in the better grades that standard dry cells have become very much like the famous "one-horse shay"—when they give out they give out all over, and, as they are so inexpensive, they are best restored by installing new ones. Dry cells cannot be recharged like storage cells.—W. H. Trueman, *Pacific Dental Gazette.*

Success and Failure of Vaccine Therapy in Mouth Affections.—Although vaccines are an extremely useful means of treating bacterial disease, and their use in many instances is attended by results not otherwise attainable, yet they are not by any means a universal panacea, and unexpected failures sometimes occur. To what can we attribute these failures?

(1) We must remember that we are endeavoring to induce an active immunity in the patient to the infecting organism, and if we fail to get a vaccine of the correct organism, our attempts to produce this immunity and so cure the patient must also fail; (2) the dose of the vaccine given may be unsuitable, either too small to produce any immunizing response or too large, and with a succession of such large doses no good can result, as instead of producing immunity we are lowering the resisting powers of the patient; (3) although the organism of which the vaccine is made may be correct and the doses admirably adjusted, yet the immune substances in the blood may not properly reach the focus of infection; (4) the patient's tissues may not respond to the stimulus of a correct dose of a suitable vaccine through failure of the immunizing mechanism, and (5) there may be factors of which we are at present completely ignorant.

To get the best results, then, with vaccine therapy, it is essential to have the infecting organism determined as certainly as possible, to have the vaccine carefully and correctly prepared, to give the vaccine in suitable doses at well-adjusted intervals, and finally, to bring the blood and lymph streams rich in immune substances to the focus of infection, where they can come in contact with the bacteria and so aid in overcoming the infection. —Dr. Loveday, *Dental Record.*

Experimental Study of Some Effects of Certain Anesthetics.—The drugs—viz. chloroform, ether, nitrous oxid-oxygen, and cobra venom—used by Yates in his experiments were found capable of instituting degenerative changes in the parenchyma of the heart, liver, and kidney, or of aggravating such changes when already established. These metamorphoses were found to bear a serial relationship of increasing severity from which recovery is not always possible. Anesthetics are regarded by Yates as toxic in their effects, and should, he says, be adminstered with due regard to their most dangerous action as affected by individual conditions. Ideal general anesthesia, pleasant and safe, seems to be impossible until a drug is found which will have a purely selective and benign action on the sensorium. The nearest approach thereto may be the development of methods requiring the minimum of the least injurious drugs (probably the most transitory in action), *i.e.* which will least impair, or may possibly enhance, the efficiency of cardio-vascular, respiratory, or defensive mechanisms.

Discouraging discordant opinions, based on personal experience and clinical observations, and therefore frequently biased, Yates believes, justify the statement that there is no one method of anesthesia, single, combined or sequential, which is so safe as to warrant its invariable application; on the other hand, chloroform may be said to possess no redeeming feature. The observations made by Yates in his series of experiments on unfavorable animals under untoward conditions are in such accord with clinical evidence as to give hope that the experiments now under way, designed to determine the degree of persistence of the lesion caused by drugs and their effects on resistance to infection, may permit of valuable deductions.—*Wisconsin Med. Journal*, per *Journ. Amer. Med. Association.*

Failures With Buckley's Formocresol.—The action of this remedy when sealed in the pulp chamber of a tooth the canal contents of which are putrescent is twofold. On the one hand, it is so powerfully disinfectant that it kills the germs of various kinds which abound there; and on the other, it chemically unites with some of the gases which are byproducts of the putrefactive process, rendering them inert, so that further swelling, pressure, and pain are prevented.

This action is positive and uniform in all cases where a proper technique is observed. This technique begins with the remedy itself, which must be a fairly *fresh* preparation. Formalin is a solution of formaldehyd in water, and like all such solutions, gradually gives off the gas, so that an old mixture of formocresol or even a fresh mixture made up with an old solution of less than 38 per cent. formaldehyd, cannot be expected to give results. This is one cause of failure in the use of this valuable drug, and one easily remedied.

Another cause of failure is neglect to place in the tooth a sufficient quantity of formocresol to produce a prolonged effect upon the bacteria, or enough to supply formaldehyd gas to unite chemically with the gases of putrefaction and render them inert as rapidly as they are formed.

We are frequently confronted with cases where it is impossible to seal in more than the most minute quantity, owing to the great loss of tooth structure. In these cases it is better to resort to solidified formaldehyd. Of this last substance a piece not larger than the head of a brass pin, wrapped in a little cotton, may be gently placed in the mouth of the canal and hermetically sealed and left not longer than twenty-four hours.—C. S. Tuller, *Dental Summary.*

Soldering.—Between hard and soft soldering there is this essential difference: In soft soldering the heat is supplied to the solder; in hard soldering, to do so is to fail. In hard soldering the heat must be applied to the work, otherwise the solder fuses to a ball, and is apt to become slightly oxidized; it then requires skilful management to make a good joint. The tendency is to flow over the joint instead of into it, and while apparently the job is well done, the joint is weak and will give way when subjected to strain. This may be illustrated by taking two pieces of tin plate, joining them together by folding the edges, and lapping them together like the joint down the side of a tin can. Now lay a few fragments of wax along the joint where the two pieces of tin come in contact with each other. Apply heat, and as the wax melts, it will appear to be sucked into the joint as if by capillary attraction, and when hard solder does this, you may be sure that you have an ideal joint. Regarding the matter of heat, insufficient heat is a great cause of a beginner's trouble. What is really required is a surplus of heat, so that you not only get the work hot enough, but get it hot quickly, otherwise oxid forms and makes it almost impossible to get a sound joint. Insufficient heat is a frequent cause of melting or burning the work itself. Strange as it may appear, the more heat you have at your command the less likely is this to happen. It is a small supply of heat which has to be kept up a long time which causes the trouble, as it oxidizes the work and the solder before the solder gets hot enough to run. If you have plenty of heat and do not apply it quickly enough, the same state of affairs sets in, and the work is burned or melted. Burning is a surface fusing accompanied by an oxidation that roughens and weakens the metal. A good soldered joint should be made as doctors speak of a wound healing—"by first intention"—for if you have to start tinkering with it, it generally goes from bad to worse.—*Electrician and Mechanic*, per *Dental Brief.*

Dangers from X Rays to Operators and Patients.—The following may be briefly said to be the danger to which the operator in radiography is exposed: If he will observe strictly the rule to remain behind a lead screen or in a lead cabinet he may work for a period of ten or twelve years in safety. What the dangers of exceeding this time limit are we do not know; perhaps there are none. Perhaps all the older X-ray operators will die of leukemia within the next ten years. Who can say? We are entitled to our opinions, but no one really knows. The pioneers in the work are still in danger; we who follow are comparatively safe.

Though the operator need never expose any part of his body to any except the weak, harmless X rays which fill the room, it is necessary to expose at least that part of the patient being radiographed to the direct rays. The question arises, How long may we expose the patient with perfect safety without any danger whatever of producing acute dermatitis? Authorities are very reluctant to set this time limit.

The very few cases of serious acute dermatitis due to exposure for radiographic work occurred when the outfits used were so small that the time of exposure reached thirty minutes and longer. Compare such exposures with those of today, which range from a fraction of a second to only one minute at most, even with the small suitcase outfits, and the improbability of producing dermatitis will be appreciated.

The first rule regarding the exposure of patients should be—Never expose the patient longer than absolutely necessary. Even with the smallest apparatus, and where a number of exposures are necessary, the aggregate time of exposure need not and should not exceed two minutes. If it is necessary to use this full time, two minutes in one day, then do not expose the same part of the same patient for a week or ten days. Give the skin a chance to recover from any change produced in it, and so guard against a cumulative effect of the X rays. I cannot imagine a case in dental radiography which would require an exposure longer than two minutes. And seldom, indeed, will it be found necessary to expose the patient, even in the aggregate, when several radiographs are made, as long as the time limit set.

Two minutes is a conservative limit—in fact, a five-minute exposure would in all probability prove harmless—but keeping inside of it, we may have the assurance that, except in a case of most extraordinary susceptibility, amounting to positive idiosyncrasy, nothing more than a very slight acute dermatitis, no worse in its effect on the health and happiness of the patient than a mild case of sunburn, could possibly occur. And even this slight acute dermatitis is so extremely unlikely to occur that the careful operator need not expect it. Thus, so far as the patient is concerned, X rays are perfectly harmless, if the operator is careful. The danger to patients from infection by instruments is infinitely greater than the danger from the sensible use of the X rays for radiographic purposes. In the early days of the X rays there was a tendency to attribute X-ray burns, not to the rays themselves, but to some accompanying factor, the exclusion of which would prevent the occurrence of X-ray burns. Thus it was suggested that burns were due to an electrical condition surrounding the tube; to chemical conditions surrounding the tube; to bacteria being carried into the tissues by the X rays; to violet rays, and so on. It is generally conceded today, however, that X-ray burns are the result of a specific action of the X rays themselves on the tissues.—H. R. Roper, *Items of Interest.*

Hints, Queries, and Comments.

IS THERE METABOLISM IN HUMAN DENTIN?

The question whether any metabolic changes take place in human dentin after the tooth is completely formed has for a long time been discussed, and opinions are still greatly divided. Charles Tomes, in his "Manual of Dental Anatomy," says: "In the hard or unvascular dentin, some degree of nutrition is perhaps provided for by the penetration of the whole thickness of the tissue by protoplasmic fibers, the dentinal fibers." Other authorities speak as vaguely about this subject. While some investigators, particularly in America, deny the presence of any metabolism in the completely formed dentin, others as decidedly assume its presence, without giving any conclusive proofs of their hypothesis. The following case that came to my knowledge proves, in my opinion, that a very active metabolism may take place in dentin:

Mr. K., 52 years of age, a healthy man of a strong constitution, slipped two years ago in the street and fell headlong on his face, so that his chin and nose were bruised and bleeding. The four upper incisors were very painful and a little loose. On closer inspection, a few days after the accident, the central incisors displayed reddish spots, which covered almost half of the labial surface and were darkest in the center. The right lateral incisor exhibited the same aspect, only the red spot was smaller. I advised the patient to have the pulps of these four teeth removed and the teeth bleached and properly treated, warning him that the pulps of these four teeth would die, which would give rise to further complications, while the teeth themselves would become still darker. The patient feared that the proposed treatment would cause him great pain, and refused to submit to it, and on his own account painted his gums with tincture of iodin.

My prognosis was partly realized afterward. For some weeks the patient had severe pain in those four incisors, which finally wore off. The reddish spots on the two central and the right lateral incisors had become dark blue, and had almost the color of a so-called blood-blister. Once more I advised the patient to have these teeth properly treated, but without any success. For some time, I did not hear any more about this case.

The patient later communicated to me that those discolored teeth had become white again, which I at first would not believe, but a single look at his teeth convinced me that his assurance was true. On my request, the patient allowed me to ascertain by the aid of the electric current that the pulps of the affected teeth had retained their full vitality. I also noted that the spots which had been dark blue were still faintly distinguished from the rest of the tooth by a yellowish, hardly perceptible tint.

Now, four years later, the sound teeth are still in the same good condition, and the pulps react normally.

It is evident that we have here an extravasation of blood which had penetrated the dentin, was decomposed, and almost entirely resorbed again after some time. In my opinion this case is not to be explained in any other way than by acknowledging the presence of a fairly active metabolism in the dentin.

ALEX MERTENS.

The Hague, Holland.

ELECTRIC DEVICE FOR WORKING MODELING COMPOUND.

MODELING compound is of very great value to the dentist, especially to the specialist in orthodontia. Owing to the prevalent very crude methods of manipulating this material, however, poor results are often obtained. In most cases the compound has been worked either too hot or too cold, and the bad results that most dentists have obtained are entirely due to faulty manipulation.

As an example, the S. S. White modeling compound may be cited. The directions say: Bring the water to the boiling-point, set it off the fire, place the compound in the water, soften, and use immediately. I have proved to my own satisfaction that the S. S. White compound can be worked very much better if put in water that is just tepid, and allowing it to remain until the water is heated to 170°.

The directions for Kerr compound, to cite another example, are very misleading. It is stated: Place the compound in water as hot as the hand can bear. As there is a difference of at least ten degrees in the amount of heat which the hands of different individuals can tolerate, it is readily seen that the temperature one hand can bear would be excessive for a compound, while another individual would underheat it. It has been my experience that the Kerr compound works best at 145°.

The directions given for the Consolidated modeling composition are about the same as those accompanying the Kerr compound. I have found that it works best at 150°.

The electric water-heater, illustrated in Fig. 1, can be purchased in any electric supply shop for $3.50. The appliance for holding the thermometer (see Fig. 2) in the heater can be made by any dentist who has had any experience in bending Jackson wires. The holder, illustrated in Fig. 3, with the desired quantity of compound, which is prevented from adhering to the holder by a piece of cheesecloth laid in it, is placed into the heater, which is filled with water at a temperature of about 60°. The current is then turned on, and the temperature of the water is raised to the point best adapted for manipulating the brand of compound used. If a temperature of 150° is required, the current should be turned off when the thermometer registers 140°, as it will be found that the heat will rise ten degrees higher than the point at which the current was turned off, and the water will remain at that temperature for about five minutes.

FIG. 1.

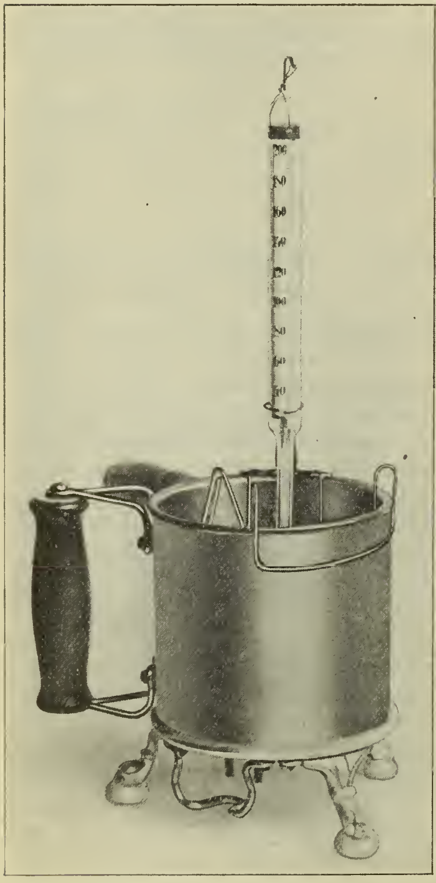


FIG. 2.

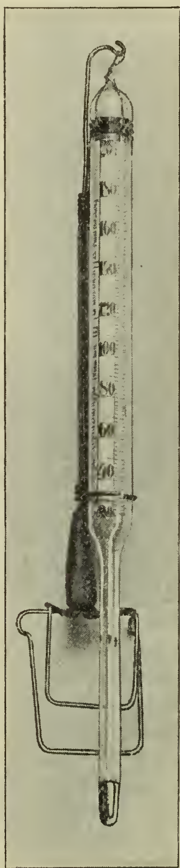
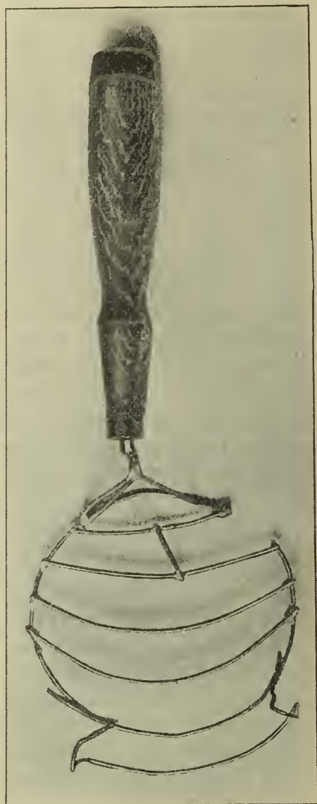


FIG. 3.



This whole outfit is very inexpensive, and will appeal to those who are striving to obtain the best results possible with modeling composition.

H. M. BECK, D.D.S.

Wilkes-Barre, Pa.

Obituary.

Brief Necrology.

Dr. John C. Wilson of Wichita, Kans., on May 18, 1913.

Dr. Arthur W. Minaker of San Francisco, Cal., on April 25, 1913.

Dr. Robert Burns Gibbs of Harrodsburg, Ky., on June 2, 1912, in his seventy-fourth year. Deceased was a veteran of the civil war.

Dr. Robert McKissik of Philadelphia, Pa., on June 8, 1913. Deceased was a graduate of the Pennsylvania College of Dental Surgery.

Dr. William A. McGiffin of Pittsburgh, Pa., on May 20, 1913, in his sixty-third year. Deceased was a graduate of the Philadelphia Dental College.

Dr. John Muth of New York, N. Y., on May 31, 1913, in his sixty-fifth year. Deceased was a graduate of the New York College of Dentistry.

Dr. Calvin King of Pittsburgh, Pa., on May 8, 1913, in his eighty-fourth year. Deceased was a graduate of the Ohio College of Dental Surgery.

Dr. Andrew Bailey Fonshill of Baltimore, Md., on May 14, 1913. Deceased was a graduate of the Dental Department of the Baltimore Medical College.

Dr. Frank L. DeGour of Reading, Pa., on June 6, 1913, in his seventy-sixth year. Deceased was a graduate of the Pennsylvania College of Dental Surgery.

Dr. Anthony J. Casey of Niagara Falls, N. Y., on May 20, 1913, of paralysis. Deceased was a graduate of the College of Dental Surgery of the University of Michigan.

Dr. William Brayton Mann of Baltimore, Md., on May 23, 1913, of blood-poisoning and pneumonia, in his fifty-eighh year. Deceased was a graduate of the Maryland Dental College.

Dr. John N. Farrar of New York, N. Y., on June 12, 1913, in his seventy-fourth year. Deceased held the degree of M.D., and was a graduate of the Pennsylvania College of Dental Surgery. He was the author of several papers on dental subjects, especially the correction of irregularities of the teeth.

Dental College Commencements.

NORTH PACIFIC COLLEGE.

The annual commencement exercises of the North Pacific College were held on Wednesday evening, May 21, 1913, in Portland, Oregon.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Elmer D. Allen
Ralph O. Appleby
Addison J. Atwater
Ray L. Bathrick
Oran S. Bartlett
John A. Belfils
Lee H. Bequeaith
T. F. Blakemore
Fred G. Bleeg
Fred G. Bunch
John E. Clanahan
Louis Cooperstein
Charles S. Dent
John B. Dye
Clinton L. Foster
Charles E. Gard
Harritt B. Gehr
Theodore Gottlieb
Howard A. Hale
Seiichi Higashida
Alva J. Howard
Arthur Hudson
Roy N. Hunt
Eugene Isdell
Emil Jantz
Otto E. Kinder
Walter J. Larson
Ira D. Latimer
Harley M. Massey
Arthur G. MacDonald
Leo L. McKenna
Philip T. Meaney
Richard G. Moss
John G. Nash
Carl S. Ogsbury
Ralph E. Ostrom
George J. Petersen
Lucien A. Pickens
Francis Quinn
John T. Ryan
H. Arthur Shaeffer
Wenzel M. Skovgard
William H. Springer
Glenn A. Thomas
Arthur F. Weeks
Roy F. West
Benton S. Woods
Keijiro Yamamoto
Guy E. York

THE THOMAS W. EVANS MUSEUM AND DENTAL INSTITUTE SCHOOL OF DENTISTRY UNIVERSITY OF PENNSYLVANIA.

The annual commencement exercises of The Thomas W. Evans Museum and Dental Institute School of Dentistry University of Pennsylvania were held Wednesday, June 18, 1913, at the Metropolitan Opera House, Philadelphia, Pa.

The degree of Doctor of Dental Surgery was conferred by Edgar F. Smith, Ph.D., Sc.D., LL.D., provost, upon the following candidates:

Julio Aleman .... Panama
Otis A. Allen .... Pennsylvania
Clarence J. Appleget .... New Jersey
Assaad J. Attiah .... Egypt
Antonio E. Baca .... Spain
Alvin J. Bagenstose .... Pennsylvania
Jacob B. Balthaser .... Pennsylvania
John R. Barber .... Iowa
Milton D. Barkann .... New Jersey
Albert G. Barrett .... New York
William C. Bauer .... New York
Abram R. Beekman .... New Jersey
Homer R. Bell .... Pennsylvania
Miguel E. Bestard .... Cuba
Louis Blumberg .... Pennsylvania
Gabriel E. Blumer .... New York
Jerome Boley .... New York
Guy H. Brady .... New York
Jacob M. Brille .... France
Malcolm H. Brinton .... Connecticut
Merritt E. Brown, Jr. .... Vermont
John A. Burns .... Massachusetts
Peter A. Callery .... Pennsylvania
Archie A. Campbell .... Nebraska
Ernest G. Caston .... Maine
Ralph R. Chandler .... Pennsylvania
Justus W. Chatterton .... New York
Harvey N. Chichester .... New York
Robert L. Clement .... Pennsylvania
George A. Coleman .... California
Joseph A. Colman .... Pennsylvania
Israel S. Commins .... New York
Juan B. Costa .... Ecuador
Arthur B. Courtemanche ..... Massachusetts
Earl V. Cross .... Pennsylvania
Andrés D. Cruz .... Porto Rico
Charles M. Cuneo .... New York
Arthur J. Cunningham .... New York
Reuben L. Cutler .... New Jersey
Robert T. Daly .... New York
Harry G. Davenny .... Washington
Theodore A. DeRavin .... Australia
Willard F. Detrick .... New York
Juan J. Diaz .... Panama
Livingston W. Doering ...... Michigan
Hugh L. Donnelly .... Massachusetts
John F. Dunfee .... Pennsylvania
John Ells .... Maine
Henry H. Facteau .... New York
Laurence L. Fagan .... Pennsylvania
Austin L. Finan .... New York
William J. Finan .... New York
Walter A. Fitzsimmons ..... Pennsylvania
Edward A. Flanigan .... Pennsylvania
Eldred L. Fraser .... Scotland
André L. Fuchs .... France
Willhenry Fuller .... New York
Lanson F. Gainsway .... New York
Edwin H. Gale .... New York
Eugène L. Gandouin .... France
Henry M. Garrett .... South Carolina
Harry A. Ginsburg ...... Connecticut
Robert R. Gwydir .... New York
Henry S. Hargreaves .... France
Carleton T. Harris ...... New York
Charles M. Harris ...... Bahamas
Leslie B. Hart .... Australia
Terry M. Hart .... Georgia
Chester T. Hatfield ..... Nebraska
William H. Hatfield .... New York
Stanley N. Holt .... New York
Fred H. Housel .... Pennsylvania
Eric G. Ireland .... England
Miguel W. Jackson ..... Georgia
William J. Kelleher ..... New York
Charles H. Kemball ..... Scotland
Andrew J. Leitch .... Scotland
Gaston L. E. Lemaire ... France
Carl E. Levan . ... Pennsylvania
Harry H. Levine .... Virginia
Kenneth Lindsay .... Nebraska
Rae W. Lockwood .... New Jersey
Frank Lodge .... England
Carl W. Lofland .... Pennsylvania
Clyde R. Long .... Pennsylvania
Herbert C. Lyle .... Pennsylvania
Harry F. McCooey ...... Australia
De Witt K. McDonald ... New York
Harold J. McGinn .... Maine
George E. McMahon ..... England
Andrew MacGowan ...... New Jersey
Raymond S. Martin ..... Pennsylvania
Oscar Mattei .... Porto Rico
Andrew S. Mayers ...... Pennsylvania
Edward C. Melville ...... British West Indies
Henry S. H. Moore ..... Germany
Francis D. Morgan ...... Australia
William R. Morris ...... Australia
John A. O'Connor ...... New York
Roger L. Offen .... Connecticut
Walter O'Keefe .... Massachusetts
Albert J. A. Oossterbaan . Holland
Le Roy Owens .... New York
Horace B. Painter .... Pennsylvania
Raymond W. Pearson ... Pennsylvania
Eiffel A. Perras .... New York
James N. Perry, Jr. ..... Pennsylvania
Benjamin L. Protass .... Connecticut
Francis A. Provot .... New York
Edward A. Puderbaugh .. Pennsylvania
Hazimeh S. Rasi .... Syria
Henry J. Rees .... New York
Leon Reisner .... New Jersey
Otto Reiter .... New Jersey

Lloyd C. Robinson	Vermont
José Rodriguez	Central America
Charles J. Ruddy	New York
Donald W. Rupert	New Jersey
Frank E. Sayre	New York
Frank Seidel	Pennsylvania
Norbert C. Sevin	Missouri
Jacob Sharp	Connecticut
Thomas L. Sinclair	Scotland
Fdwin H. Smith	Pennsylvania
Horacio A. M. Sobral	Central America
Joseph R. Solomons, Jr.	New York
Harold B. Spanier	New York
George E. Staats	New York
Albert F. Steele	Pennsylvania
George K. Stein	Pennsylvania
Montague H. G. Sturridge	British West Indies
Francis W. Traill	Australia
Earl Z. Van Alstyne	New York
Cornelis Verheyden	Holland
Walter E. Vines	New York
Jan Viser	Holland
Robert C. Vreeland	New Jersey
Fred F. Wakerly	New York
Robert Watson	Scotland
Samuel Weiman	Pennsylvania
Edward F. Welch	Massachusetts
Raymond Le R. White	New Jersey
Arthur Field Woolsey	New Jersey
Allan K. Yost	New York
Harry C. Zellers	Pennsylvania

Degree conferred (as of the class of 1912) at University Council, December 13, 1912:

Samuel Bogatin John J. Keogh Charles M. P. Valette

DRAKE UNIVERSITY, COLLEGE OF DENTISTRY.

The annual commencement exercises of Drake University, College of Dentistry, were held on Wednesday, June 11, 1913, in Des Moines, Iowa.

The commencement address was delivered by Dr. Cleo M. Chilton, of St. Joseph, Mo.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Harvey A. Anderson	Iowa
Clyde C. Atkins	Iowa
Ed W. Balbridge	Iowa
Horance S. Beemer	Iowa
Robert G. Carper	Iowa
John F. Dwight	Iowa
John C. Gerche	Iowa
Clem W. Grady	Iowa
Charles H. Henshaw	Iowa
Marion E. Irish	Iowa
Clarence W. Johnson	Iowa
Frank A. Maassen	Iowa
Gordon B. Logan	Iowa
Joseph L. Minor	Iowa
Dow A. Rice	Iowa
Ray H. Stringfellow	Iowa

GEORGE WASHINGTON UNIVERSITY, DENTAL DEPARTMENT.

The ninety-second annual commencement exercises of George Washington University, Dental Department, were held in Memorial Continental Hall, Washington, D. C., on June 11, 1913.

An address to the graduating class was delivered by President Stockton.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Edward C. Alley	Kentucky
Elmer E. Briggs	Pennsylvania
Marie G. Brodsky	Russia
Claude Durfee	Illinois
Nathan Eisenstein	Massachusetts
John S. Hardester	District of Columbia
Carl B. Maphis	Virginia
John P. Marstella	Illinois
Charles W. Rich	Pennsylvania
Walter B. Silliman	Pennsylvania
Henry M. Spillan	New York
George E. White	Massachusetts
Edward Williams	Massachusetts

COLLEGE OF DENTAL AND ORAL SURGERY OF NEW YORK.

The annual commencement exercises of the College of Dental and Oral Surgery of New York were held in the auditorium of the Engineering Societies' building, New York, N. Y., on May 26, 1913.

The valedictorian was Harry H. Manville, D.D.S., and an address was delivered by Rev. Loring W. Batten, Ph.D.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Benjamin F. Adles
Jacob J. Alper
Carl G. Anderson
Israel Appleman
David Baumet
Annette Belivan
Zachary Blum
Louis Brach
Samuel M. Cantor
Stanislaw Chalupski
Samuel Colominsky
Samuel Corne
Frank C. Davis
Walter L. Dyer
Godfrey Eriksen
Cecelia J. Feinstein
Rose E. Finkenthal
Harvey E. Fountaine
Harry A. Gartner
Samuel N. Glasserow
Benjamin A. Greiper
Francis W. Herchenroder
Jacob Hershkowitz
May Jokel
Roy S. Knorr
August E. Kraft
Louis Kushner
Herman Mainwold
Harry H. Manville
Samuel Messinger
Christopher Myer
Paul Nash
Sophie Nevin
Jacob Reiner
Sophie R. Rosenbaum
Bessie Schenkel
Fred H. Schramm
Jacob Schwartz
Etta M. Seelig
Anna D. Shapiro
Max Silver
Benjamin Spanier
Philip R. Sueskind
Fannie S. Turk
Benjamin Vendrovsky
Nicholas W. Vidor
Isaac Wachtel
Adolph M. Weiss
Isidore I. Weitzman
John J. Zapp

MEDICO-CHIRURGICAL COLLEGE, DEPARTMENT OF DENTISTRY.

The annual commencement exercises of the Medico-Chirurgical College, Department of Dentistry, were held in the Academy of Music, Philadelphia, Pa., on June 6, 1913.

An address was delivered by Dr. Edwin E. Sparks, president of State College.

The degree of Doctor of Dental Surgery was conferred by Hon. Henry F. Walton, president of the board of trustees, on the following graduates:

Guadalupe Asenjo, Garcia	Nicaragua
Walter A. Borden, Jr.	Pennsylvania
George F. Clarke	New Brunswick
Morris E. Cohen	New Jersey
John F. J. Collier	Pennsylvania
Leopold G. Delgado	Mexico
George M. Edwards	France
William M. Endlich	Pennsylvania
Thomas A. Feeney	Connecticut
Bertram T. Foulkes	New Jersey
Raymond S. George	New Jersey
Frederick W. Gmeiner	New York
Arturo Godoy	Guatemala
Jacob F. Goldberg	Pennsylvania
Frank I. Greene	Pennsylvania
William A. Hillis	Connecticut
Samuel Kallisk	Pennsylvania
H. Ogle Krause	Pennsylvania
John A. Larkin	Pennsylvania
Leon H. Leikin	New York
John B. McGee	Pennsylvania
J. Lionel Mallas	Pennsylvania
Edward A. Manning	New York
E. Montealegre, Echeverria	Costa Rica
Louis Powell	Pennsylvania
Joseph H. Reichman	Pennsylvania
Richard H. Kiethmüller, Ph.D.	Germany
Joseph L. Ruddy	Pennsylvania
Amado S. Silva	Cuba
Manuel O. Serrano y Leal	Mexico
Morris Schwartz	New York
John W. Scott	Pennsylvania
Jean S. Shachmann	Pennsylvania
R. Walter Starr, Jr.	Pennsylvania
Berton F. Sweeney	New York
Aurelio Valdes de Velasco	Cuba
Morris Volin	Pennsylvania
Markus H. Weiss	Roumania

Society Notes and Announcements.

"F. D. I."

INTERNATIONAL DENTAL FEDERATION.

General Meeting to be held at The Hague, August 27 and 28, 1913.

The next annual meeting of the International Dental Federation will be held at The Hague, Holland, on August 27 and 28, 1913, in conjunction with a union meeting of the Nederlandsch Tandheelkundig Genootschap and Vereeniging van Nederlandsche Tandartsen, the two Holland dental societies.

Hotel Central, Lange Poten, has been selected as the headquarters.

Dr. C. Van DerHoeven,
43 Celebesstraat, The Hague, Holland.

FOURTH INTERNATIONAL CONGRESS ON SCHOOL HYGIENE.

The most important Health conference that has ever been held in this country is the Fourth International Congress on School Hygiene, which will take place in Buffalo, August 25–30, 1913.

This congress will deal with every phase of school hygiene, and will be attended by the leading hygiene and educational people throughout the world. An entire section has been devoted to Mouth Hygiene, with a large amount of floor and wall space set aside for an exhibit dealing with the same subject. The organization of both the literary program and the exhibit has been placed under the supervision of the National Mouth Hygiene Association. This is the greatest opportunity that has ever been accorded the dental profession to present in an effective manner the important relation that mouth hygiene bears to the general hygiene of the body.

To make a showing in keeping with the importance of this subject it is vital that the members of the organized dental profession throughout the country do their duty both as members of the various organizations and as individuals. A few individuals cannot make an impressive showing. It is therefore imperative that, in addition to a literary program and the presentation of an exhibit, a large number of dentists unite with the congress and attend the meeting, thus establishing the dental profession's interest in and right to participate in the hygiene conferences of the world.

An elaborate literary program has been prepared and an extensive exhibit is being arranged, committees having been appointed representing each state in the Union.

W. G. Ebersole, *Ch'man, Div. Mouth Hyg.*,
200 Schofield Bldg., Cleveland, Ohio.

NORTHERN INDIANA DENTAL SOCIETY.

The twenty-fifth annual meeting of the Northern Indiana Dental Society will be held at the great Steel City of Gary, September 23, 24, and 25, 1913.

W. Leroy Myers, *Sec'y*,
Rensselaer, Ind.

WEST VIRGINIA STATE DENTAL SOCIETY.

The seventh annual meeting of the West Virginia State Dental Society will be held in the assembly room of the Chancellor Hotel, Parkersburg, W. Va., August 13, 14, and 15, 1913. Opening session 2 p.m., Wednesday, August 13th. A cordial invitation is extended to all ethical members of the profession to attend our meeting.

Frank L. Wright, *Sec'y*,
Wheeling, W. Va.

EASTERN DENTAL SOCIETY OF PHILADELPHIA.

A joint meeting of the Eastern Dental Society and the Southeast Branch of the Philadelphia County Medical Society was held May 16, 1913, at the Southwark Branch Free Library of Philadelphia. The program was as follows: M. Weiman, "Relation of Medicine to Dentistry." H. Lowenburg, "The Etiologic Influence of Dentition on Diseases of the Early Years of Life." Chas. B. Schupack, "Importance of Preservation of the First Molar." Aaron Brav, "The Dentist and the Oculist." Lewis Fisher, "The Dentist and the Laryngologist." M. K. Fisher, "Dental Radiography." H. B. Shmookler, "Gastric Disturbances Resulting from Dental Caries."

The annual banquet was held May 15, 1913, the following officers being elected for the Eastern Dental Society: R. Freides, president; M. Schechter, vice-president; H. Golden, financial secretary; J. Coltune, recording secretary; Chas. Schupack, treasurer; Louis Jacobs, librarian; M. Weiman, historian.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending June 14, 1913:

First. Lieut. Robert H. Mills, upon arrival in the United States, will proceed to Fort Riley, Kans., for duty.

For the week ending June 21st:

First Lieut. Alden Carpenter left West Point, N. Y., June 14th, on leave of absence for one month and five days.

W. L. Reesman, ACT.D.S., will proceed to Texas City, Texas, and report to the commanding general, Second division, for duty.

First Lieut. Alden Carpenter is detailed to represent the medical department of the army at the seventeenth annual session of the National Dental Association at Kansas City, Mo., July 8 to 11, 1913.

Paragraph 14, Special Orders No. 60, March 14th, War department, is amended to read as follows:

First Lieut. Minot E. Scott is relieved from duty in the Philippine Department, to take effect on or about September 15th, and will then proceed to the United States; upon arrival will report by telegraph to the Adjutant-general of the army for further orders.

For the week ending June 27th:

First Lieut. George H. Casaday, upon arrival in the United States, will proceed to the Letterman General Hospital, Presidio of San Francisco, Cal., for duty.

W. L. Reesman, ACT.D.S., arrived at Texas City, June 22d, for duty with the Sixth Cavalry.

United States Patents

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JUNE 1913.

June 3.

No. 1,063,214, to John T. Rankin. Tooth-brush.

No. 1,063,282, to Charles E. Northrop. Handpiece for dental machine.

No. 1,063,376, to Frederick H. Nies. Process of making porcelain inlays.

No. 1,063,523, to Walter T. Farrar. Tooth-brush.

No. 1,063,650, to Arthur W. Browne. Independent standard for supporting dental engines.

June 10.

No. 1,064,331, to Thomas N. Inglehart. Dental syringe-obtunder.

No. 1,064,404, to William E. Walker. Orthodontist's pliers.

No. 1,064,564, to John W. Tenny. Dental drill-holding device.

No. 1,064,635, to Joseph A. Gardner. Artificial tooth.

June 17.

No. 1,064,963, to Harry C. Dance. Interchangeable flat-back front tooth.

No. 1,065,256, to Hattie C. LaMar. Fountain tooth-brush.

No. 1,065,326, to Harry P. Marshall. Apparatus for making castings.

THE

DENTAL COSMOS.

VOL. LV. SEPTEMBER 1913. No. 9.

ORIGINAL COMMUNICATIONS.

THE RATIONAL TREATMENT OF INFRA-OCCLUSION.

By J. LOWE YOUNG, D.D.S., New York, N. Y.

(Read before the Eastern Association of Graduates of the Angle School of Orthodontia, New York City, April 26, 1913.)

PROBABLY I shall meet with no opposition from the members of this society when I advocate the early treatment of malocclusion of every description. If you agree with this, then I wish to try to impress upon you the necessity of early diagnosis of cases in infra-occlusion.

TERMINOLOGY.

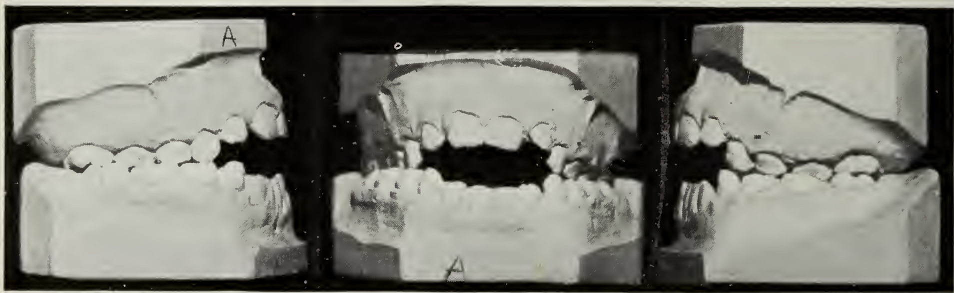
In order that there may be no misunderstanding and wasting of time in a discussion of what constitutes infra-occlusion, I wish to make it very clear what is meant by this term. In the seventh edition of Dr. Angle's book on "Treatment of Malocclusion" this definition is given for the line of occlusion: "The line of occlusion is the line with which, in form and position according to type, the teeth must be in harmony if in normal occlusion." I will therefore apply the term infra-occlusion to all teeth that require elevating in their sockets in order that they be placed in harmony with this ideal line. When the teeth are in harmony with this line, it is impossible for them to be in malocclusion. Consequently, whatever movement of the teeth becomes necessary to bring them into harmony with this line should be carefully considered.

It is possible to have any tooth in infra-occlusion, but for the purpose of this paper we may divide infra-occlusion cases into two classes: (1) Infra-occlusion of the anterior teeth, frequently termed "open-bite" cases, and (2) infra-occlusion of the buccal teeth, frequently termed "closed-bite" cases.

INFRA-OCCLUSION OF ANTERIOR TEETH, OR "OPEN BITE."

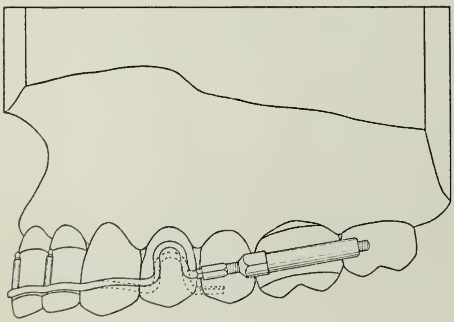
Infra-occlusion of the anterior teeth (Fig. 1) is usually due to habit of some description, and the earlier such a habit is determined, and if possible corrected, the more favorable becomes the prognosis of such cases. These so-called open-bite cases were very annoying to treat, and particularly difficult to retain, previous to the introduction of Dr. Angle's new orthodontic appliances. By means of these new appliances, it is possible to so apply force to these teeth that no slipping or loss of force is possible.

FIG. 1.



Appliance for treatment. In many cases the application of an orthodontic appliance as shown in Fig. 2 will be sufficient to elongate these anterior teeth. If found inadequate, these appliances can be reinforced by intermaxillary rubber bands. When found necessary to employ these, hooks are soldered to the

FIG. 2.



upper expansion arch in the region of the canines, projecting toward the gingiva. Directly under these, similar hooks are soldered to the lower arch, also projecting toward the gingiva. Over these hooks on each side a small rubber ring is worn constantly. If these rubbers give trouble by breaking, it has been found advantageous to use a larger rubber, and carry it back over either the upper or lower attachment on the molar bands, alternating if necessary, thus applying the rubber in a triangular way, but with the short side of the triangle in the region of the canines, which is the reverse of what will be shown in the treatment of cases where the molars are to be elongated. After such teeth have been elongated by using the intermaxillary rubbers, it is no longer necessary to continue their use, as the appliance of itself will hold these teeth in proper position, if the habit has been corrected.

INFRA-OCCLUSION OF BUCCAL TEETH, OR "CLOSED BITE."

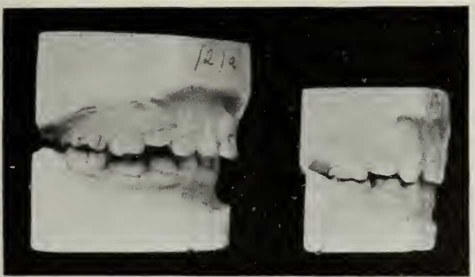
Infra-occlusion of the buccal teeth is due to lack of vertical development in this region. The causes of this maldevelopment in very young patients are obscure in many cases. When the buccal teeth are in distal occlusion, it is most logical to assume that the mandible has slipped back in the glenoid cavity. This is possible owing to the incomplete formation of the temporo-mandibular articulation, as has been shown by Dr. S. Merrill Weeks.* In the paper referred to, we read as follows: "It will be noticed that the condyle in normal cases does not rest as we might expect it to, in the deepest portion of the glenoid fossa, but at some point along the incline toward the eminentia articularis, the

* See *Items of Interest* for August 1909, vol. xxxi, p. 583.

point doubtless being determined by such features as the occlusion, condition of the ligaments, and muscles."

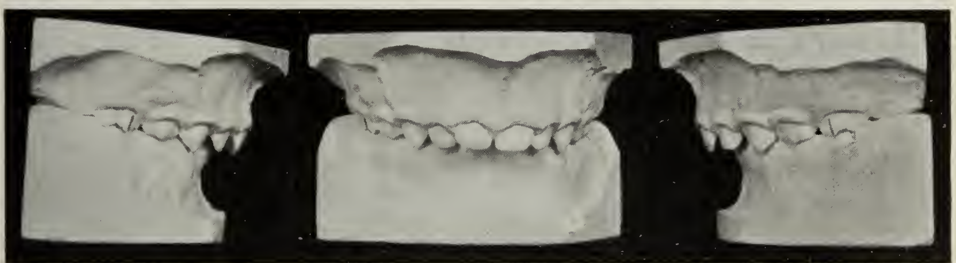
Lack of normal lateral growth of the upper dental arch, particularly in the canine region, I am convinced, is largely responsible for this distal position of the

FIG. 3.



mandible in many young patients. A careful examination of the models of our class II cases of eight years of age and under will show that, when the buccal teeth are placed correctly mesio-distally, the upper arch is too narrow to accommodate the lower teeth. In class II, division 2 cases, the retruding upper incisors prevent the molars from being so placed, but accurate measurements of the models in the canine region will show that lack of lateral development of the upper dental arch precedes the retrusion of the upper incisors. This distal position of the mandible tends to prevent normal development in the deciduous molar region.

FIG. 4.



During normal development, it is obvious that there must be considerable lengthening of the face and also vertical development of the dental arches. That this vertical development sometimes takes place during the eruption of the first permanent molars, Fig. 3 will serve to prove. How often these first permanent molars develop to a higher plane than that previously occupied by the deciduous molars it is impossible to judge from this specimen, as, in my opinion, the deciduous molars as a rule increase in vertical development during the time the first permanent molars are erupting. My observations have caused me to believe that there is always an increase in vertical development in the deciduous molar region in the period intervening between the eruption of the full deciduous denture and the eruption of the first permanent molars, in normal cases. This gradual vertical increase of the deciduous dental arches is responsible for the lengthening of the face so noticeable when we compare the face of a child of three years to that of the child from seven to nine years.

Suggestions as to treatment. I am impressed with the idea that it is impractical to depress the upper and lower incisors in their sockets, unless for some reason they have been mechanically elongated, and further, that in order to put the teeth and facial lines in harmony, it is not necessary to depress these teeth in their sockets in our young patients. If this be true, then it necessarily follows that our efforts must be confined to the lengthening of the molars and premolars, sometimes of the upper dental arch, sometimes of the lower dental arch, and more often of both upper and lower dental arches.

Practical cases. Fig. 4 shows models of the denture of a child at three and one-half years of age, with the deciduous lower incisors striking on the palate at least one-eighth of an inch distally to the upper incisors. This is evidently a case of class II, division 1, and a careful study of these models would show that,

Fig. 5.

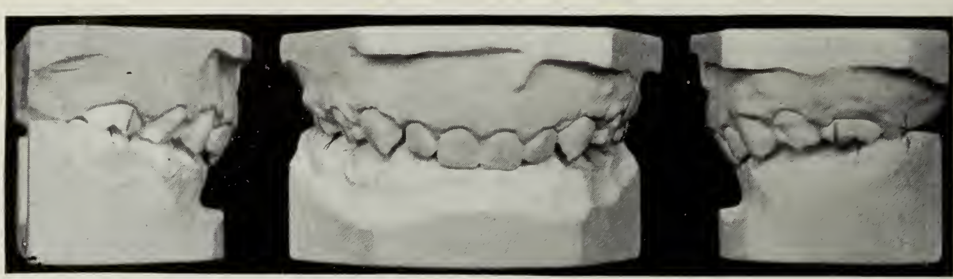


Fig. 6.

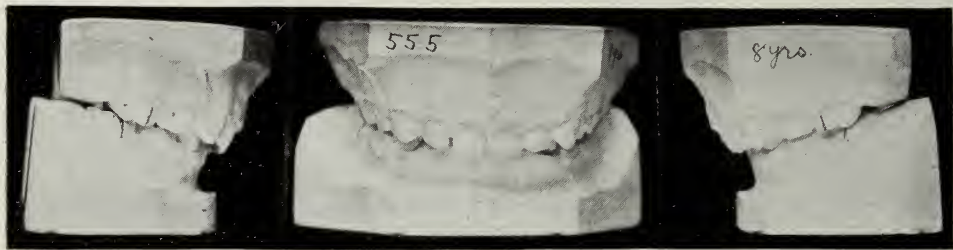
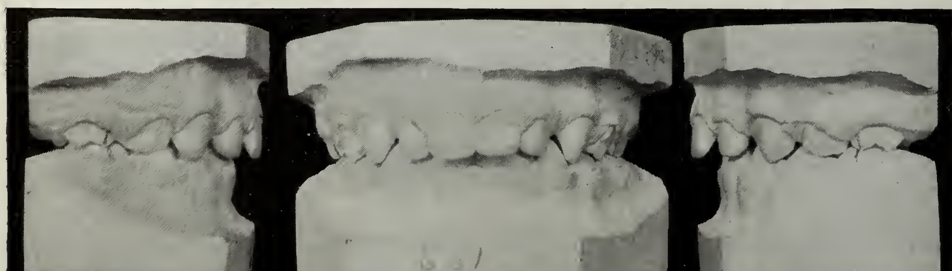


Fig. 7.



for some reason, the deciduous molars are far from being fully erupted. In fact, the gums, just distal to the second deciduous molars, are on a level with the occlusal surface of these teeth.

Fig. 5 shows models of the denture of a child four years and five months of age, with the lower incisors completely hidden by the upper ones. On the left side, in this case, the deciduous molars are in complete lingual occlusion, and it will be observed that it is a subdivision of class II, division 2, not complete, but rapidly drifting that way. Like the previous case, the gums, just distally to the second deciduous molars, are on a level with the occlusal surface of these teeth.

Fig. 6 is made from models of a child of eight years of age, with the lower incisors completely hidden. Examination of the models of this case reveals a groove across the palate, just distal to the upper deciduous teeth, in which the lower incisors rest. This is a complete case of class II, division 2, and, like the previous one, the occlusal surface of the second deciduous molars is just level with the gums, distally to them. The only permanent teeth in this case are the lower central incisors. Many more cases like this could be shown to prove

Fig. 8.

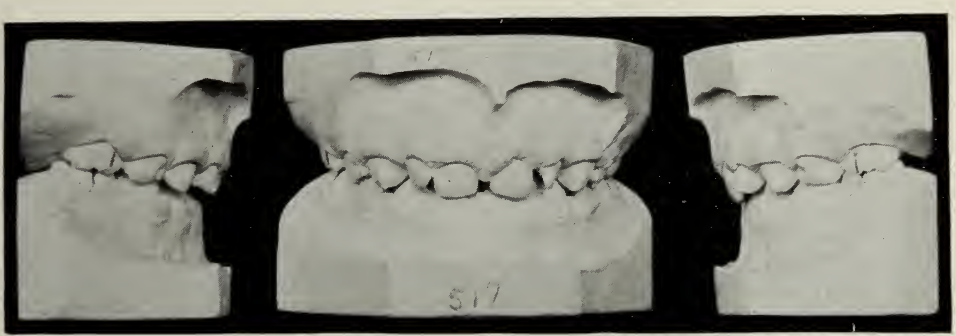


Fig. 9.

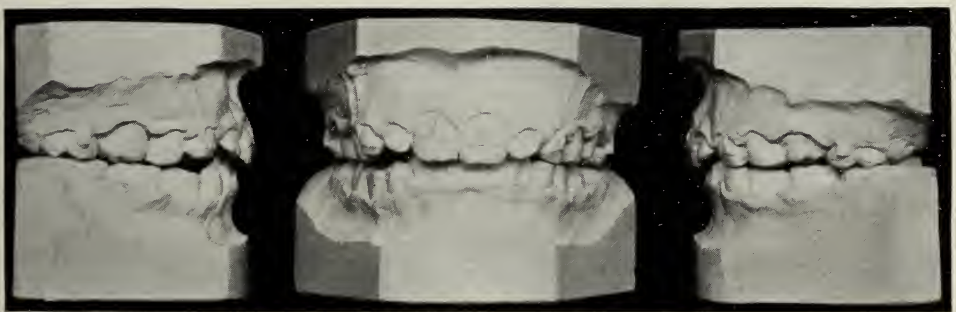
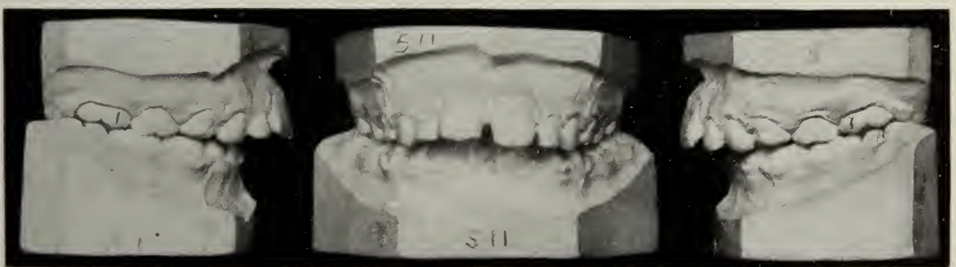


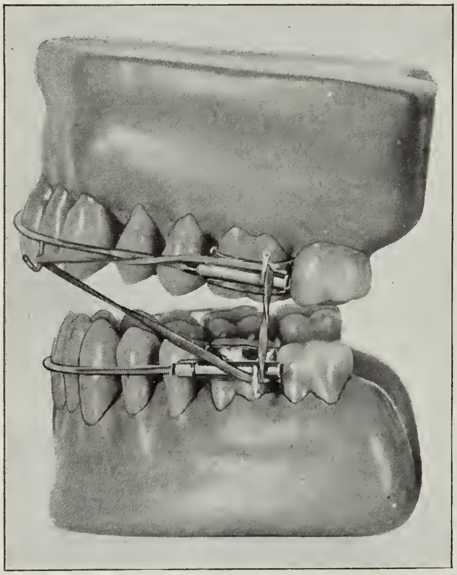
Fig. 10.



that infra-occlusion begins at a very early age.

The importance of mastication. This distal occlusion, in turn, interferes with

FIG. 11.



the proper mastication of food, and causes further lack of development owing to perverted muscular action, lack of stimulation, and insufficient blood supply to the surrounding tissues. If this is true, then what can be more logical than that these deciduous dental arches be so treated that the patient can masticate food? I am of the opinion that lack of mastication for generations is one of the great causes of early maldevelopment.

The mother or nurse, or both, should be carefully instructed as to the necessity of proper mastication and, more important still, of proper foods to necessitate mastication. In cases where the physician has advised foods that do not require mastication, systematic exercise, as biting on rubber rope, should be insisted on as advocated by Dr. H. C. Ferris. The liberal use of chewing-gum —not the ordinary kind, but good old spruce or tamarac gum, that becomes harder the longer it is used, so that it fairly makes the muscles ache when chewed for a specified time—is thought to be beneficial.

In order to dispel the belief that this condition is always due to a distal occlusion of some sort, a careful study of Fig. 7 is urged. This is made from the models of the denture of a child three and one-half years of age, and it will be observed that the mesio-distal relation of the molars is correct. The lower incisors strike on the palate just distally to the upper ones; and again, the gums, just distally to the second deciduous molars, are on a level with the occlusal surface of these teeth.

FIG. 12.

Fig. 8 shows another case of class I in a similar condition to that described in Fig. 7.

When we compare the last two cases with these [exhibiting several models of normal deciduous arches] we can readily see wherein they are deficient.

Author's method of treatment. About four years ago, the writer became impressed with the necessity of treating cases of infra-occlusion of the buccal teeth, prior to the eruption of the first permanent molars.

Owing to the fact that children do not take kindly to a removable appliance of any description and because they are more liable to carry it somewhere other than where the orthodontist wishes it to be, the following method has been employed, and has proved very satisfactory in all cases when used previous to the eruption of the first permanent molars. The deciduous molars were elongated by eight cast gold tips or gold caps made quite thick on the occlusal surfaces, and securely cemented to these surfaces as shown in Fig. 9. These cases have been watched with a great deal of interest in order to see what effect these appliances might have on the underlying premolars, but so far there have been no ill effects from their use.

FIG. 13.

Shows right and left views of a set of models before treatment.

FIG. 14.

After treatment.

An extreme case, and its treatment. Fig. 10 shows an extreme case of infra-occlusion in which a rather peculiar experience was encountered. At the beginning of treatment all eight deciduous molars were built up with gold caps made heavy on the occlusal surface so as to separate the first permanent molars. D bands were fitted to all first permanent molars, and upper and lower arches adjusted. By means of intermaxillary rub-

Fig. 15.

Shows profile and front view of face before treatment.

Fig. 16.

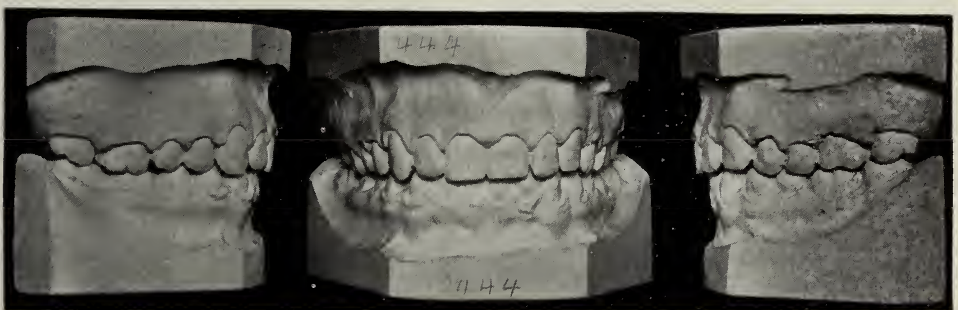
After treatment.

bers worn in the triangular way, as shown in Fig. 11, these teeth were forcibly elongated as shown in Fig. 12. Three years subsequently, the deciduous molars were lost, thus allowing the strain of the muscles of mastication to act on the first permanent molars, and they were found to settle in their sockets and permit the lower incisors to strike on the palate again. This child is now wearing individual bite-planes on the four upper incisors, so as to allow the premolars to erupt fully before they come in contact.

Fig. 17.

Shows both side views and front view of models before treatment.

Fig. 18.



After treatment.

Periods most favorable for treatment. In fact, it seems that, when teeth have come in contact and have stopped their vertical development, it is much more difficult to stimulate bone-growth to support them than when this is done during the active eruptive period. It therefore follows that the two periods most favorable for treating cases in infra-occlusion are previous to or at the eruption of the first permanent molars, and during the eruption of the bicuspids.

That the buccal teeth fail to erupt to their full vertical height, an examination of the class II cases will conclusively prove.

My observations have convinced me that failure to elongate the molars and bicuspids in these class II cases is almost sure to result in the failure to maintain the mesio-distal relation, regardless of how accurately the dental arches have been shaped to fit each other.

Bite-planes and their various modifications. Bite-planes of various shapes, securely attached to bands on the anterior teeth, have been found most satisfactory in the treatment of these cases. The shape of the plane found most useful for this purpose is the one described in the *Items of Interest*

FIG. 19.

Shows front view and profile of face before treatment.

FIG. 20.

After treatment.

for January 1911,* in an article by Dr. Alfred P. Rogers. As he has carefully gone into the technique of making this appliance, it is not necessary for me to do so at this time. My main objection to this form of appliance is that four bands firmly united together have to be cemented at one time. To obviate this, I have used tubes on the lingual side of the molar bands, close to the gingival margin, to fit over the wire soldered to the bite-plane. This permits the cementing of the front section of the appliance first, and then the individual cementing of each molar band. This is done by slipping the tube over the wire, having the band lingual to the molar which it is to encircle, and then the band is tipped buccally, forced to place, and clamped. The screw, of course, should be on the buccal side.

Individual planes attached to bands on the upper anterior teeth have been tried in a few cases in conjunction with Dr. Angle's new appliance, and so far have proved very satisfactory. Considerable care is required in making these planes in such a way that no one tooth has to bear all the strain, but, when this is done, a great sense of security is derived from knowing that, if a band *does* loosen, this is very readily detected, which is not true when the bite-plane is firmly soldered to two bands.

Intermaxillary rubber bands. In conjunction with all these bite-planes, it is necessary to wear the intermaxillary rubber bands. The position of these rubber bands can be varied according to the teeth that are to be operated upon. If it is found desirable to elongate the lower molars only, then the intermaxillary rubbers should be worn from hooks on the upper appliance in the canine region to hooks on the buccal surface of the lower molar bands. If it is desirable to elongate both upper and lower molars, the intermaxillary rubbers should be worn in a triangular way, as shown in Fig. 11. In case it is desirable to elongate the upper molars only and not the lower ones, the rubbers would be worn as in the treatment of class III conditions. This application of the intermaxillary rubbers would not be practical in a class II condition, but I have never seen a case where I thought it advisable to elongate only the upper buccal teeth in this class.

Special precautions. It is of the utmost importance, in treating these cases, particularly older patients, to make sure that the intermaxillary rubbers are sufficiently strong to keep the lower incisors in the proper position in the bite-plane during the periods of sleep, for, if the patient is able to get the molars and bicuspids in contact when sleeping, there is no possibility of elongating these teeth. I recall one case where the mandible would drop distally during the periods of sleep, to such an extent that the lower incisors would pass lingually to the bite-plane. To prevent this, the upper canines were banded, each having a plane soldered to its lingual side in such a position that in order to close his teeth the patient had to protrude his mandible so that the lower incisors rested on the bite-plane as they should. In a few months after this appliance was installed, the molars had elongated so that they came in contact.

Practical cases and results of treatment. I will now show slides of cases before and after treatment, in which these methods were employed. (See Figs. 13–16, and Figs. 17–20.)

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

* See *Items of Interest* for January 1911, vol. xxxiii, p. 21.

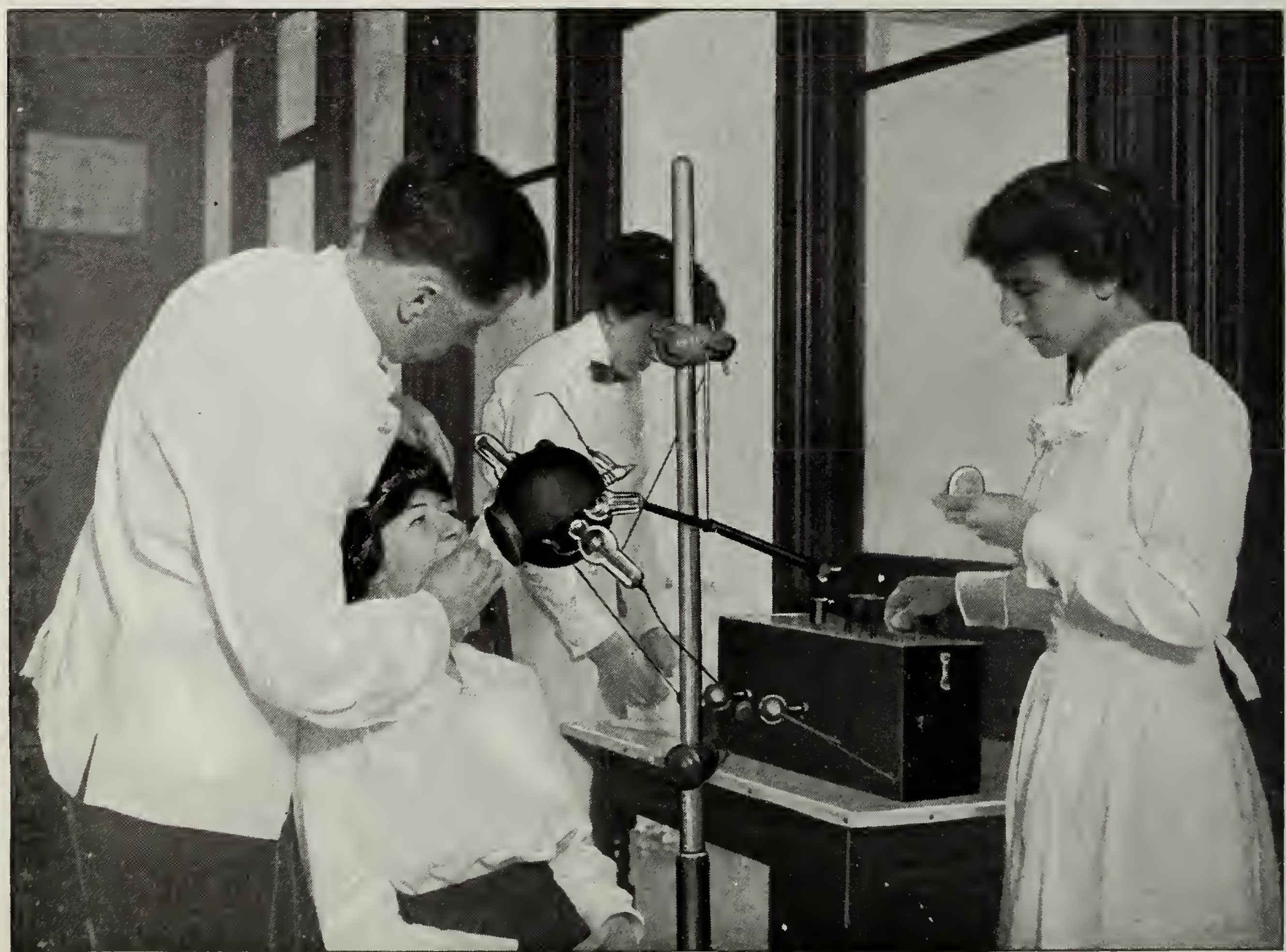
NOTES ON DENTAL RADIOGRAPHY.

By J. J. MOFFITT, D.D.S., Harrisburg, Pa.

(From exhibits held before the Luzerne and Lackawanna and the Harrisburg Dental Societies.)

THE value of the use of radiographs increases as the dental operator overcomes the difficulties involved in making the pictures, and also as he becomes familiar with reading the films or prints. As he begins to rely on their disclosures for guidance in his work, they become absolutely invaluable, and he soon wonders, as we have all done in regard to telephones and taxicabs, how he ever got along without them. The dangers, as far as dental work is concerned, are practically eliminated by covering the entire tube—with the exception of the area over the tooth (see Fig. 1)—with a prepared rubber shield.

Fig. 1.



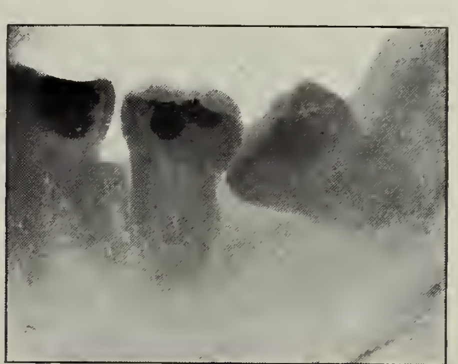
VALUE OF THE X-RAY IN DAILY DENTAL PRACTICE.

An experienced operator, it is true, can get along fairly well without radiographs nine times out of ten, and the tenth case, to him, seems to be the incurable one. These tenth cases are the ones that are of the greatest importance in a dentist's daily activities—to the one who wants to excel his competitors, because these are the cases in which the competitor has failed, and to the dentist who wants to bestow the utmost of his ability upon his patients, because of the satisfaction of curing them and retaining them in his *clientèle*. For these conditions the X-ray apparatus is indispensable. There are a great many other cases in daily general practice in which the X ray is helpful, such as filling roots, treating abscesses, correcting impending irregularities, amputating apices, disclosing causes of neuralgia, etc. Besides, the X ray is a great timesaver to a busy dentist, and a great saver of a patient's feelings in furnishing diagnoses at once without the experiments otherwise necessary, while a comfortable sense of security is derived from a knowledge of what is going on beneath the gingival line. The cases shown are just such as occur in general daily practice.

IMPACTED THIRD MOLAR.

The first case (Fig. 2) is one of an impacted third molar, in which the pic-

Fig. 2.



ture shows its size, location of its roots, and the manner in which it is held by the bone and the adjoining tooth. The gum, which does not appear, almost covers it. To remove this tooth successfully it would be best to cut away the bone over the posterior root, so that the tooth could be tilted back from beneath the overhanging part of the second molar, before force is applied with the forceps. The picture also discloses, in the second molar, the kind of anterior root that is frequently punctured when the operator is unaware of the peculiar curve of its canal.

ABSCESS.

Fig. 3 shows an abscess in the apex of a first bicuspid under a gold crown.

Fig. 3.

There are three crowns, one porcelain and two shell gold crowns, adjoining each other, with a fistulous opening leading from one of them which the radiograph shows at once to be the first bicuspid, thus rendering experiments with the other two teeth unnecessary. Such a diagnosis can be made in five minutes in a dental office.

DIAGNOSIS PREVIOUS TO BRIDGE WORK.

Fig. 4 shows a molar root which has sufficient bone between its anterior and posterior portions to make it reliable as a support for a bridge. It also shows the length and direction of the roots and their extreme narrowness, enabling the operator to avoid puncture of the sides, or protrusion through the apex.

Fig. 5 illustrates a very loose root carrying an old-fashioned Richmond crown. The X ray shows inflammatory conditions of the pericementum due to pressure of the band. The alveolar socket is in good condition, and the tooth is capable of becoming firm again under correct treatment, if the root-

Fig. 4.

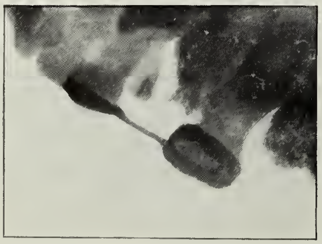
Fig. 5.

canal is properly filled and an anatomically correct crown is inserted.

ERUPTING TEETH.

Fig. 6 shows a platinum brace applied upon the deciduous teeth to prevent the

Fig. 6.



second deciduous molar from being pushed forward by the first molar, which is about to erupt. The bicuspids can be seen in their places, but will not erupt for several years. The first deciduous molar was lost, owing to conditions that are apt to occur in any child whose deciduous teeth are not given as careful attention as the permanent ones. In this case, under a carelessly placed filling, caries penetrated to the pulp, causing an abscess and subsequent destruction of the tooth. With the chief object in view of keeping the first permanent molar back in its place during eruption, a brace was made, and no loss of space will result.

ROOT-FILLINGS.

Fig. 7 was made for the purpose of examination of the apical conditions of

Fig. 7.

roots that had been previously filled by another operator, when it was necessary to crown the tooth. The solid condition around the apices of these roots shows that the tooth may be safely crowned without disturbing the root-fillings.

ORTHODONTIA.

Fig. 8 shows a congestion of the permanent lower anterior teeth, and the necessity of regulating the deciduous teeth in order to prevent serious irregularity of the permanent ones. In this case a very fine platinum appliance was put upon the deciduous canines, and these teeth are being gradually separated, so that the four incisors will assume their proper relations. The canines are chosen as abutments because they remain in position longer than the other teeth. The permanent four anterior and the three deciduous teeth are shown in the picture, one permanent

Fig. 8.

tooth being erupted. The other three have been retarded in growth owing to lack of sufficient room.

ROOT PUNCTURE.

Fig. 9 shows a case in which a bridge bearing a central and a lateral incisor was attached to the root of a central incisor, which could not be retained on account of soreness. The X-ray examination showed that the root had been punctured and that the pin and filling

Fig. 9.

were protruding into the maxilla. This root was saved and subsequently rendered serviceable.

REVELATION OF VARIOUS UNSUSPECTED CONDITIONS.

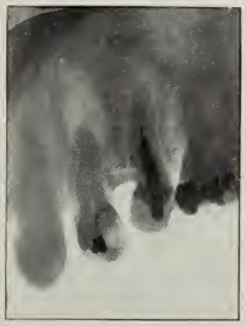
Fig. 10 (from a patient of Dr. Trout's, Red Lion, Pa.) illustrates a case in which an abscess has progressed to such an extent that the tooth cannot be saved except by amputation of the root, which is projecting into the abscess; the apical

Fig. 10.

opening is enlarged and disintegration of the tooth itself has begun.

Fig. 11 shows a case in which the abscess has not affected the apical area to such an extent that it cannot be cured

Fig. 11.



by treatment; it also shows that the root is extremely short and curved.

Fig. 12 (from a patient of Dr. Longenecker's, Mt. Joy, Pa.) is a picture of an amputated lateral root.

Fig. 13 (from a patient of Dr. Behney's, Harrisburg, Pa.) is a picture which was taken to seek the cause of pain and the location of covered roots. The remains of the roots of a second molar that were covered up by gum tissue are shown, also caries in the posterior surface of the first molar under an old amalgam filling, and unsuspected ex-

Fig. 12.

Fig. 13.

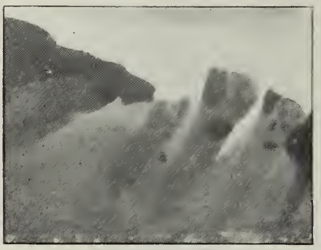
posure of the pulp, causing continuous irritation.

Fig. 14, A, is a picture of a root that had been punctured owing to a misjudg-

Fig. 14, A.

ment of the direction of the canal, which had been previously filled with cement. An attempt was made to crown it without the use of the radiograph. Fig. 14, B, is the same root undergoing treatment. The spot in the bone between the teeth is

Fig. 14, B.



a piece of protruding filling not yet removed.

Fig. 15 shows a punctured pulp-

Fig. 15.

chamber, and also a blind abscess at the apex of a crowned bicuspid.

FRACTURE OF TEETH.

Fig. 16 (from a patient of Dr. Smith's, Lancaster, Pa.) illustrates a case in which the patient, by a severe fall, had loosened several teeth. There were no diagnostic symptoms indicating extraction, so a brace was made to support the loose teeth until they had become permanently fixed in their sockets. After six weeks pus appeared, the condition remaining unimproved. An X-ray examination was made, which showed that the teeth had sustained fractures above the alveolar process in the solid part of the bone, the bone itself remaining unbroken. The patient had reached for an article, standing on a chair, which tilted, allowing the feet to fly out and the face to strike with great force on the back of the

FIG. 16.

chair, bringing about this unusual form of fracture.

IMPERFECT ROOT-CANAL FILLINGS.

Fig. 17 was made from a case of several abscesses below two gold crowns, the

FIG. 17.

roots having been imperfectly filled and the crowns poorly adjusted to them. The radiograph shows at a glance the cause of the trouble and the possibility of curing both teeth. The pulps having been destroyed, there was absolutely no excuse for making shell crowns.

FAILURE OF ERUPTION.

Fig. 18 was made in search of an unerupted central in a child nearly eight years of age. The film showed the root of the deciduous tooth only half absorbed, the other half extending along the crown of the permanent tooth and preventing it from erupting. After extraction of the deciduous tooth, another picture, which was taken several weeks

FIG. 18.

later, showed the permanent tooth one-eighth of an inch farther advanced.

ABSORPTION OF ALVEOLAR PROCESS.

Fig. 19 was made in a case of absorption of the alveolar process with a pus tract surrounding the root. The tooth carried a gold crown which extended underneath the gum fully three-sixteenths

FIG. 19.

of an inch on the lingual side. The root was very loose, the occlusion faulty, the gum swollen and very much congested. The crown was removed, the cement thoroughly scaled off the root, and prophylactic treatment begun, which soon tightened the tooth. When the bone has filled-in around the root, a proper crown will be made that will restore the original shape of the tooth.

DETERMINING EXACT LENGTH OF A ROOT.

Fig. 20 shows a method devised by the writer for determining the exact length of a root when the film has been held at an angle to the perpendicular, and the picture is either longer or shorter than the natural root. The wire

Fig. 20.

is a piece of thick regulating wire, sterilized, inserted as nearly as possible to the apex by means of a former radiograph, held in position with temporary gutta-percha, and clipped off or bent over at the occlusal end of the tooth. By comparing this wire with its length in the picture afterward, the exact elongation or foreshortening of the root is shown.

Fig. 21 (from a patient of Dr. Kirsch's, York, Pa.) shows elongation in the image of roots owing to the film being held at an incorrect angle to the direction of the rays. The picture was made in search of a missing molar as a probable cause of pain.

THE AID OF AN ASSISTANT.

Thus the X-ray picture, while always interesting, often discloses unsuspected conditions, and helps in preventing impending troubles. Every dentist who employs an assistant in his office should have an X-ray apparatus, as the only difficulty about making radiographs to

Fig. 21.

which his personal attention must be given lies in holding the film properly, and at the same time preventing the patient from getting a spark, which takes but a few minutes of adjusting. The assistant can learn to mix the developing solutions, have them in readiness, and can then develop the films in five or six minutes after an exposure is made. As there are two films to each exposure, one is used wet for making the diagnosis and the other one is dried for preservation.

The Roentgen rays will penetrate several thicknesses of films, manifolding the impression on them all.

THE SIGNIFICANCE OF NORMAL OCCLUSION.

By MILO HELLMAN, D.D.S., New York, N. Y.

(Read at the fourth annual meeting of the Eastern Association of Graduates of the Angle School of Orthodontia, New York, N. Y., April 1913.)

NORMAL occlusion of the teeth is one of the phenomena the recognition of which has placed our profession upon a definite scientific foundation. It is the basis of the science of dentistry, and the unqualified condition upon which the efficiency of a denture depends. By a clear conception of the normal relations of the anatomical units of a denture and by a thorough appreciation of their physiological significance, we are enabled to understand the rôle played by the masticatory apparatus in phylogenetic as well as in ontogenetic development; and in proportion as we are able to grasp and interpret the ideas implied by the term "normal occlusion," we shall conceive how remarkable and far-reaching are its effects.

ANGLE'S STUDIES OF OCCLUSION.

Although numerous authors have from time immemorial written on alignment, articulation, mechanical relation, and occlusion of the teeth, it was not until Dr. Edward H. Angle (1) gave us his conception of this phenomenon that the profession obtained a clear understanding of what it really means. While Dr. Black (2) and Dr. Muehlreiter (3) long ago informed us that the teeth do not merely interlock or interdigitate, and definitely described the manner in which it is accomplished, Angle not only observed the minutiæ of these interrelations, but also enumerated the forces that bring them about and upon which these relations depend. To him the profession owes a debt of gratitude which can only be repaid by the recognition of his achievements, and the acceptance of, and adherence to, his teachings. His conception of the *line of occlusion* and his *law of normal occlusion,* to which I shall refer later, are but natural outgrowths of his profound insight into the problem of occlusion.

SCOPE OF PRESENT INVESTIGATION.

To convey, then, a comprehensive idea of normal occlusion and its significance from a scientific viewpoint, it will be necessary to treat the subject in a manner that will not only portray the mechanical interrelation of the teeth, but also bring into the perspective the factors concerned in the establishment of these relations, as well as the effects produced by the normally functionating masticatory apparatus upon its closely associated structures. It is, consequently, necessary to divide the subject-matter into the following topics:

(1) The development of the structures concerned in the establishment and maintenance of normal occlusion ("the forces of occlusion," Angle).

(2) The development of the deciduous and the permanent dentures and coincident development of the face.

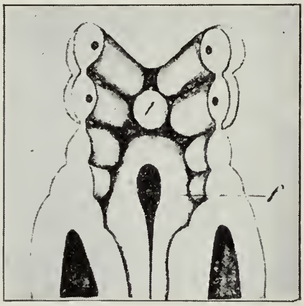
(3) The fundamentals of occlusion of the teeth.

(4) The effect of normally occluding teeth upon the alveolar process and its intimately related structures.

(1) DEVELOPMENT OF THE STRUCTURES CONCERNED IN THE ESTABLISHMENT AND MAINTENANCE OF NORMAL OCCLUSION.

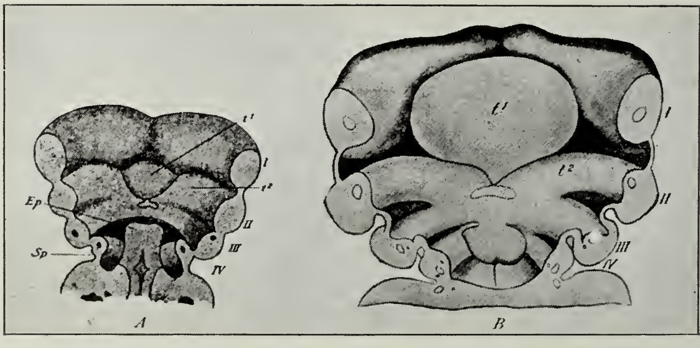
It will be of interest to consider briefly the early embryonic processes involved in the development of the masticatory apparatus, and note the sequence of their occurrence in relation to their functional importance. At the beginning of development of the external form, the embryo initiates those changes in the head region which ultimately result in the oral cavity and its contained organs. Thus, about the third week of embryonic life, the oral fossa makes its appearance. The manner in which these morphological changes occur I shall not touch upon, as it is mainly a matter of embryologic detail, and is described minutely in works that treat of this subject in a general[4], comparative[5], special[6], and experimental[7] way—to which the student may be referred for reference. What we are particularly interested in at present are the results brought about by these changes. Thus, before the maxillary, mandibular, and fronto-nasal processes have united to form the oral fossa, in embryos of about 3 mm., there may be seen in the median line of the floor of the stomodeum, between the ventral ends of the first and second branchial arches, a small, rounded elevation which has been termed the *tuberculum impar* (Fig. 1, *t*). In later stages (Fig. 2, A) this becomes larger, and reaches its greatest development in embryos of about 8 mm.; at the same time there appears on each side of the floor of the mouth a longitudinal groove—the alveolo-lingual groove—each of which, at its anterior end, bends medially toward its fellow. By these alveolo-lingual grooves an area is marked out in the floor of the mouth which gradually becomes more and more prominent and rounded upon its oral surface, and forms the anterior portion of the tongue (Fig. 2 B, t^1). This median elevation is bounded at the sides and almost to the median line in front by the alveolo-lingual grooves, and posteriorly it is separated from the anterior edge of the

FIG. 1.



Floor of pharynx of an embryo of 2.15 mm. *t*, Tuberculum impar. (His.)

FIG. 2.



Floor of pharynx of embryos of (*A*) 7 mm. and (*B*) 10 mm., showing the development of the tongue. *Ep*, Epiglottis. *Sp*, Precervical sinus. t^1 and t^2, Median and lateral portions of the tongue. I, II, III, IV, Branchial arches. (His.)

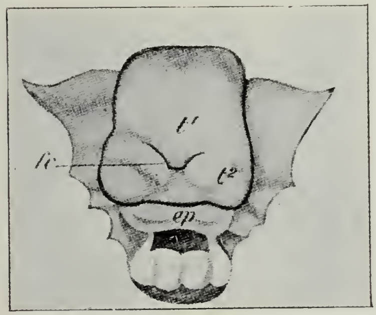
second branchial arches by a distinct V-shaped groove.

The posterior portion of the tongue arises as thickenings of the ventral ends of the second branchial arches, and is consequently a V-shaped structure, into the angle of which the posterior part of the anterior portion of the tongue fits (Fig. 3). The two portions, anterior and posterior, eventually fuse, but the groove which originally separated them remains more or less clearly distinguishable, the vallate papillæ developing immediately anteriorly to it.

As to the muscular character of this organ, there is no need of special mention, since it consists partly of fibers derived from its own substance, the lingual muscle, and from a number of extrinsic muscles—the hyoglossi, genioglossi, styloglossi, palatoglossi, and chondroglossi—it is evident that its influence is highly effective and that in subsequent development it becomes a factor of vast importance.

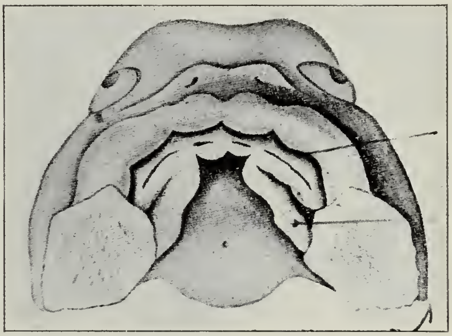
After the formation of the oral sinus, at about the fifth week, an ingrowth of epithelium into the substance of both the maxillary and fronto-nasal processes above and the mandibular processes below takes place, and the surface of the ingrowth becomes marked by a deepening groove (Fig. 4, *Lg*), which separates an anterior and lateral fold, the lip and

Fig. 3.



Floor of pharynx of embryo of about 20 mm. *ep*, Epiglottis. *fc*, Foramen cecum. t^1 and t^2, Median and lateral portions of the tongue. (His.)

Fig. 4.



View of roof of oral fossa of embryo, showing lip groove and the formation of the palate. *Lg*, Lip groove. *Pp*, Palatal process. (His.)

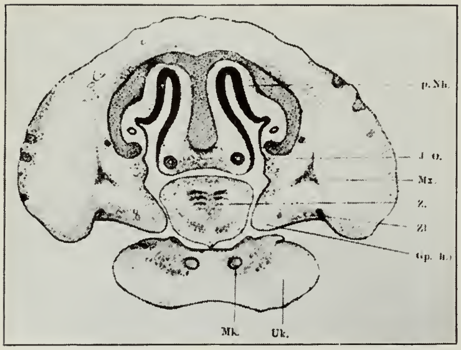
cheek, from the alveolar process. Medially, from the maxillary portions of the upper jaw, shelf-like ridges then begin to develop (Fig. 4, *Pp*).

When, however, these ridges or shelves, which become the palatal plates, are first formed, about the fifth or sixth week, they have an almost vertical direction, projecting downward and somewhat inward between the sides of the tongue and the alveolar process (Fig. 5*) (8). The tongue, at this stage, completely fills the primitive oral cavity, the stomodeum, its dorsum being in contact with the base of the skull (Fig. 6). Later, the lower jaw, which at first is considerably shorter than the upper, increases in length and at the same time in breadth, and assumes a more horizontal position. The tongue, as may readily be seen in Fig. 7, A, forms first the core for the developing and shaping of the jaw-bones, and later constitutes the most important structure for the molding of the roof of the mouth; for, as the tongue sinks downward between the Meckelian cartilages, the palatal ridges bend dorsally over it, so as to assume a horizontal position (Fig. 7, B), and through further growth, up to about the third

* Figs. 5, 6, 7, 8, and 9 were taken from Michio Inouye's work: see bibliography.

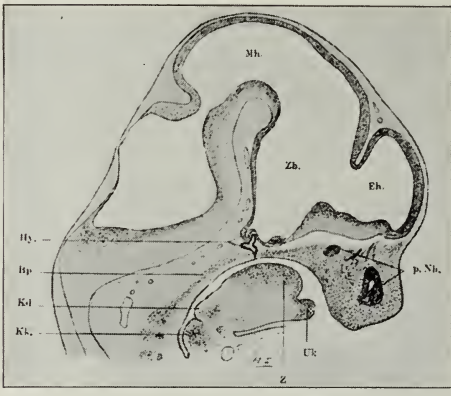
month, their union in the median line takes place to form the palate (Fig. 8). for it now devolves upon the structures thus far formed, *i.e.* the tongue, the lips,

FIG. 5.



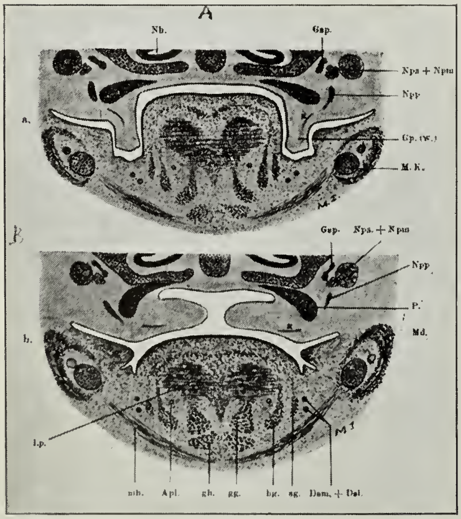
Frontal section through face of embryo of mole, showing position of tongue during development of the palate. *Mx,* Maxillare. *Z,* Tongue. *Zl,* Dental lamina. *Gp.* Palatal process. *Mk,* Meckel's cartilage. *Uk,* Mandible. (Inouye.)

FIG. 6.



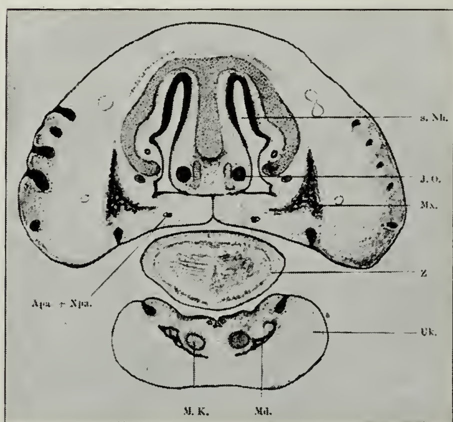
Sagittal section of embryo of mole, showing relation between the tongue and the skull. *Z,* Tongue. *Uk,* Mandible. *Hy,* Hypophysis. *Bp,* Basal plate. *Kd,* Epiglottis. *Kk,* Larynx. (Inouye.)

FIG. 7.



Frontal section through face of embryo, later stage than Fig. 5, showing change in position of palate processes and change in position and form of the tongue. (Inouye.)

FIG. 8.



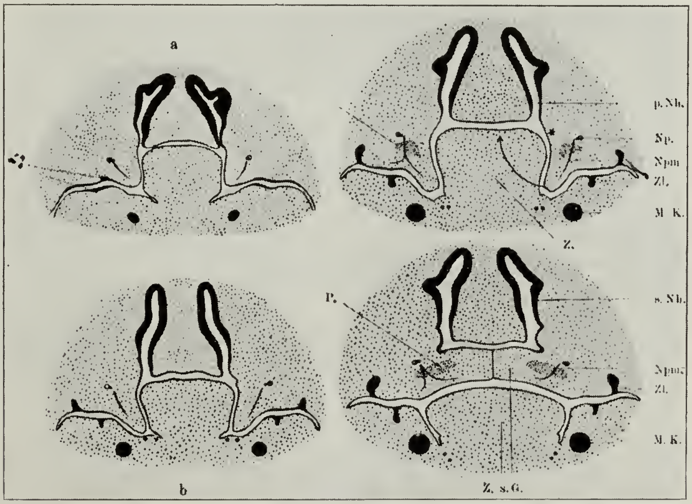
Frontal section through face of embryo, later stage than Fig. 6, showing union in median line of the palatal processes. (Inouye.)

These processes in development having taken place, the first and most important condition of normal occlusion is fulfilled, and the cheeks—to maintain the normal relation between the two jaws until the eruption and proper locking of the teeth has occurred. Even more, the correct placing and locking of the teeth themselves depends upon the normal development of these structures. The effect of their powerful influence will readily be appreciated, if the force exerted by the tongue, lips and cheeks during their functional activity be carefully measured. The highly efficient suction-pump that these organs constitute in the healthy nursing infant is corroborative evidence of their effectiveness.

(2) DEVELOPMENT OF THE DECIDUOUS AND PERMANENT DENTURES AND COINCIDENT DEVELOPMENT OF THE FACE.

The beginning of the development of the teeth in the embryo takes place at about the seventh week, *i.e.* shortly after the formation of the palate and the differentiation of the lips and cheeks from the jaw itself has taken place. (Fig. 9.) The formation of the dental shelf or lamina, and its further development into the required number of tooth germs, the dental papilla, and enamel organ, I shall not dwell upon. What I do want to emphasize at this moment is the fact that, at this early period in the history of the development of the dental apparatus, the definite shapes, the forms, and sizes of the teeth in their respective crypts are designed, and when the time arrives for them to take their position in the arches, they form, individually and collectively, when normal, a complete and harmonious whole. With what particular purpose this process takes place can only be appreciated when we realize the accuracy necessary for the establishment of the inter-relationship between the individual members of a denture, when the organ as a whole reaches its adult normal type. How truly remarkable to think that every sulcus, groove, fossa, ridge, inclined plane, etc., formed at this early period, will play an important rôle in the integrity of the masticatory apparatus as a whole, years later on! Synchronously with the process of the developing teeth, the growth of the muscles within and of those surrounding the oral cavity is taking place. Combining, therefore, the influence exerted by the muscles of mastication, respiration, deglutition, speech, and expression, with the developing and eruptive force of

FIG. 9.



Frontal sections through oral and nasal cavities, showing relative development of the palate and dental lamina. *Zl*, Dental lamina. *Z*, Tongue. *s.G*, Palatal process. *M.K.*, Meckel's cartilage. *p.Nh*, Primitive nasal cavity. *s.Nh*, Secondary nasal cavity. (Inouye.)

the teeth, a powerful stimulus is given to further the growth of the developing bones of the face. Thus, at the time when the eruptive force of the deciduous teeth is carrying them occlusally, the alveolar process grows around them. This process of growth, according to Noyes(9), brings about an increase in the size of the jaw-bones in three dimensions of space. He says:

For, as the teeth erupt, they and the alveolar process grow downward, forward, and outward in the upper jaw, increasing the distance from the floor of the nares and the floor of the orbit to the alveolar border and the occlusal edges of the teeth. In the lower jaw, this movement is upward, forward, and outward, increasing the size of the arch and the distance from the symphysis to the mental foramen.

But, after the deciduous teeth have taken their position, the developing permanent teeth in their crypts continue the influence upon the development of the jaws and the face. "With the continuing growth of these teeth prior to their eruption, there is an accompanying pushing downward, forward, and outward of the deciduous teeth, process and all, increasing the size of the arch from canine to canine, causing the deciduous teeth to stand wide apart, and finally, when the roots and the alveolar process of the deciduous teeth are absorbed, they are pushed from the gum." (Noyes.) If three skulls be compared, that of the toothless infant (Fig. 10), that of the child with the deciduous dentition (Fig. 11), and that of the adult with the permanent denture (Fig. 12), it will readily be seen to what extent the changes in growth have influenced the transformation of the bones of the infant face to those of the adult.

The influence of the developing teeth upon the growth of the face may be observed from the standpoint of the changes in the facial expression. As Schwalbe(10) says:

Thus the most striking change in the head taking place from birth until the end of childhood is found in the face. Even to those who observe these phenomena not from a medical point of view, this change is the most significant of the entire body. The face reflects intellectual life; the development of intellectual life finds expression in the facial change.

The first change in the nursing infant gives the countenance a greater fulness, and produces the characteristic appearance of the infant face. At birth, the forms are less full, while in healthy children during the middle of the first year, their round face, with their round cushionlike cheeks and large eyes, is normal. Furthermore, the growth of the facial portion of the head is more rapid than that of the brain portion, especially after the first year; above all, the erupting teeth and the accompanying enlargement of

Fig. 10.

Skull of infant at birth. (Noyes.)

the jaw-bones give the face a different expression. As the facial expression is decidedly influenced in infancy by the eruption of the deciduous teeth, so it is again in childhood the transition from the deciduous to the permanent dentition that produces a change in the facial expression. Of course, this is a slower change, taking place more gradually than that first described.

A similar view is expressed by Stratz (11) in the following manner:

Just as the growing of the milk teeth enlarges the jaw-bones and with them the lower part of the face, producing the first fulness from the typically toothless nursing infant, in a similar manner but in a higher degree the features are markedly longer, more definite, and stronger. The lower jaw becomes more powerful, its angles are more definitely marked, the round soft mouth is lengthened, the nose becomes more prominent, the cheeks assume no more the position of small globes

FIG. 11.

Skull of child, showing deciduous dentition in position, and development of permanent dentition. (Cryer.)

FIG. 12.

Adult skull showing completed permanent dentition. (Cryer.)

below the eyes, but disappear gradually, and flatten out about the increasing width and length of the chin and mouth portion. As the growth of the brain-case and eyes is much slower than that of the face, the eyes are apparently continually rising, and the head seems to diminish in size as compared with the face. Besides this, and owing to the lateral gain in the jaw portion, the eyes seem to approach each other more and more. Also this difference is only apparent, for the distance between the pupils changes very little during the entire life. . . . Although the transformation of the child's face to that of the typical girl or boy is very gradual, there is during the change of the dentitions a marked exacerbation in this process.

(3) THE FUNDAMENTALS OF OCCLUSION OF THE TEETH.

In order to realize the accuracy with which such a masticatory apparatus as presented in Fig. 12 is perfected, and at the same time appreciate the degree of its efficiency, it is necessary to review in a general way some of the salient points pertaining to its anatomical construction. As Angle expressed it—"The shapes of the cusps, crowns, roots, and even the very structural material of the teeth and their attachments, are all designed for the purpose of making occlusion the one great object." In proportion, therefore, as we are familiar with the minutest details pertaining to the occluding surfaces of the teeth, shall we respect the integrity of the smallest portion that enters into the formation of the masticatory apparatus. Just as in the case of an extremely complicated machine, the efficiency of its mechanism may depend upon a single insignificant cog of one of its numerous wheels, so, in the masticatory apparatus, the integrity of the whole depends upon the presence and normal functionating of every one of the inclined planes of the cusps of a tooth.

This is the problem that perplexes every student and baffles every practitioner. But while no orthodontist can begin the treatment of a case without a thorough knowledge of occlusion, it is most surprising to note how little cognizance is taken of this by the majority of the general practitioners in dentistry. As upon the normal locking of the occlusal inclined planes of the teeth depends in a great measure the ultimate result of normal development, it follows that upon it depends the permanence of all orthodontic operations, as well as the success of all dental restorations.

A careful examination of a normal denture in reference to occlusion will reveal a number of factors which vary from the simplest to the most complex, depending upon the anatomical character of the different teeth in the dental series. Thus, while the occlusion of the incisors is quite a simple matter, the labial surface of the lower and lingual surfaces of the upper alone coming into relation, this condition is immediately complicated when the occlusion of the canines is studied. The plain labial and lingual surfaces of the incisors are here divided by the lingual and labial ridges, resulting in labial, buccal, mesio-lingual and disto-lingual surfaces. The canines, consequently, present four surfaces, instead of merely one cusp which must be correctly placed, if the normal is to be obtained. Furthermore, as we reach the multicuspidate teeth, the designation becomes still more complex. For instance, taking up the study of the occlusion of one cusp—the buccal cusp of a premolar—we remember from our anatomical knowledge that leading from the point of that cusp there are four ridges, the mesio-incisal, the disto-incisal, the central buccal, and the triangular. These ridges transform the cusp into a pyramid, so to speak, with four surfaces, or rather inclined planes, two of which point to the lingual and two to the buccal. But since each of these present either mesially or distally, they are termed as above, mesio-buccal and disto-buccal, mesio-lingual and disto-lingual. It is evident, therefore, that the premolars occlude by means of eight inclined planes, and not by means of two cusps or points.

In the molar series, on the other hand, each tooth contributes sixteen inclined planes, and not merely four points, toward the process of triturating food. This is further complicated when we remember that each cusp in turn is antagonized by four inclined planes, from four different cusps. Thus, for instance, if the occlusion of the mesio-lingual cusp of the upper first molar be analyzed, it will be found to come into relation by its mesio-buccal inclined plane with the disto-lingual inclined plane of the mesio-buccal cusp of the lower first molar; by its disto-buccal plane with the mesio-lingual plane of the disto-buccal cusp of its lower namesake; by its mesio-lingual plane with the disto-buccal plane of the mesio-lingual cusp of the lower first molar; and by its disto-lingual plane with the mesio-buccal plane of the disto-lingual cusp of the lower first molar.

What confuses the majority of the dental profession in regard to the anatomical make-up of the occlusal surfaces of the teeth is that too much stress is placed upon the elevations and insufficient attention is given to the depressions of those parts. If the grooves, sulci, and fossæ that divide the various elevations of the occlusal surfaces of the premolars and molars were taken more into consideration, better results would be obtained in restorative operations in general. A splendid paper on this subject was read by Dr. J. L. Young in Toronto, in 1912(12). A cusp can never be properly restored if the depressions outlining it are not perfectly reproduced. And if the fact that each cusp is composed of four inclined planes were constantly kept in mind, instead of its being merely a point, there is no doubt that operative procedures would reach a higher degree of excellence, and mutilated cases of malocclusion would be rarer. I cannot emphasize too strongly the urgent necessity of an exhaustive knowledge of the minutest anatomical make-up of the tooth surfaces, as upon it rest the ideal results in dentistry as well as in orthodontia.

As suggested by Dr. H. C. Ferris(13), the mechanical index of a denture depends upon the number of inclined planes that participate in the performance of the function of mastication. We can, therefore, easily determine the degree of efficiency of a given denture, if the number of teeth, cusps, and inclined planes that perform their normal function be computed.

The problem of the efficiency of the masticatory apparatus may be approached from another direction. If its make-up as a whole be examined, we shall appreciate the truth of Weigert's hypothesis (1896) that "physiological structure and function depend upon the *equilibrium of the tissues* maintained by virtue of *mutual restraint* between its components." Or, as Angle expressed it:

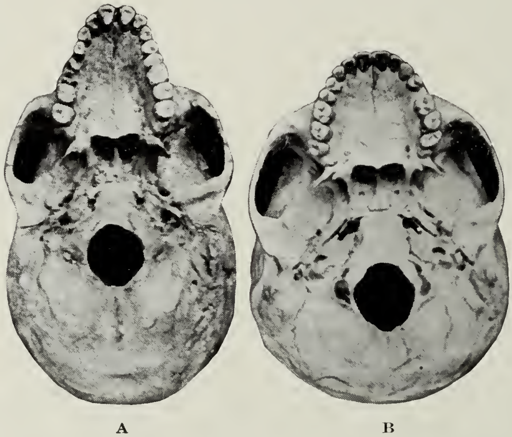
> The sizes, forms, interdigitating surfaces and positions of the teeth in the arches are such as to give one another, singly and collectively, the greatest possible support in all directions. Each tooth is not only in harmonious relation with every other tooth, but helps to maintain every other tooth in these relations, *for the cusps interlock and each inclined plane serves to prevent each tooth from sliding out of position, and further to wedge it into position if slightly malposed;* that is, if not beyond the normal influence of the inclined planes.

In any normal skull it can be observed how in mastication the overbite of the incisors would prevent the lower jaw from shifting forward, how the temporo-mandibular joint prevents it from shifting backward, how both joints and the external locking of the upper teeth would prevent the lower jaw from shifting laterally. Furthermore, the action and reaction of the molars and premolars of the opposing series, due to their positions, is such as to mutually restrain each other. It should be noted how the entire weight of the upper molars falls on the distal two-thirds of the lower molars and impels them forward. But also the reaction thereof should be observed, namely, that the distal two-thirds of the lower molars antagonizing the mesial two-thirds of the upper, exerts a restraining influence upon them.

The horizontal arrangement of the teeth in their respective arches differs in individuals. In a general way it may be said that both dental arches, the upper as well as the lower, form a semi-ellipse, the long axis of which passes between the central incisors. In the curve of this ellipse the canines stand a little prominent, giving fulness to the corners of the mouth. While the teeth of the lower arch are arranged similarly to those of the upper, they stand in a smaller curve, so that the line of the ellipse which falls on the buccal cusps of the upper premolars and molars will fall upon the buccal surfaces near the gum on the lower teeth. Furthermore, while the incisors of the upper arch are arranged so as to describe a curve from canine to canine, the deviation of their long axis from the vertical is such as to place the apices of their roots in a smaller arch. In the lower this condition is different; the apical arch may be of the same dimensions as that of the incisal edges, or even larger. However, the marked variability in outline of the dental arches may readily be seen in Figs. 13 and 14.

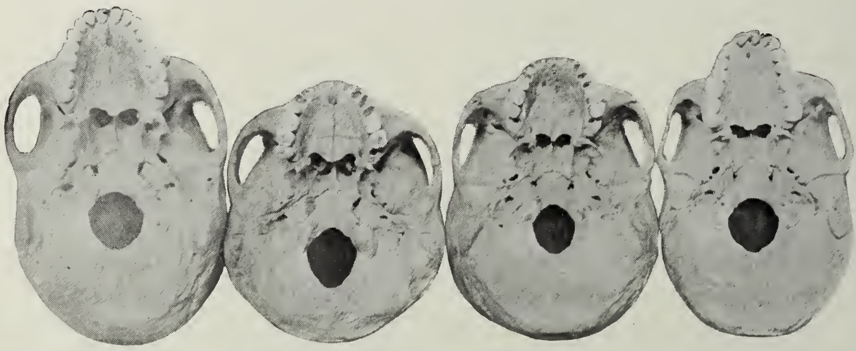
Referring to the observations made by Prof. Raymond C. Osburn([14]), a dental arch in a given type of man will be found to exhibit "a definite relation to the skull." Prof. Henry Fairfield Osborn, in 1902, demonstrated the existence of a correlation of the teeth with thirty-seven skull characters in lower animals. But whether the form of the skull or the correlated thirty-seven skull characters have any direct influence upon, or in any way affect the shape of, the dental arch, or *vice versa,* these authorities do not state. From what I shall show presently, it is probable that the form of the skull and its characters may directly be influenced by the masti-

Fig. 13.



Two skulls—A, of African Fan tribe; B, of European—showing the extreme variability in form of the human dental arch. (Cryer.)

Fig. 14.



Negro. Mexican Indian. Thibetan. Australian.
(Osburn.)

catory apparatus, although both these conditions are possibly the expression of more profound causes. Thus, asserts Professor Patten (15):

> Prominent differences in men arise from the contrasting effects of upland and lowland climates. An upland race, if in a dry region, has a purer and more bracing atmosphere, and hence does not need so much lung power. It must develop greater vigor and endurance, partly because of the cold, and partly because of the game it chases and cattle it herds. Its food is dryer, harder, and more condensed; hence a better development of the jaw and its muscles results; along with this come smaller stomachs, better digestion, and fresher blood. A tall, narrow-chested man comes into being, who is in marked contrast with the short, broad man of the lowland region. These typical differences are accompanied by minor traits, not always found in all of a given race, but often enough to indicate that they have the same general causes. Long heads and round heads represent dynamic changes, even if we cannot trace back to given climatic origins. Some races and persons have a marked development of the lower face, with prominent jaws and strong facial muscles. These people like hard foods, enjoy chewing their food, and, if possible, keep something in their mouth, gum or tobacco, or the like, to exercise their jaws. It indicates a surplus of energy and strong muscular development. It is equally plain that those with a weak lower jaw and muscles take readily to soft, sweet foods, that they suck or gulp down rather than chew. This means a better muscular development of the throat. A snake, for example, sucks down its food, while a tiger chews his. In men the sweets and the meats are causes that brings out this difference between the chewers and suckers. Another like contrast is between the mouth-breathers and the nose-breathers. We speak of breathing as a habit, and yet different habits would not tend to be formed if muscular differences did not exist. Each activity is the outlet of energy, which tends to express itself through bodily mechanisms. The strong grows at the expense of the weak; each difference in bodily powers *tends to develop a type.*

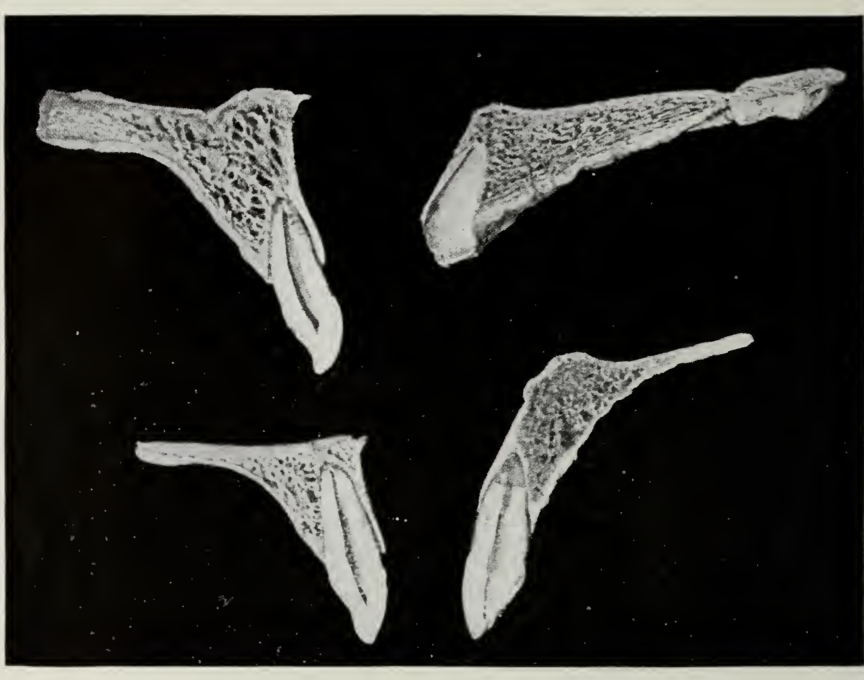
The vertical plane of the human denture may vary from that of a straight line to a marked curve with its convexity downward. The meaning of this surface outline has been guessed at by several authors, but, so far, no real significance has been attributed to it. It needs no great amount of argument to conclude that the arrangement of the teeth, individually and collectively, both vertically and horizontally, in their respective arches, is dependent upon their structural form and their environment, and that in no other position could there be that definite, positive, and effective relationship, as in the one where the forces controlling them have been instrumental in placing them.

(4) THE EFFECT OF NORMALLY OCCLUDING TEETH UPON THE ALVEOLAR PROCESS AND ITS INTIMATELY RELATED STRUCTURES.

The alveolar process, being that part of the jaw-bone which develops with the denture and atrophies after the loss of the teeth, demands our immediate attention. To describe this process minutely would necessitate the writing of a voluminous essay. Suffice it, therefore, to say that in its general anatomical make-up it is as remarkable a structure as would do justice to the functions it is called upon to perform. Its architectural construction is such as not only to give support to the teeth during their physiological activity, but also to dissipate the force of mastication exerted upon the teeth, and to transmit it to neighboring parts that are by nature more resistant than itself. To fulfil adequately such requirements, it is expected that this process should be constructed accordingly. Thus the facial and oral cortical plate of compact bone, with the intervening spicules of cancellous tissue of which it is formed, is powerful enough to withstand the enormous pressure produced during the act of mastication. But as this force is not alike in all, and not alike in the different regions of the mouth in the same individual, there is a great variability in the relative quantity of the two forms of bone in homologous regions of different individuals, and in different regions of the same individual. In Figs. 15 to 22 the proportions of the cancellous and compact bone may be observed;* the variability

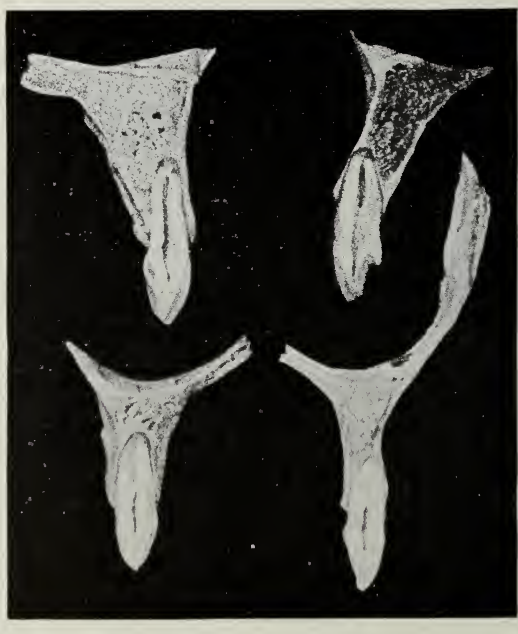
* These illustrations were taken from Rudolf Loos' work: see bibliography.

Fig. 15.



Radial sections: Upper central incisors. (Rudolph Loos.)

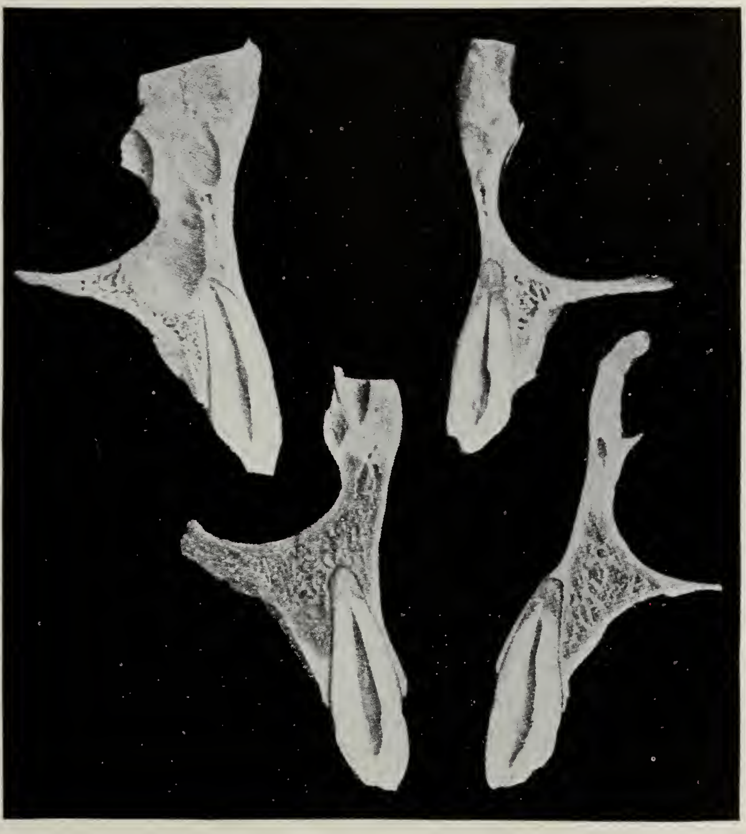
Fig. 16.



Upper lateral incisors. (Loos.)

in the relation to the palatal process and that of the root-apices to the various superposed air-spaces; the different curves described by the palatal process toward the alveolar process, and the length of the alveolar process in the various specimens. Also, wherever greater strain is exerted upon the alveolar process than it is alone able to withstand, those parts are enforced by buttresses for additional support, as in the premolar and molar regions by the malar process and its articulating bones, the malar and zygoma. The main point, however, in connection with these sections is the evidence of the manner in which the force produced by the act of mastication is transmitted by this process to the other bones of the face and the skull. Before analyzing more critically the dissipation of this force, it is important to remember the direction of the long axis of each tooth; and it can readily be observed that, if the roots of the incisors would be extended, they would strike the pyriform opening of the nasal chamber; the extension of the direction of the canine points to the frontal process, while that of the premolar and molar roots points to the floor of the antrum. Thus, according to Loos([16]), the forces of the lower jaw actuated by the muscles of mastication is transmitted to the upper teeth, and from there on upward, following well-established rules. According to the laws governing the one-armed

Fig. 17.



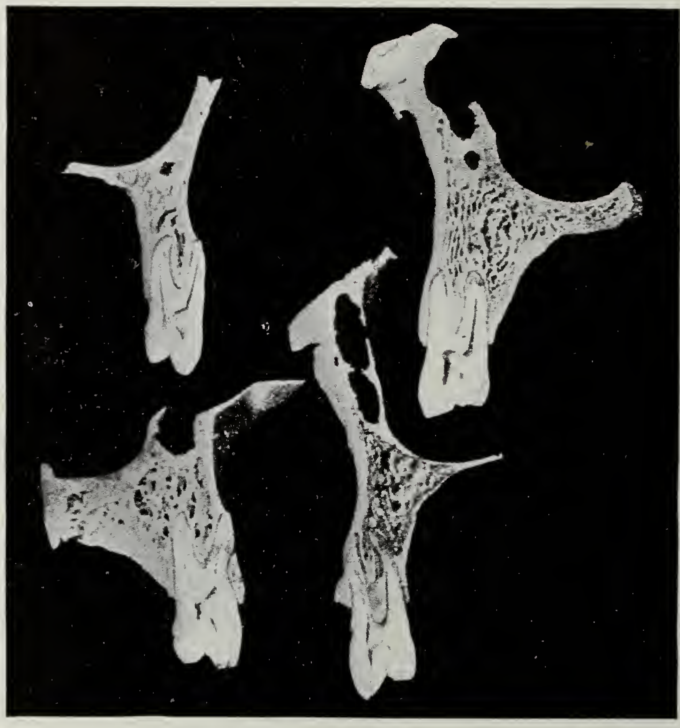
Upper canines. (Loos.)

lever, which the mandible with its dental arch represents, the various teeth are subjected to different degrees of stress, depending upon their distance from the temporo-mandibular joint—the fulcrum.

Molars. As the molars are nearest that point, the stress received by them is greatest, and we shall consider them first. The force received by the molars is transmitted directly on the facial as well as on the oral wall. The spongiosa, situated between the free alveolar plates, transmits the force exerted upon the alveoli to the compact plates of the alveolar process. Owing to the maximum pressure of mastication in the molar region, and the like resistance rendered by both the facial and oral walls of the alveolar process, there is developed a system of buttresses for reinforcement in this position. We have here the strong malar process of the maxilla, into which the facial wall extends. This in turn is reinforced by the malar bone and the zygomatic process of the temporal. The malar bone, again, articulating with the frontal bone, gains thereby still more resistance. By this manner of reinforcement, it will be seen how the force is finally transmitted to a great portion of the brain-case.

The oral wall of the alveolar process in the molar region is situated at the junction of the lateral nasal wall and the floor of the nose, that is, a point on a convex wall. The force exerted by the palatal root must therefore divide into two components, the one of which falls on the lateral nasal wall, while the other is received by the palatal process. The lateral nasal wall in turn reaches the brain-case by the median orbital wall. The components upon the palatal process derived from both maxillæ are received

Fig. 18.



Upper first premolars. (Loos.)

at the median suture, and similarly transmitted to the brain-case via the septum of the nose. The third portion of the pressure received by the alveoli is taken up by the spongiosa, and through its numerous spicules is dissipated toward both cortical plates of the alveolar process and partly also toward the floor of the antrum—again a convex bony wall. The floor of the antrum in turn transmits this force facially to the malar process, orally to the lateral nasal wall, mesially to the frontal process, and distally to the wings of the sphenoid bone. A union of all these resisting walls of the antrum, and with it also a reinforcement of the whole, is accomplished by the roof of the antrum.

Premolars. The tooth of next importance in the maxilla is the premolar. It is immaterial which of the two we shall take into consideration, both being subjected to similar conditions. The exerted pressure, as in the case of the molars, is directed upon the facial wall of the alveolar process. The transmission of the force orally is only possible through the narrow part which the wall of the alveolar process contributes to the formation of the alveolus as well as to the spongiosa. We have three kinds of buttresses to consider which tend to participate in the resistance of the force exerted on the facial wall. One part of the pressure is exerted directly upon the malar process, another upon the frontal process, and the third upon the convex lower orbital border, which, in turn, transmits it partly to the frontal process and partly to the malar process. The direct force exerted on the oral plate is taken up by the palatal process, and is compensated in an analogous manner, as in the molar region. The pressure re-

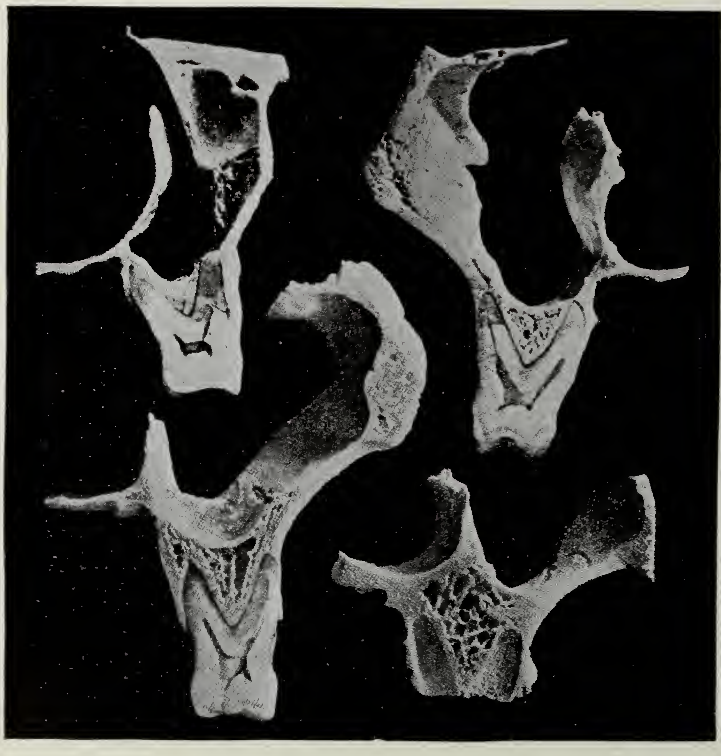
Fig. 19.

Upper second premolars. (Loos.)

ceived by the spongiosa is transmitted partly to the facial wall of the alveolar process and its buttresses, partly to the oral plate of the alveolar process and the palate, and partly to the floor of the antrum and the lateral nasal wall, which, as described above, forms one component directed to the skull and another to the nasal floor, that is in turn compensated by a similar one from the opposite half at the palatine suture.

Anterior teeth. The force that the front teeth, incisors and canines, are exposed to is slight, owing first to the distance from the fulcrum—*i.e.* the length of the lever the mandible represents—and secondly, to the character of the teeth, which are by nature designed to incise but not to triturate the food. The facial wall of the alveolar process is directly burdened, the oral wall very little. The buttress of the facial wall is formed by the frontal process of the maxilla, which is normally placed just over the canine. This process, therefore, receives all the force exerted upon the canine. The incisors transmit the force facially upon the lower border of the *apertura pyriformis,* a downward convex thickening, which in turn transmits it to the frontal process externally and to the palatine suture via the nasal spine medially, where it is counteracted by the components from the other half of the bone. Orally the front teeth exert their force upon the oral wall of the alveolar process, and, through its curved direction, it is transmitted to the palate and compensated at the median suture as above. It may also be said that, although the dissipation of all these forces is best analyzed in the permanent dentition, it

Fig. 20.



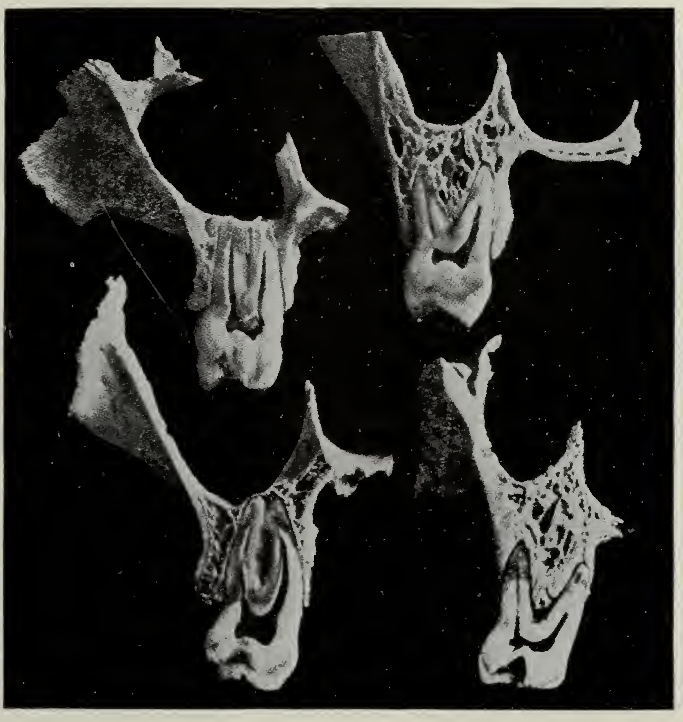
Upper first molars. (Loos.)

similarly occurs in the deciduous teeth, and its effectiveness is just as marked in the healthy toothless nursling.

We see, then, that the force exerted by the muscles of mastication upon the teeth is ultimately invariably transmitted to the brain-case. Another powerful force received by the cranium directly is that derived through the condyles of the mandible, as they articulate in the glenoid fossæ of the temporal bones. Thus, if the mandible, as stated above, represents a lever of the third class, and the weight upon the teeth during the act of mastication represents hundreds of pounds of pressure, this will be manifolded at the other extremity of the lever, in proportion as the power—the muscles—proximates the fulcrum. We would, consequently, not go so very far astray by assuming that, in the establishment of the cephalic index, the masticatory apparatus is a very important factor.

And finally, tracing the effect of all these forces upon the paths themselves, it is quite evident in what manner the face and upper air-passages are influenced. We are therefore led to agree with Prof. Raymond C. Osburn that—"When the teeth are present in the proper number and in normal occlusion, the facial outline, as far as it is affected by the teeth, will be normal for the individual, whatever particular 'cast of countenance' nature designed him to have." In other words, as Angle formulated it in his law of normal occlusion: "It is that the best balance, the best harmony, the best proportions of the mouth, in its relation to the other features, require that there shall be *the full complement of the teeth, and that each tooth shall be made to occupy its normal position—normal occlusion.*"

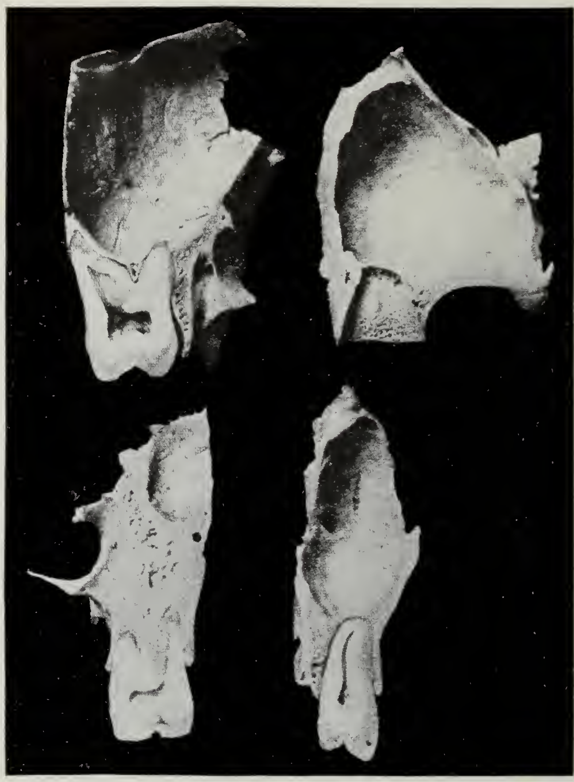
Fig. 21.



Upper second molars. (Loos.)

Of course, the position of the human masticatory apparatus as such in relation to the face and head, producing conditions of prognathism and orthognathism, is of great significance; for it may vary in the different races of man, as it varies in the different species of animals from the lowest to the highest form without the slightest deviation from the normal. Depending upon the inclination, form, and position of the alveolar process and its contained teeth, in relation to the face and head, we may have the

Fig. 22.



Upper third molars. (Loos.)

Fig. 23.

Side view of skulls of two old-world monkeys, *Colobus* and *Cynocephalus*, showing conditions of orthognathism and prognathism. (R. C. Osburn.)

different gnathic types, which is true of lower animals as well as of man. This character of the two different types of jaw of the Titanotheres, an extinct animal, has been distinctly described by Prof. Henry Fairfield Osborn(17). The different types of dentitions of the teeth should be noted in the monkeys (Fig. 23), and finally the different gnathic types of man (Figs. 24, 25, and 26).

Fig. 24.

Human skull showing condition of orthognathism. (Noyes.)

Fig. 25.

Skull of negro, showing extreme prognathism. (Cryer.)

SUMMARY.

To recapitulate, we may say:

(1) That, as the late Prof. John Ryder, of the University of Pennsylvania, contended, the soft parts are not determined by the hard parts, the reverse being true. The bony structures are the consequence of the activity of the soft parts, and are laid down later. Those parts in which metabolism is modified, so that the solid ingredients of the blood are deposited there, become solid and unyielding. Bony structures thus come into being and seem a part of heredity, when in reality they are a consequence and not a cause.

Fig. 26.

Models of normal dentitions of three orthognathic Europeans, showing variability in the inclination of the alveolar process and teeth. (M. H.)

(2) That, therefore, the first requisite of normal occlusion is the normal development of the structures concerned in the establishment and maintenance of this condition ("Forces of Occlusion," Angle).

(3) That the forces of occlusion develop in order of their importance; first the tongue, next the lips and cheeks, then the jaws, and lastly, the teeth and the dental arches.

(4) That the normal activity of the dental apparatus is functionally concerned in mastication and speech; but the interrelation of the teeth themselves depends, besides their occlusal inclined planes, upon the normal development and normal activity of the structures named under 3.

(5) That the effect of normal occlusion is not limited to the mouth alone, but influences the development of the respiratory passages and the face and head, in the establishment of type.

(6) And finally, the line of occlusion —"the line with which in form and position, according to type, the teeth must be in harmony if in normal occlusion" (Angle)—can only be thoroughly comprehended upon the keenest appreciation of the *true* significance of normal occlusion in the broadest possible manner.

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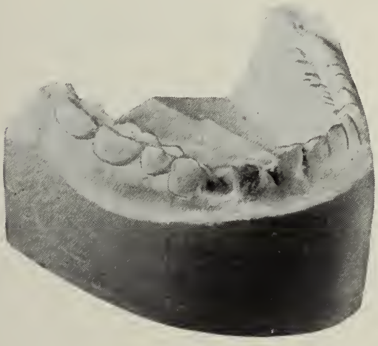
[See also *Discussion,* as reported under "Proceedings of Societies," this issue.]

FORCED ERUPTION AND REGULATION OF A RETAINED LOWER RIGHT CANINE.

By ALEX MERTENS, The Hague, Holland.

ABOUT five years ago, a lady brought her daughter of about seventeen years of age to my office, the latter's lower right canine having failed to erupt. In the place where this canine should have been there was an open space, while the lower right lateral incisor was somewhat out of proper alignment distally, as may be seen on the accompanying reproduction of the model of the lower jaw. (Fig. 1.)

FIG. 1.



HISTORY OF CASE.

Besides, there was an ugly scar on the cheek almost corresponding with the place of the alveolus of the lower right canine. On further inquiry I learned from the mother the following history of the case: From her eighth to her ninth year the patient had violent neuralgic pains along the mandibular nerve on the right side. (The family was then living in the Indies.) Continually there appeared on the cheek, following the course of the nerve, herpes blisters, which the mother, upon the advice of a physician, opened by means of a needle passed through a flame. After about a year an ulceration, as the mother called it, was formed at the site of the present scar. There was a liberal secretion of pus, and after some time the sore, and with it all pain, disappeared. The mother was of the opinion that the needle with which she had pierced the herpes blisters the last time had not been sufficiently sterilized, and had caused the sore and consequently the ugly scar, which to her was, and remained, a continuous source of grief. I heard, too, that about three or four years ago the lower right canine had been extracted because it was loose and caused pain; but whether this was a deciduous or permanent tooth, neither the mother nor the daughter could tell.

DIAGNOSIS.

My diagnosis was retention of the lower right canine. The pressure on the pulp, in all probability, had caused the neuralgic pain which persisted during the patient's eighth year. I surmised that after a year the pulp had died, causing an abscess which broke out on the face. This, too, explained the sudden relief from the neuralgic pain. Since

FIG. 2.

palpation did not reveal a retained tooth, I proposed that a radiograph be made. In this radiograph (Fig. 2) the retained tooth can be clearly seen lying in an almost horizontal position, labially from the other teeth, and entirely surrounded by bone, the crown reaching to the apex of the lower right central and the apex to the root of the lower right second bicuspid.

TREATMENT.

I then proposed to try and bring this retained tooth in its proper position, which was agreed to. First, by elastic rings, the lower right lateral was moved in a mesial direction, thus closing the space between the lateral and central. Then at the level of the retained tooth, an incision in the gums was made up to the bone and the mucous membrane pushed aside by small cotton tampons. An opening was then drilled through the jaw-bone and widened to 0.5 sq. cm. A thick, tough membrane of connective tissue was reached, making me think, at first, that I had struck the pericementum of the retained tooth, but I was soon convinced, upon using a sharp probe, that there was enamel under the membrane. The little wound was then dressed with a bit of iodoform gauze, and the patient was dismissed till the next day. A small hole was then drilled into the crown, and by means of cement a little hook was fixed in it. At the same time it was noted that there was no pulpal reaction to an electric test. The lower right teeth, from the central to the first molar, were then capped, and the caps were connected by a little bar. To this little bar an elastic ring was fastened, which was connected with the other end to the little hook in the retained tooth. By fastening the elastic ring to the horizontal bar more mesially or distally, it was possible to induce the crown of the canine to erupt in the desired place. After some weeks the crown had entirely come out of the gingiva; the incisal edge of the crown was, however, turned still too much in a mesial, the apex too much in a distal direction. In order to give the tooth a more vertical position, a second hook was fastened to the mesial side of the crown, but lower than the hook on the distal side. By effecting an upward mesial traction, while the distal hook was firmly held in its place by being fastened to the horizontal bar by a wire ligature, the tooth was placed in a more vertical position. After a lapse of five months, the tooth was fairly well in place. I then proposed to treat the root-canal and to bring the tooth still more into its proper place, but the patient thought the result quite sufficient, and declined any further treatment.

FIG. 3.

FIG. 4.

In Fig. 3 the result obtained may be seen. The position of the tooth in its socket is very solid. Another radiograph (Fig. 4), which was taken on April 10, 1909, was not very successful, yet close examination, nevertheless, shows that the regulated canine has a long root bent convexly in a mesial direction, and pretty well occupies its proper position.

THE FUNDAMENTAL PRINCIPLES OF ROOT PREPARATION.

By FORREST H. ORTON, D.D.S., St. Paul, Minn.

(Read before the North Dakota Dental Association, at its eighth annual meeting, Fargo, N. D., May 16, 1913.)

THE literature describing methods for replacing natural with artificial crowns is voluminous and abundant, and the technique of construction is, as a rule, presented graphically and in detail. Nevertheless, it must be clear to anyone who will consider the matter carefully that neither mere ingenuity nor even the greatest amount of mechanical skill in execution can at all compensate for an improper preparation of the root. Yet on this subject the literature is so slight as to be insignificant. This most difficult as well as most important feature of the work is usually dismissed with a brief and utterly inadequate caution to make the axial walls of the root parallel.

From this curt dismissal of the subject one would be inclined to infer that the preparation of the root was of secondary importance. Nevertheless, I am convinced that more crown failures can be traced to a lack of thoroughness at this stage of the work than to any other cause.

It may be true that the character of this work is such as does not lend itself readily to description by means of the written word; there can be no doubt that a better understanding of the technique and instrumentation employed may be gained by watching a clinical demonstration than by reading a verbal description. This is true of most of our work; we learn best by seeing an operation done. Most dentists have therefore come to have the type of mind known as the visual mind. One of the most difficult problems of the spoken or written word, the successful solution of which requires the master hand, is to render a description which makes the hearer or reader see the thing as it actually is—*i.e.* gives him a correct and full visual image of it. Yet, in spite of this difficulty, I see no reason why the principles which should guide this operation may not be as clearly presented as, for example, the principles of cavity preparation.

COMPARISON BETWEEN CAVITY PREPARATION AND ROOT PREPARATION.

We may draw an instructive parallel between cavity preparation and the preparation of the root for the reception of a crown. An intimate knowledge of the surface anatomy of the tooth is prerequisite to a proper understanding of the principles of modern cavity preparation. In the case of the preparation of the root, likewise, we are dependent upon our knowledge of dental anatomy, and that to an even greater extent. When we stop to consider the firmness of the attachment between the enamel and the dentin, together with the fact that a certain part of the field of operation is concealed from view by a very delicate membrane, which will usually react unfavorably to the slightest injury, we can readily understand that this work cannot be performed in a perfunctory manner. Other things being equal, it is certain that he who depends upon a sense of touch alone in this work will do more damage to the surrounding tissues than he who is aided also by a clear knowledge of the character and shape of the structure upon which he is working.

ANATOMIC CONSIDERATIONS IN ROOT PREPARATION.

The subject of dental anatomy, in so far as it has important bearing upon operative dentistry, may be conceded to have been exhaustively treated in the two able and authoritative text-books upon the subject published by Drs. Black and Broomell. But the making of a crown introduces new problems, and makes new and searching demands upon our knowledge. We are confronted with the necessity of understanding the relation of the dentin and the enamel to the contour of the tooth, *i.e.* the proportion of the tooth occupied by each tissue; we need to know the shape of the dentin when denuded of its enamel, and especially is it important to know the form of the enamel as it approaches the cementum, the amount of variation of the gingival line, and the average length of the free gum margin. The length of the free gum margin can be made a very important diagnostic sign. This feature may be decisive as to when it might not be best to employ the banded crown, for where the gum line is normal, a condition frequently found in youth, we might safely infer that the peridental attachment is normal, *i.e.* the peridental fibers are attached as far crownwise as the gingival line. Under these conditions, it would be impossible to remove the enamel without doing a serious injury to the fibrous attachment which holds the free gum margin tightly against the gingival margin. An injury to the attachment would cause a recession of the gum and progressive loss of gum contour. While the gum recedes normally as age advances, I am convinced that it is bad practice to deliberately hasten this recession.

I simply mention the foregoing supposition in passing, as it is far from being the average condition, and is chiefly to be expected in youth and adolescence. But when a tooth has been subjected to such an unfavorable environment as to require a crown, either through extensive destruction by caries or loss of structure by poorly placed fillings, the interdental space will have been lost, with more or less injury to the peridental attachment, in which case the situation admits of a banded crown. But even then we may still have from 1½ to 2 mm. from the gingival line to the free margin of the gum.

THE PROBLEM OF REMOVAL OF ENAMEL.

It is generally conceded that the ferrule should extend rootwise as far as the gingival line, and as the gingival line is the most constricted portion of the tooth, if we are to have a ferrule in close contiguity around the entire gingival circumference, the tooth must be scaled down at least as far as this constricted gingival line. How are we to be sure when we have scaled the tooth sufficiently to obtain this necessary condition? Will the removal of the enamel be sufficient to give us parallel walls, or does the dentin make up part of the gingival contour?

MERE EMPIRICISM OF LITTLE VALUE.

I have asked this question of a great many dentists, and have been strongly impressed with the want of a standard of criticism. Dentists generally seem to agree that experience and judgment are the only guides possible in this work. Each individual who accomplishes anything in this direction laboriously works out for himself by a trial-and-error method his own theory and practice, and when he passes away, his art perishes with him. I need not insist on the loss of effort caused by this method of working, nor upon what the profession loses as a whole by the fact that one man cannot begin where another leaves off.

I do not in the least underrate the value of clinical experience. But we cannot build a science on this alone. Scientific inquirers give the name of empirical laws to uniformities which observation has shown to exist in a definite number of cases, but on which they hesitate to rely in cases varying much from those actually observed. Such a law seems to hold as a matter of fact, but it is impossible to see any reason why such a law should exist. Therefore, however useful empirical knowledge may be, it is not to be compared in value with that well-connected and perfectly explained body of knowledge which constitutes an advanced and systematic science. It is in proportion as a science becomes systematic and enables us more and more to grasp apparently unconnected facts under the same law, that it becomes perfect. He who knows exactly why a phenomenon happens, will also know exactly in what case it will happen and what difference in the circumstances will prevent it from happening. Keeping in mind, therefore, these general considerations, let us see if we can discover any such principle in connection with the matter before us.

EVOLUTION AS INFLUENCING THE SHAPE OF THE TEETH OF MODERN MAN.

Let us consider the tendency shown in the evolution of the jaws of civilized man. It is generally admitted that the jaws are growing smaller. No better proof of this can be given than the changing shape of the teeth. In the higher anthropoid apes the teeth are short, broad, and extremely bell-shaped, with large interdental spaces, owing, no doubt, to the existence of plenty of room for their development. In these teeth the dentin makes up part of the contour of the crown. The teeth of primitive man, while not quite so large, have the same general type, and, as might be expected, the dentin makes up part of the contour of the crown. In the deciduous teeth of today also, the dentin makes up part of the contour of the crown.

Now, let us look at teeth of the extreme opposite type. In the highly complex nervous organization which is becoming so common in the overcrowded civilized centers today, the jaws are smaller and narrower, and as a consequence the teeth are longer and crowded more closely together; the cusps are bunched together, and the teeth are less bell-shaped. In these teeth the dentin, instead of making up the contour of the crown, presents axial walls which tend to approach each other, so that in extreme cases, when the enamel is stripped from the crown, we have a veritable peg-shape left. I would not be misunderstood as advocating that we build our theory and practice on extreme cases. If we are to have a scientific standard of criticism, we must know the anatomy of the average tooth of today; then, having possession of the general principles noted above, when we meet with extreme types the principle will tell us how and why to vary our operative procedure.

The removal of the enamel from the dentin for a space of upward of 2 mm. underneath the gum tissue, without doing injury to the gum tissue and the peridental attachment, requires so high a degree of surgical skill and is so laborious an operation, burdensome alike to the patient and the operator, that we would like to be quite sure of its necessity before insisting upon it as a normal procedure.

RELATIVE DISTRIBUTION OF VARIOUS TISSUES IN TEETH.

A description of the relative proportion of the tooth occupied by each tissue will, I think, be convincing on this point. The contour of the tooth is made up almost entirely by the enamel. Beginning at the gingival line by a beveled edge, it gradually increases in thickness, until the points of the cusps are reached; here we shall find the thickest enamel. The enamel will also be thickest underneath any ridges or elevations on the various surfaces, this thickness being formed by the increased convexity of the outer surface. The dento-enamel junction—or axial wall of dentin—passes toward the occlusal surface with little or no convexity, but only with a slight inclination toward the axial line of the tooth. If this anatomical description is accurate, the entire removal of the enamel seems to be an obvious necessity if we are to have the crown in close contiguity with the entire gingival circumference.

While the anatomy just described will not be found in any published work upon this subject, Dr. Daymon, the dental anatomist at the University of Minnesota, has thought this matter of such fundamental importance as to warrant the undertaking of a large task in grinding specimens, taking measurements, and making charts. It is hoped that a practical application of these findings will tend materially to advance crown work to a high rank among modern prosthetic dental procedures.

DIFFERENCES IN TOOTH FORM AT THE FREE MARGIN OF THE GUM AND AT THE GINGIVAL MARGIN.

In order that dentists may have a more accurate perception of the difference between the form of the tooth at the free margin of the gum and at the gingival margin, we will study these portions of a lower first molar somewhat in detail. A difference is noted in the outline form of the dento-enamel junction and that of the periphery of the crown at this point. The measurement of the outline form of the dento-enamel junction at this point is practically the same as the measurement of the outline form at the gingival line. We can easily verify this by taking an extracted tooth, obtaining the shape at the gingival margin by shaping a brass ligature wire around it at this point, and then grinding down the occlusal surface until we have reached the free margin of the gum. The discoloration and etching of the enamel will aid us in determining it on the buccal and lingual surfaces and the points of proximate contact on the approximal surface. When subsequently the outline form of the gingival margin, which has been obtained with the wire ligature, is placed over the dento-enamel junction at the free margin, it will be found almost identical.

SCALING OF ENAMEL IN DIFFERENT TEETH.

Thus, if we are to obtain a perfect adaptation of the band at the gingival margin, the removal of all the enamel at this point is obviously necessary. In scaling the enamel, we should always bear in mind the points at which we should expect to find it thickest. Our sections and drawings [demonstrating] show a thicker deposit upon the mesial and distal than upon the buccal and lingual surfaces, and again a thicker deposit upon the distal than the mesial surface. One of the most difficult points to scale is the disto-lingual angle point, and here we will find the thickest enamel. This we might expect, as the mesial root has two canals, and is wider bucco-lingually than the distal root, which has only one canal, while the measurement of the periphery of the crown is the same on the distal as on the mesial surface.

In the upper molars there is usually found a thickening of the enamel upon the mesio-lingual and disto-lingual angle points which is especially difficult to scale. This thickening is probably due to the lessened mesio-distal diameter of the lingual root over that of the two buccal roots, while the mesio-distal diameter of the crown upon the lingual root remains about the same as that of the buccal roots.

A point to note in this upper left first molar [demonstrating], from which the distal convexity has been cut off, is that the enamel passes higher gingivally on the lingual than upon the buccal surface, and in a buccal view at the point of approximal contact it may be observed that it passes higher on the distal than the mesial surface. This is an important anatomical point to remember in scaling the root, as well as in trimming and festooning the band.

SERIOUSNESS OF INJURY TO THE GINGIVAL MARGIN.

From the want of care taken to avoid lacerating the gingival margin, one would be inclined to think that a great many dentists do not fully appreciate the importance of maintaining a healthy free gum margin. I doubt if a traumatic injury to this tissue may ever be fully repaired.

The free border of the gum is covered with a moderately thick, dense coating of epithelium, but the portion that folds in and lies next to the neck of the tooth is composed of softer and more delicate cells than other portions. The lymphatic glands are larger and more numerous in this neighborhood than in other portions of the membrane. These glands lie very close to the gingival aperture. That portion of the connective tissue in close conjunction with the tooth is not covered by the epithelium—in other words, there is no attachment of the epithelium to the root of the tooth, and—"It seems to be through this space that the cells, so-called salivary corpuscles, found under the free border of the gingiva, pass, and their number is augmented with every irritation of the membrane." (Black.)

THE DENTAL LIGAMENT.

Bundles of fibers emanating from the cementum at the neck of the tooth turn up into, support, and hold the free gum margin tightly against the gingival margin. These bundles of fibers have been termed the dental ligament; anything which interferes with their attachment will cause the gum margin to recede.

TECHNIQUE OF REMOVAL OF ENAMEL IN ROOT PREPARATION.

While the dental profession has shown a wonderful productiveness in the invention of instruments suitable for accomplishing the various operations incident to operative dentistry, the same degree of ingenuity does not seem to have been directed toward the invention of instruments for the removal of the enamel. Furthermore, while the average dentist will supply himself with from one to three dozen burs and as many chisels, he will limit himself to three or four scalers, notwithstanding the fact that these instruments are subjected to the most severe strain of any in his equipment, and need to be resharpened after each operation.

Your committee has requested me to outline the technique as taught at the University of Minnesota. While each tooth, owing to its position in the mouth, will require some variation of instrumentation, it has been thought best—in order to avoid stretching this paper to an inordinate length—to limit its scope to those cases in which the conditions are favorable, on the principle that it is best to understand the simple before proceeding to the complex.

INSTRUMENTARIUM.

As the lower first molar is probably the tooth on which a banded crown is most often indicated, we will select this tooth for making our preparation for the reception of the crown. The instruments used are (1) an assortment of thin carborundum disks known under the trade name of "Joe Dandy," (2) the Harper scaler, with good assortment of scalers, and (3) the Johnson scalers. These scalers are selected for the reason that they will slide under the gum margin without injury to the soft tissues.

In order that we may have an intelligent understanding of the contemplated operation, we must know the condition of the tooth. Owing to the unquestionable superiority of even a large mesio-occluso-distal inlay over the most skilfully placed crown, a crown in this region is only indicated when the walls are badly broken down, or only the peripheral enamel remains, or in the event of using a comparatively sound tooth as an abutment in bridge work. As the latter involves a more extensive technique, we will suppose that we are to prepare a comparatively sound tooth.

REMOVING ENAMEL PROJECTING ABOVE THE FREE MARGIN OF THE GUM.

The occlusal one-fourth is first removed by cutting through this portion of the tooth [demonstrating] with a Joe dandy disk held in a right-angle handpiece. No attempt should be made to cut off the entire occlusal surface at once —such an attempt is not an economy, for too many disks will be broken. A cut is made to about 2 mm. of depth, and then this weakened occlusal portion is broken away with a chisel, continuing in this manner until the occlusal fourth is removed.

The mesial and distal approximal surfaces are next in order. The mesial surfaces may be removed by beginning at a point about one-sixteenth of an inch distal to the mesial approximal surface with the disk held in the straight handpiece and cutting at a slight angle until the proximal space is reached.

The buccal enamel may be removed next by cutting, with the same disk, a series of perpendicular cuts through the enamel. The continuity of the enamel is thus broken up, and it may be readily chipped off with a sharp chisel.

The removal of the distal contour presents the same requirements as those described for the mesial aspect, with the following difference: On the mesial surface there is a slight inclination mesially; on the distal surface this inclination must be toward the distal aspect. Owing to the presence of the anterior teeth, it is impossible to accomplish this with the straight handpiece. But this difficulty may be overcome with a Joe dandy disk, held in the right contra-angle handpiece, by reversing the handpiece—*i.e.* by holding the angle part of the handpiece toward the distal surface and beginning at a point one-sixteenth of an inch mesially to the disto-proximal surface, cutting at a slight angle toward the distal surface until the approximal space is reached.

The continuity of the enamel on the lingual surface is broken up in much the same manner as on the buccal surface, but with the difference that the perpendicular cuts are made with the disk held in a contra-angle reversed in the same manner as described in removing the distal contour. As the requirements, especially for a molar, will not allow of a chisel being used for chipping off the broken-up enamel, a heavy enamel cleaver, held in a right-angle handle and known as the Harper scaler, may be employed.

We have now removed the enamel from that portion of the tooth which projects above the free gum margin.

REMOVING ENAMEL FROM THE NECK OF THE TOOTH.

But we still have a rim of enamel encircling that portion of the tooth from the gingival line to the free gum margin known as the gingival margin, which, as I have said, will usually be from one and a half to two millimeters in extent. The rods are shortest, and therefore the enamel is thinnest, at this portion of the tooth, and for this reason it would be easier to remove were it not for its inaccessible location, as in demonstrating this technique on a freshly extracted tooth, this gingival ring of enamel is the easiest to remove.

In considering the instrumentation, then, we will have to select instruments that will slide up under the free gum margin without doing injury. I have been most successful with the Johnson scalers on the buccal and distal, and the Harper scalers on the mesial and lingual surfaces. These instruments should be modified by grinding off the convex surplus on the end, as this surplus end only takes up space without adding to the strength of the blade.

SHARPENING ENAMEL SCALERS.

It is best to have an assortment of these instruments, at least six of each kind, and it is important that they be kept sufficiently sharp to enable them to bite into the tissue without the necessity of exerting much force, for if the operator attempts to remove this enamel by main strength, he will be sure to slip and lacerate the gums, or else break off the blade of the scaler. The difficulty and time required in sharpening these blades by hand without rounding or making several different bevels on the same blade is no doubt the reason why so many operators are discouraged, and give up trying to keep their instruments sharp. With the sharpener [demonstrating] invented by Dr. Chas. Wiethoff of Minneapolis, a true bevel and sharp edge may be quickly and easily obtained; in fact, an office assistant, after a few lessons, can put on as true a bevel as the instrument had when it was purchased from the manufacturer. This sharpener is thoroughly practical, and I do not hesitate to recommend it as one of those instruments which are indispensable in a dental equipment. While frequent sharpening wears down the blade, this is an advantage, as it gives the operator an assortment of blades of different thicknesses. For example, the Johnson scaler as it comes from the manufacturers is, in some instances, too thick to allow of its being inserted between the lateral and central incisor, especially if these teeth come very closely together at the gum margin. Blades that have been worn down by frequent sharpening may be inserted without injury to the soft tissue, whereas the newer blades may be used on the buccal and lingual surfaces, where there is sufficient room to allow of their being inserted beneath the gum cuff without injury. But even when the interdental space on the four incisors is normal, owing to the thinness of the gingival enamel on the incisors a very much thinner blade would be indicated than that required for the removal of the much heavier enamel which is usually found on molars.

Having selected the proper instruments for the removal of the enamel at the gingival margin, we will be guided in our method of approach by recalling a mental picture of the shape of the gingival margin, so that, instead of pushing the scaler in a direction parallel to the long axis of the tooth, we introduce it at an angle which allows it to follow the enamel bevel. When the condition is at all favorable, the scaling of the enamel may be done without traumatic injury to the soft tissues, and when pain is experienced other than that which may be due to the pressure of the instrument, it must be attributed to faulty technique.

We have presented toward us the base or thickest part of the enamel rim, which, for illustrative purposes, may be likened to a ledge under which we are to introduce our scaler, and—except in those cases where the pulp has been devitalized for several years, in which case the attachment to the dentin will have weakened—it is not best to force the scalers up as far as the gingival line at first; but by first removing the widest part of the rim, measuring about one-half mm. all around, we will obtain more room, and then we may continue in this fashion, until the enamel is entirely removed.

Convenience will teach the operator when to use the palm grasp and when the pen grasp. This depends upon the position of the tooth in the arch and other favorable conditions, such as loss of interdental space or the tipping forward of the tooth into adjacent spaces.

CONCLUSION.

In conclusion, I would like to say that, if I have succeeded in emphasizing the importance of a more thorough study of dental anatomy, I shall feel gratified. For an intimate knowledge of the anatomy of the teeth and their surrounding structures is as important to the dentist as general anatomy is to the surgeon; in spite of which fact that part of dental anatomy which has a special bearing upon crown and bridge work has hitherto been strangely neglected.

SOMNOFORM ANALGESIA AND ANESTHESIA.

By E. L. MORAVEC, D.D.S., Cedar Rapids, Iowa.

(Read before the Cedar Rapids Dental Society, April 7, 1913.)

ANESTHESIA, the greatest boon ever bestowed upon suffering humanity, is the gift of Horace Wells, a dentist, a humanitarian, and a great benefactor. Another dentist, Dr. Morton, discovered the anesthetic properties of sulfuric ether.

Anesthesia has made surgery possible, and dentistry has contributed anesthetics to the sum total of the world's knowledge. That alone should be glory enough to make the dentist proud of his profession.

PAIN A GREAT BARRIER.

The nature of our work is such that we almost constantly inflict pain. Patients under our care suffer both mentally and physically, the one kind of suffering augmenting the other. Were it not for the dread of pain, five times as many dentists as we now have would be required. I have read that in our country only eight per cent. of the population are regular attendants of dental offices, and from forty to fifty per cent. of our people are amply able to pay for such services. *Pain* is the reason. By our continual practice our sensibilities become deadened, and the constant effort to impress upon our patients the fact that "This will not hurt" makes us finally believe that the outcry of the patient is only the result of an imaginary pain. The phrase has been coined—"He lies like a dentist."

REASONS FOR THE USE OF ANALGESIA AND ANESTHESIA.

The reasons why we should employ analgesia and anesthesia are as follows: (1) To prevent pain, thus eliminating fatigue, shock, and collapse. (2) To make possible shorter sittings, a condition certainly more pleasing to both the patient and operator. (3) To enable the operator to make a more thorough operation. (4) To enable the operator to accomplish an increased amount of work in a given time. (5) To elevate dentistry to the dignity of a branch of surgery; also to increase the receipts of our practice, since for such service the people are willing to pay.

PAIN AND SHOCK.

Pain causes exhaustion of the vasomotor centers and shock, rather than structural lesions.

Shock, then, may be defined as a depression produced by exhaustion of the medullary centers controlling respiration and circulation by a too sudden and painful or prolonged stimulation of the afferent nerves, these nerves carrying the impulses from the periphery to the brain.

As a practical illustration take the following condition: The operator applies suddenly the revolving bur to sensitive dentin; the patient turns pale, and breaks out in perspiration. What has happened? Too sudden stimulation of the afferent nerves is exhausting the respiratory and circulatory centers in the medulla, and if it be applied for too long a time, loss of consciousness may result, with cessation of breathing.

Psychical shock is caused by mental impressions, the fear of pain being the etiological factor. I have seen patients faint at the sight of forceps or from watching another patient undergo an operation. Local anesthetics would in these cases be, at best, only partially effective.

ANESTHETICS.

The first known form of anesthetic employed was boiled hemlock applied locally, and vinegar applied subsequently as an antidote or a stimulant. Other anesthetics are as follows: Sulfuric ether, $C_4H_{10}O$. Chloroform, $CHCl_3$. Ethyl chlorid, C_2H_5Cl. Methyl chlorid, C_3H_3Cl. Ethyl bromid, C_2H_5Br. Bromoform, $CHBr_3$. Pental (non-official). Nitrous oxid, N_2O_2. Also a number of others.

For your present consideration I shall take up a combination of ethyl chlorid, methyl chlorid, and ethyl bromid, which combined constitute somnoform.

Somnoform.

The first formulæ for this combination were as follows:

(*a*)

	Per cent.
Ethyl chlorid,	60
Methyl chlorid,	35
Ethyl bromid,	5

(*b*)

	Per cent.
Ethyl chlorid,	83
Methyl chlorid,	16
Ethyl bromid,	1

This (*b*) is now used in 5 cc. and 3 cc. capsules.

The action of each ingredient alone is vastly different from that of the combination. The process of obtaining or the source of each ingredient we need not discuss here.

Ethyl chlorid is used also for internal medication, as a stomachic, a carminative in flatulent dyspepsia, and a cardiac stimulant, besides being a local anesthetic and also, when inhaled, a general anesthetic—although a somewhat dangerous one, therefore seldom employed alone.

Methyl chlorid belongs to the same family as ethyl chlorid, the formula differing but slightly. It is used in medicine for neuralgia. It is a local anesthetic, and also is used as a general anesthetic; it is a very dangerous one.

Ethyl bromid was first introduced into the practice of medicine about 1880, as a quick and agreeable anesthetic, but it proved fatal in a number of cases, and was therefore abandoned. It causes dangerous lesions of the heart, lungs, and kidneys.

In the combination anesthetic, the methyl chlorid secures promptness of action, so that somnoform begins to exert its anesthetic effect within from thirty to forty seconds, or about the time required for the red blood-cells to travel from the lungs to the nerve centers where anesthesia is induced. The ethyl chlorid prolongs the stage of anesthesia, while the ethyl bromid produces the stage of analgesia immediately following the anesthesia, which is of great value in slight operations. This stage is sometimes longer in duration than the period of anesthesia.

PREPARATION OF THE PATIENT.

The preparation of the patient in my office is left to my lady assistant. Success depends largely upon the capability of this assistant, who with female patients must see to the removal of the corset and the loosening of all bands about the waist and neck. While doing this, if competent in her work, she will maintain a light conversation to keep the patient's mind off the operation, mention cases—especially those of patients of her acquaintance if possible—who have undergone such operations successfully. She should laugh with the patient, since there is nothing like a laugh to make one feel at ease. While the operator is administering the anesthetic, the assistant should stand on the left side of the chair. There should be no conversation except quiet, reassuring words from the operator, who should ask questions and request answers from the patient, thereby judging somewhat the stage of anesthesia. No whispering should be tolerated. as the hearing is the last sense to depart and the first to return. When the anesthesia is sufficient to operate, the assistant should watch the condition of the patient. If the patient is in the analgesic state, she must hold the appliance and increase or diminish the amount of air and somnoform as conditions indicate. She must, of course, be thoroughly acquainted with the symptoms of anesthesia. The necessary instruments must be at hand for the operator, a pus basin being kept ready in case of tooth extraction, and the assistant takes general care of the patient following extraction. A third person must always be present, especially if the patient be a young woman.

INDUCTION OF ANALGESIA.

After all is in readiness, the appliance is adjusted in the proper position, and the patient is allowed to breathe air only, for a few inhalations, then the indicator is advanced to about $\frac{1}{8}$—which means that the patient is getting $\frac{1}{8}$ somnoform and $\frac{7}{8}$ air—for four or five inhalations. A quiet, reassuring conversation is kept up; the indicator is advanced to $\frac{1}{4}$, while the operator continues to ask questions requiring answers, thereby judging the progress of the anesthesia. Soon a lazy dropping of the eyelids and slight muscular relaxation will be noticed. At this time an excavator should be applied to the dentin. The operator should proceed slowly at first, ask as to pain, then start slowly with a sharp bur. It will be found that the patient will not mind the bur. The assistant may, at this time, shut off the somnoform, at least in part. If the patient again shows signs of pain, she will advance the indicator. An assistant should be able to judge of the patient's condition as well as the operator, centering her attention upon the patient. By keeping the patient at this stage, the most hypersensitive cavity can be prepared with almost no pain, in a very short space of time.

FULL ANESTHESIA.

If, after preparation of a cavity, a pulp is to be removed or an extraction to be made at the same sitting, the somnoform is advanced so as to produce a complete anesthesia. The operator should never try to expose a pulp under analgesia, as considerable shock will be produced.

Signs of anesthesia. There are many factors to be kept in mind. Every symptom and detail is important. A lazy drooping of the eyelids and muscular relaxation is generally but not always present; sometimes rigidity takes place instead. In this case an oral operation would be impossible unless a mouth-prop has been placed in position beforehand. Then other guides must be depended upon. The corneal reflex, which is regarded as practically infallible in chloroform or ether, is *not* reliable in early stages of somnoform, although a valuable guide in deep anesthesia. The eyeball will roll upward and become somewhat set, with a noticeable dilatation of the pupil. There is muscular relaxation with rhythmic and automatic breathing, usually marked by snoring. By a study of these symptoms an operator develops an anesthetic sense; this sense is acquired only by experience and very careful study.

CONTRA-INDICATIONS TO ANESTHETICS.

The following contra-indications to the administration of anesthetics must be kept in mind: Diseases of the heart, such as lesion of the valves, cardiac dilatation, or hypertrophy; diseases of the brain, neurasthenia, insanity, or intoxication; diseases of the bloodvessels, as arterio-sclerosis; diseases of the kidneys, as Bright's disease or nephritis, and the status lymphaticus, or enlargement of the thymus glands, as in goiter.

DANGEROUS SYMPTOMS AND ACCIDENTS.

A sudden dilatation of the pupil, without responding reflexes, may be due to paralysis of the contractor muscle fibers, or may represent a stimulation of the dilator centers due to asphyxia.

A sudden concentrated inhalation of vapor may cause heart failure. Heart failure and death may also occur in a slight operation about the mouth under analgesia or incomplete anesthesia, since the nuclei of the trifacial nerve are so near those of the pneumogastric nerve that sudden impulses or shock may be conveyed over the vagus, causing death by inhibition of the heart's action.

Sudden coughing or vomiting may force the diaphram upward, also interfering with the heart's action.

Asphyxia, due to the respiratory centers being affected, may also result, or dropping back of the tongue, causing strangulation.

TREATMENT IN EMERGENCY.

The cessation of respiration always takes place first. Artificial respiration, therefore, should be resorted to by Sylvester's method, the tongue being pulled forward. Inhalation of amyl nitrite, or 1/30 grain of strychnin or 1/100 grain of nitro-glycerin hypodermically may be resorted to, or from eight to ten drops of adrenalin solution be placed in the conjunctival sac of the eye, adrenalin being a strong cardio-vascular stimulant; or cold ether be poured upon the chest to stimulate the reflex by its refrigerant effect. As a last resort, a strong and sudden dilatation of the sphincter ani muscles may be produced, causing irritation. The drugs mentioned should always be at hand, though an operator may hope never to use them.

EFFECT OF ANESTHETIC UPON VARIOUS ORGANS.

The effects of somnoform upon the various organs may be summarized as follows:

(1) *Skin.* Local irritant and refrigerant action.

(2) *Brain.* Depression of the cerebrum, abolishing all its functions, but returning to normal, the cortex being but slightly affected.

(3) *Medulla.* It is affected last of the entire nervous centers, and only in extreme cases of dangerous narcosis and paralysis of the respiratory and vasomotor centers.

(4) *Spinal cord.* All reflexes are abolished; the sensory side is paralyzed first, then the motor.

(5) *Circulation.* Only slightly affected; in deep anesthesia the blood pressure is slightly diminished.

(6) *Capillary area.* A slight dilatation cutaneously occurs, causing flushing of the face.

(7) *Heart.* At first slightly stimulated, but then returning nearly to normal.

(8) *Eye.* Dilatation of the pupil at first, slight rotation upward, and is "set." In deep anesthesia, contraction takes place; in dangerous cases, sudden dilatation. If the anesthesia is still advanced farther, coma results, owing to paralysis of the contractor fibers.

(9) *Respiration.* In analgesia, the respiration may be regular or irregular, depending upon the excitability of the patient; in complete anesthesia, it should be normal or rhythmic, as in natural sleep; in dangerous narcosis, cessation may set in owing to paralysis of the respiratory centers of the medulla.

(10) *Temperature.* Usually slightly reduced.

(11) *Metabolism.* Is but slight and tranquil, as elimination is carried on by the lungs and kidneys. There may be some destruction of proteids, with improper oxidation.

(12) *Blood.* The blood exhibits very slight diminution of the hemoglobin and corpuscles, but no hemolysis is produced as by chloroform and ether.

Following is a table showing the changes noted, by minutes. The figures, of course, may vary in different cases, but the records taken in a number of cases show the results to be practically the same:

	Normal.	1 *m.*	2 *m.*	3 *m.*	4 *m.*	5 *m.*	6 *m.*
Pulse	72	84	76	68	68	68	67
Respiration	16	28	20	19	20	20	19
Blood pressure	120	125	130	135	140	140	140

Dropping back to 110 on awakening.

THE FUTURE OF PORCELAIN IN DENTAL ART.

By F. T. VAN WOERT, D.D.S., Brooklyn, N. Y.

(Read before the Connecticut Dental Association, at its annual meeting, at Waterbury, Conn., April 15, 1913.)

FROM my earliest recollection and knowledge of the science of dentistry, efforts have been made to secure a material for the restoration of lost tooth structure that would possess sufficient strength to withstand the stress of mastication, and sufficient adaptability to secure perfect union or fit, and represent the natural teeth in appearance. The earliest efforts in this field were directed toward cements. This investigation is still going on, and probably will continue until the ideal has been found.

EVOLUTION OF THE PORCELAIN INLAY.

Later, porcelain was used by a few who were expert enough to grind pieces cut from porcelain teeth, to fit a cavity. Some of the manufacturers placed upon the market various shapes and sizes of porcelain buttons for small cavities in the molars and bicuspids, and an English firm presented a variety of shapes for all locations. Following this came the Timme glass inlay, which I think was the first to be fused into a metal matrix that had been shaped and burnished to fit the cavity. But it remained for Dr. N. S. Jenkins of Dresden to perfect medium-fusing porcelain for use in a pure gold matrix; and notwithstanding many contradictions in favor of the high-fusing body, I believe that to be the nearest to the ideal at present. It is true that no operation is perfect, but I defy anyone to show more nearly perfect results with another material than can be obtained with medium-fusing porcelain —if properly manipulated. This qualification may seem presumptuous, but it is true, and very pertinent.

REASONS FOR THE LACK OF POPULARITY OF PORCELAIN WORK.

Why is it that there is so little porcelain inlay work done today? I am told by the manufacturers that there is very little sale for this material, one of the best-known concerns having to abandon its plant and go into the hands of the receiver. It is because the manufacturers do not qualify in their products; they rate the fusing-point of the body too high, the reason for which I do not understand. Then there is not upon the market to my knowledge today an electric furnace which will not overfuse the low-fusing bodies unless very carefully and skilfully handled. Pyrometers are a delusion and a snare, unless perhaps in the hands of a very few. I am convinced that a time-limit and the human eye are the only reliable means of perfectly melting these bodies. The dentists, relying upon the manufacturers for data for the proper manipulation of the material and its accessories, meet with ill success, and both they and their patients become disgusted, and consider the whole method a failure.

CAUSES OF FAILURE.

Let us analyze a few of the causes for these failures: (1) Improper cavity preparation; (2) the direct method of obtaining the matiix; (3) the imperfect investment of the matrix, because of an imperfect investing material; (4) the warping of the matrix, due to the above-named factors; (5) the too rapid heating at too high a temperature, and (6) the imperfect cementation of the inlay in the cavity. These, together with a number of others, such as faulty occlusion, lack of contour, etc., go to make up the goodly number of causes for the present state of unpopularity of porcelain work.

It is not my purpose to deal with the problem of inlay work this evening, but to call attention to the higher branch of the ceramic art as applied to dental science, namely, the hand-carved porcelain crown.

THE LOGAN CROWN, AND SUGGESTED MODIFICATIONS.

The porcelain crown has been considered more from a commercial standpoint than from an esthetic or accurate one. The earliest efforts in this direction, and perhaps the most practical of these, resulted in the Logan crown. The design and mechanical application of this crown is the most practical of any yet known, but unfortunately the manufacturers persist in making this crown with a pure platinum pin, which renders it the most unreliable of all commercial crowns; while, if it were supplied with a pin of the proper rigidity—which could be obtained by the addition of from 10 to 20 per cent. iridium to the platinum, it would be not only the best crown commercially, but the best for scientific attachment to the natural root of the anterior teeth in particular, as it could be fitted with approximate adaptation to the end of the root, and placed in a position through a platinum or pure gold cap, previously fitted to the root. The space between cap and crown may then be filled with any of the standard porcelains, high- or low-fusing, and a perfect union between root and crown is secured, which is a most essential feature. But unfortunately the Logan crowns available today have pure platinum pins, which are so soft that they cannot be depended upon, and as a result we are forced to construct the entire crown from the raw material. This has led to all sorts of schemes for the production of a crown that will fit the root properly, present a natural appearance, and possess the strength for sustaining the stress of mastication.

A PORCELAIN CROWN WITH FACING.

Attention is called to an old method that is employed very much at the present time, and, while it is very much better than any appliance that can be constructed from stock crowns, it has many disadvantages.

The construction of this crown is as follows: A platinum cap is made for the root, with the necessary pins for its retention. A facing of suitable shape and color is selected and ground to fit, and then soldered to the attachment with pure gold, or preferably platinum solder, after which the rest of the crown is made up of a porcelain body fusing at a lower point than the facing.

This crown is very much better than any stock crown, but has a weakness which condemns it, namely, the difference between the high- and the low-fusing body, which prohibits a perfect union between the two, with the result that, after a short time, the lower-fusing body cracks or crazes, and later is disintegrated, so that this part of the crown has to be removed and made over, or a new crown made.

A PORCELAIN CROWN THAT IS ENTIRELY BUILT UP.

Another method consisted in spatulating the porcelain body to a putty-like mass and building up the crown upon similar foundations as described, without the facing, and carving it to shape. This crown has many disadvantages, the principal one being that the shrinkage is very difficult to provide for. Again, this crown requires perhaps three or more bakings, each of which invites inaccuracies.

THE BUELL CROWN.

Another method, which I consider really the most practical for all-round purposes, is that devised by Dr. Buell of Buffalo, N. Y. I have styled it "the Buell method." The principle is old, but the technique pursued by Dr. Buell is certainly original and practical. For fear of misrepresenting this method and its details, I shall quote verbatim from Dr. Buell:

There are two methods of attachment, (1) by an iridio-platinum post entering the root, and (2) the crown is made in the form of a porcelain shell covering a stump of the tooth, which may be applied to either vital or devitalized teeth.

The tooth is excised, and the surface end of the root ground so as to form two inclined planes, the periphery of which shall be under the free margin of the gum. The root may be so decayed that this form can be only partially obtained. Whatever the form, some provision must be made to lessen the tendency of the crown to revolve upon the root. The root-canal is opened for the reception of a square iridio-platinum post of from No. 14 to No. 16 gage, which is fitted to the root, so that it can be easily removed, then marked where it protrudes from the root. A piece of soft platinum plate from two to three thousandths of an inch in thickness, according to the size of the root to be crowned. is laid upon a lead bar, and the post driven through it. This method punctures the plate in such a manner that it makes perfect contact with the post on all sides. The post is forced through the plate until the mark, where it protruded from the root, is reached; then it is soldered with platinum solder.

The plate and post are placed upon the root, and the post driven to position. The periphery of the root is then outlined by the use of a small pine stick and mallet, after which the plate is trimmed to within one-sixteenth of an inch of this line. Placed upon the root once more, this excess is carefully burnished over the periphery. Should the root be badly broken down, it is best to pack with temporary stopping for a few days before making the cap. The periphery of the root must be well outlined through the plate, and the angle formed at this point should be sharp and well defined. For a final adaptation of the cap, a pad of vulcanite is placed between the teeth over the cap, and the patient is requested to close upon it, thus swaging the cap to perfect adaptation.

A modeling compound impression and bite is now taken. If the cap and post is not removed with the compound, it should be carefully removed and placed in its proper position in the impression. The part of the post that is exposed and the inner surface of the cap are coated with a thin film of wax, then the outer surface of the band is coated with a thick covering of wax. A plaster model and antagonizing model are poured, attaching them to a crown articulator that has a joint permitting a lateral movement.

While the plaster is setting, the shade is selected. I find the best method, in my experience, is to select, with a shade guide, a tooth that is of the proper shade. For convenience, let us assume that No. 38 S. S. W. is the shade desired.

By covering the sample tooth with the finger, so that the cervical portion only is exposed, we find that S. S. W. high-fusing porcelain, shade No. 1, matches this portion; then, covering the cervical portion and exposing the incisal half, we find that shade E matches this portion.

The plaster having set and the compound having been removed, the adjacent teeth are carved away so that the space is widened one-sixth, to allow for the shrinkage of the porcelain, and the articulator is set so that it is held open one-sixth of the length of the crown to be made. The post and cap are now warmed over the burner, and removed from the model. The wax is completely burned off and, when cold, new wax is placed upon the root side of the post, and upon the inside of the band and plate. A button of plaster about one inch in diameter in all directions is placed upon a glass slab, and the post and cap are placed, with the wax side down, into it. When set, the plaster is carved into the shape of a cone, the length of the cone determining the diameter of the tooth to be carved. The post and cap is heated and removed from the cone, all the wax is burned off, then it is chilled in water, and replaced upon the cone. A piece of glazed note-paper, about two by three inches, is wound around the cone of plaster and folded over at the bottom, forming a cornucopia the length of which, above the cap, determines the length of the tooth, and should be in excess of the required length, so that there may be plenty of porcelain to work upon. The porcelain that is to form the cervical portion of the crown is mixed to a thick creamy consistence and the cornucopia is filled with it, then jarred down by drawing the serrated handle of the carver across the paper over the plaster cone. The moisture is driven to the top and absorbed with a napkin. This is repeated until no moisture comes to the surface; the paper is then removed. The porcelain is carved away, exposing the band, and then a thin instrument is forced under the band to the post, and the cap, post, and porcelain are carefully removed from the cone of plaster.

Carve the porcelain so that it will fit into the space on the model. Carve away on the labial side to the height desired for the cervical color, leaving the lingual side intact in incisors and canines. For molars and bicuspids carve away both buccal and lingual sides, in each case carving at an angle, so that the gray porcelain will overlap, causing a blending of the shades. Remove from the model and place upon the plaster cone again. Wrap the paper around the same as before. Add the other shade of porcelain, a little thinner than the previous mix; add quickly in generous portions, so that it may run down between the paper and the dry porcelain, before it absorbs the moisture from the new porcelain. Jar slightly at first, and remove moisture as soon as it shows, repeating until it is all absorbed. Remove from plaster cone as before and trim, so that it will again go into place upon the model. Carve labial side to desired contour, then lingual side in the same manner, using the adjacent teeth and the antagonizing model as a guide. It is always best to make the anterior teeth a line or two too long, as they can be easily ground off. The tooth having been blocked out, remove it from the model and complete the carving, holding the post in a broach-holder. The surface is smoothed with the ball of the finger, thus removing all traces of the carver. The chips and powder are brushed away with a large camel's-hair brush. The surface is now all gone over with an S. S. W. porcelain burnisher, to iron down the surface and make it smoother. The biscuit bake should be made in not less than seven minutes. Try the crown upon the root, and re-adapt the platinum to the surface end of the root, fill in the space thus formed with new porcelain, and, should there be any discrepancy upon the sides or incisal end, it may be remedied by the addition of more porcelain at this time. Bake to a glaze, taking at least ten minutes for same. Try in the mouth, and, if satisfactory, cut the platinum plate away from the post with a No. 1 round bur; wet the crown and carefully peel the platinum away. Should there be any further edges around the periphery of the base of the crown, these may be removed with an Arkansas stone. The crown is then ready for cementation.

I have some specimens of the work done by Dr. Buell, which I shall be pleased to pass around for examination, and I am sure that they will be found to be very beautifully executed, and a proof of the practicability of what he says. But it has one principal disadvantage that all previous methods have—that is the great amount of shrinkage, about one-sixth, and the crown must be fired twice, and sometimes three times.

CROWN METHOD DESIGNED BY THE AUTHOR.

The last method which I shall present for consideration is one which I think reduces the technique more nearly to an exact science than any other yet devised. Let us take for a basis of these deductions the following qualifications:

The crown desired must be (1) one that possesses the maximum strength; (2) one that can be made to occlude with the opposing teeth normally; (3) one that will harmonize with its neighbors in shape, color, and contour; (4) one that will perfectly fit the end of the root to which it is attached, and (5) one that shrinks the minimum amount. This crown which I am suggesting shrinks one-tenth in every case, and, as a result, has the maximum strength, together with possibilities in blending of color that are limited only by the skill and artistic ability of the individual operator.

DETERMINING SHRINKAGE OF PORCELAIN.

The method employed for determining the percentage of shrinkage is best shown in Fig. 1, which shows a hardened steel mold, 7 mm. in diameter and 10 mm. long. This is made of Stubbs steel, as hard as fire and water will permit, and then ground to the exact size by standard micrometers, shown in Fig. 2. This instrument is seen supported in a stand, to make it rigid, and is capable of measurement to 1/200 millimeter, which is equal to 1/5000 of an inch. In order that this instrument may be made more accurate, it is provided with a ratchet adjustment, so that, in setting it, a fixed amount of resistance or pressure is employed in every case, no matter whether it is manipulated by an expert or a novice. To insure further accuracy, provision is made for the taking-up of all lost motion, and for readjustment to a standard hardened steel gage.

This instrument is of standard make, and is absolutely reliable as to its accuracy. The method of testing consists in, first, the molding of the billet in the mold (Fig. 3) with a fixed proportion of porcelain body and menstruum in a fixed space. These proportions and the formula will be given later. The result is a billet of the required diameter, but of excessive length. It is placed in the hardened steel mold, and one end is filed with a No. 4 Grobert file, so that it is perfectly parallel with one end of the mold. It is then placed upon a glass slide, and the surplus is cut from the top with a fine saw, which leaves a billet of exactly 7 x 10 mm. This is fused, and measured with a micrometer (see Fig. 4), and the resulting piece will be 9 mm. long, with the proportionate diameter. This seems to be the limit of percentage of shrinkage to be obtained with any of the bodies at our command at the present time. Further condensation by subjecting it to a higher pressure makes no discernible difference, even when measured with a 1/10,000th micrometer. Having reduced the shrinkage to so small a percentage, we have minimized the very serious difficulty of providing for such shrinkage, hence a very much more accurate reproduction of the lost part is secured.

The other essentials required for this process are shown in Figs. 5–14 (pp. 925–927)—suitable molds and press, proportionate calipers, a 5 cm. rule, lard or la.d oil, gum tragacanth, paste or jelly, a simple set of scales, and carving and other instruments. The porcelain body should be the same as that used by the manufacturers for stock teeth. I prefer Consolidated or Dentists' Supply Co.'s body, which fuse at about 2700° F., but which can be fused at a very much lower temperature by giving them time—and that is the way in which this body should be fused in order to obtain the best results in color, contour, and strength.

ROOT PREPARATION.

Almost any method of root preparation may be adopted that does not provide for a knife-like edge at the continuity of the root. An impression should be taken of the root with modeling compound, and I have found the best method to consist in making a metal ring or band to conform to the shape of the circumference of the root, but slightly larger—with about ½ mm. space all around it. This is held in position over the root, and the modeling compound, which has previously been formed into the shape of a cone, is made very soft on the pointed end, forced through the band on the end of the root, and cooled or chilled. Upon removal of this compound, it will be found that a very accurate impression of the root end has been obtained. This impression should then be invested in plaster to a sufficient depth to permit the packing of amalgam about 5 mm. thick. The amalgam should be mixed very soft, and the excess of mercury removed by pressure, after the impression is filled in.

MAKING THE BASE, OR CAP.

This will produce a very strong die, upon which a platinum cap can be swaged in a Brewster press or by any of the other methods. This cap is trimmed and shaped to project slightly beyond the margins of the root, when it is placed upon the root itself and adjusted, and such pins or dowels as are to be used are placed in position and attached to the cap with hard sticky-wax. The whole is removed and invested for soldering, and the cap and pin or pins are united with platinum solder. This cap is replaced on the root to ascertain that no change has taken place. The cap is removed and the underside—or that portion which comes in contact with the root—and the pin are painted with a thick, creamy paste of whiting and water. This is done to prevent the low-fusing metal in the plug from adhering to the platinum. The plug is then heated sufficiently to melt the fusible metal, viz, to 430° F.

The platinum cap or base is then placed into position in the metal and allowed to cool. (See Fig. 7.)

Fig. 1.

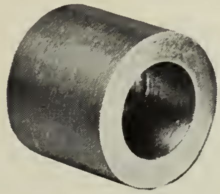


Fig. 2.

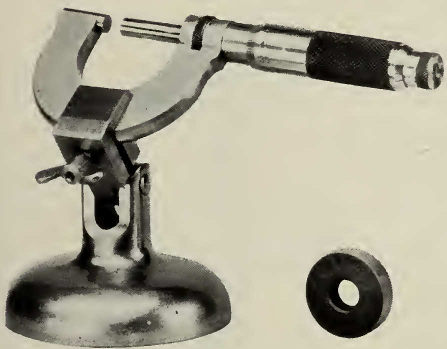


Fig. 3.

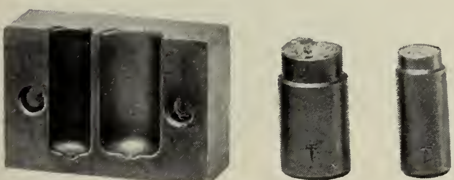


Fig. 4.

BUILDING OF THE PORCELAIN, AND BAKING.

The halves of the mold suitable for the plug are then coated with lard or lard oil, and screwed together, and the porcelains are selected, in the order of their shading, the enamel body first, the foundation second. The amount of

Fig. 5.

porcelain should correspond to the formula upon the mold. (See Fig. 7.) The plug is placed into the mold until it reaches the shoulder, which prevents it from going farther. The press and mold intact is then placed, preferably, at the opening of an electric furnace burning at a low temperature, occasionally turning it until a globule of the low-fusing metal in the plug appears at the union between the plug and mold. It is then removed from the furnace, and while still hot, the mold is taken from the press, and separated by removing the two screws which hold it together. By lightly tapping its side with a small mallet, the mold will be separated, and the porcelain will be found attached to the cap embedded in the plug. By throwing a flame on the end of the plug farthest away from the porcelain, the fusible metal in the plug will then be melted, and the porcelain attached to the platinum cap is easily removed, the result being shown in Fig. 13, A. It should then be trimmed to permit its going to place in the impression, and the general carving may be done after the following manner:

Fig. 6.

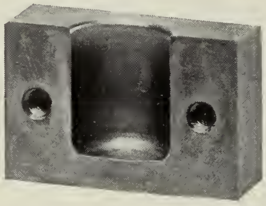


Fig. 7.

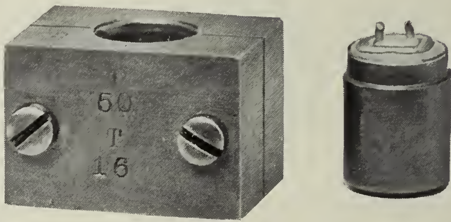
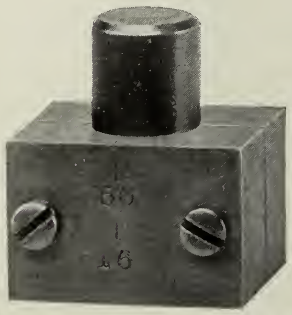


Fig. 8.

Fig. 9.

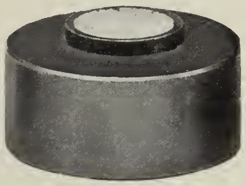
Fig. 10.



CARVING THE CROWN.

Two measurements should be taken directly in the mouth; first, the distance between the two adjoining teeth; second, the distance between the end of the root and the deepest fissure or sulcus. The measurements are taken with the fixed end of the proportionate caliper, and

Fig. 11.



that, in turn, is measured with the 5 cm. rule, and a memorandum is made thereof. The approximal surfaces of the teeth on the plaster impression are carved by resetting the caliper to the required measurement on the fixed end to the dimensions of that on the adjustable or pointed end. This makes allowance for the amount of shrinkage in that direc-

Fig. 13.

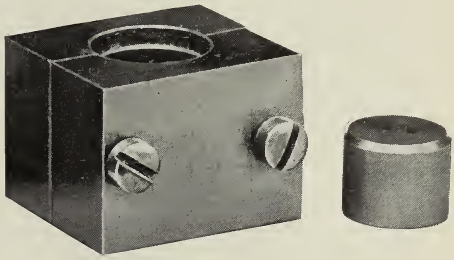
A B

tion. The opposing teeth are then set and locked on the articulator, in accordance with the measurement. The porcelain can now be trimmed and carved, gradually decreasing the length of the crown to a proper occlusion and proper general contour; in other particulars this carving is done "by eye," the result being shown in Fig. 13, B.

ADMIXTURE OF TRAGACANTH JELLY TO THE PORCELAIN.

The tragacanth jelly is difficult to make with pure tragacanth and water only, but if the tragacanth is mixed in alcohol in the proportion of gum tragacanth $\frac{1}{8}$ oz. and alcohol $\frac{1}{2}$ oz., in a small glass beaker, and stirred thoroughly, the tragacanth will seem to be held in suspension, as it is not soluble in alcohol. If $1\frac{1}{2}$ oz. of water be added very

Fig. 12.



rapidly at the same stirring, a smooth, jelly-like mass will be obtained. When a stated amount of this jelly is mixed with the porcelain body, a stiff putty-like mass is obtained, which can be easily packed, molded, etc.

Fig. 14.

CROWN-HOLDER.

Fig. 14 shows an instrument which I have constructed for holding the crown during the process of carving. It has many advantages over the ordinary pin-vise or pliers, in that it can be set up on the table or laboratory bench at any angle, which makes carving very much easier.

CONCLUSION.

In conclusion, I want to express my belief that, in a very short time, porcelain will be as popular, if not more so, than it has ever been; as the success of the silicate cements is far from assured, and our patients will not submit to disfigurement of the anterior teeth, in particular, by the use of gold and other such materials. And if the members of the profession, at least those who have abandoned porcelain, in the probable event of their feeling compelled to take it up again will depend upon their own deductions from systematic experiments, and not upon the statements of the manufacturers, then the value of ceramic art as applied to dental science will be reestablished on a much more secure basis than in the past.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

EDUCATIONAL PUBLICITY—WHY NECESSARY.

By W. G. EBERSOLE, M.D., D.D.S., Cleveland, Ohio,
SECRETARY-TREASURER OF THE NATIONAL MOUTH HYGIENE ASSOCIATION, AND HONORARY VICE-PRESIDENT OF THE FOURTH INTERNATIONAL CONGRESS ON SCHOOL HYGIENE.

(Read before the union meeting of the District of Columbia Dental Association and Maryland State Dental Society, at Washington, D. C., June 13, 1913.)

EDUCATIONAL publicity—why necessary from the dental standpoint? I am given twenty minutes by your committee to answer a question that might be answered in twenty seconds or in twenty words.

Educational publicity is necessary owing to the fact that there are one and one-half million American citizens dying annually, 40 per cent., or 600,000, of whom die from preventable diseases.

Each death, it is estimated, is preceded by two years of invalidism. This means that there are three million people sick in the United States at all times, which entails a tremendous loss to the government and country annually.

It has been estimated by conservative men that six hundred thousand of these deaths, and most of the invalidism of this country, can be averted by the employment of rational and thoroughly practical preventive measures. In the practice of preventive measures, the organ which wields the greatest influence and is most worthy of consideration is the human mouth.

Until within the recent past, both the dental and medical professions have failed to recognize the important rôle that the mouth plays in the health problems of the nation. But today most dentists and many of the leading medical men of the country are awakening to the fact that, without healthy mouths, cared for and used normally, the maximum health, strength, and working efficiency of the individual cannot be attained.

The great majority of the members of the dental profession are inactive or indifferent to the importance that mouth hygiene bears to the general hygiene of the body; almost all of the members of the medical profession are ignoring oral conditions, and the unwarned laity are marching to preventable death at the rate of six hundred thousand annually, all because those who are seeing the light have failed to do their duty, have failed to raise the curtain and let the light shine where it would do humanity the greatest amount of good.

The use of educational publicity of the most effective kind from the dental standpoint is imperative, or dentistry must be held accountable to the charge of criminal neglect.

To know that which we know relative to the important relation that mouth hygiene bears to the general hygiene of the body, but to fail to draw back the curtain and to let the light of mouth hygiene educational publicity shine into the faces of humanity with sufficient brilliancy to catch and hold the attention, is, to my mind, but little less than criminal neglect.

To possess knowledge which will save human life and then not make use of that knowledge in saving the lives of mankind is but little short of manslaughter; and I want to say to the members of the dental profession that the cry which goes up from many of the members of the laity—"Why is it that we have not been told these things before?"—is a just one, and is a criticism which we will have to meet more and more frequently, as humanity comes to know the extent to which it has suffered because of our neglect.

Of the ninety-one million people in the United States, eighty-eight and one-half million are in need of dental care, treatment, or advice. To care for these people, we have forty thousand dentists in the field. In spite of all that these forty thousand dentists have been able to do, the mouths of the human race are passing from bad to worse with such rapidity that those who are familiar with existing conditions stand appalled at the indifference or actual opposition of the dental profession to educational publicity of a kind that would be effective in checking the ravages of dental caries.

It has been estimated that there are not enough dentists in the United States to meet the present needs of the people in New York alone. If this statement is true—and we believe it is—then something is radically wrong with the system of publicity that the dental profession has been employing in bygone years.

Most of you know that I come from that state which has just passed through one of the most disastrous floods in modern times. Millions of dollars' worth of property were destroyed and hundreds of human lives lost, because those whose duty it was to know, and upon whom we relied for the employment of measures which would have prevented such destruction of life and property, failed to prove themselves worthy of the trust placed in them. Today thousands upon thousands of men are struggling, seeking to overcome the devastation and ruin wrought by somebody's failure to see and know his duty.

And so today the human race is suffering from a vast deluge of dental decay and destruction, all because somebody has failed to do his duty by not sounding the warning in such a manner that the people might be led to save themselves from much of the sin, sickness, and death that is ruining the morals, wrecking the health, and sapping the lives of the human family.

We have listened to an eloquent appeal for funds for the establishment of a Bureau of Scientific Research. We have had a vivid word-picture painted of the value and benefit such a bureau would bestow upon mankind. I would not utter a word that would detract one iota from the importance attached to that great movement. We have listened to a very earnest and strong appeal, and I say, All honor to the men who have conceived the plan and are advocating the policy of dental scientific research! We need it—and we need it badly!

But much as we need it, I am here to tell you that we need it alone for corrective measures. I stand here tonight to tell you that, with the knowledge now at command, properly prepared and spread throughout the land, nothing else is needed to arrest the decay and stop the loss of the teeth of mankind.

Years ago Dr. D. D. Smith declared to the world that he could stop dental caries, and arrest and cure mouth lesions by oral prophylaxis. At once he was pronounced a fanatic by fellow members of the dental profession; damned, double damned, and triple damned by some, particularly some men in his own city. But the principles advocated by him were right, and with that knowledge, backed by an indomitable will such as few men possess, that great warrior fought on, until today every fair-minded and honest practitioner of dentistry must concede that Dr. D. D. Smith has rendered the profession and humanity an invaluable service. Today he and his followers are redeeming thousands of mouths that have been considered beyond hope of repair, and are preventing the wrecking of thousands of others.

If these men, and women too, can, by the employment of oral prophylaxis, dental cleanliness, mouth hygiene, redeem the supposedly wrecked and ruined mouths of the people of the land, let me ask what must be the possibilities open to the men and women of the dental profession who have the foresight and the courage to step from the ranks of those who are today devoting their talents and their energies to the employment of corrective measures, and stand at the fountain-head and employ mouth hygiene measures and dental educational publicity.

It is here that the greatest opportunity is offered to the dental profession to benefit humanity. It is only by the employment of the broadest kind of an educational publicity campaign that the dental profession can ever hope to bring the ravages of dental caries under control.

With the inroad that dental caries, the greatest of all destroyers, has made upon the health of mankind, dentistry cannot hope to battle single-handed. She must call to her assistance the greatest educational institutions of the country—the medical profession, the great educational professions, the school teachers of the land, the boards of health, the civic organizations, the churches, the women's clubs, the men's clubs, the boy scouts, the camp-fire girls.

In fact, she must call to her assistance every individual that is interested in the health, strength, and working efficiency of the human race, if she is to do her duty in stemming the tide of preventable disease and unnecessary death. Dentistry has neither the men, the time, nor the money to meet the obligations that are being placed upon her.

Realizing that humanity must be awakened to the necessity of self-protection, a few of the members of the dental profession banded themselves together to form the nucleus of what is now known as the National Mouth Hygiene Association.

The purpose of this organization is to have the people know the frequency with which dental caries occurs; to have them understand the ravages this disease is making upon mankind; to teach the methods and means whereby people can escape from this devastating disease, and to place at the command of those who are able to care for themselves a method and means whereby they may look out for those unable to care for themselves, without placing an additional tax upon the individual, the community, the state, or the nation.

From the time of organization, two years ago, down to the present, the efforts of the association have been directed principally toward interesting the dental profession in its proposed work to an extent which would enable it to go to the public with a charter membership larger than the membership of any dental organization in the country. Today we have almost reached that number, but the labor required to secure that membership has been such that those at the head of the work are forced to acknowledge that the accusation of the general public that "Dentistry is interested in this movement only in so far as the individual will receive benefit from the efforts put forth," seems to be true.

Those who have been in the forefront of this work appreciate, however, that almost one thousand members of the profession have become sufficiently interested in the work to give of their time and money that humanity may come into her own.

We need educational publicity most in educating the dentist, for it is here that we meet with the greatest handicap. Unenlightened, mercenary dentistry is the handicap that is preventing true dentistry from receiving the rank and recognition due her, and humanity from obtaining that which she has a right to expect from the dental profession of this country. We need educational publicity to meet the thirst for knowledge that is being exhibited on every point by educational people and the laity in general.

Members of the dental profession, those of experience in the mouth hygiene field, have been forced to the conviction that the public is far more ready to receive information than are the members of the dental profession to place this information at their command.

I wish to repeat what I have said before, viz, that educational publicity from a dental standpoint only will make it possible to combat successfully the inroads of dental caries. Educational publicity from a dental standpoint has done much, but as yet the surface has not been scratched.

Three years ago last December, the Ohio State Dental Society was the first to place a large amount of money in the hands of its oral hygiene committee for publicity purposes. Then and twice since that time she voted $500 to be expended for this purpose.

Four years ago we went to the governor of Ohio, asking for the appointment of a dental representative on the state board of public health. The politicians, members of the medical profession, and most dentists ridiculed our efforts. But as an instance of what a little money, well spent from an educational publicity standpoint, will accomplish, we beg to inform you that Ohio has today, in the person of Dr. H. C. Brown of Columbus, a man who has received the first appointment from any great state in the Union to sit in the highest council in dealing with the health problems of the commonwealth. Dr. Brown has but recently been appointed a member of the Ohio State Board of Health, with a rank and vote equal to any member of that organization.

As another indication of what can be accomplished by educational publicity, I have to relate that three weeks ago yesterday I traveled to Wilkinsburg, Pa., a suburban village at the outskirts of Pittsburgh, and there visited the schools for the purpose of ascertaining the results obtained by a four months' *oral hygiene campaign* in the public schools.

There I witnessed one of the most remarkable scenes it has ever been my privilege to witness in regard to mouth hygiene. Hundreds of children were paraded before me upon that occasion, representing every walk in life; and as I looked into the mouths of those children, I saw thousands of carious teeth, but not in a single instance did I see a dirty or neglected mouth in so far as a toothbrush or tooth toilet could render a mouth clean and wholesome. The gums were healthy, the mouths clean, and the children seemingly happy.

To one who has traveled far and near inspecting schools, such a revelation was very remarkable indeed. The witnessing of the sight convinced the speaker once for all of the correctness of his theory that cleanliness and use were the only specifics necessary for the prevention of dental caries, or decay of the teeth.

Therefore, let us teach the boys and girls in our schools the proper care and use of the mouth and teeth. Then, a generation later, let us examine the children of those who are children today, instructed and cared for in the homes of the future as advocated today, and we shall produce a generation, hence a race of people, in whose mouths dental caries will be as rare as is the healthy mouth of today.

In conclusion, let me say that the statements uttered here tonight are not based upon fads and fancies, but upon indisputable facts gained from experiences which afforded ample opportunity to study and to know the conditions whereof I speak.

Few men, if any, have had a greater opportunity to study all phases of the question which confronts the mouth hygiene workers of this country. And I repeat that, with the value of oral prophylaxis and mouth hygiene declared and practiced in the light and in the manner now at command, no other means need be employed from a preventive standpoint.

If, with the baby in the cradle, we begin to teach the care and normal use of the mouth, we shall need to have no further concern. In other words, if the child of today and then the child of tomorrow are properly cared for dentally, the child of the future will be as perfect as the child of today is imperfect.

To the skeptic I have but to say that I know whereof I speak. I have seen the light, and my prayer now is that God, in His goodness, will spare me to stand at the helm and steer the bark of publicity until all mankind knows the value of a healthy and perfectly working "gateway" to the human body.

EFFECTS OF DEPRAVED ORAL CONDITIONS UPON NUTRITION.

By RUSSELL W. BUNTING, D.D.Sc., Ann Arbor, Mich.

(Read at the union meeting of the Maryland Dental Association and District of Columbia Dental Society, Washington, D. C., June 13, 1913.)

THIS is an age of social service. Never in all history has the world been so concerned in the welfare of "the other half"; never has there been such a strict inquiry into the life conditions of all peoples; and never has there been such concerted action to relieve suffering and social wrongs, as we see manifested so generally today. Surely the "millenium" is at hand. Well may we say with Riley:

> This world is a curious compound, with its honey and its gall,
> With its tears and bitter crosses, but 'tis a good world after all;
> And a good God must have made it—leastwise that is what I say,
> When a hand is on your shoulder in a friendly sort o' way.

MODERN SOCIAL SERVICE.

Everywhere the hand of social service is being laid upon the shoulder of the poor and unfortunate, the oppressed and the needy, "in a friendly sort o' way." It is a great work, and is enlisting the co-operation of all classes of people. The laymen in his sphere, and the members of the professions, the ministry, medicine, dentistry, engineering, and law are working side by side—each in his sphere—to bring about proper life conditions for all.

CARE OF THE CHILD.

Such a movement as this cannot be without its effect. Who can say what the continuance of this disposition for social service shall mean to the individual and to the nation? Perhaps the greatest results will not be attained in our generation, for it takes time to change customs that are established and to undo the effects of untoward conditions, but our greatest benefit will be realized from the efforts which are rightly directed toward the coming generation. Here we have to deal with virgin territory, that of child life, fresh and moldable, which will quickly respond to whatever change in life conditions we may make. And as we look into the welfare of the adult, we see that a large part of the sickness, suffering, and inefficiency is the result of some physical defect or some life condition which had its inception in childhood, the effects of which have persisted throughout the life of the individual, to handicap or entirely ruin an otherwise promising career. Truly, it is the child that is father of the man—and so it is to the children that we should give our greatest attention.

APPALLING STATISTICS REGARDING DEFECTIVE CHILDREN.

And what of our young American citizenship? Do they need any special attention? The results of investigations of public school children of every state answer emphatically, Yes. Take, for instance, the report of Dr. Leonard P. Ayres of the Russell Sage Foundation, in which he states that upon the examination of over 100,000 school children he found more than 70 per cent. of them defective. And he has tabulated the various defects under the following heads: Enlarged glands, defective vision, defective breathing, defective teeth, hypertrophied tonsils, adenoids, and other defects, the largest of these, by far, being the teeth. Statistics without number, gathered from all quarters, clearly show that the same conditions prevail in every city and community, frequently to an even greater extent.

BACKWARDNESS IN SCHOOL DUE TO PHYSICAL DEFECTS.

At the same time we find that there are far too many children in our schools who are not up to the average in their school work. Many of them are not in good health, are ill-nourished, and suffering from one or more physical defects. We have, by natural inference, come to the conclusion that there is a connection between the physical defects and the nutrition, the health and efficiency of the child, and have felt that, without the physical defect, the child would have better nutrition, better health, and greater efficiency. This belief is shared by a large number of observers as well as educators who have been watching these conditions for many years. There is not a teacher who is not familiar with the ill health and poor mentality of children suffering from physical defects, especially those which occur in the mouth, the nose, and the throat. So notorious has mouth-breathing become in its effect upon the child that teachers almost expect scholars who are suffering from this defect to be below the average in mentality and quickness of perception.

Not that we would say that every defective child is backward, or that all inefficiency may be traced to a physical defect, for, as has been pointed out by both Dr. L. P. Ayers and more recently by Dr. W. S. Cornell, director of medical inspection in Philadelphia, there are many other factors entering into the progress and development of the child which may have as vital an influence as physical defect. Among the most common of these may be cited poor food, poor sanitary conditions in the home, hereditary dulness of mentality, etc., all of which must be taken into consideration. But of this we are very certain, viz, that a large part of the children in our public schools are suffering from physical defects, many of which are preventable, and are growing up with a handicap which is too great for them to carry and at the same time keep up with the average in physical, mental, or moral growth.

UNTOWARD EFFECTS OF DISEASED ORAL CONDITIONS RATHER UNDER- THAN OVER-RATED.

Since so large a part of the physical defects which have been found lie in and about the mouth, we as dentists have been deeply interested, and have carried on many and extensive investigations of the condition of the mouth and teeth alone. In these we have been appalled by the great prevalence of dental disease and deformity, and have had our attention called with great force to the effects of these dental conditions upon the health and welfare of the child. As our knowledge has grown, we have become more and more convinced that the mouth conditions are among the important, if not the most important, of all physical conditions which commonly occur among children. Much has been written by members of our profession in substantiation of this claim, and as a result we have been accused of overrating the mouth conditions beyond their true value and importance. Dr.

Cornell, in his report of 1912, makes the statement that—"Notwithstanding the figures showing the association of defective teeth with poor scholarship, carefully estimated, the evidence of the depressing influence of decayed teeth upon both the general health and scholarship of the *whole number of children is inconclusive.*"

A statement such as this, coming from a man who has had so much experience in school hygiene work, is somewhat of a shock to us at this time. We felt that the observations of the medical inspectors and the school authorities, added to our own, had thoroughly established our position in the matter beyond a reasonable doubt. If our results had all been self-adduced, we might have suspected that we had been influenced by a too high professional zeal, and had unconsciously exaggerated the importance of our own special field; but when we have ample accord and collaboration with the medical profession, some of whom have been broader in their claims of dental importance than we ourselves have been, it gives us the courage of our convictions, and the assurance that our position may be maintained in the light of scientific investigation.

ASSOCIATION OF DEPRAVED ORAL CONDITIONS WITH NOSE AND THROAT DEFECTS.

As the faulty mouth conditions are so frequently associated with nose and throat defects, it is many times difficult to differentiate between the effects of each, and indeed they cannot be separated, for they work hand-in-hand in producing detrimental influences upon the system. In the consideration, then, of the effect of depraved oral conditions upon the general health, they must be considered together with the throat and nose conditions, being of equal importance and closely related. And the results of these oral, pharyngeal, and nasal defects may be traced, directly or indirectly, to their effect upon the nutrition of the body. It is, then, to the nutrition of the child that we must look in the consideration of his health and welfare.

THE PRIME IMPORTANCE OF NUTRITION IN CHILDHOOD.

There is perhaps no time in life when there is so great a demand for good nutrition as in childhood. Not only must metabolism be maintained, but it must be excessive; anabolism must exceed catabolism, in order that new cells and tissues be formed in the normal growth of the child. In order that these demands be fulfilled, the cells need nutritious food from which they may produce energy and a surplus for cell-growth. They also need oxygen for the oxidization of these foods to forms in which they may be utilized. They need, in addition, other proper life conditions to execute this their life-work; they need proper physical conditions, proper innervation, and proper waste removal. And, as I shall presently attempt to show, it is against all of these very desiderata mentioned that the effects of oral conditions operate.

EFFECT OF UNTOWARD ORAL CONDITIONS ON THE INGESTION AND ABSORPTION OF FOODS.

In the consideration of these phases by which untoward oral conditions might operate against nutrition, we should first consider the effect on the ingested foods and their absorption into the body. The function of the mouth in the digestion of food has been a much-debated question. A physiology which has been recently published abroad begins the discussion of digestion with the stomach, stating that the mouth has no part of any importance in the process. But in opposition to this view we have a host of authorities who place considerable importance upon the oral functions. It is interesting to read the views of Beaumont, which he gained from his study of the gastric fistula in Alexis St. Martin, and which are our earliest authentic information upon the subject. I quote: "The use of mastication is to separate the food into small particles, so that the solvent of the stomach may be applied to a greater extent of surface. . . . Mastication is absolutely necessary to healthy digestion. If aliment, in large masses, be introduced into the stomach, though the gastric juice may act upon its surface, chymification will proceed so slowly that other changes will be likely to commence in its substance, before it will be completely dissolved. . . . I therefore consider mastication as one of the most important preliminary steps in the process of digestion." In his inferences he also makes a very pertinent statement when he says that "digestion is facilitated by *minuteness of division* and *tenderness of fiber* and retarded by opposite qualities." Thus we see that Beaumont has been struck with the value of the division of the foods by mastication, but he has failed to notice the part which the saliva plays in the process.

THE FUNCTION OF THE SALIVA IN NUTRITION.

This function of the saliva has been studied and discussed very ably by Chittenden, who may be looked upon today as an authority on nutrition. He dwells at some length upon the enzyme action of the saliva, by which the indigestible starches are converted to simple sugars suitable for absorption. He says: "Need we comment, in view of the natural brevity of this process, upon the desirability, for purely physiological reasons, of prolonging within reasonable limits the interval of time the food and the saliva are commingled in the oral cavity? It seems obvious, in view of the relatively large bulk of starch-containing foods consumed daily, that habits of thorough mastication should be fostered, with the purpose of increasing greatly the digestion of starch at the very gateway of the alimentary tract. It is true that in the small intestine there comes another opportunity for the digestion of starch, but it is unphysiological, as it is undesirable for various reasons, not to take full advantage of the first opportunity which nature gives for the preparation of this important foodstuff for future utilization."

THE CARDINAL IMPORTANCE OF PROPER MASTICATION.

And we find that J. H. Kellogg, as well as Chittenden and many other dieticians and close students of nutrition, has given a great deal of prominence to the part held by the proper function of the oral cavity in the process of digestion. But it remained for a layman to call attention most forcibly to the factor. By close study and perfection of the process of mastication, Horace Fletcher changed his physique from that of a weakling to that of an athlete, and proved conclusively that the mouth had a very important mission to perform which was necessary to complete digestion. So enthused is he in his belief that he has said: "The whole problem of nutrition will be settled within the first three inches of the alimentary canal."

In the light of these opinions upon the necessity of proper mastication for perfect digestion, none of which, by the way, have emanated from the dental profession, how are we to look upon the nutrition of the children who are so largely bereft of normal mastication? When it is reported that from 70 to 95 per cent. of all school children are in need of dental attention, what does it mean? We know that of those who are reported as being defective dentally many have teeth which are irregular and out of occlusion, many have cavities which may be painful enough to put the carious teeth and their neighbors out of commission, and many have lost large portions or the entire crowns of several teeth by caries, so that, instead of a normal functioning articulation capable of performing its office of preparing food for digestion, these children have but a remnant of normal mastication possessing almost no efficiency. With this apparatus the children cannot masticate their food. They can only tear off portions of food, break it up as well as they may and their teeth will allow, and bolt it. Consequently they are acquiring perforce the habit of bolting their food, and are thus introducing into the stomach and intestines large masses of unbroken starch and proteid material. Does it seem reasonable, in the light of the knowledge we have of digestion, to suppose that children living in this manner will be well nourished?

The picture which I have drawn may seem severe, and in many cases these conditions exist to a lesser extent, but in others it is in no wise overdrawn. I remember distinctly a statement made to me by a member of the party which came to Ann Arbor to visit our institution for the purpose of obtaining ideas to be used in the building of the Forsyth Dental Infirmary. This was early in the history of the movement, and as I heard the account of the magnificent scale upon which oral hygiene was to be carried out, and the large number of chairs which they planned to operate, I asked them if they had need of so large an institution. This member of the group then told me of the thousands of poor children in and about Boston that, to their knowledge, needed attention, and in conclusion, he said: "Why, hundreds of children are in such a condition that they cannot eat dry bread, unless it is dipped in milk, or more often beer."

INEFFICIENT MASTICATION AS DETERMINING SELECTION OF IMPROPER FOOD.

It is, then, very evident that the lack of proper function of the mouth strikes at the first basic feature of cell metabolism, viz, that of proper food. The indigestion and poor assimilation which must result from lack of mastication reduces materially the carbohydrates, fats, and amino-acids, which will not be furnished to the cell unless the digestive apparatus is of extremely high efficiency. The cells of the body will not then be able to meet the demand for active metabolism and growth that is so essential with the child, and we have the picture of malnutrition with all of its attending evils, which may be traced back in large measure to the loss of function of the oral cavity.

ORAL AND NASAL DEFECTS (MOUTH-BREATHING) AS INDUCING DEFECTIVE OXYGENATION.

Furthermore, in regard to the second requisite of food metabolism, what effect have the oral and nasal defects upon the supply of oxygen? It goes without saying that the growing child needs plenty of fresh air and oxygen for the aeration and nutrition of his tissues. The cells of the body, upon which there is so great a demand for synthetized food materials, require for their action an abundance of oxygen, and the blood, that common carrier, overburdened with waste products of an excessive metabolism, needs oxygen for its own aeration and purification; so that oxygen is an indispensable necessity for nutrition and metabolism. And yet how many of our children do we see sitting and standing in a stooping position, breathing shallowly and superficially, never taking a full, deep, or normal breath. Such children are using but the upper lobes of their lungs, while a large part of their deeper lung alveoli are never filled, and are not functionating. Consequently, the lung surface in which there is contact of blood and air for the purpose of interchange of gases, instead of developing the full capacity which is so necessary to the child metabolism, is but a fraction of the normal, and greatly deficient in its function.

The practice of shallow breathing is but a habit, and may be established by a variety of conditions, but every student of child nature will testify that one of the greatest of these is mouth-breathing. Here again we are brought back to mouth and nose conditions as a causative factor. The effect of irregularities of the teeth upon the size of the nasal passage and the obstruction of that passage by irregularities, adenoids, etc., are too well known to need elaboration. And all these defects, producing a partial or complete stenosis of the nasal passages, readily establish in the individual the habit of mouth-breathing.

And what of the effects of mouth-breathing? We have all seen its connection with shallow and superficial breathing, and have inferred that this, in turn, results in a deficiency in the oxygen furnished to the cells. And what is the result? We can best answer this by pointing to the children who are mouth-breathers, and present them as evidence. They are a familiar sight in every school—stoop-shouldered, listless, with a drooping expression of the face, dull in mentality, and below the average in scholarship. Not that all these effects, which are so commonly seen in mouth-breathers, should be accredited to the deficiency of oxygen, for there are other factors which enter into the case, but it seems very probable that a certain portion of these effects are the result of a malnutrition arising from a deficient oxygenation of the tissues. Untoward mouth and nose conditions, then, do have an effect upon that second great necessity of metabolism, oxygen, and therefore they have their effect upon all nutrition.

SYSTEMIC, SEPTIC, AND TOXIC DISEASES ARISING FROM DEPRAVED ORAL CONDITIONS.

We have said that, in addition to their effect upon the foods and oxygenation of the cells, the depraved oral conditions may also affect those other indispensable life conditions, namely, proper physical condition, proper waste removal, and proper innervation. We know full well that among the vast army of children with uncared-for and diseased mouths, there is in all of them an incredible amount of infection and fermentation. Much of this infection exists in the cavities of the teeth and about them, whereby all foods that are eaten are contaminated with the infectious material. It is possible that in children, especially, the infections which are passed down the digestive tract are killed by the high hydrochloric acid content of the stomach. Regarding this there is some question, as it is found that in individuals having highly infected mouths, the intestinal infections are also above normal. This fact is being made use of in the National Jewish Hospital for Tuberculosis in Denver, where the unfailing rule has been established to insist that the mouths of the patients be put in perfect condition before beginning specific treatment, and it is claimed that this practice has been of great benefit in the treatment of tuberculosis.

In addition to the superficial growth of bacteria upon the foods and tissues of the mouth, there is also a large amount of deep infection about the roots of these decayed and neglected teeth, assuming the form of virulent and extensive abscesses. That the products of this infection, the bacteria and their toxins, are picked up directly by the circulation, to a greater or lesser degree, is very well established. As Dr. Evans, Chicago's health board commissioner, said, in speaking of these conditions in school children: "The major harm that is being done is in those children who have decayed teeth, these decayed teeth being harborers of bacteria that slowly poison, and, as a result of that slow poisoning, there is, in many instances, enlargement of the neighboring glands, and those glands stand as vicarious sacrifices protecting the remainder of the body from the invading poison. Absorption is taking place from these infected areas, and the influence of that absorption is felt, not only in the neighboring glands, but also in this group of physical conditions —anemia—the relation of which is difficult to understand."

Our attention was very forcibly called to these facts some two years ago by Dr. William Hunter, who wrote a series of articles upon oral sepsis and its grave significance in the whole body. In one of them he says: "The problem is an important one for the dental profession, and its solution is an important one in the interests of public health, especially of our school children, thirty to fifty per cent. of whom suffer from dental and oral sepsis, and its tonsillitic, pharyngeal, glandular, and other defects."

We must, then, recognize that there is a variable amount of septicemia and toxemia arising from those infections and suppurations which are so commonly seen in the mouth, upon the gums, and about the teeth. But this is not confined alone to the mouth, for we find that these neglected children have not only diseased mouths, but also diseased tonsils and adenoid growths. In these, infections may be very rife, and there is also from them a variable absorption, both through the digestive tract and directly to the lymph and blood streams. Hunter sums the matter up very well in the following strong statement: "The chief feature of this particular oral sepsis is that the whole of it is swallowed or absorbed into the lymphatics or blood. Unlike the sepsis of wounds on the outside of the body, none of it is gotten rid of by a free discharge on the surface. The effect of it, therefore, falls, in the first place, on the whole of the alimentary tract from the tonsils downward. These effects include every degree and variety of tonsillitis and pharyngitis, of gastric trouble, from functional dyspepsia to gastritis and gastric ulcer, and every degree and variety of enteritis and colitis and troubles in adjacent parts, *e.g.* appendicitis. The effects fall in the second place on the glands—adenitis; on the blood—septic anemia, puerperal fever, septicemia; on the joints—arthritis; on the kidneys—nephritis; and on the nervous system."

LACK OF PROPER WASTE REMOVAL, FOLLOWING IN THE WAKE OF DENTAL INEFFICIENCY.

If, then, infection and infectious material are being transferred with such frequency and regularity from the mouths and throats of neglected patients, we may well ask, What is the effect of this absorption and metastasis upon nutrition? We can readily see that in those cases in which the intoxication is general, the cells of the body are receiving, in addition to their foods, these toxins and poisonous ptomains, which act upon them after the manner of poisons. There is, then, a direct effect upon the physical condition of the cell, and in addition a clogging of the sewers of the body, viz, the lymphatics, interfering with the waste removal. The cells must then carry on their life process under the handicap of these adverse conditions, and react to them. They must either spend a large part of their energies in fighting this toxin enemy or succumb to its influence. If the vitality is high they may react to the occasion, and the child be nominally and to all appearances in a fair degree of health, while they are receiving and caring for a daily dose of poison. This condition, which Dr. E. C. Kirk aptly called "toxin habit," is an insidious attack upon the nutrition of children, and their elders as well, which is of the greatest importance. We are but just beginning to realize the full meaning of these conditions, and we as dentists and physicians must look more deeply into this question. Dr. Chas. Mayo recently threw a challenge to the dental profession in a discussion of the absorption of septic material from the oral cavity. He said: "The dentist's patients must be warned of the mouth as being by far the greatest portal of entry of germ life into the body, the most infected part of the alimentary canal. The next great step in medical progress in the line of preventive medicine should be made by the dentists. The question is, Will they do it?"

EFFECT OF SEPTIC INTOXICATION UPON THE NERVES.

Briefly I would mention that last factor in cell nutrition, proper innervation, and the influence of the oral conditions upon it. In the statement which we quoted from Dr. Hunter he made allusion to the effect of septic intoxication upon the nerves. Dr. Henry Upson has also done some very valuable work on the reflexes produced by irritation of the fifth nerve, as in dental disorders. From these and other opinions, which there is not time to enumerate, we may infer that both the septic conditions and the pain attendant upon dental and oral diseases is able to affect the nervous control of the body. Many have suggested that there is a direct effect upon the socalled "trophic" nerves, by which nutrition suffers through the innervation of the cell. Although evidence is not yet complete, the indications of present knowledge point quite definitely toward the influence of faulty oral conditions upon the general innervation of the body.

THE CONCURRENCE OF MEDICAL AND DENTAL OPINIONS REGARDING ORAL HYGIENE.

As briefly as possible we have reviewed some of the work and opinions of men outside of the dental profession in our attempt to justify our belief that depraved oral, nasal, and throat conditions do have their effect upon nutrition, and that occurring so frequently as they do in our school children, these conditions are affecting their general health and welfare. In addition to these I would quote but one contribution from our profession, which could not be left out of a consideration of this subject. The experiment which Dr. Ebersole, our worthy secretary, carried out in the city of Cleveland was of the nature of a scientific experiment, and has given to us more accurate information than has been gained in any other way. In this experiment he had the co-operation of medical men, psychologists, educators, and dentists. Every effort was made to eliminate errors and conflicting circumstances, and although these did creep in, and must certainly be allowed for, still the results produced in these twenty-seven children, even granting a liberal allowance for error, show a decided improvement in the general health, mental efficiency, and moral tone, resulting from the proper care and use of the oral cavity. I take great delight in using the "before and after" pictures in my public lectures on oral hygiene, and I say to my audience: "Watch especially the change in the eyes and the expression in these children." And indeed they are remarkable! Many of those young people have been changed from street waifs, irresponsible and even criminal in their appearance, to entirely new individuals, fast becoming self-reliant and self-respecting American citizens. This is evidence which cannot be controverted.

Feeling secure, as we do, in the tenability of our claims and in the certainty of the fact that by reason of neglected oral conditions children by the hundreds and thousands are suffering nutritional disturbances which are preventing them from attaining their full normal growth and development, let us do all that lies within our power to relieve the conditions which are under our control, and continue to spread the gospel of ORAL HYGIENE.

Correspondence.

DOES "SECONDARY ENAMEL" OCCUR?

To the Editor of the Dental Cosmos:

Sir,—The July issue of the Dental Cosmos contains an interesting and very learned paper on "Syphilitic Hypoplasia of the Teeth," by Dr. Bethune Stein, and an equally interesting discussion of this subject. In the course of this discussion Dr. Broomell says: "Had the child recovered, these defects (enamel pits) might have been repaired by a secondary deposit of enamel," etc.

With all due respect for such an authority as Dr. Broomell, I wish to inquire whether the formation of "secondary enamel" is possible, or whether this statement is meant as an indorsement of the now generally abandoned theory of Holtzmann and Boedecker, according to which physiological changes can, from time to time, take place in the enamel owing to the presence of a certain reticulum of organic, vital matter. The authorities with whom I am familiar teach that, while the formation of secondary dentin occurs occasionally, owing to the persistence of the odontoblasts, the formation of secondary enamel is never observed, owing to the disappearance of the ameloblasts after completion of the enamel covering. The mention of secondary enamel, therefore, by such an authority as Dr. Broomell, is somewhat puzzling.

A brief explanation of this matter will, I am sure, interest a large number of your readers, and will be highly appreciated by

Yours respectfully,
David Tabak, *Senior Student,*
N. Y. Coll. Dentistry.

Proceedings of Societies.

EASTERN ASSOCIATION OF GRADUATES OF THE ANGLE SCHOOL OF ORTHODONTIA.

Annual Meeting, held in New York, N. Y., April 26, 1913.

The annual meeting of the Eastern Association of Graduates of the Angle School of Orthodontia was called to order on Saturday morning, April 26, 1913, at 10 o'clock, by the president, Dr. Milo Hellman, New York, in the assembly room of the Academy of Medicine, New York, N. Y.

The first order of business was the reading of a paper by Dr. J. Lowe Young, New York, N. Y., entitled "The Rational Treatment of Infra-occlusion."

[This paper is printed in full at page 869 of the present issue of the Cosmos.]

Discussion.

Dr. A. P. Rogers, Boston, Mass. I think we should congratulate ourselves today, because we are really getting the best of one of the most difficult problems the orthodontist has had to face. You remember a few years ago that a case of infra-occlusion or open bite was very unwelcome; in fact, we undertook the treatment of such a case with reluctance, but after a few years' experience with it we are beginning to solve this problem. I am particularly delighted with the new ideas which Dr. Young presented this morning, and do not feel that there is very much of scientific value that I can add. There are, however, a few suggestions I should like to make, and you may take them for what they are worth.

In the first place, I think the essayist failed to say anything about the method of determining the overbite, which is really a very important factor in the treatment of these cases. The length of the overbite in the incisal region, according to my experience, must be determined before the correction of the infra-occlusion in molars and bicuspids is started. This, of course, must be left largely to the intelligence of the operator, but as a guide he has the length of the cusps of the longest teeth and the type of the individual, so that the overbite may be established correctly by the position of the inclined-plane or bite-plane plates on the anterior teeth.

Dr. Young mentioned the element of habit in the production of these various classes of infra-occlusion, and he leads us to believe that the infra-occlusion of the anterior teeth is entirely due to habit. In my practice I have found one or two cases in which absolutely no habit of any kind could be ascertained. In fact, I can conceive very readily how infra-occlusion of the upper incisors may be brought about by lack of lateral development, where the incisors are caught, so to speak, in their effort to grow. I have one or two cases which show this very clearly, yet, at the same time, the habit theory is correct for most cases. The essayist did not mention how the acquisition of habits has anything to do with the lack of vertical development in the bicuspids and molars. It is difficult sometimes to determine the etiology in these cases, but I believe that in growing children, especially in class I cases, where the orthodontist is at a loss to put his finger on the cause, he will find often that lack of vertical development is caused from biting the tongue on both sides at the same time. There are cases on record which show this to be true. It is perfectly true, of course, that the distal occlusion of the mandible at the time or during the period of vertical development must be a factor, because if the mandible is in distal position the distance between the bony structure of the upper and lower jaw is less, and in that way the vertical development of the bicuspids and molars is mechanically interfered with. As the essayist has pointed out, these cases may be caused by lack of lateral development in the upper jaw. It is of the utmost importance for us to correct this lack of lateral development as early as possible, because in children of three, four, and five years of age, if the canine region can be developed, then the mandible, in my opinion, will take its proper position, and lack of vertical development will be obviated.

The question of the correct development of the face should claim a great deal of our attention at this period of the progress of orthodontia, because a thorough understanding of all these various developments will help us materially in solving these problems early.

While the essayist was reading his paper, I was reminded of a case that shows very clearly that the deciduous molars elongate or assume a higher vertical position during the eruption of the first molars. I also recall a case from my own practice in which the upper molar was for some reason caught or wedged so that the first deciduous upper molar and the first permanent molar erupted and left these teeth far back, probably one-eighth of an inch in the vertical development between the teeth that remained stationary and the two teeth on either side of the arch. With the treatment that Dr. Young advises I believe that many of these cases will be overcome.

In the treatment of these cases we should not be in any hurry to apply inclined plates or bite-planes, but first should be sure that both arches are of proper shape and size. This has been one of the principles upon which I work, and which I have advocated, and if I deviate from this principle in the slightest degree, I find that everything must be readjusted. We must first determine the size and shape of the arch and the correct overbite which we wish to establish, then the rest seems to come naturally.

The period of retention requires serious consideration. After retaining a few cases for a considerable length of time, I have been disappointed, owing to the fact that the overbite seemed to grow more pronounced, and I do not believe that this is the tendency of nature to establish the proper type, because I have been quite well convinced that I had produced the correct overbite; but I think the period of retention should be prolonged in most of these cases. In the cases where we apply lateral force and allow the bicuspids to erupt unassisted, the period of retention can be very much shortened.

One other thought occurred to me, while Dr. Young was speaking, with regard to depressing the lower incisors. We often find, of course, that it is difficult to convince ourselves that that form of treatment should be followed; but when we come to analyze nature's efforts, I think we will decide that it is the best method to employ. In studying the eruption of the incisors, one of the laws of nature—namely, that the bones develop normally when unhampered—must be taken into consideration; and in the eruption of the central incisors nature will develop unhampered, as in any other part of the mouth. The centrals develop to a certain height and stop at that position; then the lateral incisors begin to erupt, and gradually lift themselves to the same plane as the central incisors, and there stop. I do not believe that nature if unhampered will develop these teeth beyond the line of occlusion. We are safe, therefore, in establishing the bite in all cases where there is reason to believe that there is too great elongation of the premaxillary region, and there we must look for difficulty in deciding just what type the case belongs to.

Dr. R. H. W. Strang, Bridgeport. For a number of years we have known that the development of the jaw takes place in three directions, lateral, forward, and downward, yet, while we have most conscientiously established by treatment a normal lateral and forward growth, there has been an almost universal tendency to give but little thought or attention to the production of a normal downward or vertical development. Is it not reasonable to assume that failure in vertical development will appear in just as many cases as failure in growth along other lines? I believe that Dr. Young has touched upon one of the most important subjects we have to deal with.

I have been watching these cases of infra-occlusion for some time. In most of them the origin of this deformity dates back early in the history of the denture, for this failure in development is plainly to be demonstrated in the deciduous arches. Establishing itself at this period in the life-history, it in turn becomes a most powerful agent in the production of further errors of occlusion. This takes place in a decidedly mechanical way. We note that in these cases the lower incisors occlude with the upper at or near the gingival border.

The arc of a circle drawn at the gingivo-lingual line of the upper incisors is much smaller than that of one drawn at their cutting edges, so that the lower incisors, in their attempt to accommodate themselves to this smaller circle, must produce or assume one of the following types of deformity or a combination of two or more of them: Either the lower incisors will take a position lingually to normal, the upper incisors will be forced labially to normal, or the whole lower denture will be forced distally to normal, with the production of a class II case. I thoroughly believe that herein lies the cause of cases in class II, division 2, *i.e.* primarily a failure in vertical development in the deciduous denture, followed by the mechanical driving backward of the lower arch. Whether this change occurs in the joint or in the body of the mandible I do not know, but I am rather inclined to believe that it is a distal displacement within the condyloid fossa.

Dr. Rogers mentioned the fact that he does not believe we should correct this lack of vertical development until toward the latter part of our treatment. I do not agree with him. I believe that it is one of the primary etiological factors in the abnormality, and so should receive attention as soon as possible.

Dr. Rogers. Supposing the upper central incisors and upper first molars are not in their proper physiological position—what then?

Dr. Strang. Even in those cases I am in the habit of putting in the appliance that I will show later, to open the bite at once, and so allow the lower jaw to come forward, while at the same time the upper incisors are moved to their correct position.

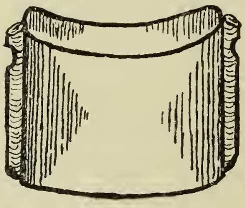
With the bite-plate that I use it is usually possible to do this. I do not say that it can be done in all cases, but where it is feasible it certainly should be done. Again, there are many cases of class I in which the lower incisors have been forced lingually, that do not admit of proper treatment until the bite has been opened. That is the first thing to do; then the lower incisors should be moved forward. Otherwise, in an attempt to move such incisors labially, one would be most liable to throw the mandible into distal occlusion or the upper incisors far forward of normal.

I have tried to treat infra-occlusion with the appliance that Dr. Rogers suggested a few years ago, but—undoubtedly owing to faulty technique on my part—I have not been able to obtain satisfactory results. In thinking it over, it seems to me that that appliance is not as practical as it should be. I do not see why we should not elongate the upper molars as well as the lower ones, nor why we should say that the lack of vertical development lies in the lower arch entirely. It would seem that if the growth of the denture is at fault in this respect, both arches would be involved.

It also appears to me that with this appliance too much force is brought to bear upon the upper incisors during mastication, and while they are supported by a heavy wire running back to the molars, yet this has not been sufficient in my cases to prevent these incisors from being driven into their sockets, rendering the appliance useless. I believe it is necessary, in order to overcome this tendency, to have the force of occlusion transferred to the hard structures in the roof of the mouth.

The bite-plate as ordinarily used has been most unsatisfactory, because it is so unstable. After experimenting a great deal, I have found an attachment that is quite positive, and although the plate can be removed for cleansing, yet, when it is snapped in position, the patient apparently forgets that it is a removable appliance. I know that this statement will give rise to doubt in the minds of many present, but I have used a great number of these appliances, and as we know that our best proof for the practicability of an appliance is its working efficiency, I can truthfully say that I have not as yet found a case in which it has not done its part, though doubtless I shall find such cases as time goes on.

Fig. 1.



The attachment is made on the upper first bicuspids, if these are in position, otherwise on the second deciduous molars. These are banded, using coin or 22-k. gold, .007″ and of proper width to extend to the gum line. On the lingual and labial side of these bands a vertical wire is soldered of 18-gage clasp metal. Close to the gingival end of this wire a notch is cut of sufficient size to receive a 16-gage wire. (See Fig. 1.)

These are placed on the teeth and a plaster impression is taken, after which they are removed and placed in the impression, and the model is obtained. Two clasps are now made of 16-gage clasp metal wire. (See Fig. 2.) The sides of these clasps engage the two notches in the vertical wires on the bands and pass over the occlusal surface in the interproximal space between the clasped tooth and the one mesial to it. (See Fig. 3.) To each one of these is soldered a strong T-bar of 16-gage clasp metal wire for attachment to the vulcanite plate. This takes the form of the well-known bite-plate. (See Figs. 2 and 3.)

Fig. 2.

When finished, this appliance should go to place with a decided "snap." In fact, it is often necessary to release some of the spring in the clasp, owing to the fact that the patient cannot remove it.

Fig. 3.

In these cases I also place an E arch in the upper jaw, making my anchorage on the first molars, while in the lower jaw I use the "new appliance." The triangular intermaxillary elastics, either alone or in combination with the regular elastics, are also worn.

Such a combination of appliances allows the molars and bicuspids to elongate to the line of occlusion, except, of course, the two to which the plate is attached. The result is usually quick and positive. Such a plate, however, should be worn for a long period of time, since the retention of this class of cases must be prolonged for years. In the later part of this period the plate may be worn at night or during the day only. [A case was then shown under treatment, with the plate and appliances in position.]

Dr. A. F. Gough, Brooklyn. I thoroughly agree with Dr. Strang in regard to beginning treatment at once. Formerly I used such a bite-plate as was suggested, I believe, by Dr. Baker of Boston. At any rate, I got the idea in Boston while attending a society meeting some six or seven years ago. Nearly all of the Boston practitioners were using it, and Dr. Reoch showed me some cases in which the bite-plate was attached to the incisors, with a wire running back to the molars. I sent to Boston and had three or four of these appliances made. Afterward I made them myself, but in my hands they were not nearly so successful as the little appliance Dr. Strang has suggested, with which I have seen some really marvelous results obtained. The principle upon which this appliance is based is also of considerable use in other cases. For instance, when the teeth on one side of the arch that were in lingual occlusion have been moved to normal position, and one does not wish to displace them on either side, the principle of this appliance is very valuable.

Dr. Harry E. Kelsey, Baltimore, Md. Dr. Young's case, in which he said no bite-plane had been worn, and yet the result was very good, attracted my attention.

I have used different kinds of bite-planes and had some good results from each, but have never been fully satisfied with any of them in every case.

The effect of the bite-plane is secured, I think, in a few cases by simply altering the mesio-distal relation of the jaw by the use of intermaxillary elastics, thereby causing the bite to be sustained by the lower incisors striking on the lingual tuberosity or shoulders of the upper incisors, thus holding the molars and bicuspids apart, until they grow up to the new occlusal plane; but in many cases that does not bring about the result desired, and some sort of bite-plane must be used.

I do not think it would be profitable to go into a discussion of what supra- and infra-occlusions are, and whether they may occur in one or both jaws, because we do not know quite enough about it as yet.

Furthermore, I do not think that we have any definite ideas regarding the diagnosis of this particular form of malocclusion, as we have regarding other forms which are diagnosed by the mesio-distal relation of the jaws to each other, because, in that case, we have definite inclined-plane cusps that must have a definite relation to each other if normal. If anyone is able to discover such a definite relationship for supra- and infra-occlusion, we shall be very much indebted to him.

I wish to thank the essayist for the valuable technique shown, which has proved so effective in all cases he has exhibited, and I think the opinions which he hazards in regard to infra-occlusion are as worthy of consideration as any offered by anyone else.

Dr. H. C. Ferris, New York. About a year ago I described the use of a bite-block, which seemed to be considered as a joke. I want to ask what takes place when these teeth fail to erupt and when they are brought out of their sockets by mechanical devices; what happens in the bottom of these sockets? We can all surmise what takes place. We must appreciate the fact that bone does not grow during that rapid removal of a tooth from its socket. The tooth will return very readily unless we hold it. When the patients were young enough, I have had a great deal of success by using the principle of mastication which I advanced before this society a year or two ago. I endeavor to induce the patients to use the blocks, although it requires a good deal of pressure on the parents and guardians to make them carry out directions, but I have a number of children using these blocks without any appliance in the mouth, and I am getting results. We cannot get away from the fact that bone grows under functional stress, and these bite-blocks stimulate normal function. I hope to be able later on to show some of the results obtained.

Dr. C. A. Hawley, Washington. This problem has confronted us for years. I have tried a great many appliances, but have never found any one ideal. We have had successes and failures and there is no form of retention that does not involve some difficulties. I agree entirely with Dr. Ferris on the question of underdevelopment in these cases. Whenever we see a case of infra-occlusion, we may conclude that there is something wrong with the development of the child. The internal structure of the face is not developed properly, and the primary cause is probably lack of use of the teeth. After many years of work, I am very much impressed with the fact that a great deal of our early treatment has produced some bad results, in that many of the appliances have had a tendency to break up the habits of mastication already formed, thus aggravating and extending the primary cause of the defect. An ideal appliance should cause absolutely no irritation, and no interference with mastication. Such an appliance is rarely found. Dr. Ferris' statement, that for the final retention we must look to the re-establishment of the perfect use of the teeth that have been lost in the first place, seems very pertinent. I am of the opinion that if we could thoroughly establish again the function and the use of the teeth, some of the maldevelopments would disappear without other treatment. The question, after all, when we have used the bite-plane or the bite-plate, is the establishment of the proper use and function of the teeth. The position in which the teeth will finally settle will depend on the type of the individual and the habits of mastication, and this adjustment will inevitably take place in spite of us.

In regard to the establishment of the exact length of the bite-plane, I see a little difficulty. While we may, no doubt, theoretically figure out the length of the bite by the cusps, yet that would presuppose exact harmony of the size of the teeth in the upper and lower jaw, which does not always obtain. That lack of harmony is naturally taken up in the overbite, and it is the anatomical shape and the size of the teeth which must finally establish the bite-plane. I do not know whether I make that point clear, but I will try and illustrate it. [Dr. Hawley then illustrated his views by means of blackboard drawings.] There is a certain occlusion, a certain length of the bite that will be established after retention in spite of any appliance.

Dr. Young (closing the discussion). I have been very much pleased with the discussion of this paper. It proves to my satisfaction that it is not advisable to write long papers, because nobody will discuss them. We have had a lot of discussion, and I think we have learned something this morning. I do not think it necessary to answer Dr. Rogers' question with regard to the depth of the overbite, as Dr. Hawley has just answered that to my way of thinking, viz, that the length of overbite is determined by the shape of the lingual surfaces of the upper incisors. In this connection, in order to save time, I may say that the case which Dr. Kelsey referred to (Fig. 13) in which I obtained a good result without the use of a bite-plane, I believe was due to the fact that the lingual surfaces of the upper incisors were of such shape that they acted as a bite-plane when the case reached that stage of treatment that permitted the correction of the mesio-distal relation and the lower incisors to strike on the upper ones.

Dr. Rogers spoke of the lack of vertical development in the anterior region being due possibly to lack of lateral widening. I have thought that in two or three cases, but I have found in each case that I was wrong; but by keeping an eye on these children I found that the irregularity was due to habit. I believe that all cases are due to some habit which can eventually be detected, and not to lack of lateral development.

Dr. Baker asked Dr. Rogers as to whether the second deciduous molar was in the arch. Whenever I see a second deciduous molar decidedly below the line of occlusion, I insist on an X ray. I am always suspicious, when seeing a deciduous tooth in infra-occlusion, that there is no permanent tooth to replace it. I am glad to say that the X ray shows permanent teeth present in as many of these cases as it shows them to be missing.

I wish to thank Dr. Strang for his discussion and for the description of his appliance. I can see great possibilities in that appliance, and am satisfied that, in very young patients, it will work, and will be very much easier to use than it is to build up these teeth as I have done.

I agree with Dr. Hawley that, no matter how accurately we may figure out where to place the bite-plane, nor how accurately we shape our upper and lower dental arches, after we remove the appliance there will be a final adjustment, and these teeth will settle down, until they come to their proper position as determined by their anatomical shape.

The next order of business was the description of clinics to be given in the afternoon. Several of the members described clinics to be given, among them Dr. A. M. Desnoes, Brooklyn, whose clinic, entitled "Suggestions in the Technique of Retention," was published in full in the June 1913 issue of the Dental Cosmos.

The society then adjourned until the afternoon session.

Afternoon Session.

The meeting was called to order at 2 P. M. by the president, Dr. Hellman.

The first item on the program for the afternoon session was the reading of a paper by Dr. Milo Hellman, New York, N. Y., entitled "The Significance of Normal Occlusion."

[This paper is printed in full at page 887 of the present issue of the Cosmos.]

Discussion.

Dr. R. B. Stanley, New York, N. Y. Dr. Hellman has covered so much ground in his paper that it is not possible to discuss every phase of the subject in the time at our disposal.

Orthodontia has passed the empirical stage, and is well on its way toward a scientific basis. Occlusion is the great principle which vitalizes it, and its true significance is only beginning to dawn upon us. Too great attention has been centered, I believe, upon the occlusal aspect of the teeth, without taking into consideration the factors which bring it about and maintain it.

Dr. Hellman shows a masterly grasp of the subject, and has correlated in his essay the researches of scientists in allied subjects in a manner calculated to lead us to a better understanding. His interpretation of Dr. Angle's dictum—"the line with which in form and position, according to type, the teeth must be in harmony if in normal occlusion"—is broad and comprehensive, and invites further study in the direction indicated.

"In proportion as we are able to grasp and interpret the ideas implied by the term normal occlusion, we will conceive how far-reaching are its effects." These words of our essayist suggest the question, What is it that is implied by normal occlusion? I take it that normal occlusion is the evidence that all changes, from beginning to end, in the development of the structures concerned in it, have taken place without interruption or deviation from the prescribed plan. Normal occlusion is not, therefore, a cause, but a result of these changes, consummated for the purpose of fulfilling a requirement of the physical economy.

The general scheme of embryonic development is carried on according to certain established laws, and is probably, as the essayist says, an epitome of the entire process of evolution. The first cleavage of the cell is a simple process, comparatively, yet without it no further change takes place; each step, therefore, is a preparation for the subsequent one. With this thought in mind, we can study the development of the oral cavity and its contained organs.

I do not intend to repeat in detail the history of embryonic development. In a general way, the maxillary, mandibular, and fronto-nasal processes, and the tissues that are to form the tongue, are differentiated at about the same time.

Yet, before the processes that are to form the jaws unite, the tongue assumes a commanding position, and acts as a mold or core, around which the jaws take form.

The significance of this fact should not be lost sight of, for the influence of this muscular tissue, both before and after birth, in molding and maintaining the dental arches, is more potent, I believe, than any other. When it is remembered that the soft tissues are developed first, and the bone last, it is not difficult to grasp the truth of this statement.

In early infancy the normal function of the tongue is of material assistance in molding and enlarging the jaws, thereby preparing for the normal eruption of the first teeth. During this process of growth, the crowns of the deciduous teeth have kept pace in their development with the jaws, and when it is necessary for them to fulfil their mission in life, they descend and take their rightful places in the scheme of occlusion. When their position is established, they in turn take part, through their functional activity, in the further growth of the jaws, until they are lost. There is no essential difference between the development of the first and second dentures; both are governed by the same laws. In both instances, occlusion plays no part until the final act.

The illustrations thrown upon the screen, showing the relation of the direction of the roots of the teeth to the structures above them, are of special interest to us.

The significance of the position of the roots is far-reaching, for only when the normal development of the superstructures or supporting structures has taken place, is this root relation possible. In other words, root position, or inclination, is dependent upon the development of the supporting structures. Any corrective measures which involve the bodily movement of the roots of the teeth must take into consideration all the factors concerned in jaw-growth.

Of more than passing interest to us are the observations of Professor Patten with regard to the effect of "lowland" and "highland" climates upon the shape of the jaws, the skull, and also the stature.

As to whether the character of the teeth influences the shape of the skull, or *vice versa,* the observations of Prof. Raymond C. Osburn, also of Prof. Henry Fairfield Osborn, when combined with those of Professor Patten, show a fundamental agreement as to an actual correlation between the shape and size of the teeth, the arches, and the skull.

Personally, I believe that occlusion occurs too late to determine materially the character of the skull. I interpret the observed correlations as evidence of the existence of definite laws which harmonize the proportions of all parts of the anatomy, for the preservation and perpetuation of the whole. Normal occlusion is but one phase of the whole scheme; to understand its true significance, we must explore still farther the mysteries of life and living.

Dr. W. M. Dailey, New York, N. Y. I think this is one of the most valuable contributions I have ever heard presented before any society. All the men of the "old school," as it is stigmatized by the Angle orthodontists, were considering irregular teeth and not malocclusion, like the Angle school. The new thought of bone-development or development of the human being according to type, and of irregular teeth being a manifestation of the lack of or non-development of bone, as described by the essayist, goes far beyond anything that had been considered heretofore, inasmuch as the men who are practicing orthodontia are really now becoming bone-stimulators, bone-developers. Another factor, namely, the condition of the parents at the time of conception, has been little considered, and must be studied in the future.

Dr. Hellman (closing the discussion). I wish to thank the two gentlemen who have discussed my paper. It is, however, difficult for me to interpret the meaning of the general silence. Does it indicate approval or disapproval? I would have preferred to hear a discussion one way or the other.

The only statement I wish to correct is Dr. Stanley's remark with regard to the cephalic manifestation after occlusion is established. I would ask Dr. Stanley to repeat his words.

Dr. STANLEY. I said that when occlusion is completed, it is too late to be of any influence in establishing the cephalic index.

Dr. HELLMAN. I do not think so, and I would call Dr. Stanley's attention to the fact I mentioned in my paper, namely, that the pressure exerted in infancy during the act of nursing is probably as effective as that which is exercised in later life, when the teeth are in position and perform the function of mastication.

I wish to thank the members and guests for their kind attention to my paper, the length of which must have been very trying for them.

The next item on the program was the reading of a paper by Dr. A. L. JOHNSON, Springfield, Mass., entitled "An Introductory Study of Habit."

[This paper was published in full in the June 1913 issue of the DENTAL COSMOS.]

The next order of business was the election of officers for the ensuing year, which resulted as follows:

President—Dr. R. H. W. Strang, Bridgeport, Conn.

Vice-president—Dr. A. L. Johnson, Springfield, Mass.

Secretary—Dr. E. S. Butler, New York.

Treasurer—Dr. F. R. Stathers, Philadelphia.

The meeting then adjourned.

CONNECTICUT STATE DENTAL ASSOCIATION.

Forty-ninth Annual Convention, held at Waterbury, Conn., April 15 and 16, 1913.

(Continued from page 836.)

TUESDAY—*Evening Session.*

THE meeting was called to order Tuesday evening at 8.30 o'clock by the president, Dr. Abbott.

The first item on the program for the evening session was the reading of a paper by Dr. F. T. VAN WOERT, Brooklyn, N. Y., entitled "The Future of Porcelain in Dental Art."

[This paper is printed in full at page 920 of the present issue of the COSMOS.]

Discussion.

Dr. E. S. GAYLORD, New Haven. The few words I shall have to say in the discussion of this paper I shall direct more particularly to the men who are not acquainted with Dr. Van Woert. Those of you who are acquainted with him know perfectly well his standing, and that he is considerably overworked, as he conducts a very large practice, so that it is very difficult to induce him to leave his office and present a paper. I wish to say to those who know him from his writings only, that he is one of the most painstaking, most precise operators in our profession in any field that he takes up, and he has come to us bringing the best work of his life, which has embraced more than thirty years of labor in the field of dentistry. He has worked out the technique of porcelain to a degree of precision which makes this material much more valuable than it has ever before been in the hands of the dentist. He has reduced shrinkage by his method of mixing the body with the medium, as he has explained to us, and forcing that into a mold, thereby imparting to the mass a degree of solidity which reduces the shrinkage to one-tenth. Consequently he brings to us something that is invaluable, and he offers it to us for free use. I regret, however, exceedingly that he did not elaborate more fully on his methods of perfecting this work.

Even those men who have condemned porcelain and taken up other materials must acknowledge that our shortcomings in porcelain work are to be attributed to poor technique rather than to the material itself. The early days of porcelain date back more than thirty years. I have still the old Downey furnace that was brought out for this work, and I still adhere to it. Porcelain certainly is one of the most valuable materials we have for filling cavities in teeth, from the esthetic standpoint as much as from the standpoint of durability, when used in cavities in which it is safe to use. I wish to emphasize this statement "in which it is safe to use." All occlusal surfaces are regarded as unsafe, but as a rule in approximal, labial and buccal surfaces, nothing is superior to porcelain, particularly in the buccal surfaces of molars.

While the profession has drifted away from porcelain, and there has been little demand for it hitherto, this demand is increasing, showing that dentists are coming back to its use. Dr. Jenkins in a recent conversation on this subject, said that he proposed to reopen his post-graduate school in New Haven next fall for the teaching of porcelain work, which he conducted a number of years ago. I was telling this to Dr. Van Woert this afternoon, and he replied that he would be glad to sacrifice his time and give lectures at Dr. Jenkins' proposed school. I say this to show that porcelain is being revived. Other filling materials have failed to such an extent that the value of porcelain is being reconsidered and properly estimated.

Dr. C. W. Strang, Bridgeport. I wish to say at the outset that it seems to me the limit of incongruity for one who has had but little practical experience in the manipulation of porcelain to discuss a paper prepared by an artist in that department. I admire the system presented by Dr. Van Woert, and recognize him as a man of high ideals, who has made a close study of this subject.

The man who is satisfied with present attainments never gets very far; but the man who wisely and judiciously follows high ideals is the one who succeeds. High ideals are the guardian angels of life; they are guiding stars to us poor mortals, and are not like the rainbow in the distance toward which the child runs with open hand to grasp, only to find it always the same distance away, the hill-top bringing him no nearer to it than did the valley. A high ideal is one of the great realities in life.

I have to admit that the best I have to offer to my *clientèle* is the old Richmond crown. From experience I know that, when this crown is well made, it is reliable and permanent. I have, however, experienced sore disappointments; after spending days in selecting porcelain facings that would be in harmony with the natural teeth, when the tooth had been backed and soldered I have found that its translucence was gone, and both patient and dentist were disappointed. Sometimes, when the patient has expressed dissatisfaction with the work, I have said, "I have done the best I can, and if you can find anybody who will guarantee to do any better than I have done, I will pay the bill." You see we put a little of the risk on the patients, because if they fail to get satisfaction anywhere else, they have to pay the bill themselves, and I want to confess that I have never been called upon to pay the expense of a second operation under these conditions.

Some years ago, before a gathering of dentists, I made the statement that I had not yet set one Logan crown, and they all congratulated me. That statement holds good today. I have never, in my practice, been over-enthusiastic in running after new things. I remember how many years ago, the practice of pulp capping was sweeping the country. Dr. Atkinson, as some of you remember, was fostering that work; and everything, regardless of pathological conditions, was treated in this way—"Cap it, kiss your patient good-by, and all will be well." Some of you know very well the ultimate results of that method, and I venture to say that very few dentists today have much confidence in pulp capping. This method probably is advisable in case of not quite fully developed teeth, for the purpose of saving the pulp as long as possible; but I think most of us get rid of an exposed pulp by the shortest possible route. The same is more or less true of cataphoresis. I remember when the cataphoresis fever spread over the profession, we found enthusiasts at almost every convention; but we do not now hear very much of that method of obtunding sensitive dentin.

I have nothing new to offer in regard to porcelain work. I was very much surprised to learn that it is practically impossible to obtain an accurate porcelain inlay from a direct impression of the cavity. I am now assured by a number of practitioners who have been using the direct method for a number of years that they have abandoned it.

Dr. J. W. CANADAY, Jr., Albany, N. Y. When I was asked to give a clinic before your society I had no idea that I would be called upon to discuss the paper of so eminent a practitioner as Dr. Van Woert, and I feel it an honor and a privilege to do so. Dr. Van Woert is an artist of great ability in his line, as his lantern slides and specimens have shown.

His description of the Buell method, especially that portion following the preparation of the root, was perhaps not as clear to the audience as he intended it to be, and it would be well for those interested in this method to read the description when this paper is published.

In contradistinction to the Buell crown, the essayist described his own method of carving a crown from an ingot obtained by high pressure in a steel mold, using a fixed proportion of porcelain body of the same quality as is used by the manufacturers, and a menstruum of tragacanth jelly. By comparison of the two methods described we find that a crown made by the Buell method shrinks one-sixth of its size and requires two or three bakings, while one made by the Van Woert method shows a shrinkage of only one-tenth, and requires but one baking, also conforms more nearly to the essayist's qualifications of the perfect porcelain crown, which is—(1) One that possesses the maximum strength, (2) one that can be made to occlude with the opposing teeth normally, (3) one that will harmonize with its neighbors in shape, color, and contour, (4) one that will perfectly fit the end of the root to which it is attached, and (5) one that shrinks the minimum amount.

Such a crown can only be constructed by an expert with very high artistic ability; but how many men of ordinary ability can do this without special appliances? A man of ordinary ability, however, can, by using care, select a stock crown with an iridio-platinum detached post, adapt it approximately to the root, make it conform in color, contour, occlusion, shape, etc., and make it fit absolutely with a casting of gold which will not show at all, and thus produce a very serviceable and esthetic result. Unless we shall all be more familiar with porcelain, and consequently more skilful in its manipulation in the "raw" state, more esthetic and serviceable results will be obtained with this method by the dental profession at large than by the all-porcelain hand-carved crown.

Dr. VAN WOERT (closing the discussion). I regret exceedingly the condition under which I addressed you last evening. It was utterly impossible for me to read the manuscript which I had prepared, because of defective light, and the result is that I have evidently not made myself clear. I wanted to emphasize particularly the many advantages of the hand-carved porcelain crown, and prove at the same time, if possible, that it was not so complicated or difficult a matter to produce such a crown as is generally supposed.

The gentlemen who have been kind enough to discuss this paper are crediting me with an undue amount of skill and artistic ability, as either of the methods presented for this purpose are within the province of all of you.

The Buell method is very much simpler in technique, but has the disadvantage of a large percentage of shrinkage and the necessity of two or more fusings before completion. Just as beautiful results can be obtained by it, however, as by this later method. On the other hand, the method just described offers the decided advantage of a minimum and exact amount of shrinkage, which renders easier reproduction possible and brings it down nearer to an exact science. I hardly think, however, that facings could be made with the appliances shown as easily and accurately as they can with the Buell method.

The meeting then adjourned until the Wednesday morning session.

WEDNESDAY—*Morning Session.*

The meeting was called to order on Wednesday morning, April 16th, at 10 o'clock, by the president, Dr. E. J. Abbott.

The first item on the program for the morning session was the reading of a paper by Dr. GEORGE E. HUNT, Indianapolis, Ind., entitled "Mouth and Health."

The society then adjourned until the next annual meeting.

THE DENTAL COSMOS

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EDITED BY

EDWARD C. KIRK, D.D.S., Sc.D.

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PHILADELPHIA, SEPTEMBER 1913.

EDITORIAL DEPARTMENT.

A QUESTION OF ETHICS.

IN the stress of circumstances incident to a recent attempt in one of our oldest commonwealths to pass an act of legislature regulating the practice of dentistry, one of the results of the involved political conflict, apart from the failure to secure passage of the bill, was to defeat the reappointment of one or two members of the existing board of dental examiners, each distinguished for a long term of efficient service under the existing dental law which it had been sought to improve. The removal of the officers in question was compassed by their opponents upon the specified grounds that they and others of the board were "not progressive." This vague indictment, with its suggestion or implication of inefficiency, furnished the state executive with a, to him, sufficient excuse for keeping favor with their opponents by removing the officers in question.

All of which is a commonplace example of ordinary political methods, and of the manifest injustice of petty politics in dealing with professional problems. The conflict in the case grew out of an attempt to pass a bill which, while many of its provisions were most admirable, yet contained certain features which were highly objectionable, and which in their purpose were bad enough to more than offset the manifest advantages which the proposed act otherwise contemplated. Unfortunately, such measures are the source of much heated debate, for the reason that opposition to their obviously iniquitous provisions is too often made to appear as opposition to the entire act, its good features included; and so it was with the case in question, with the result of the indictment of "non-progressiveness" preferred against the more conservative members of the board of examiners, and the removal of two who had achieved records of long, equitable, and efficient service.

Two phases of the issue are important: First, the damage to the state, in the work of its board of dental examiners; and second, the damage to the personal and professional reputation of the deposed members of the board.

It may occasionally be true that a poet is born and not made, but with dental teachers, dental examiners, and ordinary experts in general it is usually a long, careful, and often tedious making, especially when the product amounts to anything important in the way of efficiency. Moreover, in the case of examiners and teachers, the making is not accomplished by a specialized course of college training, but in the hard school of experience—from which fact it follows that within reasonable limits their efficiency increases as their experience enlarges; hence it is a damage to the state of no small consequence to remove an experienced and efficient examiner for political reasons on the outward pretext that he is "not progressive"—whatever that phrase may mean. As a matter of fact it is true that the new and inexperienced appointee must, if faithful to his trust, be markedly progressive in order to develop the same efficiency as his predecessor, and in that view of the case may for a time exhibit greater progressiveness; but it is probably not in that sense that the phrase "non-progressive" was used in criticism of the predecessor, if in any sense at all except as an expression of a desire to get rid of him.

Considered in its literal sense, "progressive" means having the tendency to go forward; it carries with it no sort of implication as to the goal toward which the progressivist is tending, and in that particular, like many other terms, is purely relative and therefore has no absolute application or meaning unless coupled with some other qualifying term. As applied to the case under consideration the charge of being non-progressive is about as lucid and precise a definition of technical efficiency as members of the dental examining board as to say of them that they were "corkers," "bricks," "mutts," or "bull-moosers," according to the opinions and taste of those who express themselves in terms of that character. It is, however, the very vagueness and indefiniteness of the indictment of non-progressiveness in this instance that gives to it its malignant character, for the reason that its want of precision permits full play for the imagination in the effort to decide just what was meant by the charge. A public official removed because he is said to be non-progressive is presumably deficient or unsatisfactory as a public servant; therefore it must be that to be non-progressive is to be at least negatively guilty of some sort of misdemeanor as related to the public service. To make public announcement of such official removal and for the cause stated is to not only do an injustice but to work a definite damage to the professional reputation of the party involved.

We have spent much time in tinkering with what we dignify by the term "professional ethics," and have concentrated much thought upon the construction of a code, especially those portions of it that relate to the material interests of professional men. We are impelled in this connection to call attention to a very ancient code of ethics handed down to the present generation through the records known as the Hebrew scriptures; one article of the said code being, "Thou shalt not bear false witness against thy neighbor." We are well aware that certain provisions of the code of dental professional ethics have reference to certain aspects of this same ethical standard, but we know of no other specification that is quite as clear, direct, and to the point in question as that to which we refer in the Mosaic code. Therefore with some slight sense of diffidence we are impelled to suggest to those who are seeking for higher ethical standards in the dental profession, Why not adopt that one article as a whole and without alteration or amendment into our dental code?

Correction.—In the series of diagrams of the angles of various mandibles accompanying the paper by Dr. M. H. Cryer, as printed in our July issue, the diagrams Nos. 12 and 13 should be transposed, likewise Nos. 14 and 15. The correspondence of the diagrams and the illustrations of jaws and skulls is as follows: Diagram 9, Figs. 1, 16; 10, Figs. 2, 17; 11, Figs. 3, 19; 12, Figs. 5, 22; 13, Figs. 4, 19,A; 14, Figs. 6, 19,B; 15, Figs. 6, 19,A. Exact re-measurement of various angles involves the following corrections in the text: Page 675, 2d col., 10th line from foot, *for* "135°" *read* 139°; p. 676, 3d line, *for* "133°" *read* 135°; 8th line, *for* "107°" *read* 108°; p. 683, 2d col., 6th line, *for* "125°" *read* 124°; p. 684, 1st col., 12th line from foot, *for* "135°" *read* 136°.

Review of Current Dental Literature.

[*Oesterreichische Zeitschrift fuer Stomatologie*, Vienna, May 1913.]

TEMPORARY DISPOSITION TO CARIES. By Dr. L. Fleischmann.

The temporary disposition to dental caries which is so frequently observed in patients after a period of comparative immunity, is, according to the writer's observations, caused by disturbances in the calcium content of the organic portion of the enamel—which in turn are due to disturbances or changes in the internal secretions. This contention, in the author's mind, is fully borne out by the tendency to rapid dental caries during pregnancy, chlorosis, and in cretinism, which conditions involve a marked change in calcium metabolism. The important relationship of the structure of the enamel and the disposition to dental caries has been emphasized also by Baumgartner and Von Ebner, who by the aid of carefully prepared microscopic slides of enamel have proved fairly convincingly that metabolism does take place in enamel even after the eruption of the tooth. The facts that enamel is softer in youth than in adult age, therefore much more susceptible to caries, that it changes its color and loses its luster in later years, seem to indicate, in Fleischmann's opinion, that the organic substance in the enamel undergoes progressive calcification, and that the less uniformly the organic substance has been calcified, the more readily the enamel is invaded by micro-organisms. The trend of Fleischmann's argument, which has quite a few notable supporters among European scientists, justifies the hope that it may be possible to favorably influence the calcium metabolism in enamel by therapeutic measures, thereby establishing effective prophylaxis. The effort to exert such a favorable influence upon the calcium content in enamel is in direct line with Röse's studies on deficiency of mineral salts and degeneracy (see Cosmos for January 1909, page 135), and the suggestions contained in the writer's paper; although they are diametrically opposed to the views generally accepted on this side of the ocean, surely deserve earnest thought.

[*Journal of the American Medical Association*, Chicago, June 7, 1913.]

THE POSSIBLE RELATIONSHIP OF ORGANIC DISEASES OF THE NERVOUS SYSTEM TO RIGGS' DISEASE. By Dr. J. Collins, New York.

The occurrence of purulent diseases of the alveolar processes is so common and so widespread that it has come to be regarded by many patients, and even practitioners, unfortunately, as disagreeable and esthetically offensive, but not dangerous and capable of causing serious disease. The writer's experience convinces him that Riggs' disease may be the source from which serious organic diseases of the nervous system flow. Though he can offer no other proof of the truth of this statement than the occurrence of such disease in persons afflicted with alveolar pyorrhea, and the absence of other etiology and the amelioration or disappearance of the disorder after the pyorrhea has been treated locally and constitutionally by means of autogenous vaccine, he feels constrained, nevertheless, to present a few of these observations for consideration. From a large number of cases in which he believes pyorrhea alveolaris played the chief rôle in the causation of nervous trouble, he has selected three specially instructive cases, in which the peripheral motor neurons bore the brunt of the disease. From a careful study of these and many similar cases, he is of the opinion that the neuro-muscular system is most vulnerable—after the joints—to the streptococcus viridis. That a very considerable number of the cases of chronic arthritis are of bacterial origin, there can be little doubt. In a recent article, Dr. T. W. Hastings quotes the histories of six cases of arthritis deformans of from two to fifteen years' duration which reacted to strains of streptococcus viridis. From four of these cases the same organism was isolated from a tooth socket after extraction of the tooth. Improvement resulted from injections of vaccines.

The writer concludes with an earnest plea for a full appreciation of the seriousness of pyorrhea alveolaris, and the early institution of measures that will prevent a systemic infection which may become far-reaching and extremely serious.

[*Zahnaerztliche Rundschau*, Berlin, January 19 and March 9, 1913.]

FORMALIN ECZEMA OF THE FINGERS. By Dr. H. Hoelzer, Danzig.

[*Deutsche Zahnaerztliche Wochenschrift*, Berlin, March 8, 1913.]

OCCUPATIONAL DERMATOSIS IN DENTISTS, CAUSED BY THE USE OF TRICRESOL-FORMALIN. By Professor Wolters, Rostock.

After having observed several cases of eczema of the fingers in himself and some colleagues, the writer comes to the conclusion that these cases are due to the habit of removing cotton twists saturated in formalin from smooth broaches with the fingers. In all these cases the trouble started in the finger of the left hand which was used for this purpose. Healing is very slow, since medicaments, acids, alcohol, etc., break up the granulation tissue formed, and produce renewed irritation. The formation of this formalin eczema is facilitated by the continual washing of the hands in warm or tepid water, whereby the pores of the skin are opened. After trying in vain the remedies recommended by several physicians, the writer effected a complete cure after four months of great discomfort, in the following manner: The affected fingers are nursed as much as possible, and protected during work and at night by a rubber cover, to prevent additional irritation and to produce hyperemia. In the morning the fingers are bathed in hot water of a temperature of from 35° to 40° C., and coated with pure vaselin. No formalin should be used for some time. Medicaments are useless, the healing process being much more expeditious without them. At night a little cotton may be wound around the fingers.

Several replies received by the writer from various *confrères* seem to confirm the prevalence and seriousness of this "formalin eczema," although one contributor suggests that the habit of mixing amalgam alloys in the hand may be responsible for a mercurial eczema.

A specially valuable contribution to this important subject is furnished in the article by Wolters, who, being a dermatologist, has observed that whenever new remedies for external use, especially for disinfection, are brought upon the market, numerous cases of dermatosis occur, as was the case following the adoption of phenol, sublimate, lysol, lysoform, iodoform, iodoformogen, formalin, etc. Dermatosis once produced by tricresol-formalin can easily become chronic, since any other irritating drug, as well as the continued mechanical and chemical cleansing of the dentist's hands and finger-nails, adds to the susceptibility of the skin. Small breaks and erosions are thus caused, which, when again brought in contact with the irritating drug, are cauterized and become inflamed. The epidermis undergoes horny alteration; infiltrations, chaps, pustules, and blisters are formed, and the resulting pain is often so intense as to disguise the very disagreeable itching present in milder cases. The soft tissues surrounding and underlying the finger-nails are affected, the skin is reddened, swollen, and very sensitive, and the process gradually involves the end phalanges, sometimes extending in patches over the palmar surfaces of the fingers, or even the whole hand. The same process may be transmitted to the nose, lips, and face by accidental transmission of the drug by the fingers. The nails undergo brown discoloration, which persists even after cure; Galewsky even reports their swelling up and splitting. The surface of the nail shows irregular elevations and depressions, proving that the inflammatory process has attacked the nail matrix and affected the growth of the nail. The soft tissue at the edges in some cases undergoes sausage-shaped deformity.

In regard to treatment, Wolters demands that tricresol-formalin should be entirely eliminated from dental practice, as being too dangerous and unnecessary. In opposition to Hoelzer, he opposes the use of rubber covers, as the fingers perspire under these and predispose them thereby to eczema. For the same reason he rejects warm water and vaselin treatment. For disinfection of eczematous hands, only warm water, a brush, soap, and alcohol should be employed. Practice is best suspended for a while in order to avoid renewed irritation. The best form of treatment consists in Roentgen treatment, to be repeated from three to four times at intervals of from eight to ten days. In the meantime wet dressings of 2 per cent. alsol, aluminum acetate, and salicylic acid, 1:1000, are used to produce granulation, powder or tumenol zinc for drying up the pustules and blisters, and zinc-bismuth salve for softening and removing the horny skin formation. When the condition is improved so that only redness, slight infiltration, and scales remain, coal-tar in the form of solutio lithantracic acetonica, as indicated by Sack, or liquor carbonis detergens, as indicated by Wright, is applied, this application to be followed by a neutral salve to restore the softness and smoothness of the skin. If the nails have suffered considerably, the X-ray treatment is especially beneficial for the return to normal growth of the fingernails.

The careless habit of dentists of allowing the fingers to come in contact with drugs is signally discountenanced by the above investigations. That many cases of eczema are due to the careless manipulation of formalin we are induced to believe after observing the same phenomena in three *confrères* who were in the laudable but evidently impractical habit of keeping their instruments in a formalin solution for the sake of sterilization.

[*La Province Dentaire*, Lyons, November 15, 1912.]

CASE OF ANESTHESIA BY AUTO-SUGGESTION IN AN HYSTERIC PATIENT.

By Dr. V. L. Bourselet, Paris.

Bourselet relates the case of a young woman of twenty-five years, in whom he injected a 1 per cent. solution of cocain for the purpose of extracting the upper right first molar. Before the extraction could be executed, the patient exclaimed that the operator was using ether, and that she was about to fall asleep. Her eyes became fixed, and she began to cry and to gesticulate violently for about five minutes. Upon recovering, she asked as to her whereabouts and as to what had happened. Upon her second visit, the tooth was extracted without an anesthetic. Referring to her experience on the occasion of her first visit, the patient confessed having had sexual affections. The writer, not willing to attribute this case to the topic action of the cocain, cites two similar cases which have been reported by Guérard of Paris and Ernst of Lunéville. He refutes the idea of emotional syncope, since the syndrome of symptoms, viz, pallor of the face, profuse perspiration, lividity of the skin, etc., were not present in his case. Syncope due to the cocain cannot be assumed, as the space of time which elapsed between the syncope and the injection was too short to permit of diffusion of the alkaloid through the circulatory system and intoxication of the nervous system. Moreover, the syncope came on immediately upon the patient's fallacious conception that ether was being used, in consequence of which she imagined falling asleep. Her confession of moral remorse, her nervous hyperexcitability, and the fact that she believed herself to be asleep immediately upon thinking that ether was being administered to her, induce the writer to conclude that this was a case of narcosis due to auto-suggestion in an hysterical patient.

The importance of the presence of a third person in all cases of anesthesia, no matter whether general or local, is signally demonstrated by this report.

[*Lancet*, London, April 19, 1913.]

THE MORBID ANATOMY OF PERIODONTAL DISEASE. By J. F. Colyer.

Colyer gives an interesting and well-illustrated description of an excellent, probably unique series of specimens illustrating the morbid anatomy of periodontal disease, as contained in the odontological collection in the museum of the Royal College of Surgeons of England. The specimens include examples of the disease in man as well as in the lower animals, the value of the collection being enhanced by the fact that all stages of the disease are illustrated. In discussing the more instructive specimens in the collection, Colyer makes a point worthy of special notice, viz, the difference in the spreading of the disease in the maxilla as compared with that in the mandible, which is especially marked in the region of the molars. This limitation of area of bone destruction in the mandible is to be accounted for by the different nature of the osseous tissues in these two bones. In the maxilla the bone is of a much more cancellous character than in the mandible. This difference in the spread of the disease in bones of different density is especially well marked in lower animals. Clinical experience shows that the disease varies in its rapidity, and that in some individuals there is a definite reaction of the periosteum of the bone to the injury from the toxins. This is shown by a general thickening of the alveolar bone, and in a few cases by the formation of nodulated masses simulating exostoses. The teeth also exhibit definite changes, the hard tissue showing absorption and the periodontal membrane thickening, both indications of a chronic inflammatory process. The molars frequently show large masses of adventitious tissue in the cleft between the roots, indicating extensive loss of osseous tissue at these points.

An examination of teeth removed in certain cases of periodontal disease indicates that, with the formation of a pocket around the tooth, pathological changes commence around the apex of the tooth. The roots of the teeth, especially at the apical portion, show signs of absorption, although in one such case of persistent gingivitis, as far as could be ascertained, neither the pockets nor the bone destruction were very extensive. This condition the writer explains as follows: From the septic focus around the neck of the tooth, absorption of toxins or organisms takes place through the periodontal membrane, probably by lymphatics. The material absorbed is held up, as it were, in the tissues around the apex. In other words, there is probably a natural defense at this part of the tooth, to prevent the organisms and toxins from passing into the general circulation. With the arrest of the toxins, etc., the tissues around the apex naturally react to injury; that is to say, the phenomena of inflammation appear. The formation of these septic foci around the apices of the teeth has, in the writer's opinion, not been recognized, but it is clear that it is an important factor to be reckoned with in considering treatment.

In the second part of his paper, Colyer describes pyorrhea alveolaris as seen in animals. It is of frequent occurrence in horses, cats, and dogs, and in wild animals that have been kept in captivity. The study of the disease in these animals is most instructive, and throws considerable light on its etiology and pathology.

The conclusions to be drawn from the examination of these specimens in man and animals are: (1) That the bone lesion is a progressive rarefying osteitis commencing at the margin of the alveolar process. (2) That the disease is purely local in origin and has its immediate cause in the formation of stagnation areas around the teeth. (3) That the varying density of the bone influences the rate of destruction.

[*American Journal of Clinical Medicine*, Chicago, February 1913.]

RELATIONS EXISTING BETWEEN TEETH AND EYES. By Dr. W. E. Bruner.

[*Ash's Wiener Vierteljahrs-Fachblatt*, Vienna, May 1913.]

METASTATIC OPHTHALMIA FOLLOWING TOOTH EXTRACTION. By Dr. Dimmer.

The relationship between the eyes and teeth is the subject of an interesting article by Dr. Bruner, which appeared originally in the *Annals of Ophthalmology* for October 1912. The association of certain eye conditions with changes in the teeth is not a new discovery, and its recognition long ago is suggested in the term "eye-tooth." The writer concerns himself more particularly with the production of ocular disturbances or diseases from abnormal conditions of the teeth, and these he divides into two classes, functional and organic.

The functional disturbances may be produced by abscesses or disease about the roots of the teeth or by an impacted tooth, and such reflex effects are found more frequently when the teeth of the upper jaw are at fault. The effect upon the eye on the affected side may consist in disturbances of the pupil or the motility of the iris, in restriction of the range or complete paralysis of accommodation, spasm of the orbicularis, disturbance of the muscle balance, asthenopia or amblyopia—with absence of ophthalmoscopic findings—all of which are entirely relieved upon removal of the cause of irritation.

The author cites Coopman's interesting case of blepharospasm from physiologic eruption of a tooth, occurring in a healthy child of three who made no complaint about the teeth. After five days of marked blepharospasm, examination disclosed a slight swelling back of the second deciduous molar. Incision over the permanent molar banished the spasm.

The writer himself has seen cases of strabismus, asthenopia, and other symptoms which occurred either during the eruption of the teeth and disappeared when the tooth was through the gums, or which occurred while children had their teeth regulated and disappeared when the appliances and all pressure had been removed.

Blindness following the extraction of a tooth has been reported. Organic or structural changes in or about the eye, resulting from the teeth, have been observed in many varied forms, and inflammation of almost every structure of the eye, depending upon, or at least attributable to, dental trouble, has been reported. The author mentions a case of abscess of the orbit which stood in relation to an abscess about the root of a tooth. Ulcers of the cornea of various types have been attributed to the teeth by various writers. The possibility that an intractable keratitis may be due to reflex irritation should also not be lost sight of.

Pyorrhea alveolaris has not infrequently been found to be a cause of ocular disturbance. An important point in reference to this and to other septic conditions about the mouth is that, when such is found in a patient upon whom an operation upon the eyeball is contemplated, it is most important to correct this septic condition before proceeding to any operation. Knapp reports a case of blindness from periosteitis originating from caries of the teeth extending to the floor of the orbit, where it caused some thickening and involved the optic nerve within the canal.

A remarkable fact upon which the author lays particular stress is that not infrequently the patient is wholly unconscious of anything being wrong with his teeth, and he will state that the latter are examined regularly by supposedly competent dentists. The author has grown suspicious of a mouth showing numerous gold crowns and fillings, and places great weight upon an X-ray examination, which he insists upon when he does not feel certain of the work previously done. He has succeeded in several instances in finding abscesses at the roots of teeth, or of improperly filled roots, where nothing wrong was suspected by the patient, with the result of securing relief of the ocular symptoms by treatment of the pathologic dental condition.

The possibility of ocular disturbance due to dental disease is corroborated by a case reported by Dimmer in the *Wiener Med. Wochenschrift.* A lower right molar, which had been considerably destroyed by caries, was removed in three portions in a patient of eleven years. Though no swelling or suppuration had been present in the mouth, vomiting and fever occurred two days after the operation. On the fifth day the right eye became hazy, and the pupil underwent a yellow-gray discoloration. Fever blisters of the lips and catarrhal angina supervened, and the right eye exhibited hypopyon, though the extraction wound showed no inflammatory symptoms whatever. Treatment consisted in atropin and the application of hot, wet poultices, by which the eye was gradually reduced in size. Two months after the extraction, the right eye was somewhat smaller, bloodshot, the cornea normal, the anterior chamber shallow, the iris slightly discolored, the pupil contracted with a narrow, hard synechia postero-inferiorly; the lens was transparent. In the fundus a gray reflection was noted, which in the lower half of the bulbus assumed an intensely white shade. Dimmer states that diseases of the eye of dental origin are usually due to metastasis of purulent processes from a diseased tooth to the orbit by way of thrombo-phlebitis. The inflammation of the orbit thus caused may involve the eye, which may be lost entirely by panophthalmitis. In the case cited, no inflammatory disease was present in the tissues between the orbit and the alveolar wound; the symptoms noted must therefore be explained as metastatic endophthalmitis. It is noteworthy that ocular disease following tooth extractions is very rare.

PERISCOPE.

Drying Out Root-canals.—Old hypodermic needles will be found useful to screw on the end of the chip-blower for drying out root-canals, as the heat can be applied nearer to the apex of the root-canal. Generally, part of the point should be broken off before using. —*Dental Digest.*

Removing Dental Cement.—Dental cement should never be removed from a post or crown with a bur. It is far more practical to immerse the surface to be cleaned of cement in very strong ammonia. Over night all trace of cement will have disappeared.—*Bulletin du Syndicat des Chirurgiens Dentistes de France,* per *Revue Trimestrielle Belge de Stomatologie.*

A Method of Refitting Artificial Dentures.—Modeling compound is warmed, spread over the plate, and inserted in the mouth; the patient is ordered to close to get proper occlusion. The compound is hardened by using cold water, removed, the edges are trimmed to suit, the case is invested in a flask, which is warmed to soften the compound. The flask is then separated, the compound removed, and the old rubber roughened by using large burs or carborundum points. The plate is then packed, vulcanized, and finished.—L. E. DAY, *Dental Summary.*

Removing Broken Crown Posts.—With an S. S. White trephine No. 253, the operator should trephine around the post into the end of the root to a sufficient depth. The shoulder of an ordinary screw mandrel is then reduced on the lathe to the diameter of the shank, the mandrel is shortened to one-half inch, and the sides are flattened, so that it can be grasped with the pliers. The small steel mandrel thus provided will, when forced over the post, cut a thread. The mandrel is then screwed down firmly and grasped with a post-puller, thus removing the broken post.—C. C. STONE, *Dental Summary.*

Pouring Liquids.—To pour a liquid into a narrow-mouthed bottle when a funnel is not at hand, a match-stem or wooden toothpick is moistened and laid across the top, holding it there with the forefinger. When poured, the liquid will run along the bit of wood into the bottle. A fountain pen may be filled in this manner. Chemists have a little trick for pouring liquids into a paper filter. Filter paper is not strong and is apt to break unless used with care. To avoid accidents, the chemist holds a glass rod touching the side of the filter and the lip of the vessel from which the liquid is poured. In this way the liquid is conveyed to the filter in a gentle stream and without impact.—*Dental Brief.*

Burnishing Gold Inlays.—Whatever may be the cause or causes, cast inlays do not always fit. They sometimes fit well except at certain points. The readiness with which cast gold flows under stress, owing to a disturbance of its molecular arrangement in the process of casting, greatly facilitates burnishing, and this seems to be resorted to in many instances as a means of improving the fit. That good is accomplished in this way is unquestionably true, but that harm may be—indeed, often is done—is also quite true.

When resorted to after the setting of the inlay and the hardening of the cement, as is seemingly so often done, if the burnishing accomplishes anything at all beyond the smoothing of the exposed surface of the gold, it does harm instead of good. The cement is crushed at the margins, and imprisoned though it may be for a time, its dissolution and washing out by the secretions and the darkening of the margins are the results which are sure to follow. An inlay should be burnished, and burnished well, but always either before cementation or before the setting of the cement.—J. H. CROSSLAND, *Dental Brief.*

Transmission of Disease and Sterilization of Dental Instruments.—The monthly bulletin of the St. Louis Health Department refers to a lack of aseptic precautions in certain dental offices, and of the possible spread of tuberculosis occasioned thereby. The bulletin continues: "Many dentists are deplorably lax in the manner in which they use their instruments, and often observe no care at all in the possible transmission of disease conditions. When we consider that almost every disease transmissible from one person to another is most readily transmitted through the medium of the air-passages, it can be seen easily how important the cleanliness of the dental instrument is. It is not enough that dental instruments should be wiped, for wiping does not remove all infection. Such instruments should be immersed in boiling water after the work on each patient is completed. Dental cleanliness cannot well be forced by the health department, but public aid is necessary." The bulletin asks that all dental patients insist that only carefully sterilized instruments be used on their teeth and gums, and that cases where such precautions are not taken be reported.—*Oral Health.*

Bismuth Intoxication in the Mouth.—Bismuth produces a characteristic pigmentation of the mouth which one should look out for in any case where large doses of bismuth have been used either for X-ray purposes or in the cure of fistulæ by Beck's method. Symptoms develop about three weeks after its administration. They may be ushered in by a livid discoloration of the skin, which is soon followed by the appearance of small, bluish ulcers on the gums, especially about the third molars. These gingival areas of pigmentation soon become larger and extend to the under surface of the tongue and the adjacent mucous membrane, which become intensely stained with a dark blue color, which shines through the overlying normal mucous membrane. These areas may assume a very large size; their contours are very irregular. In advanced cases, patches of diphtheritic membrane may be found on these pigmented plaques, and gangrene has also been reported in some patients. The constitutional symptoms then become very severe, and include headache, vomiting, diarrhea, and other symptoms of colitis. Fever is always present in the later stages of the disease, and albuminuria is also common. Not infrequently these patients die from the progressive weakness and constantly increasing gastro-intestinal symptoms.—M. MANGES, *N. Y. Med. Journal.*

Opening Submaxillary Abscesses Through the Mouth.—H. Morestin advises this mode of intervention in cases where the disfigurement resulting from the scar of a skin incision in the treatment of acute suppuration of the submaxillary lymphatics is a matter of serious concern to the patient, as in the female sex. He reports three cases in which incision through the mouth proved entirely satisfactory, healing taking place promptly and without any complication. In each case, at the time of operation, the suppurative process had already caused infiltration of the subcutaneous tissues and adhesion and redness of the skin. Under general anesthesia, and with the mouth held wide open and the tongue pulled to the opposite side, the author incises the floor of the mouth at the point of deep induration, if this is palpable, or, if not, at any point between the first bicuspid and the angle of the jaw. The first jet of pus is taken up by gauze previously placed at the back of the mouth; this is quickly replaced by more gauze, the cavity roughly cleared out, and the incision then enlarged, so that the pocket can be carefully cleansed and disinfected with ether or tincture of iodin. A rather tight gauze packing is then inserted. This is removed in two or three days and replaced by shallower drains. In six or seven days healing is already so far advanced that no more gauze can be introduced.—*Presse Médicale* per *N. Y. Med. Journal.*

Nitrous Oxid and Oxygen Analgesia in Various Types of Patients.—Patients who are to be placed in the analgesic condition may come under one of the four following classifications, viz, the alcoholic, the nervous and easily excited, the susceptible and the non-susceptible.

The alcoholic patient is the one that we have more or less trouble with, no matter what the anesthetic may be. So long as we keep the alcoholic patient in the first or analgesic stage, he will prove to be just as good a patient as the non-alcoholic, but if an apparatus be used whereby the gases and air cannot be controlled accurately, this type of patient will get over the borderline into the stage of excitement, and the operation will result in failure. Therefore the gas and air must be accurately mixed.

The nervous and excitable individual is the most difficult type of patient to deal with. When a patient of this type presents herself for this work, a little more time should be allowed for using a great deal of suggestion and winning her confidence. Suggestion plays a very important part with the nervous and easily excited patient; quickly inducing the analgesic stage in such a one tends to make her more nervous. The patient is allowed to hold the inhaler with her left hand; the air-valve is opened one-half, and the gas is shut off so that she will breathe nothing but air for several minutes. This will enable the operator to gain her confidence. After nothing but air is breathed for several minutes, the nitrous oxid controlling valve is slowly opened.

The susceptible individual is, of course, the easiest type of patient in whom to produce the stage of analgesia. Anemic individuals are, as a rule, very susceptible, and are easily controlled. The air-valve, in these cases, is opened to three-fourths, excepting in hypersusceptible cases, in which it is fully opened.

The non-susceptible patient is one whom the gases do not affect so readily. Such patients require a higher percentage of nitrous oxid to produce analgesia. This is accomplished by closing the air-valve to three-fourths—one-fourth being open. It takes a little longer to produce the stage of analgesia in such cases. As a rule, it takes at least five minutes for good results. When the air-valve is closed to this extent, the percentage of air is reduced, thereby lessening the percentage of oxygen and allowing the nitrous oxid to be given somewhat purer to the patient. The nitrous oxid then produces a deeper stage, and analgesia is induced without increasing the flow of nitrous oxid. —A. E. Smith, *Oral Hygiene.*

Manipulation of Cements.—The non-hydraulic and the hydraulic varieties of oxyphosphate zinc require different treatment in manipulation. The one is indicated where dryness can be maintained until the cement has set; the other where moisture can be brought into contact very soon after stiffening begins. The principal difference is found in the liquids, the non-hydraulic liquid containing less water and, in most cases, a larger proportion of sodium. The sodium causes slow setting, some pores, less strength, but greater adhesion. The lack of water causes slow setting and expansion during setting. The hydraulic liquid contains more water, is not so heavy, and has less of the phosphates in the solution. This class of cements requires more water for crystallization than is contained in the liquid, therefore must be subjected to water during setting. These cements require gradual mixing and thorough spatulation. The powder should be added in from six to eight portions, spatulating each portion well; the first portion added having the most thorough mixing of all. It should be spatulated until every particle of powder has been taken up by the liquid, and the mass becomes smooth and free from perceptible granules. Thorough spatulation and sufficient time at this point permits the formation of zinc phosphate, which acts as a cementing medium, holding together the zinc oxid granules which are not acted upon by the phosphoric acid. The remaining portion should be added a little faster, only allowing time to incorporate each portion to a smooth consistence. When the consistence of heavy cream is reached, and the mixture drops from the spatula reluctantly, enough powder has been added for crown and inlay setting.

If a filling is desired, a small portion of this thin mix is placed to one side of the slab for lining the cavity, and powder is added rather rapidly until a putty-like consistence is reached. The cavity is lined with the thin mix and the filling made with the stiff mix, shaping it to the desired form and contour.

The hydraulic and non-hydraulic cements require the same technique of manipulation up to a certain stage. When the hydraulic cement has well begun to set, and the excess around the edges shows stiffening, moisture should be brought into contact with it in order to secure the best results, while the non-hydraulic must be kept dry until it has become quite hard.

Copper oxyphosphate, when properly manipulated, makes a very strong and enduring filling. In its use the same technique applies as in the zinc oxyphosphate, up to the stage where the mass begins to show a medium degree of stiffness, and works heavily under the spatula. This stage is indicated when the mix drops lazily from the spatula held above the slab, and flattens or spreads slowly after dropping on the slab. When this stage is reached, no more powder should be added, but spatulation should continue till the mass shows a considerable degree of stiffness, not too great, however, to prevent insertion into the cavity. When mixed in this manner it sets rapidly, and fillings made in form of one-tenth inch cubes have stood up under more than 250 pounds of pressure.—C. M. McCauley, *Items of Interest.*

HINTS, QUERIES, AND COMMENTS.

PRESSURE ANESTHESIA IN MULTI-ROOTED TEETH.

OPERATIONS are many times delayed owing to the necessity of waiting for pulp devitalization, because difficulty is experienced in the employment of pressure anesthesia in multi-rooted teeth. The cause of this difficulty lies in the fact that the cocain solution is forced into the pulp tissue of the larger canal instead of into that of the smaller—that is, it follows the line of least resistance—making the removal of the pulp from the small canals very painful.

To avoid this, an exposure of the pulp is made, a small pellet of cotton previously saturated with the anesthetic solution is placed over the exposed pulp, and pressure is produced. I prefer wax, base-plate wax in summer, bite-wax in winter, to vulcanite rubber, especially in cavities involving the approximal surface. Generally, by one application the pulp in the chamber and in the largest canal will be anesthetized. If the initial exposure is small, one application may be required to allow painless excavation for a larger opening. The pulp is removed from the large canal, a wisp of cotton inserted, a ball of wax slightly larger in diameter than the mouth of the canal is rolled, and packed firmly into it. The first procedure is then repeated in order to anesthetize the pulp tissue in the smaller canals, the pulp is removed, and then a barbed broach is pressed through the wax in the large canal, and given a half-turn to engage the cotton. On removal of the wax stopping, the canals are ready to be dried and filled.

W. N. MILLER, D.D.S.
David City, Nebr.

OBITUARY.

DR. S. B. PREVOST.

DIED, July 26, 1913, in Madison, Iowa, Dr. S. B. PREVOST, in his sixty-ninth year.

Dr. Prevost was born in Champlain, N. Y. He went to Kansas City in 1865, after the close of the civil war, in which he served. He began the practice of dentistry in that city. His professional practice continued there for forty years, and he became known as one of the leading dentists, and later as the "dean" of the dental profession of Kansas City. Dr. Prevost had been honored by his professional brethren with the presidency of the Missouri State Dental Association. He was a member of Farragut Post, G. A. R., and of the Elks organization.

Dr. Prevost is survived by a married daughter and a son, Harry L. Prevost of San Francisco.

DR. JAMES W. HINE.

DIED, in Albany, N. Y., on June 4, 1913, Dr. JAMES W. HINE, in his fifty-sixth year.

The sudden death of Dr. James W. Hine at his residence, 103 Lancaster st., Albany, N. Y., was the occasion for deep regret among his best friends. The deceased, although ill with heart trouble, was not considered to be in a serious condition until the day before his death.

Dr. Hine was very popular in local professional circles. He had practiced dentistry in Albany for thirty-two years of his fifty-five years of life, and was very prominent in the state dental fraternities, his happy talents as well as his sympathetic nature winning him much attention.

He was a well-known Mason, being a member of the Temple Commandery. He was a vestryman of St. Paul's Episcopal Church, and affiliated with the Atkinsonian, a local dental society.

Dr. Hine is survived by his wife, with whom all his friends and associates sympathize in her great loss.

DR. R. B. MILLER.

DIED, July 15, 1913, in Dorchester, Mass., Dr. RUSSELL B. MILLER, in the sixty-fourth year of his age.

Dr. Miller was born in Herman, Penobscot county, Me., July 30, 1849, and received his education at the public schools and academies of that state. He was engaged in business and taught in the public schools at Hermon, and was also at different times town clerk, tax collector, constable, and deputy sheriff.

In 1882 he enrolled as a student at the Boston Dental College, and after being graduated went to Rockland, Me., and remained there in the practice of dentistry until 1895. He was for two years member of the Rockland common council and for three years member of its board of aldermen, of which he was president. He also served on the school board of the city.

Removing to Boston in 1895, he entered into partnership with Dr. F. J. McFarlane on Warren st., remaining with him until 1899, when he established himself at Roxbury, where he had since had his office.

In Maine he had been president of the Maine Dental Society and for several years a member of the Maine State Board of Dental Examiners. He was an ex-president of the Dorchester Dental Society and active in the Massachusetts, Northeastern, and Roxbury Dental Societies. He was also a member of St. John's Lodge of Masons.

DENTAL COLLEGE COMMENCEMENTS.

UNIVERSITY OF MICHIGAN, COLLEGE OF DENTAL SURGERY.

THE sixty-ninth annual commencement exercises of the University of Michigan, College of Dental Surgery, were held in Ann Arbor, Mich., on June 26, 1913.

The commencement address was delivered by Prof. Geo. E. Vincent, LL.D., president of the university.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Bert M. Adams
Henry M. Ballard
Richard L. Benedict
Harold S. Bennett
Harry L. Black
Mahlon H. Bristol
William E. Brown
Charles W. Burkheiser
Lewis F. Burlingame
Arthur S. Chichester
Earl L. Church
Frank A. Clear
Willard C. Creath
John D. Eichelbarger
Andrew A. Eriscon
Charles W. Fargo
Frank Feuerstein
Clifford C. Forrester
Shelley A. Foy
Howard W. Geiger
Edward M. Griffin
Alfred T. Grossman
Cortez R. Hall
John W. Hall
James F. Hannon
Firn R. Harding
Arthur W. Hogan
James H. Howell
Lawrence C. Jackson
Augustus H. Jensen
Paul A. Johnson
Howard L. Jones
Seward L. Kingsbury
Edward J. Kosanke
Claude S. Larned
Alfred J. Lautmann
William C. Leggett
Ira A. Lehman
Cornelius Locke
James J. McCarthy
Harry W. Mack
Henry H. McUmber
George B. F. Monk
Edward J. Mudge
Harry E. Myron
Conrad H. Nelson
Eugene LeR. O'Conner
Richard C. O'Donnell
Miguel A. Pastrana
Charles W. Peasley
William F. Quinn
Harry S. Read
Berton D. Roe
George C. Robinson
Warren E. Sargent
Louis V. Savage
Gladys R. Schiller
Alfred J. Schroeder
Raymond F. Sitter
Fred W. Smith
William B. Smith
John W. Snyder
James F. Spencer
Frederick C. Tesch
William T. Verhoeks
Orvie N. Wilton
Ralph E. Woleslagel
Homer P. Yoder

SOCIETY NOTES AND ANNOUNCEMENTS.

NATIONAL DENTAL ASSOCIATION.

Notice from Committee on Scientific Research.

COMPETENT research workers are wanted for the National Dental Association. State qualifications, experience, languages read, and preference for pathological, biological, pharmacological, metallurgical, or anatomical work is preferred. Address WESTON A. PRICE, D.D.S., Chairman of the Committee of the National Dental Association for Scientific Foundation Fund, 10406 Euclid ave., Cleveland, Ohio.

INTERNATIONAL DENTAL CONGRESS, 1914.

THE Sixth International Dental Congress will be held in London from August 3 to 8, 1914, at the invitation of the British Dental Association.

His Majesty King George V has graciously consented to be the patron of the congress, which will take place at the University of London and at the Imperial College of Science and Technology, South Kensington.

The president of the congress will be Mr. J. Howard Mummery, and the joint general secretaries are Mr. Norman G. Bennett and Mr. H. R. F. Brooks. Mr. H. Baldwin is honorary treasurer.

A Committee of Organization, under the presidency of Mr. W. B. Paterson (president of the International Dental Federation), with Mr. F. J. Pearce as honorary secretary, has been busily engaged for some time in making the preliminary arrangements.

Previous congresses have taken place in Paris, 1889; Chicago, 1893; Paris, 1900; St. Louis, 1904; and on the last occasion at Berlin, in the Reichstag, in 1909, when the German Emperor took a personal interest in the meeting, delegates attended from twenty different countries, and the governments of many of them were officially represented.

Invitations are being issued to dental organizations throughout the world, and it is hoped thus to secure the co-operation of leading specialists and representative authorities in all branches of dental surgery.

The rules of the International Dental Congress provide that all ethical practitioners of dentistry possessing the qualification of the country in which they receive their professional education, or of the country in which they practice, are eligible for membership.

The subscription for members of the congress will be 30s. ($7.50; 38 fr.; 31 mks.), and for members of their families accompanying them 15s. (19 fr.; 15½ mks.; $3.75).

The offices of the congress are 19 Hanover Square, London, W., to which address all communications should be sent.

THE PANAMA PACIFIC DENTAL CONGRESS.

As one of the attractions of the Panama Pacific International Exposition, a dental congress, international in character, to be known as the Panama Pacific Dental Congress, is to be held in San Francisco, California, beginning on the last Monday in August 1915, and continuing for ten days.

A committee of Organization has been perfected, including representatives from the Pacific Coast states—California, Oregon, Washington, Utah, Idaho, Colorado, and Arizona.

This committee is now actively engaged in perfecting the work of organization, including the establishment of executive committees in every state of the United States and in every foreign country where dental organizations are known to exist, which will be empowered to promote the business of the congress by bringing it to the attention of their national, state, and local societies, and securing memberships and contributions to the program.

The American Society of Orthodontists and the National Dental Association, of the United States of America, have already made arrangements to meet in San Francisco in 1915 as a part of the congress, and invitations will be extended to other dental societies to take similar action.

Manufacturers of dental goods have signified their intention to maintain during the congress the greatest exhibition of dental supplies ever held. Ample space for this purpose has already been promised by the Exposition authorities, and we are assured of their hearty co-operation in all things pertaining to the success of the congress.

The membership fee has been fixed at ten dollars, and the finances of the congress are being cared for by a corporation, formed within the Committee of Organization, and known as the "Pacific Dental Congress Commission of 1915."

Ample funds for promotion of the congress are assured, and in due time committees on Local Arrangements, Transportation, Exhibits, Clinics, Program, etc., will be appointed, and everything possible will be done to insure the success of the congress and make it in attendance and scientific and professional interest the greatest dental congress ever held.

The whole world is coming to San Francisco in 1915 to participate in and enjoy the Panama Pacific International Exposition, which will commemorate the completion of the world's engineering masterpiece, the Panama Canal.

Never in the history of the profession has there been so auspicious a time for holding a great dental congress, and the Panama Pacific International Exposition Company and the Committee of Organization of the Panama Pacific Dental Congress unite in a cordial invitation to the members of the dental profession to come to San Francisco in 1915 to attend the congress and view the wonders of the Exposition and the Pacific Coast of the United States of America.

Frank L. Platt, *Ch'man,*
Committee of Organization.

NORTHERN INDIANA DENTAL SOCIETY.

The twenty-fifth annual meeting of the Northern Indiana Dental Society will be held at the great Steel City of Gary, September 23, 24, and 25, 1913.

W. Leroy Myers, *Sec'y,*
Rensselaer, Ind.

NORTHEASTERN DENTAL ASSOCIATION.

The nineteenth annual meeting of the Northeastern Dental Association will be held in Footguard Armory Hall, Hartford, Conn., October 14, 15, and 16, 1913. Every effort is being put forth to insure a most attractive meeting. All ethical members of the profession are invited to attend, and those eligible are requested to join the association and help sustain the meetings.

Frederic T. Murlless, Jr., *President,*
Edgar O. Kinsman, *Sec'y,*
Cambridge, Mass.

VERMONT STATE DENTAL SOCIETY.

The thirty-seventh annual meeting of the Vermont State Dental Society was held in Burlington, Vt., May 21, 22, and 23, 1913. There was a good attendance and the meeting was a very successful one. The meeting next year will be held at Rutland, Vt.

The officers elected for the ensuing year are as follows: Dana E. Dearing, South Royalton, president; Thomas Mound, Rutland, first vice-president; W. H. McGoff, second vice-president; P. M. Williams, Rutland, secretary; W. H. Munsell, Wells River, treasurer. Executive Committee—H. M. Smith, Lyndonville, G. E. Partridge, Burlington, and W. R. Pond, Rutland.

P. M. Williams, *Sec'y.*

NEW JERSEY STATE DENTAL SOCIETY.

At the annual meeting of the New Jersey State Dental Society, held at Asbury Park, July 16 to 18, 1913, the following officers were elected: Wm. H. Gelston, Camden, president; Walter F. Barry, Orange, vice-president; Chas. F. Jones, Elizabeth, treasurer; John C. Forsyth, Trenton, secretary. Executive Committee—Walter F. Barry, Henry Fowler, Harrison; James I. Woolverton, Trenton; Joseph Kussy, Newark; Edwin W. Harlan, Jersey City. Membership Committee—A. S. Burton, Asbury Park; Franklin Rightmire, Paterson; J. F. Crandall, Atlantic City; A. L. Westcott, Atlantic City; M. B. Van Dorn, Red Bank.

John C. Forsyth, *Sec'y,*
430 E. State st., Trenton, N. J.

ARMY DENTAL SURGEONS.

MEMORANDA OF CHANGES.

For the week ending July 12th:

J. H. Snapp, ACT.D.S., left San Juan, P. R., June 28th, for his station, Camp E. S. Otis, Panama.

First Lieut. G. E. Stallman left Fort Sam Houston, Texas, July 2d, on leave of absence for three months.

C. E. Sherwood, ACT.D.S., and F. C. Cady, ACT.D.S., *en route* to San Francisco and Manila.

First Lieut. C. E. Lauderdale left Sheridan July 5th, and arrived at Fort Leavenworth July 6th.

C. G. Baker, ACT.D.S., relieved from duty at Fort Oglethorpe, Ga., and will proceed to Fort Adams, R. I., for duty.

For the week ending July 19th:

First Lieut. R. H. Mills left Fort Riley, July 7th, on leave of absence for two months and fifteen days.

First Lieut. R. H. Rhoades ordered to Hachita, N. M., for temporary duty by para. 6, S. O. 94, Headquarters, Southern Dep't, July 8th, and on completion of this duty ordered to Apache for not to exceed twenty days.

First Lieut. G. I. Gunckel, July 15th, left post Columbus Barracks, on ten days' leave.

First Lieut. J. L. K. Laflamme, July 15th, to DuPont for temporary duty.

For the week ending July 25th:

First Lieut. G. H. Casaday reported for duty at Letterman General Hospital, San Francisco, Cal., July 14th.

First Lieut. Robert T. Oliver granted leave of absence for two months on surgeon's certificate of disability. Upon the expiration of this leave Lieut. Oliver will return to the Letterman General Hospital for further examination and observation.

For the week ending August 1st—(No changes.)

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JULY 1913.

July 1.

No. 1,066,360, to ALBERT C. ALEXANDER. Method of repairing dental plates.

July 8.

No. 1,066,691, to FRANCIS M. WILLIS. Amalgam mixer.

No. 1,066,966, to HENRY A. WETTSTINE. Dental instrument.

No. 1,067,015, to WILLIAM W. FOWLER. Dental broach.

July 15.

No. 1,067,571, to JAMES H. ABBOTT. Dental tool guard.

No. 1,067,572, to JAMES H. ABBOTT. Mouth-prop.

No. 1,067,696, to FRANK W. WALLACE. Dental tool.

July 22.

No. 1,067,993, to THEODORE G. LEWIS. Soldering-block holder.

July 29.

No. 1,068,628, to GRAHAM CLARKE. Attachment for anesthetizing apparatus.

No. 1,068,698, to ERNEST O. PIEPER. Dental flask.

No. 1,068,870 to FREDERICK B. EGGLER. Dental apparatus.

No. 1,068,952, to HEINRICH VIGANO. Suction plate for artificial teeth.

THE

DENTAL COSMOS.

VOL. LV. | OCTOBER 1913. | No. 10.

ORIGINAL COMMUNICATIONS.

THE STRUCTURE OF ENAMEL.

By H. P. PICKERILL, M.D., Ch.B., M.D.S., L.D.S.Eng., Dunedin, N. Z.,

PROFESSOR OF DENTISTRY AND DIRECTOR OF THE DENTAL SCHOOL IN THE UNIVERSITY OF OTAGO; FORMERLY LECTURER ON DENTAL HISTOLOGY AND PATHOLOGY IN THE UNIVERSITY OF BIRMINGHAM, ENG.

FOREWORD.

THE original notes forming the basis of this communication were, I find, written in 1908, but pressure of other work has prevented my offering them for publication before now. It is not my intention in this presentation to traverse at all in detail the mass of work already done on the structure of enamel by Tomes, Williams, Black, Walkhoff, Von Ebner, and others; that is sufficiently well known, and needs even no bibliographical references. My immediate object is to endeavor to present a more accurate conception of the structure of enamel as a whole, by drawing attention to the value of additional methods of examination. Some of these methods I have already described in the Cartwright Essay (1911) of the Royal College of Surgeons,* and I only propose to refer quite briefly here to some of the findings there related, in order that the present picture may be less imperfect than it otherwise might be.

THE ENAMEL SURFACE.

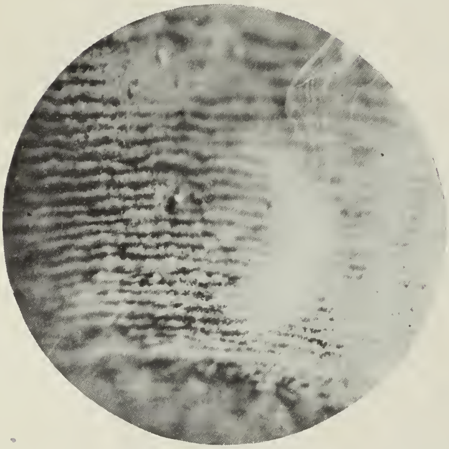
In the publication referred to above I have dealt at some considerable length with the histological and physical natures of the surface of enamel. It is obvious that from a clinical point of view our knowledge of this surface. both microscopical and macroscopical, should be as accurate as possible. It is in this surface that nature has invested the whole of the passive resistance of the tooth to disease. Once this rubicon is passed, the fate of the tooth, in the vast majority of cases, is sealed. I have shown (*ibid.*) that in all human permanent teeth the enamel surface is not normally smooth, but corrugated or "imbricated." This may be demonstrated by the following methods:

(1) By rubbing the surface with fine graphite and examining by reflected light. The depressions retain the graph-

* See "The Prevention of Dental Caries and Oral Sepsis," by the author. London, 1912.

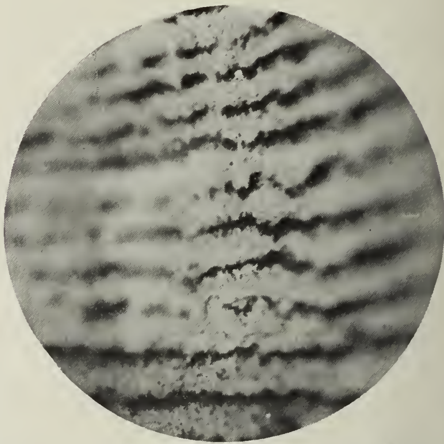
ite, the elevations remain white. (The reverse may be obtained by very light rubbing.) By this method exceedingly fine black bands can be seen running round the surface of all teeth. The character of these bands differs in susceptible and immune teeth, being deeper, wider, and more numerous in the former than the latter. In all teeth they are also most marked and farther apart just below the "point of contact" region. (Figs. 1 and 2.)

Fig. 1.



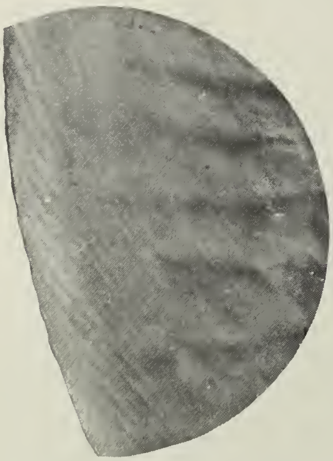
Surface of enamel treated by the author's graphite method, showing the imbrications in the cervical region.

Fig. 2.



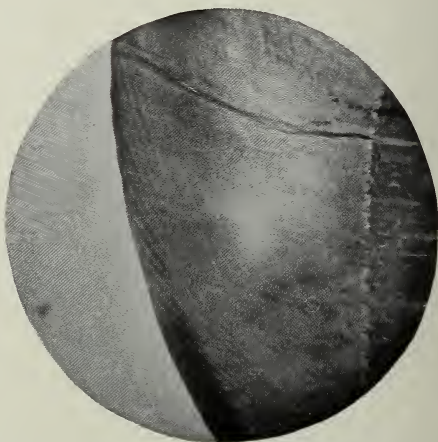
Surface of enamel treated by the graphite method, showing the imbrications. From a point half-way up the crown of a tooth.

Fig. 3.



Vertical section of the enamel surface viewed by reflected light. The surface imbrications are seen in outline, and also their relationship to the incremental striæ in the enamel is quite clear.

Fig. 4.



Vertical radial section of enamel. Shows the incremental lines as "brown" striations—being viewed by transmitted light. Shows also the surface imbrications in outline and the convexities of the enamel at the amelo-dentinal junction.

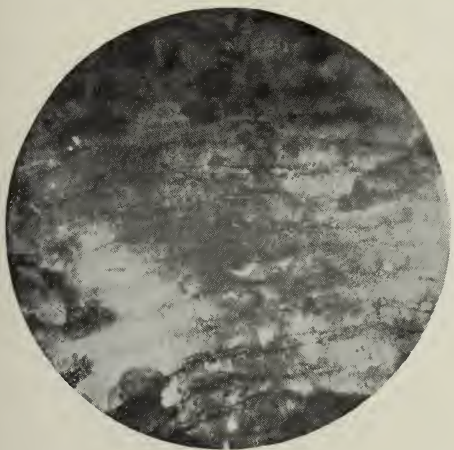
(2) By means of an apparatus which I term an odontograph, graphic representations of the surface of the enamel may be obtained. These odontograms clearly show the surface to be imbricated and that the imbrications are modified in different types of teeth.

(3) By examining sections of enamel by reflected light the imbrications at the surface can be clearly seen, and also their connection with the so-called "brown striæ" of Retzius—which are not really brown at all. It is seen that each imbrication represents the surface termination of a stria or stratum of the enamel. (Fig. 3.)

(4) By accurate substage lighting in thin sections the imbricated outline may be seen by transmitted light. (Fig. 4.)

(5) There is also another method which I have not previously described by which the presence of these superficial imbrications may be demonstrated. I refer to the microscopical examination of the under surface of the surface pellicle (which for the present I should prefer not to call Nasmyth's membrane —but this is a side issue to which I propose to return on some future occasion). The surface of the tooth to be examined is first fixed with formalin and stained with a 5 per cent. solution of silver nitrate exposed to the light and neutralized with a sodium chlorid solution. The pellicle is then removed with nitric acid in the usual way, washed, and mounted. The appearance shown is seen in Fig. 5. The dark striations of the pellicle correspond to the furrows between each imbrication, and take the stain more deeply because the pellicle is there a little thicker.

FIG. 5.



Surface pellicle stained with silver nitrate and removed from a tooth with nitric acid. Distinctly shows the impressions of the imbrications.

FIG. 6.

Vertical section of a hypoplastic tooth, showing that the obvious cessations of growth in the enamel are accompanied by exaggerated imbrications. This simply means that the ameloblasts ceased functioning for a longer period than normal, and that an abnormal number atrophied (or became necrotic) at each period.*

(6) Where enamel has been obviously arrested in its development at several periods owing to constitutional disturbances, the resulting effect is that of exaggerated imbrication. The normal process of forming imbrications is merely prolonged and magnified. (Fig. 6.) As regards the physical nature of the enamel surface, I have shown that teeth are divisible into *malacotic* (soft) and *sclerotic* (hard) types. That is to say

* See page 75 of the author's "Prevention of Dental Caries."

that the enamel of these types of teeth differs as regards its permeability, its solubility, its density, and its hardness—and further, that these differences are measurable.

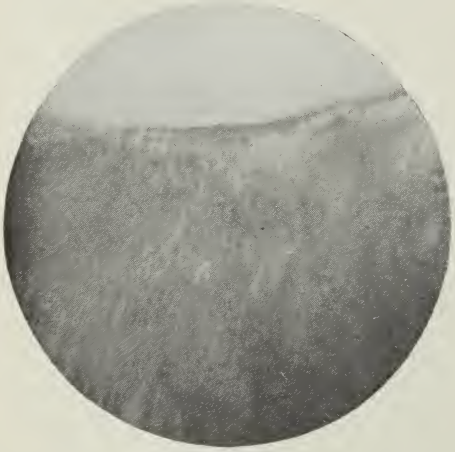
The permeability of the enamel surface to silver nitrate was found to vary very considerably, the depth of penetration being uniformly very much deeper in malacotic than in sclerotic teeth.

The solubility of the surface in different acids showed similar variations, dependent presumably upon the differences in permeability rather than upon differences in chemical composition.

The density of malacotic and sclerotic enamel was found to vary appreciably if suitable means were taken to estimate it. Again, presumably, the differences in density are brought about by differences in the permeability of the surface layers of the enamel.

The hardness of the enamel surface was also found to vary in the same manner, namely, to be appreciably less in malacotic than in sclerotic teeth when tested by the sclerometer method. (Chemical composition and resistance to crushing stress have of necessity no direct relationship to the "hardness" of a tissue, and in this respect the researches of Black and Miller did not meet the point at issue.)

Fig. 7.



Section of enamel showing cessation apparently of the prisms near the surface; their place seems to be taken by a faint horizontal striation.

Nevertheless, in spite of all the above differences, I have been unable to distinguish any difference under the microscope in the minute structure of the enamel of the different types of teeth—with the single exception, perhaps, that very occasionally in malacotic enamel the prisms appear to cease before reaching the surface, their place being taken by a comparatively clear, transparent structure having a very faint striation in a direction at right angles to that of the prisms. (Fig. 7.)

This pointedly illustrates the fact that all that is to be learned about an organ is not to be acquired by the microscope alone; that tissues with apparently identical structures may have quite different properties. I believe that the physical differences between sclerotic and malacotic teeth are, in part if not wholly, acquired after eruption; and further, that it may be possible to bring about such an acquisition; but for the detailed evidence which has led me to this conclusion I must refer to the original publication.

BROWN STRIÆ OF RETZIUS.

I think I have shown conclusively (*ibid.*) that these as such do not exist, but that their appearance by *transmitted* light is due to an increased *optical* density of the prisms. (Fig. 4.) The striæ appear an intense white by reflected light (see Fig. 3); this may be imitated exactly by painting overlapping films of Chinese white on a glass slide, and examining it under the microscope, when the overlaps appear brown by transmitted, but white by reflected light. (Figs. 8 and 9.) These striæ should, I think, be termed "lines of growth," or "incremental lines," as being more expressive of their mode of origin.

Leon Williams concluded that these striæ were due to true pigmentation, and Hopewell-Smith* indorses this by stat-

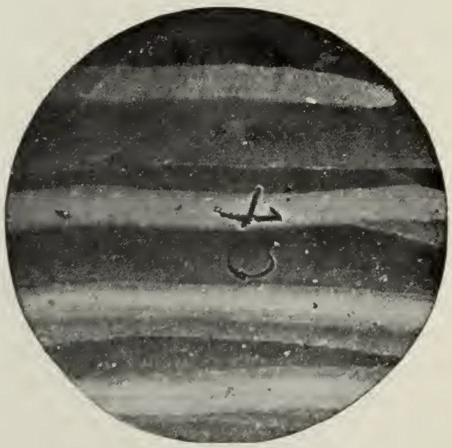
* "Histology and Patho-histology of the Teeth."

ing that their brown appearance is due "finally and correctly to pigmentation." It is however inconceivable that a deeply pigmented substance should (i) be pure white by reflected light, (ii) be perfectly translucent. Furthermore, when enamel is pigmented, as it occasionally is pathologically, the pigment is evident however it may be viewed, but is *less* intense by transmitted than by reflected light, whereas the opposite is the case with the striæ of Retzius. The same applies too, when enamel is artificially pigmented by various stains. A pigment, however, is not necessary to produce the brown appearance of enamel—a weak acid alone is sufficient, for, as is well known, in the earliest stage of caries in enamel, a *white* opacity appears *brown* under the microscope, and the whiter it is the browner it appears.

Fig. 8.

Overlapping films of Chinese white viewed by transmitted light. The overlaps, +, appear a dark brown.

Fig. 9.



Same as the preceding, but viewed by reflected light. The "brown" bands have become white.

THE COURSE OF THE PRISMS.

The description given by Tomes* of the course of the prisms in enamel is brief, perhaps, yet so good that I propose to quote it in full. I doubt very much, however, whether many histologists or dentists have ever realized the truth of this description, largely because text-books are content to show, as a rule, sections of enamel cut in a vertical radial plane only, and these latter are all that a student during his course of dental histology usually sees. Hence in visualizing the structure of enamel one is apt to conceive of it as a mass of tightly packed prisms running inward roughly at right angles to the surface and pursuing a very slightly flexuous course near the dentin. Nearly all the published illustrations of the structure of enamel are misleading to the student, and give him only an erroneous idea of what that structure really is. Tomes says:

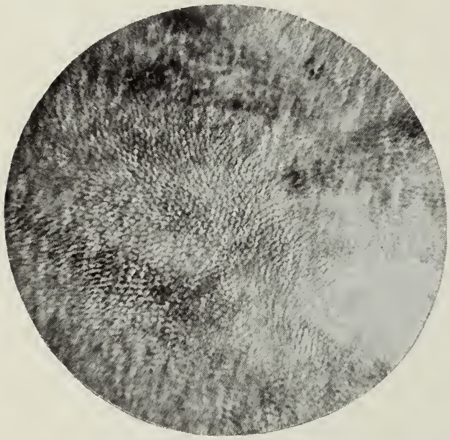
> In human enamel, on the whole the prisms are parallel and run from the surface of the dentin continuously to that of the enamel. Their paths are not, however, either perfectly straight or perfectly parallel, for alternate layers appear to be inclined in opposite directions, while they are also wavy, forming several curves in their length. The curvature of the enamel prisms is most marked upon the masticating surface, while on the sides the layers, alternating in the direction of their inclination as just described, are in planes transverse to the long

* "Manual of Dental Anatomy," p. 19.

axis of the crown, and correspond to the fine striæ on the surface of the enamel, which appear to be caused by their outcrop. The curvatures take place in more than one plane; in other words, the course of the individual prism is more or less a spiral.

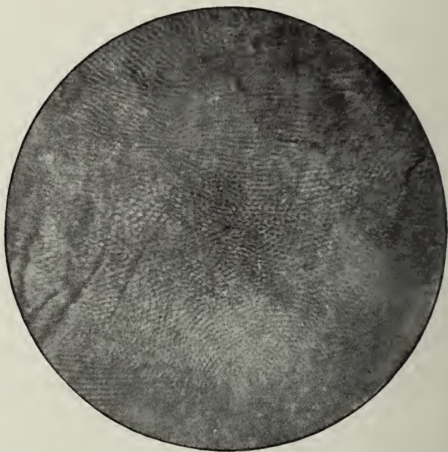
There are two clauses in this description to which one may take exception. "On the whole the prisms are parallel" hardly agrees with the later statement that the enamel prisms, in places, are "in planes transverse to the long axis of the crown." It would be more correct, perhaps, to say that the prisms run in groups, the component prisms of each group being roughly parallel to each other. Also we have seen that the surface striations (which Tomes, in common probably with most dentists, regarded as only occasionally present) are related causally to the outcrop of the incremental lines of growth. Moreover, this arrangement of the prisms referred to is present in teeth in which the surface striæ are absent; for instance, in human deciduous teeth and in dogs' teeth.

Fig. 10.



Transverse section of enamel prisms from near the amelo-dentinal junction. Slightly etched with weak formic acid. Note the "winding" appearance of the prisms; also compare the size of these prisms with those in Fig. 11. (Leitz No. 7 obj., No. 1 eyepiece. Length of camera bellows 21 cm.)

Fig. 11.

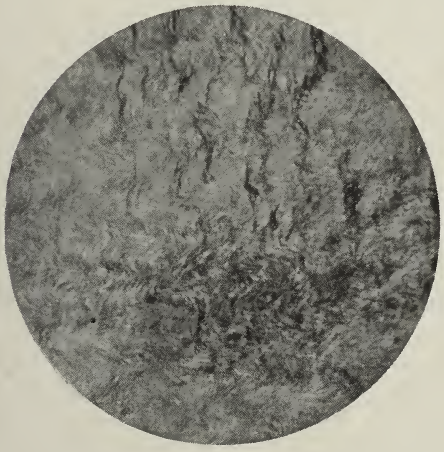


Section of enamel cut parallel to a vertical surface (central incisor). The prisms are grouped into longitudinally and transversely cut bundles. Note as to the latter that the focus is quite different for adjacent groups of prisms.

The true direction taken by the prisms in their course from the dentin to the surface can be learned only from attempts to cut sections at right angles to their course. I say attempts, for two reasons—first, it is difficult to cut sections of enamel in this direction because of its great tendency to break up into small fragments before it is thin enough for the microscope; and secondly, because it is difficult to estimate the direction in which to cut sections which will show enamel prisms cut at right angles to their course, and again, it is difficult to maintain that direction during cutting. It might be thought that cutting sections parallel with the vertical surface of a tooth would show the prisms cut at right angles. That, however, is by no means the case; with the utmost care, sections may be cut in this direction and yet show practically no transverse sections of prisms, or only isolated groups. Of course flat sections cannot be absolutely parallel with a somewhat curved surface except at one point; but here one might reasonably expect to find the enamel cut transversely so as to show a field of hexagonal prisms. Yet that is not so; the prisms even here are for the most part cut somewhat obliquely.

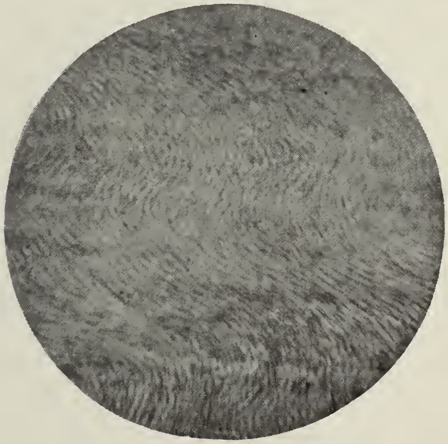
The first thing to be realized is that the course of every prism from its start at the amelo-dentinal junction is a very spiral one—it is in fact a corkscrew course; and the next, that the enamel is arranged in horizontal layers in which the prisms pursue opposite spiral courses. In the upper of two courses, for instance, the prisms upon fine focusing may be seen to be winding upward from left to right, while in the next layer they are winding upward from right to left, and so on. (See Fig. 10.)

Fig. 12.



Low power view (No. 3 obj.) of "transversely" cut enamel, to show the wavy appearance of the prism groups.

Fig. 13.



Vertical parallel section of enamel, showing the corners of the prisms about halfway between the dentin and the enamel. (No. 7 obj., No. 1 eyepiece.)

This spiral winding of alternate layers about each other gives rise, a little farther out from the dentin, to curious effects. Lines of prisms may be seen cut transversely, and between these, rows of prisms cut longitudinally, and both of these groupings run horizontally in rings or layers around the tooth or at right angles to its long axis. (Fig. 11.)

Farther out still, about half way through the thickness of the enamel, and when the prisms are cut more obliquely, the appearance again changes, and at first sight and under low powers the structure seems to be one of prisms cut longitudinally pursuing a very wavy course parallel to the surface of the section. (Fig. 12.) It is only by critical examination with higher powers that this inference is seen to be erroneous. On the top of the waves the prisms are seen to be cut transversely, and the whole appearance is, I think, explained by the lessened flexuosity of the prisms seen through the thickness of the section. (Fig. 13.)

Even at the enamel surface the prisms are not parallel, but run in groups in a variety of directions, always of a spiral nature, as is evidenced by watching the section whilst fine-focusing backward and forward, by the difficulty or impossibility of obtaining a field of transversely cut prisms, and by the fact that only a small portion of the field can be focused at once. (Fig. 14.)

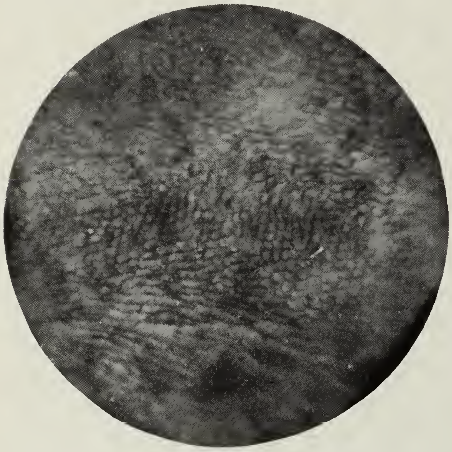
The angle which the prisms make with the surface even in vertical radial sections is very rarely a right angle. The prisms strike the surface (at least the vertical surfaces) at more or less acute angles; even when, as appears in the cervical portion of enamel, the general course of the prisms is nearly rectangular to the surface, as they approach the surface they are frequently bent sharply toward the occlusal surface, and thus make an acute-angled outcrop.

A study of surface parallel sections of enamel rapidly convinces one that we are dealing with a highly translucent and highly refractive tissue, and the different appearances, therefore, that it may present with different lighting and focusing are considerable. One further realizes that the distinctness with which the outlines of transversely or obliquely cut prisms are visible depends almost entirely upon the angle at which they are cut. When they are cut absolutely transversely or very obliquely it is very difficult to distinguish individual prisms, *i.e.* the light passes without inequalities in refraction through prisms and cement substance. When, however, prisms are cut at a certain intermediate angle the cement substance shows up quite darkly. This I believe is due to the angle coinciding with or being greater than the optical critical angle for enamel prisms as compared with cement substance, and hence the light is totally reflected.

It is a little difficult at first to reconcile the appearances seen in vertical parallel and vertical radial sections. In the latter frequently the prisms can *apparently* be traced from the dentin to the surface, yet an absolutely continuous section from the same tooth at right angles to the former shows that the prisms are in some places running almost at right angles to each other. The only explanation would seem to lie in the optical conditions just referred to, namely, that in vertical radial sections what appear to be continuous prisms are not really so, but are merely coincident oblique sections of many prisms, whose terminations do not show because the angle of section is less than the critical angle for enamel.

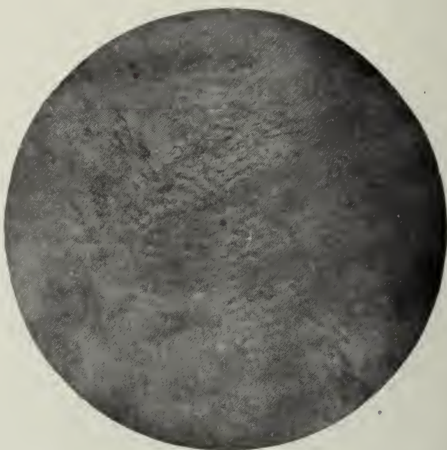
This is borne out by the fact that in vertical parallel sections under the low power, and frequently under the high power, while the enamel prisms appear to be cut longitudinally and to be running in parallel curves, yet by slightly etching the surface with weak acid it at once becomes obvious that what appeared to be prisms cut lengthwise are really rows of hexagons, *i.e.* prisms cut

Fig. 14.



Enamel prisms from just below the surface, cut as transversely as possible. Stained with silver nitrate. Shows the very different directions of contiguous groups of prisms.

Fig. 15.



A small area of enamel cut quite transversely to the prisms, viewed under the 1/12-in. oil immersion objective, to show the very regular hexagonal shape of the prisms. From near the amelo-dentinal junction. (Only a very small area could be accurately focused at one time.)

transversely. This method of etching, as an additional and comparative one, is undoubtedly of value and might perhaps be employed more frequently.

Of course in many cases the flexuosity of the prisms can be distinguished in vertical radial sections, but this feature is not the prominent one, as it is in sections cut parallel to the surface.

In these sections (*e.g.* vertical radial) by fine-focusing up and down, the prisms of two layers can alternately be brought into focus. The prisms in these two layers are seen to cross in direction at angles varying from 30° to 60° something like two types of the letter—X and X, the thick stroke being taken to indicate the prism in focus at the time.

THE NON-EXISTENCE OF "SUPPLEMENTAL" PRISMS IN ENAMEL.

It is generally affirmed, in order to account for the difference in area at the surface of the enamel from what it was originally at the amelo-dentinal junction, that supplemental prisms "are present in the outer portions which do not penetrate far inward."* In this view Hopewell-Smith † concurs. The latter author states:

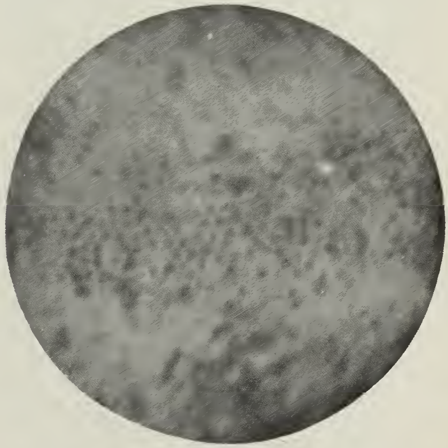
> As the rods run outward, and approach the free surface, it is obvious that many narrow spaces must be left between them as they radiate centrifugally from the dentin, the total area of which is considerably smaller than that of the cortex of the enamel. These clefts are filled with numerous short supplemental prisms, which are histologically identical with the other columns, but are of varying length. These rods are best observed over the cusps of teeth.

No photomicrographs are given, however, which show such prisms, neither have I personally been satisfied that such prisms exist; in fact, on *a priori* grounds alone it would seem exceedingly probable that such prisms do not exist.

Prisms are certainly very flexuous in their course, and thus in a thin section a prism coming up from a lower plane may appear to originate *de novo.* In order to avoid this source of error, thicker sections should be used which have been well cleared in xylol and mounted in xylol-Canada balsam; then, with the finger on the fine adjustment and the substage diaphragm closed to the minimum, prisms can be traced into higher and lower planes.

The hypothesis of supplemental prisms necessarily presupposes either the proliferation of or a considerable addition to the original ameloblasts, and I have never seen, either under the microscope or in any photomicrograph or drawing, an enamel cell undergoing mitosis.

FIG. 16.



The enamel surface treated by the graphite method. Shows the center of the enamel prisms retaining the graphite. (Reflected light.) This is not an uncommon condition in present-day teeth, and is to be regarded as a sign of slightly incomplete development.

Neither do I think it can be held, in view of Leon Williams' demonstration of the secretory function of the stratum intermedium, that these cells are capable of forming fresh ameloblasts; certainly no ocular evidence seems forthcoming of their mutation. Tomes* seems skeptical on the point, for the most he says is

* Tomes, "Dental Anatomy," p. 20.

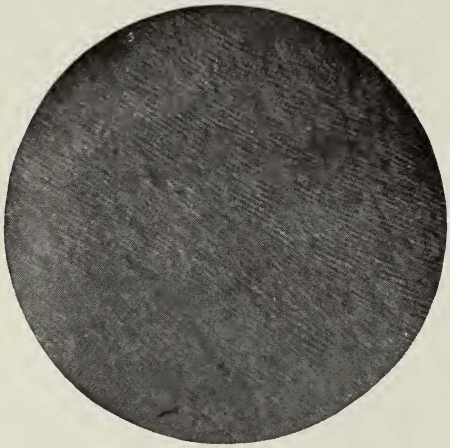
† "Histology and Patho-histology of the Teeth," p. 34.

* "Dental Anatomy," p. 172.

that it has become customary to attribute the function of recruiting the enamel cells to the cell of the stratum intermedium.

Measurements of the prisms and of the enamel as a whole are quite opposed to the presence of "supplemental" prisms, and quite relieve us from the necessity of supposing their presence to account for the difference in area at the amelo-dentinal junction and at the surface.

FIG. 17.

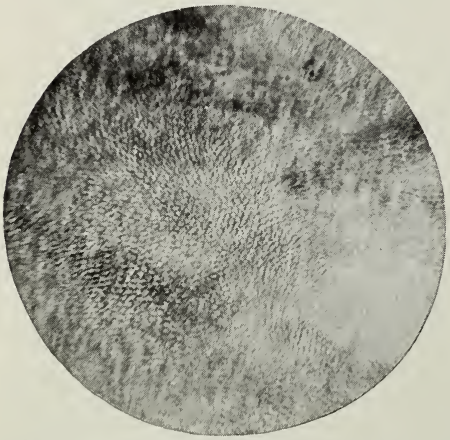


Section of enamel cut in the direction of the long axis of the prisms from near the amelo-dentinal junction, to show their size as compared with prisms near the surface (*cf.* Fig. 18). Leitz obj. No. 7, eyepiece No. 1. Camera length 21 cm.

FIG. 18.

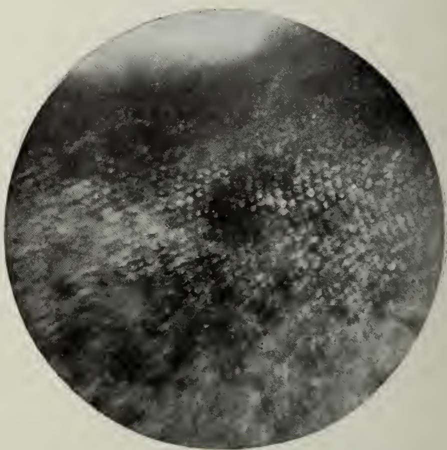
Section of enamel showing prisms cut longitudinally, near the surface. The prisms here are obviously wider than those in Fig. 17. These two illustrations are of exactly the same magnification.

FIG. 19.



Transverse section of enamel prisms near their origin. Compare their size with those seen in the next illustration.

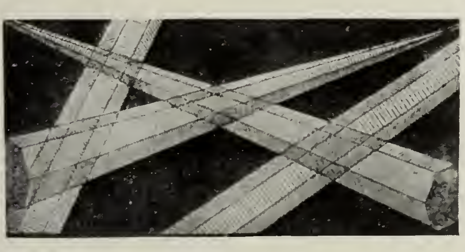
FIG. 20.



Transverse section of prisms at their termination at the surface of enamel, obtained by grinding the enamel from "underneath" and leaving the surface intact. Stained silver nitrate. Compare the size of these prisms with those shown in Fig. 19. Both are of exactly the same magnification.

I have measured a large number of prisms across their diameter, both at the amelo-dentinal junction and at the enamel surface, in different teeth, both native and European, and in all there is a marked increase in the diameter of prisms at the surface. Especially is this the case with regard to prisms over the cusps of molars and premolars. (Compare Figs. 17 and 18, also 19 and 20.) The average measurements of the diameter of prisms at the buccal curve of teeth are—(1) At the amelo-dentinal junction, 0.0031 mm.; (2) at the enamel surface, 0.0057 mm. This gives a proportion of 1 to 1.83. The measurement of the buccal surfaces of the same teeth, measured from the commencement of the enamel to the summit of the buccal cusp, compared with the length of the subjacent amelo-dentinal curve, gives an average proportion of 1 : 1.76.

FIG. 21.



Separated prisms from the outer layer of a pinna shell.

Proportion of prisms	=	1:1.83
" " surfaces	=	1:1.76
Difference	=	0.07

These proportions do not coincide with mathematical exactness, but they do so sufficiently to demonstrate the exact anatomical relationship existing between the two. Moreover the discrepancy between them may be due to experimental error, as also to the fact that the cusps and incisal edges of some of the teeth may possibly have been worn down a little, though I think not. Immediately over the cusps the prisms increase in diameter more than elsewhere, average measurements being—

At the amelo-dentinal junction, 0.0025 mm.
" " enamel surface .... 0.0065 "

[Kölliker gives the diameter of enamel prisms as varying from 0.0064 to 0.0051 mm.; Tomes and Hopewell-Smith as 0.005 mm.]

From the above it will be seen that there is obviously "no room" for the existence of supplemental prisms either in actual fact or hypothetically. There is supporting evidence by analogy that such is the case, and that enamel prisms taper somewhat from the periphery centripetally in that the hexagonal prisms of the shell of the pinna have a similar longitudinal configuration, only more markedly so. (See Fig. 21.)

SCHREGER'S LINES.

Czermak and Hopewell-Smith* affirm that these lines are dark by transmitted light, and light by reflected light. Tomes,† quoting Von Ebner, says they are seen only by reflected light, being quite invisible by transmitted light. These statements are somewhat conflicting, and at first I could find no means of reconciling them. On further investigation, however, the solution of the discrepancies seems to lie in the fact that sections of different thicknesses give very different appearances. In very thin sections the lines are invisible by transmitted light alone (*i.e.* care must be taken to avoid all sources of reflection from the surface of the section), and the lines appear dark by reflected light.

Hopewell-Smith says: "All sections by no means exhibit them"—*i.e.* Schreger's lines. It would probably be more correct to add, "when viewed by transmitted light"—for I have not yet seen a section (vertical) of enamel which did not show them very distinctly by reflected light. They may always be

* "Histology and Patho-histology of the Teeth," p. 36.

† "Dental Anatomy," p. 29.

seen by the naked eye on any cut and polished vertical surface of enamel.

The appearance of these lines is, in fact, entirely dependent upon the manner of lighting the section. They stand out broadest and most marked, like undulations with one side illuminated and one in the shadow, by combined reflected and transmitted light, especially if the latter be made oblique and small in quantity. (See Figs. 22–28.)

by giving three separate explanations of the phenomenon one of them would contain the truth—which is doubtless the case, but which, nevertheless, it must be admitted, is somewhat confusing.

There are two other possible explanations which might be added to the above list.

(1) The lines might be an effect produced by the polarization of light by the enamel prisms, seeing that enamel

Fig. 22.

Schreger's lines as seen ordinarily in a vertical radial section by reflected light.

Fig. 23.

Optical effect produced by passing a beam of light through the long axis of a sheet of glass, and resembling Schreger's lines in enamel.

CAUSATION OF SCHREGER'S LINES.

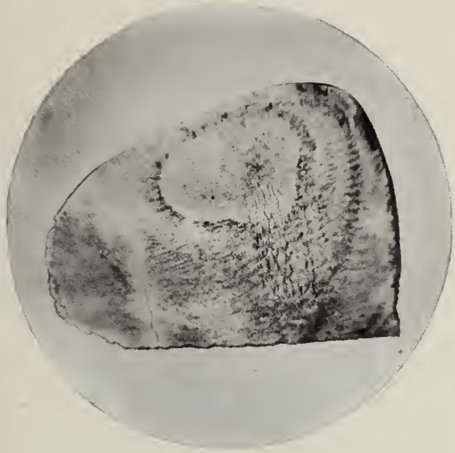
Tomes, apparently quoting Von Ebner, states* that these lines are dependent upon the different directions of contiguous groups of prisms, and are visible only in longitudinal sections. Hopewell-Smith says of them that they may be seen in ground perpendicular sections—"entire band-shaped layers of prisms alternately decussating in such a manner as to form lines . . . . High powers reveal the fact that the prisms are histologically normal, and it is only low magnifications which make apparent their occasional lengthwise groupings." He also refers to Schreger's lines as "cloud-like masses through dense pigmentation." The latter author seems to have proceeded on the assumption that

* *Loc. cit.*

in this respect resembles somewhat a polarizing prism. If a section of enamel be placed on a revolving stage and illuminated by oblique reflected light, the lines of Schreger have two points in the circle where they appear at a maximum and two points at which they appear at a minimum, and these maxima and minima points are at right angles to each other.

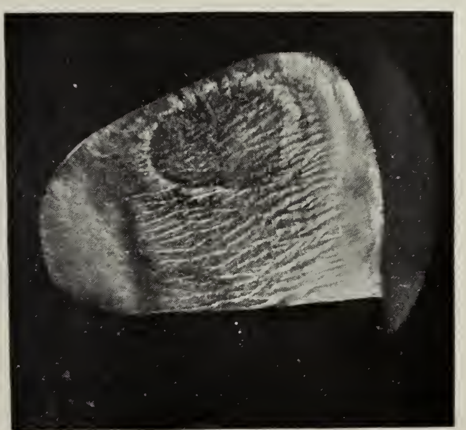
(2) They might be due to a simple optical effect such as may be produced with any piece of thick, clear glass by directing a beam of light obliquely through its long axis and examining the grouping of reflections at the other end. The close resemblance of such an appearance to Schreger's lines is seen in Fig. 23.

FIG. 24.



A "vertical parallel" section of enamel *from the center* of the labial surface of an incisor. (Transmitted light.) Shows (1) Schreger's lines cut transversely, running across the section. (2) Incremental lines (Retzius) running concentrically, much spread out and separated owing to the direction of the section. (3) "Interprismatic spaces" running vertically up the center of the section. (Compare with these the artifact crack toward the lower left corner.)

FIG. 25.

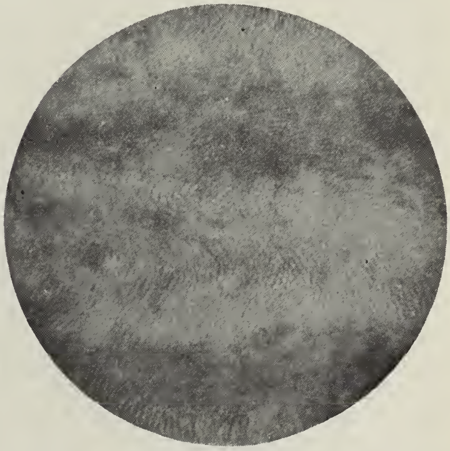


The same as the preceding but viewed by reflected light, with a very slight amount of transmitted light. The transversely cut Schreger's lines stand out very boldly. Note that dark and light areas are now transposed. The "interprismatic spaces" can be made out as glistening white markings.

I do not, however, think that either of the above suggestions gives the cause of the appearance of the Schreger's lines in enamel. They are capable of a much simpler explanation.

The usual appearance of Schreger's lines in vertical radial sections is, I take it, well known, but I am not aware that attention has been drawn to their appearance in transverse section, which really gives the key to their causation. It is obvious that a vertical section of enamel cut parallel to the surface should show these lines as horizontal bands one above another, whilst a section cut in the direction of their long axes should not show them at all, which is precisely the case. Figs. 24 and 25 show Schreger's lines cut transversely; they are more visible in these sections by both transmitted and reflected light than they are in sections cut radially. Examination with higher powers shows that these lines are caused by differences in optical density of contiguous groups

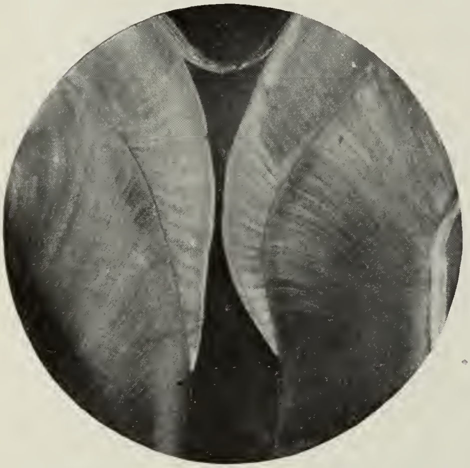
FIG. 26.



Schreger's lines cut transversely in a vertical parallel section of enamel viewed under high power; transmitted light. The dark bands are due to the diminished amount of light coming through prisms which are running more or less transversely to the direction of the light. It is impossible to get these and the transversely cut prisms in focus at the same time.

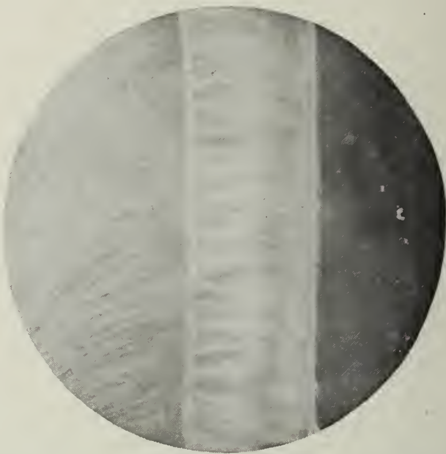
of prisms running in directions sometimes apparently at right angles to each other. (See Fig. 26.) The prisms cut longitudinally are denser than those cut transversely, hence by reflected light the former appear white and the latter dark owing to their allowing the light to pass through them; by transmitted light, of course, the exact opposite obtains, and these very facts show that the appearance of the lines cannot be due, as Hopewell-Smith suggests, to "dense pigmentation"—for if so they should appear brown by reflected light.

Fig. 27.



Lines of Schreger in the enamel of a permanent and a deciduous tooth (human). The section also shows that the bulbous termination of the enamel at the cervix of the deciduous tooth is due not to any increased thickness of that tissue, but to a bulging-out of the dentin.

Fig. 28.



Lines of Schreger in the enamel of a dog's tooth. No imbrication lines are ever present on the surface.

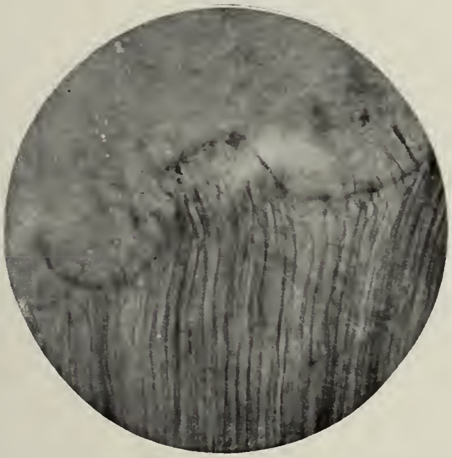
Now, enamel in vertical radial sections—and this I do not think has been noted before—has the peculiar property of picking up and transmitting light which falls upon it horizontally in the direction of the prisms. If all substage light and all light between the cover-slip and objective be cut off, the section will still be illuminated. Under such conditions, if a beam of light be sent along the long axis of the prisms, Schreger's lines will show up very distinctly. That is to say, light is readily transmitted along the prisms, but is absorbed by groups of prisms running more or less at right angles to its direction. This disposes of the polarizing suggestion. This fact, also, further disperses the pigmentation hypothesis. For it might possibly be suggested that although the tissue was very white to look at, it might contain pigment in its substance; but by this method the "interior" of the tissue is illuminated, and no color is visible (and this applies equally to Retzius' striæ). We therefore conclude that the lines of Schreger (like the striæ of Retzius) are due to effects produced by the different optical densities of contiguous groups of prisms.

Figs. 27 and 28 illustrate the presence of Schreger's lines in human deciduous teeth and dogs' teeth, and also dispose of Tomes' suggestion that the fine striæ on the surface are due to the outcrop of transversely arranged prisms. We have seen that these latter cause Schreger's lines, but although these are present in the two kinds of teeth here referred to, no "surface striæ" or imbrications are present. On the other hand, Schreger's lines may be seen on highly polished surfaces of such teeth as alternating light and dark bands wavy in outline.*

THE AMELO-DENTINAL JUNCTION.

This is a region of peculiar interest from three points of view: First, as to its microscopical anatomy; secondly, as to the possiblity of elements of sensation or nourishment crossing the dividing line; and thirdly, as to the nature of the union between the two tissues.

FIG. 29.



The amelo-dentinal junction, showing a "tongue" of dentin inclosed between two convexities of enamel. The tubules in the enamel (?) are seen to be at a different angle from or obviously not connected with the dentinal tubules.

Microscopical anatomy. The line of union between the enamel and dentin may be marked by a straight or curved dark line; it is usually broken up by the presence of numerous small convexities of the enamel looking toward the dentin. These convexities inclose between them a more or less tongue-shaped wedge of dentin. (See Fig. 29.) The dentin in the region shows as a rule the conjoining of originally separate tubules and also the anastomosis of adjoining tubules. Some of the tubules are said to cross the dividing line and to penetrate the dentin. Personally I prefer to say that they may appear to do so. Certainly some tubules terminate more or less abruptly at the junction line, and more or less opposite them in the enamel is a similar dark tube-like appearance; but it is exceedingly difficult to say that the two are actually connected, because of the impossibility of really tracing them across the line.

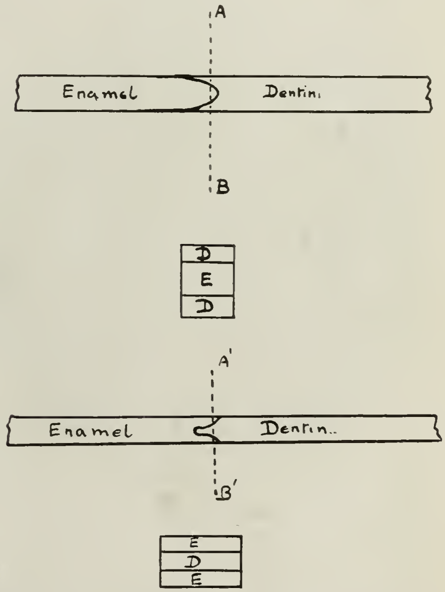
FIG. 30.

I

II

III

IV



Diagrams illustrating the cause of fallacious appearances at the amelo-dentinal junction. I. A convexity of enamel embedded in the dentin. II. The order of the layers on looking down A–B. III. A tongue of dentin penetrating the enamel. IV. The order of the layers on looking down through the line A′–B′.

There is, however, another condition which I imagine has been mistaken for the former. It is that owing to the small convexities on the inner enamel surface a very thin film of dentin may overlie the enamel at this point, and because of its transparency the enamel prisms are seen, as well as a few dentinal tubules—this is illustrated by the

* See illustration p. 55 of the author's "Prevention of Dental Caries" (1st Eng. edition).

accompanying diagram. Careful focusing, however, will show that the prisms and the amelo-dentinal junction are in reality on a different plane and usually below the dentinal tubules. The dentinal tubules are also said to connect with the *enamel spindles.* The latter, as is well known, in vertical radial sections appear as small dark spindle-shaped bodies jutting out from the dentin into the enamel, and are seen more numerously under the cusps of teeth. (Figs. 31 and 36.) A similar objection occurs here. It is extremely difficult to trace actual continuity, and against it is the fact that the spindles nearly always run at an abrupt angle from those dentinal tubules with which they might possibly be connected. I think, however, that it is extremely doubtful whether they should be called "spindles" at all, and I believe the usual conception of their shape and what they actually are to be incorrect, for the following reasons:

(1) Supposing them to be small cylindrical spaces, filled or unfilled with protoplasm, on cutting a section of enamel tangentially to the surface of the dentin they should appear as a series of small circles or round black dots. But it is just this appearance which one never gets. Instead there appear a number of dark sinuously curved lines, fringed at their margins, running in the direction of the long axis of the tooth. (See Figs. 12, 24, and 31.)

Now, these sinuous lines and the spindle appearance are never present together, but it may be seen that where the direction of a section suddenly changes to a different plane (in relation to the amelo-dentinal junction) the one condition gives place to the other. (See Fig. 31.) Also it will be readily understood that if these sinuous lines (which may be regarded as being horizontal if the tooth were lying flat on a table) were cut by a vertical section in either direction they would appear as small dark columns. The accompanying diagram illustrates this. (Fig. 32.)

Under higher powers it is seen that

Fig. 31.

Section of enamel cut tangentially to the surface of the dentin. "Enamel spindles" are seen in the upper portion giving place to the dark sinuous fringed lines of the "interprismatic spaces" lower down, and the relationship of the two is clearly shown in the highest of the latter.

Fig. 32.

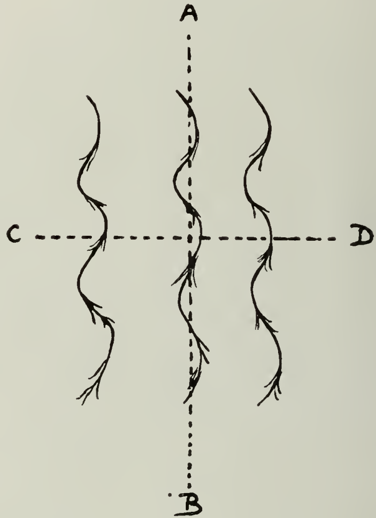
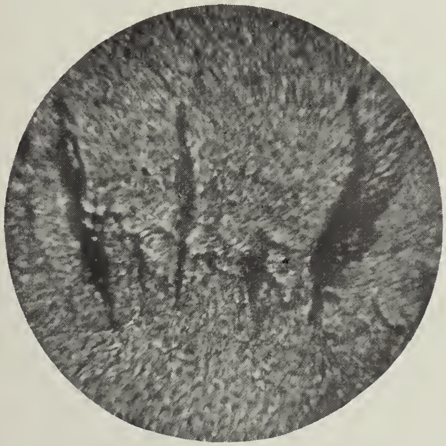


Diagram of interprismatic spaces cut in a plane at right angles to their long axes, showing that sections in either of the other two planes A–B or C–D would cut them more or less transversely, and thus show them as short tube-like structures.

these dark sinuosities run parallel to the flexuosities of the enamel prisms; they wind up from a lower plane, and where the fringes can be accurately focused they seem to be related to a darkening of the interprismatic substance and of the outer portions of the prisms themselves. (Fig. 33.) This darkening appears a deep brown by transmitted light,

Fig. 33.



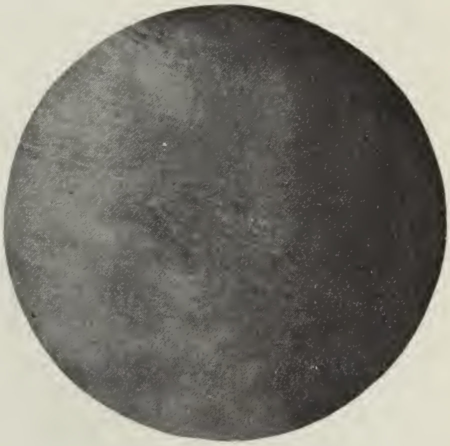
The amelo-dentinal junction, showing the interprismatic "spaces" cut horizontally, and their fringe-like processes. This section illustrates the fallacious appearance caused by the dentin overlapping the enamel, as indicated in the diagram Fig. 30. The real relationship of these structures to the dentin could only be adequately demonstrated by a kinematograph picture taken while focusing down through the thickness of a section.

but glistening white by reflected light. (See Fig. 25.) It is therefore not due to pigmentation.

(2) It may be inferred that, if the above is the correct explanation, a vertical radial section would not always cut across the curves, but sometimes along their crests. This is undoubtedly so. And then we should expect to see a broader fringed appearance somewhat similar to the appearance on transverse section. This is precisely what does appear, but such appearances are usually styled "groups of deeply pigmented prisms,"* or faultily formed prisms, and must be familiar to most histologists. (Fig. 34.)

(3) Not infrequently if a *vertical radial* section be thick enough, and also sufficiently transparent, the connection between two contiguous spindles may be traced by fine focusing through the depth of the section.

Fig. 34.



Vertical radial section of enamel showing one of the curvatures of the interprismatic "spaces" cut tangentially. The black mass to the right is dentin, the section having been submitted to a temperature of 600° F. for thirty seconds. This turned the dentin a deep yellow color, but no discernible effect was produced in the enamel. Interprismatic "spaces" may be seen of *exactly* the same character in sections not so treated.

As to the nature of sinuosities and "spindles," I think they might well be regarded as being similar in origin and significance to the interglobular spaces in dentin—significant, that is, of imperfectly acquired function. It is well known that pathological causes leading to a hypoplasia of enamel are also manifested at corresponding situa-

* Hopewell-Smith on p. 46 of his book shows an excellent photomicrograph of such a group of prisms, but twice refers to them as "stained" in an "unstained" preparation.

tions on the dentin as interglobular spaces. Now, the interglobular spaces and the "enamel spindles" are both undoubtedly physiological, and chronologically they would correspond—both would be developing at the same time.

Further, dentin is formed by the fusion of calcoglobular masses, enamel by the fusion of prisms; deficient function of their formative organs should have similar results—non-fusion of the calcoglobulin and non-fusion of the prisms. And this, in fact, is the hypothesis I suggest for the formation of sinuosities and spindles (which are identical)—that *they are "interprismatic spaces," combined with the poor formation of cement substance and of the outer portions of the prisms,* due to the enamel organ at that time not having acquired a perfect function.

It is with regret that I add to the numerous hypotheses which have previously been advanced to explain the formation of enamel spindles, and I do so only because the above appears to me to be the only one which both explains all the observed phenomena and harmonizes with our other knowledge of tooth development. As to the contents of these interprismatic "spaces," I am not at present prepared to say anything. When considering the question of the post-eruptive hardening of enamel, the point obviously arose as to whether this came about from within or without—namely, whether or not calcium salts could be passed in solution from the dentin to the enamel and there deposited. My experiments recorded in the publication previously referred to were against any such thing occurring.* (Figs. 35 and 36.) Recently Dr. Theo. von Beust† has attempted to show that a communication does occur between the dentin and enamel. He used alcoholic carbol-fuchsin by capillary attraction, and states that the enamel in the inner portions was stained—more especially along certain "fissures," which correspond, I think, to my interprismatic spaces. I am unable to confirm Dr. von Beust's findings. Certainly in teeth

Fig. 35.

Section of a tooth previously immersed in silver nitrate. The stain has penetrated the enamel to a considerable depth, but no stain has passed from the dentin (itself deeply stained) to the enamel.

Fig. 36.

Similar to the foregoing. Nowhere has the stain passed the amelo-dentinal junction. "Enamel spindles" may be seen, but these do not appear to have taken the stain at all.

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* See "The Prevention of Dental Caries and Oral Sepsis" (by the author), p. 96. (1st Eng. edition.)

† Dental Cosmos, June 1912.

treated in such a manner the enamel is stained *very occasionally,* but it is com-

Fig. 37.

Section of tooth stained with alcoholic carbol-fuchsin by capillary attraction. The dentin is deeply stained up to the amelo-dentinal junction, but nowhere has the stain crossed into the enamel.

Fig. 38.

Section of a tooth stained with carbol-fuchsin by capillary attraction. The staining of the dentin is most intense just beneath the enamel, yet no stain has anywhere penetrated the enamel.

paratively rarely and very erratically that it occurs. In my specimens the stain seems a weak diffusion or absorption throughout a small area of enamel (which might be less highly calcified than the remainder). The majority of my specimens show the dentin deeply stained right up to the enamel, but the latter perfectly white and not stained in the least degree. (Figs. 37, 38, and 39.) But I think it by no means follows that because a highly volatile and deeply penetrating stain like alcoholic carbol-fuchsin may pass occasionally across the amelo-dentinal junction, that

Fig. 39.

Similar to the two preceding illustrations. In this case the enamel is stained in a diffuse manner in two situations. This was the only one out of eleven teeth so treated that showed staining of the enamel.

serum or lymph would do the same. Figs. 35 and 36 are interesting in this respect, in that they show how deeply silver nitrate has penetrated malacotic teeth from the outer surface of the enamel, but that nowhere has the stain coming up the dentinal tubules crossed into the enamel. These are from sections which have been exposed to the light for many months, so that it cannot be said that the darkening of a small quantity of stain has not yet occurred.

The improbability of there being anything but the very feeblest continuity between the dentin and the enamel is further supported by the *nature of the* *union between the two tissues.* Enamel is epiblastic, dentin mesoblastic in origin. Both commence to form at their line of junction, one goes upward and outward, the other downward and inward. The amount of admixture of the two tissues is limited to the small

Fig. 40.

Horizontal ridges on the inner surface of the enamel cap, the latter having been removed by heat.

"tongues" of dentin seen in Fig. 29. These probably correspond to the papillæ of the cutis vera, and not improbably serve as a form of mechanical retention for the enamel cap. The actual substance uniting the two tissues must be a feeble glue-like substance, such as collagen, for it is rapidly destroyed by heat. By heating a tooth to 150°C. for two minutes the enamel will leave the dentin quite cleanly. (Fig. 40.) This, of course, may be partly due to the unequal expansion of the enamel and the dentin, but nevertheless the uniting substance gives way and allows easy separation to occur. On the under surface of enamel so removed may occasionally be seen fine horizontal ridges. (Fig. 40.)

SUMMARY.

(1) That in any study of enamel it is to be remembered that it is a highly refractile tissue, and has the power of picking up and transmitting light from even very weak illumination of the margin of sections.

(2) That no pigmentation exists in normal human enamel.

(3) That the course of the prisms is exceedingly flexuous.

(4) That no supplemental prisms exist in normal human enamel.

(5) That Retzius' striæ are, in fact, incremental lines of growth.

(6) That Schreger's lines are produced by differences in the optical density of groups of prisms passing in different directions.

(7) That "enamel spindles" are really transverse sections of continuous interprismatic "spaces," and are expressive of deficient function.

(8) That there is not sufficient evidence to show that normal secretions or bodily juices may pass from the dentin to the enamel.

(9) That the union of the enamel cap with the dentin is largely mechanical.

THE DEVELOPMENT OF THE ANATOMICAL ARTICULATOR.

By ELLISON HILLYER, D.D.S., Sc.D., Brooklyn, N. Y.

(Read before the Dental Society of the State of New York, at its annual meeting, at Albany, May 8, 1913.)

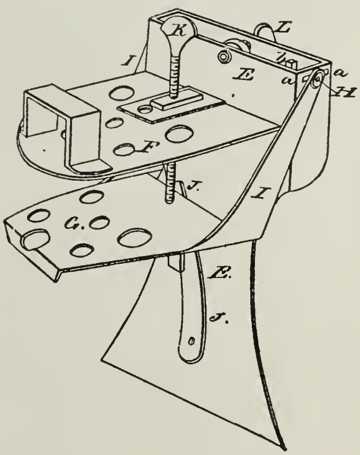
AUTHORITIES upon icthyology tell us that certain fish in seeking a coveted fresh-water pool will travel many miles up a salt-water stream, never deviating or erring in their instinctive certainty of final success. There are many deep and sparkling pools of wisdom lying far "up stream" in the pathway of dental investigation, which must be carefully and unceasingly sought in our efforts to obtain definite and tangible conclusions.

These definite conclusions have been laboriously and painstakingly sought by many men for the past half-century; the exertions of these pioneers to date are but beginning to bear fruit in the results of our dental operations. When we consider the progress of our profession for this half-century period—particularly the last two decades—we are stirred with admiration at many of the results thus far achieved. Progress has been steadily advancing toward the betterment of every procedure. Many of the men who have been the greatest factors in this advancement are among that vast "majority"—who, let us hope, are still watching over our professional welfare and by their inspiration are inciting to greater efforts those who are today carrying on the good work.

Among the many problems which have confronted the profession, one of the most difficult has been that of the anatomical arrangement of teeth. This has been due to the fact that the early conceptions of the mandibular movements were either exceedingly limited, or, if those movements were comparatively well understood, but little effort to reproduce them was exerted.

It seems like the irony of fate that at the time when the least was done to correctly reproduce natural relations of the teeth there was a greater percentage of edentulous cases than at this time, when so much is being done to bring about a solution. The conservation of tooth structure, the preservation of roots, restoration by means of casting methods, the treatment of pyorrhea, and noble efforts in the field of oral prophylaxis, are tending to gradually eliminate the edentulous condition. While, however, gradually diminishing, yet that condition will be, like the poor, always with us, and must receive the best possible consideration.

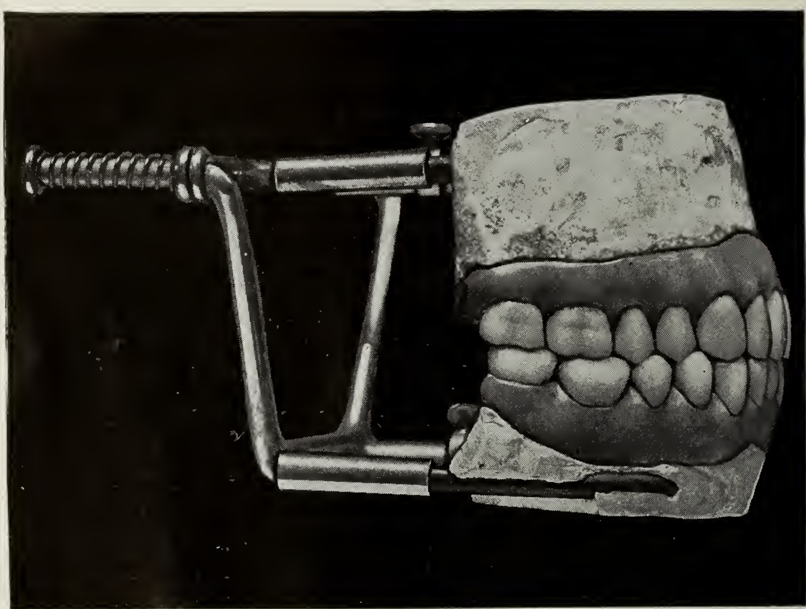
Fig. 1.



THE EARLIEST ARTICULATORS—THOSE OF EVANS AND BONWILL.

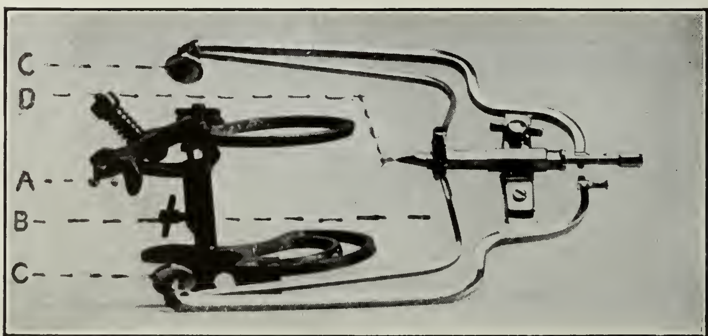
Dr. Bonwill deservedly bears the reputation of being the pioneer in this field, and his articulator is still in use by some practitioners. His work is antedated by that of Dr. D. T. Evans (Fig. 1), who in 1840 was granted a patent upon an articulator which, while showing many evidences of attempts to record the mandibular movements, evidently met with little appreciation, as only the Patent-office records give proof of its having existed. Dr. Bonwill's investigations in the early fifties covered a wide area, and led him to conclusions which were based upon the four-inch equilateral triangle. This measurement from the temporo-mandibular articulations to the symphysis was proved to exist in a large number of skulls examined, with such slight variation that it was made the basis for the construc-

Fig. 2.



Bonwill articulator. (From collection in Univ. Pa. Dental Dep't.)

Fig. 3.



tion of an articulator admitting of the placement of the models in the relation of the four-inch position (Fig. 2). The great fault in this articulator, however, lay in the fact that but two of the many movements of the mandible could be reproduced, viz, the lateral and the protrusive. Neither had Dr. Bonwill any certain means of transfer of the wax articulation from the mouth to the articulator.

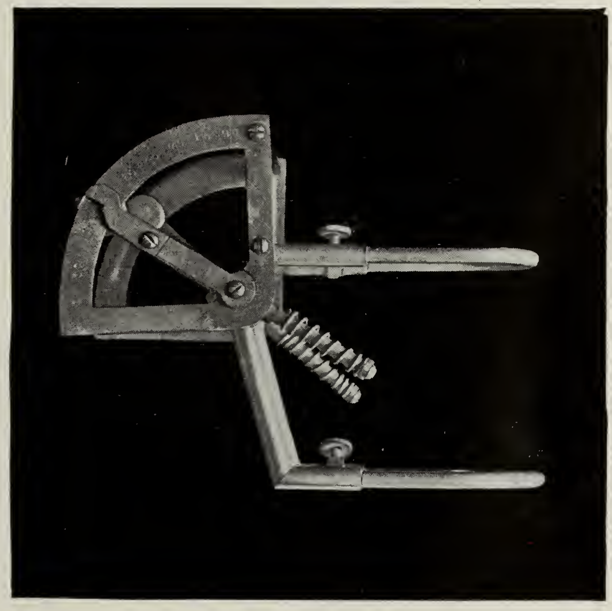
HAYES' ARTICULATOR AND ARTICULATING CALIPER.

This need was evidently impressed upon Dr. R. S. Hayes, who devised an articulator (Fig. 3) and a transfer apparatus which he termed an "articulating caliper." This resembles somewhat the "Snow face-bow" with which we are all familiar, in that it permitted the measurement of a given case, but it afforded no fixed transfer as does the Snow apparatus. Dr. Hayes also made an improvement in the manner of recording the condyle movement by providing a downward incline, which was the same upon both sides—a condition which in nature seldom, if ever, exists.

WALKER'S "FACIAL CLINOMETER."

It is most interesting to follow the trend of development as evidenced in the investigations of Dr. W. E. Walker in the early nineties. The fault in Dr. Hayes' articulator was eliminated by providing attachments to record the path of the condyle independently upon each side (Fig. 4). Dr. Walker's "facial clinometer," with which he computed the measurements and angles of rotation, was not of such a nature as to appeal to the average practitioner.

Fig. 4.



Walker's articulator.

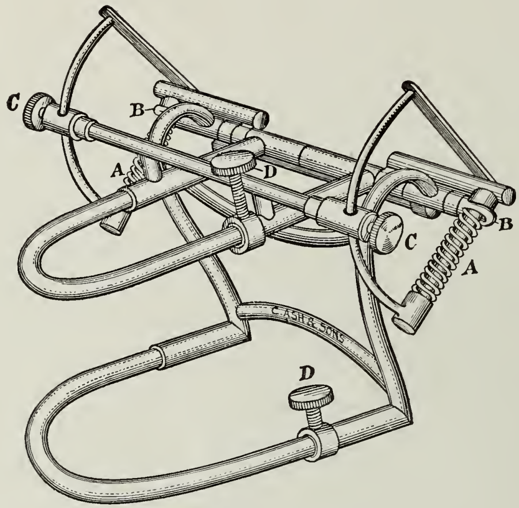
CHRISTENSEN'S ARTICULATOR.

Dr. Carl Christensen of Copenhagen followed this line of investigation, and by means of soft wax placed between the prepared bite waxes at the posterior region recorded the protrusive movement of the mandible. Like Dr. Walker's articulator, that of Dr. Christensen (Fig. 5) admitted of independent record of the condyle movement, but had no means of accurate transfer from the mouth to the articulator.

like its predecessors, however, it lacked means of mechanical transfer of the waxes.

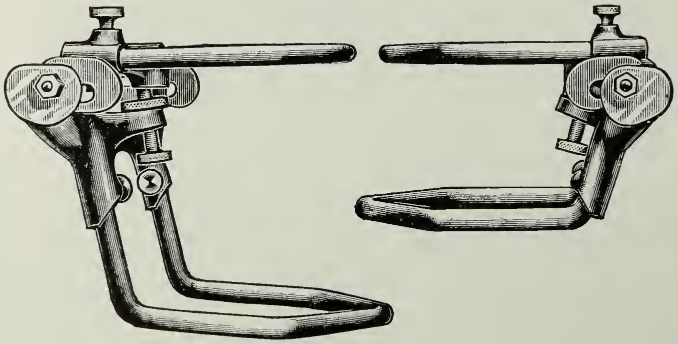
Upon this point of transfer really rested the crux of the greater part of the difficulty.

Fig. 5.



Christensen's articulator.

Fig. 6.



Gritman's articulator.

THE KERR ARTICULATOR.

The Kerr articulator contained a further development in that it provided for the record on each side of independent movement, by a condyle path permitting of a fixation at a desired angle;

GRITMAN'S ARTICULATOR.

This was thoroughly impressed upon the minds of Dr. Geo. B. Snow and Dr. A. D. Gritman, who collaborated at the University of Buffalo, Dr. Gritman producing an articulator which provided, by lateral extensions upon the condyle portion of the frame, for the attachment of the "face-bow" devised by Dr. Snow.

Fig. 7.

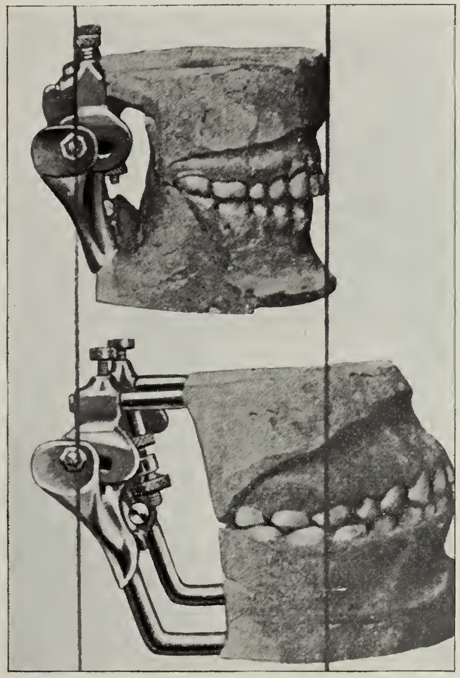
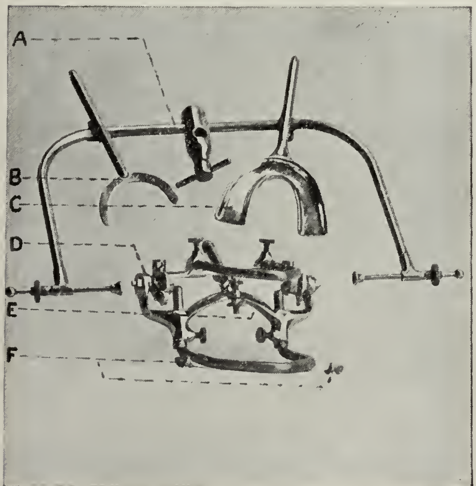


Fig. 8.



Dr. Gritman's articulator (Fig. 6) had many advantages not possessed by previous ones. The lower adjustable bow, constructed with an upright arm attachment, made it possible to adapt large or small models with equal ease. (Fig. 7.) The condyle paths were almost horizontal, having a very slight oblique slope, the same on both sides—fixed and immovable. This was corrected, in the subsequent articulator presented by Dr. Snow (Fig. 8), by paths movable and adjustable to a given position recorded by means of the "bite gages" (Fig. 9).

Fig. 9.

SNOW'S "FACE-BOW" AND "BITE-GAGES."

It is not my purpose in this paper to enter into the details of the preliminary steps of the preparation of bite waxes, nor of the arrangement of teeth made possible by the use of the anatomical articulator. It is wise, however, to note the essential points of difference, which have developed regarding the transfer of the bite waxes from the mouth to the articulator. Except for the somewhat indefinite methods used by those already referred to prior to Drs. Snow and Gritman, little had been done in this direction. Dr. Snow, in giving to the profession the "face-bow," bestowed an inestimable benefit, and I sincerely hope that we may be able to show to Dr. Snow, while he is yet active, how much we appreciate what he has done. The special virtue in the face-bow lies in its certainty of position due to the fixation of the various parts (Fig. 10). When the bite waxes have been fully developed as to adaptation of trial bases, fulness of contour, lip lines, etc., and the upper and lower waxes united, the fork is placed in the waxes with the bar portion extending in a line parallel with the base of the facial angle (Fig. 11). The face-bow is then adjusted to the bar by means of the clamp, and the adjustable condyle rods placed in apposition with the previously marked temporo-mandibular articulations. The graded marks upon the condyle rods make it possible to adjust

FIG. 10.

Face-bow in position. Prothero attachment on face-bow to assist in proper adjustment. Bites in mouth, with T-piece projecting through swivel clamp on face-bow.

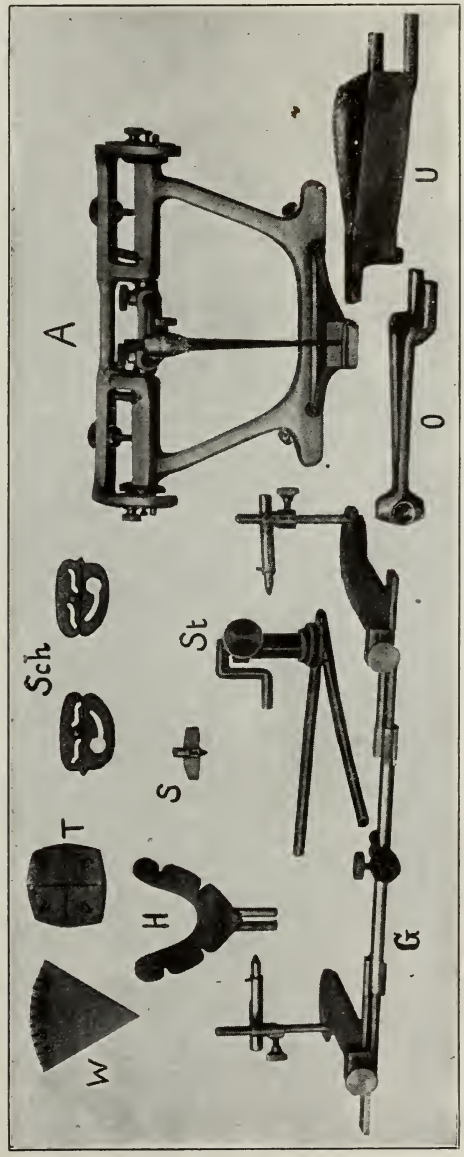
FIG. 11.

the bow equidistant upon each side, thus recording and fixing the condition thought out many years previously by Dr. Bonwill. With the clasp screw set the condyle rods may be loosened and the waxes withdrawn from the mouth. The rods are then placed as far as possible within the bow and set. In this position they fit snugly upon the projections intended for them. The models are then adjusted to position by means of the bite waxes. Care should be used to adjust them upon the articulator in such a position that the fork shall be parallel with the bench upon which rests the lower bow of the articulator. The models being secured by the plaster, the waxes, upper and lower, should be separated, reintroduced into the mouth, and, with the bite gages inserted at the posterior surface of the lower wax surface, the patient should protrude the mandible, allowing the projection on the upper surface of the bite gage to mark the position of the protrusion. The waxes are then replaced upon the articulator, and the set-screws securing the condyle paths released, as also the extension bar at the back. When the models have been approximated by the waxes with the bite gages in position, the inclination of movement on each side is recorded and set by means of the set-screws on each side. The extension spring bar is again hooked into position, the bite gages are removed, and the operator is ready to proceed with the certainty that the individual positions of the case have been correctly recorded upon the articulator, and that, if all subsequent operations be carefully carried forward, results will be relatively certain.

GYSI'S WORK ON THE PROBLEM OF ARTICULATION.

With the exception of Dr. Christensen, all the investigators I have mentioned have carried on their work in this country. There have been many others, however, on the other side of the Atlantic who have used their best endeavors to perfect apparatus to accomplish the desired end. Among these are Dr. Bennett of London, Dr. Breuer of Vienna, and Dr. Gysi of Zurich. The investigations of Dr. Gysi, published in the DENTAL COSMOS in its issues for

Fig. 12.



A, Articulator. *O*, *U*, Extra bows. *G*, Condyle path register. *H*, Horse-shoe plate. *Sch*, Extra pair of condyle path guides. *W*, Angle measure for condyle path slant. *T*, Type plate for molar groove. *St*, Holder for register *G* (to be used when plastering models to articulator).

January, February, March, and April, 1910, created a profound impression. The articulator which he devised (Figs. 12 and 13) seemed exceedingly complicated upon its first introduction, but, like many another apparatus, when understood lost much of its apparent intricacy. The improvement claimed for

Fig. 13.

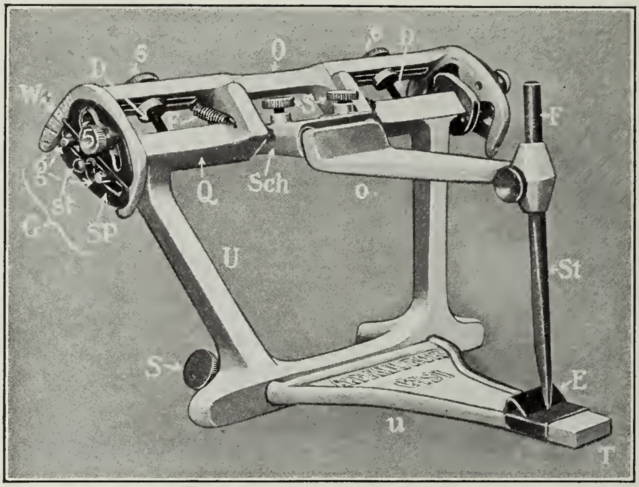
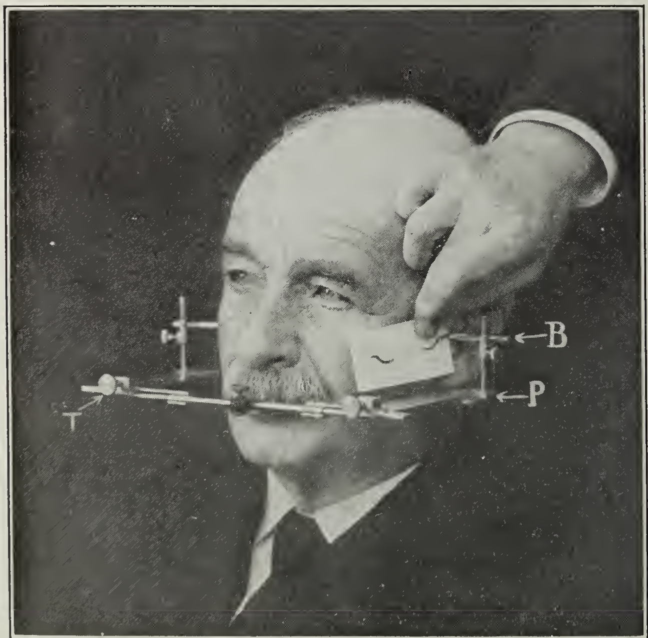


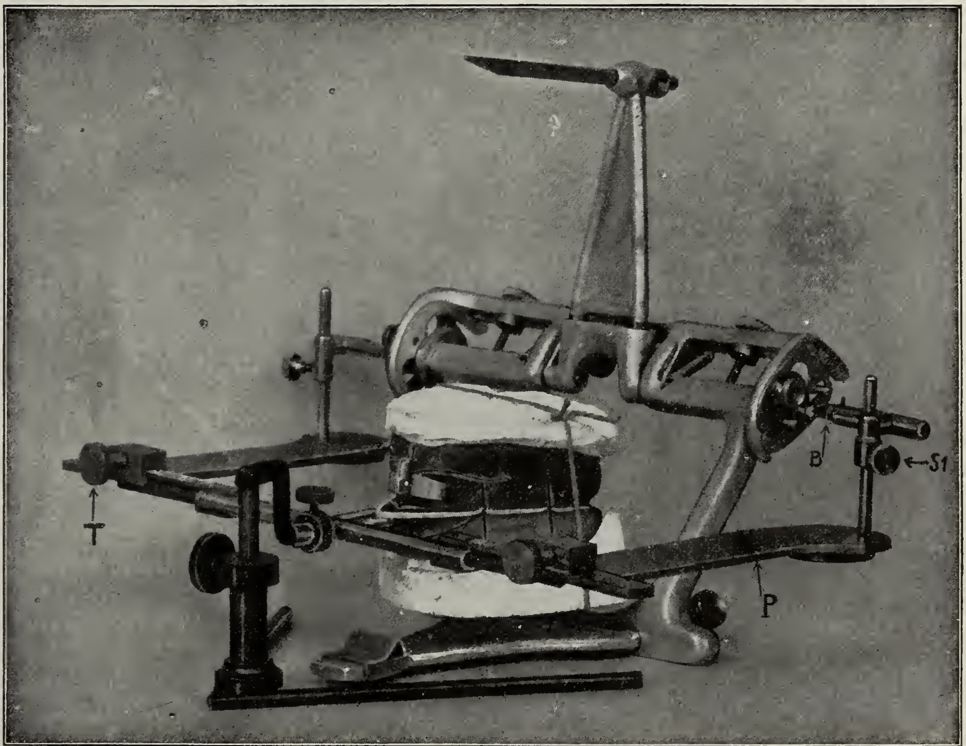
Fig. 14.



Shows method of determining slant and form of condyle path.

this articulator was its ability to record and transmit in the movement of the mandibular portion of the articulator the precise movement of the condyle upon each side. This was made possible by having selective condyle path plates, attachable to the articulator according to the requirements of the case. The condyle path register differs from the Snow face-bow in that the records of the movements of the mandible are made upon cards placed upon the face in the condyle region. The metallic mouthpiece, termed a horseshoe plate, for attachment to the bite waxes, has several sharp projections upon the under surface for securing it in the lower bite wax. The condyle path register consists of a transverse bar with right-angle arms, right and left, each carrying a graphite point contained in a tube operated by spring tension. The bow is attachable at the middle to the horseshoe plate. The positions of the condyles having been predetermined and marked by crayon, the graphite points on the transfer bow are adjusted to these points. A card is then interposed between the face and the graphite point, with the lower edge of the card parallel to the arm of the transfer bow. The mandible is then moved in all directions by the patient, right and left and up and down, with resultant marks upon the card. The records of both sides are taken upon the same card (Fig. 14). The records of many cases show what great variance exists in the paths of the condyles. No two cases are exactly alike and no two sides of any case are the same. The records obtained, the card is then carefully removed. The graphite

Fig. 15.



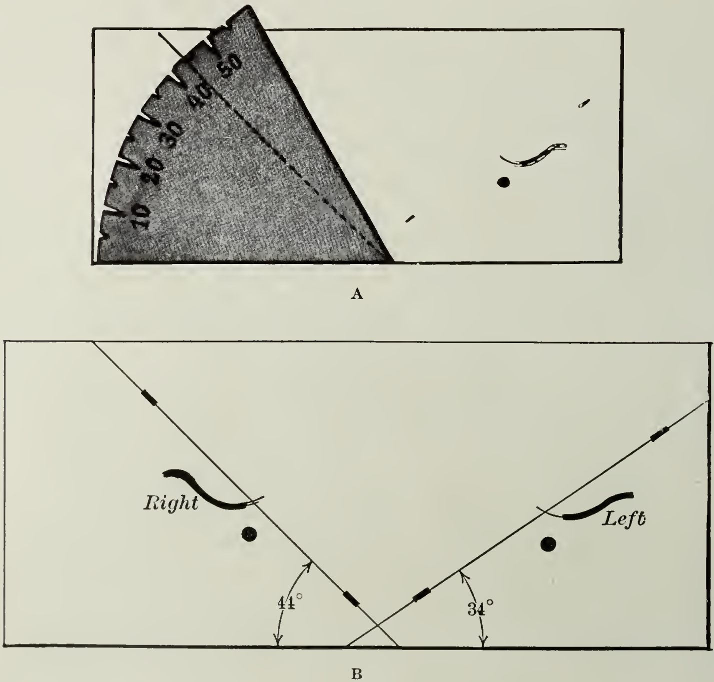
Shows models ready to be attached to articulator.

points are then securely fixed in position, the condyle path register with the waxes *in situ* is removed and prepared, by attachment to the holder (Fig. 15), for attachment by plaster to the articulator. The card record is used for obtaining the angle measure of the condyle movement. This is secured by the selection of a condyle path plate (Fig. 16), containing slots one of which will accurately include the line marked. Marks are made in the middle and at each end of the plate, and a line drawn through these will indicate the main line of direction of the condyle path passing through the end marks. By the use of the angle measure (Fig. 17) the degree is obtained. The condyle path plate is

Fig. 16.

Shows how main direction of condyle path is found by means of the slotted plate.

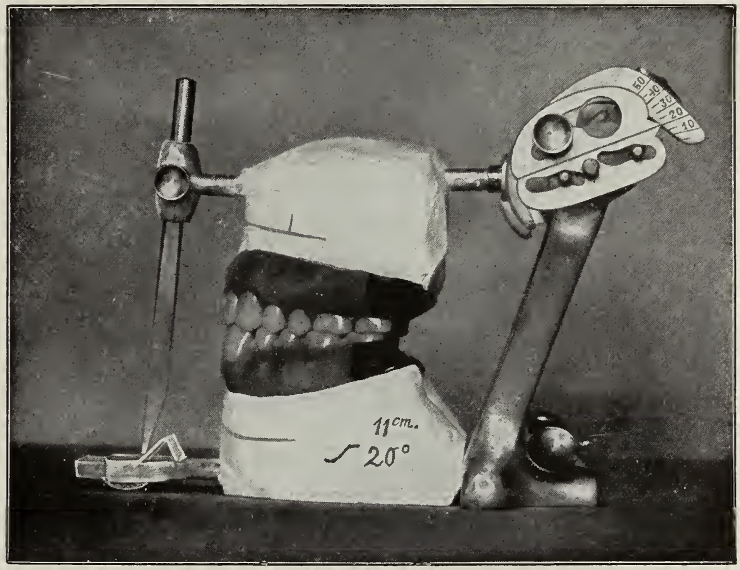
Fig. 17.



A, Shows mode of measuring angle formed by condyle path and lower border of recording card. B, Shows completed measurements of condyle path.

then adjusted to the articulator and set to the degree indicated upon the record —right and left side (Fig. 18).

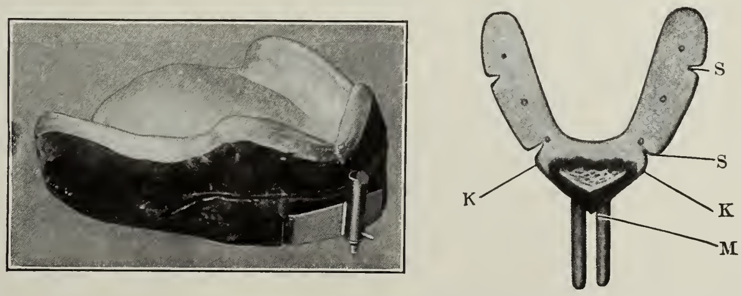
Fig. 18.



Side view of articulator, with incisor guide.

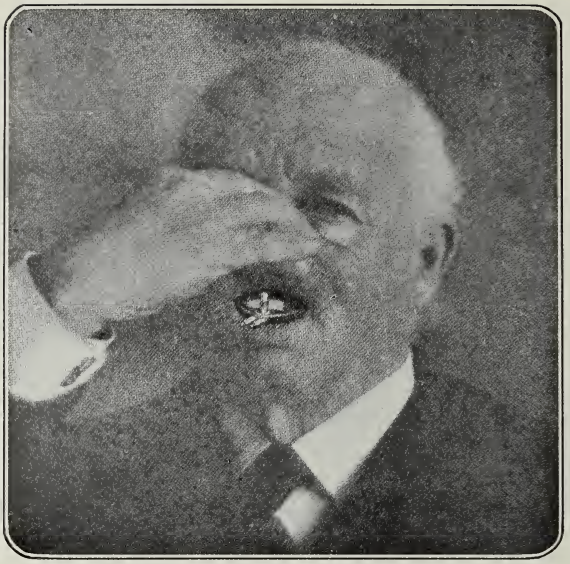
Another unique feature of this articulator is the incisor bite guide. Provision for this is made by the placing upon the upper wax bite a small register (Fig. 19), consisting of a brass plate bent at an angle on each end for insertion into the wax. Upon the face of the plate is a tube containing a pin operated by a spring. With the horse-shoe plate in position, a film of dark wax the thickness of a sheet of paper is spread upon its upper surface. The patient then moves the mandible from right to left and protruding, for a few minutes, until a definite triangular outline is formed (Fig. 20). Marks are then made upon the upper wax at the

Fig. 19.



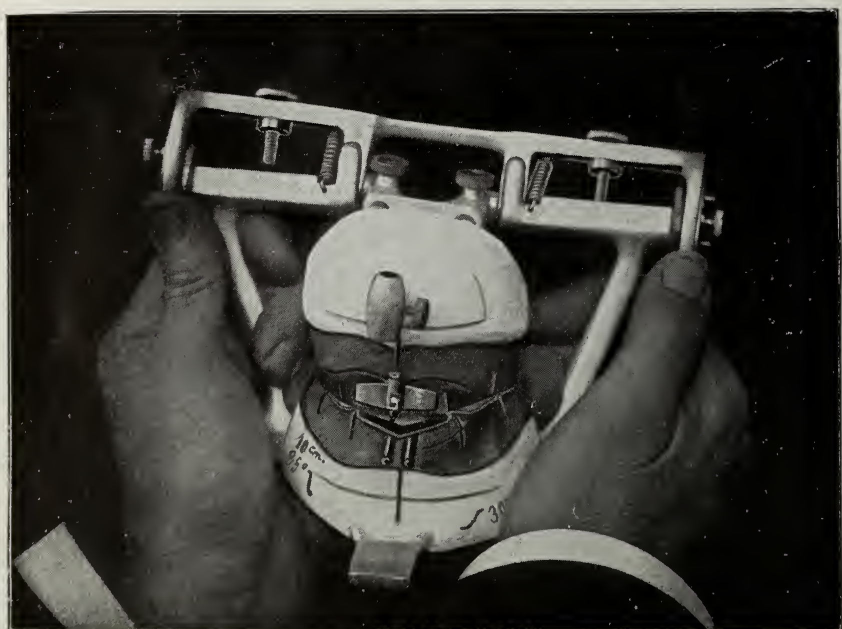
Small register fastened to upper wax model, and horse-shoe plate with registered incisor path.

FIG. 20.



Registering the incisor path.

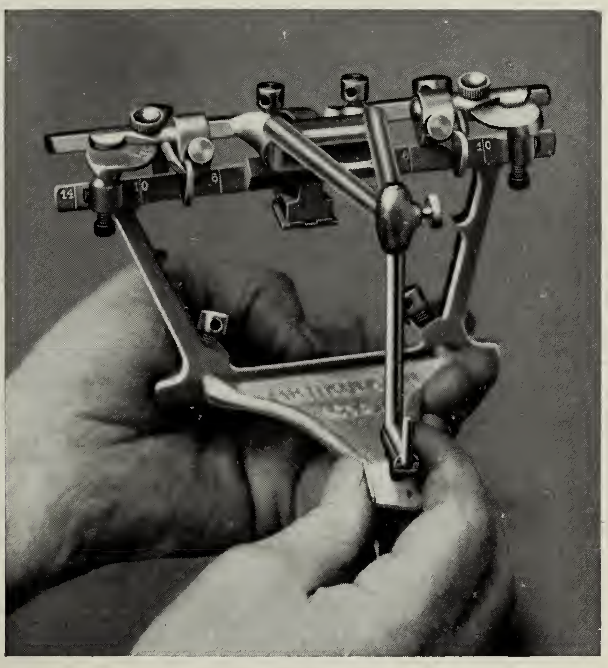
FIG. 21.



Showing how the proper positions of the rear supporting pins (the balancing points) are determined; also how the articulator is best held in setting up the teeth for articulation in lateral movements.

points of depression in the sides of the horseshoe plate to indicate the relative position of the upper and lower waxes. The wax bite plates are fastened to the casts and attached to the articulator by means of the condyle path register. The register is attached to the horseshoe plate and fastened to the holder, which permits of raising or lowering of the graphite points to approximate the point of the temporo-mandibular articulation. When the casts have been secured to the articulator, the register is removed, and with the horseshoe plate in position the two supporting pins are set to mark the limitations set by the marks made by the incisor guide (Fig. 21). These form, according to Dr. Gysi, the true rotation points in the mandible. The incisor guide pin, placed anteriorly to the casts, gives full support to the teeth in setting up (Fig. 13, St.).

FIG. 22.

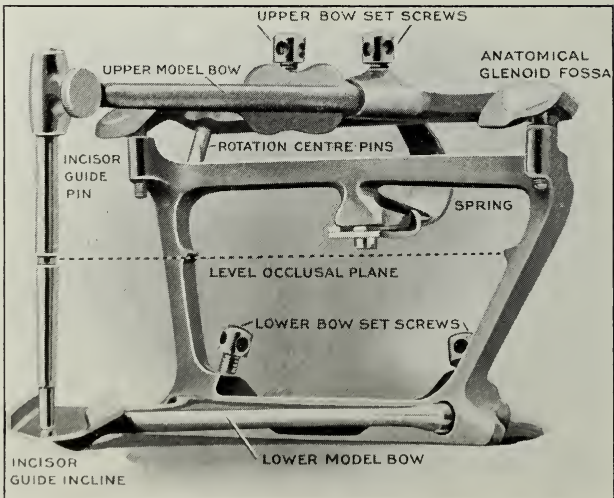


GYSI'S "ADAPTABLE" ARTICULATOR.

Hardly had the profession been introduced to the Gysi articulator when two others, destined to supplant it, were offered. The Gysi "adaptable" articulator (Fig. 22) differs from the former articulator in that the selective condyle path plates are dispensed with, and both adaptable lateral and downward path plates are attached to the frame to be set according to the degree indicated by the instruments of transfer. The same procedure is followed as previously in obtaining the condyle path records, but in addition there is provided a lateral condyle path register (Fig. 23). This register consists of an adjustable bow carrying at each end a ground-glass plate. The condyle path register has a double-end graphite carrier, one end horizontal, as in the previous method, and the other end vertical for record upon the under surface of the glass plates, held at the region of the articulation. The degree of angle measurement on the card is registered by the adaptable downward path plate; the degree marked on the glass plate is registered on the adaptable lateral path.

Fig. 23.

Fig. 24.


UPPER BOW SET SCREWS
ANATOMICAL GLENOID FOSSA
UPPER MODEL BOW
ROTATION CENTRE PINS
INCISOR GUIDE PIN
SPRING
LEVEL OCCLUSAL PLANE
LOWER BOW SET SCREWS
LOWER MODEL BOW
INCISOR GUIDE INCLINE

The condyle path is so constructed as to give the curve which is natural to the glenoid fossa, operating over a post to correspond to the condyle.

GYSI'S "SIMPLEX" ARTICULATOR.

The latest articulator offered by Dr. Gysi is the "Simplex" (Fig. 24). This is a modification of the "adaptable" articulator, and to many of the profession seems to be a step backward. This is explained by Dr. Gysi, collaborating with Dr. Clapp, in the *Dental Digest.* On page 8 of the January 1913 issue Dr. Gysi says, "The Gysi 'Simplex' articulator will not satisfy the requirements of dentists who desire to meet in the best possible manner the requirements of each case." If it were Dr. Gysi's object to interest those who have never used an anatomical articulator and induce them by its adoption to pass on to something better, then its mission will not be fruitless. It offers many advantages which the early articulators lacked. It possesses many of the excellent features of the "adaptable" articulator, viz, the curved glenoid fossa, the condyle post, and the incisor guide. The articulation, however, is fixed at an angle of 33° forward and downward inclination, and 16° lateral inclination, and, contrary to all the later deductions, is made the same on both sides. This angle of 33° is explained by Dr. Gysi by saying that a large percentage of examined cases indicates a close approximation to this degree. The transfer of the bite waxes may be made by either the Gysi condyle path register or the Snow face-bow. In the latter case, small projections are placed upon the condyle posts (Fig. 25), to receive the depressions on the adjustable rods. The use of the transfer instruments, however, is not de-

Fig. 25.

manded in this method. Projections on the upper portions of the mandibular part of the articulator, on a plane with either a notch on the incisor guide pin or an adjustable incisor guide placed in the position of the notch, mark the occlusal plane.

THE WEISS ARTICULATOR.

In the productions of Dr. Gysi the ultimatum in apparatus seems to have been reached. To say, however, that the last word regarding the solution of articulating problems had been said would be most unwise, for there are those who are still delving into the unsolved, the results of whose labors are still to be recorded. About two years ago, Dr. Weiss of Havana presented before several societies in Europe an articulator whose construction and basic principles radically differ from any other in existence. The maxillary portion is fixed upon a standard and fastened securely to the bench. All movements are produced by the mandibular portion—thus mechanically reproducing, as far as possible, natural conditions. Those who have seen its operation and the results obtained by it have been most enthusiastic about its possibilities. Unfortunately there is no specimen of the articulator in this country, as far as I am aware, nor any illustration which I am able to present to you.

Fig. 26.

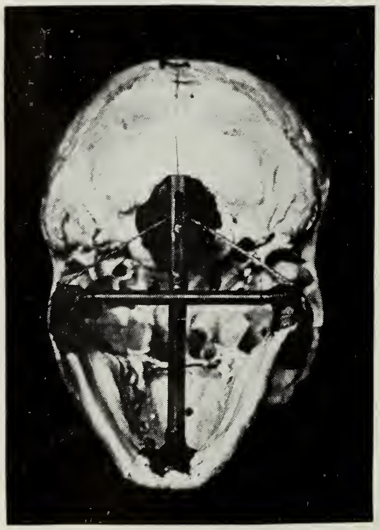
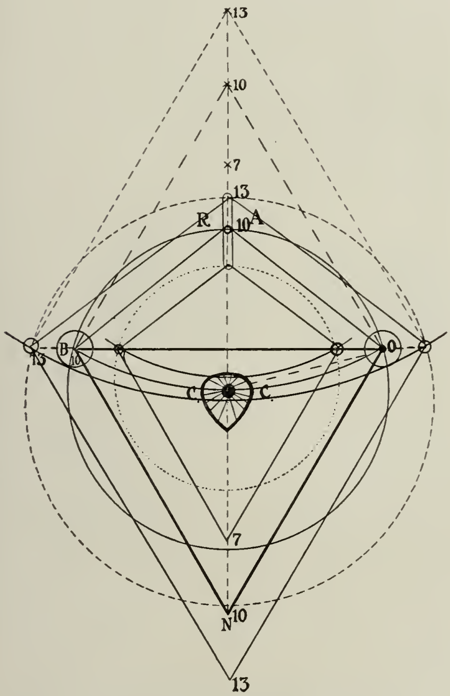


Fig. 27.

SCHWEITZER'S PROJECTED ARTICULATOR.

For many years one of my valued associates at the New York College of Dentistry, Dr. H. Schweitzer, has been investigating this subject of articulation, and has devised an articulator which also differs radically from all others, in that the rotation point of the mandible is placed at the position of the vertebral axis. This conclusion was reached after the examination of many hundred articulated skulls, and, as can be seen by these specimens (Figs. 26 and 27), applies to animal as well as human skulls. The movements of the mandible, as all investigators have found, have been so difficult to control that if it were possible to obtain an instrument which would furnish a fixed rotation point, much would be gained. Dr. Schweitzer has endeavored to geometrically prove his contention by constructing a double "Bonwill triangle" (Fig. 28), showing calculations upon three sizes of arches, 7, 10, and 13 cm. respectively. These triangles are constructed with a common base. Using the apex of the occipital triangle as a radiating point, he in-

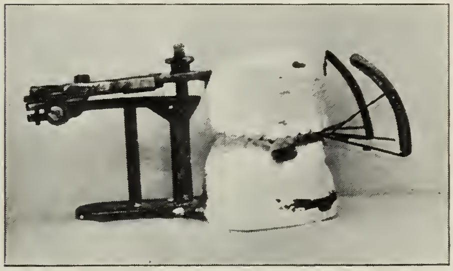
FIG. 28.



The rotation axis of the mandible.

scribed an arc through the condyle points. Bisecting this arc by a line bisecting the two triangles, the points of intersection furnished the centers of circles which when projected *were found in every case to pass through the center of the foramen magnum*—the position of the vertebral axis. Basing his deductions upon these facts, he constructed an articulator (Fig. 29), having a fixed point in the region of the vertebral axis, adjustable by face-bow to the requirements of a given case. The bite relations are registered by an incisor path guide and a molar path guide. While this articulator is still in a somewhat unfinished stage, the projected articulator will certainly offer some unique features to apply to the practical restoration of teeth in their true anatomical relation.

FIG. 29.



CONCLUSION.

My object in this *résumé* has been twofold: First, to show how much labor has already been expended upon a most important part of our work; and second, to stimulate, if possible, the interest of the practitioner who is still holding to the use of the plain-hinge articulator.

The work in this direction which is to-day required of the undergraduate in all the colleges of the land will, we trust, in a few years begin to bear fruit. So many operations are dependent upon proper articulation that the edentulous case bears but its proportionate share in the consideration of the subject. The efficiency of our bridge work and our partial dentures depends largely upon the provision we have made for proper resistance of stress, and this can be best provided for by the use of an articulator which, during the procedures of construction of the denture, will show the various conditions which the restoration must meet. If this paper shall have aroused interest in even a few of my hearers, then the effort will not have been in vain.

A MOLDED PORCELAIN-CEMENT INLAY.

By J. EDWARD LINE, D.D.S., Rochester, N. Y.

CEMENT of the so-called porcelain variety is packed into the cavity in plastic condition by means of suitably formed pluggers and spatulas, and shaped, as with a trowel, to restore the contour of the tooth. This means very careful preparation, viz, the forming of the cavity, the adjustment of the rubber dam and drying of the cavity, the incorporation of the correct quantity of powder in the correct quantity of liquid, the thorough spatulation of the mass, and the introduction and contouring of this mass before the initial setting. Further conditions of success are the following: First, an eye to form and color on the part of the operator; second, manipulative ability that measures up to the requirements of the eye in question and makes plasticity effective within the time limit imposed by the nature of the cement. Operations that compare favorably with the fused porcelain inlay are not uncommon with operators who have made a specialty of this phase of dentistry; they have demonstrated conclusively the possibilities of porcelain cement in competent hands.

In order to attain the same, a similar, or better result, in a more leisurely manner, while at the same time eliminating some of the features involved in the method described, we have to substitute an only slightly different treatment of the material and a few mechanical appliances, viz—a brass flask (Figs. 1 and 2), in two parts and separable, with guide pins in one half and holes to correspond in the other, the approximate surfaces coned out to accommodate the pattern and investment, and each half topped by a lug or trunnion (A) that fits loosely into a hole (B) in the end of the jaw of a pair of parallel pliers (Fig. 2); and a pair of pliers of the kind just mentioned.

FIG. 1.

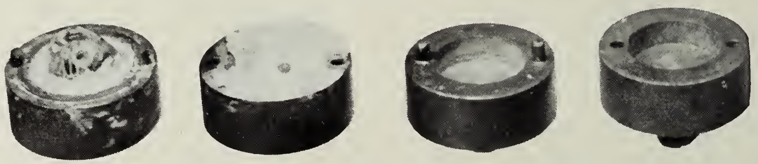
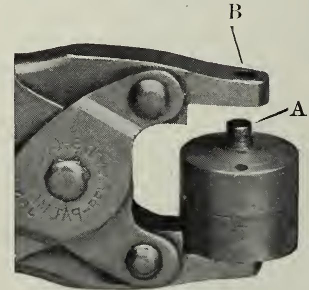


FIG. 2.



DETAILS OF PROCEDURE.

The procedure consists in—

(1) The preparation of the cavity as for an inlay of any kind—viz, made of gold, some other metal, or porcelain.

(2) The building of a wax model as

for a metal inlay, except that acute angles are not permissible.

(3) The coating of the model with oil, or copal or sandarac varnish.

(4) The coating of the interior of the flask with a thin layer of wax, to prevent or reduce to a minimum the adhesion of the investment. Warming the flask facilitates the flow of the wax, and effects its spread in the thinnest possible layer. Warming also aids materially in the release of the investment when the flask is opened.

(5) The investment of the wax model or pattern in plaster in one half of the flask, and, when the plaster has set, adjusting the other half of the flask, previously filled with soft plaster, bringing the two parts of the flask together by pressure applied by finger and thumb, or by means of the pliers described above. Care should be taken to provide for the separation of the parts without distorting the pattern or breaking the edges of the mold. In other words, the pattern should be invested in such manner that it will "draw" freely from each half of the mold.

(6) The flask should be warmed, opened, and the wax washed out by means of hot water poured from a dish at an elevation, as in the preparation of a mold in vulcanite work; then the mold should be given time to dry.

(7) The mold is painted with copal or sandarac varnish, and lined with No. 2 gold foil in order to produce a particularly dense surface.

(8) Each half of the mold is filled to excess with a so-called porcelain cement mixed and worked to such plasticity as is advised by the manufacturer.

(9) The lugs or trunnions of the flask are adjusted to the corresponding holes in the pliers, pressure is gradually applied until the parts of the flask have been brought together, and the flask is allowed to stand for the prescribed twenty minutes, or until the operator is ready to adjust the inlay to place. Twenty minutes is the minimum time prescribed in the directions that accompany porcelain cements; but, when allowed to set twice or thrice twenty minutes, or longer, a more lasting product is obtained. If the inlay is allowed to set over night, it becomes as hard as flint and correspondingly durable.

(10) The flask is opened, the inlay removed, the "bur" trimmed off by means of stones or sandpaper disks, the cavity sides are roughened, both inlay and cavity are dried, and the inlay is set with oxyphosphate cement, and trimmed and polished later in the usual way and by the same means.

ADVANTAGES.

By this method several cavities may be prepared at one sitting and wax models made thereof. The fillings may be made at the operator's convenience in the laboratory. They may be set one after another at the next appointment, and without the rubber dam—a feature that will commend itself in the filling of posterior teeth, for which the molded cement inlay is particularly adapted. The method generally in vogue necessitates the presence of the patient and the use of the dam from beginning to end; the method under consideration does not require the presence of the patient while the filling is being made, nor does it call for the rubber dam at any time.

CAN THE ILLEGAL PRACTICE OF DENTISTRY BE LIMITED BY LAW?

By R. OTTOLENGUI, M.D.S., LL.D., D.D.S., New York, N. Y.

(Read before the Dental Society of the State of New York, Albany, May 8, 1913.)

I BRING before you one of the most serious problems which confront the dental profession of this entire country, and one the solution of which is peculiarly difficult in our own state. In choosing my title, I had first in mind to ask, "Can the illegal practice of dentistry be *eliminated* by law?" but it occurred to me that, up to the present era, with all the laws that have been passed by all the countries in the world, the offender against the law has never been eliminated, so that the query seemed futile. For "eliminated" I then thought of substituting the word "controlled," but this in turn I set aside, because the control of that which in itself is offensive really means the toleration of it, as when the municipality licenses a liquor saloon. It has seemed to me, then, that the best that any law may accomplish would be the reduction of the number of offenses to the minimum, by rendering detection easy and by making punishment sure and swift. In this sense I ask, "Can the Illegal Practice of Dentistry be Limited by Law?" and I unhesitatingly answer, "Yes, it can!"

We have before us, then, the question of the limiting of the total number of illegal practitioners of dentistry to the minimum, and if we look upon illegal practice as an ulcer on the body politic we may think of it as a disease and consider for a moment the etiology thereof, for without a comprehension of etiology we shall never discover the cure of any disease.

THE ILLEGAL PRACTITIONER THE PRODUCT OF THE LAW.

The illegal practitioner is primarily the product of the law. Secondarily, he is the result of both laxity of law and lack of law. I may explain this statement very briefly. Before we had any dental statutes we had but two kinds of dentists—the ethical man and the quack. When the states began to enact dental laws the situation became complicated, because at once we literally created the illegal practitioner—for were there no law regulating the practice of dentistry, there surely could be no illegal practitioner. Furthermore, the complexity is increased when we consider that nowadays it does not follow that, because a man is practicing illegally, he is a quack, nor can we call all the charlatans illegal men. Some of the grossest offenders against the code are nevertheless legal practitioners—and to this extent at least the laws have injured the people, by giving countenance and legal standing to men who, in the absence of laws, would be readily recognized as quacks. I make this point at the outset because I desire to have it distinctly understood that I am in no sense studying this problem from the angle of ethics. In this paper I recognize the legal right of any licensed dentist to advertise if he chooses to conduct his practice in defiance of ethics and good taste. The man aimed at is solely and only the man who practices in defiance of the law, and it matters not whether he conduct his practice ethically or unethically, he is an offender in the eyes of the law, and as such cannot consistently rise and say that he is mistreated in this argument.

I have shown that the illegal man is the direct result of enacting laws, and I have said that he has increased in numbers because of laxity in law and because of lack of law. By *laxity in law*

I mean laws which, however well intended they may be, are ineffectual either because they are not or because they cannot be enforced. The law of this state is in this class. By *lack of law* I mean laws which permit things which should be prohibited. For example, the New York statute describes so-called mechanical dentistry, and permits the unlicensed man to practice that particular brand of dentistry. By this lack of law we have countenanced the laboratory in which is trained and from which is graduated, without diploma, the illegal dentist. This particular phase of the problem is one to which I merely allude, as it is not my intention in this paper to really discuss the laboratory man, or mechanical man, at all, further than to suggest that it is a problem in itself that well might be investigated by our Board of Regents, with the end in view that some just, proper, and effective statute regulating the practice of "mechanical dentistry" might be enacted. By effective, I mean that the statute should be effective in terminating the existence of these unlicensed schools of dentistry from which are turned out a steady stream of unlicensed dentists.

THE OBJECT OF DENTAL LAWS.

Before the discussion of any dental law, we should fully agree as to the object which the law is to serve, and I am sure that many statutes have proved ineffectual because drawn by men who did not have the true object in view. A dental law must obey the rule of all laws, which means that it should be enacted in the interest of the whole people, and not for the benefit of either the individual or any class of individuals. Thus the statute should not be intended to improve the status of the dentist, of the dental society, or of the dental school. On the contrary, if it be in the interest of the people at large, the law should unhesitatingly restrict the conduct of the dentist, the conduct of the dental society, and the conduct of the dental college.

With this purpose in mind, let us ask why it is requisite to protect the community against the dentist.

INTEREST OF THE COMMUNITY IN DENTAL LAWS.

To bring my argument to a point which can be quickly grasped by even the slowest mind, I will first compare the community at large to an automobile. Anyone who has ever seen an automobile completely dismembered knows that it is a marvelously complex mechanism, with a multitude of ingeniously constructed parts, so assembled that when all are in order we have harmonious co-ordination which results in the perfect working of a perfect machine; a machine that responds readily and promptly to all calls; that will travel fast or slow, up-hill or down-hill, and turn easily for every deflection in its course. Even the man who has never seen a machine taken apart, knows this in a general way—that an automobile must be in thorough order to render the highest service. We all recognize, therefore, that the slightest disarrangement of parts must interfere with the wonderful co-ordination of all the other parts—and to that extent, at least, efficiency is proportionately lessened. But we know another thing, and that is that a trifling accident, such as the loosening of a nut, if neglected, may result in a stoppage of the whole works, or at least may transmit damage to a more important part.

A perfect working community is composed of a similar co-ordination of numerous units all working for and aiding the work of one another. The harmonious working of all these units depends, of course, upon many factors, but the chief factor of all is *health,* and any disturbance of the health of the community causes a proportionate lessening of its efficiency—a depreciation of output. It might seem hard to show that the sickness of a single individual can be a matter of much concern to the whole community, but really it is not so difficult. A number of cases of scarlet fever occurring in a school frequently causes the closing of the school—and this outbreak must have originated in the illness of one child. Thus, perhaps, the education of a thousand or more children is temporarily stopped; the presence of these young people at home instead of at school disrupts the family routine by adding to the burdens of the parents, and this in turn may greatly interfere with the business interests of persons far removed from the original cause of disturbance. I could give many examples, but this one will serve: A man recovering from typhoid fever, about three years ago, was permitted to return to work in a dairy in New Jersey, and within a brief period there was an outbreak of typhoid on Washington Heights, New York city, which resulted in the death of two or three persons and the illness of a score. Thus the health or illness of one man was a matter of concern to a community in a different state.

I need not argue before this body of dentists that the condition of the teeth of a man bears a close relation to the man's health. But I wish now to compare the individual to the same automobile to which we likened the community. Like that wonderful machine, he is composed of hundreds of co-ordinating parts which produce the highest efficiency only when a state of health exists. A speck of dirt in a carburetor pipe may stop the best six-cylinder car from climbing a hill, and a piece of poorly masticated food may clog the digestive apparatus of a man and terminate his work in a quite similar manner.

Perfect health of the individual depends primarily upon the proper mastication of food, and secondarily upon the proper assimilation of food. The slightest accident to this masticating apparatus, as for example the loss of a cusp of a single tooth, lessens the efficiency of the entire body proportionately. But the neglect of caries in teeth often results in a diseased condition of the tooth roots, which if not cured causes a continuous contamination of the body itself, interfering with food assimilation and materially lessening the power of the body to resist infectious diseases. Thus in quick sequence we may have—First, tooth decay; second, exposure and death of the pulp; third, infection of the pulp and apical disease. If this be neglected, or what is just as vital to the community, if this be improperly treated or be left untreated by the dental attendant, then may follow—fourth, a continued draining into the system of infectious material; fifth, a lowering of the vital resistance of the body; sixth, the acquirement of some infectious disease, such as scarlet fever; seventh, the infection of other individuals, resulting in the closing of a school, the closing of a factory, the death of persons important in the business world, etc.

For these and allied reasons, the community has a right to pass laws which shall determine whether a man is sufficiently skilled in dentistry to be given a license to practice.

INEFFICIENCY OF PRESENT LAW OF NEW YORK.

Having shown that the community has a right to pass a law regulating the practice of dentistry, before we may logically ask for a change in the existing laws we should show that the existing laws are ineffectual. This is so abundantly true of the New York statute that there is scarcely an argument against the present law that I can advance that is not well known to all of you. However, I must point out at least the most flagrant flaws.

The chief difficulty is that the law does not provide any adequate means for its enforcement. The discovery and prosecution of illegal practitioners is placed in the care of this society. This is a compliment to the society, but is a gross injustice to the citizens of this state. The prevention of the illegal practice of dentistry should be one of the most sacred duties of a state to its people, and yet we find this Empire State of the great United States of America satisfied to free itself of this duty by turning it over to a private society, whose members have neither the time nor the money to properly safeguard the health of the people.

In other departments of police work we find regularly organized corps of efficient men, all receiving salaries, and with moneys provided for the expense of apprehending offenders against the law. But in this exceedingly vital department, the New York State Society is asked to furnish out of its own pocket the moneys needed for apprehending the offender, securing the evidence against him, and even for supplying the attorneys for prosecuting him. In case of conviction and fine, the fine is paid back to the State Society, and this is a double wrong. It is wrong, first, because the remuneration of the policeman should not depend upon the conviction of the man arrested, since this is bound to bring about an injustice either to the prisoner or to the prosecutor. It is wrong because, since the pay of the policeman, the witnesses, and the prosecuting attorney must depend upon the moneys collected in fines, it is a natural consequence that the appeal to the judge will be for a fine, when all arguments should be for the imprisonment of the convict. As an example, in the Second district we secured a fine of $500 against an illegal man, who smilingly drew out his check-book, settled with the court, and jumping into his big limousine, hurried down town to superintend the opening of a new office. The imprisonment of ten such men will better serve the people at large than the collection of ten thousand dollars in fines.

As the law has stood for years, and as it would still stand even if the amendments recently pending before our legislature had been passed, this society must have charge of this work and must furnish a committee to superintend it, which committee must give its services free. Why should our members work for the state free? Does the governor work without salary? Do the assemblymen and senators who make these laws, give their services gratis? Dr. Wm. Carr has rendered such service to this society and to this state for years, without very much thanks from either the society or the state. This is very honorable conduct on the part of Dr. Carr, but it is not so very honorable on the part of the society or the state to accept such service. For not only must Dr. Carr, and other members of the law committee, do this work at great sacrifice of time and money, and without remuneration, but they find themselves actually in a position of receiving threats on the one hand, and of suspicion on the other. I do not know about Dr. Carr, but Drs. Rogers and Johnson, who have done similar work in the Second district, have not only received many threatening letters themselves but similar letters have been sent to the women of their households.

"GRAFT" AND PROTECTION OF UNLICENSED DENTISTS.

Let me explain what I mean by suspicion. New York state, and particularly New York city, is fairly riddled with what is called "graft." The most lucrative form of graft is the exaction of monthly payments for the privilege of doing an illegal act without police interference. The collection of such money is usually made by some person in a very subordinate position, and he invariably explains that he is only acting for "a man higher up." This "man higher up" is a convenient cloak for the actual receiver, and the ingenuity of the scheme lies in the fact that it is never explained how much higher up the money actually goes. The limitation is left to the imagination of each person studying the problem. Thus, if you choose, you may decide that it goes no higher than the ward man; or you may believe that the captain gets a slice of the graft cake, with perhaps a bit of the frosting going to the inspector, and some of the filling to the commissioner. Then there are others who believe that some cakes are delivered uncut to party bosses, or even higher.

This is the sort of position that this society is asking its honorable members to occupy, when electing them to membership on our law committee. It is common belief in New York city that illegal men are promised immunity, protection, and even non-arrest, in exchange for a definite sum paid monthly. Dr. Carr does not believe that any such systematic blackmail exists. Some men are so highminded and honest themselves that they cannot believe that other men can be dishonest. But Dr. Carr is almost the only man in New York city who has at all studied this matter and still believes that graft does not exist. I am sure that both Dr. Johnson, the present law-committee man of the Second district, and Dr. Rogers his predecessor, will testify that graft exists in their district. For this reason Dr. Rogers has refused to serve longer, and Dr. Johnson has asked to be relieved.

Of course it is always difficult to prove the existence of grafting, though just at present enough of the truth is coming out to satisfy us all that the rumors of the past, even though no legal evidence existed, were founded on facts. So it is in the dental situation; I cannot give you legal proof, but I can tell you of the present system, and give you the rates. Formerly the charge for an individual illegal dentist was ten dollars per month, and each man settled with "the man lower down," the blackmail collector; by the way, sometimes "the man lower down" is a woman. At present there is an association, the members of which are assured protection at twenty dollars per month, the fee for having an unlicensed assistant being five dollars per month. Just how this immunity is obtained and to whom the money is paid, it is less easy than ever to discover. But this is the condition which is said to exist; perhaps it does, and perhaps it does not. The point of interest to us is that we are not and cannot be certain that it does not exist, because such is our law that it is possible—which is quite sufficient reason why we should make a new law that would render the continuance of such conditions as nearly impossible as we may.

Now I have that to say which I cannot say with too much emphasis. I myself am somewhat like Dr. Carr; I take an optimistic view of my fellows. I do not believe that all men are dishonest till proved honest; I prefer to think a man honest till proved otherwise. Hence I never have believed much in this mythical "man higher up." I have never thought of this straw man as anything but a cloak for the real crooks. Consequently, I do not believe there is any such person in the dental situation, but I do believe that our law is such that we are compelled to rely too much upon agents who are sufficiently unscrupulous to blackmail illegal men, taking money from them, and whispering as they take it, "Of course this goes higher up."

I have been asked, "How can this be, when the immunity is actually delivered?" The answer is simple. The members of our law committee are compelled to rely upon attorneys, and they in turn must leave the collection of evidence and the arrests largely to the work of agents. There is very little money in these cases for our attorneys, none at all for our law committee, and it is not strange that the real work should be left to the agents and sub-agents.

But, gentlemen of the New York State Dental Society, the situation has become intolerable. We have no longer the right to ask men to work on our law committee in the presence of such conditions. If this society has any self-respect, if it has any conscience, if it has any sense of its duty to the people, we should, before we adjourn, pass a resolution notifying the governor of this state that one year from date we will terminate our contract, and abandon this police work. We should notify this state that it may either leave our people unprotected prey to the illegal and incompetent dentists, or else place upon the statute a law which will adequately meet the situation. Can such a law be framed? It can!

THE ADEQUATE LAW.

That the limiting of illegal practice of dentistry is not easily accomplished is indicated by the fact that no law yet passed in any state has proved entirely satisfactory, nor has any law long remained unaltered, which shows a constant admission of inadequacy in the statute altered. But the later and apparently the better laws have certain features conspicuously present. The chief of these are—1. That the state shall prosecute offenders. 2. That all dentists shall register annually. For a solution of the difficulties in this state I would suggest that a committee should be appointed to frame a new statute which shall contain the following main features:

First: The illegal dentist being an offender against the health interests of the state, his prosecution should be placed in the care of the board of health. I make this suggestion because I have been informed that the boards of health may prosecute without appeal to county prosecutors. If this be not true, then my plan would be that the detection of the illegal man should be given into the care of the board of health, and the prosecution left to the county officers. When I refer to the board of health I touch upon a subject which will require some study. I would prefer that in large cities the work should be in the care of the local board of health, but as there are no local boards in suburban districts, it will be necessary to include the state board of health in this work in some manner. Perhaps the state may be divided as at present into judicial districts, and where there is a large municipal health board, as in New York city, that district might be cared for by the health board there. These boards of health should provide a sufficient number of inspectors to constantly investigate infractions which might be reported. If necessary these may be exclusively dental inspectors, or it may be possible to add this work to the duties of men already on the city pay-roll. But these men should be city servants and not private agents, as at present.

Second: ANNUAL REGISTRATION. Every dentist in this state, now practicing and hereafter entering practice, should be compelled to register annually, and his right to such registration should be the exhibition of his state board license, with proof that such license had been issued to him and to none other. False registration should be severely punished by a heavy fine or imprisonment, or preferably both. A fee of one dollar should be collected for each annual registration. Failure to register prior to a specified date should subject the dentist to a fine of one dollar for every thirty days of delay. Other states have adopted annual registration with advantage, but I believe that an improved plan of registration would greatly increase the effectiveness of the law, while decreasing the chance for evasion and the levying of blackmail. My idea is that while the supervision of the practice of dentistry should be in the care of the health board, the registration should be in the care of the board of examiners. This board issues the license to practice in the first place, and should care for the registration. They would be better qualified to prevent false registration, and moreover would serve as a foil against possible blackmail by the health board inspectors. One member of the board of examiners therefore, possibly the secretary, should have added to his duties the care of this registration, and perhaps might best be called the dental registrar. This man should have a salary, and all demands for money involved in the expense of prosecuting illegal men should be vouched for by him and should be paid upon such voucher by our State Society treasurer. To this extent, and to this extent only, should the State Society continue in this work. All registration fees, examination fees, and all fines, should be paid into a special prosecution fund, and this fund should be administered by this society as a further preventive against wrongdoing.

The most important part of this registration plan I have yet to outline. Once annually, at a given date, the list of men registered should be published in pamphlet form. This list should likewise contain a list of those who have died, and, as all deaths must be reported to the health board, this dead-men's list should be easily compiled, and thus many "dead men" now practicing dentistry would be compelled to return to their graves and attend to their own private affairs.

Each of these registration pamphlets should be sent to all registered men, and should contain, conspicuously printed on the first page, an invitation to all registered men to report to the registrar the names of any men known to be practicing dentistry whose names fail to appear in the Register. Such an invitation would remove all doubt of the legal right of a practitioner to lodge information against an illegal man, but, better still, the informer would not be making any accusation against the legal status of the other man. He would simply be reporting a fact, as for example "J. R. Smith is practicing dentistry, at ——— number, ——— street, and his name is not in the Register." Moreover, such information should be received as a confidential communication, just as at present a tenant in an apartment house may report that the plumbing in his apartment is not in order. Upon receipt of such notice, a health board inspector calls and inspects all apartments, thus protecting the informer. Upon report of the existence of an unregistered dentist, the dental registrar will report to the board of health, upon which the dental inspector will call. If the man can show a license, he is served with an order to register within thirty days, the fee being the legal one dollar, plus one dollar for every thirty days which had elapsed since he should have registered. Failure to register after receiving such notice should render the man subject to citation before the board of examiners, who may either fine him and permit him to register, or recommend him to the Regents for revocation of license.

I believe that such a law would greatly reduce the chances of practicing illegally, and would furnish at one and the same time both the machinery and the money needed for limiting the illegal practice of dentistry. I am prepared to present further argument if needed.

DEFINITION OF DENTISTRY.

We have seen the course to be pursued when the dental inspector calls upon a licensed man who has failed to register. We have now to consider his course when he enters the place of a man who cannot show a license for himself or for his assistants. It must be the legal right of the dental inspector to demand the exhibition of a man's license, failing which he should be liable to immediate arrest. At present the burden of proving that a man arrested has actually practiced dentistry lies with the prosecution, and the law has so protected the accused with technicalities, and judges are so little conscious of the seriousness of the offense, that it is most difficult to convict the first time, and well-nigh impossible to convict of a second offense. This is so true that a large proportion of the men who have been convicted, and so reported to this society, are still in practice; and it is this glaring fact that leads men to believe that these men who have once been convicted, who have not since qualified legally, and yet who are still in practice, must in some way be receiving immunity by the payment of graft. This is not legal evidence, but it is ground for a very logical suspicion.

It follows, therefore, that in some way these technical protections must be removed. I believe the remedy may be found in a definition of "legal practice of dentistry," in such terms that even the presence of a man in a room where there is a dental outfit would suffice for his arrest, the burden of explanation of his presence and his need of such an outfit being upon him. The definition of dentistry proposed in the law recently before the legislature is a great improvement upon any that we have heretofore had, but by studying all the definitions in the statutes of other states, I am sure that even this may be improved. The law should be so worded that a real offender may be easily arrested and convicted, and I am sure this can be done. If not, then it follows that the illegal men have more brains than the legal men.

REVOCATION OF LICENSE.

But our law should not stop with an attack upon the illegal practitioner. We need more drastic treatment of the legal man who employs, safeguards, and trains the illegal man. We already have in our law a rule that such men are liable to have their licenses revoked, yet I am credibly informed that only two such revocations have occurred, notwithstanding the fact that often in court the legal man comes forward and testifies that he is the employer of the accused. The remedy for this is a more rigid enforcement of this revocation clause. If ten or twenty licenses were revoked because of the employment of unlicensed assistants, there is no doubt that practitioners would be less willing to hire these men —saving a few dollars at the risk of losing their licenses.

THE CONDUCT OF DISTRICT SOCIETIES.

I have said that the conduct of societies is rightfully a matter for legal restriction. A fatally erroneous idea now prevails in our district societies to the effect that they are private dental clubs with social rights. Such is not the case, and should not be the case. If any of us desire to form dental societies for special purposes, and with social distinctions, it is our legal right to do this. But the highest duty of the district society should be, not to erect a barrier of ethics to keep men out of membership; the barrier should operate only to keep men in. In other words, a great service may be rendered to the people if we would throw open our doors to all legal practitioners, because all legal practitioners should have the advantage which the district society should afford in providing post-graduate teaching both in practice and conduct. Thus we should only ask the applicant for membership, "Are you a legal practitioner?" If he be, he should be permitted to enter. Having once signed the by-laws, however, he should be compelled to abide by them. Our committees on ethics should cease to be ornamental appendages to our stationery. They should comprehend that they have a real duty to perform. Let us suppose that each society member could have a printed certificate of membership which he could hang in his waiting-room, and which could serve as an announcement to his clients that he is not only a legal practitioner, but an ethical practitioner. Then suppose that a member were proved guilty of an infraction, his membership suspended or revoked, and his certificate taken away from him. Would not such a certificate be a business asset as well as a moral aid to a better conduct of the man's practice? I think so. Moreover, I think that in the past our state and district societies have not been sufficiently awakened to their duties. Let us, with the contemplated reorganization, arouse ourselves from this lethargy, and let us extend the hand of fellowship and brotherly love to our neighbors, and let us say in a Christian spirit, "Come thou and abide with me, that we all may be better men, better citizens, better dentists."

PYORRHETIC INSTRUMENTATION.

By WM. CRENSHAW, D.D.S., Atlanta, Ga.

(Read before the Piedmont Dental Society, Anderson, S. C., November 25, 1912.)

IF one should get together the various forms of pyorrhetic instruments on the market today, certainly the exhibit would—to the uninitiated, certainly—seem to constitute an ample armamentarium. Indeed, as to multiplicity of instruments the real need has been far exceeded. While many are capable of doing good service—particularly in their originators' hands—yet the various patterns, forms, and sets in vogue have proved the interest of the stomatologist in the malady which he treats rather than furnished efficient surgical means for the work.

INSTRUMENTS WITH CUTTING EDGE OBJECTIONABLE.

The writer is prompted to offer this paper in the hope of pointing out some dangers resulting from the use of improperly designed instruments, with reference particularly to the essential feature of the instrument, its working point—instead of its cutting edge, for except for very limited application in special cases pyorrhetic instruments should not have a cutting edge, *i.e.* an edge that cuts into the cementum or other tooth structure with which we deal in treating this disease. The writer is aware that some stomatologists in the surgical treatment of pyorrhea prefer to plane the roots, in order to remove the cementum to a depth that will remove the embedded spores which penetrate, as has been claimed, into the depressions and canals of the cementum that were once occupied by the prolongations of the pericementum. But this practice has not been successful, according to the observation of the writer at least, and he therefore bases his judgment on the idea that the cementum should not be planed, but only freed from calculus deposits or fragments of necrotic pericementum, and otherwise cleansed and left as smooth as may be.

If it is necessary to leave pyorrhetic roots smooth and unirritating to the gum tissue which is to readapt itself to the root, then the instrument with beveled or sharp edge should not be used, because of the ease with which it cuts into the cementum, leaving pits and nicks difficult to smooth out, and therefore unfavorable for gum adaptation. More harm is done with beveled instruments, therefore, which are sharp, than with those that are essentially dull, because, even in dry, hard teeth, the keen-beveled or chisel edge cuts into the cementum. Again, the sharp edge constantly misleads, because it becomes engaged with undulations of cementum of the slightest prominence, causing the operator to apply force in order to remove what he thinks is a calculus deposit, while in reality he is forcing his instrument into cementum, and as a result nicks and notches the root in this effort. Only a dull-beveled instrument should be used, because the object is to dislodge deposits, and the dull-beveled edge will do this with less danger of cutting into cementum than a sharp one. Both practical observation and theoretical deduction lead to the conclusion that the beveled edge, with few exceptions, should be used.

INJURY TO THE CEMENTUM AND SOFT TISSUES TO BE AVOIDED.

The chisel-edge instrument, for instance, inclined at an angle of 23 to 25 degrees, as illustrated in Fig. 1, makes one realize at a glance how easily the root may be cut into when a chisel is forced against it at any point along its length, and when firm pressure is applied. The root is scarified in this way when the operator discovers as he

Fig. 1.

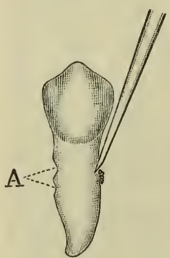


Fig. 2.

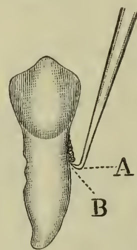
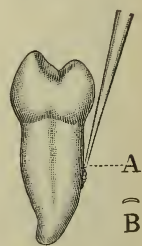


Fig. 3.



thinks a stubborn lump of calculus; but on finishing his work he leaves the scooped-out surface in about the condition shown at A, Fig. 1. Mistakes of this kind are made, and difficulties are created which are not easily overcome, in working at a point where the curvature of the root is known only by the tactile sense.

Take the action of the type of pyorrhetic instruments known as the plane (Fig. 2), which is less harmful than the chisel as far as injury to the root is concerned—but observe the distance from A at the back of the plane to the cutting edge B, and compare it with the thickness of the blade at the point of the right-angle edge instrument (A, in Fig. 3). It will be observed that the difference in the thickness of this form is hardly a third of that in Fig. 2. The clumsiness of the latter, and the unnecessary bulk at the point of such instruments cause unnecessary gum laceration.

In offering these instruments the writer is prompted by the need for such as will remove calculus deposits and other abnormal substances, and perform the work without injury to the root and with as little injury to the soft tissues as possible.

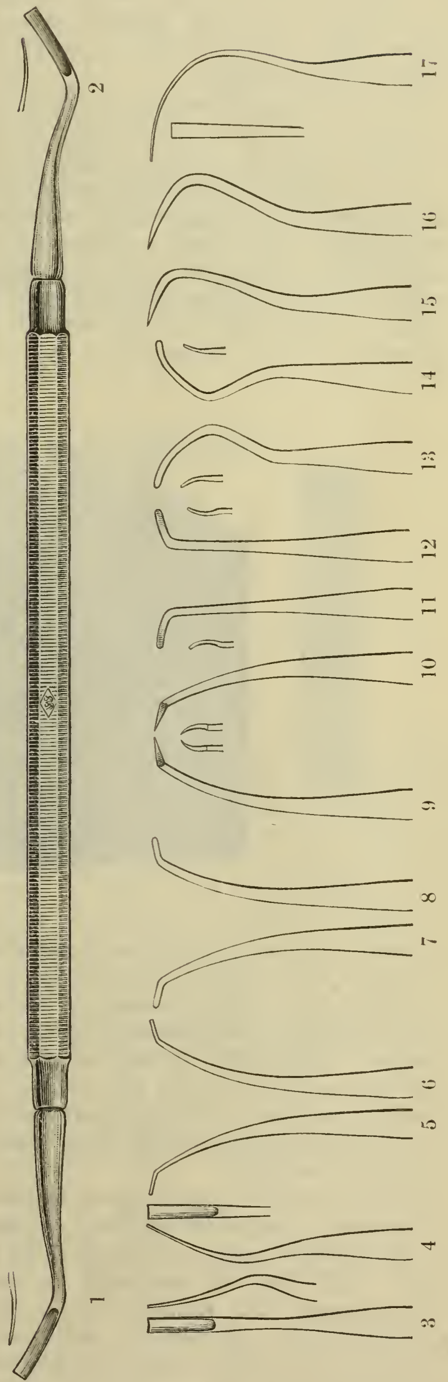
ADVANTAGES OF THE INSTRUMENTS DESCRIBED.

Bends of the shank are employed in some of these forms that are familiar because used in other sets of instruments; but the working end of the instrument is the essential point which the essayist is concerned about, viz, the right-angle working edge. (See Fig. 3, A, and B, the end view of same.) This form of point is, in nine-tenths of pyorrhea cases, the proper one to employ. The exceptions are instances in which no harm results from the use of beveled edges, owing to the position in which they are used and the application of the point.

Fig. 3 shows the application of a right-angle edge instrument. Theoretically and practically, it is impossible to injure the root with a right-angle edge working under the pressure necessary to dislodge salivary deposits, because, while such an edge will lodge and engage against deposits of whatever kind, it will not, under such pressure as is necessary to remove these, cut into cementum.

A right-angle edge, when clean and made of fine steel, will engage and break away scales of calculus, if the edge is applied with firm pressure and at the proper angle; it remains in working order longer than an acute or beveled one, and can scarcely be made to injure the cementum, because of the lack of the degree of acuteness of the cutting or beveled edge. It has two working edges on some forms and four on others, and works effectively at the front and back of the edge in almost all of the designs embraced in the list offered.

The new forms are made almost entirely in pairs of rights and lefts, and



The Set of Instruments.

mounted in double-end handles, so that whatever the form of instrument wanted, the right one and its alternate are together when the respective form of instrument is selected.

As long as pyorrhea specialists differ so widely in regard to their aim in instrumentation—viz, either simply stripping the roots of concretions and shreds or patches of pericementum, or using instruments which shave or plane off the cementum—so long must the armamentarium of the pyorrhea specialist be multiplied. The writer has seen enough of successful work accomplished by the removal of accumulations and cleaning the roots, in contradistinction to the chiseling and planing process, to induce him to advocate and practice the former method. The outfit should be simple, the instruments as few as possible in number, and of such design as to cause no more lacerations of the gum tissue than are inevitable.

Another desideratum in pyorrhetic instruments is delicacy of form, because of the delicate nature of the work to be done. The field of operation is close and cramped, the tissues delicate and sensitive, and instruments are needed that do not stretch, tear, or lacerate. Big instruments hinder and obstruct the view, and defeat the end to be accomplished.

DESCRIPTION OF PROPOSED INSTRUMENTARIUM.

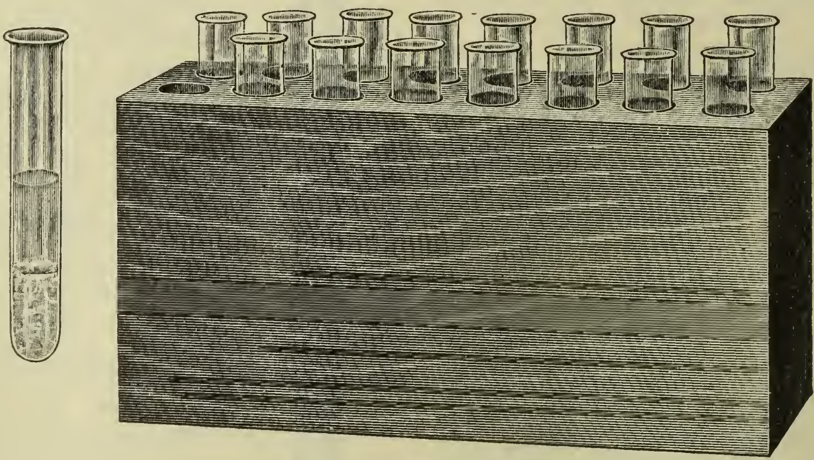
Nos. 1 and 2 are R and L instruments, adapted to scaling around lower incisors —anterior and posterior.

Nos. 3 and 4, adapted to the rounded edges labially and lingually of the lower incisor roots.

Nos. 5, 6, 7, and 8—two pairs—applicable between incisor roots and in the crotches of upper molars.

Nos. 9 and 10, R and L, are applicable at various points, but specially to the crotches of upper molar roots.

Fig. 4.



Nos. 11 and 12, R and L, apply to the roots of upper central incisors, canines, the palatal roots of upper molars, and other points.

Nos. 13 and 14, R and L, have beveled edges, and are adapted to the crotches and concave surfaces of the crotch side of the lower first and second molar roots.

Nos. 15 and 16, single instruments, applicable back of upper and lower third molars and between the teeth throughout the arch.

No. 17, to be used back of last molars —above or below.

PRACTICAL INSTRUMENT HOLDER.

Fig. 4 represents a holder which may be attached to the side of or placed on the bracket table; it is provided with test-tube bottles or phials of one-half inch diameter, and from four to five inches long.

These phials are provided with a cushion of cotton roll pushed to the bottom, over which is poured a gill or so of grain alcohol. One handle, carrying two instruments, is placed in each phial.

This contrivance for holding the instruments places them within easy reach of the operator, one point being placed upright so as to be seen, and so that the form of instrument wanted can be readily found, while the other point is resting in the phial on the cotton roll cushion, which prevents dulling the points by contact with the glass. Each instrument is sterilized, as often as it is used, by being returned to its place in the holder, and in this way confusion is prevented, and the table is left clear for other necessary appliances.

The holder shown provides sixteen phials, which hold sixteen single-point instruments, or thirty-two instruments in double-end handles.

THE NON-COHESIVE GOLD FILLING.

By A. W. SWEENY, D.D.S., Baltimore, Md.

(Read before the Academy of Stomatology of Philadelphia, at its regular monthly meeting, May 27, 1913.)

"Prove All Things: Hold Fast That Which is Good."

THE first three words of that well-known maxim seem to have appealed strongly to many of the profession who have been less attentive to what immediately follows.

OVER-ENTHUSIASM REGARDING INNOVATIONS.

The eagerness with which such dentists seized upon the many new departures and wonderful discoveries heralded as destined to revolutionize the practice of dentistry has betokened an attitude of hopeful expectancy, awaiting the advent of something which should render that practice easier and more remunerative; and the persistence with which those innovations have been exploited, despite many disastrous failures, has furnished a striking illustration of optimism and enthusiasm; but how, during all that search for something new, anything of long-known and demonstrated usefulness should have been largely forgotten is difficult to realize. Optimism and enthusiasm are admirable qualities, which have made greatly for the world's advancement, but there are other worthy qualities, among them prudence, caution, and conservatism. The spirit of modern progress is splendid, but there is still need for the wisdom of the ages.

Besides the tendency to rush into doubtful experimentation, we have also shown a tendency toward the over-employment of some standard resources. The vulcanite plate and the gold shell crown have both been shamefully over-exploited. The cast gold inlay now claims a large share of our attention, and it, too, is being greatly over-utilized. Kindly do not misunderstand your essayist. He is *not* the enemy of the inlay; he is its friend, and would but raise his voice in warning, in the hope of contributing some trifle which may assist in saving it from the unwise over-enthusiasm of many, who, though now its friends, are likely to become its bitterest enemies.

The opinion of Dr. Taggart regarding the appropriate use of the inlay should be entitled to respect. Before placing his casting appliance on the market, he stated that he had been fairly flooded with little scraps of wax from members of the profession, with requests to make inlays to go into cavities which could have been much better filled in the ordinary way. In the face of such testimony, what are we to think of the recommendation of some that we relegate our pluggers to the rubbish heap, and the statements of others that they rarely fill cavities with gold save by casting? Yet there is scarcely a doubt but that it has become the practice of many not only to allow the inlay to practically usurp the place of the gold filling, but also to permit it to encroach largely on the field long successfully occupied by amalgam.

PROVED AND TRIED USEFULNESS OF AMALGAM FILLINGS.

About ten years ago, a gentleman, now an enthusiastic advocate of the inlay, published an account of how he had treated and filled two large approximal cavities in molars, extending beyond the gingival margins and upon the occlusal surfaces of the teeth. He filled those cavities with amalgam, and stated his belief that he had rendered better service than if he had made use of gold shell crowns.

Knowing the care and skill which distinguish that gentleman's operations, your essayist does not hesitate to express his belief that, assuming the patient to have survived in the enjoyment of fair health, those amalgam fillings are now protecting the teeth perfectly, and will do so indefinitely. Most probably that man would fill two exactly similar cavities tomorrow with inlays, but why should he resort to the more difficult and expensive method unless absolutely convinced that it would give the better service? Far be it from your essayist's purpose to advocate anything which might tend toward a lowering of our fees, since he has long regarded them as too low already, save in favorable instances; but we must face conditions as they exist, not as we would prefer to have them, and as we have very eminent authority for the statement that we have the poor with us always, there must continue to be a great demand for an efficient service which can be easily and cheaply rendered. Furthermore, it will sometimes happen, even when the financial resources of the patient are most abundant, that the simpler service may be preferred. Twenty years ago your essayist was asked to fill a large distal cavity in a lower molar for a patient who was unquestionably a multi-millionaire. A gold filling had failed. All conditions were favorable, so a new gold filling was recommended; but the patient objected, saying—"That tooth was filled by Dr. Blank, a very eminent man, yet it has only lasted about two years. Now I would rather have you fill it with amalgam; it can be done much more easily and quickly, and very possibly it may last longer than the other filling."

The amalgam filling was inserted, and the patient carried it to his grave some twelve years later. In your essayist's own household there is a large amalgam filling on the distal surface of a lower third molar, extending well over on the occlusal surface. The operation did not require thirty minutes, but the filling has protected the tooth perfectly for over thirty-five years. Will someone engage to fill a similar cavity with an inlay in so short a time, and will anyone confidently predict a longer term of service?

At a health resort in the Rocky Mountains, your essayist had the pleasure of examining the teeth of a gentleman of New York, who had been a patient of Dr. Marvin's. There were no fillings in the anterior teeth, but a number on the distal surfaces of the bicuspids and the approximal surfaces of the molars, some of large size. They were simply ideal; not a trace of inequality could be detected as the explorer passed from the surface of the enamel to the highly polished surface of the metal, and your essayist realized that Dr. Marvin had displayed rare skill and consummate judgment, and that better service could not have been rendered—yet every single filling was of amalgam. Motives of economy could scarcely have influenced the choice of that preparation. The appearance and manner of the man and the fact of his stopping for pleasure at an expensive resort more than two thousand miles from his home tended to negative that conclusion. He stated that the fillings had been in service for a number of years, and had afforded the utmost satisfaction.

Such cases are not phenomenal; you have all seen similar ones repeatedly. They are merely cited in evidence of the fact that in the long familiar and often maligned amalgam we have a preparation of almost inestimable value, which should not be lightly thrown aside in favor of something else as to the extreme permanence of which we are not quite so certain.

DIFFERENT CASES REQUIRING DIFFERENT METHODS OF GOLD FILLING.

But a vast number of cavities must be filled with gold, therefore it is of the utmost importance to determine correctly which is the best preparation of that metal, and which the most appropriate method for its employment. Candidly, there is not, there cannot be, a single best method or preparation for all cases, just as there cannot be one best medicine for the treatment of all disease manifestations. The very quality which may constitute the cardinal virtue of a given one in a given case may prove its most glaring vice when the effort is made to use it inappropriately.

In the discussion of a paper, an operator stated that he had recently filled two large approximal cavities in molars with inlays, and that the two operations, complete, had required about two hours, whereas gold fillings would have required fully four hours.

SPEED IN GOLD FILLINGS AS EVINCED BY DR. BONWILL.

Twenty years ago the late Dr. Bonwill presented a patient at a meeting in Baltimore for whom he had made a very large number of gold fillings. Besides the incisors and canines, nearly every approximal surface of the bicuspids and molars contained a filling, many of very large size. The fillings were magnificent, fully equal in contour and finish to the highest class of inlay work. After all had examined them and praised them enthusiastically, Dr. Bonwill remarked casually, "Gentlemen, I filled all those teeth in one day." And when that statement was received with looks and expressions of incredulity, he added, "Certainly; why not? I would not ask more than fifteen or twenty minutes to make the largest of them." What would the gentleman who prided himself on the completion of his two large inlays in two hours have thought if he could have seen Dr. Bonwill fill two correspondingly large cavities in so splendid a manner in from thirty to forty minutes?

Doubtless some will reply, "Ah yes, but there have been very few Bonwills." And that is true; but not even the skill and genius of Bonwill would have sufficed for the attainment of such results, if he had not possessed a very broad and thorough knowledge of the art of filling teeth with gold, and it was that knowledge, added to his vast skill and enthusiasm, which enabled him to accomplish such prodigies. Furthermore, as it is conceded that what *has* been done *can* be done, if we would profit by that knowledge and use the same preparations as he used them, we could accomplish substantially similar results. Like so many more of the great men whose genius has shed luster on our calling, Dr. Bonwill has gone over to the great majority, but his patient is still living, and there is a gentleman in this audience who will tell you that those great gold fillings, made with such wonderful ease and celerity, are still in position, protecting the teeth perfectly, after the lapse of over twenty years. Why, then, the constant insistence that the use of the inlay saves so much time and discomfort? In some instances it does, surely, but in others it effects the reverse. A gentleman told a member of your essayist's household that he had just had a tooth filled with "one of those new-fashioned melted gold fillings," and expressed the hope that it would prove very durable, as the operation had been excessively painful on account of the cutting necessary to make room to get the filling into place! Another asked to have a distal cavity in an upper bicuspid filled with an inlay; but when it was prepared it was seen that considerable additional cutting would be required. The cavity chanced to be quite sensitive, and the patient objected, so it was filled in the ordinary way.

PRESENT PREPONDERANCE OF THE USE OF COHESIVE GOLD; LIMITATIONS OF THAT MATERIAL.

For some reason or reasons, which your essayist frankly admits his inability to fathom, the great mass of the profession have long confined themselves strictly to the cohesive preparations of gold. Conversing with a salesman for one of the large supply houses, your essayist expressed the belief that if a canvass were made of all the dental offices in Baltimore, in probably seventy-five per cent. no gold for filling would be found save some pattern of cohesive pellets. The salesman fully concurred in that opinion, with the proviso that he would say *ninety* per cent. of the offices. Now, a cohesive pellet is a thoroughly suitable and convenient preparation of gold for certain cavities, but a more inconvenient and unsuitable preparation for some other cavities could scarcely be devised. What wonder is it, then, if those who have steadily restricted themselves to that single preparation should have met with an excessively heavy percentage of failures? In an uncomplicated, readily accessible cavity, a man of very mediocre attainments can make a thoroughly reliable gold filling with cohesive pellets alone; but as the location of the cavity is found less accessible, conditions will prove different, and in many distal cavities of bicuspids and molars, notably when the crowns of the teeth are long, the difficulties and dangers will prove sufficient to tax the resources of the most skilful manipulator, and it is the belief of your essayist and others that very much of the great popularity of the inlay is traceable to the many disheartening failures long encountered by those who have been trying to treat those difficult cases with such unsuitable preparations.

INJUSTICE OF THE ABANDONMENT OF NON-COHESIVE GOLD FOIL.

But we all know that a half-century and more ago there were, relatively speaking, many men in the profession who could and habitually did fill just such cavities with gold, with very gratifying success. Were those men so vastly our superiors in manipulative dexterity that, with the few and crude appliances which they possessed, they could readily accomplish something which we, despite our vastly improved and amplified equipment, cannot equal? The proposition is unthinkable! They achieved their successes because they used a preparation admirably suited to their needs.

The statement has been attributed to someone that gold foil is "an antiquated and obsolete preparation for filling teeth." Antiquated it unquestionably is, as it is probably the earliest known preparation of that metal used for that purpose. Obsolete it has become in the practice of a vast number of the profession, but, in permitting it to become obsolete, many have done so to their own disadvantage and to the incalculable detriment of their patients. It was that antiquated preparation, gold foil, in its most antiquated form, the non-cohesive foil of our forefathers, which enabled them to achieve their highly satisfactory results, and if we would but lay aside some of our preconceived notions and use that same foil substantially as they used it, we could not only equal those results but could really go far beyond their most brilliant achievements. We need not confine ourselves to the flat surfaces and wide-open spaces which were the objectionable features of many of their operations; we can do far better, as has been demonstrated for years in thousands of instances. While the great mass of the profession have long been striving to force our most excellent cohesive preparations to do duty under conditions which have caused their very excellence to constitute the heaviest handicap to their successful employment, we have always had among us men of great skill and unquestionable standing who have steadily upheld the merits of non-cohesive gold foil, that splendid antique handed down to us as a precious heirloom by our forefathers. A half-century ago its merits were most ably supported, among others, by Drs. Maynard and Cockerille in the nation's capital. Much more recently, they were splendidly demonstrated by the brilliantly gifted Bonwill in this city, and until but little more than two short years ago those merits were steadfastly upheld, like a bright beacon light, by the lamented Harris in Baltimore, almost until the day when his hands grew cold in death, and it is with mingled feelings of pride and reverence that your essayist now invites your attention to the operations which serve so brilliantly to illustrate his paper, as examples of the highest point of attainment in the art of filling teeth with gold. He offers them as a silent, but splendidly eloquent message of good cheer and encouragement from beyond the grave, pointing out to all a safe and easy pathway to an assured success.

ADVANTAGES OF NON-COHESIVE GOLD FOIL.

Some of the useful properties of non-cohesive foil are strikingly illustrated by the occlusal surface fillings herewith submitted. [The paper was illustrated by fillings in the teeth of Dr. Niman. During the discussion a tooth containing a gold filling by Dr. Cockerille, in perfect condition after almost forty-eight years of service, was passed around, and as there was a later-developed cavity, it disproved the claim that such teeth remain immune to caries.] We have been repeatedly told that fillings of non-cohesive foil would be rapidly worn out on such surfaces. The most recent of those fillings have been in service for over five years, and your essayist is prepared to testify that not a particle of anything but Abbey's non-cohesive gold foil entered into their construction. The large contoured approximal fillings have been in service for seven years, and are mainly of the same foil. They serve also to upset the theory that non-cohesive and cohesive gold should not be used together, as there can be no homogeneous union between them. Some will remember the inquiry made years ago thus—"Why does a countryman wrap a rag around the bung before he drives it into the bunghole of his cider barrel?" The answer was—"Because he does not want to lose any cider." The impossibility of homogeneous union between the rag and the bung or with the periphery of the hole does not trouble him; he knows that the soft, pliable folds of cloth will be so tightly compressed that there can be no leak, so he goes to market with an easy mind and a clear conscience. And so it was when our beloved teacher performed those really remarkable operations. Finespun theories did not matter. He started with the old, familiar non-cohesive foil of Abbey, driving it to a thoroughly close adaption along the gingival margins, against the lateral walls, and freely into the occlusal portions of the cavities, and at the point which his mature and unerring judgment showed to be appropriate, he laid aside his non-cohesive foil, took up his cohesive preparation, and, driving it to an absolutely secure anchorage—homogeneous or mechanical, as you may prefer—in the masses of gold already in place, he built out the contours, rounded up the knuckles, and so completed the masterpieces which you have seen. And if it be true that the realization of work well done, of duty thoroughly fulfilled, constitutes the highest recompense of labor, surely he must have been enabled, at the conclusion of that splendid service, to sit down to the enjoyment of a munificent reward. Some practitioners who know the value of non-cohesive foil do not avail themselves of its advantages. Various excuses are offered. An intimate friend told of having watched the filling of an exceptionally difficult distal cavity in a lower third molar by a colleague who used Abbey's non-cohesive foil. The cavity was filled with ease, in but a fraction of the time which the narrator would have required to fill it with cohesive gold, and for years the filling rendered splendid service. Asked why he did not at once accustom himself to the use of non-cohesive foil, he replied—"Oh, I have always been too busy to spare time to learn new methods." Yet who but the busiest practitioner can so ill afford *not* to spare the time to learn all reliable methods which effect a substantial saving of time and labor?

MODE OF INTRODUCTION OF NON-COHESIVE GOLD FOIL.

Some imagine that the use of non-cohesive foil requires the expenditure of a vast amount of very fatiguing effort, whereas exactly the reverse is true. That idea prevails among some of the pupils of the late Professor Harris, whose college days date back for a third of a century. Professor Harris was a very tall man; his hands were large and gifted with tremendous power, and in his earlier days he used a great deal of heavy hand pressure, and many who then watched his demonstrations, while greatly impressed by his brilliant results, were discouraged by the thought that what was, for him, so easy, would be impossible for a man with hands of ordinary grasp and vigor. In his later years, however, he changed his method greatly, and nearly all the gold which he used was carried directly into the cavity and condensed with the old familiar automatic mallet, which even a girl's delicate fingers can manipulate. His method was strikingly shown in the case of the occlusal surface fillings already noted. A strip of gold was carried to the distal side of the cavity; several short folds were doubled over and pushed in, standing upright beside it; then, under rapid blows of the mallet, more gold was driven in, until, in a few minutes, the cavity was most substantially filled—and there was not the least suggestion of roughness in handling the patient.

LESS OBJECTION TO THE AUTOMATIC MALLET WHEN USED WITH NON-COHESIVE GOLD FOIL.

Objection has been made to the automatic mallet on the ground that its blow is most disagreeable. That is purely an individual matter. Our patients object to many of our appliances, and the automatic mallet would scarcely come under more general condemnation than would the engine bur, the disk, the separator, or the polishing strip; indeed, aside from the forceps, most patients would pronounce the bur the most objectionable of all our appliances. Certain it is that your essayist has sometimes been asked to substitute the automatic for some other style of mallet, and many of you have probably had the same experience. It is also a fact that the blow of a mallet on non-cohesive foil is not nearly so sharp and resonant as is the same blow upon cohesive gold, and while that fact will be seized upon as evidence of the superior density attained with the cohesive preparations, the fillings submitted herewith [demonstrating] do not show any discoverable lack in that direction.

Furthermore, it is now some years since a gentleman of Baltimore won an elaborate supper on a wager with a gentleman of this city by making a filling of Abbey's non-cohesive foil in a steel matrix, entirely by hand pressure, which, after an exhaustive scientific test, was declared to show "greater weight, greater specific gravity, and greater freedom from air-spaces" than did the cohesive gold filling of his competitor made in the same matrix with the help of a mallet.

THE OLD OFTEN THE BEST.

From the foregoing, the conclusion would seem but logical that many could, with great profit, spare sufficient time from their search for novelties to familiarize themselves with the properties and use of that preparation which was for so long the pride and main reliance of our forefathers. None need fear that the adoption of such a course would imply a retrogression, for it is not alone by keeping in touch with the best of what is new, but also in maintaining a firm grasp upon everything which has abundantly proved its usefulness in the past, that we may hope to realize in full the true spirit of progressiveness.

Because something recently introduced may prove highly useful, we must not jump to the conclusion that it should supersede everything long similarly used with great success. Though the trend of modern progress is ever forward, we are often forced to realize that some of our best recent achievements do not equal some of the triumphs of an earlier period. Notably is that true in the field of art, though illustrations are not lacking elsewhere. The ablest sculptors of our day have not equaled the sublime creations of their illustrious colleagues among the ancient Greeks and the Italians of the sixteenth century. No painter of our time has given us anything quite comparable with the masterpieces of Raphael and Correggio, of Titian and Rembrandt, Jacob Ruysdael, Holbein, Velasquez, and many others. Though the modern piano has utterly eclipsed the old-time spinet and harpsichord, and though in technique and tone the world has not seen the equal of such men as Liszt and Rubenstein, Paderewski and Mark Hamburg, no living composer has written anything which classes with the great works of Beethoven, of Mozart, Schumann, and Chopin, while in the field of the music drama the world is still waiting for the worthy successor of Wagner; and while the piano and its great exponents have scored such signal triumphs, no contemporary violin-maker has equaled a Stradivarius or an Amati, and no wizard of the bow now before the public will claim to be the rival of Paganini. The modern express train and the giant ocean liner are immeasurably ahead of the stage-coach of our ancestors and the galley of the ancients. The high-powered automobile has utterly outstripped the horse, and can easily distance the stoutest thoroughbred, yet there are no indications that that noble animal will be permitted to become extinct or to revert to the type of his diminutive prehistoric ancestor; and though by reason of certain very narrow and ill-advised legislation, notably in our Empire State, the thoroughbred has suffered a sad diminution in value, in England and some other countries where broader and more enlightened ideas and cleaner politics have prevailed, he is held in universal admiration, and the sport of kings still flourishes as of yore.

The foregoing random illustrations should remind us that, while we do well to remain alert and watchful for substantial improvements, we should hold on with a firm and unrelaxing grasp to everything which long experience has proved to be good.

RECENT INDORSEMENTS OF GOLD FOIL FILLINGS.

We have long been prone to mount hobbies, which we have often ridden far afield, to our detriment and humiliation, but happily a saving grace has always brought us back to safer and saner methods. Latterly we have again been indulging in that dangerous propensity, and many have gone "joy-riding" with the gold inlay, to the peril of all participants in those excursions. Happily, though, again there are signs of a better state of things; the breakneck speed has been reduced, and we may confidently expect, ere long, to see those venturesome riders turning again toward the safe and well-beaten highway. Some recent reminders have pointed clearly in that direction. In the DENTAL COSMOS for December 1910,* the gifted editor, commenting on a clinic held for the purpose of testing the relative efficiency of different styles of mallets for condensing gold, sees evidence that the making of gold fillings is not soon to be numbered among the lost arts. By an interesting coincidence, in the same issue of

* See DENTAL COSMOS, 1910, vol. lii, p. 1406.

that well-known journal, in the opening lines of his paper on the gold inlay, Dr. J. V. Conzett says:*

> In the opinion of the writer, there is no better filling than a good gold foil filling. Gold foil in the hands of the man who is an expert in its use is a material unsurpassed for stability and permanence; fillings made with it have demonstrated their perfection by the only test that is a fair one, the test of time. We *know* what gold foil will do in the hands of the master workman; therefore it requires no apologies at this late day.

About the time the above appeared in print, it became known through the dental-supply trade that the surviving partner of the old house of Charles Abbey & Sons, whose non-cohesive foil had long been the standard among users of the preparation, had retired from business, and that his product was no longer obtainable. By a few that information was received with feelings akin to consternation; but soon foil of similar properties was in the market, and, in the summer of the year 1911, the S. S. White Dental Mfg. Co. joined in the effort to perpetuate the excellent qualities for which the product of the old house of Abbey was so long and so justly famous. That latter fact is one about which there can be no difference of opinion, for all must realize that a house of such great and varied experience in catering to the wants of the dental profession may be absolutely relied upon not to waste its capital and jeopard its reputation by placing on the market any article which its management regarded as not only antiquated, but also obsolete.

As an additional evidence that the views herein expressed are not merely the unsupported ideas of your essayist, but that they are shared in by some whose opinions are entitled to respect, you will find among the writings of Prof. S. H. Guilford a passage wherein he likens the effort to fill a cavity with cohesive or non-cohesive gold to the attempt to stop a bottle with a plug of hard wood or with a rubber cork. He says that it *can be done* with the hard wooden plug, but can be much more easily and certainly done with the rubber stopper.

* See DENTAL COSMOS, 1910, vol. lii, p. 1339.

TIME AND LABOR REQUIRED FOR GOLD FOIL FILLINGS NOT OVERTAXING.

Though special mention has been made of Drs. Maynard, Cockerille, Bonwill, and Harris, men who stood as giants among their colleagues, their example should prove an inspiration rather than a discouragement; for, while the gift of genius has been vouchsafed to but a few, the capacity for honest work is the endowment of the many. A man of very modest ability can make a great number of most useful fillings with cohesive gold, if he will exercise proper care and patience, but in three-quarters of those cases he can do better work with far less labor if he will use non-cohesive foil; for he can dispense entirely with retaining pits and deep undercuts, largely with the rubber dam, and, if he prefers, with the mallet also. The constant insistence upon the great saving of time and discomfort effected through the use of the inlay must come chiefly from those who have forgotten that large gold fillings were most successfully made over a half-century ago, while little was said about their proving such a tax upon the nervous resources of either the operator or the patient. Many do not realize that an eighth-ounce book of non-cohesive foil can be thoroughly packed into a cavity in from ten to fifteen minutes, and while that feat will call for the services of a master, if one less highly gifted should require from twenty to thirty minutes for its accomplishment, it still could not fairly be termed a fearfully taxing, nerve-racking experience. The inlay is a splendid thing; in its proper place, it is well-nigh ideal, but its legitimate field is by no means so wide as many seem to have imagined.

FINAL APPEAL FOR THE NON-COHESIVE GOLD FOIL FILLING.

Gentlemen, whatever may be its deficiencies and limitations, your essayist feels a firm and positive conviction that his paper contains food for your very serious thought, and that it is worthy of something more than your passing and casual attention. We all recognize the obligation resting upon us to render for those who intrust themselves to our hands the best service of which we are capable. At the same time we realize the duty we owe to ourselves and those dependent upon us to neglect nothing which may assist us to conserve our time and lighten our labors, so long as the attainment of those ends shall not cause a lowering of the standard of the services which we render. Often it has appeared a difficult problem to reconcile those seemingly conflicting claims; but how freely, how joyfully may we embrace the opportunity held out in a vast number of instances, not only to effect a notable saving of our time and lightening of our labors, but also to make our services of greater and more enduring value! Surely that prospect must prove most alluring; its consummation must constitute a goal toward which all may strive with great zeal and earnestness, knowing that, in its realization, we shall accomplish a great and worthy work indeed.

And, if it be true that in another and a higher sphere of existence those who have gone on before us retain a consciousness of what takes place here below, possibly some may find an added incentive to the prosecution of that good work in the thought that they may be resting under the approving smiles and sharing in the benedictions of the great forefathers of our profession and some of the most illustrious of their successors—among the latter who have recently left us, one of the ablest, one of the kindest, one of the most charming and lovable men whose presence among us has served to grace and ornament our calling.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

THE ARCHOGRAPH: AN INSTRUMENT FOR DETERMINING AND RECORDING ARCH VARIATIONS AS APPLIED TO TOOTH MOVEMENTS.

By ROBERT H. W. STRANG, M.D., D.D.S., Bridgeport, Conn.

(Read before the Alumni Society of the Angle School of Orthodontia, at its seventh annual meeting, New London, Conn.)

WITH the advent of the "new appliance," so recently introduced by Dr. Edward H. Angle for the treatment of malocclusion, comes a marked demand for an accurate method of determining and recording arch changes in their relation to tooth movement. Previous to the use of this form of appliance the force was transferred from arch to tooth by means of the ligature, so that it was possible to gage its application with a fair degree of accuracy. With the "new appliance" the attachment is direct, and any change in the curve of the arch or in the angle of the pins must result in tooth movement, and the question is—"In what direction, and how far?"

THREE FACTORS TO BE DETERMINED FOR SUCCESSFUL EMPLOYMENT OF ANGLE'S "NEW APPLIANCE."

Three facts must be known before accurate and uniform results can be obtained. First, the direction of the force applied; second, the effect of this force at the point of application and at all other points, including especially the anchorage; third, the amount of force. Without a means of answering these questions, this wonderful little appliance is bereft of much of its value as an instrument for scientific tooth movement.

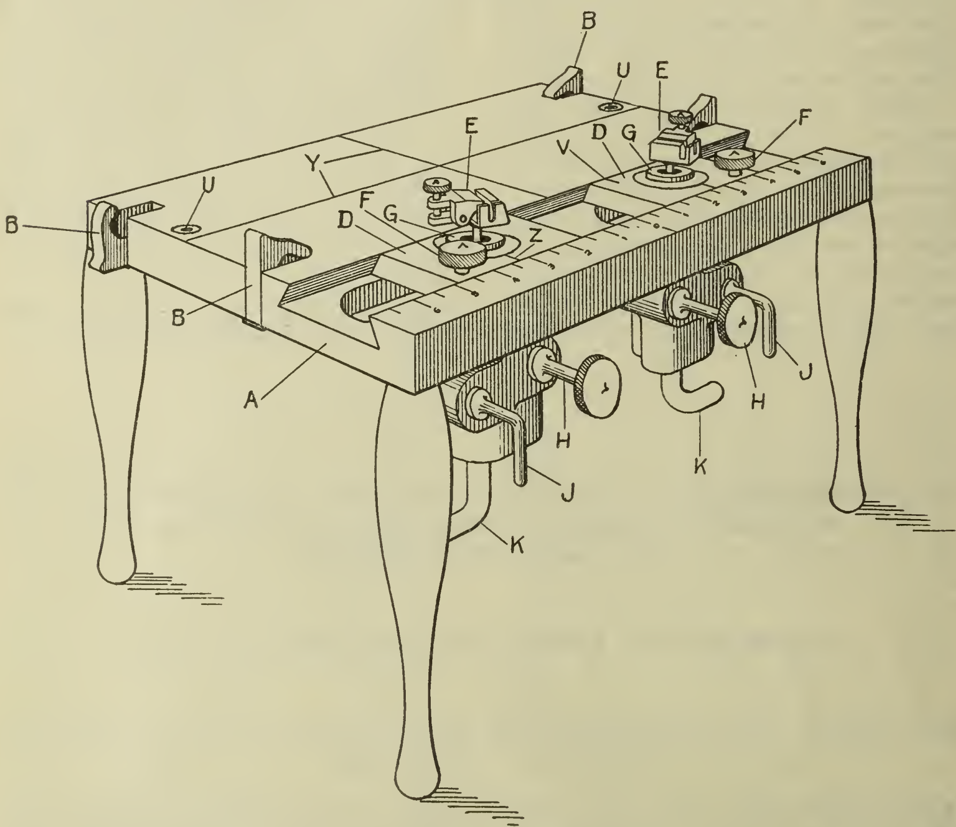
After much experimenting, the instrument that appears in the illustrations here shown, and which we will call an "archograph," has been devised for this purpose. Through its agency we are able to determine and record accurately the direction of force as produced by changing the shape of the arch wire or by bending the pins, and the effect of such force upon each tooth attached to the arch and upon the anchor teeth. We are further able to judge the amount of force by the extent of these changes as shown upon our record sheet.

DESCRIPTION OF THE "ARCHOGRAPH."

A brief description of the instrument is now in order.

This consists of a stage A, Fig. 1, mounted on four legs in table-like effect. For convenience of description, we will designate the side corresponding to the upper part of the illustration as the *top* of the instrument; its opposite side as the *base;* the two remaining sides as the left and right sides respectively. On the latter two sides are spring clasps B, for holding the recording paper in position. In the center of the right and left sides and in the center of the top are placed scratch-marks Y,

Fig. 1.



to be used as indicating lines. The recording paper is to be correspondingly marked, so that it can be replaced in the same position at any subsequent time.

At the base of the stage are the two slides D, moving freely to right and left, and locked by the set-screws F. These also carry scratch-marks, V to record on the paper the position of the slides, and Z to measure distances on the millimeter scale below the slides.

Each slide has attached to it a telescoping tube G, which can be raised or lowered to any desired height by means of the screw H, and locked by the lever J. Surmounting these tubes are the chucks E, of such design that they will hold any of the various styles of anchor tubes used in the different forms of appliances. Each is attached to its tube G, by means of a ball-and-socket joint, which can be set when at the proper angle by turning the lever K.

Fitting upon the stage A is the removable platform R, in Fig. 2, which is held in position by the dowel pins W, fitting into the sockets U, in Fig. 1. On R are placed six pointers S, Fig. 2, which have three adjusting screws L, M, and N. The position of these indicators on R is subject to variation according to the case in hand, by using any of the screw-holes O as desired. Each pointer has a hinge joint at P, so that the end can be lifted away from the top of the little pin on the arch after adjustment has been made.

FIG. 2.

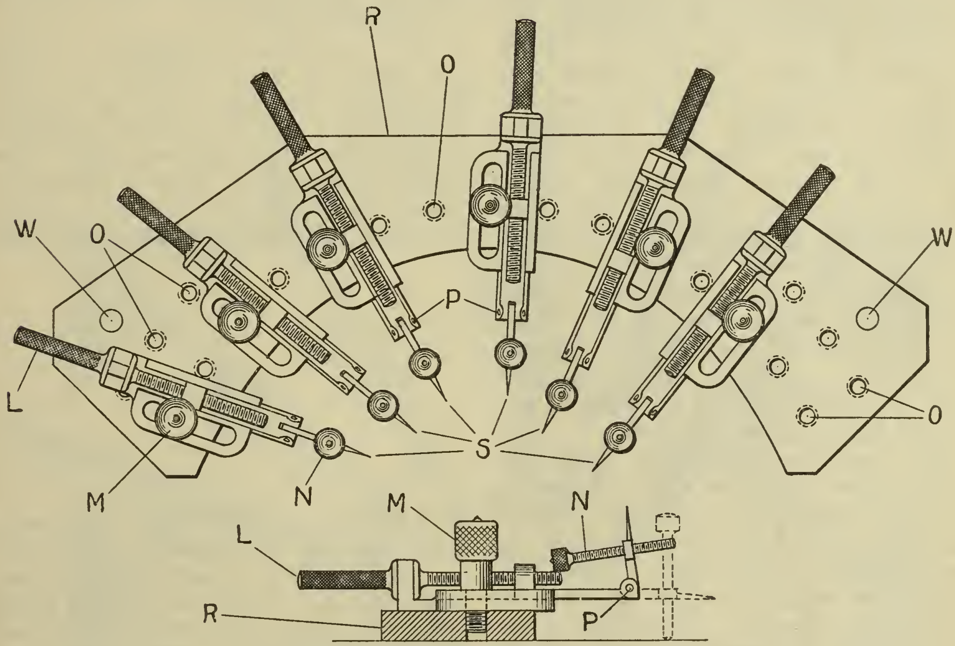
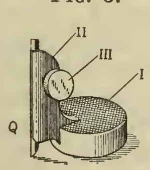


FIG. 3.



The tracing pencil Q in Fig. 3 completes the equipment. It consists of a round body I, attached to which is the lead-holder II, controlled by the binding screw III.

MODE OF ADJUSTING THE ARCH TO THE ARCHOGRAPH.

In adjusting the arch to the instrument, making records and arch changes, we proceed as follows: Let us suppose that the arch has been adjusted to the mouth, has been in position passively for the usual period to allow the patient to accustom himself to the appliance, and that the time has now come for the application of force. In the chucks E in Fig. 1 are placed buccal tubes and end sections of duplicate form to the ones used in the case in hand. Of course, if some other means of attachment, such as the Young-Angle lock, has been used on the anchor bands, this must be duplicated and placed in the chucks. In our description, we will consider that the sectional arch, as described by Dr. Angle in the DENTAL COSMOS for January 1913, is the appliance in use. The platform R is removed from the stage A, and the recording paper adjusted.

The arch is then taken from the mouth, and placed in the end section on the instrument, and the correct lateral separation given to the slides D, as indicated by the width of the arch wire, after which the slides are fixed by turning the screws F. The tubes G are now raised or lowered by turning the screws H, until they are in that position whereby as much of the arch as possible is brought in contact with the recording paper. The proper height being thus ascertained, they are locked by the clamping levers J. The final step is the locking of the ball-and-socket joints at the base of the chucks, which is accomplished by turning the levers K. The buccal tubes in the chucks of the instrument are now in the same relationship, the one with the other, as are the tubes on the anchor bands in the patient's mouth. It is well at this point to test our adjustment. This is readily done by removing first one end of the arch, and then the other, allowing each in turn to fall passively upon its receiver, over which it should lie in perfect alignment. Having ascertained that the adjustment is correct, we are ready to make a tracing, which is quickly done with the pencil Q in Fig. 3. This is designed so that the lead is always brought to bear upon the arch at the same angle of inclination. Without this precaution the tracings would be valueless. The position of the pins at their points of attachment to the arch is now indicated on the paper with a dot made by piercing the sheet with the point of a common pin. Later this mark is recorded in ink.

As it is usually impossible to bring the arch in contact with the paper throughout its entire length, there are some of the pins also not in immediate relationship with the recording sheet. Upon each one of these is slipped an accurately fitting tube, 1/32 in. in length, to which has been soldered with the flat side against the tube, a small, half-round wire, .030 in. in diameter and 1/4 in. in length. This is pointed at the end. (See Fig. 4.) When this tube is placed upon the pin, the wire will extend down and touch the paper. The flat side of the wire rests against the arch, prevents rotation of the tube on the pin, and makes the indicating point accurate and positive. (See Fig. 4.) Two of these are seen in position on pins 3 and 4 in Fig. 5.

FIG. 4.

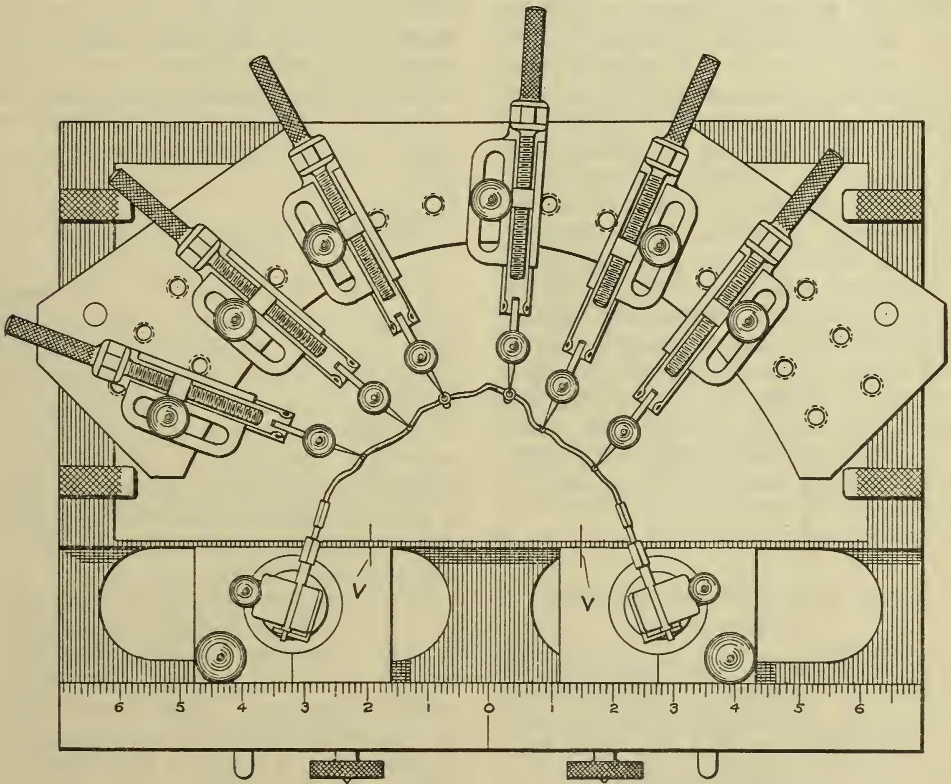
The platform R, holding the pin indicators S, is now placed upon the instrument, and a marker adjusted to the end of each pin. We now have fixed indices on the most vital points of the arch, *i.e.* the anchor ends and the places of attachment for each tooth, while the whole arch is accurately outlined on the record sheet. The completed adjustment is shown in Fig. 5.

MAKING AND RECORDING READJUSTMENTS OF THE ARCH AND PINS.

Now we are ready to change the form of our arch or the inclination of the pins so that tooth movement may be accomplished. Such changes should be exceedingly delicate, and, until one is quite familiar with this appliance and with the archograph, should involve the movement of but one tooth. After acquiring the necessary technique, variations can be made affecting the movement of several teeth with absolute safety and accuracy.

and the unchanged pins brought in contact with the pointers. Immediately the character and amount of variation at the altered area is detected, together with its effect upon the anchorage of that side and all positions on the arch between the point of bending and this anchorage end. If this variation is too great, is in the wrong direction, or has produced a faulty inclination in the pin, we are able to

Fig. 5.



detect and readjust it before harm has resulted. The proper variation being completed at one point upon the arch, the necessary readjustment is made to correct the disturbed relationship at the anchorage end. It is now well to determine whether the amount of force has been well calculated, and is within the physiological limit. This the patient alone can tell, so we apply the altered arch to the teeth. There should be absolutely no discomfort when it is in position, nor should it feel "too tight." Hav-

Each individual pin-marker is now thrown back, and the stage R lifted from the instrument. The arch is then slipped out of the end sections, and the bend made at the point desired. The end of the arch farthest away from the point of bending is then replaced in its end section. This end of the arch is used in order that as many unchanged points as possible can be brought in contact with the previously adjusted indicators. These are now placed in position by adjusting the stage R to the instrument, ing ascertained that we are also correct in this detail, we replace the arch on the archograph, and make a tracing of the change for record. The new position that the pin at the point of variation has taken should also be registered. These records can be retraced to advantage in different colored inks, and the dates recorded on the paper in the corresponding color. In this manner the writer usually registers four different series of changes on the one record sheet. Before the recording paper is removed from the instrument, indicating points are marked upon it at the junction of the scratch lines, Y and V, Figs. 1 and 5. This permits replacing the record at a future sitting, and the readjustment of the arch to its previous tracing.

When several changes are made at different points upon the arch the technique is the same, but each individual variation must be completed, perfect readjustment made in the disturbed anchor relationship and the pin indicators again fixed before another alteration is begun. Thus constant points are maintained as guides, so that each change is made accurately and scientifically. The number of changes is then limited only by the demands of the case and the skill of the operator.

RANGE OF USEFULNESS OF THE ARCHOGRAPH.

While this instrument was devised for use with the "new appliance," it has been found to be exceedingly helpful in making adjustments of the old style arch. With its help perfect adaptation to anchor tubes is made certain and much displacement of anchor teeth avoided. Such movements as parallel expansion or contraction of molars, rotation of molars, and tipping of molars can be planned with absolute accuracy.

MANIPULATION OF THE ARCHOGRAPH WITH OLD STYLE ARCH.

The technique of adjustment and use with the old style arch does not differ materially from that of the "new appliance," but is of course easier to acquire because of the one-piece arch. The arch is taken from the mouth, the ends are placed in the tubes held by the chucks E, the various adjustments made and the chucks locked. Tests are applied to see that the relation of the tubes to the ends of the arch is correct. A tracing is then made. Whatever changes are desired in the shape of the arch are then made in the mouth, using one end of the arch as a fixed point, and testing the changes frequently by placing this end in its anchor tube. When the proper form has been reached, this same end of the arch is placed in its coresponding tube in the instrument, and the opposite end is bent to fit its tube perfectly, thus assuring accurate adjustment to anchor teeth. A record is then traced of the new arch form.

ACCURACY OF TOOTH MOVEMENT INSURED.

It is the belief that this instrument has been simplified as much as is possible, but even now it undoubtedly appears quite complicated, until one has familiarized himself with it. Therefore it is not to be expected that it can be used with perfection immediately. As these appliances are extremely delicate, so must be the adjustments made on the recorder, and it requires considerable practice to master the technique.

To the operator who feels that he has but a few minutes to spend on each case, this instrument certainly will not appeal; for it is not a time-saver as related to the individual sitting. However, when used as a guide throughout the entire period of treatment, it will save both time and energy, for it makes tooth movement positive and always toward the normal, thus avoiding any prolongation of treatment through wrong application of force. Furthermore, by obviating all guessing, inflammatory reaction is precluded, and hence treatment is made most comfortable for the little patients.

As a final word, the writer would express the sincere hope that the archograph will be found of help to the orthodontist in his problems of treatment, and will be of particular aid in the scientific application and effective use of the "new appliance."

Correspondence.

SCIENTIFIC ALLOYS.

To the Editor of the Dental Cosmos:

Sir,—In view of the articles which have appeared in the Dental Cosmos advocating alloys, for amalgam, in which the metals are in atomic ratio, I beg to ask the following questions:

(1) If an alloy in which the metals are in atomic ratio is the best alloy for any purpose, why is it that the proportions of copper and tin differ so widely in speculum metal, bell metal, and gun metal?

(2) Does not the fact that the proportions of the metals differ so widely in the above-mentioned alloys prove that the proportions of the metals in an alloy depend on the purpose for which the alloy is made?

(3) Is it not admitted that the amount of mercury necessary to add to an alloy, in order to produce an amalgam for filling teeth, precludes the possibility of the *amalgam* being an alloy of metals in atomic ratio?

(4) If a primary alloy is made of metals in atomic ratio, which is then made into a secondary alloy, in which the metals are not in atomic ratio, by the addition of mercury, is there any proof that the secondary alloy, or amalgam, is necessarily better *because* the metals in the primary alloy were in atomic ratio?

I should also like some information on another point.

If an amalgam is made with an alloy of silver, tin, and copper, and it is admitted that, in the presence of air and moisture, certain antiseptic or tooth-preserving salts will be formed, is it wise to state that this is of no value, because these salts cannot be formed in the cavity unless the filling leaks?—and then in the same breath state that it is more difficult to make a moisture-tight filling with amalgam than with cohesive gold? If that be the case, how many perfectly moisture-tight amalgam fillings are made in the mouth? and in how many cases can the formation of the more or less tooth-preserving sulfates be despised, as of no account, because the fillings are so tight that they (the sulfates) cannot be formed between the filling and the dentin?

I believe it has been found difficult to make a perfectly adapted amalgam filling in a Wedelstaedt steel tube, even if the sides are roughened with a carborundum stone. It is still more difficult to produce perfect adaptation in a glass tube. Provided the amalgam does not contract, and provided it is an adaptable amalgam, fillings *can* be made in glass tubes which show no leakage after immersion in an aniline dye or a penetrating ink. But the careful and accurate manipulation necessary to produce a moisture-tight filling in a glass tube makes one doubt one's capacity to produce the same result in the mouth in all, or even in the majority of cases.

Yours faithfully,

Wm. Cass Grayston.

Scarborough, Eng.

PROCEEDINGS OF SOCIETIES.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

Forty-fifth Annual Meeting.

FIRST DAY—*Morning Session.*

THE forty-fifth annual meeting of the Dental Society of the State of New York was opened on Thursday morning, May 8, 1912, in the assembly room of the Educational Building, Albany, N. Y. The president, Dr. C. F. Baylis, Oneonta, called the meeting to order at 10.30 o'clock.

The Rev. J. V. MOLDENHAWER, Second Presbyterian Church, Albany, invoked divine blessings on the deliberations of the society.

The vice-president, Dr. W. W. Smith, Rochester, took the chair while the president, Dr. C. F. BAYLIS, read his annual address, as follows:

President's Address.

We are again assembled to attend the annual meeting of our society, the forty-fifth anniversary of the organization. I trust it is well that another year has passed and we can again meet the friends we have learned by close association to esteem and respect. Our surroundings are most delightful as we are privileged for the first time to hold our meetings in this beautiful building, devoted exclusively to educational purposes. It is an experiment, holding our meetings in one place and having the clinics and exhibits at our hotel headquarters. I trust it will be profitable to all concerned.

As your presiding officer, I extend a cordial welcome to all, and I trust that you will have a pleasant and profitable time, and return to your several localities with a feeling that you are better prepared to serve your patients, and yourselves, for having been with us.

This society and its allied district societies for the past forty-five years have succeeded in making our profession a representative one in this state. It is now looked upon by the members of other professions, and by people generally, as an educated, skilled, respectable, and progressive profession, of which any man may well feel proud to be a member.

To every ethical practitioner of our profession in this state I wish to say that he owes a great debt of gratitude to the men who have been the pioneers in building up these societies, and our profession, and I invite you to come with us and give us your co-operation and support, that we may not only be a leading society, but a progressive one, with every representative ethical member of the profession with us, all moving forward for the good of the society, the profession, and the public to whom we strive to give health and happiness.

REORGANIZATION.

The adoption this morning of new By-laws makes this meeting a marking-stone in our onward and upward progress as a society. The old order of conditions has passed away, and we enter the future under a new and progressive form of government and an unlimited membership.

We have reorganized—or, as I term

it, we have moved forward from the small to a large dental society. This reorganization makes no change in the management of the district societies, except that their active members become members of the State Society and of the National Dental Association, and that they must collect dues from their members sufficient to enable the district society to pay the dues of the State Society, and that the State Society is to pay the dues of the National Dental Association. The district societies at their annual meeting are to elect a representative on the Executive Council and an alternate, a member of the Law Committee, a member of the Legislative Committee, two members of the Oral Hygiene Committee, and are to recommend two members for appointment on the State Board of Dental Examiners.

For a number of years the business of the society, except election of officers, has been transacted by the Executive Council. Under our new by-laws, they also elect the officers of the society, thus placing us entirely under a "commission" form of government. All sessions of the Council are open to members of the society, and any member may be heard on any subject under consideration.

DISTRICT SOCIETIES.

It has been my privilege to be the guest of the several district societies, except the Second and Ninth, which I regret not being able to visit because I had no definite knowledge of the dates of their meetings.

My visits to the several sections of the state convinced me that there is a deep feeling among the members of the several societies for the welfare of the organization and its members, and that good-fellowship and harmony permeate the local organizations. The evident progressiveness seemed more along the lines mentioned than that of increasing the membership. I would recommend that we do a little missionary work, and go out and induce our ethical brother practitioners to come with us. Let us try to make them see that to do so would be for their good, for the good of the local society, for the good of the State Society, and above all for the good of the profession. Every ethical dentist should feel that the societies are entitled to his moral and financial support, in return for what they have done for his profession.

The presidents of the several district societies are endeavoring to create a closer relationship with the various sections of the state, and to this end they have arranged a dinner for the retiring and active presidents of the several societies, at six o'clock, May 8th.

SCIENTIFIC RESEARCH.

The Scientific Research Committee have been very fortunate in having Prof. Wm. J. Gies, of the department of biological chemistry, Columbia University, to continue the direction of their investigations. With the splendid facilities of Columbia University back of him, he is able to go about his work with the best equipment available to science at the present time. Many of the stock preparations and appliances have been supplied by the university without cost to the committee. Professor Gies has not accepted personal remuneration, and the money appropriated has been expended in employing associates of Professor Gies who are willing to devote their time in carrying out the experiments under his direction.

I would recommend that the society appropriate at least three hundred dollars for the use of the Scientific Research Commitee for the coming year.

STATE LIBRARY.

I am informed that the State Library does not contain any books on dentistry. I recommend that the Dental Society of the State of New York appoint a committee of three to select a list of dental books for the State Librarian to have purchased and placed in said State Library, at Albany, N. Y.

INTERNATIONAL CONGRESS.

The Fourth International Congress of School Hygiene will convene at Buffalo,

N. Y., August 25 to 30, 1913. This congress is one of the most important conventions ever held in this country from the standpoint of public health. Our society has been very active in inducing the Public Health Commission of this state to introduce Oral Hygiene in our public schools. It seems a most opportune time for this society to be represented at such a congress, and I recommend that the Oral Hygiene Committee take steps toward affiliation with this congress.

HONORARY MEMBER.

It gives me great pleasure to recommend the election of Wm. J. Gies, M.D., Ph.D., as an honorary member of this society. Dr. Gies for the past several years has been doing a great amount of scientific investigation inquiring into all the possible factors in the causation of dental caries, and I believe his investigations toward the solution of this great problem are of concrete and substantial value to the society. He has been nominated by Wm. B. Dunning, seconded by Ellison Hillyer, Arthur H. Merritt, L. M. Waugh, and other members of the society.

THE PROGRAM.

The Business Committee have succeeded in securing for us some excellent papers by prominent men in the profession, from without as well as within our state; and prominent members of the medical profession have consented to read and discuss papers and also to give clinics. With the very complete reports that the several committees have prepared on timely subjects, I feel confident that very interesting and profitable sessions await you.

CLINICS.

The Committee on Clinics have been a very hard-working and efficient committee. They have succeeded in securing a very large and excellent list of clinicians for the two sessions assigned to this section of our meeting, and I trust their efforts will be rewarded by a large attendance.

CONCLUSION.

In conclusion, I wish to state that the hearty co-operation tendered me by the members throughout the state has been very gratifying, and that every request made by me of a member of this society has been cheerfully granted.

Dr. Smith appointed the following as the Committee on the President's Address: Dr. Louis Meisburger, Dr. A. R. Cooke, and Dr. W. B. Dunning; after which the president, Dr. Baylis, resumed the chair.

The next order of business was the report of the Business Committee, by Dr. H. J. Burkhart, chairman, who reported the program for the day.

Dr. G. B. Beach, secretary of the Executive Council, presented the amendments to the By-laws brought over from the last annual meeting, and, on behalf of the Council, recommended their adoption.

Dr. Beach moved the adoption of the amendments as read. [Motion carried.]

Motion was then made and carried to adjourn until the afternoon session.

Thursday—*Afternoon Session.*

The meeting was called to order Thursday afternoon, at 2.30 P.M., by the president, Dr. Baylis.

The first order of business was the reading of the minutes of the previous meeting—which was dispensed with until a later session.

The next item on the program for the afternoon session was the reading of a paper by Dr. Ellison Hillyer, Brooklyn, N. Y., entitled "The Development of the Anatomical Articulator."

[This paper is printed in full at page 989 of the present issue of the Cosmos.]

Discussion.

Dr. H. L. Wheeler, New York. This description of the development of the articulator has been so complete that it is unnecessary for me to comment upon it. I wish, however, to call attention to one or two points. The articulators that are very largely in use today may be said to be, first of all, the Twentieth Century Articulator (Dr. Snow's), the Gritman articulator, and that of Gysi. Professor Gysi, of course, in his articulator has obtained practically two features that are wanting in other articulators—that is, the retention points and the ability to produce lateral motion. As the condyle slides down over the glenoid fossa, over the eminentia articularis, there is the protrusive movement which brings the jaw outward and forward, and the lateral motion, and these motions are obtained in the Gysi articulator. With this feature we have had practically no experience, and Professor Prothero, in a paper read before the First District Society this winter, did not place as much dependence on that as upon having an adjustable condyle path. The Gysi articulator is a complicated one, and probably represents as perfect a means for reproducing the various movements desirable in the mandible as has been or will be obtained for some time by any mechanical appliance. In the Simplex articulator, which is within the means of, and which can be operated by, the average dentist, one of the most vital necessities of a good anatomical articulator has been eliminated—that is, the adjustable condyle path. This articulator has a condyle path which allows for the protrusive movement and for the lateral movement, to be sure, but this is set at a certain fixed degree on the scale—I believe the essayist said it was at 33°. Since there is, however, a wide difference in the angle of the condyle path in different mouths, also a difference in the angle of the condyle path on either side in almost all individuals, I believe it to be essential for obtaining the best results, and up to date, that the condyle path be adjustable. The Snow articulator possesses this feature in the most simple and readily understood form. Of course it is desirable, if possible, to get the other movements, but it is also desirable to have the articulator simplified so that the average practitioner may understand it, and it has been found difficult to embody in an articulator all the movements of the mandible.

I wish to further speak of one or two items in relation to the setting up or properly articulating the teeth in or upon the anatomical articulator. At the present time the profession is greatly interested in, and very enthusiastic over, the probability of obtaining what are called perfect anatomical molds of porcelain teeth. To a certain extent, of course, that is desirable, but there is one feature, so far as my observation goes, that has been neglected in considering the question of obtaining correct anatomical occlusion in artificial teeth. The average individual who needs a complete upper and lower artificial denture has arrived at the age when the cusps and grinding surfaces of the teeth are comparatively well worn; the high, well-marked cusps of the anatomical artificial teeth, which are obtained from very perfect natural teeth that have not been worn, will therefore not work in the mouth of the average individual who needs a denture! There are reasons for that. The natural teeth are set in bony sockets and in cushions of peridental membrane, and, as the teeth move forward, backward, and laterally, there is a certain amount of motion which allows each tooth to give, and allows for the changing of the direction of the movement. So far we have found no means whereby it is possible to make artificial dentures in any other way except so that the teeth stand in relation to each other in a perfectly rigid manner. There is no individual motion whatever in the approximal relationship of artificial teeth. The teeth in an upper and lower denture in moving over each other are incapable of reproducing the movements of the natural teeth in their alveoli, and that means that artificial teeth must have lower and flatter cusps. If the teeth of a man of eighteen, twenty, or twenty-five years of age, the cusps of which are very little worn, are reproduced in porcelain and set up rigidly in an artificial denture, they will interfere with the movements of the mandible. Even though the idea of anatomical teeth be theoretically correct, allowance has to be made for the rigidity of the artificial denture. Besides this, another feature has to be taken into account: The average edentulous individual has lost his teeth at different times, and this progressive loss generally results in a decided change in occlusion, which will inevitably bring about a change of the condyle path sooner or later. Nature will adjust herself to that change—which is very fortunate, for if it were otherwise, dentures made on a plain-hinge articulator would not work. Most patients could not adjust themselves to dentures made without any consideration of the proper anatomical movements of the mandible; but because nature makes an effort to readjust the relation of the condyle to the glenoid fossa, and its movement over the eminentia articularis, mankind finds it possible to go on chewing with less movement and less convenience, and so the average wearer of a denture manages to get along somehow.

I wish to emphasize Dr. Hillyer's plea that artificial dentures, as far as possible, should be made so that it will be easy for the patient to adjust himself and to enjoy as easy a use of the mandible as when he had a complete natural denture. In the dental colleges the classes are now being strongly impressed with the necessity of understanding the principle and practical use of the anatomical articulator, and in the course of time, I believe, a large number of dentists will solve these problems in such a manner that their patients will be very much better served than they have been in the past.

Dr. L. M. Waugh, Buffalo. I should prefer to discuss this paper reversely, and speak first of the Gysi articulator, because with this apparatus the condyle movements may be most nearly registered and reproduced, and the technique of application of this apparatus is not as complicated as we have been led to believe. The Gysi articulator has not been practicable until the construction of the recent Gysi scientific articulator. The first one was not practical, because it was made of soft metal. The face-bow was made too soft, and if, in attempting to register the movements of the condyle, any resistance was met, its parts would yield so that a sufficiently accurate movement of the condyle was not obtained. For that reason I believe that the Snow face-bow, in combination with the New Century articulator, while it does not attempt as much as the original Gysi articulator, will yet give uniformly good results for practical work. In the new scientific articulator of Gysi, the softness of the metal has been overcome, and it has been made sufficiently rigid for it to effectually register the movements of the mandible. Those who wish to come near the ideal in prosthetic work will find the Gysi articulator to give the best result that can be obtained, but the New Century articulator together with the Snow face-bow, with which we are perhaps more familiar than with any other anatomical articulator, will give sufficiently accurate results for practical purposes. The Gritman articulator with a fifteen per cent. descent condyle path, and with a fixed path, gives excellent results as compared with older articulators, but the teeth require more grinding than if we set the general direction of the condyle path to suit the individual case, as may be done with the New Century articulator.

When any new invention is brought before the profession, there are a few enthusiasts whose attempts are beyond the practical, and that has been the case with anatomical occlusion. Some men attempt what is away beyond the practical, and they have developed and advocated a technique so complicated that it frightens the average practitioner out of the hope of ever mastering it. Anatomic articulation is not a difficult process; it is simple if we use the Gysi articulator, and still more so if we use the New Century and the face-bow. I feel that in the hands of the average practitioner the apparatus which does not require too much scientific measurement will give better average results than one that does.

Dr. Wheeler has spoken of one or two items in relation to occlusion, the topography of the teeth, and temporo-mandibular articulation. The argument is often advanced that the Snow face-bow is not absolutely accurate. That is true, but can we get anything absolute? If we examine a skull we find the bony head of the condyle fitting in the bony depression of the glenoid cavity, and for years the question of anatomical occlusion was based upon this more or less fixed bony structure. Upon a closer study of the skull, however, we find that, interposed between the condyle head and the glenoid fossa there is a yielding fibro-cartilaginous tissue. In articulation this fibro-cartilage moves more or less back and forth with the movement of the condyle, and there is more or less play in the joint. It is not fixed, like a machine, and there is a certain power of accommodation to which Dr. Wheeler referred, and which largely facilitates our work. In trimming the bite-plate, unless we have the proper amount of wax so that when the patient brings the jaws together there will be sufficient stress to cause the yielding of the ligament in the joint, we shall find a slight opening sufficient to reduce the masticating power necessary for the reduction of foods that offer resistance, such as meats. This factor must be borne in mind, and no matter how accurate our measurements are, and what scientific possibilities an apparatus offers, we may still not obtain the maximum efficiency. There is a certain amount of accommodation in the parts that allows nature to adjust matters. It is common knowledge that dentures are constructed without consideration of the condyle path and the distance of the models from the joints. Yet patients become accustomed to dentures thus constructed—for two reasons: First, they learn to masticate without the use of the lateral motion; secondly, owing to the yielding of the tissues mentioned, during articulation, the denture becomes more comfortable in a year or so.

So much has been said with regard to anatomical occlusion that I do not know which phases it would be best to discuss in detail. The establishment of the retention center is possible with the Gysi, but not with the Snow articulator, and is important in many cases. The incisal guide, while, in my opinion, it is not of much use, gives a little rigidity. One objection to the New Century articulator is that, if one has not learned to use it carefully, he may spring it just enough to throw the bite off, and this is prevented by the incisal guide. This is a feature of the Gysi articulator that the New Century articulator does not possess.

It was my good fortune to know Dr. Gritman when he first had the inspiration of constructing an articulator. I have followed the development of this work, and in studying the different kinds of articulators I have become convinced that the possibilities for producing anatomical occlusion with any one of the anatomical articulators will permit us to make dentures which are efficient from the beginning, and which the patient may learn to use correctly with a minimum of discomfort. With the anatomic method of articulation we are able to obtain results that we could not obtain with the old method.

One point is essential, and I cannot emphasize it too strongly, namely, that we must use a face-bow of some sort and establish the proper cuspal relationship. In other words, we must have the proper occlusal planes of the teeth in artificial dentures, and just in proportion as we do that will our patients find themselves able to accommodate themselves to the plate. But unless we use the face-bow and establish proper articulation, we shall lose one of the most important advantages that anatomical occlusion affords. It does not matter so much what anatomical articulator we use; but we must be acquainted with the method of its application. Its use decreases the tendency to failure; still, obstacles remain that it will not overcome, although it promises to do much better work than has been accomplished before.

We hear so many practitioners say

that they are not interested in this work, that their aim is to care for people who appreciate their teeth and want to save them. These practitioners are closing their eyes to one of the greatest possibilities for the improvement of our efficiency. The aim of modern dentistry lies in prophylaxis, and in the recognition of the fact that the deciduous teeth must be saved from their eruption up to the time when artificial dentures become necessary. The lesson learned in using the anatomical articulator teaches us to recognize a new meaning of the contacts of the occlusal surfaces of the teeth. It teaches us that the proper relationship of the inclined planes is a feature of prime importance, and that the grinding and incisal edges of the teeth mean more than we realized in the years gone by.

Dr. Hillyer (closing the discussion). I do not think it is necessary for me, in closing, to add anything to the discussion, which has followed natural lines.

Report of Fellowship Committee.

The next order of business was the report of the Fellowship Committee, through the chairman, Dr. R. H. Hofheinz, as follows:

Mr. President and Members of the Dental Society of the State of New York,—The Committee on the Fellowship Medal, at a meeting held in Albany last year, unanimously decided to recommend that Dr. James Truman of Philadelphia become a Fellow of the Dental Society, of the State of New York.

R. H. Hofheinz, *Chairman,*
A. L. Swift,
W. J. Turner,
A. R. Cooke,
L. Meisburger,
Committee.

Presentation of Fellowship Medal.

Dr. Baylis, the president, asked Dr. Hofheinz and Dr. Cooke to escort Dr. Jas. Truman to the rostrum. He then presented the metal to Dr. Truman, with the following words:

Members of the Dental Society of the State of New York,—With each passing year the members of this society appreciate more and more the value of the fund placed at its disposal through the generosity of the donor, Dr. Wm. Jarvie, by which the society is enabled to prepare and have suitably inscribed a medal to be presented to some distinguished practitioner of dentistry who by his ability, labor, and self-sacrifice has attained eminence in the profession. The special committee whose duty it has been to select the person to whom the William Jarvie Medal should be awarded this year has made a most happy selection, not only because of the eminence and distinction of the gentleman who will be the recipient, but more especially on account of the very high personal regard in which he is held by all who have been honored with his acquaintance. It is not only a pleasure but also a great honor for me to announce that the William Jarvie Medal will this year be awarded to Dr. James Truman.

For many years as an instructor he has had much to do with shaping the minds and lives of students who have been fortunate enough to come in contact with him. As a writer he has been devoted to the elevation of the literature of the profession. His many valuable contributions to the science of dentistry are well known and appreciated by the profession. Throughout a long and active life he has been a leader in every activity in which he has been engaged, bringing to every subject an energy and enthusiasm which inspire everyone brought in contact with him with the desire to strive for better things and to labor for the uplift of the profession. It may be fitting to enumerate the positions of trust he has held.

James Truman, D.D.S., LL.D., was born in Abington, Pennsylvania, a suburb of Philadelphia, in 1826. He was educated in the public and private schools of Philadelphia. He received his degree in dentistry at the Philadelphia College of Dental Surgery; received the honorary degree of LL.D. at the University of Pennsylvania in 1904. He was demonstrator and professor of operative dentistry in the Pennsylvania College of Dental Surgery from 1864 to 1876; was professor of dental pathology, therapeutics, and materia medica in the University of Pennsylvania in 1882; dean of the University of Pennsylvania from 1883 to 1895, and professor emeritus since 1909. Was editor of the *Dental Times,* 1865–1869; editor of the *International Dental Journal,* 1890–1905, and has been a contributor to various dental publications. He is a member of the American Dental Association, honorary member of the Dental Society of Europe, member of the Pennsylvania Dental Association, the Academy of Stomatology of Philadelphia, and of the Biological section of the Academy of Sciences. He has been in active dental practice for sixty-one years in Philadelphia, with the exception of four years in Waterloo, N. Y., and four years in Germany, at Frankfort, Hanover, and Dresden.

This, briefly, is a partial history of the activities of a most remarkable man. It is a rare privilege to honor one who has been so eminent in his profession, and also has been so faithful in maintaining high standards and ideals. May he live many years to enjoy and receive the honors due him from a profession that he has done much to create, and for which he has devoted many years of ceaseless toil.

As president of the Dental Society of the State of New York, I take great pleasure in presenting to you, Dr. Truman, this medal, which expresses in a small way the love and esteem in which you are held by our members, and in so doing permit me to say that we feel highly honored in having an opportunity to confer this compliment upon one so modest and deserving.

DR. TRUMAN'S RESPONSE.

Mr. President and gentlemen of the New York State Dental Society,—Let me thank you for this unlooked-for appreciation of my efforts. I would hesitate, and do feel a delicacy in taking up your time, but I cannot allow this meeting to pass without a recognition of the deep feelings that stir my inner life today.

I consider myself as an adopted son of New York state. Here I practiced my profession for a period of several years. Here I married my wife. Here two of my children were born. Here I tried to reform the politics of the state, but I must confess with very poor success. Need I say I love this state? Nature has marked it for scenic beauty beyond comparison. I have wandered by the beautiful and placid waters of Lake Seneca; have gazed and acquired poetic inspiration as I have viewed the beautiful hillsides of Lake Skaneateles; have sailed the broad bosom of that great inland sea, Ontario; have stood enthralled amidst the roar of Niagara's mighty waters; have floated down the great river that flows by your doors and have been inspired by the picturesque mountain scenery—have watched as I approached the Highlands, and they seemed ready to embrace the mighty waters as they passed them by; have taken lessons from the Palisades, lessons of geological interest, as these towering walls gave evidence of the mighty power of the waters as the Hudson passed onward to the sea. Amid these manifestations of beauty and power, I said to myself: Our friends the Germans may properly sing of their historical Rhine with its castled and baronial-dotted mountain sides, but give to me, in preference, the American Hudson with its legendary lore, its Sleepy Hollows and Rip Van Winkles, its romance of Indian traditions, as it passes onward in silent grandeur, the most beautiful and majestic of all the mighty rivers that float upon the fair bosom of our great Republic.

I have labored with the mighty men of the past in this state—men from the North, South, East, and West—to rouse dentistry from its crude beginnings. I have seen, in day dreams and night visions, the great Royal Arch of Dentistry, beginning in the crude uprisings of a profession; have seen it magnificently arching the zenith of life and fading away in that seven-hued robe of glory and beauty into infinity; but it remains incomplete, the keystone is not in place—it lies prone and contemned. On it is inscribed this legend: MEDICINÆ DOCTOR. Not that I value degrees would I ask you, men of New York, to assist in placing this stone in position; but for that higher ideal that our profession should stand for—the scientific, the broader culture that this legend represents.

Here, receiving from your hands this beautiful gift, it represents to me, in its radio emanations, the future yet in store for us as one of the important factors in the healing of the nations. In memory I bow in reverential adoration of the men of the past. Here I stand in gratitude to you for this splendid recognition of my very imperfect work. Here I hopefully look into the future as the sands in my hourglass are running low, and patiently await the evolutions and developments of time. [Long-continued applause.]

The next order of business was the reading of a paper by Dr. R. Ottolengui, New York, entitled "Can the Illegal Practice of Dentistry be Limited by Law?"

[This paper is printed in full at page 1008 of the present issue of the COSMOS.]

After the reading of Dr. Ottolengui's paper, the secretary, Dr. A. P. BURKHART, read the following resolutions passed by the Allied Dental Council of Greater New York, together with a telegram:

At a regular meeting of the Allied Dental Council of Greater New York (being the federation of the Eastern Dental Society, the Harlem Dental Society, and the Kings County Dental Society), which was attended by nearly 500 dentists, among whom were some of the most prominent men in the country, the following resolution was unanimously adopted:

Whereas, quackery in dentistry has assumed proportions hitherto undreamed-of; and

Whereas, this quackery is foisted upon an unsuspecting public, jeoparding their health and well-being; and

Whereas, we hold it is the duty of the dental profession to protect both the good name of our profession and the welfare of society in our branch of the healing art; and

Whereas, in the lecture delivered by Dr. Ottolengui before this gathering he has outlined legislation which if carried into effect promises to stamp out this evil, which casts such a slur upon the good name of our profession; therefore be it

RESOLVED, That this gathering most heartily indorses the policy outlined by Dr. Ottolengui, and urges that the State Dental Society, being the official representative of the dental profession in the state, start its machinery in motion to the end that these suggestions be placed on the statute-books and thus become the law of the state.

ALLIED DENTAL COUNCIL, G. N. Y.
S. H. FILLER, *Sec'y.*

Dr. Ottolengui's paper was then discussed by the following gentlemen: Drs. A. S. Johnson, Brooklyn; W. H. Rogers, Brooklyn; Wm. Carr, New York; F. W. Proseus, Rochester; T. P. Hyatt, Brooklyn; L. Meisburger, Buffalo; M. L. Rhein, New York; H. E. S. Chayes, New York; with closing remarks by Dr. Ottolengui.

Motion was then made and carried to adjourn until the evening session.

(To be continued.)

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

Regular Monthly Meeting, held May 27, 1913.

The regular monthly meeting of the Academy of Stomatology of Philadelphia was called to order by the president, Dr. Joseph Huggins, in the lecture hall of the College of Physicians, Tuesday evening, May 27, 1913, at 8 o'clock.

The President introduced Dr. A. W. Sweeny, Baltimore, Md., who read the paper of the evening, entitled "The Noncohesive Gold Filling."

[This paper is printed in full at page 1019 of the present issue of the Cosmos.]

Discussion.

Dr. L. Ashley Faught, Philadelphia. I am sure that I voice the thought of all the members of the Academy when I express the gratification with which I have listened to this most admirable paper of Dr. Sweeny. He has not only brought to us a symphony in diction to which it has been most pleasant to listen, but he has written it to a most timely keynote—"Prove all things! Hold fast that which is good."

Dentistry is no novice in progress, and it is not a far cry from the early fathers to the present twentieth-century dentist. In an extremely short period of time the operative dentist has been caught by three successive waves of revolution, and forced to a mental halt and readjustment, that out of revolution might come evolution: First, the wave of cohesive or adhesive or sticky gold; second, the "new departure"; third, the inlay, particularly the gold inlay.

Without any attempt to become chronological, I will ask you to prolong the vision backward, and for a few minutes to study with the essayist of the evening these periods of revolution and evolution.

The early operative dentist was most concerned with an exceedingly simple proposition—a cavity in a tooth, and the development of some means of filling the void. To this operation the term obturation has been applied; the etymology of the word justifying its use, viz, from the Latin *obturare,* to stop; a stopping placed in an opening or hole, just as a glass stopper or cork is placed in the hole of a bottle.

Various substances were used, the most advanced operators—perhaps the most skilful—pronouncing in favor of gold. The main idea was a durable stopping, a replacement as far as possible of that which was lost, possibly the stopping of further decay. The essayist has attended to ringing all the changes, and referred vividly to what was accomplished by the fathers—to the durability of their work. It is quite unnecessary for me to weary you with repetition. Such were the conditions of 1835. As I have stated—and to avoid controversy, I shall avoid chronology—but about that time, or possibly much later, certainly in the decade from 1850 to 1860, came the first revolution, a welcoming of the cohesive property of gold, the renaissance of operative dentistry, a new era of restoration, the drawing of a line between what was, at best, mutilation and disfiguration, and the development of form and beauty.

The war was on, and Robert Arthur's treatise on "The Use of Adhesive Foil" was studied with the deepest interest. In place of flat, broad, approximal fillings came the evolvements of the contourists. To the mere *saving* of teeth *in situ* was added the attempt to restore a useful organ. Almost all here present are young enough—I dare not say old enough—to know of the men who did what was gigantic work, viz, imitating nature—in the language of that greatest of all contourists, "The building of golden mansard roofs upon the priceless pearls, within the ruby portals, for the tooth-spirits to dwell in." The art developed, and thousands became proficient, until in 1893 a prominent manufacturer of gold foils said: "At the present time, the sale of non-cohesive foil is very limited, and grows less every year. Those who use it are old practitioners; in fact, we do not know of any young practitioner who uses it at all."

The revolution was complete, and the establishment of approximal contact and the restoration of approximal contour were the greatest gain of this epoch. The restoring of the typal form of the organ and restoration to its normal position in the arch, perhaps to normal occlusion and normal functioning, were the contributions of ideal effort. Much was gained, but the conservative watchmen noted that much was lost—often the teeth! The exacting nature of cohesive foil, which would not change its inherent working qualities to suit the dentist's theories, had now paved the way to the second revolution in dental progress, namely, the "new departure," its slogan being the same as in the early days, viz, the saving of teeth. More properly speaking, this rebellion was heralded by such statements as—"In proportion as teeth need to be saved, gold is the worst material to use." None, even today, will question the truth of the assertion of the great apostle of the new departure that —"Hundreds of thousands of teeth have been lost, years before their time, from no other cause than that, in using gold, impossibilities were attempted in defiance of incompatibility of material, and despite the unsurmountable physical characteristics which precluded its working." Knowledge, based upon observation, led many in this rebellious period of dentistry to confirm the saying of Dr. C. C. Allen that—"If my life and fortune depended upon the saving of a tooth merely, without regard to its appearance, I *would fill it with amalgam.*"

War was waged against accepted doctrines, until this second revolutionary period led to thoughtful consideration, with the cohorts in dentistry much divided in their struggle for professional place and precedence. In this connection, it is truly remarkable that cements, so utterly unreliable as filling materials, were admitted to be a good material under gold, and well worthy of much consideration.

Now burst upon the horizon my friend and old college classmate, Dr. W. H. Taggart, with his cast gold inlay process, promising the attainment of the highest achievement, viz, the saving of teeth, approximal restoration, and a still further advance—restoration of occlusion. A prophecy has been lately made that "The time has now arrived when the dentist must awaken and grasp the need of making occlusion the fundamental principle of his everyday work." I was much pleased to read this statement, for it has been the primary theme of my own class teaching for the last ten years.

Thus, by the three great epochs I have sketched, has progress in operative dentistry been made, revolution being quite prominent, and evolution the possible attainment. To the query, What is the object to be attained in filling teeth? evolution has developed the classic answer: To exclude agents of decay, to protect the tissues of the tooth, to prevent fracture, to restore shape and function, and to produce cosmetic effect;—a twentieth-century answer, and quite different from that of the nineteenth century. Completeness seems to have been attained. While, with the essayist of the evening, I bow with respectful deference to the forces by which such progress has been reached, I feel with him that there is danger in the alluring possibilities of attainment. And I plead with you for the acceptance of his message that the filling of teeth with gold foil be not allowed to become obsolete; that inlays, gold and porcelain, and silicate cements be not allowed to banish gold foil, and particularly, non-cohesive gold foil, from up-to-date dental offices. They have almost succeeded, but not wholly so, for as Dr. H. B. Tileston has said—"Whoever would practice dentistry in this twentieth century, with the lofty purpose of giving his patrons the best possible service, must be a man of judgment. He cannot afford to be a faddist; decidedly, he should be an eclectic. He will still find many cases in which gold foil can be used to best advantage, and many also in which foil of the non-cohesive variety will give the most satisfactory results."

Did I hear someone inquire where and when non-cohesive foil should be used? I have already spoken too long, and I cannot permit myself to turn this meeting into an occasion for a rostrum lectuie, but an outline answer may be permitted: Non-cohesive gold foil should be used in all occlusal and other pit cavities; in labio- and bucco-gingival cavities, wholly or in part; in the gingival third of all approximal cavities, except in large contour restorations in incisors; against the labial enamel plate in incisors.

It is just these places that I, with the essayist and a few others, plead that we "hold fast that which is good," for, to my mind, the gold inlay has not been proved. Good work with it involves a difficult technique, and it is as weak as its weakest link in the chain, which is the cement. Gold has the one great faculty of "staying put." With the proper redevelopment of the old gold technique, no operator need worry as to the results of his operations, but this cannot be said about any other and later developed method of operating.

Dr. R. Ottolengui, New York. I feel very much embarrassed in approaching the discussion of this paper. When I read it in the manuscript, I thought it would be rather an easy matter to discuss it, but after I have heard it read with all the oratory and enthusiasm of the essayist, I find it difficult to answer, because I am impressed with the fact that this is almost a religion with the essayist, and I was early taught that it is a great deal safer method in life never to argue a religious subject with a religious man. I am therefore going to expose the rift in my armor at once, so that whatever I may say, he may find his answer readily, and I tell him frankly that I know nothing about non-cohesive foil, because I have never used a leaf of it.

I wonder if the essayist would mind my asking if he has any objection to mentioning the name of the man to whom he alluded in the paper as having published an account of filling two teeth with amalgam.

Dr. Sweeny. I omitted the mention of the name purposely, but I will say that it was someone you know very well.

Dr. Ottolengui. That is what I thought. I rather imagined he meant myself, except for the eulogistic manner in which he alluded to the man, until I remembered that everything courteous comes from Baltimore. I want to say a word about these two fillings which were described. These fillings were not, strictly speaking, amalgam fillings, they were amalgam inlays. They were made by burnishing gold foil into the cavities, packing them with amalgam, removing them and keeping them twenty-four hours to set, after which they were polished and put into place, so that, in that sense they were not amalgam fillings, but inlays. I hope the essayist's prophecy that they are still doing service is true, but I doubt it. [Laughter.]

Now I must say a word about amalgam, before I say anything of gold. The essayist has said that the poor are always with us, which evidently is a plea for some kind of filling that will be inexpensive. In my practice, if I were to measure my service by time, leaving out the element of cost of material in any complicated cavity which I had ever filled with amalgam, I would find it necessary to charge more than if I had used gold. And this is where the patient suffers when amalgam fillings are used as a cheap substitute, for he obtains cheap service. So much has been said about amalgam and what amalgam has done—and it is a curious fact that we always find some isolated example cited by some successful practitioner to prove the efficiency of amalgam, as was the case tonight—that, when I hear so much about what amalgam has done, I feel tempted to show what it *has* done. I threatened to write a paper on this subject years ago, and collected from different practitioners who extract teeth a large number of teeth filled with amalgam. I remember that one of these colleagues sent me one hundred such teeth, and out of these only ten of the fillings had ever been polished in any way whatever, and those not on the approximal surfaces. I need not tell you why; you know the difficulties of making amalgam fillings and polishing them, especially in a patient who cannot afford to have it done right. If the patient cannot afford to pay for this work, the dentist cannot afford to have him come back the next day to have the filling polished, and, if the filling is not polished, there are spaces left for food to accumulate. If I could show you some of these teeth, and the masses of amalgam which must have been under the gum, extending almost as far over the margins as into the tooth—these teeth being supposed to be saved, but the cavities being out of sight —you would lose some of the faith in amalgam that is being engendered.

There, then, lies the problem that must be solved in regard to the inlay; we must find a substitute for gold, and here is a curious fact that, when amalgam is used as a substitute for gold foil, we do not necessarily displace the gold foil filling, but, if we find a substitute for gold, good enough for use in inlays, it will make gold inlays necessary. This problem is being attacked now in two or three quarters, and I believe that, in the not distant future, a perfectly good casting metal at a cost of $4 an ounce will be on sale, by the use of which the cost of cast inlays will be considerably reduced.

The aim of this whole beautiful paper has been to point out the need of a filling with which to *save* teeth, and we are just arriving at an appreciation of what the inlay can do, and that in the future we must do something more than save the teeth. We must absolutely restore the masticatory function, and while the credit for pointing out the possibility of this work must go to Taggart, we must also give credit to Dr. Young for pointing out to us that occlusion is of just as much importance to the operative dentist as it is to the prosthodontist and the orthodontist, and this is the message that I want to bring to you tonight.

A great many practitioners are drifting into specialties, and presuming to charge large fees for their specialist services; why should we not imitate the specialist's method? The orthodontist starts by making a set of models, studying the case and explaining to the parents what he must do, if he is to produce in the child a proper masticatory apparatus. The beautifying of the child is a secondary aim; the primary object is to put the teeth in such a position that the patient may masticate food, and the orthodontist points out that a proper masticatory apparatus will be conducive to proper nutrition, and that with such an apparatus the patient will possess a higher resistance to diseases that attack the body—thus, perhaps, by having his teeth correct, he may avoid the necessity of an appendicitis operation. The whole thought is that the correcting of malposed teeth means more to the patient than mere appearance.

Then comes the prosthetic specialist. He takes a set of models, studies the case, and then, with a certain amount of metal and porcelain combined, produces a denture with which the patient can "chew as well as ever" (which was never true once), but for that he is able to charge a specialist's fee, like the orthodontist.

Why do not the operative men do the same? I will pass around a set of models of the mouth of a lady who came to me because she had broken off the corner of a tooth that had been filled. I examined her teeth and found that she had paid an orthodontist a fancy fee to have her teeth regulated—and I knew therefore that she had an appreciation of occlusion. I asked her to let me take a set of models and show her what a poor masticating apparatus she had; and so, instead of patching an amalgam filling for her, I have undertaken to remove a number of shapeless amalgam fillings and large gold inlays, so that I might be able to restore these teeth by reconstructing the occlusal surfaces of eight molars. I am sorry to say that I have only finished one side at the present time, but some day I hope to have the models of the finished case to show you. This is only one example that I bring to your notice of the way in which I think we should treat these cases, viz, start in and take out all those amalgam fillings that may be *saving* teeth, all those cohesive gold fillings that may be *saving* teeth, all those non-cohesive Baltimore fillings that are *saving* teeth, but which are interfering with proper mastication of food by presenting flat occlusal surfaces.

In this connection I must emphasize that whoever says that the gold inlay is the quick method of filling teeth, does not understand the gold inlay method; and whoever says that the gold inlay must be used to the exclusion of every other method of filling, does not understand the purpose of the gold inlay.

We should "prove everything and hold fast that which is good," but just as we appreciate the fact that we must in the future do something more than simply save teeth, that we must cease being mechanics, and become physicians instead, and attempt to save the lives of our patients, just so much will we enter into a more perfect field of work rendered possible for the first time in dentistry.

Proper occlusal planes cannot be made with gold foil, because we cannot carve out the sulci and build up the cusps in the hard metal in the mouth. During the last winter I have re-carved, to the best of my ability, more than forty inlays that had been satisfactory to me when I inserted them, but since Dr. Young has shown us the proper appreciation of occlusal planes in a perfect masticatory apparatus, I have become ashamed of such work, and am attempting to undo it, and so have learned the difficulty of carving teeth as they should be.

While what Dr. Flagg said—"In proportion as teeth need saving, gold foil is the worst material to use"—may have been true, the reverse is true now, viz, exactly in proportion as teeth need saving, we must turn to gold, and such gold must be cast—and if we cast our bread upon the waters, it will come back to us after many days.

Dr. Rhein, New York. I wish to say at the outset that there are a great many of the essayist's aphorisms, if I may use the term, with which I am in thorough accord. I do not believe there is only one way to accomplish anything, and I believe good dentists, men who are really fitted to practice dentistry, can obtain very good results by several different methods. With regard to amalgam, I believe that as perfect a filling for saving teeth can be made with amalgam as with any material we have, but I believe it to be the most difficult material to properly work that we have at our command. Dr. Kirk, who is in the room, very likely remembers a very painful incident that occurred between us some years ago. I agreed to write the chapter on amalgam for the "American Textbook of Operative Dentistry," which I did; but for some time afterward I was a most unhappy individual—for two reasons: I had been giving clinics with amalgam, demonstrating the magnificent results that could be produced by it, but during that time I realized the fact which Dr. Ottolengui has so vividly portrayed to us, that amalgam as generally used means a needless destruction of teeth, because it is employed in dealing with caries in the teeth of the poor. I maintain that operative dentistry is nothing more nor less than a luxury, and that it is impossible to rightfully administer it to the poor, and when that is attempted, instead of becoming a blessing it is an absolute detriment to the people we are endeavoring to serve in this unworthy manner. So when I saw myself going down in history as the "amalgam man," standing sponsor for what I considered the most dastardly thing perpetrated on the human race, I wept bitter tears and put my manuscript in the furnace. This little chapter of history Dr. Kirk will probably recall; it occasioned some unpleasantness between us, and I am glad to make this explanation of my actions at that time.

I have amalgam fillings in the mouths of patients that I inserted thirty years ago that are as good today as they were then; whole buccal walls of molar teeth standing up as smooth and polished as a pane of glass, but this is simply due to the care and time taken in the insertion of these fillings. Speaking of the preservation of teeth for thirty years brings up the most interesting portion of the essayist's paper—the length of time that certain fillings will preserve teeth. There never was a more misleading impression produced upon the minds of people than in regard to this matter—for the reason that the great majority of people between the ages of twenty and forty-five are immune to caries, and it makes no difference what kinds of fillings are inserted—unless inserted in such a way as to produce some unnatural conditions—they will preserve the teeth. Cited cases of fillings mean nothing unless backed up by evidence that the individuals in whose mouths the fillings were inserted were not immune to caries. The gentleman whose mouth we had the pleasure of examining for a few moments this evening is a man who certainly in my judgment is absolutely immune to caries, and has been so for some time past, so that the fillings shown here before the meeting mean nothing in regard to their saving qualities in these particular teeth.

Getting down to the gist of the paper, which is the use of non-cohesive gold: I have used it, but I do not like it. As I said at dinner tonight, there is only one occasion on which I am in favor of the use of non-cohesive gold foil, and that is when I find it in a tooth in which the pulp has died and I want to get to the pulp quickly; under such conditions the filling is so soft that I can get into the pulp very quickly. These are the only occasions on which I am glad that non-cohesive gold may be used. While that statement represents my own individual feeling, successful operators like the essayist have found non-cohesive gold of great value. I wish to point out some of its defects as I see them. Dr. Ottolengui mentioned its greatest defect, and that is the difficulty of properly restoring the masticatory surfaces of the teeth. Reconstructive gold work was never properly understood until two years ago, when Dr. Young of New York enunciated the theory of anatomical restoration of the masticatory surfaces. In what it means for tooth preservation this transcends anything ever presented to dentistry up to that time. To be sure we have spoken of masticatory restoration in a general way. Taggart spoke of it when he brought out the casting process, but not in the absolute restorative sense in which Dr. Young has brought it to our attention.

The essayist says that at a competition between a Philadelphian and a Baltimorean, the Baltimorean succeeded in introducing more non-cohesive gold into a matrix than the Philadelphian who used cohesive gold. I do not know who the Philadelphian was, but I feel sorry for Philadelphia if her reputation is going to rest on such an operator. I am ready to enter a contest and agree to insert more cohesive gold into a given matrix than can any man with non-cohesive gold. I will put more cohesive gold into a given form than any man can cast with the inlay process with the same character of gold. I will agree to put in cohesive gold with a higher specific gravity than non-cohesive gold, and even higher than gold is ordinarily supposed to have. I have with me a plaster model of three teeth in which I inserted cohesive gold fillings several years ago, and since that time I have not disturbed these teeth except that from two of the fillings I have removed portions of the gold and at many different clinics have packed fresh cohesive gold on the original fillings—having done this to illustrate that when a person has mastered the art of manipulating cohesive gold it is easy to make a solid homogeneous filling with it. I have no use for pellets or for cylinders, and years ago I gave up the use of gold foil for this purpose, because I feel that I can best accomplish my purpose with rolled gold. The only essential is that the gold shall be absolutely pure and the operation clean from beginning to end.

As to the question of the time consumed in inserting a filling, I do not think that element should enter into the discussion, for the reason that the saving of teeth properly is a luxury. If it can honestly be made one of the necessities of life and given honestly to the poor, well and good; but we have not reached that time as yet.

This is what we find when non-cohesive gold is used in simple occlusal cavities: As soon as the patient loses immunity, at some point in the margin our explorer will crawl up between the gold and the wall of the cavity. It would not do this, however, a year or so before that, when our patient was in a condition of immunity.

Dr. Black in his able treatise on operative dentistry—and I do not approve by any means of a great many things he says on the subject—brings out with great emphasis the liability to recurrence of caries at gingival and approximal sites, as the result of what he calls the flow of gold from masticatory stress. We do not get that if the teeth are not in occlusion—of course not. I have seen most beautiful operations done by expert operators, and when I have said that the patient could not receive much benefit from these teeth in mastication, the operator has replied, "I am not going to have my work marred by having it chewed upon." It is strange how much work of that kind is to be found if you look for it. This is not operative dentistry, gentlemen, and when Dr. Black speaks of the compound approximal filling under stress as liable to give way at the gingivo-approximal angle he gave the advocates of non-cohesive gold their death-blow so far as its value as a tooth-preserver is concerned—and yet he went on advocating its use, and so do his disciples today. It is the lack of proper specific gravity in that portion of the filling which produces that flow of gold to which he had his attention called, and which I defy him or anyone else to show in any filling of cohesive gold when properly condensed. I use today the electric mallet the same as many men in this room, and have seen its use demonstrated many times by Webb. So it was with astonishment that I heard the essayist speak of Dr. Bonwill's using non-cohesive gold. He may have done so, but I saw Bonwill clinic hundreds of times and I saw him give clinics with the electric mallet, and I never saw him make a non-cohesive gold filling. I watched him closely packing cohesive gold more rapidly, I admit, than any man I ever saw use it. Did you, Dr. Darby, ever see Dr. Bonwill use non-cohesive gold?

Dr. Darby. I saw him use Abbey's non-cohesive gold, but heated to redness.

Dr. Rhein. Then it was cohesive! What difference does it make what gold we use?—it is cohesive gold when one piece sticks to another, no matter what gold we use. I do not use gold foil; I use rolled gold from sixty to one hundred and twenty thickness and with all the dexterity that I think one can display with No. 4 foil. It is simply a question of the individual. It is absurd, however, to speak of Dr. Bonwill clinicing with non-cohesive gold, for the reason that he used Abbey's gold and made it cohesive by annealing. I understand by non-cohesive gold that it is gold which, when not put into the flame, will not stick one piece to another, but instead one piece will slide over the other. There it is that the men in the Wedelstadt district place their greatest stress—on the kind of gold that they use. It must not cohere, so that there is space between the different cylinders.

In conclusion I wish to say that I am not an advocate of cohesive gold fillings as opposed to the cast inlay. I use the cast inlay every day; I use cohesive gold fillings every day, and I inserted an amalgam filling today, but I spent two hours in inserting it. I knew of nothing that would take its place in this particular case, and it was in the mouth of one of the most fastidious patients I have. I say this to emphasize one of the beautiful things the essayist brought out, namely, that every material has its proper place, and that all depends upon the judgment of the man using it. As to cast inlays, the unfortunate thing is that just as dentists seized upon amalgam and wrought all this terrible havoc, they are doing the same with the inlay. I claim that it takes more skill to put in a perfect inlay than it does a gold filling. I claim that the preparation of the cavity must be absolutely on geometrical lines or else the fillings will be imperfect. No cohesive gold filling will take the place of the cast inlay on the masticatory surface, when the inlay is properly made. I wish to emphasize strongly what Dr. Ottolengui said in that direction, because no living sculptor can be found who can carve out from a rough gold block a surface that will reflect the anatomical sulci so perfectly as can be done with the wax model before the inlay is cast—and there alone is where the superiority of the inlay rests, and where the inlay will gain adherents more and more as the point made prominent by Dr. J. Lowe Young, with regard to anatomical restoration of the masticatory surfaces, is more thoroughly understood.

Dr. Darby. I shall say but little, because the ground has been well covered. I am glad that Dr. Rhein called attention to the fact that Dr. Bonwill used gold in the cohesive form. I knew Dr. Bonwill before he came to Philadelphia, and saw him make a great many fillings, but his gold was always well annealed. He used Abbey's soft foil, but he was in the habit of heating it to redness, and it was just because of the cohesive property which the high heat imparted to the gold that he was able to work it so successfully with the electric and mechanical mallets.

In the earlier years of my practice I used nothing but Abbey's gold foil, usually of the non-cohesive variety. In all simple cavities it was used in the form of tape, and often the gold was not annealed until the last piece or two was applied to the filling—simply in order to give the filling a hard surface for finishing. I think Dr. Rhein is wrong in supposing that fillings made of non-cohesive foil are more often defective at the margins than those made of cohesive foil. My own observation would lead me to believe that as perfect adaptation can be made with non-cohesive as with cohesive foil. It is adaptation, not hardness of material, that saves teeth. Dr. Edward Hudson probably knew nothing of cohesive foil, and yet I have seen fillings of his that had lasted seventy years. Dr. Elisha Townsend used non-cohesive gold in making his beautiful fillings—although it has been said of him that his gold was placed on a plate and put in the oven of the kitchen range to heat it, before he packed it into the cavity.

Dr. F. D. Gardiner. I am very glad to have heard Dr. Sweeny's able paper. There are very many suggestions in it with which I heartily agree. The ground has been so well covered in the discussion that there is very little left for me to say. I would state, however, that I believe a filling material should be prescribed to meet the existing conditions; that we should treat caries of the teeth as a disease, and not as merely giving occasion for mechanical intervention. I would say also that I was taught to use non-cohesive gold on the wedge principle, and that I used it with a great deal of satisfaction and success for several years. Later I changed my methods of operating and used cohesive gold exclusively, because it was better adapted to my methods of cavity formation. Either will preserve the teeth equally well. Few operators learn to manipulate cohesive gold accurately. I was taught to use unannealed soft gold in connection with cohesive gold. I have seen operations performed by my preceptor, as beautifully as I have ever seen anybody make them, entirely of unannealed gold on the wedge principle, every layer of gold going to the bottom of the cavity and extending to the surface, and I defy anyone to distinguish those operations from the most perfect cohesive fillings ever made. I have inserted some myself over thirty years ago, and when I see them occasionally, it is only by looking at my records that I can tell whether these fillings were made of soft or cohesive gold.

Dr. C. C. Harris. I had hoped, on coming here this evening, that I would not be called upon to speak upon this subject. The discussion seems to have so completely covered conditions met with in the posterior teeth that there is hardly anything for me to add, except that I would like to emphasize, for the sake of the young operators present, that the building out or contouring of posterior teeth with non-cohesive gold was never advocated. I think all advocates of non-cohesive gold—of whom I am naturally one—intend, as far as possible, that all cavity surfaces should be covered with non-cohesive gold. Into this gold, cohesive gold can be introduced, particularly if the tooth is to be built out at an angle or is to be brought out in contour. I have been practicing over thirty years, and it is very rare and unusual for me to introduce an entirely non-cohesive gold filling. I line the walls well with non-cohesive gold, and then I introduce and pack cohesive gold. The one part of the mouth to which non-cohesive gold is especially adapted is the approximal surfaces of the six anterior teeth. I do not see how anyone who has ever learned the first principles of non-cohesive gold manipulation, and has any sense of the artistic and esthetic, can ever hope to get away from the use of this gold. There are few cases that come to my hands—if I get hold of these cases early enough—in which any gold will be displayed, and with that thought in mind I am going to pass around a case that may interest you, viz, a couple of fillings done by my father twenty-eight years ago. That is my style of work in anterior teeth.

The advantage of non-cohesive gold, after one becomes familiar with it, is that one can save the very thinnest of walls. I care not how thin or frail the walls may be, though they may be as thin as paper, I can cover them with non-cohesive gold and into that pack cohesive gold that will preserve the teeth indefinitely.

I had last summer—pardon the conceit of this remark, because it is not meant in any vainglorious attitude, but simply to prove the principle—a woman who said to me, "Doctor, those fillings are still standing in my front teeth. Do you remember that you told me it would be well worth the time and expense if they lasted only two years, and then, if necessry, to pursue whatever course might be required?" I looked at those fillings with some admiration, and asked how long they had been in the teeth, and she said about twenty-five years. Those walls were as thin as paper; you could see the gold through them, and probably you would not admire that work because of the fact that the walls were so thin, and it might be objected that they should have been cut away. We have a gentleman in Baltimore, Dr. Gingrich, who is quite an adept in and enthusiast for non-cohesive gold, and who uses non-cohesive foil exclusively, while I use cohesive gold in the body of the filling. I sent this lady down to him that he might see this work. He called me up later—and this is the part of his remarks that I hope you will forgive me for repeating—and said, "I want to say that the man never lived, does not live, never will live, who can duplicate that work. You know I think I am something of a non-cohesive gold worker myself, but I would never attempt such as that, nor do I appreciate how anyone else could attempt it. But while I say this, I have something else to say. I do not want you to feel hurt or think that I mean to depreciate your efforts, but I believe that is the only time you ever did it." Within the same month, a woman patient called with similar work in her mouth, even more beautiful as to clearness of margins, and I asked her how long ago the filling had been inserted. She said the work was done thirty years ago, when I was quite a youngster.

Do not understand me to say that my father never used cohesive gold; he used as much of one kind as of the other. Dr. Tucker, for whom in 1878 he built up a bicuspid into occlusal contact with the upper teeth, recently wrote me that this filling and porcelain fillings set with gold are still perfect. I think Dr. Sweeny will bear me out in the statement that this filling has every appearance of a shell crown.

If I can be allowed a few minutes further, I want to say a few words in demonstration of the value of this kind of work: Two years ago a lady came to my office inquiring for my father. I gave her his address, to which she went, and I regret that I did not keep her name and address, for the reason that I lost sight of her afterward. She had in her mouth twelve fillings in anterior teeth, some quite large and as beautiful and absolutely perfect as any operator could possibly make them. She told me that a portion of the work was done by him in 1860, and the rest in 1861, in Harrisburg, Va. Not one filling showed any imperfection or any sign of failure. Within the year past I had a young man in my office with exquisite non-cohesive gold fillings in the masticating surfaces of the lower and upper molars, and likewise such beautiful amalgam fillings as I had never seen before, and if amalgam will accomplish such results as that, it looks to me as though the inlay is a useless acquisition to the profession. These gold fillings were so perfect that I remarked to this gentleman, "You have as perfect fillings, with as beautiful margins, as I have ever seen. This work was evidently done by someone who was graduated more than twelve or fifteen years ago, because graduates of the last fifteen years have not done such work as this." I then asked him who did the work, and he said, "Dr. Darby, of Philadelphia." [Applause.]

In those cases, I do not care whether you pack cohesive gold into the center or not—I personally succeed by packing cohesive gold into the center—but I insist that every cavity shall have the saving lining of non-cohesive gold. I used Abbey's gold for this purpose as long as it was available to the profession.

Dr. Darby alludes to Abbey's gold being made cohesive by annealing. I would feel awkward and foolish not to agree with Dr. Darby, but I will say that one cannot make Abbey's gold cohesive in the sense of other cohesive gold, by annealing. It is, however, possible to do the following: If one is inserting a large filling, he can line the cavity with non-cohesive gold and then run the next ribbon through the flame, which helps the cohesive gold to take hold, but does not render it cohesive in the sense that cohesive gold is adhesive.

Dr. Sweeny (closing the discussion). The hour is very late, and in view of the fact that the only gentlemen who have really offered any contention have left, it hardly seems charitable to say much in rebuttal of their testimony.

It is useless for me to say how thoroughly I appreciate your reception of my effort—it is a great gratification to me. But, great as that gratification is, there is another which vastly transcends it, viz, that arising from the very hearty and unmistakable manner in which so many have testified to their appreciation of a scientific fact. By your testimony in that direction you have simply added to the long chain of evidence that you are indeed exactly what you claim to be, namely, a body of true scientists and true professional men, and that, as such, you desire above all else knowledge and truth, and you want that knowledge no matter what theories may be affected by its promulgation—that is what affords me that greatest satisfaction. If I could afford to take up your time, I might say a little in rebuttal of the statements of Dr. Rhein, but I will answer briefly.

Here is a tooth [demonstrating]—a very commonplace-looking affair as you look at it casually; it has a fair-sized, plain-looking filling in the center, such as all of you have seen thousands of times, and, on the face of it, it does not mean anything at all, but when you realize that it was put in by Dr. Cockerille in 1863, and that the tooth was extracted by Dr. Gingrich in 1911, it is a pretty good rejoinder to Dr. Rhein's statement that, if conditions tend to the production of caries, we will be very apt to find little pits around the margins. My experience has always been that one is more apt to find them around margins of cohesive gold fillings. I want to pass this around, and wish you to observe that conditions which promote caries exist, because there is a cavity on the side of the tooth.

I can scarcely refrain from saying a word or two in reply to the two gentlemen from New York. That was a pretty fair and reasonable statement by our friend from New York, but it hardly measures up to the standard of what he has before announced to you as to his views on this subject.

I have not been as long or as actively engaged in the practice of dentistry as some of my *confrères,* but I have spent quite a little while at it, and, if there is any consideration whatever in filling teeth that is of greater importance than saving the organs, then I am under a sad misapprehension of my duties. If it should be proved in time that we can get this restoration of occlusal surfaces and possibly more restoration of contour and an equal, or even, if you like, a greater amount of efficiency in the direction of tooth preservation, then indeed the passing of the gold filling will have been fully accomplished. But we have not advanced to that stage as yet, and I am strongly inclined to think that, no matter what advanced ideas we may take up, when we attempt to inculcate those ideas into the minds of our patients, and tell them that there is any consideration whatever which can outweigh, or that all other considerations combined can outweigh, the saving and preservation of their teeth, we will be likely to find a tremendous majority coming from Missouri, and they will want conclusive and substantial evidence.

Though I regret to have to tire you on personalities when there is no opportunity for rejoinder, I am almost of the opinion that if our distinguished colleague, who unfortunately was compelled to leave us, had in his own molars some such fillings as those which Dr. Niman has so kindly offered for your inspection, or some like those of Dr. Bonwill's patients—conscious though they may be of the fact that the missing portion of the occlusal surfaces of the teeth were not reproduced in ideal perfection, but in so thoroughly practical a manner that they were never conscious of any deficiency in the performance of the act of mastication—I think it would be safe to say that he would hesitate a long time before he would consent to the removal of a single filling in order to make place for the most perfectly formed inlay that could be made.

My chief object in coming before you was not to exploit anything whatever to the exclusion of anything else of value, but simply to try and impress upon your minds, with all the earnestness possible—and especially on the young men, who are to be here long after many of us have gone—the importance of the fact that, while they are waiting for the perfection of the inlay process—waiting for that long-sought panacea, the perfect filling—they may avail themselves during that interval of something which has so long succeeded as a preserver of the teeth. That, gentlemen, is the principal object of my coming before you.

Again I do not wish to be personal, but there is a dear young friend of mine, sitting in this audience, who holds a teaching position in one of our colleges, and who told me not long ago that he did not know anything about non-cohesive gold; that he had never used a scrap of it, and had never seen a particle used, and when I told him that an entire book of non-cohesive gold could be packed into a tooth in a quarter of an hour, he raised his eyebrows, and although he was too polite to say so, looked very much as though he thought I was romancing. But, gentlemen, you can do it, and for the benefit of these young gentlemen I would say that until you know that you have something better, hold fast to that which has proved itself to be very good. You cannot hope to become, in a short while, as proficient in the use of non-cohesive gold as were the old masters—maybe not one of you will attain such perfection, but that does not really matter, because anyone who will bestow the same amount of care and attention that is being bestowed today on inlays, can learn to make thoroughly substantial and durable operations.

The meeting then adjourned.

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EDITORIAL DEPARTMENT.

THE INTERNATIONAL DENTAL FEDERATION—"F. D. I."

IT is now thirteen years since the F. D. I. was organized, at the close of the Second International Dental Congress, held in Paris in 1900; its annual meetings have been uninterruptedly held each succeeding year, the latest having convened at the Hague, August 27th, 28th, and 29th of the present year. As we have pointed out in these pages on previous occasions, this international body came into being not as the expression of any selfish or local professional interest, but as the spontaneous materialization of a generally felt need for an arena in which might be threshed out in debate those fundamental problems affecting the progress and development of dentistry as a whole, and especially the relations of dentistry to society at large and to the public service.

In the very nature of the case, because of the international character of the organization and its cosmopolitan membership, it was at the outset understood and clearly specified in the organic law of the body that its functions were purely consultative and advisory—that it did not desire nor could it acquire any legislative attributes effective outside of its own membership; that its usefulness, apart from the opportunities which its meetings afforded for the discussion of problems of international interest, rested solely in the weight which its conclusions might derive from the character and professional reputation of its members and such value as would attach to their findings as expert authority. In short, the sole influence which, in the nature of the case, it is possible for the F. D. I. to exert upon dental professional advancement is a moral influence, directive and advisory in its method. Upon that basis, and without legalized authority to enforce its conclusions, the work of the F. D. I. has proceeded during the thirteen years of its existence, showing each year an increasing and enlarging influence in its harmonizing and unifying effect upon the policy and activities of dentistry as manifested in the several nations of its constituent membership.

Each nation has felt that its dental professional activities required the stimulation of comparison and competition in order to shake off the incubus of provincialism that inevitably impedes progress in any direction where a nation or an individual lives, or attempts to live, a self-contained life. The process of evolution of dental training, dental legislation, dental procedure and practice, in the several countries of Europe and America respectively had developed peculiarities of method characteristic of each, and it was generally felt that opportunity for discussion and comparison of ideals and methods would not only be mutually helpful, but would tend to put the world's dentistry upon a more stable and uniform basis. The creation of the F. D. I. supplied the forum in which dental professional problems could be discussed from an international viewpoint; and since its establishment its members have had the great satisfaction of witnessing the ever-increasing influence which it has continued to exert in advancing the ideals and purposes which brought it into existence.

It is worthy of note that wherever the F. D. I. has met in Europe it has always been under the highest governmental patronage or under the auspices of the constituted educational authorities of the country. It has thus contributed to improve and advance the social relations and status of professional dentistry in a way and to a degree not possible for any less cosmopolitan organization to do. If the F. D. I. had done nothing more than what it has accomplished in a purely incidental way for the larger social recognition of the dental profession it would have amply justified its existence. It has, however, done more than any other single influence to modify and unify the standards of dental education in the several countries represented in its membership. Its earlier period of activity was concerned more particularly with the great underlying question of the educational features of the dental professional curriculum—for it is a self-evident proposition that divergences of method in the professional education of practitioners result in corresponding differences of ideals and methods in dental practice; hence a fair degree of unanimity in educational methods becomes an essential prerequisite for the unification of standards of professional practice. The discussions of the educational problem by the F. D. I. through several annual sessions resulted in the concerted recommendation of a plan of curriculum which has since been either wholly adopted or at least has served to extensively modify the curricula of the dental educational institutions whose nationalities were severally represented in the membership of the international organization. In the accomplishment of this purpose the F. D. I. has promoted a step which has distinctly advanced the work of unification of the standards, both educational and legislative, of the dental profession of the world.

The universal interest which has been aroused in the public service relations of dentistry is a question with which the F. D. I. has been definitely concerned, and with which at the present time it is most prominently occupied. The conditions which determine or modify the relations of dentistry to the public service in the several countries of the world are extremely varied and complex, being the reflex of social and governmental conditions in each of the countries concerned. The F. D. I. therefore logically becomes the arena in which these differences may be best studied, and where the influences may be put in motion leading to their proper adjustment. The meetings of the Hygiene Commission have constituted a clearing-house of ideas in relation to the public dental service in all countries, and for the present the deliberations of this commission are the most important and valuable activity of the F. D. I.

The public service question has not been allowed, however, to overshadow certain other activities of this important international body. Its established purpose of stimulating scientific research is practically manifested in the creation of the Miller prize annually awarded for the highest attainment in dental science or practice, constituting an honor not second to any within the gift of the dental profession and a stimulus to scientific and professional attainment in dentistry throughout the world.

The official relation of the F. D. I. to the authorized series of international congresses was early established, having been confirmed by the congress at St. Louis in 1904 and at each subsequent international dental congress;—for which reason, together with the others already referred to, it is important that in the consideration of our national and state organizations and their multifarious relations and interests we do not lose sight of the significance of this great international organization, in which our own national body is officially represented. It is especially pertinent at this time that the leaders of our national body keep in touch with the activities of the F. D. I., in view of the approaching congress to be held at San Francisco in 1915, in connection with the Panama Pacific International Exposition—for if that congress is to have a *de facto* "international" character it should become officially allied with the F. D. I. in order to avail itself of the general and weighty influence of that body, especially throughout Europe.

Note.—Dr. VAL. MACDONALD, whose article, "A New Method of Treating Empyema of the Antrum," was published in our May issue, calls attention to a typographical error on page 501, viz: *For* "salol solution" *read* "SALT solution." Referring to the method he mentioned, of placing the indifferent electrode *under the chin,* and employing a special headgear for its application, he writes that he does not now consider the plan to possess any special advantage. He says: "In all ionic treatment I now apply it to the wrist, or even allow it to be held firmly into the palm of the hand."—ED. DENTAL COSMOS.

Bibliographical.

The Ontogeny of the Primate Teeth.

Die Ontogenie der Primatenzaehne. [Odontologische Studien I.] Versuch einer Loesung der Gebissprobleme. Von Dr. L. Bolk. Ss. 122, 2 Tafeln, u. 74 Abbildungen. Jena: Gustav Fischer, 1913.

This is a comparative study, concentrating on the very earliest steps in tooth development. The results, if confirmed, will necessitate a radical revision of the usual descriptions based on Röse's classic of 1891.

In this study, Bolk has examined the several teeth, at different ages, in eight primate species, including man. He has used the wax-plate reproduction method to confirm the study of serial sections.

He describes four structures which may almost unconditionally be said to have been hitherto absolutely unknown. These are (1) the lateral enamel ledge, (2) the enamel crypt, (3) the enamel septum, (4) the enamel navel. These structures are seen in both deciduous and permanent teeth.

The lateral enamel ledge is a wing-like or buttress-like outgrowth from the dental ledge, arising separately for each tooth. It projects laterally (labially or buccally) and attaches to the lateral side of the enamel organ in all cases. In isolated transverse sections the lateral ledge and dental (mesial) ledge give the impression that the enamel organ is connected with the oral epithelium by two strands.

The enamel crypt is a niche, having the dental ledge for its mesial wall, the lateral ledge for its lateral wall, and the top of the enamel organ for its floor. Its cavity is filled with mesenchyme, which is in wide connection with the jaw mesenchyme. In the incisors this opening is directed proximad, in M_3 distad. Between these teeth the transition is gradual.

The enamel septum we must describe from a different viewpoint. Instead of one center for the differentiation of the enamel pulp, Bolk has found two—one mesial (lingual) and one lateral (buccal). Between these, for some time, exists an area of undifferentiated cells in the form of a septum running in an approximo-distal direction. In transverse sections it stretches from the external epithelium of the enamel organ to the stratum intermedium. This septum divides the body of the enamel organ into a mesial and a lateral division.

The enamel navel is a groove or depression in the external epithelium of the enamel organ, just at the point where the septum touches this layer. This groove further accentuates the division of the enamel organ into a mesial and a lateral half, suggested by the septum.

Bolk offers a semi-hypothetical account of the process by which the above structures and their relations are produced. He interprets these facts as meaning that each primate tooth arises by the fusion of two separate *anlagen*—that is, each primate tooth is a double structure, equivalent to two reptilian teeth. The theory is therefore termed the Dimeric. The lateral division of the mammalian enamel organ is the *protomere,* the mesial division the *deuteromere.*

There are three principal objections to this theory. Bolk takes up each separately and decides that none of them is insuperable.

To generalize his theory for the mammalia, he studied series from four other orders, and finds therein these same structures.

Chapter III deals with the "accessory ledge." This is almost a side issue to his main argument, but is introduced to make clear some points in Chapter IV. This ledge is generally interpreted as evidence of a prelacteal dentition. Bolk homologizes it with that ledge from which the glandulæ labiales are developed in certain reptiles. He has found no evidence in favor of a prelacteal dentition, and doubts its existence.

The fourth and last chapter deals with the relation between reptilian and mammalian dentitions. In its essence it has been already abstracted (see DENTAL COSMOS, January 1913, p. 102). Bolk has in the course of this monograph reported many other very interesting observations, but they are relatively details and cannot be given here.

Bolk's theory is a praiseworthy attempt to compromise between the theories of differentiation and concrescence. In brief, this compromise is as follows: In the reptilian ancestor of the mammals a triconodont *differentiation* had been instituted. So much is in agreement with the views of Cope, Osborn, etc. Two such triconodont teeth—one buccal, one lingual—became fused. This is the peculiarly mammalian process, and therefore, is the origin of the mammalian tooth. Bolk allies himself essentially with Röse. This fusion of two triconodont teeth, the lingual side of one to the labial side of the other, would yield a six-cusped element as the typal mammalian tooth. The principal variations in cusp topography among the mammalian orders arise by a secondary reduction of this six-cusped tooth.

This supposition of Bolk's permits the utilization of much paleontological evidence collected by Cope, Osborn, etc. It employs all the embryological evidence advanced by the classical concrescence theory, and it eliminates the confusing and unwarranted assumption that each cusp of the mammalian tooth represents a single reptilian cone tooth.

However novel this Dimeric theory appears, it is nevertheless interesting to note that in 1911 d'Éternod read a paper before the twenty-fifth meeting of the German Anatomical Society, in which he held that "Toutes les dents humaines sont des bicuspidées modifiées," and promised later to publish researches of thirty years in support of this view.

Of more immediate interest to the dentist are the structures newly observed by Bolk. His report demands a restudy of the initiation of tooth development in man, and if found warranted, prompt revision of our present text-book description.

As the second study in this odontological series, Bolk promises to report on "The Anatomy of the Primate Dentition."

J. L. APPLETON, JR.

PAMPHLETS RECEIVED.

"Der Hohe Gaumen." (High Palate.) By Dr. R. Landsberger, Berlin. Reprinted from *Archiv fuer Anatomie und Physiologie*, 1912.

"Schutzvorrichtungen der Zaehne." (Defensive Mechanism of the Teeth.) By Dr. von Wunschheim, Vienna. Reprinted from the *Oesterreichisch-Ungarische Vierteljahrsschrift fuer Zahnheilkunde*, 1912.

"Ueber die Anatomischen Veraenderungen des Unterkiefers bei einigen Stellungsanomalien der Zaehne unter Zugrundelegung der Roentgenologischen Befunde." (On the Anatomic Changes of the Mandible in Certain Anomalies in the Position of the Teeth, with a Report of X-ray Findings.) By F. Hauptmeyer, Essen. Reprinted from *Deutsche Monatsschrift fuer Zahnheilkunde*, 1913.

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"Anfertigung von Porzellanfacetten und Platinkappen mit Porzellanbissflaechen." (Making of Porcelain Facings and Platinum Caps with Porcelain Masticating Surfaces.) By Dr. E. Wuensche, Berlin. Reprinted from *Deutsche Zahnaerztliche Zeitung*, 1912.

"Theoretische und Praktische Studien ueber Zahnzemente." (Theoretical and Practical Studies on Dental Cements.) By Dr. H. Chr. Greve, Munich. Reprinted from *Deutsche Monatsschrift fuer Zahnheilkunde*, 1913.

REVIEW OF CURRENT DENTAL LITERATURE.

[*Archiv fuer Zahnheilkunde*, Dresden, January 1913.]

SILVER NITRATE AND ITS APPLICATION IN DENTAL PROPHYLAXIS. By DR. F. BROSIUS, BERLIN.

The various uses of silver nitrate and its generally acknowledged though not generally enough used advantages are discussed by the writer under a classification of six groups, the first being the deciduous teeth and the first permanent molar. In these teeth, a from 30 to 40 per cent. solution is applied with cotton and a pointed orange-wood stick to all pits and fissures, which have been previously freed of any adhering food débris by an explorer. The tongue and lips are protected with a linen napkin. In carious teeth, any portions of leathery decay are removed with sharp excavators, care being taken not to come too near the pulp, as silver nitrate, if applied to an exposed or nearly exposed pulp, invariably produces a purulent pulpitis. The fundus of the cavity is saturated with the silver nitrate solution, which is allowed to act for several minutes, and the cavity is filled with oxyphosphate cement. In very sensitive teeth a twist of cotton saturated with the solution may be laid in the cavity, and sealed-in temporarily with Fletcher cement. The second deciduous molar should be cleansed mechanically, as well as by silver nitrate chemically, in order to prepare the field for the eruption of the first permanent molar, which in turn, when erupted, should be carefully observed, and the fissures of which should be treated prophylactically as described.

The writer applies the silver nitrate to the cervico-approximal, cervico-buccal, and cervico-lingual cavity margins before inserting fillings, thereby preventing the recurrence of caries in these most vulnerable areas. If the drug is applied carefully and the cavity preparation is correctly made, the discoloration at the cervical margin cannot be seen.

During periods of great nervous tension, as in pregnant and hysterical women, men suffering with nervous breakdown, convalescents, and during puberty, the progress of caries and the hyperemia of the gingivæ can be prevented to a great extent by painting the lingual tooth surfaces, especially their cervical portions, with the silver nitrate solution, and observing a strict dental hygiene.

In atrophy as well as hypertrophy of the gingivæ, painting with silver nitrate solution, in the former condition combined with massage, is favorably indicated.

Single teeth in old persons, abutment teeth, teeth in contact with artificial dentures, and teeth which bear clasps, can be successfully preserved for a long time by repeated silver nitrate treatment, which is also indicated as a prophylactic measure against the formation of chemical erosions.

The black discoloration can be removed by touching with tincture of iodin or sal ammoniac.

[*Therapeutic Gazette*, Philadelphia, July 15, 1913.]

UNTOWARD RESULTS OF QUININ AND UREA HYDROCHLORID AS A LOCAL ANESTHETIC. REPORTS OF THERAPEUTIC PROGRESS.

This abstract contains an interesting report of several cases of untoward effects of quinin and urea hydrochlorid, the danger of the application of which as a local anesthetic in dental practice has been pointed out before in these columns. (See DENTAL COSMOS for February 1913, p. 169.) In every case cited, extensive sloughing was noted, and the healing process was considerably retarded. In one case of Dr. Arthur Hebb's an extensive abscess followed the use of a one per cent. solution. Again, in another case, the injection of a two per cent. solution of this anesthetic mixture was followed on the third day by a rise in temperature to 103° F., which continued daily for four or five days. Not until the fifth day did the wound show any sign of breaking down; on the fifth day, there was a distinct slough of considerable size beneath the mucous membrane which, after a few days, broke down, followed by a discharge of liquid pus. A similar result has been reported by Dr. H. H. Rightor. Though the anesthesia was perfectly satisfactory, considerable discoloration of a violet hue was observed on the day following the operation, lasting for five days. The anesthesia of the tissues persisted all this time. On the seventh day there was a foul odor and well-marked localized gangrene, extending to the line of infiltration entirely around the line of incision, but no suppuration, necessitating the removal of the gangrenous mass with tissue forceps.

The cases reported surely warrant extreme care in the daily as well as casual employment of this solution in dental practice.

[*Zanaerztliche Rundschau*, Berlin, May 4, 1913.]

THE PROBLEM OF ROOT-CANAL FILLING IN CONNECTION WITH ROOT RESECTION. BY DR. B. MAYRHOFER, INNSBRUCK.

Opinions are still divided as to whether, in a tooth the root-apex of which is to be resected, the canal should be filled before, during, or after the operation. The last method has practically been abandoned, since after resection of the root, the wide aperture of the apex allows the invasion of blood and serum into the root-canal, and irrigation of the root-canal with strongly antiseptic solutions is not only insufficient, but very harmful to the healing process of the alveolo-gingival wound. Whenever possible, Mayrhofer fills the canal before resection with balsam of Peru and round gutta-percha points sterilized in alcohol. These points are introduced by means of sterile pliers, the beaks of which are oval and allow of easier manipulation of the points than flat-nosed pliers, and packed as tightly as possible by means of a strong, rigid root-canal probe of suitable angle. In this way the mechanical obturation combined with the bactericidal action of the balsam of Peru prevents the recurrence of bacterial growth. If any gutta-percha is forced through the apical foramen, it does no harm, as the apex is resected subsequently; on the contrary, any protruding gutta-percha acts as a guide during the operation of resection. If a root-canal cannot be filled to the apex, owing to its tortuous form or its narrow lumen, or if blood or serum persistently invades the root-canal, Mayrhofer finds root-canal filling during the operation excusable. Even in such cases, however, he prefers to obturate the uppermost portion of the root-canal, which is subsequently resected; he then carefully cleanses and sterilizes the remaining portion of the root-canal, and fills it with balsam of Peru and gutta-percha points in the manner described. If, as it sometimes happens, the filling of the canal causes excessive pain, an anesthetic can be forced through the root-canal. It is always advisable to make the root-canal filling and apical resection in one sitting, and to close the gingival wound by suture, thereby insuring a very rapid process of healing.

[*Journal of the American Medical Association*, February 22, 1913.]

THE SERPENT'S TOOTH IN FORMALDEHYD. BY DR. W. E. MORGAN.

[*Le Laboratoire et le Progrès Dentaire*, Paris, March 16, 1913.]

SEVERE FORMALDEHYD INTOXICATION. BY J. WATT.

The reckless freedom with which formaldehyd solution and its derivatives are used in hospitals, by surgeons, dentists, boards of health, and food preservers, leads the writer to call attention to the dangers attendant on the use of this most insidious drug, which have been pointed out in former issues of this journal. (See DENTAL COSMOS for February and September 1913, pp. 147 and 957.) There is no doubt that a personal susceptibility has much to do with the effects, but the number of unfortunates who, with the best intentions, have been using this drug, especially since Dr. Buckley's introduction of tricresol formalin, is becoming so great as to place formaldehyd at the head of the list, not excepting the X rays, of irritants of the skin and the mucous membranes, while its results are so serious as to leave those tissues peculiarly weak in their resistance to other irritants.

Since formaldehyd has been announced as the proper ingredient for the denaturing of alcohol, the amount designated being one part of the forty per cent. formaldehyd solution to 250 parts of alcohol, the use of this denatured preparation for surgeons' and dentists' hands and in the operating room in general has produced an appalling number of untoward accidents of the kind described above. The writer relates his own experience with a chemical dermatitis of four weeks' standing, due to formaldehyd, the affection assuming very disagreeable and extremely painful proportions. Like all other chronic forms of dermatitis, the affected surfaces are peculiarly susceptible to heat and cold, alkalis and acids. Soaps made of animal fats, ointments containing animal fats such as lanolin or lard, emollient preparations like cold cream, and the viscid liquid preparations so universally used for chapped hands and face, should not be employed in these conditions; are all intensely irritating and provocative of profanity, while the soaps made of vegetable oils and the vegetable or mineral oils themselves are very soothing.

Solutions or ointments containing lead, zinc, tar, oil of cade, ichthyol, and the various combinations of salicylates and pyrogallates are all temporarily beneficial in formaldehyd dermatitis, but seem to be provocative of new circles of intensely burning and itching, red, minute papules of acute character at the margins of the old. So many members of the medical and dental professions have been invalided physically, incapacitated for professional work, deprived of livelihood and rendered nervous wrecks by this peculiarly subtle and all-pervading vaporous poison, that it should be relegated to the uses of the undertaker and pathologist only, and only then used with extreme care. Every practitioner should be as careful in the use of formaldehyd as he would be with a bottle of bromin—for, once stung, repentance is vain.

In view of the fact that formaldehyd is now known by experience to be so dangerously irritant, not only to the skin but also to the mucous linings, as in the eye, mouth, and nasal passages, and because its efficacy as a germicide and disinfectant is now seriously questioned by some of our best pathologists and masters of sanitation, and since its special use in root-canal treatment can be supplanted by that of several other and no less efficient drugs, may we not wisely discard it altogether?

For the benefit of his fellow sufferers, the writer outlines the best attitude toward formaldehyd thus: (1) Avoid it entirely. (2) Wash the hands or affected parts not more than once a day with lukewarm water and a vegetable oil soap, such as Castile. Avoid green soap made with a fish oil or any animal oil soap. At other times use olive oil or cottonseed oil for cleansing purposes. A little phenol added to such oil—ten minims to one ounce—keeps it from becoming rancid and adds to its soothing quality. (3) Apply to the affected parts, two or three times daily, an ointment made of zinc oxid one part, starch two parts, and petrolatum eight parts. During the vesicular and acute stage this should be applied without friction; but after the epithelium becomes dry, and the derma somewnat thickened and scaly, the ointment can be rubbed in, and the zinc reduced somewhat. (4) Avoid all powders except sterilized starch, and then during the vesicular stage only. (5) Rubber gloves cannot be worn for more than from three to five minutes without producing marked irritation by reason of the confined perspiration. (6) Wear a cotton protecting sleeve or glove, or both, night and day, until thoroughly healed. Silk or woolen goods cannot be allowed to touch or rub the affected part without producing irritation.

Watt investigates the effects of commercial formaldehyd, viz, a 40 per cent. aqueous solution, when taken internally, and remarks that the toxicity and symptomatology of this irritant poison are still little known. He reports the case of an alcoholic of sixty-three years of age who had taken about 28 grams of commercial formalin intended for purposes of disinfection. He was brought to the hospital in a state of complete unconsciousness, and died despite syringing of the stomach, administration of stimulants, and artificial respiration.

The symptoms observed in the various cases described by the writer differ greatly, evidently according to the quantity of the drug ingested. Tendency to vertigo, loss of consciousness, and more marked involvement of the respiratory apparatus than the circulatory system are noted in almost all cases. The predominance of cerebral symptoms which are rapidly followed by death does not allow enough time for the phenomena of irritation of the heart and digestive system to develop fully, except for initial vomiting. In conclusion, Watt places the toxicity of formaldehyd on a par with that of phenol.

[*Zahnaerztliche Rundschau*, Berlin, January 19, 1913.]

PHYSICAL STUDIES ON IMPRESSION COMPOUNDS. By Dr. F. Schoenbeck, Leipzig.

The plastic impression materials used in dentistry are composed chiefly of resin and stearin, to which, for the sake of obtaining a certain consistence, fillers such as talcum are added. Some dyestuff and a few drops of an ethereal oil improve appearance and taste. Under a low-power microscope these materials present the picture of a uniform surface, permeated with fatty acid needles, particles of coloring matter, and grains of the filler employed. Besides these we observe more or less dissolved resin particles, which are easily recognized by their yellow color. The size of these resin particles directly influences the plasticity of the material, which should possess the following properties: It should soften at a temperature higher than that of the mouth, should possess great plasticity, uniform structure, should give a sharp impression, should not stick, should harden quickly in the mouth, and should not contract or expand to any great extent, though a slight expansion is not detrimental. The temperatures at which the various impression materials tested became soft and workable varied between 41° and 45° C. The size of the grain of the filler employed greatly influences the plasticity of the material. The amount of contraction in an impression compound can be determined—First (and unsatisfactorily), by a ruler and calipers; second, by the micrometer. The tests carried out by the writer with the micrometer method showed in the various brands examined a variation in contraction of from 0.005 to 0.035 mm. For very delicate measurements he uses a telescope the lens of which is provided with a micrometer scale. A rod of impression material, about 5 cm. in length and ½ cm. in diameter, is fastened to an upright glass rod. After cooling, the length of the impression material is marked on the glass rod, which is immersed in a square water-bath. The temperature of the water-bath must be regulated so that the impression material will soften but will not become distorted. The mark made on the glass rod is observed through the telescope and noted, and the same observation is repeated after the water-bath has cooled down to room temperature. A comparison between the two observations will determine the amount of expansion or contraction that has taken place. For still more accurate measurements, a combination of the telescope described and two micrometers has been used by the writer.

On the whole, the volumetric changes in impression materials do not differ very widely, since a difference in temperature of only about 20° is to be reckoned with, the various materials being workable at from about 40° to 60° C.

If placed in boiling water, the composition of modeling compound is altered entirely. Fatty acids and resin particles are dissolved or melted out, and the change in the quantitative ratio of the materials contained in the compound naturally alters the physical behavior of the mass.

In order to obtain a homogeneous, plastic mass, the softened compound should be kneaded thoroughly, microscopic examination showing a much more uniform distribution of the filler in the kneaded mass. Kneading also discloses any large particles of resin which may be embedded in the compound, and which can be easily removed before taking an impression.

[*L'Odontologie,* Paris, May 15, 1913.]

IODIN IN DENTAL THERAPEUTICS.

By Dr. Siffre.

With all its excellent qualities, iodin has one great fault, viz, it is volatile, and even the greatest precautions cannot prevent the dispersion of its vapor, which attack metals such as steel, nickel, silver, or German silver, and produces discoloration even in porcelain. But this very quality of vaporization renders this drug valuable in dental therapeutics, especially in dental caries. First of all, iodin does not produce pain when applied to hypersensitive dentin or to pulp. In fractures in children's teeth, the continued daily application of the alcoholic tincture of iodin stimulates the pulp to the formation of secondary dentin, disinfects the fractured surface, and saves the tooth for ulterior restoration by an inlay, a filling, or a pivot tooth, the iodin preventing suppuration and death of the pulp, or chronic pericementitis, which would otherwise follow such an accident. Iodin is especially favorably indicated in carious teeth of children who are unwilling or unable to have fillings inserted. In cavities in deciduous teeth, the writer recommends the introduction of a pellet of cotton saturated with ordinary tincture of iodin, or oil of geranium with 10 per cent. iodin, this application being very simple and abating the pain in pulpitis. After a few daily applications, the tooth is sterilized, and gingival fistulæ disappear.

In order to insure full benefit of the iodin, which in the alcoholic tincture volatilizes too rapidly, the aqueous solution is preferable. This is obtained by adding iodin crystals to an aqueous solution of potassium iodid, in which iodin can be dissolved in all proportions. As an excellent formula, Siffre recommends the following: Iodin crystals 1 gram; potassium iodid 0.50 centigram; glycerin, a few drops, to cover the I and KI, which are allowed to dissolve by stirring from time to time. The resultant liquid is thick and very stable, and emits only very little vapor, so that it can be preserved in a bottle covered with a bell jar. Repeated application of this iodin-glycerin on cotton sealed in cavities with gutta-percha and left for a week prevents recurrence of caries. The glycerin is removed from the cavity before final filling, by wiping with alcohol and drying with hot air. If any other metal but gold, which is not attacked by iodin, is used for the filling, such as amalgam, silver, tin, or copper, an iodid of these metals will be formed which, by its antiseptic action, prolongs the life of the tooth. For treating root-canals, a paste of iodin, glycerin, and tannin, which hardens and produces relatively little discoloration, can be used advantageously. At any rate, any stains can be removed satisfactorily by repeated washing with alcohol and drying with hot air.

Periscope.

Preventing Solder from Flowing.—Any portions of a crown or bridge to which it is undesirable that solder should flow are coated with ordinary ink, after heating the piece. The borax is subsequently applied, and the solder will be confined to the desired areas.—*Journal Odontologique*, per *Sud-Est Dentaire.*

Clasps of Cast Gold Contra-indicated.—The casting of gold clasps is not to be recommended. The elasticity of the gold, essential in a clasp or spur, is destroyed by casting, while in drawing or swaging this quality of the material is preserved.—*Le Monde Dentaire,* per *Revue Trimestrielle Belge de Stomatologie.*

Desensitizing Hypersensitive Dentin.—If, in excavating a cavity, hypersensitive dentin prevents further progress of the operation, a solution of equal parts of zinc chlorid, tincture of iodin, and distilled water is applied on a pellet of cotton to the cavity for from two to three minutes. If necessary, the application is to be repeated.—*Oesterreischische Zeitschrift fuer Stomatologie.*

Preventing the Sticking of Modeling Compound.—In order to prevent the sticking of softened modeling compound to the fingers of the operator and burning them, the hands should be thinly coated with vaselin oil. By applying a thin coat of the same oil to the surface of the soft compound, its adhering to the teeth or mucous membrane, hence distortion of the impression, is avoided.—*Journal Odontologique,* per *Sud-Est Dentaire.*

Leukoplakia Cured in Four Days by an Injection of Salvarsan.—In the case reported, the patient, a smoker, with syphilis of five months' standing, was unable to take food or use tobacco. The injection of the salvarsan was but slightly painful, and the patient was able to go about his business without interruption. Healing ensued within four days. A similar remarkably rapid cure of smokers' patches in a syphilitic by salvarsan was reported in 1910 by Balzer.—*Revue Dentaire,* per *Revue Trimestrielle Belge de Stomatologie.*

Inserting a Shell Crown on Posterior Teeth.—In adjusting a shell crown on upper or lower molars, fingers and thumbs are much in evidence. To overcome this a strong spatula of steel, ivory, or bone about five-sixteenths inch wide is selected, and a piece of base-plate gutta-percha large enough to engage the occlusal surface of the crown is stuck on one end of this spatula, thus holding the crown for adjustment and final setting.—G. A. Bowman, *Dental Brief.*

Articulating Paste.—A very convenient and useful means for ascertaining the points of contact in setting porcelain inlays and articulating artificial dentures by the anatomical method may be supplied by mixing ivory black and glycerin to a thick paste. The opposing surfaces are wiped dry, and a small quantity of the paste is painted on the occluding tooth. On closing the mouth, the point of contact will be plainly marked.—D. W. Barker, *Dental Digest.*

Advantage of the Decimal System in Measuring Fluids.—The selling of fluids by weight is really the simplest. It is only necessary to place the bottle in the scale, counterbalance it, and then, after placing the required weight in the one scale, to pour the fluid into the bottle till the scales balance. This is a great saving of labor, as there is no subsequent washing of measures, and one fluid after another can be served out in rapid succession.—*Edwards' Dental Quarterly.*

The Uses of Barbed Broaches.—Barbed broaches are designed to serve several purposes: (1) To cut off or excise the pulp at the end of the tooth-root; (2) to remove the pulp after it has been severed, or to remove the remnants of a decomposed pulp, or one devitalized by arsenous acid; (3) to carry medicaments, with or without the aid of cotton, to or through the apical foramen; (4) to pack dressings or the various plastic materials used in making the root-filling. In the last case, the operation is sometimes facilitated by snipping of the point of the broach, and making the blunt end smooth by stroking it once or twice on an oilstone.—*Dental Dispensary Record.*

Eau de Cologne in Applying the Rubber Dam, Taking Plaster Impressions, or Cleansing Root-canals with Soda Solution.—The application of the rubber dam can be rendered considerably more agreeable in regard to taste and odor, if it is washed with soap and water, rinsed, and then immersed in water containing a little eau de Cologne. After drying, the rubber dam is sprinkled with talcum powder.

A few drops of eau de Cologne added to the water in which plaster is mixed renders the taking of an impression less disagreeable, and reduces the tendency to nausea.

As an addition to a soda solution which is highly recommended for rinsing root-canals, eau de Cologne is greatly appreciated by patients with a delicate sense of taste.—*Monatsschrift fuer Zahntechnik und Verwandte Gebiete.*

Inlay Anchorage for Bridges with Removable Pivots.—The retention of inlays, or of inlays used as anchorage for a bridge, can be considerably enhanced by passing a bur through the inlay in such a way that a platinum or gold pivot can be passed through the hole into the root-canal of the tooth. The direction of these pivots should be arranged so as to make the pivots converge. In bridge work, the inlays and pivots are removed together in an impression, a model is poured, and the bridge finished. The inlay or bridge is cemented to place, the pivots are introduced into the holes while the cement is still soft, and ground off after hardening of the cement. In many cases the pivots can be made so short that devitalization of the pulp is superfluous, while at the same time increasing the retention of the appliance.—*Monatsschrift fuer Zahntechnik und Verwandte Gebiete.*

Tumors of the Carotid Gland.—Sinushin describes the carotid gland and its tumors. The gland is situated at the bifurcation of the carotid artery, and its tumors are usually single, of the size of a hen's egg, reaching sometimes as high as the mastoid process. Sometimes they are pierced by the artery. When compressed, all pulsation stops. Laterally they can be moved, but not vertically, nor during the act of swallowing. The sympathetic and vagus nerves are not involved. Such tumors have never been observed before the age of eighteen; they occur usually between twenty-five and thirty, mostly in women, and on the left side. The growth is slow, causing no objective symptoms. Operation gives a high mortality—20 per cent.—owing to the cerebral complications liable from ligation of the carotid artery. Yet the possibility of malignant degeneration of the carotid tumor and metastasis renders imperative their operative removal. The carotid artery can be compressed, but must not be ligated; only the external carotid should be ligated during the operation.—*Medizinskoe Obozrienie,* per *Journ. Amer. Med. Association.*

Treatment of Vincent's Angina.—Treatment is satisfactory in mild cases, most unsatisfactory in the serious ones accompanied by toxemia, prostration, and mechanical obstruction to breathing. In the mild cases, in which the ulcer resembles syphilitic lesions, best results are derived from the use of trichloracetic acid. The membrane is first removed by hydrogen dioxid, wiping off with a cotton swab. A 10 per cent. solution of cocain anesthetizes the ulcer, after which, in a few minutes, trichloracetic acid is applied. Three or four applications—sometimes but one is needed—at intervals of two or three days, are sufficient. Tincture of iodin is not so efficacious as the trichloracetic acid, but in an extensive ulceration, involving much surface, it is preferable. Orthoform relieves the pain. The teeth must be cared for, and no progress will be made so long as carious teeth and abscesses remain. The patient's general condition must be improved. In the more serious cases, local treatment is not satisfactory. It is hoped that a specific antitoxin may soon be produced, or that possibly salvarsan might prove efficacious against this spirochete, as it is against that of syphilis. —T. H. HALSTED, *Lancet-Clinic.*

Selection of a Cement Spatula.—The spatula is too often lightly considered or entirely overlooked as an important factor in mixing cements. Both its form, for mechanical reasons, and its composition, for chemical reasons, must be considered. Cement powder and liquid do not mix, like many other substances, by the solid dissolving in the liquid, and then combining atom with atom or molecule with molecule, nor are they like a lot of glass marbles mixed with glue into a mass, a simple mechanical mixture, but each granule of powder coming into contact with the liquid has a thin layer on its surface dissolved by the liquid to form the cementing substance that binds the undissolved portion of the granules together. This process must be accomplished in a short time, and the more intimately every surface of a granule comes in contact with the liquid, the better will be the resulting mix.

To accomplish this quickly and evenly, a correctly shaped spatula must be used.

This we find in the heavy, double-edged, uniform-width German silver spatula on the market. Presenting an oval surface to the slab, the granules of powder are caught under it and rolled forward and back into the liquid, thereby more nearly coating all surfaces of granules with liquid than could possibly be done with a flat, springy spatula mixing with a patting motion. Vigorous, thorough spatulation is necessary to secure a good mix, whether it be thin and creamy for an inlay or thick for a filling.

The composition of the spatula is an important factor. Owing to the hardness of the granules of the powder, particles of any metal spatula—with the possible exception of tantalum—will be ground off and enter the mix, thereby discoloring and changing its composition to a greater or lesser degree. An iron spatula will produce a great amount of discoloration, if thorough mixing is accomplished, but a German silver or coin silver spatula will not only give very slight discoloration, but will be a benefit to the mix chemically.—G. C. POUNDSTONE, *Dental Review.*

HINTS, QUERIES, AND COMMENTS.

ANOTHER CHARGE AGAINST FORMALDEHYD.

LAST winter I treated myself for colds with vaccine, hypodermically administered. I had been disinfecting the syringe employed by various methods, usually by placing it in the dry, formaldehyd sterilizer, or by combining this with other familiar methods. I found the pain from the vaccine treatment to be long-continued, in one instance lasting over one month, and noted that a sore spot formed at the place of insertion of the hypodermic needle. Naturally enough, I attributed this mishap to infection, and consequently was more and more careful in cleansing and disinfecting the syringe and the area of skin surrounding the place of insertion—but to no avail. All my efforts to discover the cause of the sores were unsuccessful, until I suspected the formaldehyd chamber, and then the trouble ceased. At present a number of purplish spots still persist at the places where injections were made, which I can attribute to no other cause than formaldehyd. Perhaps the pains in the gums of which patients so often complain after hypodermic injection for the extraction of teeth are in part due to the same cause.

I have become greatly interested in Dr. Grove's "Warning Against the Indiscriminate Use of Formaldehyd Preparations" (published in the DENTAL COSMOS for February, p. 147) in which he relates certain experiments, and concludes that Dr. Buckley's mixture of formaldehyd and tricresol is injurious to the tissues. This statement, if true, is very important, and my own experience, as related above, seems to bear out Dr. Grove's conclusions. On the other hand, teeth treated by the tricresol-formalin method do not have to be extracted in after years as frequently as Dr. Grove's statements would lead one to surmise. For this reason, I am still using Dr. Buckley's treatment, though with some trepidation. Dr. Grove concludes by saying "There are other methods for the correction of these conditions equally satisfactory, and free from the dangerous properties of formaldehyd." It would have been of great interest to know to what other methods Dr. Grove refers. What other method of treatment will abort an abscess as well as that indicated by Buckley? Is it vaccine therapy, which has been claimed by a manufacturer of vaccines to be most efficient? Is it sodium and potassium? Even if this last combination reached the microbes which have passed beyond the apical foramen, how can it be applied to a distal cavity in a second or third molar, when the tooth is almost too sore to be touched? In many such cases, pain prohibits the application of the rubber dam—indispensable in sodium and potassium treatment—and even the slightest amount of instrumentation is hardly bearable. If Dr.

Groves knows any treatment that will curb the demon of alveolar abscess as readily as Dr. Buckley's mixture, thousands of dental practitioners, in my opinion, would be delighted to hear of it from him.

STEWART J. SPENCE.
Chattanooga, Tenn.

OCCIPITAL PAIN DUE TO GINGIVAL LESION.

I WISH to report a case in my practice which may possibly be of interest to the profession in general.

Some time ago, a patient, Mrs. M., age about sixty, came to me complaining of pain in the alveolar portion of the upper jaw, right side. She wore two plates, upper and lower. She had a deep cut in the gum on the same side, which was undoubtedly caused by a sharp projection in the upper plate. She mentioned casually that she had suffered of late from pain at the back of her head, in the region of the lower part of the occipital bone, and was being treated for it by a nerve specialist, but so far without material results. The doctor had diagnosed the condition as a nervous trouble, constitutional in origin.

On questioning her I learned that the pain had started synchronously with that in the gum. Naturally I concluded that the cut might be the cause of it—which proved to be the case.

After remedying the defect in the plate, and applying curative treatment to the wound, I sent her home, cautioning her not to wear the plate for a day or two. All pain disappeared, and so far there has been no recurrence.

GEO. G. WEINSTEIN, D.D.S.
New York, N. Y.

DENTAL COLLEGE COMMENCEMENTS.

PHILADELPHIA DENTAL COLLEGE (TEMPLE UNIVERSITY).

At the annual commencement exercises of the Philadelphia Dental College (Temple University), held in Philadelphia, Pa., June 1913, the Degree of Doctor of Dental Surgery was conferred upon the following graduates:

Avelino Abalo	Cuba
William J. Averbuch	France
Elizabeth Beatty	New Jersey
Elmer H. Brown	New Jersey
Francis J. Conlin	Massachusetts
Joseph A. Corriveau	Massachusetts
Russell B. Cunningham	New Jersey
Gastaos R. Da Costa Ramos	Brazil
Louis B. Dennett	New Hampshire
Leon Desbaillets	Switzerland
Alexander Duchange	France
Roger Duchange	France
Fritz Egger	Switzerland
George H. Elliott	Maine
Paul W. Eves	Pennsylvania
Axel G. D. Fischer	Sweden
Edward K. Graham	Pennsylvania
Walter Grandage	Connecticut
William J. Greene	Massachusetts
Luiz F. Guimaraez	Brazil
George T. Holt	Rhode Island
Guy S. Ingram	Pennsylvania
George A. Jenkins	Connecticut
Israel Kine	Pennsylvania
Terra W. Leach	Australia
Charles D. Leidy	Pennsylvania
John H. MacDermott	Massachusetts
Clarence E. Morton	Pennsylvania
Gordon D. Peters	New Brunswick, Can.
Mogue S. Power	Newfoundland, Can.
Hugo Renfer	Switzerland
Alfred L. Robinson	New York
Benjamin Rouslin	Rhode Island
Francisco A. Sabater	Porto Rico
William J. Scheifley	Pennsylvania
Ida Slutchefsky	Russia
Winfield V. Stafford	New Jersey
Benjamin Stein	Pennsylvania
William Stoehr	New York
Frank M. Stout	Pennsylvania
Robert G. Stringer	Pennsylvania
Elsie B. Struppler	Pennsylvania
Charles J. Timmins	Pennsylvania
Norman W. Trimpi	New Jersey
Isaac Unger	Connecticut
Maria H. Verheyden	Holland
Isaac L. P. Wilson	Costa Rica, C. A.
Ernest M. Woodcock	Maine
Philip H. Woods	Pennsylvania

Society Notes and Announcements.

INTERNATIONAL DENTAL CONGRESS, 1914.

The Sixth International Dental Congress will be held in London from August 3 to 8, 1914, at the invitation of the British Dental Association.

His Majesty King George V has graciously consented to be the patron of the congress, which will take place at the University of London and at the Imperial College of Science and Technology, South Kensington.

The president of the congress will be Mr. J. Howard Mummery, and the joint general secretaries are Mr. Norman G. Bennett and Mr. H. R. F. Brooks. Mr. H. Baldwin is honorary treasurer.

A Committee of Organization, under the presidency of Mr. W. B. Paterson (president of the International Dental Federation), with Mr. F. J. Pearce as honorary secretary, has been busily engaged for some time in making the preliminary arrangements.

Previous congresses have taken place in Paris, 1889; Chicago, 1893; Paris, 1900; St. Louis, 1904; and on the last occasion at Berlin, in the Reichstag, in 1909, when the German Emperor took a personal interest in the meeting, delegates attended from twenty different countries, and the governments of many of them were officially represented.

Invitations are being issued to dental organizations throughout the world, and it is hoped thus to secure the co-operation of leading specialists and representative authorities in all branches of dental surgery.

The rules of the International Dental Congress provide that all ethical practitioners of dentistry possessing the qualification of the country in which they receive their professional education, or of the country in which they practice, are eligible for membership.

The subscription for members of the congress will be 30s. ($7.50; 38 fr.; 31 mks.), and for members of their families accompanying them 15s. (19 fr.; 15½ mks.; $3.75).

The offices of the congress are 19 Hanover Square, London, W., to which address all communications should be sent.

THE PANAMA PACIFIC DENTAL CONGRESS.

As one of the attractions of the Panama Pacific International Exposition, a dental congress, international in character, to be known as the Panama Pacific Dental Congress, is to be held in San Francisco, California, beginning on the last Monday in August 1915, and continuing for ten days.

A committee of Organization has been perfected, including representatives from the Pacific Coast states—California, Oregon, Washington, Utah, Idaho, Colorado, and Arizona.

This committee is now actively engaged in perfecting the work of organization, including the establishment of executive committees in every state of the United States and in every foreign country where dental organizations are known to exist, which will be empowered to promote the business of the congress by bringing it to the attention of their national, state, and local societies, and securing memberships and contributions to the program.

The American Society of Orthodontists and the National Dental Association, of the United States of America, have already made arrangements to meet in San Francisco in 1915 as a part of the congress, and invitations will be extended to other dental societies to take similar action.

The Panama Pacific Dental Congress is the first organization to apply to the Exposition management for space for exhibits, and to ask that a definite time be set aside for its meeting.

Manufacturers of dental goods have signified their intention to maintain during the congress the greatest exhibition of dental supplies ever held. Ample space for this purpose has already been promised by the Exposition authorities, and we are assured of their hearty co-operation in all things pertaining to the success of the congress.

The membership fee has been fixed at ten dollars, and the finances of the congress are being cared for by a corporation, formed within the Committee of Organization, and known as the "Pacific Dental Congress Commission of 1915."

Over $8000 has already been subscribed for promotion purposes by the dentists and dental societies of the Pacific Coast states, and this fund will be increased by many thousands of dollars before the congress meets.

Ample funds for promotion of the congress are assured, and in due time committees on Local Arrangements, Transportation, Exhibits, Clinics, Program, etc., will be appointed, and everything possible will be done to insure the success of the congress and make it in attendance and scientific and professional interest the greatest dental congress ever held.

The whole world is coming to San Francisco in 1915 to participate in and enjoy the Panama Pacific International Exposition, which will commemorate the completion of the world's engineering masterpiece, the Panama Canal.

Never in the history of the profession has there been so auspicious a time for holding a great dental congress, and the Panama Pacific International Exposition Company and the Committee of Organization of the Panama Pacific Dental Congress unite in a cordial invitation to the members of the dental profession to come to San Francisco in 1915 to attend the congress and view the wonders of the Exposition and the Pacific Coast of the United States of America.

FRANK L. PLATT, *Ch'man,*
Committee of Organization.

NEW JERSEY BOARD OF REGISTRATION.

AT a special meeting of the New Jersey State Board of Registration and Examination in Dentistry, held at Newark, N. J., on Saturday, June 14, 1913, the resignation of Dr. Charles A. Meeker as secretary-treasurer was announced; also the retirement of Dr. Meeker from the board on account of ill health, after twenty years of faithful service.

Governor Fielder has appointed Dr. Cornelius Kiel of Hoboken to fill Dr. Meeker's unexpired term. Dr. Alphonso Irwin of Camden, N. J., has been elected secretary-treasurer. Hereafter all communications concerning the granting of licenses to practice dentistry in the state of New Jersey should be addressed to Dr. Alphonso Irwin, 425 Cooper st., Camden, N. J.

The office of the New Jersey State Dental Commission has been transferred to Camden, N. J.

NORTHEASTERN DENTAL ASSOCIATION.

THE nineteenth annual meeting of the Northeastern Dental Association will be held in Footguard Armory Hall, Hartford, Conn., October 14, 15, and 16, 1913. Every effort is being put forth to insure a most attractive meeting. All ethical members of the profession are invited to attend, and those eligible are requested to join the association and help sustain the meetings.

FREDERIC T. MURLLESS, JR., *President,*
EDGAR O. KINSMAN, *Sec'y,*
Cambridge, Mass.

PENNSYLVANIA STATE DENTAL SOCIETY.

OFFICERS AND COMMITTEES—1913–14.

THE officers and committees of the Pennsylvania State Dental Society for 1913–14 are as follows:

Officers—Howard S. Seip, Allentown, president; Jas. G. Lane, Philadelphia, first vice-president; H. E. Friesell, Pittsburgh, second vice-president; Luther M. Weaver, Philadelphia, recording secretary; Geo. S. Schlegel, Reading, corresponding secretary; W. A. Spencer, Carbondale, treasurer.

Council—For one year: A. E. Bull, Wilkes-Barre; W. C. Scott, Lansford; C. B. Bratt, Pittsburgh. For two years: Victor Cochran, Philadelphia; C. O. Booth, Pittsburgh; C. E. Peters, Pittsburgh. For three years: Joseph Huggins, Downingtown; C. A. Bachman, Emaus; F. L. Davenport, Wilkes-Barre.

Board of Censors—D. B. Williams, Wilkes-Barre; C. M. Bordner, Shenandoah; E. W. Bohn, Reading; A. S. Koser, Harrisburg; F. W. Allen, Philadelphia.

COMMITTEES.

Program—S. P. Cameron, Philadelphia; J. D. Whiteman, Mercer; V. S. Jones, Bethlehem.

Local Arrangements—A. E. Bassett, Philadelphia; E. R. Sausser, Philadelphia; J. A. Standen, Philadelphia.

Exhibits—H. B. McFadden, Philadelphia; Geo. F. DeLong, Reading; F. L. Davenport, Wilkes-Barre.

Clinics—F. R. Stathers, Philadelphia; C. A. Bachman, Emaus; C. S. Van Horn, Bloomsburg.

Publication—L. M. Weaver, Philadelphia; W. W. Booth, Pittsburgh; B. B. Sprout, Williamsport.

Dental Science and Literature—E. S. Filbert, Pottsville.

Ethics—C. M. Bordner, Shenandoah; J. M. Crosby, Bradford; W. H. Lowell, Lancaster.

Enforcement of Dental Law—L. M. Weaver, Philadelphia; H. Zimmerman, Annville; W. C. Middaugh, Easton.

Necrology—W. H. Trueman, Philadelphia; W. H. Scholl, Reading; Geo. W. Klump, Williamsport.

Legislation—C. B. Bratt, Pittsburgh; W. H. Fundenberg, Pittsburgh; Geo. R. Root, Philadelphia; V. H. McAlpin, Warren; Geo. W. Klump, Williamsport; H. E. Trostel, York; J. C. Reed, Harrisburg; A. J. Heffernan, Wilkes-Barre; W. C. Scott, Lansford.

Oral Hygiene and Public School Dental Education—Geo. S. Schlegel, Reading; H. W. Heckel, Pittsburgh; S. B. Luckie, Chester; W. B. Mausteller, Harrisburg; P. B. McCullough, Philadelphia.

Reorganization—J. G. Lane, Philadelphia.

GEO. S. SCHLEGEL, *Corresp. Sec'y*,
Reading, Pa.

INDIANA BOARD OF EXAMINERS.

THE next meeting of the Indiana State Board of Dental Examiners will be held in the State-house, Indianapolis, Nov. 10 to 15, 1913. All applicants for registration in the state will be examined at this time. No other meeting will be held until June 1914.

Notice. All persons legally registered for the practice of dentistry in Indiana are required, under Section 9 of the new statute, to register with the secretary of the State Board of Dental Examiners, ANNUALLY, on or before the 31st day of December. The annual registration fee is $1.00. Blanks will be mailed to each qualified dentist on December 1st. This act applies to those dentists who have left the state or are now not in practice, the penalty being the revocation of said persons' license within ninety days, upon failure to re-register. The annual registration certificate is necessary to entitle one to practice.

For further information apply to

F. R. HENSHAW, *Sec'y*,
508 K. of P. Bldg., Indianapolis, Ind.

MASSACHUSETTS BOARD OF REGISTRATION.

A MEETING of the Massachusetts Board of Registration in Dentistry will be held in Boston, October 22, 23, and 24, 1913. For applications and further information apply to

G. E. MITCHELL, *Sec'y*,
14 Water st., Haverhill, Mass.

MARYLAND BOARD OF EXAMINERS.

THE Maryland Board of Dental Examiners will meet for examination of candidates for certificates November 6 and 7, 1913, at the Baltimore College of Dental Surgery, Baltimore, at 9 A.M. For application blanks and further information apply to

F. F. DREW, *Sec'y*,
701 N. Howard st., Baltimore, Md.

DENTAL COMMISSIONERS OF CONNECTICUT.

THE Dental Commissioners of the State of Connecticut hereby give notice that they will meet at Hartford on Thursday, Friday, and Saturday, November 13, 14, and 15, 1913, to examine applicants to practice dentistry. Application blanks, rules, etc., will be mailed by the Recorder upon request.

EDWARD EBERLE, *Recorder*,
902 Main st., Hartford, Conn.

MICHIGAN BOARD OF EXAMINERS.

The next regular meeting of the Michigan State Board of Dental Examiners will be held at the Dental College, Ann Arbor, commencing Monday, November 10th, and continuing through the 15th. For full particulars and application blanks address

F. E. Sharp, *Sec'y*, Port Huron, Mich.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending August 15, 1913:

Harry M. Deiber, act.d.s., August 11th, left Fort Thomas, Ky., *en route* to Fort Logan H. Roots, Ark., for temporary duty.

L. B. Wright, act.d.s., August 11th, reports at Fort Ontario, N. Y., for temporary duty.

First Lieut. J. R. Ames returned to status of leave from treatment at Walter Reed General Hospital.

First Lieut. F. L. K. LaFlamme arrived at Fort Hancock, N. J., August 13th, for temporary duty.

First Lieut. R. H. Rhoades left Fort Apache, August 6th, for temporary duty at Fort Bliss.

For the week ending August 22d:

J. W. Smith, act.d.s., arrived at Fort Sam Houston, August 14th.

First Lieut. J. R. Ames granted fifteen days' leave of absence on expiration of leave already granted him.

For the week ending August 29th:

First Lieut. H. G. Voorhies will proceed to Hot Springs, Ark., and report at the Army and Navy General Hospital for observation and treatment.

First Lieut. E. P. Tignor granted leave of absence for one month about August 25th.

First Lieut. F. P. Stone, August 25th, reports for temporary duty at Fort Williams, Me.

First Lieut. S. D. Boak, August 27th, returned to West Point, N. Y., from leave of absence.

For the week ending September 5th—(No changes).

United States Patents

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING AUGUST 1913.

August 5.

No. 1,069,616, to Ansel C. Hulbert. Dental vulcanizer.

August 12.

No. 1,069,680, to Harry E. Dowell. Tooth.

No. 1,070,123, to William W. Evans. Dental instrument.

No. 1,070,132, to Gustav Holtz. Method of producing backings for artificial teeth.

No. 1,070,219, to Alexander W. Wimmer. Artificial tooth.

August 19.

No. 1,070,442, to Ernest Fogg. Artificial teeth.

No. 1,070,494, to William C. Lampe. Detachable tooth facing for bridge and plate work.

No. 1,070,500, to David S. Mackenzie. Dental casting apparatus.

No. 1,070,785, to Thomas E. Dimelow. Artificial tooth.

No. 1,070,858, to John H. Trayne. Toothbrush holder and sterilizer.

No. 1,070,905, to Vanderburgh McRae and Charles McRae. Dental plate waxer.

August 26.

No. 1,071,106, to Frank H. Skinner. Dental instrument.

No. 1,071,228, to Paul Gross. Mandrel for dental disks.

No. 1,071,395, to Woodfred E. Clayton. Dental engine.

THE

DENTAL COSMOS.

VOL. LV. NOVEMBER 1913. No. 11.

ORIGINAL COMMUNICATIONS.

THE RESPONSIBILITY OF THE DENTIST IN ORAL MALIGNANCY.

By ARTHUR B. CRANE, D.D.S., Washington, D. C.

(Read before the union meeting of the Maryland Dental Association and the District of Columbia Dental Society, Washington, D. C., June 12 to 14, 1913.)

A GROWING knowledge of the importance of pathological conditions in the mouth in their relation to the general health and mortality of the human race is permeating the medical profession, and awakening a respect for dental surgery, hitherto somewhat dormant, notwithstanding the wonderful and artistic mechanical restorations of which our profession has been so proud. The coincidence of Riggs' disease with pernicious anemia, alveolar abscess with infective arthritis, irregularity of the teeth with respiratory diseases, unclean mouths with alimentary infection, and decayed teeth with low vitality, offer a field for study and research which may well occupy the minds of the medical and dental professions jointly. It is now recognized that in many conditions the dentist holds the keys to life and health, and upon the degree of intelligence with which he locks or unlocks the doors rests the future standing and recognition of dentistry. The obvious truth of this circumstance is the reason for the attempt of the writer to present the subject of malignant oral neoplasms.

IMPORTANCE OF EARLY DIAGNOSIS OF MALIGNANT NEOPLASMS.

There is no condition encountered by the dentist which is of more unfavorable prognosis, or which to any degree approaches the mortality attendant upon malignant tumors of the mouth; and yet, through mistaken diagnosis or lack of discernment, many of these dangerous growths progress, under the very eyes of ignorant or careless dentists, to such an alarming extent that by the time they reach the oral surgeon, all hope of successful operation is passed, and the unfortunate patient is doomed to a slow and horrible death.

OBSCURE ETIOLOGY OF NEOPLASMS.

The etiology of neoplasms is obscure, and while many possible theories as to their cause have been advanced, and though men of great scientific attainment, backed by the wealth of multi-millionaires, are daily striving to establish definitely their origin and a more successful method of treatment, at present the surest hope lies in early diagnosis and immediate surgical removal. It will be comprehended, then, how necessary it is that the dentist, who may often discover an oral tumor before even the patient is aware of its existence, and to whom, in any case, it is usually first presented, should be able to recognize the early manifestations of malignancy.

GENERAL CLASSIFICATION AND CHARACTERISTICS OF TUMORS.

A knowledge of the general classification and characteristics of tumors is prerequisite to intelligent diagnosis, and at the risk of being somewhat elemental, a brief outline is presented. Tumors are broadly differentiated, according to Coplin (Brown), as neoplasms and cysts. Cysts of the mouth are always benign, and only indirectly concern the subject under consideration. Neoplasms are newgrowths composed of tissue cells more or less retarded in development; they persist or increase in size at the expense of the organism, and have no physiological function. Neoplasms are classified according to their histology, as epithelial, or those arising from the epiblast or hypoblast; connective tissue, or those arising from the mesoblast, and mixed. Clinically they are classified as benign, malignant, and uncertain.

Newgrowths of the mouth are comparatively uncommon, and certain forms of tumors are rarely found there. Papillomata and adenomata are the benign representatives of the oral epithelial group, and carcinomata the malignant. Of the connective tissue group chondromata, osteomata, fibromata, and angeiomata represent the benign type, and sarcomata the malignant. The mixed group comprises a class of tumors usually referred to as teratomata or monstrosities, and are not found in the mouth, unless compound dermoids and the so-called "mixed tumor of the palate," both of which are benign, may be considered in this class. Although only two species of tumors are classed as malignant, it should never be overlooked that any of the benign forms may undergo malignant change; consequently any new-growth in the mouth which is not the result of inflammation or hyperplasia should be looked upon with suspicion, and either be immediately removed or kept under careful observation.

PROGRESS IN MALIGNANT TUMORS.

The prognosis of malignant disease is favorable in proportion to its duration prior to diagnosis. When early recognition is followed by prompt operation, sarcomata and carcinomata in favorable positions are often curable, but in the later stages they become not only incurable but inoperable. Unfortunately, the ease of diagnosis is in inverse ratio to the progress of the growth. While a well-developed malignancy of the mouth is not difficult of recognition, the early stages present many obscure and confusing symptoms, and the conscientious dentist who endeavors to expedite the diagnosis must expect to meet often with failure and ridicule—for even the most experienced diagnosticians are prone to be mistaken in their suspicions. Where life may be lost through procrastination, however, no personal feeling of timidity should be permitted to embarrass a complete study of the condition, and if, in a lifetime of practice, a dentist succeeds in demonstrating even one malignant tumor in its operable state, this is reward enough for many mistaken apprehensions.

DIFFERENTIAL DIAGNOSIS.

When an oral tumor presents, the possibility of inflammation or hyperplasia should first be considered. Alveolar or pericemental abscess, necrosis, pyorrhea alveolaris, empyema of the antrum, hypertrophy of the gums or tooth pulp, impacted teeth, and encapsulated roots are seldom difficult of diagnosis, although at times each may present symptoms suggesting a new-growth. The infective granulomata are more vague. Of these, actinomycosis, which is a rarity in man, may be known by the presence of the sulfur-like granules in the pus, which is early thrown off. Gumma and primary tubercular infections may usually be identified by the history or coexistence of other symptoms. Pyogenic granulomata are generally preceded by acute inflammation. While the granulomata, in some ways, resemble sarcoma, equal care is necessary in dealing with chancre and lupus, which simulate carcinoma. Enlargement of the lymph nodes from syphilis, tuberculosis, or other infection should be carefully isolated from a like condition resulting from carcinoma.

IMPORTANCE OF EXPLORATORY PUNCTURE IN OBSCURE TUMORS. CYSTS VERSUS TUMORS.

Some uncertainty may arise in distinguishing the cyst from the neoplasm, but careful palpation will usually disclose the characteristic parchment-like crepitation of the wall of the bone-cyst or the free mobility and fluctuation of the glandular variety. An exploratory puncture will indicate the fluid-filled cavity of the cyst, or the more or less solid consistence of the neoplasm. Too much emphasis cannot be given to the necessity for the exploratory puncture in the progress of diagnosis of all obscure tumors; cases of needlessly brutal operations from lack of this simple precaution are often noted. This step should not be carelessly undertaken, and should be omitted unless necessary, as malignant tumors resent such interference. The flexible silver probe should be discarded in exploring, and a stiff but delicate steel probe substituted. When the sense of touch has been highly developed, the use of such an instrument will not only impart an appreciation of the difference between a cystic cavity and a solid tumor, but will indicate the presence of enamel, bone, necrotic bone, or cartilage within the growth. When the cyst is within the bone, the radiograph is a positive aid to final identity. As a rule, cysts are slow-growing tumors, and are painless unless infected.

DIFFERENTIATION OF BENIGN FROM MALIGNANT NEOPLASMS.

When a true neoplasm has been recognized, it will present evidences leading to its identification as benign or malignant. In making this distinction, the history of the tumor is of primary importance. A newgrowth slowly increasing in size during a period of years is probably not malignant, unless stages of rapid growth have been noticed. It should then be classed as uncertain. A neoplasm increasing very actively without interruption and destroying all tissue which interferes with its progress is most frequently malignant. A malignant tumor is not often encapsulated or circumscribed, hence is practically fixed, while a benign tumor is usually encapsulated and circumscribed, hence mobile. The mobility is further influenced by the fact that the benign growths are not deeply adherent unless they become the seat of bacterial invasion, while the malignant types are always infitrating and therefore adherent. In the absence of infection, ulceration is unusual in benign neoplasms, but the malignant generally ulcerate upon reaching a free surface. A benign tumor in the mouth is ordinarily covered with normal mucous membrance; a malignant tumor soon breaks through the mucous membrane. Benign tumors are common to all ages; malignant tumors, with certain exceptions, are rare in early life. A blood-test for leucocytosis will often clear a doubtful diagnosis. In benign cases this is absent; in malignant cases it is often marked. Metastases, or transportation to distant points, forming secondary tumors, are wanting in newgrowths of a benign type, though all too common in malignant types. The tendency to recur after apparently complete extirpation is strongly indicative of malignancy. Cachexia, a condition of defective nutrition marked by rapid emaciation, anemia, and loss of strength, is an invariable though sometimes retarded characteristic of the malignant growths, and when present contra-indicates operation. The previous history of the tissue involved, as well

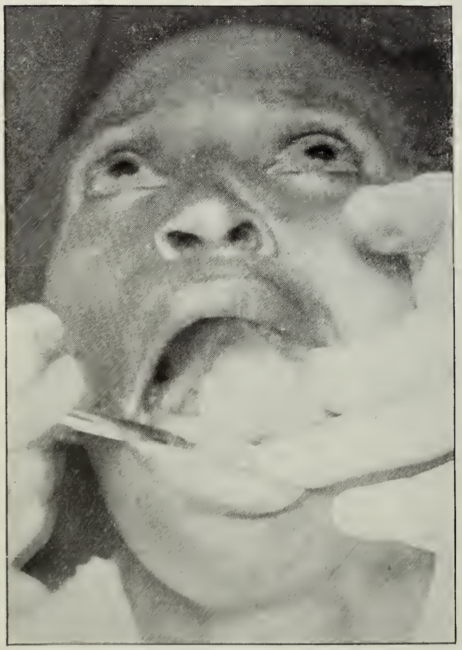
Fig. 1.

A well-developed sarcoma. Growth three months. External bulging caused by incision, mistakenly made in diagnosis, prior to being seen by the writer. Inoperable.

Fig. 2.

A recurrent fibroma. Note how tongue is pushed aside. Half of lower jaw excised upon mistaken diagnosis of sarcoma.

Fig. 3.



A huge fibro-sarcoma of the hard palate. Growth four years. Encapsulated and containing a cyst. Benign.

Fig. 4.

Papilloma superimposed on dentigerous cyst. Growth four years. Mistaken diagnosis of mixed sarcoma rectified before operation, by radiograph.

as the situation, formation, and color of the tumor and lymphatic involvement, all have important bearing in diagnosis, as will be pointed out later. All tumors of the mouth should be suspected as malignant until positively proved to be benign. A benign tumor may contain malignant areas.

Fig. 5.

Radiograph of huge papilloma, superimposed on dentigerous cyst. (Same case as Fig. 4.)

DIFFERENTIAL DIAGNOSIS BETWEEN CARCINOMA AND SARCOMA.

It is often important to make a differential diagnosis between carcinoma and sarcoma prior to operation. Age is an important factor in this, carcinoma being rarely seen before middle life. About 40 per cent. of carcinomata begin around the age of sixty. When occurring in the young they are exceedingly malignant. Sarcoma may appear at any age, being most frequent between ten and forty-five. Under thirty a malignant growth is probably sarcoma. Repeated mild trauma in certain situations, such as the irritation of the lower lip from pipe-smoking, of the tongue or cheek from a jagged tooth, or of the alveolar process or floor of the mouth from dentures that do not fit, often precedes carcinoma. The history of an isolated, somewhat severe trauma should suggest sarcoma. Murphy (Brown) states that a trauma severe to the degree of laceration or fracture never causes malignancy, while Coley, who has a record of 225 cases of sarcoma following trauma, does not even exclude severe trauma (Scudder). Sarcoma following injury usually begins within one month, but the possibility of a late effect should be carefully taken into account.

Carcinoma springs from the epithelium and is primarily a surface tumor. In the mouth it is, therefore, exposed from its inception, except when it arises from the mucous membrane lining the antrum or within a salivary gland. Sarcoma begins its growth in connective tissue and may be discovered by palpation early, if starting from the periosteum, but is seldom discovered in its incipience when central in the bone or in the antrum. When arising from the periosteum, at first there is a pseudo-encapsulation, which makes it difficult to distinguish from certain benign growths, but carcinoma is always frankly adherent. A malignancy of the tongue, mucous membrane of the cheek, floor of the mouth or lip, or within a salivary gland, is probably carcinoma, while on the body, angle, or ramus of the mandible or the body of the maxilla, it is probably sarcoma. Sarcoma and carcinoma may each arise from a tooth socket. Sarcoma often grows more rapidly than carcinoma, but may grow intermittently, while the latter is continuous.

The shape of the tumor is indicative. The sarcoma, being smooth and globular, causes a rounded enlargement of the overlying tissues; the carcinoma is diffuse, cauliflower-like in appearance, and is preceded in its growth by an area of induration. Carcinoma ulcerates early and gives off a very offensive discharge that contaminates the saliva, which flows involuntarily out of the mouth. Sarcoma is more cleanly, and ulceration takes place late, if at all, and then usually from bacterial infection of a lacerated area.

The presence in the tumor of cartilage, bone, lime salts, pigment, or a cyst, points to sarcoma. A tumor free from bacterial invasion, which causes enlargement of the cervical lymphatics, is probably carcinoma. Carcinoma is more painful than sarcoma, although in the early stages pain is slight and is not a constant factor of either. Sarcoma is more tender than carcinoma. Edema and enlarged superficial veins are often encountered in both types of malignancy, and may suggest inflammation, confusing the diagnosis.

TUMOR IN THE MAXILLARY ANTRUM.

When a tumor is situated in the antrum, early manifestation is the exception, and a differential diagnosis is extremely difficult. A fleeting neuralgia or deep-seated pain in the region of the bicuspids or molars, without apparent cause, is frequently the first symptom, although pain is often absent. A sense of fulness or weight, symptoms of empyema, especially if the discharge is scanty and slightly tinged with blood, a slight edema of the infraorbital region, loosening of the adjacent teeth, disturbances of the eye, perhaps with slight exophthalmos, and bulging of the antral walls, are other suspicious signs. Later the alveolar and palatal processes bulge, the malar bone and nose are pushed aside, and, if the tumor is malignant, this is soon manifested by a breaking-down of the mucous membrane of the mouth or nose, or the skin of the cheek. A combination of several of the foregoing symptoms in a person past middle life, together with an enlargement of the adjacent lymphatics, would point to carcinoma, although recent investigations by Martens and Butlin (Scudder) seem to point to late involvement of the lymphatics from cancer of the antrum. In a patient under thirty, especially when accompanied by partial or complete stenosis of the lacrimal duct, such symptoms would suggest sarcoma. The extraction of a tooth in relation with the floor of the antrum sometimes gives the dentist an advantageous opportunity for seasonable diagnosis, provided the use of a probe in the tooth socket after extraction is a routine practice, for, even in the premature state, the probe will pass without obstruction into the antrum until it comes into contact with the mass of the tumor. Again, as the pain symptoms are usually first referred to the teeth, the patient may seek dental advice, even though no unsoundness of the teeth exists. In such cases, if clinical evidence strongly points to a tumor of the antrum, an exploratory puncture is justifiable. A perforation may be made between the roots of the first and second molars, or just posterior to the canine fossa, with a No. 5 spear-pointed drill under local anesthesia. Such openings readily heal, when suspicion is not confirmed. Transillumination and the radiograph are most helpful in demonstrating antral obstructions.

DENTAL SYMPTOMS OF MALIGNANT TUMOR.

In the course of daily practice, the dentist should be on guard against malignancy when teeth extracted from a supposed pyorrhetic area have glistening nodules of soft tissue adherent to the sides of the roots; when a tooth in relation with the floor of the antrum is extracted and the apex of the root is found to be apparently metamorphosed into soft, cartilaginous tissue; when the lower first molar is prematurely erupted and is not firmly held in the alveolus; when teeth with vital pulps are found to have the root apex eroded; when otherwise normal teeth suddenly become loose and change their position; when there is a rapid and decided unilateral change in the contour of the alveolar process or hard palate, without inflammation; when ulcers or fissures are increasing in size and will not respond to local treatment; when a patient with sound teeth or an edentulous ridge in approximation with the floor of the antrum has pronounced symptoms of empyema which do not yield to irrigation; when a tooth socket after extraction becomes filled with a bulging mass of tissue which one application of the actual cautery does not inhibit, and when epulis recurs after removal of the underlying periosteum.

MICROSCOPIC EXAMINATION IMPERATIVE.

All portions of soft tissue adherent to the roots of extracted teeth, which cannot be unmistakably identified as inflammatory or normal tissue, should be examined microscopically. In fact, in the ultimate analysis, the microscope offers the only unfailing means of determining the true nature of a tumor, and it is a general practice to excise small sections of the growth for this purpose. The necessity for this should be carefully weighed, however, as malignant neoplasms are often alarmingly accelerated in their growth by such interference, and, when all clinical signs point to malignancy, it is better to operate first and make tissue examinations subsequently. When sections *are* made prior to operation, the examination should proceed with as little delay as possible, as, in malignancy, safety is often a matter of days.

THE DENTIST'S ATTITUDE AFTER ESTABLISHING DIAGNOSIS.

When the dentist suspects a malignant neoplasm, an immediate consultation with a competent surgeon should be arranged, in order that the responsibility may be shared. The operations indicated are more extensive than the average dentist is experienced enough to perform, and his duty ends when a qualified surgeon has been retained to perform an operation, although he should prepare the mouth by as thorough a prophylactic treatment as circumstances permit, and he may perhaps assist at the operation by the extraction of teeth and so forth, if desired.

THE DENTIST'S SHARE IN AFTER-TREATMENT.

It is in the after-treatment of the successful cases that the dentist has a useful and almost undisputed field, for the deformities caused by the radical operations demanded for the sake of cure are often serious. The facial expression and the function of mastication must be restored as accurately as possible. While surgery is experimenting with bone-grafting and metal substitutes, the results as yet are far from gratifying, and some prosthetic appliance made by the dentist must perform this useful service. It is not the purpose of this paper to enter into an exposition of this subject, especially as each case presents its individual demands, but the suggestion of cast aluminum appliances, held in place where possible by Gilmore clips, may not be amiss. An excellent *résumé* of this class of work is given in Scudder's "Tumors of the Jaws." The prosthetic pieces therein depicted, however, seem to leave much to be desired from a dental point of view, and it is to be hoped that the reputed ingenuity of American prosthodontia will be vindicated in the near future by improvement in these devices.

In the preparation of this paper, the authoritative works on the subject have been reviewed and may have been unconsciously quoted. The writer has been guided by a somewhat extensive opportunity for clinical observation from the dental standpoint, as well as the advice of several friends of the medical profession.

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NOTE ON POTASSIUM CHLORATE AND DENTAL CARIES.

By H. P. PICKERILL, M.D., Ch.B., M.D.S., L.D.S.Eng., Dunedin, N. Z.,
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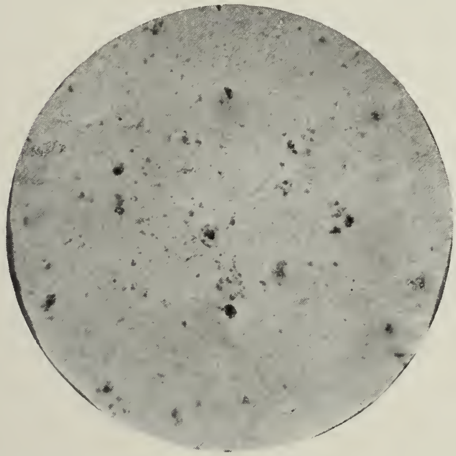
In a recent number of the Cosmos (*i.e.* May 1913, page 490) Dr. Nodine attempts to show bibliographically that potassium chlorate is in the way of being a panacea for all oral lesions of an infective nature. I am not concerned with his attack on Dr. Hermann Prinz' statements, but I wish to call attention to one or two points which concern me in connection with my work on the prevention of dental caries.

In his "Summary" (No. 10), Dr. Nodine states: "It is, by reason of its effects on alkaline salivary secretion, ... very efficient in preventing the multiplication of lactic acid bacteria, and in neutralizing the acids produced during the life activities of other bacteria and putrefaction processes" I fail to find what this is a "summary" of, since there is not in the substance of the article any mention, much less proof adduced, of the power of potassium chlorate to prevent the multiplication of lactic acid bacteria. Unsupported statements of this kind are, I think, to be especially deprecated in a critical and pseudo-scientific communication.

chlorate, and I discontinued them. I found that after the use of potassium chlorate, 5 grains three times a day, the average alkalinity of the saliva per minute was decreased from 1.73 (N/50 H_2SO_4) to 1.64, and the alkalinity per cc. from 1.5 to 0.94, methyl-orange being the indicator used).

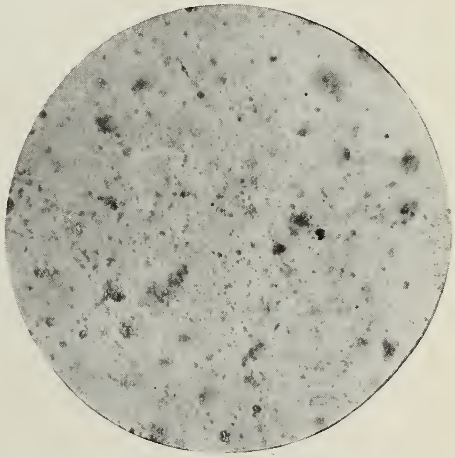
I also tested its possible action in reducing the amount of acid formed from various carbohydrates (chiefly

Fig. 1.



Photograph (by transmitted light) of the colonies of organisms developed from mouth-washings before using potassium chlorate. The growth throughout all the dishes was extremely uniform. (Leitz 1x obj., No. 3 eyepiece.)

Fig. 2.



Photograph of the colonies of organisms developed from mouth-washings *after* using potassium chlorate. The colonies were pink, by reason of the lactic acid formed from the glucose having acted on the neutral red.

Everyone is aware, I suppose, of the beneficial effect often produced by the exhibition of potassium chlorate in cases of infective and mercurial stomatitis; it is a matter of common clinical experience. It does not follow, however, that the drug will cure all cases and kinds of stomatitis, neither that it has any effect whatever in reducing the susceptibility to caries if used as a dentifrice. The jump, however, by the argument of analogy, is a small one. The same possibility occurred to me some two or three years ago, and I carried out some experiments to test its value in this direction. The experiments, so far as they went, were not favorable to the use of potassium

bread and glucose), and was unable to find that it had any definite action at all; the results were so variable as to lead to no definite conclusion. The average acid formed from the chlorated saliva and carbohydrate was, however, a little in excess of the control average.

The result of the following experiment is a direct negative to the statement that potassium chlorate prevents the multiplication of lactic acid bacteria:

The mouth was thoroughly irrigated with 10 cc. distilled water for one minute. A plate culture on neutral red glucose agar was then made from these washings, with of course full aseptic precautions. Six grains of potassium chlorate was then taken, sucked, crushed, and swallowed. One hour afterward another plate culture was taken in a similar manner to the above. Both plates were incubated for forty-eight hours. The number of colonies of lactic-acid-forming organisms developed was, if anything, slightly more in the culture after potassium chlorate than before it, as may be seen from the accompanying illustrations.

I do not contend that these experiments were sufficiently exhaustive to be conclusive, and so did not include them in my book on the "Prevention of Caries," but as far as they went they certainly are in opposition to Dr. Nodine's "Summary."

Potassium chlorate seems to require some active inflammatory focus to be present before it can exert its beneficial action, but this condition is certainly *not* fulfilled in the vast majority of cases where a dentifrice is indicated.

Dr. Nodine asks: "When has a therapeutic agent been condemned because of its transient taste?" May I draw his attention to the fact that my investigations have shown that the taste of a drug is probably far more important than its supposed therapeutic effect—at least from the point of view of the prevention of caries and oral sepsis generally?

There is no possible doubt that nearly all diseases of bacterial origin owe their inception to a favorable stagnation. Movement and circulation are in general terms opposed to bacterial action. Given a free and proper oral salivary circulation, there will be little chance of organisms lodging and proliferating sufficiently to cause a lesion. Now, the majority of drugs with disagreeable tastes act as salivary depressants, and will if habitually used undoubtedly do far more harm than good by producing a state of oral stagnation—and therefore, of bacterial proliferation.

That the glosso-pharyngeal and lingual nerves should be maintained in a condition of full excitability and conductivity is, I believe, essential to the preservation of natural immunity in the mouth. I would even suggest that caries of the teeth may be regarded as a symptom of failure of the nervous mechanism controlling salivary secretion to functionate normally.

CONFLICTING OPINIONS CONCERNING THE MANUFACTURE AND USE OF ALLOYS FOR DENTAL AMALGAMS.

By MARCUS L. WARD, D.D.Sc., Ann Arbor, Mich.

(Read before Section I of the National Dental Association, at its annual meeting, Kansas City, Mo., July 8, 1913.)

IN order to reach the part of the subject that should be of most interest to the profession at this time, it will be necessary to review so much of the literature that the title of the paper might well be called "The History of Dental Amalgams Since Dr. Black's Work." When the writer took up the work of teaching upon filling materials it became necessary, in order to get the requisite information to give much of a course, to do some work on the subjects involved. Practically nothing had been put in form for this purpose. The work of Dr. Black on alloys was in print in the DENTAL COSMOS in 1895–96, but was as he reported it, and not in good form for use by either practitioners or students of dentistry. A few other subjects were likewise in print, but of these the same might be said. It soon became apparent that the subjects least understood and demanding the most attention were those of alloys and cements and the other plastics.

PREVIOUS INVESTIGATIONS BY THE WRITER.

As a result of work in this field I have been called upon at different times to discuss the subject of alloys. One of my first papers appeared in COSMOS for December 1905, under the head of "Some Things About Alloys Not Generally Understood." I was prompted to write that article because I found, generally, that dentists did not understand the subject. The difference between the two classes of alloys that resulted from Dr. Black's work was not generally realized, nor the difference between those two classes and the alloys made previously. The same was true regarding the alloys that were high in silver and marked "Rapid setting," "Medium setting," "Slow setting." Various opinions were held regarding the cause of spheroided fillings. The use of more mercury to make a plastic mass than was to be left in the filling was quite generally held to be injurious, weighed proportions being considered the correct method of combining the alloy and mercury, and a change in formula the result of any other procedure. In the *Dental Review* for 1907 (vol. xxi, p 406) appeared another paper by the writer, entitled "Some Reasons for Instituting a Public Means of Protecting the Profession Against the Use of Poor Alloys." This article implied that one or two of those whom I supposed possessed information that would be helpful to me and the profession were not giving it out, or else did *not* know what they were given credit for; and that not only myself, but dental teachers generally, were not able to present the subject of alloys to students in a manner that would compare favorably with the presentation of similar subjects by teachers in engineering. It was pointed out that some alloys on the market appeared to be very poor and others very good, and that there was no reliable way for the dentist to find out the difference between the two; also that conscientious and capable manufacturers differed as to just what constituted a good alloy; also that the manufacturers who were making what appeared to be our best alloys were claiming to be following Dr. Black's plans, and that analyses of such products showed them to be composed of from 65 to 68 per cent. silver, 26 to 28 per cent. tin, 3 to 4½ per cent. copper, and 1 to 2½ per cent. zinc. Also, that while some of the claims made by the manufacturers regarding the use of different quantities of the different constituents had been recognized by some of those who did not follow such claims, the use of zinc was open to question, because some were attributing to it the property of facilitating long expansions after the filling had been inserted, and others were claiming it to be secondary to other materials in causing this phenomenon. An example of this difference in opinion regarding the use of zinc was mentioned and the amount of the difference given, though the names of the manufacturers were not given—for fear that an injustice might be done one of these two manufacturers, both of whom I had every reason to believe were conscientious in their claims, and because the difference between the two alloys mentioned was not great enough, in my opinion, to warrant taking the chance of injuring one of these manufacturers' trade. For reasons which will be obvious later, I will mention these names at this time. They were the Dental Protective Supply Co. and the N. K. Garhart Co., then of Indianapolis, now of Boston.

Along with the other things mentioned in the paper were reported some tests for strength of these alloys, which showed that those coarsely cut and containing the smaller quantity of zinc would be a longer time in reaching their maximum strength than those with more zinc and finer cut. The so-called plastic alloys were condemned as a class because of their low strength and long expansions, but to avoid condemning any one manufacturer's product I mentioned nine who were selling the same class of alloys, and mentioned, along with the plastic alloy that I was condemning, for each manufacturer a high silver alloy marketed by the same concern, thus enabling the dentist who desired to change from the plastic alloys to the high silver ones to do so without having to purchase a different manufacturer's products.

In Cosmos for 1908 (vol. l, p. 109) appears another article by the writer, entitled "The Effect of an Excess of Mercury upon Shrinkage, Expansion, Strength, Change in Composition, and Stability." In discussing this subject it seemed advisable to mention the names of some of the manufacturers' products to show the similarity in quantities of mercury required to make a plastic mass, so I mentioned eight of those mentioned in the previous article in 1907.

THE DENTAL PROFESSION'S CHANGED ATTITUDE TOWARD PLASTIC ALLOYS.

Not only up to this time, but subsequently, has the discussion of the subject by me been confined largely to the things that could be improved by the dentists. My reason for this was that I was satisfied that many of the leading manufacturers knew much more about the subject than did the profession, and were giving to the profession products as good as could be produced with our present knowledge, while on the other hand I saw many things that the profession could improve on. My aim had been to get the profession informed on the subject to such an extent that they could separate for themselves the reliable from the unreliable manufacturers; at the same time giving the manufacturers a chance to see the tendencies of the profession's demands and make improvements where possible. And, in fact, there has never been anything in my hands so effective in separating the good alloys from the poor ones in any community, as to give the dentists detailed information about alloys in general rather than to attempt to injure the manufacturer. At the time these papers were published it is clear that I regarded eight or nine of our manufacturers of alloys as capable of supplying products that were as good as our present knowledge of the subject would permit. I had mentioned the L. D. Caulk Co., the S. S. White Co., the Dental Protective Supply Co., the N. K. Garhart Co., Gideon Sibley Co., H. D. Justi & Son Co., and two or three others among those who were furnishing products that would give good results if the dentists would do their part in handling them. I feel certain that the manufacturers themselves will grant that this process of giving information to the profession has reduced their sales of the plastic alloys markedly, but made a corresponding increase in the sales of their high silver alloys. In fact, in many localities the representatives of the above-named houses will not try to offer to the profession one of the plastic alloys, because they know well that dentists have learned the difference between these and something better. The result is that the representative makes a sale of his high silver alloy. He must meet what the dentist demands or lose his trade; so we can see that the better informed the dentist is, the better informed must be the manufacturer and his representative. It seems, then, that we must not lose our confidence in a manufacturer because he supplies one of the plastic alloys to those who want it, so long as he is capable of furnishing one of the high silver alloys to those who want it. That does not make him to be distrusted; he is simply supplying what is demanded of him. For a year or two now I have had a great number of letters from all parts of the country asking what I had to say regarding the articles that have appeared mostly in the Cosmos, and Dr. Black's statements in his book on "Operative Dentistry," relative to the quality of the alloys that I had mentioned at various times as being the best we have. It is plainly to be seen that the channel by which these articles have reached the profession is such a prominent one that the articles have caused an unsettled condition regardless of the obscurity of one or two of the men themselves.

MC CAULEY'S ALLOY STUDIES, AND THEIR MISLEADING EFFECT.

For example, appearing in Cosmos, February 1912 and January 1913, and in the proceedings of this association, are articles by Dr. C. M. McCauley of Abilene, Texas. In discussing one of these papers Dr. J. A. Bliss of Ruthven, Iowa, says (Cosmos, January 1913, p. 58): "Dr. Black makes the statement that the only three elements that should enter into a perfectly good alloy are silver, tin, and copper. He emphasizes that any zinc introduced into an alloy is alarming, when we consider the fact it does not alloy uniformly with other metals, and consequently in one portion of one and the same ingot there may be a percentage of zinc above what is intended, and in another portion of that ingot there will be less zinc than was intended, and this necessarily results in an uneven alloy. Dr. Black, therefore, excludes zinc as being detrimental and undesirable, and *we are forced to the view* that any alloy that contains zinc should be excluded from our tests, which means all but two or three. This is alarming, when we consider the fact that of all the fillings made in the United States, at least seventy-five per cent. are made with amalgam." Dr. McCauley says, in the same article that Dr. Bliss was discussing: "I still maintain that the method of making and balancing alloys as discovered by Dr. Black is the only scientific and dependable method which has been introduced up to this time." We may note at this time that Dr. McCauley calls the method of Dr. Black's "scientific." In the same article Dr. McCauley says that "Silver, tin, and copper are the only metals that should be used in alloys." In the discussion of the same article Dr. McCauley gave some results of tests on the following alloys: Rego, Crandall's, Fellowship, Twentieth Century, True Dentalloy, and others. In these results it may be seen that Rego, Crandall's, and Fellowship are given a much better showing than are Twentieth Century and True Dentalloy. In fact, he reports three tests on Twentieth Century, all of which shrank, and four tests on True Dentalloy, two of which shrank. To those who do not follow the alloy question closely this may seem a very ordinary thing to happen, but to those of us who have followed the question in some detail it appears a strange coincidence that the three alloys to which Dr. McCauley gives first place should be made with little or no zinc, and that the Twentieth Century and True Dentalloy with more zinc should be given such a poor showing. This becomes more strange because of the great popularity of these two alloys, and, if these tests were representative of the true movement of these alloys, would tend to show that the dentists were not good clinical observers, or that a little shrinkage made no difference; and that the statements made by me at various times that there were several good alloys in the market, in which these two were included, were open to question. Another strange coincidence appears in the tests reported by Dr. McCauley in which he gives Garhart's Gold White an expansion of 342 points, when Mr. Garhart has been about the only manufacturer to say that he adhered to the given formula, and, like nearly all the rest, to the use of zinc—both of which Dr. Black does not now approve of.

Just what Dr. McCauley expected to gain by publishing a report of this nature is not clear. It would seem, however, that the principal thing that he did was to point out that he thought—what Dr. Bliss said in the discussion, viz—"That the condition is alarming, and that there are only two or three alloys in the market that were what they should be, and that these alloys are zincless alloys." Dr. Bliss in another part of the discussion makes a plea for assistance. He says, "I assure you that it is a great responsibility, and if you knew some of the persecutions endured by him (Dr. McCauley) since he began these investigations, you would be indignant. It is a shame that one man should bear the brunt of these attacks. In justice, therefore, to Dr. McCauley and his fellow investigators, these tests should be made under the supervision of the National Dental Association, or some state society, as a part of the society's work, thus relieving the investigators of any personal responsibility." These statements of Dr. Bliss just about represent the condition of affairs in the profession after the publication of results of the nature of the one published by Dr. McCauley, in which he places the largest, most reputable, and most competent manufacturers in the same class as those who could not be expected to furnish to the profession products of a high order, without taking the ordinary precautions of a scientist by giving some of the details of how the tests were made.

The publication of such results, which are damaging to reputable manufacturers and conflict with the opinions of others, must be carefully placed before the profession if the result is not to be generally bad instead of good. While Dr. McCauley makes the statement that "It is not intended that the practitioner should accept the above figures as conclusive, and select his alloy therefrom," the evil of his tests is not corrected. He has placed the good with the bad. He has gotten many of the dentists who have not looked into the matter to doubting; and when dentists begin to think that all are likely to be bad, the really bad stand about as good a chance as any.

THE ALLOY MANUFACTURERS' NOTABLE EFFORTS.

I have made the statement several times that some of the best manufacturers differ as to what constitutes the best alloy for all purposes, but that I believed these differences of opinion to be honest ones. I have also made the statement that as a rule the larger supply houses were best equipped for distributing uniform supplies because they were in the best position to secure the services of competent men. I have arrived at these opinions because I have known some of them willing to send men the entire length of the country to consult me regarding some comparatively minor things that would help them, and to build duplicates of my apparatus so that they could check me, and because I found them watching every piece of literature on any subject that had any bearing on the problems before them, including such publications as the Journals of the American Chemical Society, the Society of Mechanical Engineers, the Institute of Metals, and the Institute of Testing Materials, and watching the reports of the alloys research committee and purchasing about every work that came out on the subject of metallurgy.

These things have convinced me that we have no reason to become alarmed about many of the manufacturers not doing their part. There are some differences of opinion among them which we, as a profession, can help to settle clinically if no one presents any experimental data; and until these differences of opinion are settled, we can, in my opinion, rest assured that many of the manufacturers are even more anxious than we are that their products stand the tests that are demanded of them. One of these differences of opinion that has been the cause of two or three attacks upon the work of Dr. Black is that concerning the use of a plan of balancing instead of a given formula for making alloys. Some of the best qualified manufacturers we have, seem to take advantage of the statement of Dr. Black that a fixed formula is not good for general use in making alloys; while others who are good, reputable men present some good argument that this is nothing more than an acknowledgment that those who use a varying formula have not mastered the metallurgical part of the work. These statements, coming as they often do through our leading journals, and often in the proceedings of prominent societies, keep the practitioner somewhat busy trying to find whether it is simply advertising matter or whether it is a plan that has merit. Dr. Black says ("Operative Dentistry," vol. ii, p. 310), under the heading "Experiments with the Silver-Tin Alloys," "From this point another short course of alloys only ½ per cent. apart was necessary to find the exact balance which would produce an alloy that would absolutely lie still while hardening. When this was found, it was a good formula for that batch of metals, but not for another batch, for the purity might be different; and the formula for each new batch of metals had to be found. Therefore, no fixed formula could be good for general use. If it were possible to use chemically pure metals a fixed formula would be possible, but such metals would be too expensive for use in dentistry."

ATKINSON'S CRITICISM OF THE G. V. BLACK METHOD OF ALLOY-MAKING.

In the June 1913 issue of the Cosmos, at page 584, under the subheading, "The G. V. Black Method of Alloy-making, and Its Defects," W. W. Atkinson says:

Had Dr. Black left the utilization of his work to others, the luster of his achievement would now be undimmed; but unfortunately he followed his researches into a strange realm, that of metallurgy, and as a result threw the question of alloy-making into confusion. He developed an elaborate system of "balancing" which is entirely empirical, and the system itself is condemned by the facts. Summarized, it is as follows: First—As. in his opinion, all metals procured commercially for use in amalgam alloy-making are impure, and as impurities aggregating from 4/10 to ½ of 1 per cent. are fatal to the attainment of certain requirements in an amalgam made from their alloys; therefore test batches must be made from each new lot of metals, and, upon the basis of the results obtained on the micrometer and dynamometer a perfect "test" formula must be evolved from which the regular batches intended for use are to be made. Second—Alloys are not chemical compounds, but mere physical solutions of two or more metals within each other, the percentages of which may be varied at will. Third—No "formula" is needed when the manufacturer follows the G. V. Black method of "balancing."

Let us take up the first of these assumptions. Upon the authority of Mr. Jacob P. Eckfeldt, chief assayer, U. S. Mint, Philadelphia, bar silver of a fineness of 999.5 and from that point upward to 999.75, is commercially available at the U. S. Assay-office, New York City, N. Y., at current market rates. This silver the writer is able to purchase, regularly, from a Philadelphia broker of precious metals, who does not seem to regard its fineness as being espcially remarkable. Purified shot copper, electrolytic, has a guaranteed fineness of 999 plus, and analyses have shown that the odd one-thousandth of impurity is oxygen, due to dissolved oxids, an easily corrected deficiency. "Straits" tin, purified, has an average fineness of 999.5, often it is finer, and a recent analysis of commercial tin made for me by Booth, Garrett & Blair, showed a fineness of 999.61. Thus a "G. V. Black" alloy made from a formula approximating 68 per cent. Ag, 27 per cent. Sn, 5 per cent. Cu, made from metals of the purity noted, should be within 0.036 of 1 per cent. of 1000 fine, a negligible difference.

It might be argued that such metals were not to be secured at the time of Dr. Black's investigation, but that would not be correct, for pure metals were certainly then obtainable at an added retail cost to dental alloys not exceeding 20 per cent. With such metals available, a formula once established could be continuously reproduced, provided the work were done by a metallurgist having the knowledge and exercising the care needed in such operations.

Pursuing this, then, to its logical conclusion, it must have been assumed that the dental fraternity was unwilling to pay a price commensurate with an alloy of pure metals, which assumption seems untenable.

The second assumption, that the metals of an alloy may be varied in their percentages, which means that their chemical affinities may be disregarded, shows that Dr. Black either did not avail himself of the copious literature on the subject or entirely ignored it, and therefore merited to some extent the caustic criticism of Dr. Ad. Fenchel, who denominated Dr. Black's measurements as superficial and his metallurgical investigations as barren of a true comprehension of the internal structure and chemical constitution of alloys.

* * * * *

The third assumption, that no formula is needed for the making of an amalgam alloy when the manufacturer follows the G. V. Black system of "balancing," might at first thought be dismissed as the extravagant utterance of an overzealous enthusiast, were it not for the commercial advantage which may be taken of it, to the consequent detriment of efforts to secure uniformity in this most important material. It has given rise to a multiplicity of formulæ, afforded opportunities for advertising claims of wonderful and mysterious properties secured through the medium of awe-inspiring "tests" with micrometers and dynamometers—all with the glory of Dr. Black's prestige skilfully interwoven—and, through the relatively enormous expense which attaches to frequent analyses of such alloys, has blocked attempts to ascertain their constituents or to secure other details of importance excepting those of strength and volume change. This leaves the behavior of amalgam fillings made from these "tested alloys" to the "test of time," the very thing that Dr. Black most strongly and most justly condemns. The assumption that no formula is needed, however, falls of itself, for it is a well-known fact that, under the Black method of "balancing," a formula must be worked out before a melt is made, and this formula must be based upon a previously attained "tested" formula which has met the physical requirements noted.

N. K. GARHART'S VIEW.

Whether or not this argument stands the test, of course, depends upon the amount of corroborative evidence presented in the future. That I might find out more in detail how Mr. N. K. Garhart felt about the matter—knowing as I did that he was one of the manufacturers who did not believe in this plan of balancing, and that he, like Mr. Atkinson, had come in actual contact with the advantage that those had who were privileged to use this form of advertising, and that he actually believed that the use of such advertising and its acceptance by the profession and teachers of dentistry blocked the efforts that were made to secure uniformity—I recently took the matter up with him privately, and later secured his consent to use some of his letters. A part of one of them follows:

I am now taking you back to the early period of Dr. Black's writings, and in which he referred to filings giving better results than shavings. His explanation or theory as to the cause was a very weak one, and in my opinion not scientific. At the conclusion of his early writings in the COSMOS he contended that you could not make a satisfactory alloy from a "set" formula—and about which time a course in alloy-making was added to others of the Northwestern University. Caulk, Sibley, and the S. S. White Company sent their men there to take this course. These parties have consistently followed this argument in their advertising to the dental public. While I was in Indianapolis, I published a small booklet on the manufacture of alloys, the latter part of which contained some experiments on the "thickness of cut." These experiments showed that as a given formula was cut progressively thicker or heavier, the factors of efficiency were increased accordingly. I also stated that shaved alloys at that time were thin in cut while those of filings were much heavier; and so this was the real reason why Dr. Black found filings to be more efficient. In later years Dr. Black has verified this important factor, and states that a suitable alloy depends on the fineness of cut as well as other important details. Thus, later, my work on thickness of cut was confirmed by Dr. Black.

Dr. Black has been more or less silent concerning the subject of "set" formula since then. Now the point comes up, Did Dr. Black realize that the real secret of producing a uniform alloy depended on automatic processing?—that his statement "You cannot use a 'set' formula" was not scientific, or not in keeping with facts, was found to be an error? Did he realize so afterward? Yet this very statement has been the foundation for faking on the part of our large manufacturers. They were wise enough to take advantage of this claim and use it for their own ends. The main point was, Our formulas are secret; chemical analyses will not reveal their make-up. We have to change the formula before we can make a satisfactory alloy; therefore this constant variation in our formulas makes their percentage of composition inconstant. Thus these heaviest advertisers have been deluding the profession on this point all of these years.

"WHO IS WRONG?"

There can be little doubt about how these two manufacturers feel regarding this plan of balancing. Neither can there be much doubt in your minds about the effect of such caustic and contradictory statements in preventing the profession from arriving at a definite conclusion from the standpoint of knowledge of the subject, or the selection of products for use in the practice of dentistry. We may expect the question will be often asked: "Who is wrong?" as long as such differences of opinion exist, but as one of the principal objects of this paper is to restore, as far as possible, confidence in many of our manufacturers' ability, and to temper somewhat the widespread feeling that the question of amalgams is one of chaos, I want to emphasize the statement that I made in the last edition of the "American Text-book of Operative Dentistry," which is as follows:

> A review of Fenchel's recent work and the earlier work of Kirk and Burchard, each of whom have viewed more closely the chemical phases of alloys, would not suggest the plan offered by Dr. Black. The question "Why does a fixed formula not give a definite movement during the setting?" has been asked of the writer so many times by teachers and practitioners alike, that it would seem that the plan had not been understood nor accepted generally by the profession. All seem agreed, however, that the plan gives as good results and furnishes us with as good alloys as our present knowledge of the subject will permit. It is the manner of reaching the result about which there seems to be a difference of opinion.

I treated the question at that time considerately—First, because I did not want to stir the profession into a state of distrust when the evidence would not warrant it; and second, because some of the technique involved in the plan would be good to follow as a check against error even though a definite formula were determined upon and definite metallurgical methods arrived at in the manufacture of these products. It would seem, then, that the objections to the plan were—First, that it furnishes an excellent advantage in advertising to those who are privileged to use it; and second, that it implies indefinite methods of manufacture and difficulty in securing metals of a high degree of purity.

To one who has gone far with the study of metallurgy as a science and reached the place where he presents his results in the form that Dr. Fenchel and scores of others present theirs, or has any conception of the statement of Dr. Kirk in his editorial in the June COSMOS, that "It is the business and end of scientific research to ascertain the exact truth, which when ascertained and systematized into an organized grouping of data is what constitutes science," the statement of Dr. McCauley that "The plan of making and balancing alloys as discovered by Dr. Black is the *only* scientific and dependable method which has been introduced up to this time," not only appears like an utterance from one who not only had not done much work, but had ignored the literature on the subject except as to that portion presented by Dr. Black, the greater part of which was seventeen years ago.

W. W. ATKINSON'S VIEWS SCRUTINIZED.

Another phase of the problem has been placed before the profession within the last two or three years which because of the nearness of it to the principles of the chemistry with which the profession is most familiar, promises to upset for all time the plan of balancing which the profession has had for its consideration for the last seventeen or eighteen years. The work of Fenchel has already been referred to, also one of the articles of W. W. Atkinson. Another article by Mr. Atkinson appears in COSMOS for August 1912, which, like the one previously mentioned, has principally to deal with what he designates as a discovery. Whether it be a discovery, and whether the discovery, if it so prove, has merit, remains for the future to tell. One thing seems true at this time—that it is so near to it that, like the plan of balancing, which he condemns, it promises to give the product which he offers as an example of his discovery advertising which that product may not merit. He criticizes about every alloy made upon the ground that they are made "without respect to their atomic relationship, and therefore, within them, atomic compounds are formed which are surrounded by an unappropriated surplus, a eutectic perhaps, which makes physical balance impossible;" but he presents practically no chemical evidence that this compound exists, nor if it does exist, that he has produced it, nor if it does exist and he can produce it, that it possesses properties superior to those that are not made in atomic ratios. The profession should be grateful to anyone who will present the subject in question along chemical lines, because it gets all to thinking along lines of accuracy and truth, but if we are to condemn the mystery surrounding the marketing of the alloys we now have, and are to make real scientific progress, we must demand of Mr. Atkinson the evidence demanded by those who deal with these problems from no other standpoint than a scientific one—or else he, like the ones now using the Black plan of balancing, will be getting what he terms "commercial advantage." Mr. Atkinson points out that silver, copper, and tin are the only metals that should be used in making alloys for amalgams, and says: "Amalgams made from chemically balanced alloys do not discolor—although they do not and cannot contain zinc—for the electrical and chemical affinities are satisfied." Following this he says that "A surface discoloration occurs when a patient is taking the iodids medicinally, but zinc in this instance offers no protection." He gives analyses of five G. V. Black alloys made by Dr. S. P. Burns, and in commenting on them says:

The sum of the percentages divided by 5 —the number of alloys noted—gives the following averages: Ag 66.76, Sn 26.92, Cu 5.408, Zn 0.814, Au 0.056, and therein lies the significant fact that these empirical experiments were successful only when the formula approached the percentage nearest to the established chemical compound of tin and silver, Ag_3Sn—for Ag_3Sn = Ag 73.1 per cent. plus Sn 26.9 per cent., and the averages of the percentages of silver and tin show the following results when in mutual relationship:

Average of
66.76 parts silver = 71.264 per cent.
26.92 " tin = 28.736 " "

This undoubtedly results in the formation of Ag_3Sn + the excess of silver and tin which combines with copper and zinc to form mixed crystals, so that the mixture or alloy consists of Ag_3Sn + mixed crystals and eutectic of silver, tin, copper, zinc, and, in the case of Odontographic alloy, gold.

It is obvious that Mr. Atkinson attributes what success the alloys known as Black's have had to the silver and tin being in percentages close to the formula, Ag_3Sn, which he says is established. In his first paper he discusses the chemical theory of alloys, a part of which paper is as follows:

There are two theories regarding amalgam alloys, the physical and the chemical. The first holds that alloys are probably solid cold solutions of two or more metals within each other, and may be varied in percentages irrespectively of their atomic relation, and to be satisfactory must meet certain requirements in the matter of strength and volume change. According to this theory, an amalgam must expand 1/20,000 inch in setting, and should withstand all stress of mastication.

The other theory is that all alloys should be made in chemical equivalence; that is, that the combining ratio of the metals is their atomic ratio, and that balance is only possible in this way. Both theories are correct in some respects. The first states the correct physical requirements of an amalgam, and the other points out the scientific means of attaining them. Both schools are in error in other respects—for, on the one hand, given percentages of given metals in combination with mercury will produce certain desired results, while on the other hand, the mere fact of chemical crystallization does not necessarily meet the physical requirements, for the crystal may be too soft or its volume change may be toward condensation.

Under the subheading "A Discovery and a New Amalgam Alloy," he says:

In September 1911 I deduced an alloy formula, with the metals in atomic ratio. It is based on the theory that chemical balance, other things being equal, is physical balance, and that silver, tin, and copper, by reason of their observed properties, are the most trustworthy metals with which to compound an amalgam alloy. Experiments were made to test my conclusions, which were entirely confirmed. The alloy compounded is the amalgam alloy instanced in another part of this paper. Its formula is Ag_2SnCu.

In his second paper, under the subheading "The Chemical Theory of Alloys," he says:

> Chemistry has shown that certain alloys of metals undergo condensation in freezing, and that others undergo expansion; that the affinities of certain metals for each other must be considered before they can be perfectly combined into an alloy, and that the atomic law is the important factor in such combinations. Herein lies the significance of the failure of percentage alloys; they are not combined with respect to their atomic relationship, and therefore, within them, atomic compounds are formed which are surrounded by an unappropriated surplus, a eutectic perhaps, which makes *physical balance* impossible.
>
> Therefore, bearing in mind the precision of its data, and the fact that such data afford the means whereby the physical behavior of alloys of metals may be accurately forecast, I place supreme confidence in the chemical theory of alloys, and *know* that it offers the only solution to the amalgam alloy problem.

While Mr. Atkinson admits that "The mere fact of chemical crystallization does not necessarily meet the physical requirements, for the crystal may be too soft or its volume change may be toward condensation," he later says that his alloy of the formula Ag_2SnCu is based on the theory that chemical balance, other things being equal, is physical balance. This leaves the real significance of the term "physical balance" somewhat in doubt, and the chemical theory as he describes it open to question.

Since he says, however, that the percentage alloys fail because they are not combined with respect to their atomic relationship, and therefore, within them, atomic compounds are formed which are surrounded by an unappropriated surplus which makes physical balance impossible, there can be little doubt that he intends to imply that the alloys that are made in atomic ratios are superior, for dental purposes, to those made from percentage ratios. This seems to be quite a common error, and in looking over the alloys used for structural work one is impressed more thoroughly than before that seldom do alloys, made according to atomic ratios, meet the requirements which are demanded of them. The thing of most vital importance in the consideration of alloys for a given purpose seems to have escaped the observation of Mr. Atkinson—viz, that *alloys in their true sense are not chemical compounds.* When most metals are mixed there is not the total and complete alteration of properties which is the distinctive feature of chemical action between a metal and a non-metal. When the chemical compound does occur, then, we may expect the properties of the constituent metals to be more nearly lost than when the solid solution or mechanical mixture occurs. "Alloys" then, generally speaking, means the accumulation of properties of metals; and "chemical compounds" means, generally speaking, destruction of them.

That those who are interested in the subject may get a more clear conception of these questions, I quote the following from the introductory of "A. Humbolt Sexton," which leads up to the statements by him that "Definite chemical compounds in no case form alloys of any industrial importance," and later, that "None of the definite chemical compounds are of any use in the arts," as well as the statement by Hiorns that "Most often, alloys seem to be mixtures of definite compounds with an excess of one or other metal," and the statement of Fulton that "Most of the physical properties of alloys are dependent—First, upon the formation of mixed crystals; second, upon the formation of chemical compounds; and third, upon the formation of a conglomerate of the two substances (eutectics or eutectoids)," also the statement by E. F. Law in discussing some of the alloys formed by definite atomic ratios of their constituents, that "They are perfectly homogeneous, brittle alloys, breaking with a conchoidal fracture—properties which render them practically useless to the art-metal worker":

> When two or more metals are melted together they, as a rule, remain intimately mixed, showing little tendency to separate

according to their densities, or, as it may be otherwise expressed, they remain in solution one in the other while they are in the liquid condition. When the mass solidifies, this state of uniform distribution or mixture may continue, or it may be broken up. In the former case the solidified mass will contain the constituent metals in a condition of more or less uniform diffusion, and such a mass is called an alloy. In the latter case the metals will separate according to their specific gravities, the heavier metal going to the bottom and the lighter rising to the top, such separation being as a rule the more complete the slower the solidification. The separated metals in this case are rarely if ever pure, but each retains a small quantity of the other, and strictly speaking both are therefore alloys. In practice, however, the term alloy is restricted to those cases in which neither of the metals is present in very small proportion; the other cases being simply considered as metals containing an impurity.

An alloy is neither a mechanical mixture nor a chemical compound. An alloy is, then, an intimate mixture of two or more metals, and the term mixed metals has sometimes been used in place of alloys. This is, however, very misleading, as the alloys are much more than mere mixtures, and mixtures of metals may exist which are not alloys.

If lead and copper be melted together, and the mixture be slowly cooled, the metals will separate. If, however, the mixture be quickly cooled, separation cannot take place and the metals will remain mechanically mixed the one with the other, they not having had time to separate into distinct layers, but the mass will consist of intermixed particles of the two metals, and if it be heated up to the melting-point of lead this metal may be, to a large extent, melted out. This, then, would be a case of a mixture of metals, but not of an alloy. In an alloy, the mixture must be of such a character that the constituent metals lose their individuality, and become blended into a new substance which has properties, to some extent at least, unlike those of its constituents.

As a rule, substances which are not elements are divided into the two classes, chemical compounds and mechanical mixtures, but the metallic alloy cannot be made to fit exactly into either group.

In a mere mixture the particles, however small and however intimately they may be mixed, always retain their individuality, and the properties of the mixture are always a mean of those of its constituents. If the constituents be black and white the mixture will be gray, if red and white, a paler shade of red, and so on through all the other properties. This, as is well known, is not the case with alloys. Brass containing, say, 50 per cent. of copper and 50 per cent. of zinc, is yellow, and this yellow color is certainly not a mean between the red of the copper and the bluish white of the zinc; nor is the specific gravity, or indeed any other property of the brass, a mean between those of its constituents. The only point in which alloys always resemble their constituents is that they are distinctly metallic.

Alloys, therefore, are not mechanical mixtures.

A chemical compound contains the elements in fixed proportions, these being always simple multiples of the atomic weights, and some of the physical properties follow from the molecular weight of the compound. This is not the case with alloys. As a rule, the metals are not present in any simple atomic proportion, and further, the proportions can be varied often within wide limits without producing any great change in the properties of the alloy.

The metals do not show any strong chemical affinity one for another, but there is no doubt that in some cases definite chemical compounds of the metals do exist, but in no case do they form alloys of any industrial importance.

Solutions. There is still another form in which substances can exist which, while not a mere mechanical mixture, is something less than chemical combination. If salt or any other soluble substance be stirred up with water it disappears, or dissolves in the water, and the result is a solution of the salt. This solution has some of the properties of the salt; it has, for instance, a salt taste, yet its properties cannot be said to be a mean between those of water and salt. The salt dissolves without increasing the volume of the solution, so that the solution is denser than the mean between salt and water. The addition of the salt also lowers the freezing-point of the water, so that the freezing-point of the solution, instead of being a mean between that of water and salt, is lower than that of either, and by the addition of proper proportions of salt it may be reduced to about —22.5°C.

The essential character of a solution is that the constituents are so intimately blended that they cannot be separated or detected by mechanical means, whilst at the same time they have not entered into true chemical combination.

Solid solutions. As a rule, when a solution is frozen the constituents separate one from another to a larger or smaller extent, but this is not always the case. We can imagine a solution to become solid without any other change, and the result would be a solid solution in which the constituents would still be so intimately mixed that no mechanical separation would be possible, and in which the properties would not be a mean of those of its constituents, but in which these constituents would not be present in the definite proportions required for a chemical compound.

Alloys. True alloys are never mere mechanical mixtures of metals, and though in some cases the metals do combine, yielding definite chemical compounds which often retain their metallic properties, none of these are of any use in the arts. Alloys are very frequently solid solutions of one metal in another, or of a chemical compound of the metals in the metal which is in excess. Many consist of mixtures of such solutions with definite substances that have crystallized out during cooling, so that the actual composition and structure may vary very widely; and each alloy, or rather group of alloys, must be studied separately, as it is impossible to lay down any except the most general rules.

The alloys of copper and zinc probably form as large, interesting, and useful a class of alloys as any in the commercial world. At least three have been recognized as having the following formula:

	Per cent.		Per cent.	
$CuZn$	—49.3	copper,	50.7	zinc.
$CuZn_2$	—32.7	"	67.8	"
$CuZn_3$	—24.6	"	75.6	"

If we now compare the alloys of commercial value with these percentages we find, instead of following them, there is about everything we can imagine, ranging from 90 per cent. of copper and 10 per cent. of zinc, to 15 per cent. of copper and 85 per cent. of zinc. Brass for wire often has about 72 per cent. of copper and 28 per cent. of zinc; brass for the more common work, such as fittings, etc., often has about 66⅔ per cent. of copper and 33⅔ per cent. of zinc. Brass for bolts, butts, etc., known as "Muntz metal," has 60 per cent. of copper and 40 per cent. of zinc; while if greater strength is desired the copper is furnished reduced to 56 per cent. and the zinc increased to 42 per cent., forming what is known as "Delta metal."

Of the alloys of copper and tin we find four described, as follows:

	Per cent.		Per cent.	
$SnCu_4$	—68.1	copper,	31.9	tin.
$SnCu_3$	—61.6	"	38.6	"
$SnCu_2$	—51.7	"	48.3	"
$SnCu$	—34.8	"	65.2	"

And we find gun-metal, one of the most useful of alloys, to be composed of from 8 to 11 parts of copper and 1 of tin, 90 per cent. of copper and 10 per cent. of tin being most generally used—a percentage ratio and not an atomic ratio. These two metals are often used for what is known as bell-metal in the proportions of about 80 per cent. of copper and 20 per cent. of tin, and in this instance we find percentage ratios. With the alloys of copper known as German silver one has but to look over the thirty analyses presented by Hiorns to find that the manufacturers are not only varying widely in the same constituents, but are often using a fourth and fifth metal to get some particular property.

The alloys of gold and copper, gold and silver, gold and copper and silver, and gold and copper, silver, and zinc, as they appear in scores of combinations for use in dentistry and in making jewelry, show that the percentage ratios far outnumber any possible atomic ratios. The same is true with the low-fusing alloys composed of lead, tin, bismuth, and cadmium. In fact, we can follow the same condition through the remainder of the non-ferrous alloys and all through the ferrous ones, each forming more evidence that alloys made in atomic ratios do not necessarily mean alloys that are more desirable for dental or other purposes, *and when alloys in atomic ratios do occur, they are usually more desirable when modified by an excess of one or more of the constituent metals.* This is where the knowledge of chemistry and the use of the microscope applies, —not always in forming chemical compounds, but in determining whether they have formed, and the effects of excesses upon the physical properties. It is *these* methods that make the plan of balancing as suggested by Dr. Black appear empirical, and have made it possible for the trained metallurgist with his microscope to form quite accurate estimates of physical properties without having made the actual tests himself.

For us to accept the formula of Mr. Atkinson, Ag_2SnCu, as *being possible,* and that he can produce it, without some of this kind of evidence, means for us to ignore the doctrine of variable valency, and assume that the greatest of questions in metallurgy, solutions, is thoroughly understood by him. We have learned, when speaking of the valency of an element, that it is essential to mention with what other element that value takes effect. For example, iron is di- and tri-valent toward chlorin, but is tetravalent toward sulfur and hexavalent toward oxygen. We have also learned that many compounds remain as such only within certain ranges of temperature; and oftentimes the pressure exerted by the products of dissociation has a controlling influence on valency. Consequently, it is to be expected that the general affinity ratios of the elements are dependent upon external conditions, of which temperature seems to be the most important and pressure next in importance. An exhaustive examination of the dependence of valency upon the nature of the atoms with which it enters into combination, and the effect of external physical conditions, internal physical conditions, position in the periodic system, etc., makes the assumption of Mr. Atkinson that he is justified in substituting an atom of copper for one of silver in his tin compound, Ag_2SnCu, on the ground that silver and copper *form no compounds* and the valency of tin is constant, when there is at least one silver-copper compound known (Ag_3Cu_2), appear also open to question.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

THE OPERATIVE AND POST-OPERATIVE TREATMENT OF PYORRHEA.

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(Read before the Dental Society of the State of New York, at its annual meeting, Albany, May 8, 1913.)

THE operative treatment of pyorrhea is now so firmly established that discussion of its advisability is beside the question. Owing to the fact, however, that there has as yet been no crystallized method of practice in such treatment, it will be my effort on the present occasion to attempt to portray a method so crystallized as to make it possible for one who has not hitherto made use of it to put it into practice in an intelligent manner, and gain the desirable and beneficial results for his patients so much sought by every conscientious operator.

POLISHING OF ENAMEL SURFACE BY THE AID OF DISCLOSING SOLUTION.

The most essential thing in undertaking any particular operation in surgery is to have a clear conception of the underlying philosophy upon which such operation or treatment is based. Therefore a brief description of the tissues to be operated upon is essential. Pyorrhea treatment should begin on the surface of the tooth; this may seem a little odd, but a moment's consideration of that surface will make my point clear. Since the valuable studies of Pickerill have been presented to the dental public, we have been convinced that normal enamel is not smooth, but is a surface of minute furrows and ridges. As early as 1907, I urged, in a paper read before the National Dental Association,* that a ragged enamel surface is one of the fruitful causes of pyorrhea.

Pickerill's study of the enamel surface, together with the use of Skinner's disclosing stain, emphasizes this fact. The bacterial flora of the enamel surface at the gingival line and interproximal surfaces of the teeth bears a constant relation to inflammation of the gingivæ. A series of recent studies made by the author convinces him that the bacterial flora of these surfaces is rich not only in ferments, but in diplococci, staphylococci, and strepto-bacilli. The constant presence, therefore, of such a rich flora of micro-organisms is a most important feature in bringing on inflammation of the gingivæ and the underlying bone. Therefore the author has changed his method of treatment to the extent that he begins with the tooth surface first, provided that the case is still in the operable class.

If the case be operable, then the operator should begin his treatment by rendering the surfaces of such teeth absolutely smooth by the use of sharp planes, fine stones, disks, abrasives, and such polishing materials as will give the highest glaze and most brilliant sheen possible. This work should be undertaken before the pyorrhea pocket itself is disturbed, for the very simple reason that, if pumice or fine silex is used in polishing the teeth, this material will find its way into the pyorrhea pockets that have been opened up by instrumentation. The presence in the pockets of insoluble particles of silex or pumice causes additional irritation to those tissues; hence the advisability of doing the polishing of the enamel surfaces before operative procedure is commenced on the tissues of the root. The disclosing stain should be used both before and after the tooth surface is polished;—before, to guide the operator to the points which need polishing most; after, to check up the result, because the etched surfaces and bacterial growth on the tooth surface are so transparent and elusive that the operator, even after what may seem to him a very satisfactory polishing, may attain very poor results, because of the great difficulty in removing all traces of the bacterial coat.

* See DENTAL COSMOS for March 1908, vol. l. p. 240.

MINUTE ANATOMY OF THE ROOT OF A TOOTH.

After this phase of treatment has been completed and the mouth and gums have been thoroughly freed of the polishing material by flushing them with water, the operator should begin the treatment of the root surface, a study of which surface is exceedingly important as a prerequisite to successful treatment. We are accustomed to think of the roots of teeth as being composed of pulp, dentin, and cementum, the cementum being the outer covering of the dentin, affording attachment to the fibers of the peridental membrane, which forms the joint between the tooth-root and the alveolar process. A study of the cementum itself is well worth while, and to that I now call your attention.

The cementum is composed of atypical layers of bone, with thousands upon thousands of bone cells scattered through it. These bone cells are most numerous in the deeper portion of the cementum, and they gradually become fewer in number as the external surface of the cementum is approached, until a distance of about one-fiftieth of an inch from the external surface is reached, at which point very few bone cells are found. The small spaces which the bone cells occupy are called lacunæ, and the cells intercommunicate through channels known as canaliculi. On account of the necessity for a firm layer of attachment for the suspension of the tooth in its socket and the formation of the joint between the root surface and alveolar process, nature has built a denser portion of bone in which are very few lacunæ at most, and usually none at all. This denser portion of external surface, which, as I have said, is at most not over one-fiftieth of an inch thick, does not occur as a distinct layer clearly outlined as something that could be dissected up and stripped off, but is merely a denser layer of bone of exactly the same kind as that which composes the whole cemental structure. This denser portion varies in thickness in different parts of the root, but is a constant feature in the root structure wherever one may chance to examine it. External to the dense layer, the porous layer varies in depth and in porosity at different parts of the root, but it also is a constant feature of cemental structure.

SURGICAL TREATMENT OF THE ROOT SURFACE.

The aim of the operator in this type of root-surface surgery should be to cut away from the root all evidence of this outer rough coat, in which the suspensory ligament of the joint has its insertion, and he should attempt to do this in such a way as to leave a brilliant, gleaming, polished surface. When once he has uncovered that surface, he should stop instantly, lest he cut through the denser layer of the cementum, and expose to subsequent infection bone cells in the underlying spongy portion of the cementum. The enamel surface and the cemental surface of the tooth are the only two areas in the whole physical economy which lack the protective activity of the leucocytes. There being no leucocytes in the saliva, the enamel surface must be protected from bacterial growth in one of two ways: First, by mechanical means through mastication, or second, by polishing by the patient himself or by the dentist. The only other way in which the enamel surface can be protected is by establishing immunity to bacterial growth, and this is the great problem which now confronts dentists the world over. Is it possible by a known method of diet or therapy to produce such a condition of immunity as will inhibit the growth of bacteria on the oral surfaces?

THE PROBLEM OF IMMUNITY.

Our knowledge of immunity at the present time has not advanced to such a state of perfection as to crystallize any known method of bringing about immunity to bacterial growth in the mouth and alimentary tract. So we can dismiss that phase in the present discussion, and simply say in passing that that part of the problem must be studied with an ever-increasing interest by our profession, if we are to make real and lasting progress.

CAUSE FOR FAILURE OF MEDICINAL TREATMENT.

I said a moment ago that the leucocytes offered no protection to the root surface, and it is on this account that all kinds of medication directed toward the inhibition of infections in pyorrhea pockets must, in the end, fail. However much good such medicaments may do for the moment, the root surface is soon reinfected, because the leucocytes do not pass out of the tissue to do their best work, and the porous inequalities of the root surface offer an undisturbed culture-bed in which bacteria procreate in infinite numbers, ever supplied with food material from the blood-stream and saliva, but out of reach of the activity of the leucocytes. It is because of this fact that it is necessary actually to skin the root surface. The author thoroughly understands that the so-called scaling of the root surface has been advocated for generations, but this scaling is not enough. One must actually plane off the infected porous coat with the putrescent remains of the ligament of attachment, if he would prevent reinfection of the root surface, and he must do this skinning operation in such a way that he will not open up the still more porous substance of the deeper portion of the cementum.

TYPE OF INSTRUMENTS TO BE USED IN SURGICAL ROOT-SURFACE TREATMENT.

To accomplish this operation in the best manner without cutting too deeply, thus causing harm, one should have instruments so constructed as to render it impossible to take off more than a thin layer at any one stroke, and these instruments should be so sharp that they may be very lightly held in the fingers of the operator. Each one should be so constructed as to contribute steadiness and accuracy by its form, therefore all instruments for this work should be in effect straight instruments. First, they should have their cutting-edges exactly in line with the center of the handle, no matter what curvature of the shank may be necessary for reaching otherwise inaccessible positions on the root; second, each instrument should have two points of contact with the root surface, the cutting-edge and as broad a point of contact on the root surface mesial to the cutting-edge as it is possible to attain; third, the cutting-edge should be sharpened at nearly a right angle, to allow of push-and-pull movement, as advocated by Gartrell, James, and others. The observation of these three requirements make for accuracy and perfection of movement, and if these principles have been observed in the creation of the instruments for this work, the operator is able to gain more perfect results than he otherwise could gain by haphazard operation with instruments of haphazard construction.

THE IMPORTANCE OF A LIGHT GRASP OF AN INSTRUMENT.

The most difficult thing we have to overcome in teaching instrumentation in root-planing is the disposition of the operator to hold the instrument very tightly and strongly in his hand, and to bear down too hard on the cutting-edge. Blades should, as I have said, be sharpened at almost a right angle, so that bearing down cannot drive the cutting-edge into the tooth. Excessive bearing down robs the operator of delicacy of tactile perception, therefore he should hold the blade just as loosely in his fingers as he can and still make the planing movement. He should remember that the blade is intended to rest on two points, the cutting-edge and that portion of the shaft between the cutting-edge and the hand, which we might call the plane head. The instrument will not cut unless it rests on these two points. The fact that the instrument has two contacts makes for steadiness and accuracy in planing, and is an exceedingly important feature. Another reason for light grasp of the instrument is that one can distinguish between the different types of material with which the blade comes in contact. If the instrument is held very lightly in the hand, the shaving of tooth substance or of calculus differs in the sensation conveyed to the operator sufficiently to inform him what he is cutting—for it is to be remembered that too deep cutting means reinfection, which increases sensitiveness.

SENSATIONS TO BE GAINED DURING INSTRUMENTATION.

This is the practical reason for insistance on a light, delicate grasp of the instrument and a very discriminating sense of touch, because there are five distinct sensations which may be gained from the movement of the cutting-edge of the instrument on the tooth surface. First, there is the more or less jelly-like feeling which one gets when touching peridental membrane fibers without calculus; second, there is the rough, gritty feeling which calculus produces; third, there is the sensation—quite distinct from either of the first two—which the plane gives when cutting the porous root surface after peridental fiber and calculus are removed; fourth, there is the smooth, velvet-like feeling which the sharp plane affords when it has arrived on the hard layer of the cementum; fifth, there is the sensation noticed after one has been cutting on this hard surface for a few moments, a sensation due to the chattering of the blade in the spongy structure of the atypical bone of the body of the cementum. This is a sensation which the operator should never let occur, and which will not occur if he will stop when he meets the velvet-like smoothness in the hard layer which results from perfect operation. It follows as a matter of course that one needs instruments adapted to the surfaces; curved plane-heads for convex and concave surfaces, and blades of varying length and breadth —all systematically arranged to facilitate speed and to avoid confusion.

In choosing my instruments for my clinical work, I am guided by two considerations—by the fact that the root surface is to be regarded as a weight to be moved, and by the fact that the handle of the instrument is to be regarded as a lever.

TECHNIQUE OF OPERATING.

In regard to the operative work itself, one should take short strokes, always keeping the wrist in line with the forearm, beginning at the gum margin and directing the instrument root tipward and around the curvature of the root, going deeper at each succeeding movement, thus clearing a path for the instrument and making the operation painless, because of the small displacement of tissue. It should be the dentist's aim to polish the enamel margins so that they may easily be kept clean. Sensitiveness is due largely to the irritating effects of acids which result from fermentation and too deep cutting.

CLASSIFICATION OF INSTRUMENTS USED.

The instruments which I use in my clinic number one hundred and forty-four, and they are classified in four ways. They are first divided into eighteen groups of eight. This division is based on the position of the surfaces to be planed in relation to the finger-rest of the operator. Each one of the eight planes is made to fit one of the eight divisions of a circle, or, to be still more explicit, each plane is turned on its long axis 45° from its adjoining neighbors. This enables the operator to sit facing his patient and operate from eight different aspects of any given tooth from the same finger-rest, without changing his position in relation to his patient.

A second classification divides the instruments into three groups of forty-eight each. One group is intended for planing straight or flat surfaces, one for planing convex, and one for planing concave surfaces. This is to give the operator a selection which will fit any type of root surface, as it is impossible to plane a concave area with a flat or convex instrument.

A third classification divides the instruments into two great classes, one with a large offset or angle in the shaft, to reach far back into the mouth without stretching the corners of the mouth, and another to permit operation in the anterior portion of the mouth, in which case the curvature or bend of the shank more nearly approximates a straight line.

A fourth classification divides the instruments again into three groups of forty-eight—long, medium, and short, or large, medium, and small. These different classifications afford the operator instruments for every conceivable type of surface, except V-shaped angles, such as we find at the bifurcation of roots.

NECESSITY FOR SHARP INSTRUMENT EDGES.

Next in importance to the necessity for having an instrument at one's hand for every conceivable type of root surface and depth of pocket is the necessity for extremely sharp edges on the instrument. Such keen and sharp edges are speedily gained by the proper use of a sharpening device which makes the maintenance of a proper edge automatic.

REGENERATING LOST ALVEOLAR PROCESS.

Assuming for the moment that by our course of treatment we have cared for the enamel and the root surfaces, the problem which now presents itself is that of the loss of the alveolar process. The experience of the great majority of operators tends to create in their mind the idea that the alveolar process is not and cannot be restored when once lost. However, these conclusions are based on experience which has not taken into consideration the physiological requirements for the development of new bone, and on the hypothesis that bone is produced from periosteum, an erroneous belief. Since the wonderful laboratory experiments of Macewan of Glasgow, we have been taught that bone does not grow from periosteum, but rather from pre-existing bone cells; therefore the problem is to bring about the proper conditions for the reproduction of bone. The conditions are asepsis, freedom from pressure, and the freshening of the bony surfaces from which production must occur. This, I will admit, is a difficult combination of conditions to bring about in the mouth, but in just the proportion we can bring them about we can have deposit of new bone around the roots of the teeth upon which we have operated. The problem is, How can we best satisfy these conditions? The plan followed by the author in his attempt to provide the proper conditions for bony growth consists, on completion of the operation of skinning the root surface, in freshening the margins of the existing process by light curetment, which, of course, is followed by profuse bleeding. The next step is to seal the margin of the gum to the root by a suitable dressing material. If the blood-clot which flows up into the space formerly occupied by the ligament of suspension and alveolar process can be maintained in that triangular area for even a few hours, the bone will actively produce new bone cells during such period of time. If the period of time can be extended from days to weeks, the outpour of new bone will continue as long as freedom from pressure on the uplifting bone and asepsis obtain. The blood-clot is the best provisional filler of the space formerly occupied by bone and ligament of suspension. It has a certain anti-bacterial quality, and it exerts no opposition or resistance to the outpour of new bone cells from the process margin. The author is convinced by repeated experiment and observation that new bone can be and is produced about the roots of teeth to a considerable degree. It is probably true that we can never expect to have the original outlines of the process reproduced, but it is certainly true that enough outpour of new bone occurs about the roots of teeth which have lost a portion of their alveolar support to vastly increase their mobility and resistance to stress—an occurrence that would have been deemed impossible five years ago.

SEALING SOLUTIONS FOR GINGIVAL MARGIN.

The matter of a proper material with which to join the gingival margin to the root surface affords a field for experiment. At the present time, the writer is using two materials. One is sandarac varnish, which is applied to the tooth surface and gum after drying with the air-blast. This varnish will be retained for some time, thus closing the pocket to the fluids of the mouth. A still better material for closing the pocket is a combination of creasote and iodin, which is applied to the tooth surface and gum margin. This is allowed to dry-in for a moment, when it is followed by a coating of a saturated solution of tannic acid in glycerin, as advocated by Adair. This dressing will stay from twenty-four to forty-eight hours. The author has repeated the application at intervals of from two to four days, first thoroughly cleansing the necks of the teeth with hydrogen dioxid, lightly stirring the new granulation tissue piling up around the tooth root, just enough to cause bleeding, and then reapplying the sealing solutions. Under the conditions produced by this procedure, a surprising amount of new bone will be gained, and the teeth rendered much more solid in their sockets than by any other method of procedure known to the writer.

POST-OPERATIVE TREATMENT OF THE TEETH.

The post-operative treatment of this condition consists in gaining and maintaining, as nearly as possible, freedom from bacterial flora on the tooth surfaces. This end may be attained through the regular use of the revealing stain, which enables the patient to see where the bacterial coat is accumulating, and, subsequent to the operative treatment, to remove from the root surfaces, by proper use of the tooth-brush, wood points in a holder, and floss silk, any bacterial coat which the revealing stain may show to be present.

The next thought in post-operative treatment is apt to arise from the fact that many of the teeth are hypersensitive to heat and cold after the root surfaces have been skinned. This can often be controlled by drying into them saturated solution of silver nitrate applied with wood points in the holder, rubbing this solution in as vigorously as possible and keeping the warm-air blast playing over the surface when the application is made. When the sensitiveness grows less from day to day nothing further need be done, but when the sensitiveness to heat and cold is cumulative, pulp removal and canal-filling must be resorted to, the work to be done under nitrous oxid anesthesia or interosseous anesthesia, as the operator may elect.

CARE OF THE SOFT TISSUES IN AFTER-TREATMENT.

The next problem which presents itself to the operator is the care of the soft tissues. Assuming that a sufficient length of time has elapsed since the beginning of the operation to permit the deposit of the maximum amount of bony material around the roots of the teeth, it is then advisable to attempt to improve the tonicity of the mucous membrane of the gingivæ. This is best accomplished by massage. In this connection the author has used a variety of medicaments. Among the earlier drugs used for this purpose was that recommended by Dr. Smith of Philadelphia, a proprietary preparation, but a very useful one. Sulfo-carbolate, in a 10 per cent. aqueous solution, was experimented with, and is still used with great benefit in certain types of cases. The tannin, alcohol, and glycerin compound, a proprietary remedy made under the name of Azone* has been by far the most useful of any of these remedies. A two per cent. salt solution in hot water followed by 70 per cent. alcohol in water is excellent. Whatever solution is used should be massaged into the gums with a cotton roll held in a hemostat, or Kuroris. The whole purpose of these measures is to stimulate the development of a dense gum membrane, and to cause the gingivæ to shrink tightly to the necks of the teeth; and for this very reason, this method of treatment should not be adopted until all possibility of bony uplift is passed, for shrinkage of the overlying tissues checks the outpour of new bone. When the labial or buccal and lingual levels of the process are high, and the process between the roots of teeth has been destroyed, it is possible to bring about, by such perfect operative procedure, a condition of asepsis which will permit nature to fill entirely the crevices between the roots, which crevices may be as deep as a quarter of an inch. The leucocytes poured out into these spaces are the provisional filler thereof, and subsequently organize into connective tissue. Moreover, the labial and lingual mucous membrane will bridge across such masses of granulation tissue, and cover and protect these areas which otherwise would remain open for the ingress of food materials and infection.

In a future paper I hope to deal with the following problems. First—

DANGER OF BREAKING DOWN TOO FAST THE GRANULATION TISSUES AROUND INFECTED TEETH.

An important thought in the operative treatment of pyorrhea is one which has been impressed upon the author by repeated misfortune, viz, that it is unwise to disturb more than two or three teeth at a sitting, on account of the fact that the wall of granulation tissue which hedges in pyorrheal infections is broken down through the effort to free the root surface of its infection. When the wall of granulation is thus broken down, large numbers of bacteria are introduced directly into the circulation. If only two or three teeth are disturbed, the individual can absorb and destroy the dose.

* Azone = alcohol, glycerin, decoction of red oak-bark, equal parts.

If, however, through the anxiety of the patient to have his work rapidly completed, a large area involving six or eight teeth is disturbed, the patient is liable to have a pneumonia supervene, or an active joint infection, or an acute nephritis, or he may have a sharp chill and considerable temperature for two or three days. Having noticed examples of each of these four types of post-operative disturbance described, the author limits the area treated in any one mouth to two or three teeth at one sitting.

In line with the thought just discussed is another bearing on the same question. The writer also forbears attempting to stamp out a mouth infection immediately preceding a grave surgical operation in other parts of the body. He prefers to have the mouth operated on from ten days to two weeks before subsequent surgical interference is necessary; for the patient is more liable to harm on account of the breaking-down of the wall of granulation tissue, which has existed for perhaps years, and which is the one factor which has prevented a pneumonia, a joint infection, or a septicemia, any one of which serious disturbances may follow after this protective wall of leucocytes is broken down. During the skinning of the root surface the patient may have absorbed a sufficient amount of bacteria to so weaken his resistance as to react very poorly under the added stress of a grave surgical operation; whereas, if sufficient length of time elapses for healing to have occurred before subsequent operation takes place, the patient is in a very much better condition to resist a serious operation in other parts of the body. The importance of splinting teeth which have lost so much bone that there is not enough left to hold them rigidly after infection is stamped out should be considered.

The second problem is—

AFTER-TREATMENT OF LOOSE TEETH, AND WHY TEETH LOOSEN.

Teeth loosen from two causes, the swelling of the ligament of suspension heaving them up in their sockets, and the actual loss of the process. Teeth often are very loose although they have ample bone to hold them. After the operation of root-skinning is successfully accomplished, this type of tooth regains its rigidity in a marked degree in from twenty-four to forty-eight hours. If, however, much bone has been lost, no matter how successful the operation of root-skinning may be in stamping out infection, the tooth remains loose. It then becomes a matter of judgment as to whether these loose teeth shall be retained for any further service. If they can be supplied with some artificial means of support which will prevent lateral movement in their sockets, they will, as a rule, bear all of the weight of mastication without complaint. Therefore the construction of suitable splints or bridges of a removable character, which will afford mutual support to these teeth and prevent lateral movement, is a most successful form of treatment.

Diet is of the greatest importance. Alcohol, tobacco, and heavy meats should be eliminated. Citrous fruits and vegetables should be used, and starches should never be mixed; one starch is enough at a meal. The patient should eat generously of few elements and gain variety by different menus, rather than by many foods at a single meal, and should consume at least two quarts of pure water in every twenty-four hours. The patient should also sleep out of doors, or in a well-ventilated room, and take reasonable exercise.

The third problem is that of—

VACCINE THERAPY.

Vaccines are needed only when recurrence occurs in a clean mouth or when the patient's resistance is extremely low, and then only when such tonics as pepto-mangan fortified by strychnia and iron (Blaud's pills), or phosphorus have failed, or when a joint-infection will not yield after the initial focus in the mouth has been eliminated, at which juncture an autogenous vaccine is indicated. Viable lactic acid bacilli, also, are of great service in this connection.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

INFECTIONS RESULTING FROM LOWERED VITALITY, CAUSED BY UNHYGIENIC MOUTHS.

By CLARENCE J. GRIEVES, D.D.S., Baltimore, Md.

(Read before the union meeting of the Maryland Dental Association and District of Columbia Dental Society, June 13, 1913.)

THE foregoing title assigned by the committee promoting this symposium on Oral Hygiene assumes that vitality—meaning, no doubt, the general cell resistance of the body to disease—is lowered by an unhygienic mouth; and that infections—meaning, according to Gould, "The communication of disease germs or virus by any means, direct or indirect"—arise from that lowered vitality. In a word, the title presumes too much and too little;—too much, for it is a bare statement that unhygienic mouths (implying, in the usual use of the term, uncleanliness) lower the vitality, without real substantiation in fact; too little, for if this hypothesis be correct, not only infections in the local sense of the word, but many well-defined and serious systemic diseases, are bound to result. It is thus immediately apparent that the writer is expected to discuss all of the as yet unsettled predisposing causes of oral and of much special pathology in thirty minutes, the time allotted this paper; he hastens to admit his limitations, for the reading of the most meager bibliography alone, bearing on the subject, would consume twice that period.

DEFINITION OF THE UNHYGIENIC MOUTH.

The first and most difficult question to dispose of, that this matter may be discussed sanely, is the definition of an "unhygienic mouth." This is not so easy as it would appear, for in this instance the usual definitions, "unsound" and "unhealthy," do not define. All mouths, in this sense, are unsound, hence unhygienic without the continual help of the dentist. The normal, the obverse of the unhygienic, is ideal only, and so rarely realized as to be a negligible quantity; so in any attempt at mouth classification, the "near normal" must be accepted. It allows a small percentage of malocclusion and caries of the first stage in childhood and adolescence, recurring deposits in the usual areas of salivary calculus through adult life, and abrasion, possibly erosion, and clean gingival recession in after life. Indeed, it may be said, if these defects are carefully corrected by the dentist, the mouth is normal and can be so maintained. Dental caries neglected (through damage to the interdental spaces and gingivæ ending in gingivitis and pyorrhea, if the diathesis exist; through malocclusion in the sense of missing and tipping teeth, or the loss of all the teeth; by infection, through the root-canal, and lesions of the mucosa and tongue from lacerating carious enamel edges) will most certainly cause unhygienic conditions of the soft tissues, resulting in the invasion of these tissues by pathogenic organisms and the presence of pus and tissue exudate, and producing a condition of real disease or infection, the dangers of which will be defined later. In this manner, caries is a predisposing cause to unhygienic and unhealthy mouths; but the line must be sharply drawn, with the knowledge in hand to date, between these lesions and the consequent systemic damage, and the existence in the mouth of progressive caries without such lesions of the soft tissues. For it has only been presumed, and never proved, that the ingestion of wasting carious tooth structure, the contents of carious cavities, and general filth from decomposing food lying therein, is obnoxious, except that the denture is rendered unfit occlusally, the food is bolted instead of masticated, often resulting in intestinal putrefaction, and the mouth is offensive owing to the lack of toilet.

THE QUESTION OF THE ETIOLOGY OF DENTAL CARIES.

Dental caries in itself is not a septic process. There is no evidence yet adduced, in the first place, to prove that pathogenic organisms are active in producing caries. Though some of these are acid-producing, they exist in carious cavities only as casual visitors. In the second place, granted great growth of such organisms in many carious cavities, it is not reasonable to suppose that the ingestion of them would produce lesions in the faraway gastro-intestinal tract until pyogenic conditions were produced locally in the mouth, membranes, gingivæ, and alveolus. It is safe to presume that the gastro-intestinal tract is well guarded until the chemotactic power of saliva and other local protective powers break down, allowing local lesions, and caries *per se* can only predispose to gastro-intestinal infection. "No reference can be found in the literature relative to gastro-intestinal disturbance, or record of lesions therein, arising from the ingestion of common mouth flora and their products, which induce dental caries."(2) Of such Howe(1) says: "In other portions of the digestive tract, as the stomach and intestines, these organisms take an active part in the digestive processes. The fermentation processes that take place in the oral cavity, to the destruction of tooth tissues, have in the intestinal tract an inhibitory effect upon the microbic destruction of proteids."

Nor has it ever been shown that dental caries is an infection or infective locally, any more than it has been proved that caries is primarily a filth disease; in fact, "The local causes assigned for the initial lesions of caries, the decalcification of enamel, are numerous and not clearly elucidated. It is said to be due to fermenting particles of carbohydrate food retained about the teeth; to a definite film of bacteria covering all vulnerable surfaces and cavities; to oral mucus and its decomposition, etc. All agree that there is no specific organism ascribing caries to the usual, not the unusual, mouth organisms; that there must exist an agglutinated gelatinous plaque, protecting the bacteria and their acid products from the dilutions of saliva; and many state that a general acidity of the saliva does not produce dental caries."(2)

Finally, Kirk(3) affirms that dental caries is not a filth disease nor necessarily caused by fermenting particles of carbohydrate food lodging about the teeth, but that the initial lesion is due to a fermentable carbohydrate, possibly glycogen, excreted through the salivary glands, the ideal medium for the acid-forming organisms—and Black agrees with him; further, that the salivary secretion is an expression of nutrition, and that in turn is dependent on the food habit.

THE "LOCALISTS" VS. THE "CONSTITUTIONALISTS."

So the matter still stands undecided between these two theories—the "localists," headed by Miller and his followers, who maintain that caries is produced locally by the fermentation of carbohydrate food lying about the teeth; and the "constitutionalists," headed by Kirk, Michaels, and others, who believe that, while it is produced locally, the fermentable element is furnished by some constitutional defect or fault in metabolism, producing an excessive amount of glycogen in the saliva, which is agglutinated in a fermentable film on the teeth. The same division occurs in the etiology of that other great dental disease, pyorrhea alveolaris. Here, again, the "localists" claim that all pyorrhea is produced locally by trauma of the gingiva, principally from malocclusion and cervical calcific deposits, directly infected by fermenting and putrefying food particles as a pabulum for pathogenic organisms.

The "constitutionalists," on the other hand, are equally sure that it is but a local expression of some defective diathesis, or lowered vitality if you please, such as arthritism, disturbed metabolism, etc.

"UNCLEANLINESS" NOT THE PRIME CAUSATIVE FACTOR IN MANY MOUTH LESIONS.

So, in the light of assured facts, it will not do to glibly assert that caries and pyorrhea, the two greatest of all oral diseases, are due to filth and produced by unhygienic mouths, in the sense of unclean mouths. The term "unclean" is too often thus confounded with "unhygienic" in our minds, and while, from the standpoint of treatment, cleanliness is not only "next to," but becomes real "godliness" in all surgery, and cleanliness will always be the *vade mecum* of the dental surgeon, the fact that cleanliness is practiced and taught in the treatment after the onset of caries or after pyorrhea pockets have occurred does not necessarily indicate that uncleanliness is the real cause of these diseases any more than that it is a contributory cause to the onset of any disease. We must not befog our still doubtful etiology by our treatment, which is as often as not empirical. There is a long list of oral diseases calling for surgery or medication, always general as well as local, in which the teeth play little or no part. Aside from the lesions of syphilis, tuberculosis, and gonorrhea, there may be mentioned stomatitis, phlegmonous, ulcerative and catarrhal, cancrum oris or noma, nearly always fatal; marginal gingivitis, unassociated with calculus; Ludwig's and Vincent's angina, etc., and the neoplasms and blastomas; also the diseases antedating or coincident with the eruption of teeth, as aphthous stomatitis, particularly thrush, which is a stomatitis of nursing infants, produced by the *oïdium albicans*. G. V. I. Brown([4]) gives uncleanliness of the mouth and feeding apparatus as the local cause, particularly in bottle-fed babies; but he emphasizes the constitutional state as the real cause, saying, "It is rarely seen except in ill-nourished and debilitated children." This is true of every oral lesion; we will find the constitutional element, lowered vitality, malnutrition—be it a dyscrasia, diathesis, or real disease—to be the prime factor to be reckoned with, whether teeth and the filth collecting about them exist or do not exist in the mouth as local foci. It is probable that we may have "the cart before the horse" in the etiology of many mouth lesions, and that, after all, lowered vitality from malnutritional or other causes may be the real reason for the oral infections which seem entirely local.

"CLEANLINESS" NOT THE PANACEA FOR ORAL DISEASES.

This would appear to be confirmed by the treatment, or the failure of the treatment, in every instance. First, because, while it might be possible to keep the mouth free from food débris or "dirt," which has been defined as "matter out of place," the organisms—and it is said that over one hundred and thirty have been cultivated—which are the normal flora of the mouth, are matter not *out of* but decidedly *in* place, and hence not dirty. Cleanliness, as a treatment *per se,* fails before the fact that it is impossible to get a mouth surgically clean. Second, mere cleanliness, as far as it is possible to carry it out, will only assist but never induce a cure without the building-up of the general cell resistance. For instance, can an oral syphilitic lesion be treated by cleanliness alone? This is the main defect in our treatment of caries today—it is all local, not based on a clear etiology; and this explains why we are never through treating recurrent caries in the same mouth, until an immunity is established by body processes, and not the operator's processes. And this is why, after failure of local treatment in pyorrhea, vaccines are being exploited.

CLASSIFICATION OF ORAL SEPSIS.

The type of unhygienic mouth, then, which is really associated clinically with lowered vitality is thus shown to be not necessarily the mouth reeking with caries, but the mouth where caries, or any other contributing cause, induces local lesions of the soft tissues; and this condition, for want of a better term, is called "oral sepsis." It covers a multitude of mouth sins, and is ably explained by D. F. Colyer(5) when he says:

> The term "oral sepsis" is used not to denote a specific disease, but collectively to include all chronic inflammatory diseases about the mouth;—there occurs an increase in number and variety of organisms commonly found in the mouth, especially those of the pyogenic class. Under altered environment many of these organisms may undergo change in virulence in the direction of exaltation or attenuation—some of those which were non-pathogenic may become pathogenic. The catarrhal and suppurative products which result from bacterial activity undergo putrefactive change, and in this condition are constantly passing into the gastro-intestinal tract with enormous numbers of bacteria.

It is apparent that the term covers all inflammatory mouth processes, and it is to just this lack of definition that we object; if the term pyorrhea alveolaris stands for confusion in pathology, then oral sepsis is "confusion worse confounded."

We can now classify oral sepsis as follows(2):

(A) Tissue exudate and pus freely evacuated into the mouth from pyorrhea, fistulous dento-alveolar abscess, or from any freely draining surface; ingestion and absorption of pyogenic products via the gastro-intestinal tract.

(B) Tissue exudate and pus retained in the alveolus from chronic "blind" dento-alveolar abscess and peridental abscess; pressure absorption via the blood stream by metastasis.

(C) A combination of the foregoing in advanced pyorrhea and dento-alveolar abscess, or deep necrotic surgical areas, which only drain occasionally; pus retention below the level of drainage. Damage results by methods in A and B.

LOCAL EFFECTS OF ORAL SEPSIS.

In looking into the local effects resulting from oral sepsis and the infections arising therefrom, it is obvious that these will occur at any point in the soft tissue where local cell resistance is lowered, either from traumatism or constitutional causes. The gingivæ, peridental membrane, and alveolus are histologically the most vulnerable tissues exposed, being transitory structures subject to trophic change, hence are those most frequently involved. Other local expressions of infection are empyema of the antrum, to which, however, Worthington allows but 2 per cent. to be caused by septic teeth; and the infections of the pharyngeal ring, pharyngeal and faucial tonsils, which occur so frequently in oral sepsis as to be more than coincidental. Pickerill(6) also names Ludwig's angina or cellulitis of the floor of the mouth, arising around the lower third molars; parotitis, from ascending infection through the duct; and from dento-alveolar abscess, periosteitis, and necrosis of the jaws, but rarely osteomyelitis, and, the most common of all, lymphadenitis, through the circle of Waldeyer, in which the submaxillary and post-cervical glands are most frequently involved.

SYSTEMIC EFFECTS OF SWALLOWED PUS.

It is worthy of note in nearly all of these conditions that the common pathogenic organisms recovered from the pus are the staphylococcus albus and aureus, streptococcus, and pneumococcus. The influenza bacillus evidently plays an important rôle, principally by hematogenous infection, and Hartzell(7) reports fatal cases of alveolar infection, in which an anaerobe was recovered from the blood. A most serious and frequent question in dealing with the mouth of the average child, quite as important systemically and locally as diseases of the tonsils and adenoids, relates to the persistent fistulous dento-alveolar abscesses on the roots of temporary molars. It is next to impossible to really cure these cases, and the operator is confronted by an open infected inoperable root-apex on the one hand, and, on the other, the knowledge that the early loss of these premolars will produce malocclusion in the permanent teeth.

With sweeping pus areas often entirely surrounding the erupting bicuspids, it is surprising how little local damage is done, and appreciable systemic disturbance is so rare, except in the case of the ill-nourished, that it would appear that the ordinarily healthy child is almost immune to pus absorption. The reverse, however, is equally true, for, when the cell resistance, local or general, is lowered, the tissue areas involved are large and rapid, and systemic disturbance is profound and lasting.

As to the general systemic effects of these infections causing oral sepsis, the field is so large as to be difficult to condense intelligibly. Under the classification previously given, class A, in which the pus is freely flowing in the mouth owing to pyorrhea, in which, if the whole denture is affected, the suppurating area is said to be four square inches, and in fistulous alveolar abscess, serious systemic effects arise, according to Pickerill(9)—as secondary infections of the gastric and particularly the intestinal tracts from the ingestion and absorption of organisms and toxins, pus, and tissue exudate—and frequently result in septic gastritis and enteritis, colitis, appendicitis, etc.—from the absorption of pus by the intestinal walls into the blood stream, producing, according to Hunter(10), "pleurisy, nephritis, endocarditis, cholecystitis, and various toxic effects in the blood, as septic and pernicious anemia, chronic toxemia, septicemia. Sometimes the toxins are selective, as when exerting their influence on the nervous system, producing severe mental and degenerative effects; or on the organs of excretion, as the kidney, producing nephritis; on the skin, producing rashes; on the joints, producing so-called rheumatic swelling." A long list of authorities might be here named, principal among whom stand Hunter(10), Goadby(11), Mayo(12), Pickerill(9), Colyer(5), Billings(13), and Hartzell(7). In class B, where the pus, micro-organisms, and toxins are retained, as in "blind" dento-alveolar abscess and peridental abscess, pressure absorption occurs directly into the blood stream by hematogenesis. These cases are quite as dangerous, if less apparent, than the freely flowing pus cases, producing infectious and rheumatoid arthritis, arthritis deformans, endocarditis, and amylaceous lesions of the kidney and liver. The recent invetigations on this subject by Baer(14), Gilmer(15), Rosenow(16), Rhein(17), and the writer(18), will explain the etiology of these lesions more fully.

ORAL SEPSIS AS AFFECTED BY CERTAIN SYSTEMIC DISEASES.

The foregoing are but a few of the systemic diseases attributed to oral sepsis, and it yet remains to speak of the effect of certain systemic diseases, aside from those already mentioned, upon the oral cavity, producing a condition of oral sepsis and predisposing to local oral infections. It is to be noted that oral sepsis is classed as both cause and effect. Ulcerative stomatitis and gingivitis and general catarrhal conditions have long been associated with continued contact, as in the workers in brass, lead, nickel, antimony, and bismuth, and the effects of phosphorus are fully recognized. That the continued administration of mercury is productive of mercurial stomatitis and interstitial gingivitis, finally resulting in the loss of the teeth and alveoli, our forefathers very well knew. Scarlet fever, measles, and diphtheria, acting locally on the mucosa, and pneumonia, typhoid fever, and all other diseases in which the vitality is continuously lowered, induce an unhygienic mouth and a condition of oral sepsis.

THE VICIOUS CYCLE AND SYSTEMIC RESISTANCE.

So the status of the whole question appears equivocal, and we seem to reason in a circle, as in many other phases of the great and unsolved question of vitality. It has been here postulated that lowered vitality, or generally weakened cell resistance, is the basal cause of nearly all oral diseases, as it is of general disease; and the septic mouth conditions established through this agency, the oral sepsis prevailing against the local and constitutional defenses, will in turn as surely induce some of the various diseases previously named. And it is just as certain, if the oral sepsis preexist, that it will add to the gravity of the prognosis in any disease. This is known as the vicious cycle, and no consideration of the subject is complete which ignores its early recognition and the seriousness of the part it plays.

The possibility of general malnutrition and disease lowering the resistance of the local tissues, when some lesion, ordinarily simple, becomes a chronic pus focus—the local absorption of pus, micro-organisms, and toxins by hematogenesis, or the more usual ingestion of these products, finally affecting areas of the digestive tract and again lowering vitality and weakening the resisting powers of the local cells engaged in protecting the primary portal of entry;—this is the significance of the vicious cycle, and it is so grave as to make each of us wonder how we ever have survived thus far, and to be devoutly thankful for the wonderful alchemy of the human body and its immunizing powers, which are becoming better understood in the hourly fight against disease.

MODERATION AND RESEARCH URGED.

The field we have been considering is comparatively new, and, like all new fields in the healing art, most seductive. The etiology of a disease is hardly dry in print, the research only fairly in hand, before the operating begins. So it was with infection of the appendix, until the recoil has now assigned to the appendicitis operation its important and proper place. So it is with infection of the tonsils; after wholesale amygdalectomy, a sane understanding is gradually prevailing as to the relation of diseased tonsils to general health.

It is to be hoped that the dental profession will keep its balance, and not be carried away by this terribly new hypothesis—that every disease under the pathological sun is caused by an unclean mouth. This can be done only by the most assiduous research into oral pathology in its proper relation to general pathology. This we can and must do, and do quickly, if we are to deserve that high encomium paid our profession by Sir William Osler when he said to the dentists generally, "You are the keepers of the gate."

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SYNTHETIC PORCELAIN, USING MALLET FORCE FOR INTRODUCTION.

By CLYDE DAVIS, M.D., D.D.S., Lincoln, Nebr.

(Read before the National Dental Association, in general session, at its annual meeting at Kansas City, Mo., July 8, 1913.)

THE term "synthetic porcelain" is one which should be applied to all processes in which an attempt is made to manufacture porcelain. Synthesis is the opposite of analysis, and means the uniting of elements to form a compound. We have synthetic rubber—also synthetic eggs—and, correctly speaking, dentists manufacture synthetic gypsum when they make a plaster-of-Paris model.

In all the attempts made to manufacture a dental filling of the silicates, the powder is composed largely of the same ingredients as fusible porcelain—that is, silex, kaolin, feldspar, water, and pigments.

PROPORTION IN THE INGREDIENTS.

In all synthetic processes the final result may be chemically quite like the original; yet in most instances there is a considerable difference in the physical properties of the product, as well as in the several different attempts at manufacture. In all of the synthetic processes the best results are obtained by having the ingredients as nearly as possible of the same proportions as found in the materials produced by natural processes. To illustrate: We have a plaster-of-Paris model more nearly resembling the gypsum rock when the mix is made as thick as possible and yet constituting a homogeneous mass (*i.e.* 21 per cent. of water and 79 per cent. of calcium sulfate). Or, in other words, there must be an abundance of the basal ingredients. This rule is true of the production of synthetic porcelain. In order to obtain the best results, the mass must be heavy with these basal ingredients, much thicker than is produced when following the instructions of the manufacturers of the various silicates.

SECURING HOMOGENEITY.

It is absolutely essential in all synthetic processes that the mass be homogeneous. Before the process of setting begins we have a mixture of fine sand and a fluid, which is like a mixture of fine sand and water—and it is practically impossible to produce a very thick mixture of sand and water by the process of spatulation and have that mixture homogeneous. In endeavoring to overcome this difficulty I have developed a method which has proved entirely successful, and which has produced a filling that is uniform as to time occupied in setting as well as uniform in texture, is stress-resisting, and seems to be far superior to the fillings which are produced by the advertised method.

This method is as follows: Put a small quantity of fluid on the slab, adding powder from time to time in a hurried manner, spatulating until there is produced a mixture as solid as very thick putty, even to the point where it has lost practically all adhesive property. The mass should be quickly worked into a compact form and then patted or paddled with a clean part of the agate spatula. I term this plan of mixing, the puddling process. With this process, viewing the mass under the magnifying glass the effect is seen to be quite similar to that in the manipulation of moist sand. You have all illustrated the process by patting the sand on the beach with the foot, when bathing.

We attain this same result when preparing a homogeneous mass in making a fused inlay. This is done by jarring the mixture as it is held in the matrix, the most common method being to draw a file across the pliers holding the matrix. Those who are familiar with porcelain work will notice the similarity of results when patting this otherwise dry and unworkable mass of synthetic porcelain.

The puddling process requires only a few light blows with your spatula, when the proper shade will immediately show up and the surface will gloss. The material is then ready for the cavity. The conditions as to the use of the matrix and as to the surface exposed should be the same as for introducing an amalgam filling, using the mallet force.

APPLICATION OF THE PORCELAIN TO THE CAVITY.

In approximal cavities in anterior teeth, the matrix should be used to supply the missing lingual and approximal walls. In approximal cavities in molars and bicuspids, the missing axial wall is restored with the matrix. The porcelain is carried to the cavity with a small agate instrument; take from the mix a quantity sufficient to about half fill the cavity. Wipe this hurriedly against all walls and into all angles, being sure the margin next to the matrix is covered.

The second portion taken should be sufficient to more than fill the cavity. This is applied hurriedly and the approximate contour secured. Immediately apply the plugger point which I will describe later. This should be dipped in melted cocoa butter, all excess being wiped off. This precaution is to prevent the material from partially adhering to the flat face of the plugger point. Apply mallet force to the plugger, using a very light blow with a light mallet. I will describe the mallet later.

If this process be viewed under a magnifying glass, it will be seen that the porcelain again develops the normal color, and the surface looks glossy and wet just as it did on the slab.

The blows at first should be light, and the plugger point should be held back so as not to distort the contour. As the setting process begins there will be noticed a resistance which feels as though one were malleting a piece of rubber. Before this condition arrives, the effect is to produce a homogeneous mass. As the setting process begins, a slight condensation takes place as the particles of sand are driven into closer adaptation, removing many little spaces which exist, and which is analogous to bridging in building a good filling. Fifteen or twenty blows will probably constitute the entire process. Just before the last four or five blows the plugger point should be dipped in cocoa butter and carried to the filling so that the entire surface is flooded. If the process of malleting be carried on too long the filling will begin to take on a lighter shade, which is the result of breaking up the process of crystallization, and irreparable damage is done.

ADVANTAGES OF THIS FILLING. THE SPECIAL PLUGGER POINT AND MALLET.

Fillings so produced will all set in practically the same time, which is at least twice as soon as by the method published by manufacturers; the maximum edge strength is always obtained, and the filling will be entirely uniform and superior in every desired respect.

As to the plugger point referred to, I have made it out of platinized gold. I pass it around for your inspection. This plugger point could be made of any material which it would be possible to keep clean and having a surface sufficiently hard to always remain intact. The form shown seems to be the best for most cases.

I also pass around the mallet, which you will notice is very light and has a soft surface. The reason for this kind of mallet is quite apparent. If you will revert to the sand-and-water mixture mentioned, you will readily agree with me that the light blow is the one to be desired.

To illustrate: Make a very thick mixture of sand and water. You can easily puddle this with a light paddle, whereas if you strike the mass with an iron hammer and a heavy blow, you will make a very dry mixture at the point of contact, driving the water to the periphery. Is not this the principal reason for so many fillings having poor edge strength? We have been taught to crowd them into the cavity with a spatula and then draw a matrix tightly over the mass while setting. If such manipulation be indulged in before the setting process begins, it will certainly tend to crowd the fluid out of the central mass and spread it about the margins of the filling. In this case one will not only have a mass that is not homogeneous, but one that is altogether too fluid in the region of the margins. If the spatulation or crowding of the matrix be done after the process of setting has begun, cracking of the mass will certainly result in destroying the texture of the filling.

FINISHING THE FILLING.

Manufacturers have cautioned us not to use steel instruments in finishing these fillings. No instrument coated with an oxid should be used in placing the material before the setting process begins, as particles are liable to be dislodged and incorporated in the body of the material as a mechanical mixture; this later affects the color of the filling by further chemical dissolution or combination.

After the filling, however, has been condensed and properly surfaced, particularly if it has been coated with cocoa butter, any clean instrument or a steel file may be used with impunity without involving any discoloration. I make it a practice to trim the fillings with a clean, keen-edged chisel and fine finishing files such as are used for finishing gold fillings. The margins do not break, nor do the fillings discolor, and I have as yet to see a single filling injured thereby.

If the mallet force has been employed in introducing the filling it will be necessary to do all finishing within a few minutes after placing the filling, as when the setting is complete it will be so hard that a new gold-trimming file or plug-finishing knife will slip off of the surface as it would from that of glass. When a high polish is desired, a second sitting may be resorted to, and the polish secured by the use of disks and strips carrying a fine grit. It has been my experience, however, that the best shades are secured by finishing the filling at one sitting, which may be begun in four or five minutes after completing the malleting and the entire process finished fifteen minutes later.

REASON FOR USE OF COCOA BUTTER AND OF WAX.

In no case should the surface of the filling be allowed to become cleaned of the cocoa butter, as exposure to the air during the process of setting allows water evaporation and will destroy the color as well as the texture on the surface of the filling. The profession does not seem to be entirely clear as to the reason for using cocoa butter and wax, which is this: During the process of setting, the cocoa butter prevents the evaporation of moisture. As soon as the setting process is complete the filling will absorb moisture for some little time, entirely reversing the process. These two conditions are true of a plaster-of-Paris cast. For this reason we use a wax to coat the filling when complete, to remain in place for at least twenty-four hours. If the wax be not used, the filling absorbs the fluids of the mouth, which implies the carrying-in of organic substances that will later decompose and by a process of oxidation will produce discoloration.

The white wax which has recently been furnished with the porcelain is entirely worthless, as it seldom remains in position longer than a few minutes or hours. The form of sticky-wax which was first put out for this purpose in the little glass tubes, and is yellow, is ideal.

DURATION.

As to the length of time any of these synthetic porcelains will stand in a practically perfect condition, no one can say. We have had invariable success so far. There is no question that such a filling will last and preserve the teeth for a number of years. Some years from now the profession will be able to judge as to final results.

It is very difficult to get a correct and adequate contact point in approximal fillings. Synthetic porcelain requires time and experience in manipulation to be able to produce a correct contour when working as hurriedly as the manipulation of this material demands. One cannot be sure that correct contact point, even though it be secured, will be maintained. It is questionable whether or not it will resist interproximal wear; I predict that it will not. Dr. Black states that in a mouth forty years of age, where no cavity existed, the approximal wear in the length of the entire arch was equivalent to one-half the width of a bicuspid in that mouth. This was the result when the approximal surfaces were covered with normal enamel. The possibility of building a filling of synthetic porcelain so as to resist such wear is very questionable.

The profession should also be cautioned about using this material unsupported in angle restoration in the anterior teeth. At the incisal edge we have a cord-of-wood proposition to deal with in both labial and lingual enamel plates, as the stress is sidewise to the enamel rods. The incisal edge must be beveled to the axial when using any filling, or the enamel margin will not stand. It is possible to make a gold inlay protecting this incisal edge, leaving the labial face open to receive a porcelain filling after setting the inlay. We have found this method a temporary solution of this problem in class IV fillings.

Yet the synthetic porcelains, with all their faults, are being accepted as quite ideal in many cases, and should be taken up by every practitioner, in order that he may develop the maximum skill in their use. The manufacturers are spending large sums to assist us in this work. It is certainly up to us to do our part. However, those of us who are studying this new material have found that we cannot simply buy the package, secure a patient, and make a perfect operation. It takes much laboratory work, and a large number of attempts, to obtain ideal results. It takes a longer time to learn the correct use and manipulation of any of the porcelains than it does to make a good gold inlay. In fact, one has found in the teaching of students that it is next to cohesive gold in the time required to master its peculiarities.

A WORD ON CAVITY PREPARATION.

The length of this paper forbids a consideration of cavity preparation for synthetic porcelain, hence I will close with a general statement applicable to all cavities. Be sure to have the full cleavage of the enamel. Keep the margins as far as possible from excess stress. Avoid acute angles in filling material. Every cavity should have retentive form equal to that desired for amalgam. Vital pulps need fully as much protection as when using cohesive gold or amalgam. Be sure all decay is removed from the dentinal walls, as the acid of tooth decay seems to be absorbed by the filling after setting, affecting both color and texture.

Bear in mind that the material while setting gives off moisture, and that the dentin must not be desiccated, particularly in non-vital teeth, as it will absorb moisture from the material to the ruination of the filling. It is good practice to varnish the dentinal walls in all deep cavities.

Lastly, while this filling is as yet far from perfect, it deserves honest consideration by every practitioner.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

THE SALIVA.

By PERCY R. HOWE, A.B., D.D.S., Boston, Mass.

(Read before Section I of the National Dental Association, at its annual meeting, Kansas City, Mo., July 8, 1913.)

THE most important problem now before the dental profession is to determine what differences exist between the saliva of mouths in which microbic life extensively flourishes and the saliva of those in which it is inhibited.

This is not a simple task, but involves broad and complicated physiological and pathological questions. The search in the saliva for a specific agent for or against dental caries has not been successful. We must, then, examine critically the fundamental principles of growth, nutrition, and disease, which the vast work of physiological research is making more and more clear to us; and we must try to establish, bit by bit, the connection between these principles and the local action of tooth decay.

VARIATIONS IN SALIVARY REACTION.

Analysis shows that the saliva from a resting gland differs from that flowing under a stimulus. The saliva from the resting gland is frequently acid, that under a stimulus alkaline, the degree of alkalinity depending on the degree of stimulation. Pain causes a very alkaline reaction. Analysis also shows that under the same stimulation saliva differs in different persons. The saliva is, then, individual in character; and it is reasonable to infer that that which accompanies rapid and extensive decay differs in some respects from that which is not associated with that pathological condition.

This may be readily demonstrated by experimentation. Collect from the parotid gland of several subjects one or two cubic centimeters of saliva, using every precaution against contamination from extraneous material, using in each case the same stimulant to incite the flow. Prepare a solution of sugar or starch. Then by means of a pipet add 1 cc. of one of the salivas to 2 cc. of the sugar or starch solution, incubate, and test for the amount of acid formed as described below. It will be found that the amount of acid differs in each case. In one it is twice what it is in another; in still another it is three times as much. The bacteriologist would attribute such differences to the number and kind of bacteria present. These play an important part in such an action, but are not the complete explanation, for activity of growth and virulence must be taken into account fully as much. If we subject the salivas to analysis, it will be found that they show wide analytical differences, so that we may feel that this difference in bactericidal activity or virulence is to be thus accounted for.

EXPERIMENTS IN VARYING THE CHEMICAL ELEMENTS OF SALIVA.

In order to arrive at a conception of the possible character of a saliva favorable for the proliferation of bacteria of the type that we believe to be concerned with tooth decay, I have carried out a series of experiments in which certain elements of the saliva have been artificially increased, and the effect on bacterial growth compared with controls. The bacteriology of dental caries, as worked out by Dr. Miller now more than twenty years ago, has received no material change, and we still believe this process to be due to lactic acid-forming organisms. On this basis I have determined the comparative activity of these organisms by estimating the lactic acid formed. The estimation has been carried out in the usual manner by titrations with phenol-phthalein for an indicator and with N/100 NaOH. Although the exact composition of the saliva has not been so completely determined as to have an established formula (I have carried out some rather complete analyses and balances that I will report later), yet for the present purpose it is sufficient to mention as elements albumin and globulin, mucin, phosphates, carbonates, chlorids, and the bases calcium and magnesium, sodium and potassium. These elements I have added to cultures of maltose, lactose, dextrose, and levulose; and have determined the lactic acid formed in the different cultures under exactly the same conditions.

STIMULANTS AND DETERRENTS OF LACTIC ACID FORMATION.

These experiments, comprising some five hundred tests, show that in every case the phosphates of the alkali bases are decided stimulants of lactic acid formation. They act here as in alcoholic fermentation.(1) Here and there throughout physiological experimentation it has been remarked that sodium phosphate, both the mono- and the dibasic, excites bacterial cultures to growth, and that it promotes cell growth. This property is not confined to the sodium phosphates, but is common to the phosphates of the other alkali bases. The phosphates of the alkaline earths act in the same way, but, on account of the solubility difficulties, are not so markedly shown. An increase of albumin and mucin, each of which I have added to cultures of the type described, produced a marked increase in the lactic formation as compared with controls. Creatinin causes a similar increase.

If it be true that with the picric acid test no other substance forms the distinguishing color,(2) then creatinin is a constituent of the saliva. On account of the colloidal nature of the saliva it requires a little time for the color to appear. Weyl's test and Salkowski's also give a positive reaction. Creatinin, as is well known, is a product of muscular (endogenous) metabolism, and it may here be accounted a stimulating agent.

The carbonates, bicarbonates, and chlorids diminish lactic fermentation, according to these experiments.

PROBABLE EXPLANATION OF PHENOMENA.

When we consider all these elements of the saliva from the standpoint of furnishing bacterial life with its nutritional requirements, we have a very reasonable explanation of their respective actions in these experiments as excitants or depressants. The globulin, albumin, mucin, and creatinin are all able to furnish the nitrogen for the structural requirements of the bacteria. Bacteria are selective, and with utilizable sugar present, even pathological germs form simply lactic acid, yet they must have nitrogen for their own structural purposes. Dr. Kendall is authority for the statement that the typhoid bacillus grown in broth forms toxins, but, when utilizable sugar is added, it forms lactic acid. In the first instance the smallest amount injected into a guinea-pig produces toxic symptoms, but in the second almost any amount can be injected with no ill effects. The organisms that attack the teeth must find not only suitable carbohydrate material, but also some material from which to obtain the nitrogen upon which their very existence depends. Under the conditions provocative of tooth decay even pathogenic bacteria become lactic-forming, and indeed the very growth that in the mouth causes such damage is, farther on in the digestive tract, considered a very desirable thing. Metchnikoff has advocated the introduction of lactic-forming bacteria for the purpose of changing the toxic character of intestinal putrefaction.

Others to effect the same end have advocated furnishing the microbic flora with a suitable medium by feeding some utilizable sugar.

Certain bacteria cannot be grown *in vitro* unless they have amino-acids.(3) These acids furnish a nutritional requirement. They are of course obtained from albumins, either by the action of a ferment or by proteolytic bacteria. From this we may feel that when the albumin or the globulin of the parotid or the mucin of the submaxillary saliva becomes subjected to the action of the proteolytic bacteria (and these exist in quantity in the mouth),(4) the lactic bacteria would here find a very available source of nitrogen, and that it would stimulate these organisms to active growth. I have experimentally found this to be so; and by adding amino-acids to cultures have found the lactic acid production to be indeed increased.

PATHOLOGIC CONDITIONS AS FAVORING LACTIC ACID FORMATION.

Local infective processes of the gums, tonsils, sinuses, and nasal passages, adenoids and inflammations of the pillars of the fauces and of the uvula, or catarrhal conditions in which the colloids of the mouth show evidence of alteration or liquefaction by bacteria, are distinct aids to the lactic-forming organisms through affording an available source of nitrogen. I have shown this to be so *in vitro*. The albumin and the globulin are the better source of nitrogen as compared with the glycoproteid mucin, for mucin is comparatively poor in nitrogen. Viscidity of the saliva does not always signify a favorable medium for bacterial proliferation *per se;* viscidity of the parotid usually does. In cultures such as I have described the parotid saliva produces more acid than the submaxillary or the sublingual saliva. Compare the decay of the first molars with the decay of the lower front teeth.

Urea is frequently found in the saliva, and acts in the same way. Amino-acids are converted into it.

PHOSPHATES AND CARBONATES.

When we recall that bacteria of the kind associated with tooth decay are low forms of vegetable life, we know that phosphates meet nutritional requirements; and this may be considered a possible explanation of their stimulating action in lactic fermentation.

Although chlorids are essential to or are tolerated by certain kinds of bacteria, they here act in an inhibitory manner; and the same is true with the carbonates. Nor can we see, with our present knowledge of bacterial life, how they could be of service from a nutritional point of view. While I have termed the carbonates inhibiting substances, their action is to neutralize the lactic acid formed. Bacteria are able to form this acid in the presence of carbonates, as may be seen by a comparison of the degree of alkalinity in a control with that in a culture of some hours' incubation. Here the alkalinity will be found much lessened owing to some of it being used to satisfy the acid formed.

BALANCE OF ELEMENTS IN THE SECRETIONS.

Physiological chemistry has shown that under normal conditions the secretions of the body maintain a certain proportion or balance of many of those very elements which we have been discussing. The albumin and the globulin sustain a rather definite ratio to each other. The amount of sodium relative to the potassium, and of the calcium to the magnesium, are other ratios. Individual in character this balance may be, but under certain pathological conditions it is materially changed. The proportion of albumin to globulin, for example, in certain kidney disturbances is changed so that the globulin greatly exceeds the albumin(5); while in tubercular conditions the albumin much exceeds the globulin. In pneumonia is to be seen another example of this, for here the sodium-potassium relation is reversed from what it normally is,(6) and the calcium-magnesium relation undergoes great alteration. The sodium, chlorin, and calcium are here retained, whereas the potassium and the magnesium are excreted in excess. (7) It has been shown, too, that in the intestinal disturbances of infantilism similar irregularities occur. (7) Calcium is here not taken up by the tissues. (7) In one case reported, a normal urine contained a calcium-magnesium proportion of 244:100, when in the abnormal case the ratio was 27:100. In intestinal crises 60 per cent. more calcium is excreted than is taken in by food. These few cases serve to illustrate the fact that these very salivary constituents suffer disarrangement under certain systemic metabolic conditions, so that one element unnaturally predominates over the other. The saliva is no exception to the other secretions in the feature of having a balance of elements, as is known to every investigator of the subject. The chlorid-retention of fevers holds true in respect to the saliva. Under normal conditions the phosphates are increased by a heavy protein diet. Excess of the earthy phosphates in the urine is indicative of a heavy phosphate content in the saliva.

The chlorids remain usually constant, (8) but show increase by introduction through food supply. There is, however, a heavy demand for sodium chlorid in the system, for it is supposed to furnish the sodium base for all sodium salts in the body. It appears in the blood in connection with potassium phosphate, and a certain portion of it is taken up in a double decomposition forming sodium phosphate and potassium chlorid. On account of the large amounts of potassium salts present in vegetables, the individuals living on such a diet need more chlorids. The deficiency of chlorids in the saliva allows the mucin of the submaxillary saliva to become precipitated by the organic acids of the mouth. (9) Drinking a large amount of water will cause an increase in the chlorids in the saliva. (11) From many analyses I believe that in mouths where extensive caries is progressing it will be found that the chlorid content of the saliva is low. The administration of diuretics lessens the chlorid content. The chlorids under normal conditions maintain an isotonic relation in the tissues and in the bodily fluids.

Carbonates represent the ingestion and ultimate oxidation of carbohydrate material. Fatty acids given in the form of salts of sodium cause large quantities of carbonates in the urine: Schotten. (10)

A FIELD FOR INVESTIGATION WORK: LATER CONTRIBUTIONS—PICKERILL'S WORK.

These few facts serve to show some of the possible ways in which these elements of the saliva are disturbed in their arrangement, and in what way we may expect to increase or to diminish them. This clearly shows, as well, the immense amount of investigation work that needs to be done in order to clear up the connection between dental caries and the various systemic phases that effect such alterations in the habitat of the micro-organisms as to cause them to take on an active growth.

This manner of consideration of the subject of tooth decay is based on the supposition that an abundance of utilizable carbohydrate is always available from the food supply.

A thick, viscid saliva can be thinned out and the chlorid content raised by drinking a liter of water with the meals according to the experiments of Mathill and Hawk, (11) and as I have ascertained by actual measurement, using a viscosimeter described by me in the Cosmos for April 1912 (page 431).

With respect to the effects of stimulation of the salivary glands, Dr. Pickerill's interesting and instructive work shows that acid and sapid foods produce the greatest flow and cause the greatest degree of alkalinity. (12) He advocates the use of such sapid substances for this purpose, and for the same reason he recommends acid mouth-washes and the incorporation of potassium bitartrate into powders. He attributes (and rightly) the greater degree of alkalinity to the larger amount of alkaline salts present, believing that the activity of bacteria is in no wise interfered with, and that they still have every facility for the formation of lactic acid, but that the presence of these alkaline salts in the salivary fluids will satisfy this acid, and that they will be chosen rather than the salts of the teeth. This idea of alkaline salts to neutralize acidity has been our usual treatment. Dr. Pickerill obtains a more constant presence of these salts. In respect to phosphates, he believes them to be protective agents for the reason that they may satisfy an acid. My experiments have convinced me that they are a nutritional stimulant to these organisms. Dr. Pickerill feels that mucin is a protective agent because it gives an alkaline reaction when it decomposes. I believe that it is a protective agent from a physical standpoint, but that its decomposition encourages a vigorous growth of lactic-forming bacteria by affording the necessary nitrogen, and that it is then converted into an augmenting factor. This I have substantiated by experiment. It is undoubtedly true that organic acids have their place in our armamentarium, yet I feel that the neutral and alkaline salts also have theirs.

The increased alkalinity arising from stimulation is of course due to the increased flow of blood that ensues upon the activity of the gland. The reaction of a resting gland may be acid, but when the gland is activated the reaction becomes alkaline. The degree as given by indicators is only relative. Dr. Pickerill has used methyl-orange, but it is not considered a very sensitive indicator—indeed Sutton says it is unfit for organic work. I have used methyl-red, which was recommended to me by the Industrial Institute of Chemical Research at Washington. This indicator can be used cold, in the presence of carbonates, and is very sensitive. It reduces the alkalinity as given by Dr. Pickerill. Phenol-phthalein, with the addition of a bit of potassium oxalate to take care of the calcium salts, and boiling, adding by tenths N/100 HCl and boiling again, repeating until boiling no longer causes it to redden, gives very accurate results.

Dr. Pickerill deals for the most part with the saliva under stimulation, but not wholly, for he advocates a protracted diet of acid foods, thereby producing a more alkaline saliva. It seems to me that it is during the longer intervals between meals, when mechanical friction has passed, and when stasis can best occur, that the bacteria find the opportunity for the largest production of acid. It is the character of this slowly exuding saliva that has the more prolonged effect upon caries, rather than the flow that follows the stimulation of eating, and persists only for a few minutes after. In either case the saliva depends for its individuality on many systemic phases, some of which have been indicated. The saliva may contain foreign or morbid products, as I have shown in different articles. It is capable of alteration, but demands familiarity with physiological principles, together with a knowledge of chemistry sufficient to guide any attempts at treatment.

SUMMARY AND PRACTICAL SUGGESTION.

One aim of this article has been to emphasize the fact that many systemic conditions are directly reflected in the saliva and act to promote decay.

Another idea is to show that the condition of the surrounding parts, by furnishing proteolytic bacterial substances, encourage tooth decay. It is desired to suggest the consideration of the saliva as a medium furnishing acid-forming bacteria with necessary nutritional requirements, and not simply as a neutralizing agent for acid already formed.

We recommend, then, as general suggestions, coarse foods, and sapid and acid foods as salivary stimulants. We recommend also dietetic consideration on account of the nature of the metabolites, attention to intestinal conditions on account of the toxemias that result,([13]) and fully as much attention to the state of the kidneys for very similar reasons(14); and finally, seeing that the adjacent anatomy is free from inflammatory and catarrhal states.

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ORTHODONTIA AND ITS RELATION TO DENTISTRY.

By ROSCOE A. DAY, D.D.S., San Francisco, Cal.

(Read before the National Dental Association, in general session—being transferred from Section I—at its annual meeting, Kansas City, Mo., July 9, 1913.)

THE relationship of Orthodontia to general dentistry is such that it demands hearty co-operation upon the part of both the orthodontist and the general practitioner, and is of pronounced assistance to both in accomplishing the results desired. The orthodontist is in the same relation to dentistry as the rhinologist, aurist, and oculist is to medicine. Not that the orthodontist feels himself greater in his art, but simply that the time has arrived, in this advanced and progressive age, when the laity demand individual attention to themselves and families, especially in the proper care of the children from every point of vantage looking toward normal development of the human body.

IMPORTANCE OF ATTENTION TO OCCLUSAL CONDITIONS.

I believe I am not presuming too much in saying that there is not a person present here today, who follows his general practice closely and has his patients' welfare at heart, who feels that he can afford to give time to a case of malocclusion, or any character of malformation, without neglect of some other department in his practice. Thus is shown one of the reasons why the science of dentistry is being divided into its many departments, called "specialties." Another very important reason is that the laity are becoming educated to the facts, and are demanding that they receive the benefit of that "special education" that is necessary in order to fit the competent man to practice successfully his specialty and get results.

The position of the general practitioner of dentistry demands that he should be very familiar with orthodontia from its many standpoints. The family physician first takes the responsibility of the child from its conception, through the prenatal and postnatal period, up to the time of the presence of the full complement of the deciduous teeth. Then the family dentist comes in, and as a rule he is the first to come in contact with the patient who is in need of the services of the orthodontist. His advice is always asked regarding the development of the dental arches, the condition of the teeth, and especially the dental occlusion. It is of great importance that he be thoroughly familiar with normal occlusion and its relations—with the influences it exerts upon the development of the facial bones and proper muscular functions—so as to enable him to diagnose the condition at once and offer the best judgment in regard to cases that come under his observation.

"NORMAL OCCLUSION" DEFINED.

It may seem rather superfluous to present to you the definition of "normal occlusion," given by Dr. Edward H. Angle, but I cannot resist doing so at this time, inasmuch as it covers so thoroughly the cases that come under the care of the dentist. It will assist materially in enabling him to diagnose those cases, while it implies as well the probable prognosis if they are not given proper attention.

He defines—"The line of occlusion as being the line in which, in form and position, according to type, the teeth must be in harmony if in normal occlusion."

There can be, then, but one line of occlusion, and it must be the same as the architectural line on which the dental apparatus was constructed. This ideal line was intended to govern not only the length, breadth, and peculiar curve of the dental arches, but the size and position of each tooth, cusp, and inclined plane composing these arches; and more than this, that as the dental apparatus is only a part of the great structure of the human body, each part and organ of which was fashioned according to lines of design, it must have been intended that the line of occlusion should be in harmony in form and position with, and in proper relation to, all other parts of the great structure, according to the inherited type of the individual.

Anyone giving this definition sufficient thought and study may apply it to cases that come within his observation, and can readily appreciate its broadness, and see how completely it covers the individual case at hand.

ETIOLOGY TO BE STUDIED.

An important factor in the majority of cases relates to the etiology, or causation, of malocclusion and abnormal development. The etiology of each case presented demands the most careful and thoughtful consideration, in order that the operator may be able to remove the cause, if possible, and prevent further abnormal development along the line of perverted normal occlusion.

The causes are numerous, and each one has its own individual characteristics in that regard. Those most commonly associated with malformations are nasal stenosis, brought about by adenoids, polypus, infected tonsils, some form of deviated septum, or irregularity of the turbinate bones, resulting in an underdeveloped nasal passage, lacking capacity for normal breathing. The natural result is the necessity, in the case of a patient so afflicted, of using the oral cavity for breathing purposes in conjunction with its other normal functions, and in the greater majority of cases creating an habitual mouth-breather, whose habit greatly retards the normal physical and mental development.

We know that the osseous development is greatly influenced by mechanical stimuli, whether of muscular function or otherwise. In the case of a mouth-breather, the abnormal functioning becomes greatly pronounced by the mouth being constantly held open in breathing, which creates abnormal muscular pressure against the lateral halves of the upper arch and a backward pull on the mandible, with lack of the normal function of the tongue in assisting, as it does when in its normal position, in forming the arches.

Mal-locking of the cusps of the teeth as they erupt in their respective positions, and continual pounding of the mandible into the upper arch when the teeth are in malocclusion, also altered conditions of atmospheric pressure in the inspiration and expiration of air, are pronounced factors in the abnormal development of the bones of the face and accessory sinuses. Nature fully intended the nasal fossa to be used for breathing, and in so doing made provision for the air to be properly prepared and treated for its reception into the lungs; and when the oral cavity instead has to perform that function, the absence of the preparation of the inspired air results in the lack of full distribution throughout the lung cells; a continuation of such conditions greatly hinders the distribution of sufficient oxygen to the system, which tends to entail lack of development in the region of the chest and a general anemic condition of the patient as a whole.

MALNUTRITION AS A FACTOR IN ETIOLOGY.

Another mode of causation that presents itself very frequently is malnutrition, which may be traced as far back as the prenatal stage, namely, to the anemic or faulty assimilation of the mother.

In early infancy the child, in some cases, cannot be fed by natural means—the mother's milk—which necessitates artificial feeding; and many times the physician is not able to prescribe a formula that takes the place of the natural food—all of which necessarily retards the early development of the child. In some instances a too highly organized food is given—food lacking the proper ingredients for bone-building.

The eruption of both the deciduous and the permanent teeth is at a period when the greatest growth of the body is in progress, and if malnutrition or any other abnormal factor is present during this period, it is quite natural that it should seriously affect the normal development of the dental arches and interfere to a great extent with normal eruption of the teeth into the respective positions.

HABITS AND ENVIRONMENT.

Diseases acquired in early childhood and improper environment are influences which tend to deflect from normal development—as oral habits of various characters acquired in early childhood and not overcome before having become the cause of some pronounced abnormal functioning. The habit of mouth-breathing, acquired owing to some obstruction of the naso-pharynx, when it has been of long duration, is in many instances the one that is hardest to overcome. Thus, many times, after the rhinologist has removed the cause of the nasal stenosis, and the orthodontist has restored normal muscular function and normal occlusion of the dental arches, the patient, through lack of effort and long association with the habit, continues to breathe improperly—especially when fully relaxed, as in his sleep. This is not a common condition, but one due to a chronic condition of long-standing malformation, and must be overcome by mechanical assistance in closing the mouth while in repose.

Higher civilization is another great factor in causation, associated with disuse of the oral cavity, in lack of sufficient amount of natural exercise in mastication, owing to the fact that our food of today is so prepared that it is to a greater extent predigested before being served for consumption. It is proved, therefore, that the great factor behind these maldevelopments, in many instances, is perverted nutrition and the rearing of the child in a hothouse existence, as it were, with a lack of the proper amount of natural environment, in not being associated closely with nature as the Creator intended.

IMPORTANCE OF CARE OF THE DECIDUOUS TEETH.

One of the most material points, one that is frequently of the greatest significance for the future welfare of the patient in the matter of oral development, is the thorough and conscientious care of the deciduous teeth. This is of the utmost importance in its bearing on the normal development of the dental arches. Through the efforts of the dentist the parents are becoming more enlightened in that regard, and are much more appreciative of the necessity for the proper care of the deciduous teeth until their successors erupt; they are being educated to understand the very important part that the deciduous set play in assisting nature to insure a normal growth of the dental arches, and it is one of the essential duties of the dentist at all times to thoroughly impress this fact upon the parents.

FACTORS IN THE CAUSATION OF ABNORMALITY.

A causal factor that appears in some instances is a congenital anatomical deficiency, such as cleft or non-union of the suture of the superior maxillary bones, malformed or misshaped cusps and crowns of teeth, non-formation of the permanent tooth-germ to succeed its predecessor, the deciduous tooth. These causations, fortunately, are not common, but, when they occur, present a serious difficulty to overcome. Again, in some instances the phenomena of deficiency may be reversed, even to the extent of supernumerary teeth erupting inside the upper dental arch, disarranging the teeth as they erupt, and so bringing about a malocclusion.

The causes mentioned are general, and there are many instances, perhaps, where we may be able to trace the etiology to some other origin; and this emphasizes the necessity laid upon the dentist that he be so equipped with knowledge in relation to orthodontia as to enable him to diagnose the cases that present themselves. It is of the utmost importance that these abnormalities be recognized at or as near the beginning as possible—not waiting until they have developed to the chronic stage, so to speak, but taking them into consideration at once and giving relief through proper orthodontic procedure.

OBJECT OF ORTHODONTIA TO SECURE NATURE'S IDEAL.

The relationship and object of orthodontia in dentistry is purely to assist nature toward the normal functions of the oral cavity, normal development of the facial bones and dental arches, normal muscular functions and normal occlusion of the teeth—which, when established, maintains a balance of function that was originally intended by nature, and in consonance with the inherited type of the individual.

You are all fully aware of the results of a dental impaction of long standing, and the difficulty in trying to overcome a malformation that has gotten to such an extent of development that every function is practically abnormal; also the fact that many of the more pronounced cases of delayed development of children are influenced by dental impactions. This is a factor recognized by the science of medicine—especially by the man in that profession who is devoting himself to the care of children—and by the rhinologist as well. Nature's original intention is harmony of development and function in all parts of the human body as to its inherited type of the individual. She creates the size and form of the teeth in harmony with the bones of the face, and they are so constructed and arranged that they properly resist the natural forces when the teeth are in normal occlusion. Each bone of the skull bears a relationship to the others as to size, and the failure of one or more to gain its full size naturally affects the growth of the other bones that articulate with it; and when this change of bone-development takes place to such an extent that the erupting teeth are forced to take a position in occlusion other than normal, the perversion of bone-development immediately becomes further assisted by the exertion of the mechanical forces of occlusion, besides the creation of a perverted muscular function, upsetting the balance of expression of the facial features.

Other anatomical deformities of the human body, such as come under the care of the orthopedic surgeon, are given attention, as we know, at the earliest possible age, in order to place nature at her best advantage for a more perfect development of the parts afflicted. We, as dentists, have the same responsibility in regard to oral deformities and malformations, and beg to suggest for your consideration whether it be not more logical and practical that the dentist should recognize these abnormalities at the earliest age possible and assist nature toward realizing her original intention of development in the case of each individual.

You cannot but agree that it is of the utmost satisfaction to the dentist, and as well to the patient, to realize at maturity a normal development and balance of function of the oral cavity and its affiliations. It is, as well, of great assistance to the dentist in the future upkeep of the organs of mastication. The creation of and the skill in the adaptation of appliances for use in the cases at hand are essential, and need to be thoroughly understood, but, even so, these become of no material value to the operator unless, further, he be able to proceed on a scientific orthodontic basis from the beginning to the completion of each case treated, and be thoroughly familiar with the laws governing normal occlusion.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

Correspondence.

AN AMAZING CONTRAST: "RESEARCH" AND "RELIEF"— A SUCCESS AND A FAILURE.

To the Editor of the Dental Cosmos:

Sir,—The Research Committee of the National Dental Association is said to have a fund in hand of $16,000, and more in sight. For more than twenty years past, a Relief organization has been talked about; articles have occasionally appeared in dental journals advocating the cause, and telling of the great success and of the good work done by the British relief organization; a few years ago a committee was appointed by the National Dental Association to solicit money;—and apparently the unfortunate and the aged are still unthought-of and uncared-for! The donors to the research fund are seemingly unaware that research workers or scientific investigators are too often men who sadly need care and assistance, and they are forgetful, if they ever knew, of the number of deservedly prominent dentists who in the last thirty years have been wholly dependent on the charity of friends.

While most heartily congratulating the Research Committee on their success in getting money, the apparent failure of the Relief Committee is sadly disheartening. The warning note in the editorial in the Cosmos for December 1911 was not heeded. The object, movement, and work have been "allowed to lie dormant," and I feel sure that that splendid presentation and appeal to the profession was not generally seen or read.

The "recall and referendum," in dentistry, means a careful study of present conditions and grave thought as to the actual importance, value, and benefit dentists will gain by contributions to either or both the research or relief funds. The writer believes that dental colleges and universities all over the country, medical colleges, the Rockefeller and Carnegie Research institutions, and the grand Evans Memorial and Dental Department of the University of Pennsylvania have been giving and will continue to give all the scientific food that the dental, medical, and other professions can absorb and thoroughly digest for some time to come, and that the workers in these institutions will be glad to see energetic efforts made to raise money to care for the aged and unfortunate.

Money is wanted, and if the dentists will wake up and realize the grandeur of the relief movement, and work together, they can easily raise before Christmas $10,000 as a starter. In every town and city, I might say village, there are churches, asylums, and hospitals—beautiful object lessons that tell of the personal sacrifice of a poor but united people, whose money contributions were always small, rarely more than one dollar, but frequent, until finally the churches and charitable institutions were truly made in every sense homes for the unfortunate and aged. Let the same persistent spirit be manifested by the dentists of the country, and ideal homes, so lovingly pictured by Dr. J. B. Story of Texas, would soon be ready for guests.

It is estimated by enthusiasts that the National Dental Association this year will number over 12,000. A Relief Fund must be raised, and can be, if these members will give the fee received for one hour only of extra service each year to the fund. This will not be giving money. It means that they may miss a ball game, or an auto ride and incidental expenses, and allow the patient to do them an act of charity.

A few active men in city and state societies, making persistent personal appeals, with the kind co-operation of the dental journals, ought, and no doubt will, soon get good returns. Will the Cosmos please again publish the December 1911 editorial? It is so full of interesting information, suggestions, and good advice.

James McManus, D.D.S.

Hartford, Conn.

"DOES 'SECONDARY ENAMEL' OCCUR?"

To the Editor of the Dental Cosmos:

Sir,—My attention has been directed to a communication appearing in the September issue of your journal, calling attention to a statement made by me regarding the occurrence of "secondary enamel."

In reply to Mr. Tabak, I hasten to state that the quoted remark was not "meant as an indorsement of the now generally abandoned theory of Holtzmann and Boedecker, according to which physiological changes can, from time to time, take place in the enamel owing to the presence of a certain reticulum of organic, vital matter."

I have always considered enamel on an erupted tooth to be practically a finished product, and I continue to adhere to this belief.

Your correspondent evidently has failed to take into consideration the fact that the teeth referred to were unerupted, and were still confined in their follicles. This being the case, the enamel organs which were in contact with the partly calcified tooth-crowns made it possible for the defects, viz, enamel pits, to be partly or entirely repaired by a new or "secondary deposit of enamel," the so-called "brown spots" of hypoplastic teeth.

Sincerely yours,

I. N. Broomell, D.D.S.

Dean of Dept. of Dentistry, Medico-Chirurgical College of Philadelphia.

To the Editor of the Dental Cosmos:

Sir,—In the September issue of the Cosmos you published a communication from David Tabak, in which he asks the question: Does "secondary enamel" occur? In reply to this communication I will say, that in some cases it most certainly does occur.

I know a young negro girl, who was struck in the mouth with an ax some eight or ten years ago, the blow splitting the central incisor. There is a distinct scar in the tooth showing that secondary enamel certainly does occur. The tooth is in good condition, it has been giving service for all these years, and will probably continue to do so for many years to come.

Respectfully yours,

N. G. Slaughter, D.D.S.

Athens, Ga.

"NORMAL OCCLUSION," LINGUALLY, OF THE UPPER PREMOLARS.

To the Editor of the Dental Cosmos:

Sir,—In the communication "The Significance of Normal Occlusion," published in your issue for September, the author urges the importance of a knowledge of the minute details of the subject; and opinions in agreement with that standpoint have frequently been expressed in your columns. If then, on any significant point, it is found and reported that the relationship of teeth in normal occlusion differs from what is described as such in text-book and other published statements, those interested in the subject will be ready to criticize and re-examine for themselves, and as a result will either set aside the unorthodox findings, or accept them.

I found that the points of the lingual cusps of the two upper premolars do not normally occlude *between* the two lower premolars and between the lower premolar and molar, but in or at the distal groove or sulcus of the corresponding lower premolar. That was the relationship exhibited in all the finest dentures examined—in skulls, plaster casts, and in the living subject. It has since been independently verified by several observers of repute, and accepted by them as being the normal relationship. It was also noted that this occlusal arrangement is in at least one or two ways mechanically and physiologically superior to that hitherto described and accepted. And certain details in the normal morphology of each premolar come into clearer definition, and are in harmony with the observed normal occlusion.

The dentitions examined belonged mostly to European stocks, and of course a different normal occlusal relationship may in general obtain in America. After all that has been written about the importance of occlusion, the point should be worth inquiring into.

Yours faithfully,

D. M. Shaw.

Royal Dental Hospital,
London, September 13, 1913.

THE STORY OF "TIRADENTES."

To the Editor of the Dental Cosmos:

Sir,—Dentistry has its honored names of skilled workers, inventors, and worthy citizens; also of men who have had to do with great political movements, whose work is part of the world's progressive life. Of these latter, one had a life-story so unusual, and ending so tragically, that it is well worth while to repeat it.

This story is suggested to the memory by the name of the battleship (Minas Geraes) of the Brazilian navy which this summer brought Dr Lauro Müller, Brazilian minister for foreign affairs, to return the visit paid to that country, in 1906, by Secretary of State Elihu Root.

Minas Geraes (general mines) is the name of one of the largest provinces of Brazil, one full of mines, and among them the oldest gold mine in the country. With many villages and mining towns, the province had no large city. Through these villages, and over mountains and valleys, among miners and farmers and shepherds, Joachim José de Silva (*tiradentes,* or tooth-puller) worked for years as a dentist, and everywhere he preached freedom. With many others, he had been aroused by the American Revolution to wish for national life free from the corruption and despotic rule of Portugal.

The club of patriots to which he belonged worked eagerly and incessantly to awaken the people to demand independent national self-government. Roads hardly existed. The people were ignorant; discovery meant death. Plans were prepared for the expulsion of their Portuguese king and his adherents, and for the establishment of a republic. They were discovered, and forty of the leaders were arrested in Ouro Preto, the capital, and shut in damp and dark cells for months. All were condemned to death, but influence and bribery rescued all but "Tiradentes." He was made the scapegoat, and after nearly three years of imprisonment was executed, in April 1792, in the public square of Ouro Preto. His body was quartered, and the quarters sent to different cities and publicly exposed as a warning. All his property was confiscated. His house was burned and the ground salted, and his family was declared "infamous" even to the third generation.

But, today, his name is honored over all Brazil. Monuments stand in honor of him, and streets bear his name in many cities. In the principal plaza of Ouro Preto, on the spot where he was executed, stands a marble column bearing his statue. The pedestal of this monument is the stone on which he was exposed in a pillory and publicly scourged. The man died, but that for which he lived and died is triumphant.

PAUL EGBERT.

PASADENA, CAL.

Proceedings of Societies.

NATIONAL DENTAL ASSOCIATION.

Seventeenth Annual Meeting, held at Kansas City, Mo., July 8 to 11, 1913.

GENERAL SESSIONS.

TUESDAY—*First Session.*

THE first general session of the seventeenth annual meeting of the National Dental Association was called to order at 10 o'clock Tuesday morning, July 8, 1913, in the Century Theater, Kansas City, Mo., by the president, Dr. F. O. Hetrick, Ottawa, Kansas.

The President introduced the Rev. D. D. MUNROE, Kansas City, who invoked the divine blessing on the deliberations of the association.

The President next introduced Mr. HUNT C. MOORE, Kansas City, assistant city counselor, who, instead of Mayor Jost, welcomed the association on behalf of the city, as follows:

Address of Welcome.

Mr. President, ladies and gentlemen,—It is not often that I have the honor of representing the mayor on occasions like this—because he has a weakness, whenever there are ladies present, for abandoning all work at the City-hall and taking his automobile in hot pursuit. Today, however, he is detained at the City-hall with some city officials from Kansas City, Kansas. I understand he is giving them some pointers on city government and a lesson or two from the democratic code, and we don't object to that. Now, I am not going to make a political speech, Mr. President, but if I ever run for office I certainly would like to have this bunch of fellows back of me. [Laughter.]

The mayor wishes me to extend to you a most generous welcome. He wants you to feel at home and "be one of us." I am glad on this occasion that I can associate with you gentlemen without fear or trembling. Ordinarily, when the name of a dentist is mentioned in my presence I have a touch of "buck ague" and I imagine myself in a soft-seated chair, and every now and then jumping from one side of the room to the other. But, notwithstanding this, I realize that you are a lot of good fellows and never put a fellow entirely out of commission as do the surgeons and doctors sometimes. I am familiar with all of your instruments and just how you use them, and know which way a fellow is going to jump when the current is turned on.

To you dentists who have come here without your wives or sweethearts, I want to say while there are two police-courts in this city, that the city counselor can issue as many pardons as they can make convictions, and I want you to feel that the town is yours and that you are secure from molestation. [Applause.]

The bankers of our city do not have much to do with the lawyers of the town, but I have seen their advertisements in which they claim to have a surplus on hand. I want to say to you that if some of you visitors don't use a part of that surplus it is not my fault. We have a city with sixty miles or more of boulevards, and it is known as the greatest boulevard city in the world. We are justly proud of it and we want you people to see the city and take the inspiration you obtain back to your homes. Let me tell you another thing—confidentially—that all of your friends who are practicing dentistry here, while they may not admit it, are quite wealthy; they all have automobiles, so don't you let them "streetcar" you around while you are seeing Kansas City. [Applause.] Make them ride you in their automobiles and if they run away and will not do it, come down to the City-hall and I will see that your wants are supplied.

But seriously, my friends, we are proud to have this great convention in our city. We are proud of the splendid work that you are doing for humanitiy, and we congratulate you upon the progress you are making. Your organization is unlike many of the organizations of today, which combine solely for the purpose of raising prices and cornering the market. I know that your splendid organization will never encourage its individual members to raise the price for making an unfortunate a set of teeth! There is nothing but good to come from a meeting like this or from an organization like this. It is to the credit of you men, individually and collectively, that you are making the fight you are. I noticed in the press of yesterday that you are busying yourselves with proposed laws for the preservation of health, and among them the compulsory dental treatment of children. Nothing contributes so much to a strong and rugged body as good teeth, and, my friends, compulsory dental treatment for children is as important as compulsory education of children—which has been tried and found to be a good thing; and do not become discouraged—for this movement which you have inaugurated will bear fruit and eventually become the law of the land. It will be to your everlasting credit to realize that you and your associates were pioneers in this great work. In order for one to have a strong and vigorous mind it must be housed in a strong and healthful body, and every effort made toward protecting the body from the ills that come from diseased teeth should be encouraged by all right-thinking people. God speed the splendid work your great organization is doing along this line, and may it accomplish all of its worthy ends!

Finally, I want you all to feel at home. Be "one of us." Have a good time, and if there is anything you want and can't get, come down to the City-hall and I will see that you are properly cared for.

Again I extend a heartfelt welcome. [Applause.]

Response to Address of Welcome.

Dr. Geo. E. Hunt, Indianapolis, Ind., responded to the address of welcome on behalf of the association, as follows:

Mr. President, Mr. Moore, ladies and gentlemen,—It is a privilege and a pleasure for me to respond to this cordial welcoming address. I feel that we are going to have a most excellent meeting here this week, one replete with wisdom and overflowing with zeal. I feel that my little talk this morning should be in the nature of thanksgiving, in the nature of grace before meat—that I should say, "For what we are about to receive may we be truly thankful." And I trust not one here in this convention is as ignorant in regard to grace before meat as the little lad I shall tell you about. The Sunday-school teacher was trying to instil into the class the desirability of thankfulness for the good things of life, and turning to one little lad, said, "Tommie, what is it your father says when you sit down to the table and before you eat?" Tommie replied, "He says, 'Go easy with the butter, kids; it costs forty cents a pound.'" [Laughter.]

We come to you, Mr. Moore, from the four quarters of the earth. We come from the frozen North; we come from the sunny South; we come from the wild and woolly West, and from the effete and effulgent East. In the year since our last meeting we have had our troubles combating the perplexities of the high cost of living, but after the glorious Fourth had gone by and we were all safe and sane again, and the time had come for the annual reunion, we dismissed our cares, collected a few accounts, took our tooth-brush in one hand and our palm-leaf fan in the other, and hit the trail for the city on the Kaw.

The profession of dentistry is just coming into its own, and this week's meeting in your charming city will plant another milestone of progress on our way out of the wilderness in which all branches of the healing art have been groping in the past. We, in dentistry, have been harassed on one hand by the indifference and ignorance of the people regarding what we were able to do for them, and on the other by a lack of appreciation on the part of a large part of the profession itself regarding our duty to the public. Our troubles may be illustrated by the story of the two hunters who were once traversing a wild portion of the West, when an enraged buffalo bull attacked them. One of them promptly climbed the only tree within miles and the other dove headlong into a cave. After a moment or so the man in the cave came rushing out. The bull promptly charged him and he again precipitately entered the cave, only to as hastily make his exit from it. When this had been repeated several times, the man in the tree yelled to his partner, "Stay in the cave, you blamed fool!" And his partner replied irritably, "You go to thunder!—you don't know anything about this cave; there's a bear in the cave!"

But brighter days are coming to the profession and to humanity through the profession. Better health, better mentality, and greater efficiency is what we offer the world, and the world is preparing to accept it.

As I came through this great commonwealth of Missouri last Sunday and gazed through the car windows upon the acres after acres of ripened wheat, and mile after mile of growing corn, I said to myself, Surely this is the land of plenty, this is the Promised Land; and as I sat there looking over the fields and thinking of the bumper harvest that Missouri will experience in a few weeks, my imagination carried me forward a few months, and I could see the golden kernels, ripened as they will be then, part of them going to fill out the rotundity of the justly famous Missouri mule, and the other part being shipped to Peoria, Ill., to be turned into an also justly celebrated variety of corn-juice.

Mr. Moore, we appreciate your warm words of welcome, and we know we are going to like your town. We are prepared to like not only the town, but its citizens, and although, when we leave, the calves of our legs may be a little sore from climbing up and down your altitudinous streets, and although all our handkerchiefs may be in the laundry from mopping our brows, we hope that none of your citizens, after we leave, will feel it necessary to say it was the dentists of the National Dental Association who put the "can" on Kansas City. [Applause.]

The next order of business was the report of the Executive Council, by Dr. H. J. BURKHART, chairman, as follows: The Executive Council directs me first of all to report the resolution offered yesterday in the general meeting of the Executive Council, the Executive Committee, and those interested in formulating the new rules for this association, as follows:

RESOLVED, That in view of the apparent misunderstanding which exists relative to several matters in connection with the transition from the old to the new constitution, it is the sense of this meeting that the following action shall be taken:

1st. That the Officers and Executive Council elected at Washington shall conduct this meeting as under the old constitution, except that the Council will report to the House of Delegates, after it is organized, instead of to the general body.

2d. That the House of Delegates for this session shall consist of one delegate representing each state society which has voted to affiliate with this association, and that none of such delegates shall hold over for 1914, unless re-elected by their respective societies.

3d. That such house shall hold its first meeting on Wednesday, July 9th, at 2.30

P.M., in the "White room" at the Baltimore Hotel.

4th. That the House of Delegates shall select the place of meeting and elect the general officers for the ensuing year; also, a board of nine Trustees, all of whom shall serve for one year only, and shall transact all other business appertaining to the conduct of the affairs of this association, subsequent to this meeting.

5th. That the new Constitution and By-laws shall be in full force as applied to the 1914 meeting.

6th. That all former members, and new members who wish to be credited as members for the current year, shall pay five dollars dues, as per statements already sent out by the Treasurer, and that the payment of said dues shall cover membership up to January 1, 1914.

7th. That hereafter the fiscal year of this association shall agree with the calendar year, and dues of one dollar per member for the year 1914 shall be payable January 1, 1914.

8th. That all members of state societies which have voted to affiliate with this association, who are not already members, shall be extended all privileges of membership at this meeting, without payment of dues, but will not be entitled to receive the bound volume of the Transactions.

Dr. Burkhart moved the adoption of the resolution, which was duly seconded and was carried unanimously.

Dr. BURKHART. The Council suggests that all members present belonging to state societies which have not affiliated hold a meeting sometime during the day or evening, and select one person to represent them in the House of Delegates which will convene at 2.30 tomorrow, and certify the delegate that has been selected, to the secretary of this association before 9 o'clock tomorrow morning, so that the Council may make up a list of duly accredited delegates to the first House of Delegates to meet tomorrow.

The Executive Council will meet in Parlor D, Hotel Baltimore, at 3 o'clock this afternoon, and you are requested to bring all business matters before the Council at that time. There will be another meeting at the same place at 9 o'clock tomorrow morning, and the Council specially requests that those having any sort of business connected with the association will present it at one or the other of these sessions, so that we may clean up the business of the old association before the House of Delegates takes charge of the new.

Dr. Burkhart then announced the program for the day, and said that each day a daily program would be printed and distributed among the members outlining the entire program for the day.

Motion was made and carried that the report be adopted.

Dr. T. B. Hartzell, vice-president from the West, took the chair, while the president, Dr. F. O. HETRICK, Ottawa, Kans., read his annual address, as follows:

President's Address.

Members of the National Dental Association, ladies and gentlemen,—You have listened to the welcome from the high officials of our city—Kansas City belongs to Kansas, therefore we say our city—and I want to emphasize their welcome to you, my brethren, to our home. But once before has a dental convention of national proportions met in this section of the country, and that was when the American Dental Association met at Excelsior Springs, Mo., nearly thirty years ago.

We are highly honored by your presence among us again, and are delighted to say so. Let me say that we are glad—glad and proud—to welcome you here!

TIME OF MEETING.

This brings me to the first recommendation I have to submit for your consideration—viz, the time of meeting. The time of our meeting should be permanently changed to a more comfortable season of the year. We have reached a stage in the evolution of this organization when the convenience of the greater number should be taken into consideration. A change in the time of meeting might make a difference in the attendance at the first few annual sessions, but I firmly believe that, if tried for a reasonable time, the association could not be induced to again hold its meetings in the summer season. Compare the comfortableness of the going, coming, and time spent at the session held in Birmingham, Alabama, during the month of March, with any session held in recent years, and the evidence is all in favor of the Birmingham meeting. I have no recommendation as to the exact date, but I would suggest that the meeting be held not earlier than October nor later than March. Precedent and some argument is against such a change—but who wants to take a vacation and attend a dental convention at one and the same time?

THE NEW CONSTITUTION.

During this session of the National Dental Association we begin work under the new constitution. The revision of the constitution has been one of the storm centers for the past five years, and the past year has been no exception. We hope our differences will be amicably settled and that hereafter we may all work together in harmony and be factors in the upbuilding of our association upon a foundation that will be worth while and will endure. Too much of the time of this association in the past few years has been given to the settlement of personal differences and local difficulties, but with the larger house of delegates it is possible that this condition can be eliminated, and it should be, with no uncertain measures—the big stick if necessary. A house divided against itself cannot stand, and I would urge that every member take the broadest possible view of the questions that come before us and work for the upbuilding of the National Dental Association. There are plenty of aggressive movements upon which all our time and energy may well be expended, and which will bring greater results.

THE DENTAL JOURNAL.

There have been recently several movements inaugurated which are of vital importance to our profession, but to my mind the one demanding our first attention is the establishment and financing of our own dental journal. The machinery to accomplish this should be very definitely set in motion at this meeting, and our own journal should be established, and upon a solid foundation, not later than the year 1915. Several methods of financing this enterprise have been suggested, one of which is that five hundred life memberships at fifty dollars each be sold, thirty dollars of each membership to be set apart in an investment fund, the interest from which would pay the annual dues of the members who bought life memberships. This would give a fund of fifteen thousand dollars with which to establish our own journal. Whatever method may be employed, definite steps should be taken at this session, as it will take at least two years to accomplish our object.

THE SCIENTIFIC FOUNDATION FUND.

From this time the work of the Research Committee and the Scientific Foundation Fund Committee should be merged into one. You will hear the reports of these committees later, and I wish to call especial attention to them. One of the greatest movements started by this association was begun at our meeting last year. When you hear the report of the chairman of the Scientific Foundation Fund Committee, I am sure you will be gratified beyond your fondest hopes. What has been accomplished is but a slight forecast of the possibilities if the proper form of organization is adopted. The organization should be effected in such a way that it will be competent to handle large sums of money, and of such a character as to appeal to men of large affairs. It will be necessary to place upon this committee some men of national reputation who are already familiar with methods and means of organizations of this character, and who are already in touch with great problems. You will hear this more in detail from Dr. Weston A. Price in his report. Opportunity is knocking at our door; more institutions than we can use have thrown open the doors of their laboratories and have bidden us enter. Shall we heed the call? I feel that I cannot urge upon you too strongly that we should avail ourselves of these opportunities immediately. Compare the possibilities before us at present with the meager little sums that we have spent each year in the past upon research work.

Fifty years ago the dwellers on plains said there would never be a city of any importance built upon the bluff where Kansas City now stands; but there were men of splendid courage among those pioneers, and today you see the result of their convictions in that the hills have been cut down and filled into the low places, and this is yet but the beginning. Just so must we look and build for the future.

THE NATIONAL RELIEF FUND.

The work of the National Relief Fund Committee should have our most hearty support. This should come more particularly from the individual dentist himself for the relief of his unfortunate brothers.

THE CROCKER LAND EXPEDITION.

During the past year the Crocker Land Expedition, under the auspices of the American Museum of Natural History and the American Geographical Society, with the co-operation of the University of Illinois, has been fitting-out—an expedition whose object is the exploration of the last great land mass on the surface of the globe. The matter of the need of a dental equipment for this enterprise was brought to the attention of your president, and Dr. C. B. Warner of Urbana, Illinois, was appointed a committee of one to secure the necessary dental supplies for such an expedition. Permit me to quote from a letter from the leader and ethnologist of the expedition, Dr. Donald B. MacMillan. After extending his thanks for the "excellent supply of dental material and equipment," he says: "Our dental equipment is perhaps as complete as any we have, and I am sure every member of the expedition appreciates your gift. The physician has had special dental training, and will be able to give the members of the party temporary dental service other than extracting, and thus save their teeth until they return to civilization." Dr. Warner deserves special commendation for the active interest he has taken in securing the necessary dental supplies for the expedition.

DENTIST APPOINTED TO STATE BOARD OF HEALTH.

I am sure it is a source of gratification to you all to know that the Governor of Ohio, Hon. James M. Cox, has taken an advance step in appointing as one of the members of the State Board of Health a dentist and one of our members, Dr. Homer C. Brown, of Columbus, Ohio. I would suggest that a committee be appointed under authority of this body to draft suitable resolutions commending Governor Cox for this action, and that a copy of said resolutions be forwarded to him.

I wish in closing to express my deep appreciation of the honor you have conferred upon me by elevating me to this high office. For the future I bespeak the greatest harmony in our association, and hope that upon the two great problems confronting us, the journal and the Scientific Foundation Fund, we may present a solid, unbroken, aggressive front.

Dr. Hartzell appointed the following as the Committee on the President's Address: Dr. E. S. Gaylord, A. R. Melendy, and Burton Lee Thorpe.

The committee reported at a later session as follows:

Report of Committee on the President's Address.

Mr. President and members of the National Dental Association,—In review of the several recommendations in the President's address—

We approach the radical change in the date of our annual meeting with a degree of apprehension, as valid arguments present for and against such change. The subject is not new, having several times been considered by this body. We suggest this compromise: Adapt the time of our meeting to the locality, making the date sufficiently past the heated term to insure immunity. We recommend, however, that the 1914 meeting be held in the East about July 15, 1914, making it possible for the members so desiring to attend our meeting and the Sixth International Dental Congress in London, Eng., August 3 to 8, 1914.

We heartily commend the proposition to finance and establish the Journal as soon as possible. With the increased annual income under our plan of reorganization, it seems feasible to accomplish within the time indicated in the address, 1915.

In relation to the work of the Scientific Foundation Fund and Research Committees, we heartily concur with the address, and would emphasize the obligation created by the opportunity offered our profession in this great advance, to benefit humanity.

Allusion to the Relief Fund is also commended by your committee. The wisdom of making such provision for our unfortunate members is both wise and justified.

The appointment by Governor Cox of Ohio of Dr. Homer C. Brown as member of the State Board of Health is gratifying, and we believe we should work shoulder to shoulder with the medical profession upon these boards.

Respectfully submitted,

Burton Lee Thorpe,
A. R. Melendy,
Edward S. Gaylord,
Committee.

Dr Hetrick resumed the chair, and introduced Dr. Weston A. Price, Cleveland, Ohio, chairman of the Scientific Foundation Fund Committee, who reported for the committee as follows:

Report of Committee on Scientific Foundation Fund.

It is a great pleasure for me to be permitted to make the report for the Committee on Scientific Foundation Fund, and I wish to assure you that I am not going to bore you with a long statement of details, but will take only a few minutes to report some of the possibilities open to the dental profession.

I am sure that it is not necessary for me to remind you that a large percentage of the infections that enter the human body enter by way of the mouth, or that a great many septic conditions have their origin in the mouth. You have been listening to that during the last year through papers on oral hygiene; you are interested, however, in the larger question of our duty to humanity. The first part of the subject states clearly the need for this work; and, as I see it, the need of the hour is not that we shall approach the subject only from the standpoint of the pathologist, but that we should establish our position in line with all the great professions of the world. I am going to ask you to look with me at the march of civilization;—we shall see that all down through the thousands of years that have been passing, all of the great civilizations have had in their midst these great infections that have not only swept off the total population within every twenty-five years, but sometimes nearly the entire population of a district in a single year. There have been instances where the population was wiped out so completely that not one person was "left to tell the tale" of a previously large population, and I want to show to you a picture of such a civilization as that of Sweden, where one-twenty-fifth of the population died every year of one single infectious disease. That was twenty-five years ago; today we have only one in a million dying of that same disease. And when we think how the great sources of infections so common a few years ago are one by one being stamped out and no longer curse humanity, we are thrilled with joy. But this joy is soon mixed with pain—for there yet stands the great source of infection, the largest of them all, the one that has caused the largest amount of suffering and has afflicted the largest number of people, and we have done practically nothing to emancipate humanity from it—I speak of oral and dental infections, which are the most universal and the most serious of all that afflict mankind.

EMANCIPATION FROM FORMER SCOURGES.

I want you to see with me how the great emancipations from scourges have been accomplished. You only need to go into the study of any one particular disease. Let us look at the diphtheria scourge that a few years ago entered our homes and took from our families, in the United States alone, enough children every year to populate all the schools of Kansas City. These lives have been saved by the coming of the antitoxin for diphtheria. How and why did it come? Because the great medical profession realized its responsibility to humanity, and had men who were willing to go into laboratories and work for the love of humanity and the love of truth, and find a means for relieving their fellow men from this dreaded disease. When measured by the value of a few horses, the value of a few dollars put into laboratories, the value of a few hours' time for research work, no investment can compare in returns and desirability to having had five, ten, or a hundred dollars invested in that research work. Yet, while this great work has been done and is being done, we, the dental profession, have done practically nothing.

Let us look at another example: We know that a large percentage of all babies born have been afflicted with hemorrhage of the newborn, and if you have gone into the hospitals for babies you have seen, up to a few years ago, that these babies were condemned to die. But something happened. There has come to the world a great thing, the surgery of the bloodvessels, because a profession cared! It was necessary to add to the blood of these infants some blood that had the power of coagulation. One evening, just a few years ago, there happened in New York this picture: A physician the father of a first child was sitting by his newborn babe, whose life was slowly but surely going out as had been the case in all the past with these babies, and as the eyelids and lips were getting bluer and the child's paroxysms getting slower in its desperate struggle for relief, this anguished father telephoned Dr. Alex Carrel, one of the men connected with the Rockefeller Institute, and asked him if he could not do something for this baby. His answer was affirmative, and he came quickly to the house of the heartbroken father and mother, put the father on the bed by the side of his baby, and with his new technique for the surgery of the bloodvessels successfully united the father's artery with the vein of the child and put some of his blood into the child's body. Almost immediately they could see a pink flush in the face of the baby, very soon it was crying and hungry, and in a few minutes it was nursing with avidity at its mother's breast. There was no period of convalescence; the baby that was dying but a moment before was now well, for the fatal hemorrhage had ceased. It was saved!—and all through the coming years these babies can be saved. Why? Because somebody cared enough for these babies and for the truth to place laboratories at the disposal of men, and men who cared for the truth enough to give their lives in making this research. Surely there has been no power known to history so great as this power of truth, which is revolutionizing the whole of civilization in our generation.

Look at the yellow fever scourge in Panama, in Havana, and in Mexico, where half the population at times were taken off, and the complete stamping-out of that scourge, and see the spirit that made that relief possible. Scientists knew, or thought they knew, that it was the mosquito that carried the yellow fever germ, but there were four hundred varieties of mosquitos. They thought it was carried by the female of one of these varieties, but did not know; they thought this mosquito must take the poison from a person sick with yellow fever during the first three days of that person's sickness, and then must wait twelve days and bite a well man who would therefrom develop yellow fever. They could not experiment on animals by allowing the mosquito to bite them, because animals would not contract the disease; it was necessary that this experiment should be made on man. Men were not wanting, for Dr. Lozier and

Dr. Corell of Washington came and offered to bare their arms to the mosquito. These men had even been sleeping in the soiled clothes of men who had died from the disease, willing to get this disease even when they knew that it meant almost certain death to them. Few men have ever given service with so little realization of sacrifice and so great a sense of privilege as did these men. One of them when he knew that he was doomed to die, wrote a letter to his wife saying that he thanked God for the opportunity that had come to him by solving the problem, and thereby to give this relief to humanity. Was it worth while? It was!

THE PRESENT OPPORTUNITY—A GOOD START MADE.

But that spirit of sacrifice, measured by a life, is not what we are asking of you today. We offer you the privilege of helping to support some trained men to go into laboratories and do the research work necessary to bring to humanity and emancipation from the dental scourges. The laboratories are waiting and ready for this work. I also want you to know that this great dental profession is alive to this opportunity! You can scarcely appreciate the favorable conditions without having gone from place to place as I have gone and seen the response to this opportunity. Society after society to whom this matter has been presented, has, when the members have been told of this plan, supported the movement almost to a man; many times, every person present volunteered to give money in support of the work. In the city of Columbus, when this project was presented before the dental society, though with only forty-two present, every person contributed, to the amount of $1200. When it was presented in Cincinnati, $2700 was subscribed and the first year's payment entirely made, and they are enthusiastic to do more. The profession of Cleveland has subscribed $4010 toward this fund to help men to go into the laboratories and do the work, and other societies have taken up the work with enthusiasm and earnestness; and all are standing shoulder to shoulder with a solid front. A substantial start has been made toward the same result in Iowa, Missouri, Kentucky, Indiana, Maryland, District of Columbia, Pennsylvania, Minnesota, Colorado, Tennessee, and Texas, and Wisconsin joins this month. The reports are not complete from any of these states, and from many we have no report except the substantial subscription secured at the time the plan was presented. The total amount of these incomplete reports is $12,640; and we regret exceedingly that we could not have known how much has been secured in each city and state to date. Some of the incomplete reports are as follows: Cincinnati, $2767; Columbus, $1200; Cleveland, $4010; Toledo, $500; Washington, $700; Louisville, $500; Pennsylvania and components, $782; Iowa State University Dental Alumni, $500, with several smaller amounts. It is essential to remember that this is entirely a report of progress, for in many places the work has just started. Other states would have taken it up before this, had not conflicting engagements prevented the chairman of the committee from being present at their meetings.

GENEROUS TENDER OF LABORATORY FACILITIES.

Now I want to tell you something of the attitude of the public toward this movement. When this work became known to some of the great institutions of our country, they responded at once. One did not even wait for the committee to come, but sent for us and said we might have the use of their laboratories and they would give us every assistance. These free laboratories include privileges in the Cushing Laboratory for Pathological Research of the Western Reserve University, and the Case School of Applied Science Research Laboratory, both of Cleveland; Iowa State University Research Laboratories; Michigan State University Research Laboratories; Hygienic Department of the U. S. Department of Health of Washington; Bellevue Hospital Research Laboratory, New

York; Cincinnati Hospital Research Laboratory; Parke-Davis Research Laboratory, Detroit; University of Chicago, and several other competent institutions, including more very choice facilities than we can probably use for some time.

THE PROPOSED PLAN.

When I have said to men with money, "Can you help us?" the almost invariable reply has been: "We have means for such good causes, but there are so many demands that we have to have something of an indorsement. What are your indorsements? What has the dental profession done in financial support and service for such work?" And there was nothing that I could point to that indicated that we have made the sacrifices which our professional responsibility demands of us. Your committee has undertaken to get this indorsement in two ways: We want a fund for immediate use, and that fund shall be raised from the entire dental profession—it will be a guarantee of their indorsement, and will also pay for the bread and butter of the men who are going into these laboratories.

This money from these different societies that I have spoken of is for that fund, and we are asking that the dental profession of each state shall give each year for five years an amount equal to the number of men practicing dentistry in it—that is, about $40,000 a year for five years from the United States, or $200,000 in all. On this basis, Ohio would be expected to subscribe $12,000—and already Ohio has subscribed $9000 of that $12,000. Indiana will, I am sure, do the same. Illinois and Wisconsin will doubtless do the same. And as we have gone from one society to another we have found that same response, not always as fully as in Ohio, but as sure and certain; and my appeal in behalf of the Scientific Foundation Fund is that you help us to present a solid front, thereby showing that the dental profession is united in the support of this work.

With regard to opportunities for help, I have to say that we have been negotiating with competent research workers and find that a large number of men who are very competent and whose heart is already known to be in this work can be available for the service of the National Dental Association. If we as a great profession will support this work, by some such method as the committee has outlined, backed by the National Association and supported by the state societies and their component societies down to the very last man, then all the men back of this movement will have a strong bond of sympathy between them, for the profession will be united more closely than ever before—but, best of all, it will not be a despised profession! Never in my life have I been so proud of being a dentist as I am today, because of our opportunities, and I would not be anything else if I might for the asking, because the opportunities for us are greater, to my mind, than they are for any other calling or any vocation; hence I challenge you to join in this campaign for human emancipation from dental disease.

SHALL MEDICINE WIN THE REWARD?

If the dental profession does not do this, the medical profession will do it, and do it soon. I was told, just this morning, of another instance wherein one of the greatest institutions of the country, a body of medical men, were to be furnished to do this work that the dental profession has not done, simply because of the insistent need of it in the practice of medicine. As sure as the medical profession does it, they will have the credit, and they will deserve the credit. If we, the dental profession, are ever to deserve that credit, it will only be when we are willing to make real sacrifice. I wonder if there is one man in this room who would not feel unworthy of this great profession if he would not give at least half a day a year to help to rescue humanity from this scourge. While I was coming over on the train, a dentist said he wanted to give fifty dollars a year, and I think we shall find a large group of men who will be willing to do the same. In Cleveland we had a number of men give fifty dollars, and in Cincinnati the same, and some even one hundred dollars. Ours is the opportunity, and we can have exactly as much research work done as we are willing to plan a foundation for, and that foundation will be the moral and financial support and indorsement of the dental profession. Do you want insignificant, unsatisfactory work, done in a haphazard way in a few laboratories? No!—we all want a magnificent organization with a central institute, or with institutes in different parts of the country, where this work can be carried on by the best men, so that the entire world will look to the dental profession for help, and will acknowledge it as having wrought the greatest single service for the emancipation of humanity from its various afflictions.

The Executive Council has asked me to give to the members of this body the opportunity to say now whether or not they would like to have a part in this work. I do not present this as a plea; but as a privilege that is yours *now*.

RECOMMENDATION TO THE ASSOCIATION.

We will recommend to the association that the committee of three be changed to a commission of twenty-five, with an Executive Board of five to enlarge and carry on this work, and that technicians or assistants be engaged at once to enlarge the capacity and output of some of the men who are doing, gratuitously, the best private research at present.*

Respectfully submitted,
WESTON A. PRICE, *Chairman*.

The general session then adjourned until Wednesday noon.

WEDNESDAY—*Second General Session.*

The general session was called to order Wednesday, July 9th, at 12 o'clock, by the president, Dr. F. O. Hetrick.

The first order of business was the report of the Committee on Necrology (James McManus vice-chairman), and consisted of obituary notices of two members, viz, Dr. Wilbur F. Litch and Dr. Drury J. McMillen [brief sketches of the lives of both of whom have already been printed in the DENTAL COSMOS—see, respectively, issues for February, page 242; July, page 753].

The next order of business was the report of the Executive Council, made by Dr. Burkhart, chairman, which was the announcement of the programs of the general session and the various sections for the day.

The next item on the program for the general session was the reading of a paper by Dr. CLYDE DAVIS, Lincoln, Nebr., entitled "Synthetic Porcelain, Using Mallet Force for Introduction."

[This paper is printed in full at page 1108 of the present issue of the COSMOS.]

Discussion.

Dr. G. A. CRISE, Manhattan, Kans. "There is a tide in the affairs of men, Which, taken at the flood, leads on to fortune"—and there is a tide in the affairs of men as operators, which, if taken at the flood, leads on to perfection —and that is what we are after in this convention. We gather to discuss the different phases of dentistry and discover different ways of doing work because we desire to arrive at perfection in the thing we are most interested in.

I have read Dr. Davis' paper over thoroughly, and have tried to make the very best analysis of every phase of it. In the use of silicate cements I have spent about five years in research work and practice, and I believe that we are reaching the perfection point in the working of silicate cement fillings—that they are going to be a great boon to the dental profession in the way of esthetic work.

I do not agree with the essayist on some points that he mentions; in the first place, in the mix. I agree with him in the way he mixes silicate ce-

* The opportunity was given to those present to make a voluntary contribution, and about $2500 was contributed.

ments, but I do not agree that, when we insert the filling, it is absolutely necessary to use mallet force. I do not assert that he is not right; however, the opportunity comes for you and me to work out this problem in our own offices.

There is a different way of mixing each of the silicates on the market, and we have to use a different mix with every one. I take it for granted that Dr. Davis is referring in his paper to DeTrey's porcelain. This porcelain is peculiar to itself; the way in which the molecular parts come together is different from any other silicate on the market. The humidity of the dental office has a great deal to do with the silicate filling; an office kept at a temperature of about 65° would be about ideal for manipulation and mixing, but I do not agree that when the material is puddled on the slab and put in the cavity one would obtain a better filling by using mallet force to drive the material against the walls of the cavity than by inserting it in the way the manufacturers recommend.

I received the essayist's paper on the 25th of June, and had but little time to try his method in my office, but I did something in that direction. Of course I am a novice, but I have found already that the color and shade of the filling is the same upon the slab under the magnifying glass as it is in the mouth under the mallet. I do not believe that we get a better texture by mallet force than by the process laid down by the manufacturers. When we have the cavity prepared, the slab ice-cold and the spatula ice-cold, when all conditions are right, and the thermomeeter is at about 65° or 70°, the longest time the synthetic cement can be held at the exact point at which it must be inserted is about two minutes; after two minutes the point is passed at which the filling may be disturbed, else the action of the component parts in its setting qualities will be disturbed. After the filling is inserted it must immediately be coated with cocoa butter, and must be kept so for ten minutes, because synthetic cement has in it a component part of water, which must be retained in the filling for ten minutes; after ten minutes it has undergone a change, and we can finish the filling, which must then be coated with wax that is to be left only for two hours, this being the longest time advisable; I would rather have this wax stay one hour than two, about one hour and a half being better in a great many instances, depending a great deal on the conditions in the mouth. But that filling must have water then. Dr. Davis says that it must be twenty-four hours, but there I do not agree with him—because, like Portland cement, it must have water in order that it may assume the stone-like consistence of Portland cement, and we must have the same condition as in porcelain. Synthetic cement is made of different materials. All of the silicate fillings on the market have about the same ingredients, but DeTrey's synthetic is different from the silicate cements. By combining certain elements a preparation has been produced that, when inserted in the cavity, assumes a porcelain-like state, fulfils the same conditions as porcelain—and is, in fact, a porcelain.

After the filling is finished, or rather after it is inserted, I use chisels as Dr. Davis has suggested. I use the disk also as Dr. Davis suggested, and I use the wax that is sold with the cement, which is nothing but paraffin, and I instruct the patients, "In two hours from now, take that off the filling." I have demonstrated silicate cements for two years and I find that, if the wax is left on longer than twenty-four hours, the filling, when the saliva strikes it, assumes a different condition. I cannot explain this phenomenon, but, when the filling is examined under the magnifying glass, we see a difference. Anyone can make this experiment by observing one filling twenty-four hours after it has been coated with wax, and another two hours after it has been coated with wax. In the latter case a better result, more crystallization, a more healthy appearance in the filling will be noted. In that regard I do not agree with Dr. Davis, yet we are all striving for perfection. I hope to demonstrate these points in the clinic I shall give tomorrow, when it will be seen that a synthetic cement filling requires as careful or more careful technique than any other filling. I think it is really harder and requires more skill, more dexterity and more ability, to insert a good synthetic filling, that cannot be detected at a glance in the mouth, than any other filling, and if we are successful with synthetic cement fillings, then we have arrived at that ideal which we are all striving for.

Dr. L. L. Barber, Toledo, Ohio. I first want to say that in my belief the silicate cements are among the best filling materials we have for certain places. Next, that there is no silicate cement on the market with which I am familiar—and I believe I am familiar with all of them—I do not believe that there is one the manufacturers of which have not changed the directions for mixing from one to five times. When Aschers "artificial enamel" appeared first upon the market, I purchased a forty-dollar package. I took instructions for the mixing from their expert, and went home and used that forty-dollar package in my laboratory before I ever attempted to make a filling in the mouth. Then I thought I was equipped to do some wonderful things. I started in according to instructions, and made as many failures as many of you have made. I then began to make up the different silicate cements as they came along, and when I was in Germany I went with Dr. Ames to Dr. Schoenbeck's laboratory in Berlin, and we studied the whole process there and returned home with a goodly supply of Schoenbeck porcelain, which seemed as though it was going to be an excellent thing—and it was, in its way. In the same way we have taken up the different cements as they presented themselves, and have mixed them according to directions, but the next time we saw the demonstrators and pointed out the defects in their cements, they would immediately say, "You are not mixing it right." They would ask us to show them how we mixed the material, and then they would say we were all wrong, and would proceed to show us the improved way of mixing. You all know the whole mixing process, and how the manufacturers have changed their formulas, etc. Now comes Dr. Davis, with his method of malleting.

If it were possible, I allow, to follow out in the mouth Dr. Davis' technique in the insertion of cement fillings, I should find very little in his paper to discuss, because I have had my laboratorian, who is a good technical man, make many experiments along the line which Dr. Davis suggests, and I have come to the conclusion that silicate cement fillings, when we can get directly at them with the mallet as Dr. Davis suggests, are denser than those inserted in any other way. The central surface of the filling can be made as dense by putting a celluloid strip around the tooth and going over it with a steel burnisher, but the same result is not obtained in the edges. Instead of distributing the liquid evenly over the surfaces, as in Dr. Davis' method, most of the liquid is carried to the edges because of the fact that the celluloid strip forces it from the center to the edges. That has been my experience. If we could put our foot on this material, and pat it as we do the sand when we go in bathing, as Dr. Davis has said, it would be well and good, but there might be some objections to that method of procedure. My method has consisted in using agate and tantalum burnishers specially made for that purpose, and patting the surface of the filling in the same way with a mallet. This I find to give me the very best results. The same objection, however, prevails there as with Dr. Davis' method, because all surfaces cannot always be reached. Another way is to fill the cavity to excess and not attempt any finishing at all until after a given time.

I find by the aid of the magnifying glass that fillings made in holes drilled in metal—that is the way in which my laboratorian made the tests for density—are much denser if inserted by some sort of tapping or malleting, and the edges are very much better. In regard to the setting of the silicate cements, it has not been my experience that they set much more rapidly when inserted by tapping than by other methods.

Dr. Crise made a splendid point which Dr. Davis did not mention, namely, the temperature of the slab, spatula, room, etc. These are factors that retard or hasten the setting of the cement. Another thing that materially affects the filling is the rapidity with which we add the powder to the liquid. I can take any silicate cement and mix two masses of the same consistence, and have one take twice as long as the other to set, and I will not have spoiled the crystallization of either. Dr. Davis' remark about keeping the silicate cement filling coated with cocoa butter is a very essential point. It is a known fact that the moisture must not be allowed to evaporate from the filling until proper setting has taken place, and that the filling must not absorb the moisture of the mouth until complete crystallization has taken place. I have always thought that it is better to allow the wax to remain on the filling a longer time than two hours. I am not here to say that it is, but in my experience it is better to leave it on longer. A good way to get the wax covering off is to instruct the patient to brush the tooth vigorously at the expiration of whatever time the operator may consider best. Silicate cement fillings, of course, require as much judgment in the manner and selection of place of insertion as any other kind of filling. I believe that Dr. Davis' idea in regard to the removal of all unsupported enamel is good, but it can be carried out a little farther, probably, than he has suggested.

Dr. Davis (closing the discussion). Replying first to Dr. Crise, I would say that it was not my intention to drive the filling harder against the wall. The malleting is simply a convenient way of jolting the filling. I desire to strike it, as it were, with a stuffed club. I desire to affect the entire mass, and do not think of driving it against the walls. It is placed against the walls and in the undercuts with the spatula; the malleting is simply a means for agitating the mass and producing the effect of puddling while it is in the cavity. The same can be done with the mechanical mallet used in building a gold filling by striking the edge of the tooth, but the patient does not like the effect upon the teeth.

Some have criticized the length of time required in the use of this method. Any kind of cavity can be filled, I think, in as short a time by this method as by any other. I do not mean that one should mallet the filling until it turns white, as such a procedure would ruin it. As to a filling turning white on one side and not on the other, I cannot contribute anything to that observation. My method is to leave the wax on for twenty-four hours, and I have never had one discolor. If we fail to take the wax off, and the filling discolors, there is a reason that we should think about.

I respect Dr. Crise's opinion, because I think he has done fully as much in this line, and more, than I have. I would insist, however, that the points I have mentioned are valuable, and that you try them; if you have failures at first, try them again.

Dr. Barber speaks of making these fillings with burnishers instead of using the mallet with special plugger points. Burnishers will probably answer the same purpose, if they are properly designed for this work.

Dr. Barber also speaks of the varying time required for porcelain to set, and the controlling of the setting by the mix. I am convinced that by the method I have suggested one can obtain a more homogeneous mass and a stronger texture in the porcelain. The jolting process seems to have the effect of causing the porcelain to set in about the same length of time, and is always the same. It produces uniformly good results, and comes more nearly to perfection for some reason. My contention is that we get a homogeneous mass, and a better uniformity of action in the material.

Dr. Crise. When you mallet, do you not accomplish the same results as in making porcelain inlays—that is, draw the liquid to the surface and have not so dense a filling underneath?

Dr. Davis. No; my experience is that it makes a perfectly homogeneous mass.

One of the speakers criticized my remarks in regard to leaving unsupported enamel. You can leave some unsupported enamel the same as in any plastic filling, provided it is entirely removed from stress, as on the labial surface of a tooth.

The next order of business was the report of the Research Committee, by Dr. H. C. Ferris, New York, N. Y., chairman, as follows:

Report of the Committee on Scientific Research.

In the presentation of the report of the Committee on Scientific Research, your chairman is inclined to emphasize one or two salient points in the history of our efforts to advance our information on the physiological and pathological study of the organ of mastication. This study has been directed, as previously stated, to one field—vast enough in its scope to attract to it all the efforts of the gentlemen particularly interested, but with little means at our command.

STUDIES ON THE CAUSE OF DENTAL CARIES.

In this work, as in all other scientific fields, we find critics, who take what little truth has been established, and elaborate upon it, and draw conclusions from a few experiments; but we must appreciate that this problem of ours, the cause of caries of the human teeth, has been studied for centuries by the pathologists—that it is not a local disease, but a condition incident to bodily states the complexity of which has never been explained.

To be sure, we think we have in our specialty commenced to appreciate some of nature's workings, viewed from another angle, that have escaped the minds of the physiologists and pathologists—whose attention has been directed to processes more complex because of their difficulty to study and because they are more prominent in the painful conditions that are met in everyday medical practice; and even in this department of medicine the percentage of pathologists is lamentably small. It is not given to every man to have the patience to determine the etiology of disease, but some one man properly equipped with fundamental education will be found to carry on this work after we assure him a compensation.

TECHNIQUE FOR SALIVARY ANALYSIS.

We have established a technique for salivary analysis which we know is not without fault, but is sufficiently accurate to form a basis for research work. We are constantly trying to improve this technique so as to make it a standard for the investigation of the pathological field, as those who have been laboring in this direction have appreciated that a uniform technique is most necessary, if we are to reap the value of others' criticism. Writers will frequently introduce another reagent which carries with it its own problems, and disregard the requests of your committee to carry out their research work under a recognized method, and then parallel their findings with their new reagent!

THE PHENOL-PHTHALEIN INDICATOR.

It is not that we would recommend the narrowing of a man's procedure, but rather to multiply findings without too much technicality. For instance, considerable comment has been made in reference to the indicator, phenol-phthalein, in determining acid index—that it is unstable because it is sensitive to carbon dioxid. Even though it be proved to be sensitive to carbon dioxid, if the recommendations in the technique are carried out the specimen will be examined immediately in each instance, and the time of comparison will be a constant factor, and the CO_2 content will be estimated in the acid index. Acknowledging the necessity of correction, the report would add to our information, and will show, over long periods, modification beyond those caused by diet.

There is no objection to other indicators being used and more information acquired, but your committee cannot but urge adherence to a technique, even with its faults, if we are to make progress.

In pursuance of this line of thought,

we have been working upon the relation between the CO_2 content in the saliva, and its acidity to phenol-phthalein, and its alkalinity to methyl-orange, with three or four indicators.

The suggestions as indicated in Prof. H. Carlton Smith's report a year ago, to the effect that the acidity of the saliva was largely due to its CO_2 content, caused us to investigate after his method of procedure; and after numerous experiments we adopted a change in his technique, so as to be able to precipitate and centrifuge excess barium salts, instead of reading our findings with comparison of the turbidity. The change in the technique will read as follows:

CO_2 Determination.

The apparatus consists of a potash bulb to remove CO_2 from the air drawn in; a round-bottom flask in which the saliva is boiled; a test tube condenser and drip-cup, an Erlenmeyer flask which contains the $Ba(OH)_2$ to react with the CO_2 in the saliva, and a suction pump.

It is first tested for leaks by turning on the suction pump and watching the bubbles come through water in the Erlenmeyer flask, while the rubber connections between flasks are each closed in turn.

Then the apparatus is freed from CO_2, and at the same time a final test for air-leaks is made. This is done by putting 10 cc. N/40 $Ba(OH)_2$ into the Erlenmeyer flask, from a buret or pipet, and 50 cc. recently boiled water added to the round-bottomed flask through the separatory funnel. The suction pump is started and the gas flame under the round-bottomed flask adjusted so that almost 50 cc. will distil over into the drip-cup in one-half hour after boiling commences. It must be watched when the water begins to boil, to be sure that the vapor pressure of the water is less than the suction. Otherwise back pressure in the flask would shoot the water back through the potash bulb, and once started it would act like a siphon. After half an hour the suction pump is disconnected from the Erlenmeyer flask, at the same time that the air is admitted to the apparatus through the separatory funnel to avoid back pressure anywhere.

The $Ba(OH)_2$ in the Erlenmeyer flask is then titrated with N/40 H_2SO_4, using phenol-phthalein as an indicator. If the apparatus is free from CO_2 and air-leaks, it will require exactly 10 cc. H_2SO_4 to titrate the 10 cc. $Ba(OH)_2$ used.

Then the drip-cup is emptied, another Erlenmeyer flask containing 10 cc. $Ba(OH)_2$ is put in place, the suction turned on, and 10 cc. saliva and 50 cc. recently boiled water are added to the round-bottomed flask through the separatory funnel. The heating is continued for one-half hour after boiling commences, and then the Erlenmeyer is disconnected as before, and the excess $Ba(OH)_2$ is titrated.

The difference between this number of cc. of $Ba(OH)_2$ and H_2SO_4 equals the number of cc. of $Ba(OH)_2$ used up by the free CO_2 and the CO_2 from acid carbonates of 10 cc. saliva. This figure divided by 40 (N/40 $Ba(OH)_2$) is used, and, multiplied by 1000, it gives the parts CO_2 per thousand, which we call the CO_2 index.

Proceeding according to this technique, we examined numerous specimens for their free acid and combined acids with phenol-phthalein, then estimated accurately a quantity of carbon dioxid, reducing the figures to an index and subtracting the CO_2 index from the total acid. The findings of these investigations showed that there was a persistence of acidity after the carbon dioxid was accounted for.

Illustration of specimen three hours after breakfast from patient with no caries.

	Acid index.
Acidity to phenol-phthalein	5.5
" " aldehyd	2.0
Total	7.5
Carbon dioxid index	6.9
Acid index corrected	0.6
	Alkaline index.
Alkalinity to methyl-orange	13.0

Illustration of specimen three hours after breakfast from patient with extensive caries.

	Acid index.
Acidity to phenol-phthalein	12.
" " aldehyd	6.5
Total	18.5
Carbon dioxid index	6.75
Acid index corrected	11.75
	Alkaline index.
Alkalinity to methyl-orange	14.5

In a recent communication, Dr. H. Carlton Smith acknowledges that he has come to the same conclusion, viz, that the acidity exists in a large number of the specimens after the CO_2 correction. Examination of these specimens for alkalinity with methyl-orange as an indicator, and H_2SO_4 as a titrating medium, showed them to be alkaline in every instance, and we are shown by these differences that there are acid factors that are not accounted for by either of these indicators. The recording of these two findings, however, enables us to make a comparison which may have physiological value, and gives us some little idea of the metabolism of an individual system as regards its ability to produce carbon dioxid.

In all pathological examinations we have found an increased acid index both free and combined, with a lowered carbon dioxid content, and when the CO_2 content was not half of the acid finding, it would appear as a pathological specimen, indicating disturbed metabolism. If the CO_2 is higher than the free acids, it shows presence of acid carbonates. The number of investigations was not sufficient to establish this statement as a fact, as there are many other elements which may influence this finding; but we have at least satisfied ourselves that there are few salivary specimens that do not show acid findings, even after the CO_2 content has been quantitatively established.

To illustrate the point previously made in reference to the pathological conclusions, an examination was made of the specimen of a patient suffering with chronic Bright's disease of long standing, referred by Dr. G. R. Kuhn, chief of staff of St. Mary's Hospital, Brooklyn; and the following report on these properties shows the highest figures ever found in the laboratory:

Patient—Mr. J. G. M.

	Acid index.
Acidity to phenol-phthalein	41.
" " aldehyd	13.
Total	54.
Carbon dioxid index	8.1
Acid index corrected	43.9
Enzymic index	0.168
Proteolytic ferment	0.
Centrifuged sediment	32 per cent.
Overstanding fluid	Clear.
Mucin in sediment	14.3 per cent.
Overstanding fluid	Opalescent.

This is but one case, but if a thousand cases would show similar findings within physiological limits, we could then report a truth.

THE VISCOSIMETER.

Prof. H. Carlton Smith, Harvard Dental School, department of chemistry, has developed a viscosimeter, as reported a year ago, and has made a series of investigations with his instrument. His report is as follows:

In regard to the request which you make, I shall be very glad to give you the results of my work on saliva with reference to the viscidity and enzymes. In fact, it happens to be along just these lines that I am working at present.

I find that in the majority of cases the viscosity should be taken on saliva from which the solid particles have been allowed to settle naturally. In other words, the use of the sieve recommended in my text-book, which I presume you have, is not a desirable method, as the character of the mucin is liable to be so changed that the degree of viscidity is less than actually exists in the saliva before filtering. If the saliva is received at such an hour as to prevent a natural settling of the sediment and subsequent viscosity test on the same day, it may be necessary to clear the saliva in the centrifugal machine. I do not know yet just how the centrifuge affects the character of mucin, but feel that it is less than the sieve.

I also find that it is undesirable to have any volume of liquid whatever in the tube at any point below the restricted point in the condenser, as it apparently makes a difference with the amount of atmospheric pressure on the surface of the saliva. The temperature must be very accurately maintained within one degree C. of some selected point. I am using 20° C. at present.

In regard to the apparatus: The CO_2 apparatus I constructed from a very large test tube, a small Soxhlet flask and ordinary glass tubing which I bent myself. For the viscosimeter I took some Eimer & Amend 10 cc. graduated pipets, carried them to a local glassblower together with a 10-inch Liebig condenser, and explained from the cut what I wanted, telling him that the constriction of the pipet must be such that I could read 5 cc. within the condenser, and that the constriction must at least be an inch above the water inlet, and it must be of such character that it would take 5 cc. of distilled water at least one-half minute to run through it. This he did in a very satisfactory manner.

The viscosimeter that I am using now takes just 35 seconds to discharge 5 cc. of distilled water at 20° C. I use a stop-watch for time, and paper bands to facilitate accurate reading.

The viscosity tests are satisfactory and consistent, taken by the apparatus previously described. The enzymic index has caused us considerable trouble. I do not feel that the test with starch paste is satisfactory for general work, and have spent some little time in trying to work out a method based on a determination of the sugar produced in a given time, but as yet have nothing that I want to talk about.

We have examined over one hundred samples of saliva, finding about 16 per cent. of the samples showing acidity. Of these only 4 per cent. come from cases marked as having good teeth. Of the viscosity tests only 47 were from samples accompanied by a description of the condition of the teeth. Of these, two cases reported as from mouths with good teeth have high viscosity; fifteen cases showing decay have high viscosity. On the other hand, in ten cases of low viscosity the teeth are good; in nineteen cases of low viscosity the teeth show more or less decay.

These figures, as well as any I might give (and they all tell practically the same story), show that it is impossible to draw positive conclusions from any one factor determined by salivary analysis.

I feel that the lack of uniformity of methods must rather seriously retard the progress which is being made toward the positive interpretation of the results of salivary analysis.

(Prof.) H. Carlton Smith.

These findings seem to be conclusive on this subject, but I am sure I am voicing Dr. Smith's opinion when I state that he would prefer to have some other laboratory work through a similar series upon the same technique.

As chairman of the committee, I wish to officially thank Dr. H. Carlton Smith of Harvard University, and Dr. Russell W. Bunting of Michigan University, for the generous assistance which they have lent us in our undertakings; and if their example were followed by other universities of the country, our information would grow rapidly.

EFFECTS OF THIOCYANATES IN DISSOLVING GELATIN.

In order to determine the soluble effects of thiocyanates upon gelatin, a series of experiments was instituted by Constance E. Schradieck, pathologist, Brooklyn, N. Y., under a sterile technique, and established the fact that ammonia-sulfocyanates had no appreciable effect upon gelatins in solutions varying from 1:100 to 1:2000, which appears to be conclusive.

PRACTICAL APPLICATION OF THE TECHNIQUE ADVOCATED.

In order to practically illustrate the application of our technique in the study of pathological conditions, your chairman wishes to report a case from his own practice, observed for a period of three years, which resulted in a cure of chronic constipation:

Mr. C. P., twenty-four years of age, a college athlete and an electrical engineer, apparently was in good health until he became confined in office work, when he developed intestinal indigestion and a chronic constipation. He had been in the hands of several medical advisers, and Dr. T. P. Prout, pathologist, of New York City, had his case under observation during my treatment. All medication was eliminated. A quantitative analysis of his saliva was made which was as follows [exhibiting charts].

His urine and feces were examined by Dr. Felix Von Oefele, New York City, and were as follows [exhibiting charts].

An examination of his mouth showed a malocclusion, class I, mutilated by extraction, presenting 29 inclined planes in occlusion, representing 22 per cent. of normal.

After a year's orthodontic operation, returning the teeth to their normal inclination, Dr. Henry W. Gillett of New York City re-established the inclined planes with prosthetic pieces and gold inlays, developing 115 inclined planes in occlusion, which represented 85 per cent of normal, resulting in mechanical retention of the occlusion.

Examinations of the secretions and excretions were made at intervals, showing a gradual improvement, and comparisons were drawn June 23, 1912, which showed the functioning ability of his teeth improved 60 per cent.; ability to reduce starch to sugar in the mouth improved 66 per cent. The coefficient of non-utilized food in the feces showed an increase of 333 per cent., but was 3 points below normal owing to continued intestinal disturbance. The chronic constipation has entirely disappeared, and he has had no medication for a period of fifteen months.

The comparison of salivary analysis shows a marked difference in many properties and makes a very interesting study. The quantity in a given time increased. The consistence showed a more viscid condition, with the presence of mucin, while the original examination showed none. The ptyalin was markedly increased; the thiocyanates increased; the chlorin decreased. The total solids were decreased. All these properties showed improvement, but the percentage of Esbach's albumin, and the increased quantity of total acidity and urea, were unfavorable on the second examination, but were accounted for in feces analysis by a greatly increased auto-intoxication, which was attributed to a change of diet and the lack of use of the restored organism, with the adherence to the habit of selecting soft carbohydrate food, and the fact that liquids were taken with meals. Recommendation was made to eliminate these pernicious habits, and on June 30, 1913, a year later, another set of specimens was examined, which showed a constant improvement in all properties, and the following figures show the difference occurring between the original examination and the completed one: Ability to reduce starch increased 229 per cent.; non-utilized food in the feces showed one point below normal; the original auto-intoxication improved 12½ per cent.; coefficient of fat-splitting increased from 37 : 100 to 50.3 : 100, normal being 52 : 100.

An examination of salivary specimen showed total acidity 18, slight increase over original; amino-acids as ammonia greatly reduced; chlorin decreased; centrifuged sediment increased 7.4 per cent., thiocyanate remained the same.

He has enjoyed excellent health since the work was completed; his constipation entirely disappeared. His countenance has become more alert, and his eyes more brilliant; the photographic record (see Figs. 1, 2, and 3) will prove these assertions. He is more ambitious for work, and is doing well in business in New York City.

His record would not be complete without the following report from Dr. Henry W. Gillett from the prosthetic standpoint:

Report on the Case of Mr. C. P.

The slides illustrating this case make sufficiently plain the prosthetic steps, so that detailed description is superfluous. The gold restorations are cast, and are mostly of 2½ per cent. platinized gold, and the porcelains are hand-carved for the case. At all points thoughtful attention was given to the establishment of conditions that should conduce to the maintenance of cleanliness, that should eliminate mechanical irritation, and that should permit of efficient masticatory movements and at the same time promote retention of the orthodontic results.

In reporting this case from the viewpoint of the general practitioner, I desire to depart a little from the usual routine, and speak of the underlying principles involved, of the possibilities of our work, and of the responsibilities our position entails, using this particular case as an illustration.

I realize that but a small percentage of cases of this type can receive such treatment as has been possible in this case, but I desire to lay strong emphasis on the responsibility of our profession for keeping such patients informed of the grave effects upon nutritional functions of inefficiency of the masticating organ, and to urge that the train of functional disturbances and organic lesions which must follow such inefficiency be forcefully presented to our *clientèle* at all reasonable times and as cogently as lies in the power of the individual operator. We have no right to pass by the opportunity of calling attention to the facts—of emphasizing the certainty that

Fig. 1.

Fig. 2.

Fig. 3.

a material inefficiency of the initial nutritional organ is of as grave import as a similar inefficiency of any other single organ—be it heart, kidney, stomach, or liver—because it is likely to lay the foundation for disturbance in all these as well as other vital organs.

The portal of the digestive tract has been surrendered to our care, and in that portal the initial step of the complex nutritional function is performed. This fact loads us with a serious responsibility. This responsibility imposes upon us the need for a more careful consideration of the masticating organ as a whole than it usually receives. It is my belief that we are too prone to focus on the individual elements of the organ, and to lose sight of their relation to its other parts, and to its efficiency as a unit.

In this case the patient first presented with a message from his father to the effect that he wanted to know whether the dentistry in his son's mouth was adequate, and those of you who have thoughtfully studied the slides showing the original conditions will realize that a comprehensive and satisfactory answer was not entirely easy. I realized that what the father had in mind was the kind of fillings that had been done, and their condition. I also realized that if I confined my reply to the question as he meant it, and failed to take up the graver inefficiency of the masticating organ as a whole, I might in the future meet with severe criticism—because the father was himself an engineer of capacity, with a keen appreciation of the value of an efficient organ.

Fig. 4.

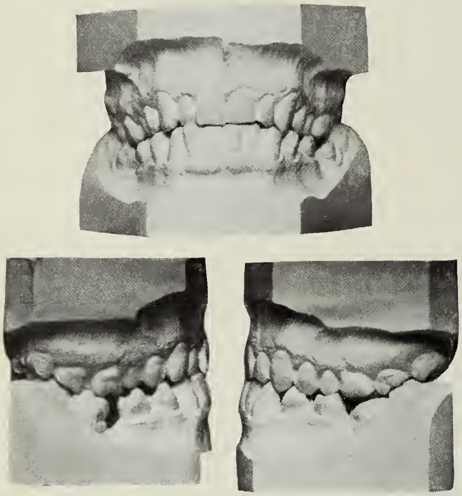


Fig. 6.

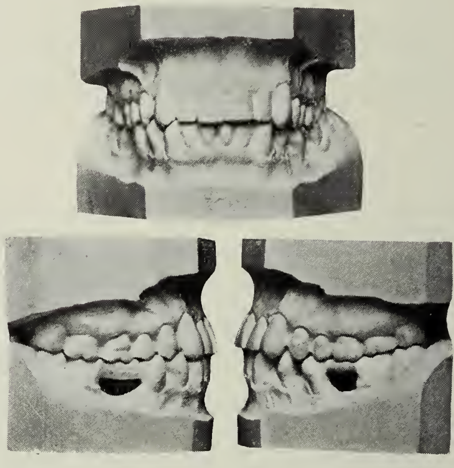


Fig. 5.

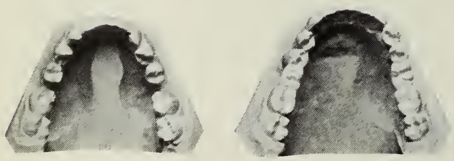


Fig. 7.

Therefore my reply contained the statement that if the young man carried out his intention of taking up active professional life in New York City, with its attendant pressure and complexity, it must necessarily follow that he would break down physically before reaching middle life, and that he must look forward to a lowered efficiency for much of the period in which he might succeed in pursuing his practice.

In preparing the reply to the further question, as to the right remedy, I consulted Dr. Henry C. Ferris, and asked him to first analyze the situation from the orthodontic and physiological side, and tell me what assistance I might expect from orthodontic procedure. After considering his report on these two elements, I stated to the father that by combined orthodontic and prosthodontic measures we might reasonably expect to raise the efficiency of the masticating organ from below 10 per cent. of normal, where Dr. Ferris conservatively estimated it to stand, to at least 80 per cent. of normal, and to retain it permanently at that point.

In work of this type I hold that it is necessary to adhere to two fundamental principles —namely, that anatomical restoration of individual teeth is of first importance, and that it is correct surgery to replace with substitutes any and all teeth or parts of teeth that cannot otherwise be brought into harmony with the lines insuring an anatomical occlusion and its permanence.

I believe a study of the slides illustrating this individual case will convince you that the life prospects for this subject have been profoundly modified by the procedures put in practice; that from an original certainty of continued struggle with hampering disabilities, his outlook has been changed to one warranting the expectation of high efficiency, and confidence that he will go far in his chosen field.

With this case as an illustration, I submit for your consideration the statement that, as a profession, we should give more attention than we do to the efficiency of the masticating organ as a whole, and that we need to make a broader study of the possibilities in all mutilated malocclusion cases than has been our habit.

HENRY W. GILLETT, D.M.D.

CONCLUSIONS.

(1) In drawing conclusions upon our past work, we must acknowledge that it is impossible to make a correct diagnosis from any one factor in analysis unless it be the percentage of the ptyalin in the specimen.

(2) We have also proved that we must look farther to account for the acids found in the saliva. Whether they are produced by the action of bacteria upon the muco-proteins is one of the problems for future solution.

(3) Gelatin is not more soluble in solutions of sodium thiocyanate than in water out of the mouth; but what effects this property has upon the muco-proteins in the mouth remains to be proved.

(4) We have shown that, by comparison of analyses of the secretions and excretions before and after an improvement in the functioning ability of mastication, we modify the whole organism, and thereby put our work on a scientific basis worthy of the consideration of the world.

In closing, we wish to say that while we have not been able to establish a great many truths, we have worked with a definite method of procedure, and our findings may be corrected or disputed— which means honest advance.

It is the sincere wish of your committee that this work continue under the new committee upon these broad lines, and not upon individual methods.

Respectfully submitted,
HENRY C. FERRIS, *Chairman.*

The general session then adjourned until Thursday noon.

THURSDAY—*Third General Session.*

The general session was called to order Thursday at 12 o'clock by Dr. T. B. Hartzell, vice-president.

The first order of business was the reading of a paper by Dr. ROSCOE A. DAY, San Francisco, California, entitled, "Orthodontia and Its Relation to Dentistry."

[This paper is printed in full at page 1117 of the present issue of the COSMOS.]

Discussion.

Dr. HORACE L. HOWE, Boston, Mass In discussing this most interesting paper, I will say that I heartily agree with the general sentiment expressed by Dr. Day. One succeeds best in those fields of work he likes best. The practice of dentistry today is so complicated that to follow all branches with equal enthusiasm is well-nigh impossible— therefore the development of the specialty of orthodontia.

To best serve the public it is necessary for us, who sometimes stand as advisers, to be thoroughly alive to the importance of normal functioning of the jaws and of the nose. The longer I study malocclusion, the stronger is my belief that most of its causes may be traced, directly and indirectly, to the too little use of the jaws and nose. The jaws were designed for USE. Recently a strong, handsome, splendidly developed Swedish gentleman came to my office for treatment. Every tooth was perfect. The jaws were large and well-developed.

FIG. 1.

Only four or five small fillings were present. I remarked that he must have used his teeth when young. In reply he told me that his people in Sweden considered bread unfit for food if less than three weeks old.

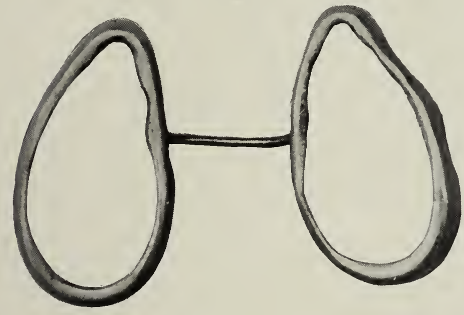
There is no doubt that the use of the jaws in vigorous mastication is the source of stimulation toward its development and the source of the preservation of the teeth after they erupt. The jaws will not develop without the blood supply, which is, in turn, dependent on the stimulation of exercise. One of the most pitiful objects I ever beheld was a boy of perhaps fifteen, whose lower jaw was of the size of that of a child of six. (Fig. 1.) What caused this condition? I *know* it was due to *lack of use.* Of this I am positive, because the boy had ankylosis of the jaw from childhood. His jaw lacked the stimulation of use.

Just a word regarding the importance of the nose: Dr. Day points out that in many cases of malocclusion where mouth-breathing is associated, even after the efforts of the rhinologist in removing the adenoids and polypi, and those of the orthodontist, the nose will still be unused. This, indeed, is the case. The nose, having remained unused perhaps for many years, lacks its proper development. The stream of air passing in and out of the nose under positive and negative pressure is an immense developing force. When we inhale vigorously through the nose, the whole internal head is ventilated, the accessory sinuses are cleared, the air is dragged from the frontal sinuses, the internal ears are ventilated through the Eustachian tubes. To demonstrate this fact one has only to breathe vigorously through the nose, especially in cold weather. Again, when the air is exhaled through the nose, a positive pressure is exerted, which sends the air forcibly through all these passages. Thus it goes back and forth, ventilating and clearing and developing the whole head.

Imagine the loss when the nose is not used. The stream of air when carried to the lungs through the mouth, besides losing the filtering and warming effect of the nose, does not become the developing and ventilating force I have described. Imagine what this loss means to a developing child! Is it any wonder that many cases persist in mouth-breathing even after our combined efforts? We need to take advantage of every possible factor for the establishing of the normal use of the nose. In many cases, the patient should wear the intermaxillary elastics for a long time after the correction of the malocclusion, simply to cause the closing of the jaws when the muscles are relaxed during sleep.

In connection with this subject, I wish to speak of a nasal dilator which I think will be an aid to establishing normal breathing. This is designed to be worn at night—when, as we all know, because of the increased blood pressure with the body in recumbent position, the passages of the nose are smaller than when the upright position is maintained. The dilator (see Fig. 2) holds the soft parts of the nose away from the turbinate bones and septum, allowing much freer passage of the stream of air. In many cases it is a physical impossi-

Fig. 2.



bility for a child to draw the proper amount of air through the nose. I hope this mechanical dilator will prove as useful as it promises to be.

In conclusion I would once more emphasize the importance of normal functioning of the jaws and the nose.

Dr. V. H. Jackson, New York. This is a very important paper, and I should like to have had time to read it carefully before taking part in the discussion.

Dr. Howe's introduction of this expander for the alæ of the nose is important. There is erectile tissue in the nose and in severe changes of weather this tissue becomes active and closes the nostrils, compelling the individual to breathe through the mouth. At night also, very often, this tissue becomes active, and it is of great benefit to the patient to have this apparatus hold the alæ of the nose in position while sleeping; it is very important for the growing child—in fact, for persons of any age. The nose does not develop normally unless functioning properly, and unless it is functioning properly the turbinates become overdeveloped.

Lack of development of the arches is due in many cases to constitutional conditions, and that brings us to heredity. I am a believer in heredity, but I think that some are not holding to that view as strongly as they should. It is very important that we should take these children in hand at the earliest possible opportunity and watch the development of the arches during the developmental stage. I have models of the mouths of children of four years of age in which I am expanding the arches, and every one shows a condition of distal occlusion, the lower arch being retruded and both arches developing according to these conditions.

The essayist's paper shows clearly the relationship between the practitioner and the orthodontist, and I was much pleased to hear him say that the general practitioner should be posted sufficiently in orthodontia matters to be able to advise parents in regard to their children. Every practitioner should be almost obliged to pass an examination on these matters, because, if we are going to be practitioners and advise mothers regarding their children, we need to understand all phases of the etiology of malocclusion and be able to advise the mother in the right way. I often tell patients, when they think me a little over-anxious to get these children under treatment, that they would not set a plant in a front yard and let it grow by itself, but would watch it and care for it and see that it was not strangled by weeds. We need to take charge of these children and direct the development of their arches and faces so that we may bring about what nature intended, by improving the groundwork or bony processes that will produce and support perfect arches and normal occlusion of the teeth.

The general practitioner is the man who must advise the parents as to whether a child shall go to an orthodontist, or whether he himself is to take care of it—and he should not interfere unless he can help the child by doing the best that can be done. That means that every practitioner should be thoroughly posted and be able to give the parents the best advice obtainable. Many practitioners are not following this method; often they attempt treatment of these cases although they do not understand the true requisites to bring about the proper shape of the arches.

I was pleased to hear the essayist's paper, which is calculated to bring out the best that is in us—and that is what we are working for.

Dr. F. C. Rodgers, St. Louis, Mo. I wish to compliment Dr. Day on his splendid paper. It has special importance at this time, when the subject of preventive treatment both in medicine and dentistry is rife throughout the country. Dr. Day has incorporated in his paper the basic principles of pathologic causes of malocclusion of the teeth, and has also pointed out the responsibility of the dentist in directing the development of the teeth and calling the attention of the parents to the necessity of having the malformations corrected at the earliest stage. If the interest of the general practitioner could be aroused to the point where all would work in harmony and with the object in view of preventing these distortions of the mouth and face that we see every day, and that are caused by maldevelopment of the teeth, there would be no need of the orthodontia specialist. These deformities are preventable in their early stages by very simple treatment; therefore the advice of the dentist is important. The general practitioner should guard against the development of malformation, and thus we should be doing a great service to humanity. Not only do irregularities of the teeth cause malformation of the jaws, but the relationship of the nose and the entire contour of the face is also affected.

This is a serious problem, and it should receive closer attention from the profession than, I believe it has been given in the past.

Dr. Howe. In connection with the essayist's paper, I want to speak of the work which Dr. Baker of Boston has been doing in showing the influence of mastication upon the skull. Dr. Baker took a group of young rabbits and removed the teeth from one side of the jaw to see what influence this would have upon the development of the rabbits. Perhaps some of you have seen the record of these experiments, and I mention them now simply to call your attention to them. After these rabbits had grown up, he compared their skulls with the skulls of rabbits that had developed normally, and the comparison was very marked. The median line was deviated toward the side which was used in mastication. The nasal fossa on the side used was larger than on the other side. The backbones of the rabbits were twisted, and the pharynges were also twisted. A German investigator connected with the University of Berlin also performed similar experiments with dogs, in order to show the influence on the development of that animal, and these experiments were even more marked in their results. I simply mention these experiments as being in line with Dr. Day's paper.

Dr. W. E. Grant, Louisville, Ky. I wish to say that I believe the greatest good the men who are working in the field of orthodontia can possibly do at this time is to inaugurate a campaign of education that will result in intelligent and enthusiastic work on the part of the general practitioner along the line of corrective measures. The general practitioner seems to have overlooked the fact that he has a professional duty to perform in this direction, and we all know that many good men are failing to do their professional duty in rendering service to young patients that come under their observation. This is true of practitioners in the larger cities, but especially of those in the smaller cities who do not have the opportunity to refer cases to the specialist; they do not think it is necessary for the patient to be under the care of a specialist at that time. In other words, the general practitioner in many cases believes in playing the waiting game; he believes that, after the child is twelve or fifteen years of age, there will be time enough

—when, as a matter of fact, corrective measures should be applied earlier in life. In my localities I have endeavored through clinics and papers to show the necessity of the general practitioner taking up this work and being able to give intelligent advice to parents in the care of such cases by the orthodontia specialist.

Dr. GRAFTON MUNROE, Springfield, Ill. It gives me much pleasure to voice my sentiments in regard to the excellence of this paper. Dr. Day has given us a paper worth the consideration of every orthodontist and practitioner of general dentistry. One of the most important developmental phenomena that engage my attention relates to the muscles of the child—of which, with reference to the mouth and nose, Dr. Howe has spoken. We know that the smallest children are actively engaging their muscles when obtaining their natural food. The child who is artificially nourished is not developing the muscles of the head, nose, throat, and cheeks as he should; when, however, the child is nursed by the mother, a more active development of the muscles takes place, and all the muscles of the head act, aiding the development of the bones of the head, consequently the nasal apparatus is better developed. As a general practitioner and not having engaged in the practice of orthodontia except in a limited way, I have found that a very important item to be considered is the appearance of approximal caries. As soon as approximal caries commences in the deciduous teeth, they will be noticed to fall out of their normal positions, and if the first permanent molar erupts against a carious or broken-down deciduous molar it will be tilted out of its normal position and occlusion. Of course, as orthodontists we all appreciate the fact that the first permanent molar is the keystone and guide of the whole arch, and if that is tilted out of position we shall have a disarrangement of the whole arch. Special attention should therefore be given to the appearance of approximal caries, and by taking care of the deciduous teeth we shall in a great degree prevent malocclusion.

Dr. J. V. BOSWELL, Springfield, Mo. After ten years of work in orthodontia I am convinced that we have only scratched the surface, and that, considered in several aspects, it is of more importance than we have often thought. Considered from the standpoint of the dietetist, it is almost impossible thoroughly to masticate or insalivate food without normal occlusion; while from the standpoint of the practitioner who is only filling teeth, we know that teeth in their proper alignment are less susceptible to caries, because there is a more normal contact and the interproximal spaces are more normal, thereby preventing food from lodging, fermenting, and causing caries. There can be no doubt that a great amount of irregularity is caused by lack of stimulation. We are living in a "spoon age," when people are accustomed to eat foods that can be eaten with a spoon and require no mastication. If I have studied correctly the investigations on the teeth of prehistoric peoples, I understand that by comparison the size of the crowns and roots differed from what it is today. Our teeth are set in the bones weakly; small roots and large crowns are the result of eating foods that require no great amount of mastication and promote no great amount of stimulation, whereas in past times the roots were larger as compared with the size of the crown.

One of the greatest troubles that the general practitioner has had in the past was that he did not seem to see these evils until they were fully developed. It was easy to see where teeth were missing, and where a bridge could be placed, or where teeth were decayed and needed filling; but apparently he did not see malpositions until they had made considerable progress. I had one dentist tell me, not a great while ago, that he never had a case for orthodontia presented to him. I believe it was because he was not a good diagnostician, and could not see the evil progressing. This feature should be considered carefully, for it is here that we owe our greatest duty to our patients.

Dr. H. A. ELMQUIST, Des Moines, Iowa. It seems that the early etiology of irregularities is the most important field of dentistry, and yet these irregularities date back farther than the time when the general practitioner of dentistry comes in touch with them. Here medical men and dentists should come closer together; the medical man is the one to see these conditions first, as we do not often see the patients until the damage has really been done. We often do not see children until they are eight, ten, or twelve years of age, when they have lost their deciduous teeth without having been taken to the dentist. Often the first permanent molar is already decayed to the point where it is giving trouble, and then the damage has been done by interference with the development of the jaw. The medical man, therefore, who comes in touch with these patients sooner than we do, is the one who should recognize these conditions, and he should send the patients to the dentist.

Dr. L. M. Waugh, Buffalo, N. Y. It is with a good deal of hesitancy that I rise to take part in this discussion, as I take it for granted that thus far the subject has been discussed only by men who are actively engaged in orthodontia, while those engaged in general practice have not yet voiced their sentiments in the matter. I have enjoyed this paper more, perhaps, than others which have been offered by orthodontists to the general practitioner for his enlightenment, because the essayist goes to the basic principles of his subject and does not obscure them with illustrations of failures which have resulted from the mistakes of the general practitioner. The points brought out leave in our minds a most vivid impression of the harm that comes when steps are not taken for the early establishment of normal occlusion. As a general practitioner who is paying a good deal of attention to prosthetic procedures, I believe that the prosthetist is recognizing more fully the necessity for observing the principles of normal occlusion than any other branch of dentistry excepting orthodontia. The sooner all the branches of dentistry, special or general, recognize the fact that normal occlusion is the ideal for every operative procedure, the better it will be for the profession. This principle is applicable from the time the deciduous teeth are erupted, all through life and in every part of our work, no matter what restorations are done, down to the senile stage when the teeth are replaced with artificial dentures. When we restore an occlusal surface with a filling, we should have the ideal of normal occlusion in our minds; when we make crowns, normal occlusion is the mark at which we should aim; when we make bridges or artificial dentures, normal occlusion is the standard toward which we must work. The orthodontist steps in to aid the practitioner in establishing normal occlusion when the general practitioner is unable, under the stress of the busy day, to give proper time to such work; and if normal occlusion is established, the patient retains the teeth and the face is developed normally. After the orthodontist has established the nearest possible approach to the ideal of normal occlusion, it is our duty to see that this normal occlusion is maintained in everything we do—in building contacts, in restoring occlusal surfaces, and in the making of crowns and bridges. The establishment and maintenance of normal occlusion, reinforced by oral prophylaxis, which is now being so extensively exploited, is the ideal toward which as general practitioners we should work.

Dr. Gustavus North, Cedar Rapids, Iowa. To me it is apparent that the greatest causes of irregularities of the teeth are mouth-breathing and thumb-sucking during childhood. Mouth-breathing is generally caused by nasal obstruction, and we as dentists ought always to advise that such children be taken to a specialist for treatment. Thumb-sucking is a habit in infancy, and this habit is often encouraged by the mother and the nurse.

Dr. G. R. Hodge, Kansas City, Mo. There is no doubt that the orthodontist is of great assistance to the general practitioner and his patient. We should be able to direct patients to the right place, either to the orthodontist or the rhinologist, if the case cannot be treated in general practice. The time has come when we should be able to educate the public along this line. These children can be benefited if rightly directed. Thousands of children are hard of hearing today on account of nasal troubles and enlarged tonsils. The education of the public along these lines would bring about grand results, and probably quicker results than can be obtained in any other way. Every day we see cases in which children would be benefited through life if their parents were properly instructed. In the case of my own child, who was a mouth-breather, I have seen the good results to be obtained from proper treatment. A few years ago I brought him to Kansas City and had adenoids removed from his throat, and in two weeks I saw a marked change. I think it is our duty to try to educate the public along this line by any means we can, and I am sure that it will prove of great benefit to the coming generations.

Dr. DAY (closing the discussion). I first want to thank you all for the kind criticism accorded my paper. It is really a pleasure to see how much you appreciate normal occlusion, and it is very flattering indeed to know that you have accepted the paper in the way that it was intended. I have tried to make it as broad as possible, and my object in reading it was to benefit all.

One or two points have been brought out that I wish to speak about. One was preventive dentistry; and here I may say that the one object of early treatment in orthodontia is prevention. In the locality where I established myself as a specialist I have had many headaches over the fact that I had predecessors whose practice it was to advise waiting until children were fifteen years and older before any treatment was begun. That, I think, is the greatest mistake we could make. The one thing to do is to be candid and recognize these conditions and advise corrective treatment early.

Last year I had the pleasure of going to a wild portion of Oregon where there is a settlement of Indians numbering some fifteen hundred, and while there I had the privilege of examining the teeth of many of these people and studying their habits. Among them I found some very intelligent men who—I want to emphasize this fact—believed in living the simple life, and lived upon coarse foods. The government gives them one hundred and sixty acres of land each, and food of the coarsest variety, and it was astounding to me that among these fifteen hundred people I did not see a case of malocclusion—not one!

As a matter of comparison I want to call your attention to another fact. Our state board of prison directors appointed a commmittee to examine the prisons in the state with a view to establishing a dental department to care for the teeth of the inmates. We have a state administration that is doing all in its power to assist the community at large, and they even continue their efforts after men are placed in prison. I went to the prison for the purpose of examining these men and making recommendations to the directors as to what would be necessary for the establishment of a dental chair in the prisons. It may sound narrow, but, after examining 1115 men, I was convinced that malformations and irregularities of the teeth had a great deal to do with the mental state of these people. One man had been condemned to die and had been reprieved a number of times, and just before I left I received two or three invitations to his hanging—which I hardly think will come off, because we are trying in California to do away with capital punishment. This man was sent to prison for life, and while there he killed three other prisoners; and he has a malocclusion of class III, the worst case I ever saw. His upper jaw is entirely inclosed within the mandible, with not one tooth in occlusion. Now, no one can convince me that this condition has not had its influence in the development of the man's brain and face. I saw many other cases of the worst types of malocclusion, and I am convinced that these conditions have their effect upon the mental development.

Someone spoke of the examination of children in the public schools. That is a great thing, but unfortunately the examiners' positions have gotten into politics, as in a certain city which I visited not a great while ago where I saw examiners at work who did not recognize irregularities of the teeth or malformations, but only saw cavities in the teeth. In the normal development of the mentality of the child these factors must be considered, because the mechanical forces of occlusion have everything to do with the facial bones and with cranial development.

Army Dental Corps.

Dr. Hartzell then introduced to the audience First Lieutenant ALDEN CARPENTER, official representative of the dental corps of the United States army, who addressed the association as follows:

Mr. President, members and friends of the National Dental Association,—It affords me great pleasure to receive this recognition; furthermore, let me say that the members of the dental corps of the United States army appreciate the consideration you have shown them in granting to them the right to representation in your organization.

I am sorry to state that I am not prepared to entertain you with an interesting paper—which is all due to the fact that our friend Dr. Dewey has been showing me what he has accomplished in research work, and also in orthodontia. This has so impressed me that I feel like giving up general practice and devoting all my time to orthodontia.

The climatic conditions this morning are such that a long-drawn-out paper had better be printed and distributed than read; so I have endeavored to prepare a short syncpsis of what constitutes our corps, and how the work is carried on in the army.

First, the act of Congress approved March 3, 1911, establishing the dental corps of the army:

> Hereafter there shall be attached to the medical department of the army a dental corps, which shall be composed of dental surgeons and acting dental surgeons, the total number of which shall not exceed the proportion of one to each thousand of actual enlisted strength of the army. The number of dental surgeons shall not exceed sixty, and the number of acting dental surgeons shall be such as may from time to time be authorized by law. Dental surgeons are commissioned with the rank of first lieutenant, and shall have rank in such corps according to the date of their commission. The pay and allowances of dental surgeons shall be those of first lieutenant, including the right to retirement on account of age or disability as in the case of other officers.
>
> Appointees as acting dental surgeons must be citizens of the United States between twenty-one and twenty-seven years of age, and graduates of standard dental colleges. They shall be required to pass the usual physical examination as required for appointment in the medical corps, and a professional examination which shall include tests of skill in practical dentistry and of proficiency in the usual subjects of a standard dental college course.

> Applications for examination should be made to the Surgeon-general of the army, and applicants who qualify at the examinations will be employed on a contract for a period of three years, receiving $150 per month, also traveling allowances in changes of station, quarters, heat and light, also medical treatment in case of sickness.
>
> After a period of three years, acting dental surgeons whose work and conduct give rise to no material and well-grounded criticism will be regarded as eligible for promotion to the grade of dental surgeon, subject to a physical and professional examination by a board duly constituted as prescribed by law. Members of the dental corps are not permanently assigned to any one station, regiment, or arm of the service, but are transferred from station to station as the needs of the service demand. All supplies, instruments, etc., are supplied by the government.

There are now twenty-eight dental surgeons and twenty-three acting dental surgeons in the service. Their field of operation necessitates their visiting all the military posts in the United States, Alaska, Hawaiian Islands, Philippine Islands, Porto Rico, China, and Panama. So you may see, gentlemen, that the young man of active mind who longs for a change of scenery and climate may realize his ambition.

Before closing, I wish to state that I know of no better field for the young professional man than in entering the United States army. He will there receive a training that will better fit him for his chosen field, and if he shows adaptability in any specialty pertaining to dentistry, his opportunities are many, with a commander ever ready to promote the art and science of dentistry.

The general session then adjourned until Friday at 12 o'clock.

FRIDAY—*Fourth General Session.*

The general session was called to order on Friday at 12 o'clock by the president, Dr. Hetrick.

Panama-Pacific Dental Congress.

Dr. Hetrick introduced Dr. T. SYDNEY SMITH, Palo Alto, Cal., who addressed the association as follows:

Mr. President, and members of the National Dental Association,—I have the honor to come before you in the interests of the Panama-Pacific Dental Congress, and to bring to you greetings from the officers of that congress and the host of willing workers in the Pacific coast states.

It is evident to all that the completion of the Panama Canal is one of the greatest achievements of modern times and marks a new era in the commerce and prosperity, not only of the two Americas, but also of the entire world. It is fitting that this new era of commerce should be celebrated and ushered in by a great International Exposition to bring together the nations of the world at some definite time and place. This Exposition, as you know, will be held in San Francisco, California, in 1915.

It is equally important that we should take advantage of this gathering of the nations to advance the interests of science in general, and that we should not neglect our especial branch, the science of dentistry. Realizing the significance of this, the dentists of the Pacific coast states took the initiative step and organized the Panama-Pacific Dental Congress. Having taken this decisive action, representatives were sent last year to Washington at the time of the National dental convention to secure the co-operation of this great organization. Our gratification can well be imagined when we obtained, not only the unanimous consent of this body to meet with us, but also secured the International Dental Federation. Having secured the co-operation of these two great bodies, it devolved upon us to work out ways and means whereby we could make this, if possible, the greatest congress which has been held in the history of dentistry.

To insure the success of this congress we found it necessary to elect permanent officers. The Committee of Organization, in regular session at San Francisco last June, elected the following officers:

Dr. FRANK L. PLATT, *President.*
Dr. CHAS. N. BENBROOK, *Vice-president.*
Dr. F. G. BAIRD, *Treasurer.*
Dr. ARTHUR M. FLOOD, *Secretary.*

The Executive Committee consists of the above-named officers, and eleven others who constituted the Committee of Organization. Executive committees, each consisting of a chairman and four others, have been appointed for about forty states and eighteen foreign countries, and the appointments of a number of others are pending. Negotiations are under way with manufacturers and dealers for the purchase of exhibiting space. Various means and methods for publicity have been put into execution and are awaiting development. Universal enthusiasm prevails throughout the coast states, and the most cheering and encouraging reports and letters are coming in from all over the world. The proposition grows larger with each day.

Subscriptions to our promotion fund have been generous and most satisfactory. So far the following organizations have subscribed:

The California State Association ...	$1500
San Francisco District Society	500
Alameda County Society	500
Southern California Association	1000
Additional private subscriptions to date (from Southern California) ..	1400
Oregon State Association	250
Portland District Society	300
Utah State Dental Society	150
Odontological Society, Salt Lake	50
Washington State Society	150
Seattle Dental Study Club	100

The total subscriptions to date are nearly $13,000.

It is desired by the committee that the members of the profession generally buy their memberships in the congress at their earliest convenience, so that the committee may, as early as possible, have some idea as to what the ultimate membership will be, as well as creating and establishing a personal interest in the Congress.

The Panama-Pacific Dental Congress will open on Monday Morning, August 30, 1915, and continue in session for ten days, not including Sunday. The congress will meet in the new million-dollar auditorium to be constructed by the Exposition Company as a part of the Civic Center of San Franciso, which will not be an integral part of the Exposition, and not within the grounds. In behalf of the officers of the Panama-Pacific Dental Congress, I most cordially invite you all to attend this great meeting, and to aid us in making it the largest and best ever held.

Motion was made and carried that the invitation to the National Dental Association from the Panama-Pacific Dental Congress presented by Dr. Smith be accepted with thanks.

Installation of Officers.

The next order of business as announced by the President was the installation of the newly elected officers. The following officers were then duly installed:

President—Dr. Homer C. Brown, Columbus, Ohio.

First Vice-president—Dr. Chas. Channing Allen, Kansas City, Mo.

Second Vice-president—Dr. M. L. Rhein, New York City.

Third Vice-president—Dr. H. H. Johnson, Macon, Ga.

Treasurer—Dr. H. B. McFadden, Philadelphia, Pa.

General Secretary—Dr. Otto U. King, Huntington, Ind.

Dr. Brown then introduced to the association Dr. W. S. Zeile, of Sydney, Australia, who addressed the association.

Dr. H. J. Burkhart moved that a rising vote of thanks be given to the retiring president, Dr. Hetrick, for his very efficient work in conducting the affairs of the association. [Motion carried.]

Dr. Burkhart also moved a vote of thanks to the Local Committee of Arrangements, and especially to Dr. Chas. C. Allen, for the splendid work done in making the arrangements for the meeting and for the very efficient manner in which they conducted everything placed in their hands. [Motion carried.]

Motion was then made and carried that the association adjourn until the next annual session—at Rochester, N. Y., July 14,* 1914.

* [As will be seen by reference to "Notes and Announcements," on a later page, the date above given has been *advanced* one week. Accordingly—*Read:* The National Dental Association will meet at Rochester, N. Y., July 7, 1914.—Ed. Cosmos.]

SECTION I: Prosthetic Dentistry, Crown and Bridge Work, Orthodontia, Metallurgy, Chemistry, and Allied Subjects.

Chairman—Harry E. Kelsey, Baltimore, Md.
Vice-chairman—Frank T. Taylor, Boston, Mass.
Secretary—J. H. Wallace, Omaha, Nebr.

Wednesday—*First Session.*

The first meeting of Section I was called to order on Wednesday morning, July 9th, at 10 o'clock, by the chairman, Dr. Harry E. Kelsey, Baltimore, Md.

The first item on the program, as announced by the Chairman, was the reading of a paper by Dr. Percy R. Howe, Boston, Mass., entitled "The Saliva."

[This paper is printed in full at page 1112 of the present issue of the Cosmos.]

Discussion.

Dr. E. P. Brady, St. Louis, Mo. In reading the able paper which the essayist has presented it occurred to me that anyone who has not entered this field of study cannot appreciate the enormous difficulties that present themselves and seem to baffle every effort upon the part of the investigator.

A study of the saliva shows that that fluid is subject to many influences which tend to change its composition, as has been mentioned. The saliva secreted by a resting gland differs from that secreted by one that is under stimulation. The composition differs in different individuals also; it is individual in character. It is also found that, depending upon the variety of nervous stimulation, the character of the saliva secreted may be materially changed. To illustrate: The secretion from the submaxillary gland under a stimulus from the facial nerve is abundant, limpid, low in mucin, etc., while that produced under a stimulus from the sympathetic nerve is scanty, rich in mucin, and of rather high specific gravity. My reason for bringing this fact forward is that several cases have come under my observation in which grave pathological conditions of the dental organs have existed, and all of the patients were under treatment for nervous disorders. I am not prepared to draw the conclusion that a disturbance of the nervous system would also affect the nervous stimulation of the salivary glands to such an extent as to be the auxiliary cause of the pathological condition existing, however an abatement of the general disorder showed a corresponding improvement in the dental conditions. I am working in this field at the present time, and am not prepared to make a definite statement as yet.

I have not approached the study of the saliva from the same point of view as the essayist, and there are several points of consideration which he has failed to mention which appear to me of prime importance—as, for instance, in reference to the saliva from various persons in whom caries of the teeth does not prevail: How does it behave when it is incubated?—that is, Is lactic acid formed to an appreciable amount? How do the results from these tests compare with similar tests performed with saliva from mouths in which caries prevails? If the saliva in any of the above cases were alkaline to start with, of course the decrease in alkalinity would show that acid had been formed during the incubation. The point to be proved in the above would be: Is lactic acid formed in mouths free from caries?—and, if so, what is the combating element of the saliva? Would the alkalinity, if present, neutralize this acid?—or, conversely, Is the saliva of so-called immunes deficient in nutrient material?

It is understood in these experiments that the various carbohydrates be added to the salivas. In the classification of micro-organisms, the lactic acid bacillus is generally classified as one requiring the presence of nitrogen compounds to meet nutrient requirements. One authority claims that lactic fermentation occurs in the various carbohydrates, when animal nitrogenous matter is present. It is reasonable to believe that albumin, globulin, and mucin can meet these requirements. One or two investigators have experimented with the saliva, using various commercial enzymes with the hope of ascertaining if the lactic acid present in saliva be due to enzyme activity. No definite results were obtained; still the fact remains that an enzyme can be isolated from the lactic acid bacillus which produces the specific fermentation action of the mother organism. Also it has been shown that some substances in certain concentration kill the ferment and do not interfere with the action of the enzyme. This problem is rather complicated, and, as this field of investigation may be considered in its infancy, it is hardly in order to recall the various theories that have been offered as to the formation of lactic acid by the various enzymes. From what has been said, however, we may see that, although the saliva may be deficient in nutrient material, still lactic acid may be formed by the presence of a small quantity of enzyme acting upon carbohydrate material.

It is a well-known fact that constitutional disorders have a direct action on the nature of the saliva, and there is no need of any further elaboration upon this subject.

In regard to the use of the various indicators for determining the degree of alkalinity or acidity, it may be stated that Foa claims that the actual alkalinity is always considerably less than that found by titration, while the reaction as determined electrometrically is nearly neutral.

In the case of using $KHC_4H_4O_6$ as a mouth-wash, especially at night, it is only reasonable to believe that during this period, the mouth being at rest, even if the saliva be alkaline the interstitial spaces, the points that more readily succumb to caries, will not be penetrated by the saliva, and consequently the acid formed will not be hindered in its action; while on the other hand, if the treatment suggested by Dr. Miller be followed—*i.e.* if, in acidity of the saliva, milk of magnesia be used—the physical property of this mixture will keep it in contact with these points, and thus keep them alkaline.

The author suggests that the saliva be considered as a medium furnishing acid-forming bacteria with the necessary requirements, and not simply as a neutralizing agent for the acid already formed. In accordance with this suggestion it seems plausible that in those cases in which there is a prevalence of caries, the alkalinity of the saliva would in no way interfere with the activity of the micro-organism, but simply neutralize the effect of the acid formed; and in considering the nature of the mouth-washes used, necessary provision should be made not only to neutralize the acid, but also to inhibit the action of the lactic acid organism.

In conclusion, I wish to express my approval of the general suggestions offered by the essayist, as they all have a direct bearing upon the nature of the saliva and also the factors provocative of pathological conditions of the oral cavity.

Dr. Russell W. Bunting, Ann Arbor, Mich. There has never been a time in the history of dentistry when there was such a widespread interest in the cause and control of caries as is being manifested today. Everywhere we find men who have enough interest in the subject to spend considerable time and endeavor in the following out of some specific feature of the problem, and who are adding to the sum of acquired knowledge on the subject.

Since the trend of modern investigation seems to point out that the variable forces which determine the susceptibility and immunity of the teeth to caries lie outside of the teeth, the greater number of the investigations have been focused upon the saliva and its contents, seeking in that fluid the determining factor in the process. If, then, the saliva plays so important a part in the process, it is very necessary that close study be made of this secretion to ascertain its component parts, and their behavior with respect to caries. The paper to which we have just listened is a report of valuable work along this very line, and will be a distinct addition to the literature upon the subject.

The author has well stated his premise when in the opening paragraph he says that "The problem of caries is to determine the differences which exist between the saliva of the mouths in which microbic life extensively flourishes, and the saliva of those in which it is inhibited." Next, he has, by a long series of experiments, determined that phosphates, sugars, amino-acids, etc., stimulate fermentation in the saliva, and that carbonates and chlorids inhibit it. He has then gone into that very important and ultimate field toward which all investigators must gravitate—that of the dietetic control of the salivary secretion—and has suggested methods for decreasing the fermentations in the saliva.

All of this is very important, and is of especial interest to me, inasmuch as I have been engaged in studies of this subject from a somewhat different angle for the past two years. I have examined and incubated a large number of salivas, looking for some that would refuse to form acid. I have found that they all undergo acid fermentation in their natural state, some forming more acid than others in a given time, but those which showed marked differences were few in number and did not in any way coincide with the susceptibility or immunity to caries. In any case, the amount of acid formed in any saliva was inconsiderable as compared with that which would be formed in any of them upon the addition of one-half gram of bread.

The results of my experiments have led me to believe that the amount of fermentation in a given saliva is not so much dependent upon the particular bacterial flora present, or the presence or absence of some restraining influence, as it is upon the quantity and the character of the food which is available for fermentation. Carbohydrates must be present either in the salivary secretion itself, or come from ingested foods from which the acids may be formed. That the presence of amino-acids will accelerate the action of the acid-forming bacteria, as reported by Dr. Howe, is an interesting feature.

But interesting and important as is our discussion of the fermentations of the mouth and their relation to dental caries, it does not seem reasonable that we should emphasize this factor to the exclusion of all others, as the author seems to have done. For the process of caries, acid fermentation is indispensable, but it is also necessary to have an accessory factor—namely, protection to the acid-forming bacteria and to the acids which they have formed. The acids must be confined against the tooth, and some provision made to keep the saliva from diluting them and washing them away. We have all seen filthy mouths in which the fermentations were very high, and yet there was no caries. Acids certainly formed in these cases, and in no small amount, but they have not been able to affect the enamel of the tooth. It has been protected either by the filth itself, or by some form of plaque which was not conducive to caries. So that in the investigation of caries from the standpoint of the saliva we must, on the one hand, look to the acid fermentations of the foods, both salivary and ingested, and on the other, inquire into local conditions immediately about the teeth which make it favorable or unfavorable for the acids to attack those organs.

There is great need for further work to be done along these lines. Confined as we are to the saliva, we are under a great handicap, for we are dealing with a perverse and fickle fluid that seems to resist our every effort at investigation. By the nature of the secretion and by the variability of its constituents the most simple reactions are obscured and their veracity may be questioned. It is just such investigations as this, applied to every phase of the problem, that are needed. Careful and painstaking research must be carried on by a number of men who are well qualified to undertake the task, to get first a fuller understanding of the basic principles in the saliva, and then to study its relation to dental caries. It is a big work, and one of such importance as to be well worth our best endeavor. I wish to congratulate Dr. Howe upon the research he has made, and the association upon the presentation of his paper.

Dr. Howe (closing the discussion). The criticisms given are very interesting, and show, for one thing, the need of more extended study of oral pathological processes. They are, further, an evidence that creditable work has already been carried out upon these most important questions. In my paper I have endeavored to present some ideas respecting the constituents of the saliva that might act to stimulate or interfere with bacterial growth. In other words, I have presented a study of the saliva as a culture medium. The importance of the media to the bacterial growth may be further seen in the fermentation of sugars. It is the sugar in the souring milk that makes the lactic acid. Solutions of sugar exposed to the air are always converted into lactic acid solutions. So that we see that here it is the medium that controls the lactic acid fermentation, fully as much as the bacteria. A very great number of bacteria have been isolated that are concerned in this kind of fermentation—yet we must always have sugars or starches for them to act upon in the production of lactic acid. Other contributory factors have been considered in the paper which I have had the pleasure of presenting.

The next order of business was the reading of a paper by Dr. Marcus L. Ward, Ann Arbor, Mich., entitled "Conflicting Opinions Concerning the Manufacture and Use of Alloys for Dental Amalgams."

[This paper is printed in full at page 1082 of the present issue of the Cosmos.]

Discussion.

Dr. Clarence J. Grieves, Baltimore, Md. I wish to thank Dr. Ward for his valuable research in amalgam alloys. It seems that we have had a research meeting, and I do not know that we could find any greater argument for the necessity of dental research than these two papers by Dr. Howe and Dr. Ward.

It seems most unfortunate that when our profession decides that it really needs to investigate some phase of a subject, it finds that particular subject most difficult. It was thought that it would be easy to look over the saliva and by chemical analysis solve the whole question. The same can be said of amalgams, and you have seen this morning how easy it is!—for when we attack the proposition of alloys we find that an alloy is no simple thing, not a chemical compound nor a mechanical mixture—in fact, nobody appears to know just what it is; and right in this breach our help will come from such men as Dr. Howe and Dr. Ward.

I would like to speak for a moment from the standpoint of the general practitioner. We all admit that there is one thing of which we should be sure, and that is the exact nature of what we put into the human mouth, particularly as we put it there with the hope that it is going to stay. So in taking up the question of amalgam, a material that today is saving more teeth than any other one material in our hands, it is important for the dentists to know the metals that go to make it, and how they will behave in the mouth. When I read Mr. Atkinson's paper in the Dental Cosmos (issue for June 1913), while I am not a metallurgist, I thought that we had all been wrong, and that it had all been fixed for us—that the making of dental alloys was simply a chemical proposition; and here again we owe Dr. Ward a great vote of thanks. For if the manufacturers had gone into making amalgam on the laws of valence as suggested by Mr. Atkinson's article, we should have had very unreliable amalgams indeed. So the problem is not so simple as it looks. These alloys are curious things, the union of metals producing a result which apparently does not follow the laws of chemistry or physics, and we are not yet ready to depart from the rules laid down by Dr. Black. My particular part in the discussion has to do with the behavior of these metals in the mouth, and is based upon studies regarding the action of saliva on German silver, gold and platinous zinc alloys, which I reported some years ago. I recognized the value of zinc from the physical standpoint in small proportion as a good constituent in these alloys, and, if the proportion be small enough, I may agree with Dr. Ward, but I have an animus against the insertion of zinc in any percentage in the human mouth.

Allow me to quote from my former paper:*

> If it can be established that a vitiated saliva, or even a normal saliva and its mucous content, or the decomposition of food in the common retention centers, or a combination of all of these, affect the metals in use in operative and prosthetic dentistry in such a way as to bring about their corrosion, forming other retention centers to the minute but ultimate destruction of smooth surfaces, prophylaxis exacts of us that we correct the environment, if possible; close all retention centers against the lodgment of filth, or substitute some material impervious to such action.

* * * * *

* Cosmos, vol. li, p. 1041. September 1909.

The alloy German silver was found, by six assays of as many varieties manufactured, to consist of copper 6.1, zinc 2.1, nickel 1.7, and iron 0.2. . . . Plain German silver examined with low powers after exposure of a few weeks in the mouth, in child saliva, presented craters in the centers retaining food; on longer exposure these craters extended all over the appliances—an arch bar for instance—even to the parts kept clean by the lips and tongue; corrosion was more pronounced in fixed than in removable appliances, and distinctly more violent and rapid, even to perforation of the metal, when gold plating, which was always defective, occurred.

That the added layer of gold should greatly increase corrosion, even granting some damage to the alloy in plating, is significant when seen in the light of the table of Berzelius, gold and copper standing as highly electro-negative, as opposed to nickel, zinc, and iron, which are electro-positive.

It was found that the craters were cut in the food-retention centers just as the tooth was cut, but there the analogy ceased; for to conclude that this is an acid process *per se* is to admit either that the acid starting craters extends and is retained all over the appliance, even at the constantly cleansed spots, or to admit a general mouth acidity as high as the retention centers—a position entirely untenable, for all children wearing appliances do not have hyperacid mouths, while the corrosion of German silver is remarkably constant in all mouths.

Electrolysis is, then, the principal agent working toward the destruction of this alloy —with the acids of food decomposition first charging the battery, and with the saliva containing these as a general electrolyte. This may be further established by the following facts:

First: An alloy containing, approximately, gold 18, platinum 2, the remaining four parts of the 24 karats being made up of equal parts of silver, copper, and zinc, after short wear under like conditions presents corrosion almost as pronounced as with plain German silver.

Second: "Dutchmen" of German silver wire used to fill in bridge dummies surrounded by gold solder and exposed in finishing, present deep degeneration spots on otherwise smooth surfaces when placed in the mouth away from the abrasion of occlusion. . . .

Last, but by no means least, the study of a large number of 18-karat gold solder surfaces known to have been smooth when placed in the mouth by the writer, develops the interesting fact that whenever a food-retention center was created, as in saddle dummies where gum hypertrophy has produced a false margin, corrosion exists to a marked degree.

Gold solders, "18-karat," are really 16-karat gold, and nearly, if not all, contain approximately, gold 16, copper 5, zinc 3. It has thus been proved that German silver with 15 per cent. zinc, 18-karat gold solder with 12 per cent. zinc, and all below such percentage, and platinous gold alloy with 5 per cent. zinc, all corrode with the human saliva as electrolyte; while gold plates of a much lower proportion of gold, such as coin gold (gold 90, copper 10) and the lower dental plates alloyed with metals all of the same electro-negative class as gold, with copper, silver, and platinum, do not degenerate under the same conditions.

Zinc to the average extent of 5 per cent. is thus the disturbing element, and the following law may be safely deduced: *Metals violently electro-positive and negative to each other should not be used in alloy or apposition in the human mouth, with the saliva as electrolyte*—as, for instance, gold and zinc, copper and zinc, etc.

Corollary to this law stand the facts that it is absurd to spend time polishing surfaces which we are assured will shortly become pitted; that it is bad dental and general hygiene to have such pitted surfaces in the mouth that the degeneration waste metal is ingested continuously, producing possibly systemic detriment; and finally, that because metallic poisoning has not been generally noted, this does not in the least affirm that it has not occurred.

* * * * *

Tin, the principal ingredient of amalgam alloys, when associated with gold cervically as foil, under the influence of the saliva loses much of its physical character and becomes hard and brittle. Binary amalgam alloys (tin and silver) placed cervically as the base for gold foil operations are changed along these lines and to a greater degree. Tin, then, is the active factor, but who will say whether the force acting as to so modify metals is chemical or physical, for these phenomena do not occur outside of the mouth. The quaternary alloys, containing besides the usual proportion of tin and silver a small portion of copper, gold, or zinc, or any two of the latter, do not harden as do the binary alloys in apposition to gold in the mouth; those containing zinc 2 parts show, when placed as a cervical seat for gold foil fillings, corrosion just above the gingival margin. These spots have been found on well-finished fillings from the hands of careful operators, and have been produced experimentally in the mouth by the writer.

It may be noted that as far as these observations go, ternary alloys (respectively silver, tin, and a portion each of copper, gold or platinum), while covered with sulfids, do not show degeneration as do the cleaner-looking quaternary alloys having a small percentage of zinc, with gold or platinum (the writer does not take the latter any too seriously). This is of particular interest, first, because mercury, silver, copper, and tin, the metals common, in the order named, to amalgam alloys, occupy a central position in the series of electro-positive and negative substances, being almost equal in potential, while gold and platinum are as far away and opposed electro-negatively from this naturally combined central group as is zinc electro-positively; second, these four metals combined have long been known as producing the best practical results.

I am not at all clear as to the percentage of zinc Dr. Ward proposes, and I do not understand how it can exist independently in bulk in amalgam alloys without being dissolved out, when we know that German silver, which is a homogeneous zinc alloy—as proved by the fact that it is so often used as a resistance in reducing electric currents,—will degenerate in the mouth, as has been shown.

Dr. Hamilton. I wish to congratulate Dr. Ward on his paper, and I would like to ask how dentists who are not able to make these researches are to know what alloys to use. I have for the last twelve years used alloys made after the Black formula, but it seems that there is some question now as to their superiority. What alloy then should we use? To this question I would like to have some definite answer, if one can be given.

Dr. W. A. Price, Cleveland, Ohio. It is not safe to call upon me while talking of a subject that needs additional research, for I am liable to get my subscription blanks and try to collect more money to help Dr. Ward solve his problem.

I wish to emphasize that, after Dr. Black, Dr. Ward, Dr. Fenchel, or any of our great men, have made their most painstaking and careful researches, they are not in position to advise you to use such and such an alloy—as asked today—because immediately they would place themselves in the position of being partial to certain manufacturers, or are liable to be misunderstood. One of the greatest functions of the National Research Foundation Committee will be that we can bring about a co-operation of such men as Dr. Ward, Dr. Black, and others, and let them come to a conclusion and give us their finding, which we shall accept as final, and so give it to the profession. I have no doubt that before two more annual meetings come around we shall be able to accomplish this aim, if the members of the National Association will make it possible for us to furnish assistants to work under the guidance of these men. I cannot refrain from saying that we have the opportunity now for employing eight researchers if we had the means. I want to commend the work of Dr. Ward, and assure you that when his paper is printed, and we can study it more thoroughly, we will find that it has more of merit and usefulness for our everyday practice than we have suspected from this single reading.

Dr. Rich. I would like to ask Dr. Price to say a word regarding the electrolysis of zinc in the mouth.

Dr. Price. I would hardly like to enter into a discussion of that phase of the subject now, because it would require too much time to offer the premises from which to make my deductions. We should keep in mind the fact that zinc is positive to practically all other metals, and that when we undertake to mix in the mouth different metals of which zinc is one, we are establishing an electric battery. Zinc is always positive, and it has a potential of voltage in proportion to the electro-positive relation to other metals of the series. If we had zinc and platinum in the formula suggested, we would have a very strong battery; when we use zinc with tin, we have a weak battery. When we use a comparatively high percentage of zinc in one cavity, and gold in another, we have an ordinary battery with a potential of one two-hundredths of a volt, and an amperage capacity according to the size of the filling that will by measurement run as high as one-twentieth of an ampère. When we put that amount of current through vital tissue—as is the case when we have gold on one side and zinc on the other and they are in a united electrical circuit through the dentin of that tooth and through the tissues carrying blood—immediately there will be irritation of the pulp, which has many times to do with the deposit of secondary dentin and the ultimate destruction of the pulp, with a reflex irritation without a local irritation.

Dr. Daniels. I would like to ask if the saliva, after the filling is inserted, interferes with the union of the mercury and the metals?

Dr. Ward (closing the discussion). I will discuss the last question first. Generally, it is considered that moisture makes no difference, and I think that if the mass of amalgam is not chopped up badly, this is very nearly true. We cannot dispute the fact, however, that saliva between particles of alloy acts as a foreign body, and prevents the intimate contact necessary for the best strength. If, however, the saliva is simply allowed to come in contact with the surface of a filling after it is inserted, I believe that any possible action between salts in the saliva and the amalgam will be limited to the surface of the filling. I think it is quite likely that if there were any action between the substances in the saliva and the amalgam, it would be greater while the amalgam was setting than after it had quite fully set.

Dr. Grieves and Dr. Price have each pointed out some objections to the use of zinc in the various ways in which it is being employed by dentists, Dr. Grieves placing special emphasis upon the difficulty in alloying zinc perfectly, and Dr. Price mentioning the electrolytical properties of this metal. Dr. McCauley and Dr. Bliss have each condemned the use of zinc, apparently upon the opinion of Dr. Black that it does not alloy perfectly, and Mr. Atkinson seems to have condemned it because it did not alloy perfectly and because it did not work in well with his hypothetical alloy Ag_2SnCu. I am willing to admit that many of these arguments would hold true if we were considering zinc alone; but why treat zinc as an individual metal, when we are discussing alloys, any more than we would silver? We can point out some objections to silver if we desire to do so, but no one seems to think that there are any reasons why it is not desirable. The same may be said of copper, and of tin. It is true that we may expect the behavior of zinc alone to be imparted to the alloys of which it is a part, but we must consider it in the ratio of approximately 2 parts of zinc to 198 of the other metals, and the question at once arises, Is zinc one of the controlling metals in such a minute quantity? In view of the evidence, we must answer, No. It is a modifier of a well-balanced alloy, imparting to it what appears to be its tendency unalloyed to form light-colored salts—when it forms salts at all—and to improve the consistence of the amalgam mass while combining the alloy and mercury. These modifications must likewise be considered in approximately the above-mentioned ratio.

Dr. Grieves says that he is under the impression that I favor the use of zinc in alloys. I want to modify that statement a little by saying that I am not ready to condemn it until we have more evidence that it is detrimental to our alloys. We seem to agree that the use of zinc in as small quantities as now employed, 2 per cent., facilitates amalgamation, the result being long expansions. We also seem to agree that the use of zinc in the quantities mentioned results in a better-colored filling, in most mouths, after it has been in for several years. I believe that most of those who condemn zinc will admit that it will take at least five years for a properly manipulated filling to have its usefulness destroyed by the expansion which they attribute to zinc. The question. then, for us to consider before condemning zinc, is, Which of these properties is of most value? My personal opinion is that the profession has reached a point where it will no longer tolerate black fillings in most of the places where they are required to insert plastics, even though they know that the black ones remain longer useful. Those who are now unconditionally condemning the use of zinc seemed to give the impression that the present methods of handling the metal were in a state of perfection, and that nothing more was to be expected in this phase of the work, but with this I cannot agree.

The real objection to the use of zinc in alloys for amalgam is that those alloys containing it seem to expand more than most of those without it, and my attitude is to control these expansions by more intelligent manipulation—if the manufacturers are unable to control them in the manufacture of the alloy—and by so doing avoid taking a step backward to the alloys of forty or fifty years ago, many of which were as black as coal in some mouths.

The latter part of my paper has to do with a problem which the profession has been confronting several times—viz, Are alloys made by combining the constituents in atomic ratios more desirable than those made otherwise? I think the paper is evidence enough that there is little basis for the assumption that they are.

In closing, I will say that I think there is no mistaking my position regarding the publication of results that are detrimental to our very best manufacturers.

Section I then adjourned until a later session.

(To be continued.)

REPORT OF THE N. D. A. COMMITTEE ON ARMY AND NAVY DENTAL LEGISLATION.

To the Officers and Members of the National Dental Association:

Your committee has the pleasure of again reporting more advanced legislation. We were fortunate in having the Naval Appropriation Bill amended in 1913 as in 1912, though the conditions were unfavorable in both instances. The chief features of the dental amendment of 1913 are—

(1) The creation of a Dental Reserve Corps, which was sought in 1912 and desired for many years, which shall differ in no respect from the Medical Reserve Corps, except that the qualification clause shall be extended to include D.D.S.

(2) A provision whereby the dental reserve corps may be utilized as a provisional corps of more experienced men while awaiting the selection of the best available young men for permanent service in the regular corps.

(3) A provision which prescribes that no dental surgeon shall render service, except temporary service, until his nomination shall have been confirmed by the Senate.

(4) That dental corps appointments of permanent tenure shall be made from the membership of the dental reserve corps as in the case of medical corps appointments from the medical reserve corps;—this includes a term of preparation at the Naval Medical School in Washington.

These features should be regarded as of exceeding importance, more especially as the administration of the law of 1912 might easily result in the selection of men by methods so questionable as to prohibit the idea of impartial sympathies and a kindly disposition to cooperate with the dental profession in its efforts to obtain the most worthy of its better-educated young graduates to represent it in the naval service. Announcements of impartial competitive examinations through the dental journals and the dental colleges and societies would reassure the profession of its opportunity to show its vital interests and its friendly disposition toward the object of securing to the service those best equipped by education and high professional character to meet the dental needs of the navy *personnel* and the economic interests of the government.

Another and material advantage intended by Congress to be more certainly accomplished by the new law than the law of 1912, namely, the emphasis it gives to the method of compelling the scrutiny of the Secretary before appointing, and of the Senate before confirming, will doubtless give the profession a proper and highly useful influence in regard to the passing on the qualifications so essential to the welfare of the profession as well as to the further advancement of the status of the dental service. In any event, these means and opportunities of scrutinizing the fitness of appointees must be recognized as wholesome and proper precautions, as against methods of unrestrained and practically non-competitive selection. Though these beneficial results may not be as quickly realized as may be desired by those who view the interests and ambitions of the profession as of easy attainment, there is no doubt that they will be realized in large measure and at an early date.

We fear there are but few who realize fully the immense importance of the recent army and navy dental legislation to the status of dentistry as a profession among the professions represented in the military and naval services, and we therefore offer for your information and fuller appreciation the following analysis of the effect of the previous non-recognition and the present legal recognition of dentistry.

Before the enactment of any army and navy dental laws was secured by your committees, the situation was simply as if the words "dentistry," "dental profession," and "dental surgeon" had no significance. Having no recognition in law, the dental surgeon in the military service could have no professional rights under the law. In the few individual and unauthorized cases of the assignment of men to do military dental service, the graduates in dentistry of our great universities and the enlisted man in the navy stood on equal social and professional footing, not merely in theory but in law and in fact, as was demonstrated by actual experience in particular cases. They had no right to their civil title or benefit of their college degree, nor to a position indicative of their function, nor to any degree or equality with "an officer and a gentleman," from whose social position theirs differed as widely as does that of the non-English-speaking laborer from that of the manufacturer who employs him, or as that of the valet from his employer. These are not exaggerations, but easily demonstrable illustrations of the condition that prevailed—surely a reflection on the civil status of dentistry!

What of the present—and, for that matter, of the future—of dentistry in its relation to the other professions in the naval service? Under the recent act of Congress, passed in pursuance and in consequence of fair hearings on the real issue, namely, the recognition of dentistry as a profession on a social and educational basis with other professions, the United States government is committed to the official recognition of dentistry. Therefore it is provided by law that the navy dental surgeon "shall take rank and precedence in the same manner and in all respects as in the case of appointees to the medical corps," and shall have "the same pay and allowances as officers of corresponding rank and length of service in the medical corps," and shall be entitled to retirement "in the same manner and under the same conditions as medical officers." They are also eligible, under the provisions of the law of 1912, to membership in the medical reserve corps of the navy, and additionally, to constitute a dental reserve corps under act signed by the President March 4, 1913, which creates a dental reserve corps differing in no respect from the medical reserve corps, except that the qualifying degree is extended to include that of Doctor of Dental Surgery.

Could any act of Congress be so phrased as to more forcibly and impressively carry the government's stamp of approval of dentistry, and more emphatically remove the stigma attached to it previously? or could any single act of the government more definitely or forcibly acknowledge the value of the educational course of the dental schools of America, or more gracefully acknowledge the importance of the function of the dental surgeon, than has been done by the recent acts of Congress?

There is now authorized the expenditure of about $500,000 per annum to meet the dental requirements of the army and navy, with an automatic proportional increase as the army and navy *personnel* is increased.

We are not to rest on the advantages gained. There must be promotions of dental officers in both the army and the navy, and we are confident that we are justified in assuring you that our work has made this next step probable at an early date.

In conclusion, we desire to inform the association that on April 23, 1913, the President of the United States appointed and the United States Senate confirmed the following gentlemen: Dr. Wms. Donnally, Dr. V. E. Turner, and Dr. G. E. Küsel to commissions in the navy dental reserve corps, and we offer the following resolution as part of our report:

RESOLVED, That the National Dental Association in convention assembled at Kansas City, Missouri, July 8 to 11, 1913, directs the secretary, under the seal of the association, to express our appreciation of President Woodrow Wilson's recognition of our profession by his recent appointments to commissions in the United States Navy dental reserve corps.

Respectfully submitted,

WM. CRENSHAW, *Chairman*,
CHAS. W. RODGERS,
WM. H. DEFORD,
Committee.

Subsequent to the reading of the report the following resolutions were adopted:

RESOLVED, That the National Dental Association, in annual session assembled at Kansas City, Mo., July 8 to 11, 1913, hereby expresses approval of the appointments made April 23, 1913, by President Woodrow Wilson, by and with the advice and consent of the Senate, of Dr. Wms. Donnally, Dr. Vignes E. Turner, and Dr. Geo. C. Küsel to membership in the dental reserve corps of the navy, and to acknowledge the recognition of the dental profession thereby implied.

RESOLVED, That the National Dental Association, in annual session assembled at Kansas City, Mo., July 8 to 11, 1913, hereby approves the provisions of the act of March 4, 1913, creating a Navy Dental Reserve Corps of dental surgeons who shall be appointed by the President and confirmed by the Senate, and hereby commends co-operation of the dental profession with the Navy department in an effort to attract to the navy dental service those best equipped and most suitably qualified to meet the needs of said service.

RESOLVED FURTHER, That this resolution be forwarded to the Hon. the Secretary of the Navy, Washington, D. C.

Also, at the meeting of the Southern Branch of the National Dental Association at Old Point Comfort, on July 22, 1913, the following resolutions were passed:

RESOLVED, That the Southern Branch of the National Dental Association, representing the state societies of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, Virginia, and West Virginia, and assembled July 22, 1913, at Old Point Comfort, Va., in annual session, hereby strongly approves the Dental Reserve Corps Act of March 4, 1913, because said act provides that all appointments shall be made by the President and confirmed by the Senate; and further authorizes the Secretary of the Navy to order the members of the said reserve corps to temporary active service, thus providing a ready means of meeting the dental needs of the *personnel* of the navy and marine corps with the service of men of the required skill and experience while developing a regular dental corps from men whose age at entrance precludes their having the required skill and experience; and be it further

RESOLVED, That this resolution be forwarded to Secretary Daniels, under the seal of the Southern Branch, and with the assurance that the profession of the several states represented will, if permitted, gladly co-operate with the Navy department in all efforts to attract to the navy dental service the best-equipped and most suitably qualified dental surgeons available through co-operative effort and a patriotic pride and interest in the welfare of the navy.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

Forty-fifth Annual Meeting.

(Continued from page 1042.)

FIRST DAY—*Evening Session.*

The Thursday evening session was called to order at 8.30 o'clock by the vice-president, Dr. W. W. Smith.

Dr. H. J. BURKHART, chairman of the Business Committee, reported the program for Friday.

The first item on the program for the evening session was the reading of a paper by Dr. T. B. HARTZELL, Minneapolis, Minn., entitled "The Operative and Post-operative Treatment of Pyorrhea."

[This paper is printed in full at page 1094 of the present issue of the COSMOS.]

Discussion.

Dr. R. H. HOFHEINZ, Rochester. To discuss pyorrhea alveolaris from any standpoint seems almost hopeless. I am more and more convinced that, whenever one has to vent an opinion on the writings of others, unless this be done with a certain one-sided enthusiasm or with a loving interest in the writer and the work, the result is hardly worth while. The most difficult task is presented to the debater when he is asked to discuss not only a paper or essay, but an elaborate lecture such as has been presented to us by Dr. Hartzell.

In reading some of the writings of Dr. Hartzell on this subject, I find that he is of the opinion that the pathology of the jaws and teeth have received little consideration. In this statement I differ with him; there is possibly no dental subject which has received more intelligent attention than the pathology of the jaws and teeth. The dental profession has never received a greater compliment than that which was paid to it by one of the famous Mayo brothers, who, at Chicago, read a paper on pyorrhea in its relation to systemic diseases. The indefatigable work of such men as our essayist, Dr. Rhein, and others, has compelled the medical world to recognize the importance of dental lesions in relation to general disease.

Dr. Hartzell laid great stress on the eradication of infection by not producing or at least not increasing raw surfaces, and thus establishing an abnormal condition. This is a cardinal point. It is a rather difficult question to establish what we call normality. Normality, after all, can only refer to a group, and not to the entire race. What may be normal in one mouth is abnormal in another. Look at the mouth of dogs after biting bones—a process which must leave raw surfaces of the gums, and yet infection does not necessarily follow. The tooth-brush, for instance, is neither a provision nor a product of nature, and its use renders oral conditions supernormal. What state would mouths be in, however, without its use? We are paying the price for our higher state of civilization and higher living.

The very bacteria which Dr. Hartzell has found in pyorrheal pockets are, according to Miller, frequently present in the normal oral cavity. In his famous book, "Micro-organisms of the Human Mouth," he says that, in the course of a few years hundreds of kinds of bacteria would become established in the mouth if the majority of them did not perish, sooner or later, in the struggle for existence. To what extent bacteria are a cause or result of pyorrhea still remains a question. Pathogenic organisms are remarkably well taken care of at the extremities of the alimentary canal. If it were not for these compensating agencies we would all be dead long ago.

At the beginning of this paper, the essayist says that operative treatment of pyorrhea was firmly established, but no crystallized method of practice had yet been in use. The treatment of pyorrhea seems more or less a dental specialty. I listened to a suffragette's speech a few evenings ago; she said that she disliked nothing more than a wabbling woman. I say the same of a practitioner, and above all of a teacher. During the years of my teaching I occasionally found it better to fit a case to the argument than to allow an assertion to stand on weak legs.

The essayist tells us that one of the most important essentials in surgery is to have a clear conception of the underlying philosophy. It seems to me less a question of philosophy than of science, and in this particular instance, of technique.

Pickerill, as Dr. Hartzell mentions, has convinced us that normal enamel is not smooth. The previous studies of Leon Williams, and I believe of Black, have shown us that smoothness of the enamel is not a normal condition. Its corrugated surface is a product of growth. Growth is an interrupted process, one of the best examples of which is the clam.

The essayist speaks of skinning the root, but skinning the enamel is another question. In the former instance we take off diseased tissue, but in the case of enamel we remove healthy tissue. Though it may be easier to keep off deposits and bacterial plaques from a smooth enamel surface in case of disease, rugged enamel is but an incident and not a cause. Corrugated enamel surfaces are normal in health, though they may become abnormal in pyorrhea. Both before and after treatment the interproximal space and gingival line will always remain the hotbed for bacterial accumulation. The starting-point of the *disease*—meaning the real change from a physiological to a pathological condition—remains the peridental membrane.

Many years ago I quoted a case of replantation in pyorrhea. Though this disease had affected practically every other tooth within a short time, the replanted tooth remained sound until the natural causes of absorption expelled it from the human economy.

I strongly agree with Dr. Hartzell in condemning the application of pumice in pyorrhea pockets. If used, however, it should be followed by an injection of hydrogen dioxid, or, what I consider still better, a ten per cent. solution of lactic acid and a saturated solution of sodium bicarbonate.

The absence of leucocytes in the pericementum is mentioned by the essayist as a factor that greatly favors bacterial proliferation. I beg to advance one step farther. We may find leucocytes in the cementum where the vessels are large enough to carry them, and that is particularly the case at the tip of the root. Death and destruction of the pericementum, therefore, means absence of leucocytes in the cementum. Skinning of the root is certainly a very original expression, which the pyorrhea specialist should not forget.

There are very few dental practitioners who can make a correct digital diagnosis. Fingers that work with rubber files and inlay casting apparatus are not the ones to detect and determine the different stages which Dr. Hartzell enumerates. A special digital education is necessary. This reminds me of what Oliver W. Holmes told a mother when she asked him at what time a child's education should begin: "One hundred and fifty years before it is born."

It is an acknowledged fact that the most skilful workman uses the finest instruments. Whether this can be applied to the operative treatment of roots, I doubt very much. Every unnecessary injury to the tissues is in itself an aggravation, and may lead to exacerbated pathologic conditions. Though the former doctrine of the periosteum being necessary for bone formation has been exploded, as we have been told, the periosteum still remains a medium for vascular supply. It is, therefore, very essential that the operator be well prepared with the proper instruments and have the fitting touch.

I am in almost full accord with the essayist's remarks regarding the technique of skinning the root. I also agree with him that it is unwise to disturb all teeth at the same sitting, thus crippling the entire denture. It is much like the tumor which the late Dr. Morton was asked to remove from a negro's neck. He said, "I could have taken it out at one time, but there would have been no negro left."

Vaccines seem to be still too much in the experimental stage to be accepted as a sure means of cure. If ever they prove so, I sincerely hope our colleague will sell for less than our beloved German friend, Friedmann, sold his turtle product.

I need not dwell on the splintering of loose teeth; it seems too natural. Any serviceable, even if crippled, organ should be retained. A club-foot is better than a wooden leg, a loose tooth is better than none.

Dr. Hartzell says in his paper, "Teeth often are very loose although they have ample bone to hold them. After the operation of root-skinning is successfully accomplished, this type of tooth regains its rigidity in a marked degree in from twenty-four to forty-eight hours." I have seen quite a number of such teeth regain their rigidity even without root-skinning. This class of pyorrhea is more frequently associated with constitutional causes than any other. This, however, might lead us to an endless discussion. Though the essayist did not dwell on this subject with great emphasis, he has in his previous writings expressed himself very clearly. In one of his papers he says: "I restrict the constitutional causes (1) to excessive use of mercury in syphilis, (2) to lead poisoning, (3) to a large and persistent increase of urea in the daily production of urine." I somewhat disagree with this statement of my learned friend. In the first two instances we have specific pyorrhea; the third phenomenon enumerated makes its appearance frequently in connection with rheumatism, gout, etc. I believe that any faulty metabolism, any disease that lowers the tonicity of the system, will in time act on the delicately constructed peridental membrane, and thus predispose to pyorrhea. Long ago I accepted and I still adhere to the view of Miller and others that three factors are always to be considered (1) predisposition, (2) local irritation, (3) bacteria. As a predisposing cause we must consider any disease that reduces the resistance of the tissues involved in pyorrhea, some acting with greater virulence than others.

Miller mentions one in which, three weeks after the teeth had begun to loosen, all upper incisors were hopelessly lost. He mentions no special cause, but the disease certainly was not of local origin.

A patient of mine presented himself some four weeks ago with all of his anterior teeth alarmingly loose, with plenty of bone surrounding them. "What is your internal trouble?" was my first question. "Eight per cent. of sugar." "Eliminate the sugar, and in two weeks we will start the local treatment." At the appointed time, though the local condition was not perfect, I found the teeth normally tight. "How much sugar?" I inquired. "Not any;—but do you know what tightened my teeth? Alcohol did it; my sister's dentist recommended it." Sweet innocence! I felt a tendency toward anger, but instead thought of Carlyle, to whom someone brought the news that Margaret Fuller had agreed to accept the Universe. Carlyle's only comment was, " 'Gad, she'd better."

Such papers as we have listened to induce us to regard pyorrhea as a curable disease. And, though there are instances where all scaling may prove futile, almost all cases can be bettered if treated in such a scientifically skilful manner as Dr. Hartzell recommended to us today.

Dr. W. S. LEWIS, Brooklyn. It is a cause of great satisfaction to me that I have been permitted to meet Dr. Hartzell, to hear him read his paper, and to take part in this discussion. I have read other writings of Dr. Hartzell's on this subject, but, in the paper under discussion he has given us in riper form the best of all his other writings—has given us what may be styled an "up-to-the-minute" paper on this subject. This paper could not have been written a decade ago, and it bears witness to the great advance that has been made in dental science, and especially in the treatment of pyorrhea alveolaris, during the last few years.

Most papers dealing with this subject have been to me more or less unsatisfactory in that they were written, in a greater or lesser degree, in general terms, and discussed different hypotheses at length, but have not, like our essayist's paper, suggested a definite and crystallized mode of treatment, nor explained, like the essayist, step by step a perfected and finished technique.

In our profession there is today a vast difference of opinion on the subject of the treatment of pyorrhea. There are still those—and their number is not small—who hold that very little, if anything, can be done to ameliorate this condition. There are others who hold the belief that a cure can be effected. There are those who operate with one or two pet instruments, and claim that, with these, all the scaling possible can be done. There are others who insist that the scaling shall be done with a pushing motion, and that the root surface should afterward be smoothed with files, if necessary. There are those who treat almost entirely with vaccines, and others who pin their faith on some particular dentifrice, mouth-wash, or other form of medication.

I can discuss this paper not from the standpoint of the specialist in pyorrhea alveolaris, but from the angle of view of a general practitioner of dentistry who has taken a deep interest in the subject, and who for years was groping in the dark and trying to find the light. As such, Dr. Hartzell's paper specially appeals to me, as he suggests a definite mode of treatment which, if mastered and followed faithfully, will enable us to give great aid and comfort to patients suffering from pyorrhea.

I am heartily in accord with most of the essayist's statements. I became a convert to the idea of planing the root-surface, as advocated by Drs. Hartzell, James, Buckley, Carr, Tracy, and others, several years ago, and although I know many skilful operators who use other methods and produce beautiful results, I found that for my purpose the system of planes was what I had been looking for, and that with them I could attain to results that had been before out of my reach.

I am much impressed with our essayist's method of treating the crowns of the teeth first; this has not been my usual technique, but Dr. Hartzell's logic seems good. It is undoubtedly true that roughened enamel margins and etched enamel surfaces, with their adhering bacterial growths, keep the gingivæ in a state of inflammation, unless they are absolutely smoothed and polished.

In speaking of the structure of the cementum, our essayist contends that the outer roughened layer to which the ligament of suspension is attached must be planed away. This is a most important feature, and can, I believe, be accomplished with more certainty by the use of planes than by any form of scalers or files. Once the pericemental fibers are separated from their cemental attachment by acute inflammation, they become necrotic and must be removed absolutely. We must not hope that upon the removal of deposits the pericementum will re-attach itself to the cemental surface, for the teaching of Black and others has shown that this cannot take place. Our aim, therefore, should be to remove all pathologic tissue, and if this be done the space will be filled in with new osseous and connective tissue. In all cases where there has not been too much loss of tissue before operating, the tooth thus treated will be held firmly in position once more.

Hypersensitiveness of teeth after operating is one annoying feature which appears after some months. I believe that over-instrumentation is the chief cause of this condition. Silver nitrate is very efficacious in the treatment of this condition, but it is open to the serious objection that it stains the root surface. I have found that from 50 to 100 per cent. zinc chlorid, also 50 per cent. formalin, will control a large percentage of the hypersensitiveness met with. These medicaments should be applied and vigorously burnished into the root surface, the warm-air blast being applied at the same time and the burnishers warmed somewhat.

I have not met with any great degree of success in attempting to seal the pocket after operating, but it has been my habit to fill all deep pockets with bismuth paste. I realize, however, the desirability of the procedure suggested, and, as our essayist tells us that it can be done successfully, I will try again.

In the after-treatment of the soft tissues I do not believe in any long-continued medication, having found that only for a time will such treatment restore the tonicity of the tissues; that if it be continued they fail to react to it, and in fact lose tone. Proper massage of the gums with suitable brushes—the patient to be impressed with the necessity of brushing the gums rather than the teeth—will do more to sustain the tone of the tissues than gallons of medicaments.

The problem of establishing immunity to bacterial growth is the greatest of all the problems which confront the dental profession today. Pickerill's careful investigations have brought to light many interesting facts, and his deductions deserve the most careful consideration. The hypotheses which he presents and the methods of treatment which he advocates have not been before the profession for a long enough time, nor have they been given enough publicity as yet for us to pass judgment on them, but to me his investigations are especially interesting in that they seem to link together immunity to bacterial growth in the mouth, immunity to caries, and immunity to the deposition of calculus. If Pickerill is correct, we shall by further research be able to control all these factors to a greater or lesser degree.

In closing I wish to impress on you that the essayist has given us a crystallized, practical method of treatment, which he has carefully explained step by step, and which he will elucidate still further by his clinic. From what I hear, Dr. Hartzell is successful in his work—he obtains results, and his description of his technique should be an incentive to us to go and do likewise.

Dr. F. W. Low, Buffalo. After a very pleasant visit to Dr. Black in Chicago last winter, I have come to believe that for the majority of patients we might add to the treatment, and put them on half rations. Dr. Black demonstrated to my satisfaction that in his own case, in regard to the particular diet which he used for a number of weeks, it did not make so much difference what he ate, as the amount. He proved that the deposits and re-deposits were always excessive unless his regular diet was reduced in quantity to about one-half.

Dr. H. T. Stewart, New Orleans, La. I would not have spoken tonight at all except for the fact that this admirable paper is upon a subject in which I have been particularly interested for the whole of my professional life—the last twelve years having been practically devoted to it. I wish to thank Dr. Hartzell for his paper, and to say that I wish we had in the profession in the United States one hundred men who would give their time to this work and do it as earnestly as he has done it.

A serious drawback, perhaps, in the advancement of this particular work is the disposition to criticize little details, instead of dwelling on the good work a man has done. While there are one or two items in the paper to which I would like to refer, I do not disagree with him, but simply differ with him.

As to the set of instruments which he has designed for this special work, especially for planing the root surfaces, I believe I have the honor of having presented this idea to the profession before anyone else. Fourteen years ago, in New York City, I read a paper before the Odontological Society in which I advocated the removal of the external layer of the cementum in the treatment of Riggs' disease, in a paper entitled, as I remember it, "Partial Removal and Decalcification of the External Layer of the Cementum."

Dr. Hartzell mentioned one point on which I would like to lay special stress, and that was as to curetting the margins of the bone. This curetment is often overdone. I simply wish to call attention to that point.

As to the closing of the pocket, you know that whatever be the method we employ, if we have success—whether our success is on account of the method or in spite of it—we are inclined to think, That is *the* method! Years ago I endeavored to close pockets after operating. My father, who was also a dentist, used for that purpose an almost saturated solution of tannic acid in glycerin, and later on a syrupy solution of tannin in tincture of iodin. I have tried a good many preparations, among them one advocated by Dr. Kirk, and I got results just as I got results in the treatment fourteen years ago by purely local measures. At that time I contended that the disease was a purely local one. I also said that all removable appliances of every description should be wholly condemned. On both of these questions I have changed my mind entirely. I find that I get better results in the end by not closing the pockets and leaving nature to herself.

As to the question of acids: Years ago in my own malarial district I noticed that people who were in the habit of taking, especially in the spring and summer, large quantities of lemon-juice in water, and those who lived largely on fruit, had a better condition of the mouth than others who did not. This was contrary to my teachings and ideas, but facts are stubborn things, and several years ago I began to prescribe, in certain conditions, lemon-juice in water as a mouth-wash, and I have never had occasion to regret it.

As to the instruments used by the essayist, Dr. Hartzell has certainly devised a beautiful and doubtless very useful set of instruments, but for my own part, my individual skill was developed along certain lines before those instruments were devised, and I believe I can produce better results with my own comparatively few instruments. I employ probably only eight or nine to do at least seventy-five per cent. of my operating, although I have many instruments for particular operations and for certain locations. Dr. Hartzell probably could not do so well with mine, and I could not do so well with his.

I have a word to say as to splints. This was brought to my mind by one of the pictures shown. I believe that a splint should nearly always be removable, and in the clinic I will give tomorrow I intend to show both fixed and removable splints, and why each individual tooth should at some time have individual motion, and therefore that our bridge work should be constructed with that idea in view, and so that when the piece is removed for brushing the teeth, each tooth can have individual motion. Of course the bridge acts as a splint while in place, but, in removing it, brushing gives to each tooth a slight exercise and movement in all directions in its socket.

Dr. M. L. Rhein, New York. I would like very much to emphasize the point in Dr. Hartzell's paper with regard to the need of a pathological sense in dentistry. The great difficulty in discussing such subjects before a dental meeting is the impossibility of having the major portion of your audience appreciate the pathological conditions you are trying to elucidate.

We have listened to a magnificent,

detailed, up-to-date technique in the treatment of pyorrhea, but I do not care to go into this phase of the paper because I am in most hearty accord with the essayist. I would like, however, to refer to a point in Dr. Stewart's discussion of the paper. Dr. Stewart said that he formerly advocated fixed splints, but that now he was entirely opposed to any form of splint except a removable one.

Dr. Stewart. My statement was not so positive as that. I did not mean that under no circumstances should we use fixed splints, but I meant that on general principles we should not.

Dr. Rhein. If that is the case I agree very heartily with Dr. Stewart, because I believe there are cases where there is an insufficient amount of alveolus left to make a removable fixture practicable, and in many of those cases the usefulness and health of these teeth cannot be restored unless absolute fixaation be resorted to. Recognizing the fact that such cases do exist, then I most heartily agree with the view presented both by the essayist and by Dr. Stewart, that not only is the fixed bridge to be avoided as a rule, but that fixed bridges are one of the most frequent sources of trouble with which we have to contend in pyorrhetic conditions.

When we analyze this subject thoroughly we cannot fail to be impressed by the fact that there are two factors lacking in the present-day dental curriculum, making this subject such a difficult one for the dental practitioner. The most important is the lack of instruction in diagnosis in the dental school—in every dental school, more or less; and it is impossible to correct this unless the entire curriculum is changed, because it is impossible to teach diagnosis when the teaching of pathology is confined to a portion of the body. Until the time arrives when the dental student is as familiar with every part of the body as he is with the parts in which he is being instructed, it will be impossible to convey to him the diagnostic sense which is so essential in order to handle this subject intelligently. Treatment cannot be properly pursued until an accurate diagnosis is made, consequently the lack of a diagnostic sense is so closely related to the lack of a pathological sense that they cannot be separated, and that is the one reason, from my point of view, why the subject remains the complex one to the average dental practitioner that it does today.

Dr. L. M. Waugh, Buffalo. I shall not attempt to discuss the paper, but wish to refer to one or two items mentioned by the two previous speakers—that is, that we are not teaching pathology. The Institute of Dental Pedagogics realizes that the branch in the dental curriculum which needs the most attention at the present time is not that of technique, but that which has to do with function and health; so that this subject of pathology is one to which dental teachers are more awake and to which they are devoting more energy than almost any other subject. They feel that the technical branches are pretty well developed, and I believe that pathology is now coming into its own, and that our students will be given a better grounding in pathology than heretofore.

Dr. R. Ottolengui, New York. I would like to ask Dr. Stewart one question. He spoke about splints, and the desirability as a general principle that they should be removable. I think I am not far from the truth when I say that some of the most difficult cases we have to deal with are those in which the lower incisors are involved, and I have been wondering, since Dr. Stewart spoke, how a removable splint could be applied to that particular part of the mouth. If the principle is right it seems to me that it should be applicable there, and while I have never heard of it, such splints may have been made in such cases. I would like to ask Dr. Stewart if he would make a removable splint for the four anterior teeth.

Dr. Stewart. Dr. Ottolengui seems to have assumed that I *must* splint these lower incisors. In the first place I wish to say that I think ninety-nine out of one hundred men who treat Riggs' disease attempt to save too many teeth, and that is especially true with regard to the lower incisors. When we first start out we are inclined to try to save every tooth that has any sort of attachment. We are greatly tempted to do so, especially as we know that is what the patient wants, and it is particularly embarrassing to the specialist to say that he must extract this or that tooth. The patient immediately says, "Dr. So-and-so could extract the tooth; I came to you to have it saved." That is what we meet with constantly, but the more I treat this trouble the more I come to extract teeth—those which are worse than useless, and especially lower incisors. Suppose we heal the tissue around the teeth and get what appears to be a healthy condition, and still have one tooth there which is acting as a foreign substance fastened in with a fixed splint—what does it do? It will set up inflammation which spreads to the adjoining teeth and sooner or later will give trouble.

I do not believe that splints should be put in in the majority of the cases where they are now used. I have been in the habit, where a splint is necessary, of putting tubes in inlays, when found possible to do so, in the incisors. It is a tedious piece of work, and difficult from an artistic and hygienic point of view, but usually this can be done so that the splint will be removable. I do not mean that we should *never* put in a fixed appliance; sometimes it may be necessary and advisable, but there are very few cases where the removable appliance cannot be made. Where you have two teeth standing together and you think they should be braced, you can insert two inlays—put an inlay in an inlay with tube and split pin—and still make a removable piece which the patient can cleanse, which will give the teeth individual motion, and will permit of the use of silk between them.

After all, it is a matter of common sense and good judgment in each individual case that is required to make a man successful in treating this disease, and he who adheres blindly to any method or appliance must certainly fail of the best results.

Dr. Hartzell (closing the discussion). You have indeed dealt very kindly with me, and I really should not take any more of your time, but I cannot allow Dr. Stewart's remarks to go without some little comment.

Regarding the use of acids, you will recall that I tried to make the point that immediately following the scaling of the root surfaces acids increase sensitiveness, but aside from that I am in accord with his ideas. I recommend orange-juice and water before breakfast, and of dietetic measures I think that is one of the best that we can employ.

Regarding instruments, I would say, By all means use the one with which you can produce the best results. I insist on no special set of instruments; I only attempted to crystallize a method. Why? Because so many men operate without any particular method, and if you can give them one with which they can intelligently carry out the ideas they have grasped, then they are that much ahead. In teaching we must have some method or system, and the more simple the system is the more readily you can impart your ideas. So far as being wedded to any style of instrument, I would say, Use that with which you can best accomplish the object that you are endeavoring to bring about. I would only offer this suggestion in comparing the multiple with the single-bladed instruments: If you are going to use the multiple-bladed instruments they should be dull, because you cannot realize what you are doing with the multiple blade, and you can with the sharp single-bladed instrument. You can readily train yourself to discriminate between a variety of substances with the single blade, and I do not think this is true with the multiple-bladed instrument.

One other point I would like to comment upon. Dr. Hofheinz seems to have received the idea that I did not think there has been a great deal of pathological research done by the dental profession. What I had in mind in this regard was that the courses in dental colleges in this country are trivial, and I am prepared to back up that statement. Talk of "dental pathology"—there is no such thing as dental pathology; there is just pathology, and the man who does not recognize that, in its truest sense, is not fit to be in dentistry, because dentistry today is on the threshold of a great era which can be utilized for its uplifting, and, unless benefited by teaching, the dentist cannot but stay in the ranks of the artizan. There are individuals practicing dentistry who have given great thought to pathology, but as a profession, are we laying the proper pathological foundation in the colleges? I believe all present will agree that we are not. I hope, however, that this great state of New York—which, as we have been told today, is the leader in dental thought and knowledge—will work out in the field of pathology that which the case really demands, teaching pathology of the whole body, not of the jaws and teeth—because the man whose training has not included general pathology, in attempting to diagnose cases is almost as much at sea as though he has had no pathology. That, I think should be nailed down good and hard, and these centers of dental thought, which so much influence the rest of creation, should be willing to expend their energy in the direction in which it will do the most good.

A MEMBER. Dr. Hofheinz asked a question with regard to bifluorid of ammonium.

Dr. HARTZELL. If you do not care to use surgery on the roots, and wish to decalcify materials on the root surfaces, I think bifluorid of ammonium will do it if you keep it there long enough.

The Secretary then read the minutes of the previous sessions, which were approved as read.

Motion was then made and carried to adjourn until the Friday morning session.

SECOND DAY—*Afternoon Session.*

The meeting was called to order Friday afternoon, at 2.30 o'clock, by the president, Dr. Baylis.

The first order of business for the afternoon session was the report of the Committee on Practice, by the chairman, Dr. W. D. TRACY, New York, as follows:

Report of the Committee on Practice.

During the past year very little has been written on the side of scientific investigation. It is therefore extremely difficult, and along some lines impossible, to get together enough subject matter to bring to the attention of this honorable body. It seems to the writer that in many instances such a repetition is a waste of valuable time which could be better devoted to other things.

The Committee on Scientific Research gives to us all that is new, and this in itself would seem sufficient for our needs.

PYORRHEA ALVEOLARIS.

Much has been written in regard to the etiology and treatment of this disease. Latterly a great deal has been accomplished in the amelioration of its destructive influences. Most of us are prepared to admit that it is a local manifestation of a constitutional disorder. From clinical experience it would seem that, in order to accomplish permanent relief for any considerable interval of time, each case should come under treatment in the incipient stage, as the loss of the gum tissue in the interproximal spaces and the surrounding bony support of the teeth are serious conditions to combat. As this is quite impossible to regulate, the disease is seen in all its destructive stages. Attention has therefore been called to the constitutional treatment as well as the local. In the gratification excited by the beneficial results obtained by the local treatment, it is possible for us to forget the constitutional. The features of treatment are—

(1) Constitutional: The correction of the eliminative processes of the body.

(2) Local: *a*, Raising the resistance of the parts involved against bacteriological invasion. This includes strict

hygiene and prophylactic measures, followed by the vaccine treatment. *b*, Removal of all deposits from the surfaces of the teeth. *c*, Correction of irregularities. *d*, Systematic prophylaxis. *e*, Stimulation of the cells by the Dunlop treatment. *f*, The use of splints.

The scaling process gives relief in proportion to the thoroughness of the technique, and is a very great contributing factor in the curing of the conditions.

The vaccine treatment is valuable in raising the resistance of the tissues against the susceptibility of the action of bacteria. It probably hastens a reaction of the parts more quickly. This condition could be brought about through proper diet, mouth hygiene, exercise, and plenty of fresh air.

The Dunlop treatment consists of forcing ethyl borate by means of oxygen gas into the tissues. It has a decidedly stimulating effect upon the mucous membrane and the contiguous parts.

Splinting has not received the attention which it should have done. It appears to be a valuable adjunct where the teeth have lost much of their bony attachment.

ANATOMIC OCCLUSION.

The face-bow is the keynote to anatomic occlusion. It enables the operator to transfer the wax bite plates to the articulator, so that when the plaster models are in place their planes bear the same relation to the articulator's joints that the alveolar planes bear to the temporo-mandibular articulation. This is the great scientific principle involved.

SYNTHETIC CEMENT.

Great progress has been made in the manufacture of this cement. One interesting point in the synthetic cement is that while the initial setting needs an acid reaction, yet this condition may be brought about by a very much smaller percentage of acid than is used in other mineral cements.

Further, that the reaction through simple hydration can, in a measure, take the place of an acid reaction. The reaction brought about by hydration does not permit of an excess of free acid after the cement has hardened. This renders the cement much less irritating to the pulp, and would therefore lessen the dangers of exciting the cells of the pulp tissue to activity.

PREVENTIVE TREATMENT.

Perhaps the most practical if not the most scientific treatment of the oral cavity is the hygienic treatment, as a barrier against disease. A discussion of any scientific subject in dentistry today deals with cleanliness as a basal principle of success. The outcome of the propaganda of oral hygiene is beyond computation. Its value as a preventive zone against bacteria invasion will be one of the greatest in dental disease.

CHEMICAL EROSION.

The attention of the investigators should be directed toward the treatment of this dental disorder. Its destructive influences are much harder to cope with than are those of dental caries.

THE SALIVA.

The writer has been unable to get any information in regard to the deduction which will be made from the recent investigation of saliva. What little has appeared during the past year is known to all and cannot well be elaborated upon here. The Committee on Scientific Research will no doubt give us something exceedingly interesting upon saliva at this meeting. It is hoped also that the tonsil will some day be thoroughly studied as a possible contributing cause of dental disease.

ORAL SEPSIS.

The literature relating to the field of oral sepsis, during the past year, has been abundant. Its being, its causes, its effects, its reduction and eradication, have all been comprehendingly and instructively written upon; in fact, the worth and brilliancy of some of the papers on this subject have placed them on the plane of the classics.

Not a little of the activity and excellence of the year's literary output has been inspired by the sting and pique of merited criticism passed over from members of the medical profession regarding the neglect, or carelessness, or incompetence apparent in many mouths which have been under the care of dental practitioners.

In answering these accusations the dental writers have taken an admirable stand, condemning visible malpractice and commending and pointing the way to honest, intelligent dentistry. That modern dentistry, of a certain sort, is responsible for many septicemic conditions, is not to be denied.

Even though badly neglected, the virgin mouth—that is, one which has not been raped by ill-fitting crowns and bridges whose septic roots rest in infected and necrotic surroundings—is not so dangerous a possession to its owner as the one acquired through malpractice.

The improper treatment of root-canals and its sequelæ of necrosis and suppuration, locking-in or walling-up lacunæ or cesspools of pus and infection in the alveolar process—later to be carried and distributed through the entire human body, to reinforce other pus foci in remote regions and bring about disturbing and perhaps fatal pathological changes—is to be strongly condemned.

Regarding more frequent and scenic manifestations of oral sepsis, there may be mentioned our old and constant companion, Riggs' disease—*aliases*, pyorrhea alveolaris, infectious alveolitis, and latest but not least, chronic alveolar osteomyelitis. Its etiology and cure are still the battle-ground of the "constitutionals" and "locals." When the author has the M.D. before the D.D.S., is erudite and of long experience in pathology, we shall find a great leaning toward the systemic causes and treatment; while the nimble-fingered, thoroughgoing dentist, through his complete, delicate, and patient instrumentation, finds a great percentage of his cases cured by wholly local means.

The year has abounded in excellent papers on the causes of this lesion, and treatment has covered all methods from vaccine therapy, intestinal cleansing, feeding, and Fletcherizing, to scalers, pumice, orange-wood sticks, and referring your patient to the other fellow.

The practitioners of vaccine therapy for the cure of pyorrhea are divided between the employment of autogenous and stock vaccines. As bacteriological examination of pus pockets will show many kinds of micro-organisms, while stock vaccines are pure, individual cultures, it would be necessary to have recourse to a multiple stock vaccine in order to neutralize and minimize the multiple germs found in the pockets. The autogenous vaccines are manifestly more efficient, for even identical germs obtained from other sources fail to give the beneficial results which those taken from the case in hand do. The care, competence, and experience necessary to prepare the autogenous virus does not obtain in many offices, and anything less than a perfect preparation is dangerous to use. Therefore, etc.

The recent treatment of pyorrheal cases by the injection of a vapor or gas under and into the free margin of the gum, and which passes into the weakened and diseased arterioles, revivifying the glandular and circulatory apparatus of the part, seems to offer one more efficient method of attacking these cases of oral sepsis.

The pendulum has swung so far to the left during the year, that septic conditions of the oral cavity have been accused, either as principal or accessory, of disturbing or unbalancing nearly every organ or function in the body, infecting everything on the way from alopecia to ingrowing nails. Oral septic conditions are held responsible for infections of the gall-bladder, for pathological changes in the heart and kidneys, and for disturbances in the functioning of the ductless glands.

To the swallowing of pathological organisms are attributed several cases of gastro-enteritis, and the daily migration through the intestinal tract of staphylococci, streptococci, pneumococci, *et al.*, from the oral cavity, causes the quiet little appendix to sit up, add -itis to its name, and send a C. Q. D. call for the surgeon.

The most insistent appeal running through the literature of oral sepsis, for the year, is for a broader and better pathological knowledge and sense, and its application to the case in hand. The call is for ability on the part of the general practitioner to correctly diagnose cases of suppuration, maxillary cysts, alveolar abscesses, perforated and infected antra, necrosis, osteomyelitis, epithelioma, and faucial lesions, and syphilitic and other secondary manifestations in their initial appearance in the mouth, referring cases beyond his jurisdiction to proper sources of relief, and seeing well to it that the oral work he undertakes and performs is thoroughly done.

OPERATIVE DENTISTRY.

The general trend of development in operative dentistry, as in other departments of the profession during the past year, seems to have been toward a bigger, broader, and more comprehensive view of the great possibilities of the work.

There are signs of an awakening on the part of the profession to a realization of the great importance of the restoration of occlusion. The study of the nutritional processes, and the relation that proper mastication and insalivation bear to their normal activity, has forced home the fact that prosthetic pieces and restorative operations on teeth *in situ* are practical failures unless proper occlusion is established.

It is not sufficient that the teeth should come together firmly. They must come together in a manner that will permit the normal mandibular movement that is necessary for the proper trituration of the food. In mutilated cases where elongation of certain teeth seems to have locked the bite and limited the freedom of mandibular movement, such teeth must receive radical treatment looking toward a proper adjustment, or else the bite must be opened and all occluding surfaces be built up.

The serious consideration of the problem of restoring occlusion is in no sense a new idea, but the fact that more is being said and written upon the subject today than ever before seems worthy of mention. And the fact that more men in the rank and file of dentistry today realize the importance of this feature of their work certainly gives promise of a higher standard in restorative operations on the natural teeth, as well as a higher standard of masticating efficiency in all prosthetic work.

Probably the most important factor in the recent development and improvement in the standard of restorative operations has been the perfection of a scientific system of casting gold with accuracy and precision, as brought before the profession in 1907 by Wm. H. Taggart. Considering the perfected process of gold-casting in the abstract, it is safe to say that no one thing in modern dentistry has done so much to stimulate dentists in their work, or to elevate the accepted standard of operative procedure, as has the gold-casting process. With the facilities now available to every dentist, the day of the ill-fitting, malshaped, nondescript plug of gold must soon pass. It must give way to the perfect-fitting, well-contoured gold inlay, in which the cusps and planes, the grooves and sulci, are present, and the natural anatomical lines of the tooth surfaces are reproduced.

If the masticating efficiency of a broken-down molar or bicuspid is to be restored to normal, the metallic or porcelain restoration must reproduce in detail the characteristic outlines of the occlusal surface of the tooth. While a good general contour and a firm contact point can be obtained with either an amalgam or a good gold foil filling, or even a porcelain filling, it is impossible, with any of the three mentioned, to obtain a perfect reproduction of the occlusal surface. This can, however, be obtained by using a cast gold filling or restoration, because it is entirely possible to carve the wax model to a nicety, showing all the anatomical lines. It is concluded, therefore, that a perfect-fitting, well contoured and properly carved cast gold inlay is the most perfect filling for compound cavities in bicuspids and molars that we have at our disposal.

Essays dealing with all sides of the subject of occlusion in its relation to cast gold fillings have been written by Dr. H. W. Gillett and Dr. J. Lowe Young, of New York.

ROOT-FILLINGS.

Numerous special pastes and patented preparations, the acclaimed virtues of which seem to place a premium upon slipshod root-surgery and canal-filling, are offered to the profession. Fortunately, however, our dental literature is replete with articles dealing with the problem of the scientific treatment and filling of canals, and it is believed that only those who knowingly desire to follow the so-called quick and easy methods will resort to mummifying pastes and other similar methods of uncertain virtue.

It is well recognized that a tooth in which the pulp has become devitalized is valuable to the patient only in proportion as the root-canal or root-canals have been carefully and skilfully treated and filled. In fact, the thorough treatment and filling of all roots and devitalized teeth is the real foundation upon which the superstructure of filling or crown or bridge is to rest, and it is gratifying to know that our better dental educational institutions are now giving more and better scientific instruction along these lines.

The recognition on the part of dentists and physicians of the serious results that may accrue to the health, or even the life, of a patient through foci of infection in the mouth has also had a stimulating effect on the better class of dentists throughout the country.

It is possible that a fuller understanding of bacteriology and a wider knowledge of the source of infections in the oral cavity will result in the more common use of restorative and prosthetic methods in which the elements of danger to the patient are reduced to the minimum.

It is, perhaps, needless to prophesy that unless dentists themselves realize the danger that lurks in a chronic abscess, or under a badly designed bridge, or about an ill-fitting crown, the time is not far distant when they will have their attention called to it by their brothers of the medical fraternity. The latter may, on just grounds, order the removal of dental work that appears to be having an unwholesome effect on the patient; and it were better, therefore, that dentists take advantage of the present-day knowledge on this subject and safeguard themselves and their patients from embarrassment.

W. D. Tracy, *Chairman,*
D. H. Squire,
F. F. Hawkins,
Committee.

Discussion.

Dr. A. R. Starr, New York. Your essayist states that perfect occlusion cannot be obtained with gold or amalgam fillings or even with porcelain inlays. I cannot agree with him on that point. I will admit it would be difficult to get perfect occlusion with an amalgam filling in complex cavities, especially when a matrix cannot be left in place until crystallization is complete, but I see no reason why perfect occlusion cannot be obtained with a gold filling, and even with a porcelain inlay, if the inlay be tried in the cavity before the final baking. While I realize the advantages of gold inlays in difficult cases, I am not one of those who believe that gold inlays are destined to supersede gold or amalgam fillings in all cases. I have not thrown away my gold pluggers; I keep them within easy reach, and they are not getting rusty.

I may be *passé* or ultra-conservative, but I cannot bring myself to believe that a gold inlay is better in ordinary cavities than a good gold filling. With the inlay, the cement layer is an element of weakness as well as an element of safety. It is weak in that no matter how infinitesimal the amount at the margin, it is liable to wash out in time, and leave an opening for the entrance of food, saliva, and micro-organisms; and it is only an element of safety in that it affords protection to the pulp. I am confident that I can make a gold filling in ordinary cavities in much less time or in about the same time that it would take to make a wax model and to fit and set a gold inlay, using the direct method, which I consider to be the better one.

The essayist very properly emphasizes the importance of the skilful treatment and filling of root-canals, and advises against the use of mummifying pastes or similar materials in place of the more permanent canal fillings. I prefer to use gutta-percha in all canals large enough to permit of its proper introduction, or a combination of cement and gutta-percha in smaller canals. I consider that the pastes are of use only for temporary work, or as a last resort in cases where a canal seems impenetrable. Many failures in root-canal work are due to imperfect knowledge of dental anatomy. How often do we open into an upper bicuspid or a lower incisor or canine and find only one canal filled in cases where there are two! How often do we find the facial canals of upper or the mesial canals of lower molars entirely empty or only partially filled in cases which have been under treatment.

Many of us who imagine we are quite uniformly successful in filling root-canals would receive quite a shock if we would make a radiograph of every such operation. The X ray should be used more frequently in that connection. In regard to the treatment of abscess caused by devitalized teeth, I believe we are more prone to over-treat such cases than not to treat them sufficiently. It is my custom to fill the canals in cases of fistulous alveolar abscess just as soon as those canals can be kept clean and free from moisture long enough to permit the introduction of a pellet of gutta-percha in the apex. In cases of non-fistulous abscess I frequently follow the same method, and if necessary convert the case into a fistulous one, by perforation of the alveolus. With this method many cases which have been under treatment for months will heal in a few days. In regard to pyorrhea alveolaris, that subject was so thoroughly discussed at last night's session that I shall have very little to say about it in this discussion. If pyorrhea be due to malocclusion, I would suggest correcting that malocclusion as nearly as possible, or, better still, anticipate the trouble and put the teeth as nearly as possible in proper occlusion before pyorrhea develops. The less we move the teeth after the disease is well advanced, the better. If the teeth are much loosened and displaced I find I get better results in fixation if I try to hold them in the position in which I find them.

No doubt the vaccine treatment of pyorrhea has a future, but as yet most of us are so wofully ignorant in regard to the proper use of this therapeutic method that it is not likely to come into general use. I believe some cases may be benefited by this treatment, if the proper medium can be found, to combat the diminished opsonic properties of the blood serum and improve the phagocytic action of the polymorphonuclear leucocytes, but until we are more familiar with the subject of general bacteriology and with the etiology of pyorrhea, I fear we cannot make much progress in this direction.

I should imagine that one factor which would interfere with the correct application of this treatment would be that of securing a perfectly typical and uncontaminated sample of bacterial invaders from which to make our autogenous vaccine. Since we have so great an assortment of micro-organisms in the mouth, and since we do not know which of these bear an etiologic relation to pyorrhea, I should think it would be difficult to make a selection of any special culture or cultures, in case we did not use all.

In regard to silicate or synthetic cements, I believe that pulp irritation from their use is due not so much to their chemical activity as to the fact that, being less adhesive than the ordinary cements, they require more extensive cavity preparation.

Most of the other subjects appearing in this paper have been discussed or will be discussed in connection with other papers, so I will not refer to them.

Dr. B. S. Hert, Rochester. Occlusion, which is the first phase of dentistry considered in this report, is fully as important as the committee claims, and while many practitioners have always realized its value, a constantly increasing proportion of the members of our profession are, fortunately for their *clientèle* and themselves, appreciating the fact. Our education along this line has been influenced more by orthodontia than any other one factor, although a number of other causes have been active in this connection.

The prominent place gold inlays occupy in restoring lost or correcting improper occlusion is not overestimated; however, the method of carving the planes, grooves, sulci, and cusps is in many cases not the best method of restoring the occlusal surface, as we must usually be guided by the surface of the opposing tooth, which in probably the majority of cases does not present an aspect of that character; and in such instances to make a gold inlay as described in the report—namely, having cusps, sulci, and grooves and planes carved on its surface—would defeat one of the principal objects which it was designed to attain.

Oral sepsis, its harmful effects both local and systemic, and the frequency of this condition as the result of dental operations or the lack of operative procedures by the dentist when indicated, was brought to our attention with almost dynamic suddenness and force by a member of the medical profession a number of months ago. This gentleman rendered a service both to the public and dentistry, and let us hope that more such shocks will be given to our calling, until each member of our profession realizes the important place he and his work should occupy in the healing art. It is unquestionably true that many of even our intelligent practitioners of dentistry fail to appreciate the great influence which we all should, and some now do, exert on the general physical and mental welfare of our patients.

Oral hygiene has by some dentists been called a fad; they say that it has passed over the ridge and that its importance is waning. But the committee evidently do not believe such to be the case, and anyone who has faithfully carried out the idea in his practice, who has educated his patients to do their part and to realize its value, not only locally but systemically, cannot fail to become more and more convinced of its great worth. That it is a cure-all or a preventive for all oral ills is not true, but it is a great aid in both these directions.

While the committee did not mention the administration of oxygen and nitrous oxid for the practice of humanitarian dentistry, it is a branch of our occupation which is of so much merit that it is entitled to have attention drawn to it. By its use, with very few exceptions, cavities can be prepared, teeth with live pulps ground down for crowns, and other dental operations performed without pain and without the slightest danger to the patient. It is one of the most important advances made in dentistry in recent years. With any of the various kinds of apparatus made for the purpose its administration is so simple that a beginner in its use can obtain excellent results, and one with experience will seldom fail in obtaining the desired freedom from pain. When the effect is carried only to the analgesic stage, which is sufficient in almost all cases to prevent pain, we have opinions of eminent medical men that there is absolutely no danger.

The report of the Committee on Practice has always been of a high standard, and the committee for this year has maintained the standard set by its predecessors and done its work admirably.

Dr. Henry W. Gillett, New York. I would like to say a word concerning the point which Dr. Starr raised in regard to occlusion. It seems to me that he has not entirely grasped the full significance of Dr. Tracy's statement when he speaks of the possibility of restoring the occlusion as perfectly with gold, amalgam, or porcelain as it is now possible to do with the cast gold inlay. No previous generation of dentists has ever had at its command the possibility of restoring the cusps and sulci of teeth to the degree that it is now possible with the cast inlay. Or if, for the sake of argument you consider it to have been possible, it has at least not been feasible within the physical capacity of the patient and operator. To me it seems evident that the restoration of cusps, inclined planes, and sulci is the essential part of the restoration of occlusal efficiency in bicuspids and molars, and I cannot conceive that it is feasible with foil fillings, amalgam, or porcelain, even with all our present knowledge, to anywhere near approach the results in anatomical restoration that we readily get in the adaptation of the wax, which can be so easily duplicated in cast gold.

I wish also to make a second point in connection with what Dr. Starr has said. He has drawn a comparison between the direct and the indirect processes. Limiting consideration to the simplest cases, I would be ready to admit the contention which he has advanced that the average operator may probably do better with the direct process, but it seems to me that one of the very important advantages provided for us by the cast metal process is the opportunity to make large restorations effectively. And while for some time I took the ground that the same care, skill, and attention to detail would produce similar results by either process—the indirect or the direct—for a year or two I have been drifting strongly toward the indirect method as the one capable of producing the best results, and more easily for both the patient and operator—and particularly is this true with regard to extensive restorations. Even if the operator has the skill to carve in the mouth restorations of whole occlusal surfaces, it seems highly undesirable that he should do so, because of the possible accidents which may befall his work before it reaches completion, with the consequent embarrassment of going back to the patients, confessing failure, and asking that they submit to further work in the matter of carving. These are the two points I particularly wished to emphasize.

Dr. Tracy (closing the discussion). I am sorry that more have not taken part in the discussion of the matter presented in the report. It is hard for me to believe that so many men agree implicitly with everything presented, and should they not agree with it, I should have been glad to hear from them.

I was interested to hear Dr. Starr express himself in the matter, and would not have him infer for a moment that I have cast aside my gold pluggers or that I have lost my appreciation of the good gold filling in selected places, but my conclusion is that the best possible restoration for compound cavities must be based on what we see and what we do ourselves. I know that I cannot, try as I will, with the foil filling get the results I feel I should get in these cases, and I know I can get the results with the casting process that these cases demand. I am speaking not of small cavities on buccal or approximal surfaces, but of large restorations, compound cavities, mesio-distal cavities where a large portion of the tooth structure is involved, and I know in filling these cavities with gold foil, while we have sealed the cavities and beautifully restored the contact points on the approximal surfaces, we have not restored the masticating efficiency of the teeth, because we have not reproduced the occlusal planes, sulci, and pits that nature put there for a purpose. If we can do that by any method, that method is better than we have been using in earlier years. It has been said that one of the marks of wisdom is a willingness to give up an excellent thing for a better thing. We know that the gold filling is an excellent thing, and many of those who have had a modest degree of success with it have had better success with the inlay. So it seems to me the part of wisdom for all operators to take up the method, and see if they cannot do better. I have profited very much in listening to the suggestions in the reports which followed mine, and hope that more men will take up the feature of reproducing the anatomical occlusion of the teeth either by the indirect or the direct method. As experience accumulates in the use of the indirect method, we find that we can get results with it that we cannot get by the direct process. I know of many instances where proper care has been exercised in the preparation of the cavity and the technique of making the inlay by the direct method has been carefully carried out, but these fillings did not fit the cavities as well as when made by the indirect method with the amalgam die.

I do not wish to further discuss the methods of making inlays, but I do want to express the belief that the gold inlay is the best possible means of restoring badly broken-down teeth today. Teeth can be restored by the cast gold method in such a way that it enables the operator to reproduce the anatomical outlines of the teeth and thus provide the greatest efficiency in mastication.

(To be continued.)

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EDITORIAL DEPARTMENT.

OLD WINE IN A NEW SKIN.

A RECENT writer deplores the fact that things are not as they used to be in the earlier days of dental development. He feels that organization in dental society work, as now operative, is tending to inhibit the activities of the individual worker and to exercise a disheartening influence upon those who would otherwise, and under less restrictive society regulations, be stimulated to add something to the sum total of our knowledge through the medium of society contributions or in debate thereon. The direction and control of society effort collectively and individually to any degree whatsoever is regarded as an infringement upon the inalienable right of free speech, and as tending only toward destruction of the society as such by reason of its deterrent effect upon the individual effort of its members. The case under critical consideration is the new *régime* resulting from reorganization of the National Dental Association and the inauguration of a new order of things in the governance of the activities of that important body.

It is always a difficult feat for the human mind to adjust itself to new conditions, just as it happens to be a common experience that a new hat or new pair of shoes become less obtrusive after they have been worn for a while and have adapted themselves to the wearer's individual peculiarities of physical conformation. So also when, as the result of long and more or less trying experience of a certain way of doing things in connection with our dental society work, and after careful and due consideration, a radical change of arrangements is brought about for the purpose of securing higher efficiency in that work, it is naturally to be expected that many among those habituated to the old order of procedure will find themselves for the time being somewhat uncomfortable under the altered conditions, until mutual adaptation has brought about more harmonious action and a better understanding of the practicality of the new arrangement.

It is yet too early to decide as to the probable success or failure of the reorganization plan of our National body; its efficiency has not been tried out, and the proper attitude of mind for all of us is that of the pragmatist—viz, to test it unemotionally by its results, not by what we may think it may do, nor by how it may appear in comparison with the older and discarded order of procedure.

If the Essay Committee will exercise its prerogative of excluding irrelevant and unworthy papers from the program, and the presiding officers will fearlessly exclude the garrulous and diffuse talkers who waste the time and try the patience of the audience and bring discredit and ridicule upon the association as a whole by talking about what they don't know, a long stride toward a higher plane of usefulness for our National body will have been achieved by the reorganization plan.

It is objected that the new plan means a more centralized control of society affairs, and a consequent impetus toward more objectionable political activity upon the part of those who are aspirants for political favors and emoluments. We can see no real difficulty in that connection. The only value that political office can have to the politically-minded aspirant for honors in the association is dependent upon the success and dignity of the organization itself; therefore the relation of the political worker as such to the non-political worker as such, in the association, is, to use a biological term, a symbiotic one. Consequently both must stand or fall together. It is or should be of small consequence to the non-political scientific worker—and there are a few —*who* the officers of a society may be, so long as he is able to present his communications to an intelligently critical and appreciative audience; and, *per contra*, it is more than likely that it matters but little to the political worker who reads the scientific papers or carries on the debates, so long as he can console himself with the evanescent glory of holding offices. Hence it is that both are mutually dependent and their respective activities balance each other in the machinery of society organization and work.

The conditions in dentistry today are not those of a generation or even of a decade ago. Never before has there been such an awakening along the lines of scientific interest in connection with all departments of dental work as is shown at the present time. The scientific method is gradually but surely being applied in every department, and the man who is content with empirical methods or who advertises his contempt for anything bearing the scientific label is being relegated to the scrap-heap in the great industry of present-day dental science and art.

It is inevitable as a result of this great awakening and the demand for more knowledge of actual conditions upon which to found a rational system of dental practice, that the older order of conducting our society work should give way to methods more in conformity with the needs of the times, for which reason we hail with much pleasure and satisfaction the materialized expression of this need for a new way of getting larger and better results by the reorganization of our National Dental Association. When it has been tried and if in the trying it should show defects or weaknesses, it will then be ample time to cry "Failure." But the body is wise, and can be trusted to correct its errors of organization as by fair trial they are made evident, just as it was competent to regenerate itself by casting aside its antique garments and donning its more modern garb. The thing to do now is for each man to help to energize the whole organization by giving to it the best of his individual effort.

Bibliographical.

John Hunter and Odontology. By J. F. Colyer, L.R.C.P., M.R.C.S., L.D.S. Illustrated. Pp. 214. Price, net, 20*s.* London: Claudius Ash, Sons & Co., Ltd., 1913.

Mr. Colyer has done the world of dentistry and of medicine a signal service in producing this excellent record of the work of an unusual man, one who, though claimed by England as among her distinguished sons, nevertheless belongs to the world of science as a pioneer in the field of the scientific study of anatomy and surgery. John Hunter well deserves the title of "Father of Modern Surgery." His work as a comparative anatomist placed him well in the front rank of contemporary naturalists, and his remarkable achievements in the study of comparative odontology is a benefaction to that department of anatomical science for which he has not received the full meed of gratitude and approval to which the high character and extent of his work justly entitle him.

Mr. Colyer has set forth in interesting manner and attractive style the record of Hunter's contribution to odontology, together with much data relative to the personal characteristics of the man which serve to enlist and maintain the interest of the reader in the study of the scientific features of his work. It is gratifying to note from time to time the growing interest which is being manifested in the rescuing of the history of dentistry from oblivion by the production of works of this character, and after the record of the lives and life-work of those constituting the early pioneers in blazing the pathway along which modern dental science was to have its growth is completed, dentistry will have every reason to be proud of its ancestry.

Mr. Colyer's work is a notable contribution to the literature of dental history. We are promised in the near future a translation of Professor Viau's great work "Pierre Fauchard," and others are to follow. No student of dental history or member of the dental profession having even a passing interest in the history of his calling can afford to remain ignorant of these great characters and their epoch-making work. Colyer's story of John Hunter should find a place in every dental library.

A Text-book of Surgery for Dental Students. By G. Percival Mills, M.B., B.S.(Lond.), F.R.C.S., Surg. Orthopedic and Spinal Hospital, late Resident Surgical Officer, General Hospital, Birmingham; and Humphrey Humphreys, M.B., Ch.B., B.D.S.(Birm.), L.D.S.(Eng.), Demonstrator in Dental Surgery, Birmingham Dental Hospital. Illustrated. Pp. 340. London: Edward Arnold, 1913.

Judged by its contained matter, the title of this interesting volume will be somewhat misleading to American readers, for the reason that it is not a work descriptive of operative methods for the cure of disease conditions, but rather an exposition of the principles and more striking instances of surgical pathology as related to the needs of the dental student. The surgical operation of tooth extraction is not included within the scope of the work, and neither the word "tooth" or "extraction" nor any combination of them appears in the index of subjects; yet no surgical operation is more characteristically dental, nor is any surgical operation more frequently performed in dentistry, nor is any other dental operation so frequently modified by complications fraught with danger to the patient and difficulties to the operator as that of tooth extraction. It is, therefore, matter for surprise that a work bearing the above title should be lacking in systematic consideration of the operation of tooth extraction.

Again, from the American point of view, the book contains much matter which is not ordinarily included in the courses of instruction of surgical pathology given to dental students; for example, the treatment of dislocation of the shoulder joint, the pathology and treatment of goiter, of torticollis, of a variety of ocular disorders having no direct connection with dental diseases, of spinal caries, of cut throat, and a few other instances of a similarly unrelated character do not seem to have any direct bearing of large usefulness in a course of instruction for dental students, excepting upon the principle that all knowledge is useful, even to a dental student.

On the other hand, the major portion of the work, and indeed, nearly all of it in so far as it relates to surgical pathology, is a most interesting and valuable presentation of the subject, and covers a field with which every dental student should be made familiar before he can fairly be considered safe to launch upon the public as a qualified practitioner. As a handy reference book and guide for the practitioner of dentistry the work will also find a useful and valuable place for itself. As indicated by the preface, it will be more particularly useful to the student preparing himself for the licensing examination in dentistry, the scope of which is determined by the General Medical Council of Great Britain. An occasional departure from the standards of terminology to which we are accustomed in America is observed; for example, the "superior maxilla" is discussed in a paragraph immediately preceding that in which the "mandible" is described, which is an apparent incongruity. Making full allowance for differences in terminology and in the conceptions of the relative importance of the data which would enter into a course of instruction in surgery for dental students as exemplified in the practice between Great Britain and this country, the work is a most excellent one, and intrinsically valuable for its matter as well as its teaching qualities.

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REVIEW OF CURRENT DENTAL LITERATURE.

[*Lancet,* London, March 29, 1913.]

HYOSCIN-MORPHIA ANESTHESIA FOR ALCOHOL INJECTION IN TRIFACIAL NEURALGIA. BY DR. W. HARRIS.

[*New York State Journal of Medicine,* New York, June 1913.]

THE PRESENT STATUS OF NERVE INJECTION. BY DR. O. KILIANI, NEW YORK.

The treatment of severe and intractable trigeminal neuralgia or tic douloureux by alcohol injection has now become fully established as the most practical and efficient remedy for this disease, since its first introduction in Munich ten years ago. Schloesser who first used it, and his followers in other countries, such as Ostwald, Lévy, and Baudouin, and Sicard in Paris, and Kiliani Patrick and others in America, have all practiced the methods without the use of any anesthetic other than a small percentage of stovain or cocain mixed with alcohol, and perhaps a spray of ethyl chlorid to freeze the site of skin puncture. The author himself has practiced alcohol injections for trigeminal neuralgia in 112 cases, and has tried many different methods of making the injection.

The best technique he finds to consist in a dose of $\frac{1}{6}$ of a gram of morphia with one 1/150 gram of hyoscin injected hypodermically into the arm twenty minutes before commencing the alcohol injection. In this interval the patient should be made to lie down and keep very quiet, and sleep if possible. This preparation insures restfulness and apparent absence of all pain during the process. When the needle is approaching the foramen ovale, the patient usually shows some symptoms of sensitiveness, though it is not until the nerve is actually struck that a tingling sensation is felt in the lower lip and the tongue; when this occurs, the stylet should be removed from the needle, a syringe filled with a 3½ per cent. eucain solution fitted on, and a few drops then slowly injected. If there is considerable resistance to the push of the piston, the point of the needle may be within the nerve, but if no resistance is felt, the point is certainly not in the nerve, and the needle should then be moved slightly in different directions until it is thought that the foramen has been reached, when again a few drops of eucain should be injected. If then there is resistance to the push of the piston, the syringe should be changed for another filled with 90 per cent. alcohol, and after the lapse of half a minute a few drops of the spirit should be injected slowly into the same spot, great care being taken to hold the needle quite steady. The patient will usually feel some burning sensation, which may be reflected to the lip and tongue, though not necessarily. Almost instantly, as soon as a few drops of alcohol have been injected into the nerve, sensations of touch and pinprick on the lip become blunted, and slowly, two or three drops at a time, more spirit is injected, until the anesthesia is complete, and the pinprick is not felt at all, even as pressure. Usually from 1 to 1½ cc. are required to produce this effect. After each injection of a few drops of the spirit, the lip and chin should be tested for sensation with a pin, and this method of trial injection and test anesthesia is, in Harris' opinion, the only satisfactory way of obtaining good results. He discountenances chloroform anesthesia and considers the extraordinary calming effect of the hyoscin and morphin as most valuable, since even the most nervous patients will remain quiet and peaceful during the whole operation, and yet will be able to answer at once to the skin tests for anesthesia. Of ill effects he has seen none, except in one case of extreme old age and idiosyncrasy. Vomiting occurs in some patients, but this tendency may be diminished by the addition of atropin 1/75 gram to the preliminary injection.

KILIANI reports on the treatment of facial neuralgia by injecting into the branches of the trigeminal nerve, either peripherally, where they enter the face through their respective foramina, or at the base of the skull, where they emerge, or into the ganglion itself. The success of this operation necessitates two things, in his opinion; first, a more intimate knowledge of finer anatomy and topography, and secondly, development of a technique which is decidedly more minute than we have been accustomed to heretofore. In his own experience of four hundred cases, the time which has elapsed since the alcohol injection has been at least one year. Wherever feasible, he has tried to produce the desired effect by peripheral injection, without one failure within the last few years. The fluid injected is eighty per cent. alcohol, the amount varying from 1 to 2.5 cc. The writer employs a 5 cc. Record syringe to which Schloesser's needles of rather heavy caliber with non-cutting point are attached by a bayonet lock. The needles are straight, of different length, or bent at different angles. He avoids curved needles, because the point is too difficult to locate during insertion.

This treatment is a cure only in so far as it frees the patient of his pain attacks and anxiety, but recurrences are frequent, if not the rule. According to the writer's experience about twenty-two per cent. have remained free longer than three years, including patients who have been free for five years, and in whom one might feel tempted to consider the result as permanent. In the remaining cases the recurrent attacks were much milder, of less frequency, and usually submitted easily to a renewed treatment by injections. Extirpation of the ganglion is deprecated, since it does not prevent recurrences, the nerve branches being entirely regenerated. Kiliani makes his injections without narcosis or local anesthesia, because the patient is thus enabled to tell if the needle has struck the nerve. In several more sensitive patients 5 cc. in 1 cc. of two per cent. novocain-suprarenin was injected, but the result was not so certain, the alcohol having been too much diluted by the preceding injection. Only one death has occurred in the writer's practice following alcohol injection. Other accidents are amaurosis, facial paresis, oculomotor paresis, and more or less marked stiffness of the jaw. One very peculiar feature of some of the cases where the third branch is involved is striking—namely, a snow-white coating of the tongue on the affected side, ending abruptly with the median line of the tongue, this coating disappearing with the pain within twenty-four hours after the injection. In regard to diagnosis it is important to note that, if the patient complains of constant pain with no free intervals, it is at least doubtful whether we have to deal with a true case of facial neuralgia, since in typical cases the pain comes in spasms.

Direct injections into the Gasserian ganglion, as suggested by Haertel, of 5 cc. of two per cent. novocain-suprarenin are very favorably indicated in resection of either jaw and carcinoma of the mouth, doing away with a great many of the dangers that were formerly connected with these operations.

In summing up, Kiliani states that the treatment of trifacial neuralgia by alcohol injections has come to stay, and it is desirable that more oral surgeons should familiarize themselves with this technique. The method is practically without danger, and the results in nearly all cases are exceedingly gratifying to the surgeon as well as the patient, who is thus relieved of his frightful suffering.

[*Correspondenz-Blatt fuer Zahnaerzte*, Berlin, April 1913.]

GUNSHOT FRACTURES OF THE MANDIBLE AND THEIR TREATMENT. A STUDY ON DENTISTRY IN WAR. By Prof. Dr. H. Schroeder, Berlin.

The frequency with which gunshot fractures of the maxillæ, especially the lower, occur in modern warfare, has brought about the appointment of dental surgeons in the armies of every civilized nation. In the civil war gunshot fractures of the maxillæ amounted to no less than 60.6 per cent., in the Japanese-Chinese war to from forty to sixty per cent. of all gunshot fractures. The mortality from jaw fractures amounted in the Crimean war to 46.9 per cent., in the civil war to 8.1 per cent., in the Franco-German war to 9.3 per cent. The danger from these fractures has been gradually decreased, owing to the use of steel-jacketed bullets. The data gathered in past wars, and the experiments with cadavers show that two kinds of fractures are most common, viz, separation of continuity in the mandible with considerable comminution, and complete shattering of the bone. In the former case the surgeon's aim is to fix the bone fragments and to await healing; in the second case the splintered bone must first be resected, and the remaining sound portions of bone supported.

The writer rejects Port's splint of tin, owing to the complicated technique involved in its use; he considers also all other splints that necessitate prolonged closure of the mouth as being contra-indicated. In the Russo-Japanese war, the Japanese employed an aluminum splint with swallowtail enlargement at each end, which was attached to the bone stumps by means of silver wires. The center of the splint which comes to lie on the lingual side of the bone was perforated to permit of drainage of the secretions. Owing to the risk of subsequent necrosis due to this form of fixation, this splint seems indicated only if interdental splints are impossible owing to lack of abutment teeth.

When teeth are left, Schroeder employs a German silver wire of 2-millimeter thickness which, like an Angle arch bow, is fastened to the molars with strong bands. If the mandible is fractured distally to the remaining teeth or between the molars, the bow is reinforced by means of an articulation plane or a sliding guide, the latter of which necessitates, however, the insertion of an upper arch, thereby enabling the patient to eat without pain. In edentulous mandibles, or if an insufficient number of teeth be left, the writer employs bone suture or a modification of the Japanese aluminum splint described, a number of which are kept in stock, and which by means of a metal saw and bending pliers can be adapted to individual cases. If resection of a considerable portion of the mandible is necessary, Schroeder employs his *prothèse immediate*, consisting of a reproduction of the jaw in vulcanite, with hollow ends which are slipped over the bone stumps and sutured with aluminum bronze wire. Remarkably quick healing has been generally observed in these fairly desperate cases. Schroeder's interesting paper is liberally supplied with instructive illustrations, and in concluding describes his most practical and concise instrumentarium.

[*Le Laboratoire et le Progrès Dentaire*, Paris, March 2 and May 11, 1913.]

ANOMALIES OF THE LOWER THIRD MOLAR. By A. L. Whitehouse.

RADIATION OF PAIN FROM THE THIRD MOLAR. By Dr. A. Therre, Lyons.

The general application of radiography in dental surgery has incidentally revealed numerous anomalies of the lower third molar, which may be divided into five groups; First, misplacement of the tooth in various portions of the ascending ramus; second, anomalies in position, the crown pointing mesially, distally, lingually, rarely buccally, or the tooth being totally inverted; third, combinations of the first and second anomalies; fourth, in anomalies of the second group, the third molar is often found in more or less close contact with the distal surface of the second molar, producing phenomena of resorption; fifth, partial eruption.

This last and most frequent anomaly seems to be due to a lack of eruptive force, the tooth, which is otherwise normal, erupting only with the anterior portion of its crown, the posterior portion remaining covered by gingival tissue, under which food débris may and usually does become impacted, producing a chronic local gingivitis together with a syndrome of other local or referred painful symptoms, resulting, in extreme cases, in Ludwig's angina complicated by trismus, when extraction without delay becomes imperative. In milder cases with purely local pain, treatment consists in extirpation of the food pocket by repeated daily syringing with a hot, weak solution of hydrogen dioxid, and touching the free border of the overlying gingiva with silver nitrate, this gradual treatment being preferable to excision.

Therre, in reporting four cases of pain referred from the lower third molar, states that this troublesome tooth is the most fruitful source of pain radiation, which in many instances has led to false diagnosis and treatment. Facial, cervical, and occipital pain, also earache, should always make the operator suspicious of the lower third molar. In the writer's four cases, the pain was referred to the central and lateral incisors and the canine, which is explained by the distribution of the inferior dental nerve. Infection or compression of this nerve by way of the lower third molar may produce various symptoms, either in form of simple odontalgia in the tooth, or in pain noted in the tooth itself as well as in the neighboring tissues, or finally in purely reflex pains which are perceived in more or less distant tissue, or in one or several distant sound teeth, while the culprit tooth itself is free from pain.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, June and July, 1913.]

RADIO-ACTIVE SUBSTANCES AND THEIR APPLICATION IN DENTAL DISEASES, INCLUDING PYORRHEA ALVEOLARIS. By Zahnarzt M. Levy, Berlin.

THERAPY OF PYORRHEA ALVEOLARIS, WITH SPECIAL CONSIDERATION OF RADIUM. By Zahnarzt H. J. Mamlock, Berlin.

[*Deutsche Zahnaerztliche Wochenschrift*, Leipzig, September 6, 13, and 20, 1913.]

RADIUM AS A THERAPEUTIC AGENT IN THE TREATMENT OF PYORRHEA ALVEOLARIS. By Zahnarzt R. Neumann, Berlin.

THE FIRST BIOLOGIC ACTION OF RADIUM. By Professor Dr. Walkhoff, Munich.

REPLY TO NEUMANN'S "RADIUM AS A THERAPEUTIC AGENT IN THE TREATMENT OF PYORRHEA ALVEOLARIS." By M. Levy, Berlin.

CARE OF THE TEETH AND MOUTH, AND RADIUM. By Dr. Krause, Kassel.

[*Zahnaerztliche Rundschau*, Berlin, September 28, 1913.]

RADIO-ACTIVE SUBSTANCES AND THEIR APPLICATION IN STOMATOLOGY. By Dr. Windmueller, Berlin.

Levy publishes the encouraging results obtained in eighteen cases of dental disease by radium treatment, which he employed in the Radium Institute of the Royal Charité for Biologico-therapeutic Research of Berlin. He discusses very interestingly the physical properties of the radio-active substances radium, thorium, and actinium, and their effects upon healthy and diseased tissues. Of the two chief methods available—viz, irradiation and emanation—this writer prefers the latter for the treament of oral disorders, applying the radio-active salts in the form of charged water for drinking and rinsing, of a radio-active massage paste, of compresses, and injections, or combining these forms of treatment with radium and mesothorium irradiation or inhalation. Successful results were obtained in cases of psoriasis of the oral mucous membrane, pyorrhea alveolaris, looseness of the teeth with or without pus, marginal gingivitis, leukoplakia of the tongue and mouth, dental abscess, and ulcerous stomatitis, while irradiation alone was found inefficient in chronically recurrent aphthæ as well as pyorrhea alveolaris.

While fully convinced of the valuable therapeutic properties of radio-active substances, Levy warns against overenthusiasm, and emphasizes the necessity of correct application and dosage, also avoidance of the ineffective radium preparations with which the market is being flooded. The biologico-therapeutic action of radium upon the oral mucosa not being as yet sufficiently understood, closer research in this promising field, to be carried on in co-operation with general medicine, is most desirable.

NEUMANN'S attitude toward the use of radium in dental disease is a rather critical one. He not only considers the period of observation in the cases treated by Trauner and Warnekros (see DENTAL COSMOS, August 1913, p. 853) as ridiculously short for anything like a final verdict, but remarks that in the cases of pyorrhea alveolaris reported by Levy, equally good results could have been obtained without radium. In twenty-seven cases of pyorrhea alveolaris treated by him after the methods recommended by the three above-named observers, no progress of healing was noted in any case, and it was only after a most careful scaling that healing slowly occurred, in the same way as if no radium had been used, while treatment with fifty per cent. lactic acid instead of radium produced a notably rapid advance in healing. In five refractory cases which had not yielded to even the most painstaking local treatment, no improvement occurred in spite of radium treatment applied in every suitable form.

Neumann concurs with WALKHOFF, who, as early as 1900, in collaboration with Professor Dr. Giesel of Braunschweig, the first manufacturer of radium in Germany, made observations with radium which preceded those of Becquerel and Madame Curie by a full year, although the latter are popularly given credit for the discovery of this new element. WALKHOFF noted especially the biological effect of radium upon vital cells, and, in discussing MAMLOCK'S paper, remarks that the experiments with radio-therapy in pyorrhea alveolaris are by no means very encouraging as yet, and that any improvement or eradication of pus pockets should not, in his opinion, be expected from radium application.

In rebuttal of Neumann's criticism, LEVY, in his second paper, defends his optimistic views, though he disavows any claim for radium being a panacea in pyorrhea alveolaris. Failures, in his opinion, are to be expected, but negative criticisms such as Neumann's are premature and bound to discourage others in the earnest research with a most promising element.

To this NEUMANN, in defending his critical attitude, replies that he, just like Mamlock, regards radium not as a cure, but simply as an adjuvant in the treatment of pyorrhea, the same as lactic acid or ammonium bifluorid. He shares the view of other authors, such as Sachs, that ninety-five per cent. of cases of pyorrhea can be cured or improved only by surgical treatment.

The problematic status of the radium question in connection with pyorrhea is further evinced by KRAUSE'S interesting investigation into the physics of radium and its biological action. He describes one of the many emanation apparatus on the market for the convenient preparation of radio-active rinsing or drinking-water, and prophesies an epoch-making future for radium in dentistry.

WINDMUELLER, on the other hand, reports almost uniformly negative results with radiotherapy in all its forms, which he ascribes to the altogether too low concentration of the radium preparations heretofore employed.

PERISCOPE.

Increasing the Bactericidal Action of Hydrogen Dioxid.—The bactericidal action of hydrogen dioxid can be considerably enhanced if a three per cent. organic acid, such as tannic or tartaric acid, is added to the hydrogen dioxid solution.—*Igiena Moderna*, per *Monatsschrift fuer Zahntechnik und Verwandte Gebiete.*

Allaying Pain After Extraction.—To allay pain following the extraction of a tooth, the wound is rinsed with a warm solution of hydrogen dioxid, followed by insufflation of orthoform powder. If no sprayer is available, the wound can be coated by means of a cotton tampon dipped into this powder.—*Oesterreichische Zeitschrift fuer Stomatologie.*

Case of Sepsis, Following Dental Treatment, with Fatal Termination.—The wife of a physician had several carious teeth filled. Several weeks afterward, pain was experienced in a molar, which, upon opening, showed purulent pulpitis. Though the root-canal was treated, yet ulcerous endocarditis and swelling of the liver and spleen supervened, the patient succumbing four months afterward to general sepsis induced by way of the small pus focus in the pulp.—DR. HIS, *Zahnaerztliche Rundschau.*

Obtaining an Accurate Bite in Plate Work.—In order to obtain an exact bite, the patient is asked to place his tongue at the posterior border of the introduced wax, and then to bite, which will obviate the necessity of having him bite several times into the wax. The efficiency of this method can be increased by asking the patient to bite very slowly, and swallow at the same time, while the operator applies strong pressure on the chin in order to hold the condyle in the glenoid fossa.—*La Odontologia*, per *Sud-Est Dentaire.*

A Simple Festoon Carver for Vulcanite Plate Work.—A very handy little tool for festooning the wax around the necks of the teeth is made in a moment by just putting a pen nib in the holder the reverse way. A broken steel pen, also, presents two miniature cutting-edges, which a touch or two of a carborundum wheel will convert into an instrument very useful in removing little bits of rubber from places which one cannot get at by any other instrument.—*Edwards' Dental Quarterly.*

The Use of Cement with Amalgam.—Experiments with amalgam in cavities so made that the fillings, when completed, could be removed without destroying any part of the cavity surface, show that it is extremely difficult to fill a cavity with amalgam that will seal the margins and stop caries. Therefore I consider it good practice to use soft cement in every cavity to be filled with amalgam. I use just enough to cover the cavity surface, removing any surplus with an instrument before starting to use the amalgam; then I begin with the amalgam, being extremely careful to pack it well. One need not be alarmed at the cement that oozes out at the margins of the cavity, as it may be removed, and the mixture does no harm. This method in my practice gives good service, and amalgam fillings may be made of which no operator need be ashamed.—F. J. RYAN, *Journ. Allied Dental Societies.*

Sterilization of the Right-Angle Handpiece.—It is very important that the right-angle attachment be sterilized after each use, inasmuch as it comes in contact with the mucous membrane of the mouth and the saliva. A method which I have followed during the past five years is to boil it thoroughly in water to which has been added powdered Castile soap, about one teaspoonful to the quart. After boiling, the excess of soapy water is shaken from the instrument, and a small drop of oil placed upon the gearing. The soap prevents rust and furnishes a certain amount of lubrication for the running parts. This method can also be used for the straight handpiece if it can be detached from the engine. If there are hard rubber parts connected with either handpiece, they can be boiled for a long time without essential damage.—WM. H. POTTER, *Journ. Allied Dental Societies.*

Bending Metal Tubes.—To prevent kinks in bending thin metal pipes, it is a common practice to fill them with sand or resin, the latter being poured in while in a melted state.

Both methods are open to serious objections. The sand must be dry, and either substance must be very carefully filled in, so as to touch every part of the interior surface of the pipe. There is yet another and a greater difficulty—the emptying and cleaning of the pipe after it has been bent. Any resin or sand left in the pipe may cause serious trouble when the tube is in use. All these difficulties can be got rid of by substituting water under pressure for sand or resin, short lengths of pipe which include a tap being fixed on to each end of the tube to be bent. It is easy then to get the pressure inside up to 20 atmospheres, even with a hand pump. When the pipe has been bent the taps are opened, the short lengths are removed, and no cleaning of the inside is necessary. The process has the further advantage that the pressure serves as a test of the strength of the pipe, especially during the bending.—*Zeitschrift fuer prakt. Maschinenbau*, per *Brit. Dental Journal.*

Misplaced Lower Canine.—The patient, a boy of sixteen years, complained of a tender swelling under the chin. A few days later, the crown of a tooth made its way through the skin, partly erupting on the outside below the chin. The greater part of the crown of the tooth, which was obviously a canine, projected through the skin almost vertically downward, in a position immediately below that usually occupied by the lower right canine. Except for some hypoplasia of the enamel, the form of the tooth was normal. Examination of the mouth revealed the fact that both the right lateral incisor and canine were absent. Incidentally it was noted that the maxilla was much contracted, and the upper teeth were very crowded and irregular. The boy was undersized and a mouth-breather. The history given was that, between two and three years of age, the boy received a blow on the chin in falling on some stone steps, and that subsequently an opening was present for some considerable time, through which a piece of bone was eventually removed. The cause of the misplacement would therefore appear to be that the sinus has apparently directed the tooth in its course.—F. R. Smyth, *Proc. Royal Soc. Med., Odont. Section.*

Stains from Silver Nitrate Removed with Potassium Iodid.—The operator not only gets silver nitrate on his fingers, but frequently upon the lips, and in some cases small spots appear upon the faces of his patients, indicating that in some manner he has accidentally dropped a minute quantity of the drug in making applications in the mouth. Stains which have appeared three hours after using the nitrate can be removed with iodid of potassium. A small quantity of the powdered potassium is placed upon a glass slab, and with a moist pellet of cotton the powder is carried to the desired spot and rubbed in gently. Usually the stain will disappear in a few minutes. After washing the part carefully in order to remove all trace of the potassium, the application of cold cream is usually very acceptable to the patient, especially if the stain is located on the lips or face. Most patients will experience a slight sensation on the lips or skin from the most minute quantity of silver nitrate; others will not, and, for this reason, when the operator has any suspicion that the preparation has come in contact with exposed tissue, it is well to have the patient return in from two to three hours, at which time any stain can be successfully removed.—M. T. Chambers, *Dental Digest.*

Modifying Pulp Broaches for Small Root-canals.—Much pain will be avoided by using the finer sizes of barbed broaches. By so doing one is enabled to slip the broach farther into the canal without crowding, and a better grasp of the pulp is effected. Even with the finest broaches on the market, it is often difficult to secure one fine enough to penetrate the very fine root-canals. In such a case the broach is laid flat on a wooden block, and then, with a fine file, the barbs on one side are carefully removed. The broach, having been reduced fully one-third in diameter, will now freely enter the canal, which was before considered impossible. This is really a valuable suggestion, and will bear repetition. To those who have not tried this plan of reducing the diameter of a broach, there is much satisfaction yet to come. Many root-canals are oval in shape, as shown in cross section, and the filing of one side of the broach tends to leave it also oval, and entrance is thereby more easily effected. One word of caution as to procedure: One should not, in removing the barbs on one side, allow the file to dig into the body of the broach and thereby weaken it. The broach thus prepared should not be rotated to any extent; being small, it can be carried to the apex, and thus grasp the pulp in its whole length, and rotation will not be found to be necessary. In this connection it may be added that there is less danger of breakage with a broach thus prepared; the tendency with the operator is to crowd, and with the prepared broach slipping the whole length of the tooth so easily the temptation to force the broach, and thereby bind it, is lessened.—C. B. Warner, *Dental Brief.*

Quinin and Urea Hydrochlorid Hypodermically and Tetanus.—Recently the bimuriate of quinin and urea has been very largely employed as a local application, and still more commonly as a hypodermic injection for the purpose of producing local anesthesia, so that minor operations could be performed without pain, the claim being made that this preparation is efficient, that it is not followed by ill effects, local or general, and, furthermore, that it possesses none of the dangers of cocain when that drug is given hypodermically. A number of clinical observers have reported instances of tetanus developing after major or minor operations, in cases in which no opportunity for infection by another cause than quinin could be discovered. These seemingly inexplicable infections with the tetanus bacillus have, however, been explained, in part at least, by the discovery that tetanus spores are sometimes found in the healthy alimentary canal of man, and if, perchance, there occurs a solution of continuity in the mucous membrane of the intestine, auto-infection of a traumatic or surgical wound may result. This certainly has an important bearing upon the safety and value of quinin when given by the hypodermic needle, either for the purpose of producing local anesthesia or to overcome the malarial parasite. Boiling of quinin for the purpose of sterilization not only produces deterioration of the drug chemically, but it materially impairs its therapeutic efficiency. Moreover, it seems to be pretty well proved that quinin produces some change in the tissues which renders them a singularly favorable site for the growth of the tetanus bacillus. It is the damage to the tissues produced by the injection, because a hypodermic injection of morphin or any other local anesthetic does not produce similar results. It will be interesting to note whether the widespread use of quinin hypodermically as a local anesthetic results in more tetanus cases being reported.—*Therapeuic Gazette.*

Some Errors in the Technique of Injection of Novocain-Suprarenin.—Most of the mishaps still attending the use of even the least injurious of local anesthetics, such as novocain, are due either to carelessness or to lack of foresight. The first condition of a successful injection is the absolute sterilization of the anesthetic. Solutions of novocain can be boiled and reboiled at will and for a sufficiently long time to insure absolute safety in this respect. Synthetic mixtures—even suprarenin—cannot be treated in this manner. The very popular and convenient ready-to-use phials have against them that, though they are guaranteed to be sterile, it is a work of art to keep them so in the process of use. Perhaps the best way is to pour off the needed amount of solution into a sterilized measuring-glass. Tabloids may be boiled with the necessary quantity of water. (Tabloids of suprarenin may be once boiled in this way without being injured.) A further objection to the phials is that their contents deteriorate comparatively rapidly. Novocain and suprarenin both suffer from the alkali contained in common glass. This difficulty may, it is true, be surmounted by confining ourselves to the use of those made of non-alkaline Yensen glass. They are, however, of course, much dearer than the others.

That solutions kept in bottles may be inadvertently exchanged or mistaken we have learned from a recent fatality reported from Berlin. This possibility can be guarded against by keeping, in a circular, colored bottle a 1½ per cent. Fischer's mixture of novocain, while a twenty per cent. solution for ordinary purposes is kept in an hexagonal wide-necked brown bottle. Injections should never be made in the neighborhood of a subperiostal or submucous suppuration. Sometimes it happens that a bloodvessel is pricked and a hematoma ensues. This undesirable circumstance, which can easily occur in the cheek or palate, is due to a lack of care in keeping the needle in contact with the bone. These blisters are not only very uncomfortable in speaking and in swallowing, but, though they will generally, under treatment, disappear in a few days, will sometimes fester and cause serious trouble.

The breaking-off of needles is a grave difficulty, and has led many dentists to prefer iridio-platinum and nickel needles. These, however, are rather too easily bent. A thoroughly aseptic needle-fragment will probably heal-in without causing trouble, and in some cases a greater risk is run in trying to remove it than in allowing it to remain undisturbed.

In the course of the discussion following the lecture by Dr. Williger from which the above is quoted it was remarked that the hermetic sealing of the small phials was technically difficult, that minute openings were bound sometimes to occur, and that the use of phials, therefore, was to be condemned. It was also suggested that Dr. Williger had omitted to point out the importance of taking a freshly sterilized needle in cases where a single injection proved insufficient.—*Deutsche Monatsschrift fuer Zahnheilkunde*, per *Dental Record.*

Obituary.

DR. CHAS. A. MEEKER.

Died, at the Homeopathic Hospital, Newark, N. J., September 8, 1913, following an operation for gall-stones, Dr. Charles A. Meeker.

Dr. Meeker was born in Troy, N. Y., July 13, 1846. Nearly all of his life was spent in Newark, where his professional activities found their largest expression. Endowed with a fondness for organization and with a practically unlimited capacity for work, Dr. Meeker concerned himself in the furthering of the more important dental activities of his state, and was for a long time active in the national aspects of the work of the various dental examining boards.

He was one of the founders of the New Jersey State Dental Society and of the Central Dental Association of Northern New Jersey, of which latter organization he was president for one year and treasurer for thirty years, and its secretary for twenty-seven years. He was a member of the State Board of Dental Examiners for New Jersey, and was its secretary from 1893 until a few months ago, when he resigned. He was a member of the First District Dental Society of New York, the Odontological Society of Manhattan, the New York Institute of Stomatology, and the American Academy of Dental Science, which latter association he helped to found in 1884.

Dr. Meeker was deeply interested in public dental service, and was one of the founders of the Newark free dental clinic, for which he obtained the passage of the necessary state legislation. He was vice-president of the clinic at the time of his death.

Outside of his professional activities, Dr. Meeker was connected with the old Essex Art Association and the Newark Camera Club, as secretary; the old Home Dramatic Association, of which he was one time treasurer; the National Arts Club and the Lotus Club of New York, and the Museum Association of Newark.

Dr. Meeker was a member of St. Paul's Episcopal Church of Newark. He is survived by a widow.

The funeral services were held on Thursday, September 11. Interment at Orange, N. J.

DR GEO. S. TIGNER.

Died, July 9, 1913, at the Imperial Hotel, in which he was residing, at Atlanta, Ga., Geo. S. Tigner, D.D.S.

Dr. Tigner, the report of whose death has caused the deepest regret in the minds of the large circle of his friends, was born at White Sulphur Springs, Meriwether county, Ga., being the son of Benson F. and Martha J Tigner. He studied at Emory College, Oxford, Ga., securing the B.A. degree, and after being graduated from that institution spent one year in the Atlanta Dental College, and then two years at the department of dentistry in the University of Maryland, receiving his D.D.S. degree with the class of 1895.

Shortly after receiving his diploma he elected to settle in Atlanta for the practice of his profession; and here his reputation as a dentist, together with appreciation of his character as a man, grew apace, and with the progress of the years he came to enjoy the patronage of a numerous and excellent *clientèle.* None had a wider circle of friends in Atlanta, nor was a more genuine favorite. He stood high in the community, while his character and talents were freely recognized by his professional brethren, among whom he was a prominent figure. He had recently been elected a vice-president of the Grady Hospital trustees. For many years he filled one of the chairs in the Southern Dental College. He was a member of the National Dental Association and of the Georgia State Dental Society, being elected president of the latter in 1911; also a member of the Atlanta Dental Society, serving as its president in 1910. He was a fraternity man and a Mason. At Trinity Methodist Church, of which he was a communicant and member of the board of stewards, he was a constant attendant.

Dr. Tigner married, in 1898, Miss Lula Singer, of Atlanta, who survives him. There are no children. His father also survives him, living at White Sulphur Springs, and he also leaves three brothers and three sisters, one of his brothers being Dr. Edward A. Tigner, Milledgeville, Ga., who is now the president of the Georgia State Dental Society.

After the funeral services at Trinity Church, the remains were taken to White Sulphur Springs and interred in the family burying-ground.

DR. ALLEN B. BRADLEY.

Died, September 2, 1913, at his summer home at Guilford, N. Y., Allen E. Bradley, D.D.S., of Norwich, N. Y., from an attack of angina pectoris.

Dr. Bradley had been somewhat indisposed for several days, but had been able to attend to his professional duties and was at his office on the Saturday previous to his sudden death.

Dr. Bradley was born in Guilford, N. Y., January 1861, was educated in the public schools of his native town, and secured his dental education at the University of Pennsylvania, from which institution he was graduated in 1882. The same year he located in Norwich, where he practiced his profession continuously.

April 22, 1896, he married Dora Elizabeth McCrea, daughter of Levi and Cordelia Maxson of West Burlington, N. Y. One child, Edward Maxson, was born to them, but died in infancy. Dr. Bradley is survived by his wife and his aged mother, to whom he has been devoted through the long years of her invalidism.

Dr. Bradley was a member of Emanuel Church. He several years ago attained the thirty-third degree Scottish rite in Masonry. Quiet and reserved in manner, and modest at all times, his life was largely given to the service of others, and his kindliness of heart evinced in many acts of self-sacrificing devotion toward his family and others won for him the admiration of all who knew him. He possessed remarkable mechanical ingenuity, and he was always ready and willing to use his talents in the service of a friend. His fondness for children was remarkable, and his kindliness and sympathy, his helpfulness and tenderness toward all with whom he came in contact, closely touched the lives of many of his townspeople who now mourn the loss of a loyal and helpful friend.

Society Notes and Announcements.

INTERNATIONAL DENTAL CONGRESS.

It has been thought advisable to arrange so that those who wish to attend the International Dental Congress, in London, next summer, may go on the same steamer, if they wish.

The plan is to arrange to sail on a steamer leaving New York immediately after the closing of the National Dental meeting, which will be held in Rochester, New York, early in July.

Those who wish to join the party sailing at that time will please notify me, at 560 Fifth ave., New York City, at as early a date as possible, in order that the steamship company may know how many to provide for.

Herbert L. Wheeler,
Transportation Committee, N. D. A.

INSTITUTE OF DENTAL PEDAGOGICS.

The next annual meeting of the Institute of Dental Pedagogics will be held in Buffalo, N. Y., January 27, 28, and 29, 1914. The Executive Committee is planning to present an exceptionally interesting program, which no dental teacher can afford to miss.

J. F. Biddle, *Sec'y*,
Pittsburgh, Pa.

NATIONAL DENTAL ASSOCIATION.

Date of 1914 Meeting Advanced One Week.

At the urgent request of the Local Committee of Arrangements at Rochester, the Trustees of the National Dental Association have advanced the date of the next meeting one week; therefore the eighteenth annual session will be held in Rochester, N. Y., July 7, 8, 9, 10, instead of July 14, 15, 16, 17, 1914, as originally selected. The officers, the local committee, and all other committees are going to put forth every effort to make this meeting, which is the first under the reorganization, the best in the history of the association, and we feel confident that the increased membership and interest in our association will prove a decided advantage in many ways.

Homer C. Brown, *President*,
Columbus, Ohio.
Otto U. King, *Gen. Sec'y*,
Huntington, Ind.

Research Workers Wanted.

Competent research workers are wanted by the National Dental Association. State qualifications, experience, languages read, and preference for pathological, biological, pharmacological, metallurgical, or anatomical work.

Address Weston A. Price, D.D.S., Chairman of the National Dental Scientific Foundation and Research Commission, 10406 Euclid ave., Cleveland, Ohio.

Back Copies of N. D. A. Transactions.

There are a few copies of the '07, '08, '09, '10, and '11 "Transactions of the National Dental Association," in the possession of Dr. Arthur Melendy. These copies, while they last, may be secured by libraries and other educational institutions and members of the N. D. A. by sending thirty cents per copy (to cover postage) to Dr. Arthur R. Melendy, Holston Bank Bldg., Knoxville, Tenn.

Otto U. King, *Gen. Sec'y*,
Huntington, Ind.

SCIENTIFIC FOUNDATION AND RESEARCH COMMISSION.

Research Bodies Consolidated.

The success attained by the Scientific Foundation Fund Committee in the securing both of money for a Foundation Fund for research and of the free use of many thoroughly equipped laboratories was so marked that the House of Delegates—which is the official body of the National Dental Association under its reorganization—by unanimous vote changed its constitution to provide for a commission of twenty-five men to immediately put into operation the complete plan of the Scientific Foundation Fund Committee for supporting and establishing exhaustive research and for securing funds for the endowment of a National Dental Research Institute.

The constitution was amended as follows:

The Committee on Scientific Foundation Fund shall be changed to a commission to be known as the National Dental Scientific Foundation and Research Commission. It shall consist of twenty-five members, who shall be elected by the Board of Trustees, not more than two of whom shall be from any one state. They shall serve for five years, except that of the first commission five shall serve for one year, five for two years, five for three years, five for four years, and five for five years, as shall be designated when they are elected. They shall meet annually at the time of the meeting of the National Dental Association, and at such other times as shall be designated by their Executive Board.

The duties of the commission shall be to raise funds for carrying on exhaustive dental and oral research, to disseminate scientific knowledge, to support, establish, and encourage research, and such other duties as shall pertain to the furthering of this cause. They shall select from their number an Executive Board of five members, which shall, when the commission is not in session and has not given specific directions, have general control of the administration of the affairs of the commission and general supervision of all arrangements for administration, research, and other matters undertaken or promoted by the commission. They shall organize and incorporate a corporation to be known as the National Dental Research Foundation and Institute, or such other name as the commission shall select, which corporation shall receive, invest, and disburse all the moneys provided by the commission and by themselves. They shall organize this corporation in accordance with the laws and requirements controlling such institutions, except that not less than one-third of the trustees of said corporation shall be provided by the National Dental Association. This corporation shall seek bequests, endowments, fellowships, and such other contributions as shall perfect the purpose of the National Dental Association. They shall make a written annual report to the commission and to the National Dental Association.

The commission was elected, met and organized, selecting their officers and Executive Board. The *personnel* of the commission elected is as follows:

WESTON A. PRICE, Cleveland, O., *Chairman.*
THOMAS P. HINMAN, Atlanta, Ga., *Vice-chairman.*
CLARENCE J. GRIEVES, Baltimore, Md., *Secretary and Treasurer.*
JOHN V. CONZETT, Dubuque, Iowa, Member of Executive Board.
E. R. WARNER, Denver, Colo., Member of Executive Board.
EDWARD C. KIRK, Philadelphia, Pa.
WM. CARR, New York City.
TRUMAN W. BROPHY, Chicago, Ill.
G. V. BLACK, Chicago, Ill.
M. H. FLETCHER, Cincinnati, O.
THOMAS B. HARTZELL, Minneapolis, Minn.
ARTHUR R. MELENDY, Knoxville, Tenn.
EDWARD S. GAYLORD, New Haven, Conn.
HENRY C. FERRIS, New York City.
CHARLES C. ALLEN, Kansas City, Mo.
FRANK O. HETRICK, Ottawa, Kans.
MARCUS L. WARD, Ann Arbor, Mich.
FRANK L. PLATT, San Francisco, Cal.
C. S. VAN HORN, Bloomsburg, Pa.
R. H. VOLLAND, Iowa City, Iowa.
C. M. MCCAULEY, Abilene, Texas.
GEORGE E. HUNT, Indianapolis, Ind.
EUGENE H. SMITH, Boston, Mass.
J. E. CHACE, Ocala, Fla.
SAMUEL H. MCAFEE, New Orleans, La.

The plan pursued by the Foundation Fund Committee was adopted, *i.e.* to raise funds from three sources—First, from the members of the dental profession, by their giving, as nearly universally as possible, a voluntary contribution each year for five years to start the work. This becomes necessary both for immediate funds and for indorsements of the work. Second, a popular fund from the laity, to be obtained largely by the activity of the members of the dental profession. Third, an endowment fund to make the work permanent.

The committee has already secured contributions exceeding $15,000 in signed individual pledges covering a period of five years, or $3000 per year, from the few societies to which the chairman was able to go and present the matter, as follows: Cincinnati, $2767, with the first year's payment entirely paid in; Columbus, $1200; Toledo, $500; Cleveland, $4010; Alumni Association of the Dental Department of the University of Iowa, $500; St. Louis Dental Society, $500; Alumni Association of the Louisville Dental College, $500; Indiana State Dental Society, $800; Washington, D. C., $705; Pennsylvania State and Susquehanna Societies, $782; contributions at the Kansas City National meeting, $2600; miscellaneous, $500; total, $15,364. It is expected that each state will provide in voluntary contributions an amount equal to five times the number of dentists in the state. On this basis, Ohio with 2400 dentists has already provided over $9000 of her $12,000 proportion.

The need for immediately assisting dental and oral research is such that the commission will begin work at once by providing technicians or laboratory assistants to make possible a much larger output from some of the men who are already voluntarily devoting a part of their time in dental researches and doing excellent work. This definite assistance to research work will be done to the amount of resources already available; however, present contracts will have to be limited to a total of $4000 for one year. This will be used to hire expert assistants for helping those who are doing excellent work and with available good laboratory equipment in the following subjects: Systemic infections having dental origin, pyorrhea alveolaris and kindred affections, etiology of caries, salivary analysis, etiology of erosion, dental amalgams, metallurgy for substitutes for platinum, etc., and the relation of foods to defective tooth structure. Ten of these expert laboratory assistants or technicians are greatly needed at once, and the $4000 available now will only permit of four or five of these. It is greatly desired that the members of the profession will arrange to have the subscription plan thoroughly organized at once in their respective conventions, so that the others can yet be placed this fall. It will require about an average of $5 per active member of dental societies to make up for those who cannot be reached. The subscriptions are running from $1 to $100 per year for five years. Literature and subscription blanks will be furnished by writing to the chairman of the commission.

This is only preliminary work, and the commission will engage the part or entire time of some expert research workers as soon as the funds can be obtained. The chairman has already secured for the National Dental Association privileges for research in the following laboratories and institutions: Cushing Laboratory for Pathological Research, Cleveland; Case School of Applied Science Research Laboratory, Cleveland; Iowa State University Research Laboratories; Michigan State University Research Laboratories; Hygienic Department of the United States Department of Health of Washington; Bellevue Hospital Research Laboratory, New York; Cincinnati Hospital Research Laboratory; Parke-Davis Research Laboratory, Detroit; University of Chicago, and several other competent institutions.

There are also a number of men with the research spirit found to be available whose heart is so engrossed in that work that they are now devoting much of their time and energy to it without compensation, but who have to struggle for the necessities of life. The commission will place some of these men in these available equipped laboratories as soon as funds can be secured. We do not present it as a professional duty, simply, but as a great personal opportunity; we do not ask of you self-sacrifice, but self-realization —for it is our privilege by supporting this work to help to emancipate society from its most universal malady and also the one that probably causes more total suffering, directly and indirectly, than any other.

WESTON A. PRICE, *Chairman*,
10406 Euclid ave., Cleveland, Ohio.

THE PANAMA-PACIFIC DENTAL CONGRESS.

THE work of the Committee of Organization of the Panama-Pacific Dental Congress is rapidly assuming definite form, and the entire general plan of the congress will shortly be announced.

The floor plans of the new municipal auditorium, in which the congress will meet, will be sent to all prospective exhibitors within the next thirty days. The exhibits will be held in the main hall of the auditorium, a room 190 feet square, affording ample space and light, and from present indications, all of this great area will be fully occupied. It is planned to make these exhibits and their accompanying clinics one of the great features of the congress, and they will, aside from the general program, afford a liberal education to anyone interested in modern dentistry.

Space in the auditorium has been reserved for the general sessions of the congress and for the meeting of its sections, and also for the dental societies and fraternities which will meet in San Francisco during the congress.

Three hundred thousand gum stickers, bearing the seal and date of the congress, will shortly be placed in the hands of dental dealers throughout the country, and every dentist who receives goods or letters from them will in this way be reminded that it is time to prepare for a trip to San Francisco in August of 1915, to attend the Panama-Pacific Dental Congress and the Panama-Pacific International Exposition.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

THE regular meeting of the Academy of Stomatology will be held Tuesday, November 25, 1913, at the College of Physicians, Twenty-second above Chestnut st., Philadelphia, Pa., at 8 P.M. Dr. Philip Fischelis, Philadelphia, will read a paper entitled "Present Status of Our Conception of the Peridental Membrane."

NORMAN L. JAMESON, *Sec'y*,
1429 Spruce st., Philadelphia, Pa.

FIFTH, SIXTH, SEVENTH, AND EIGHTH DISTRICT (N. Y.) DENTAL SOCIETIES.

UNION MEETING.

THE Fifth, Sixth, Seventh, and Eighth District Dental Societies of the State of New York will hold a union meeting at Elmira, N. Y., on November 20, 21, and 22, 1913.

H. H. TURNER,
Syracuse, N. Y.

OHIO STATE DENTAL SOCIETY.

THE forty-eighth annual meeting of the Ohio State Dental Society will be held in Memorial Hall, Toledo, December 2, 3, and 4, 1913. The program of papers and clinics carries the names of men of worldwide reputation. At a "Health and Science" conference on Wednesday evening we expect the governor of the state, James M. Cox; the presidents of the National Dental Association and of the American Medical Association; Dr. Kirk, editor of the COSMOS; Dr. Simon Flexner of Rockefeller Institute, and Dr. McCampbell, secretary of the State Board of Health.

Make hotel reservations early and arrange to attend the best and biggest meeting this society ever held.

F. R. CHAPMAN, *Sec'y.*

MARYLAND BOARD OF EXAMINERS.

THE Maryland Board of Dental Examiners will meet for examination of candidates for certificates November 6 and 7, 1913, at the Baltimore College of Dental Surgery, Baltimore, at 9 A.M. For application blanks and further information apply to

F. F. DREW, *Sec'y,*
701 N. Howard st., Baltimore, Md.

MICHIGAN BOARD OF EXAMINERS.

THE next regular meeting of the Michigan State Board of Dental Examiners will be held at the Dental College, Ann Arbor, commencing Monday, November 10th, and continuing through the 15th. For full particulars and application blanks address

F. E. SHARP, *Sec'y,* Port Huron, Mich.

PENNSYLVANIA BOARD OF EXAMINERS.

THE next regular examination of the Pennsylvania Board of Dental Examiners will be held in Philadelphia and Pittsburgh on Wednesday, Thursday, Friday, and Saturday, December 10, 11, 12, and 13, 1913. Application papers can be secured from the Department of Public Instruction, Harrisburg.

For further information, address

ALEXANDER H. REYNOLDS, *Sec'y,*
4630 Chester ave., Philadelphia, Pa.

INDIANA BOARD OF EXAMINERS.

THE next meeting of the Indiana State Board of Dental Examiners will be held in the State-house, Indianapolis, Nov. 10 to 15, 1913. All applicants for registration in the state will be examined at this time. No other meeting will be held until June 1914.

Notice. All persons legally registered for the practice of dentistry in Indiana are required, under Section 9 of the new statute, to register with the secretary of the State Board of Dental Examiners, ANNUALLY, on or before the 31st day of December. The annual registration fee is $1.00. Blanks will be mailed to each qualified dentist on December 1st. This act applies to those dentists who have left the state or are now not in practice.

For further information apply to

F. R. HENSHAW, *Sec'y,*
508 K. of P. Bldg., Indianapolis, Ind.

NEVADA BOARD OF EXAMINERS.

THE Nevada State Board of Dental Examiners will hold the regular semi-annual meeting November 21, 1913, at Carson City, Nev.

D. W. RULISON, *President,*
W. H. CAVELL, *Sec'y,*
Carson City, Nev.

DENTAL COMMISSIONERS OF CONNECTICUT.

THE Dental Commissioners of the State of Connecticut hereby give notice that they will meet at Hartford on Thursday, Friday, and Saturday, November 13, 14, and 15, 1913, to examine applicants to practice dentistry. Application blanks, rules, etc., will be mailed by the Recorder upon request.

EDWARD EBERLE, *Recorder,*
902 Main st., Hartford, Conn.

VIRGINIA BOARD OF EXAMINERS.

THE next meeting of the Virginia State Board of Dental Examiners, for the examination of applicants, will be held in the city of Richmond, Va., November 17, 1913, commencing at 9 A.M.

For further particulars address

J. P. STIFF, *Sec'y,* Fredericksburg, Va.

ILLINOIS BOARD OF EXAMINERS.

The semi-annual meeting of the Illinois State Board of Dental Examiners for the examination of applicants for a license to practice dentistry in the state of Illinois will be held at the College of Dentistry, University of Illinois, corner Honore and Harrison sts., Chicago, Ill., beginning Monday, November 10, 1913, at 9 A.M. All applications together with fee—twenty-six dollars—must be filed with the secretary at least five days prior to date of examination.

Address all communications to

O. H. Seifert, *Sec'y*,
49–50 Ridgely Bank Bldg., Springfield, Ill.

ARIZONA BOARD OF EXAMINERS.

The Arizona Board of Dental Examiners will meet at Phœnix, Ariz., beginning November 10, 1913.

Prospective candidates for examination should apply at once to Sidney P. Osborn, secretary of state of Arizona, at Phœnix, Ariz., for an application blank, and return same to him, properly filled out, together with the fee of twenty-five dollars.

The board also wishes to announce that the next meeting of the board, after the November 1913 meeting, will probably not be before October 1914.

As no temporary licenses are granted, it is desirable that all who contemplate applying for a license in Arizona, in the near future, should avail themselves of the next meeting of the board.

J. Harvey Blain, *Sec'y*,
Prescott, Arizona.

NEW JERSEY BOARD OF EXAMINERS.

The New Jersey State Board of Dental Examiners will hold their regular annual meeting and examination in the assembly chamber of the State-house, Trenton, N. J., on December 1, 2, and 3, 1913. Applications must be filed at least ten days prior to date set for examination.

After January 1, 1914, all applicants for a license to practice dentistry in New Jersey—"Shall present to said board a certificate from the superintendent of public instruction showing that before entering a dental college, he or she has obtained an academic education consisting of a four years' course of study in an approved public or private high school, or the equivalent thereof."

Also, after January 1, 1914, a bridge, consisting of three or more teeth exclusive of abutments, and one Richmond crown, will be required as a practical test in prosthetic dentistry, in place of a full set of teeth soldered upon a gold or coin-silver plate hitherto required.

For further particulars, apply to

Alphonso Irwin, *Sec'y*,
425 Cooper st., Camden, N. J.

IOWA BOARD OF EXAMINERS.

The next meeting of the Iowa State Board of Dental Examiners for the examination of candidates will be held at Iowa City, Iowa, commencing at 9 A.M., December 1, 1913. For particulars and application blanks write

J. A. West, *Sec'y*,
417 Utica Bldg., Des Moines, Iowa.

CALIFORNIA BOARD OF EXAMINERS.

The next meeting of the Board of Dental Examiners of California for the purpose of examining applicants for a license to practice dentistry will be held in San Francisco at the College of Physicians and Surgeons, beginning on December 3, 1913, at 10 A.M. All applications must be filed with the board on the morning of December 3d. Each application must be accompanied by a fee of twenty-five dollars, and the necessary credentials—diplomas or licenses from other states—together with a recent unmounted photograph of the applicant.

For further particulars, address

C. A. Herrick, *Sec'y*,
133 Geary st., San Francisco, Cal.

SOUTH DAKOTA BOARD OF EXAMINERS.

The next regular semi-annual meeting of the South Dakota State Board of Dental Examiners will be held at Sioux Falls, S. D., on Tuesday, January 13, 1914, at 1.30 P.M. Application for examination should be made between the dates of January 1st and 10th. For further information address

Aris. L. Revell, *Sec'y*,
Lead, S. D.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending September 13, 1913—(No changes).

For the week ending September 20th:

First Lieut. George D. Graham, on arrival in the United States, will proceed to Fort Ethan Allen, Vt., for duty.

Harry M. Deiber, ACT.D.S., relieved from duty at Fort Thomas, Ky., effective at such time as will enable him to comply with this order, and will proceed at the proper time to San Francisco, Cal., and take transport on November 5th for Honolulu, H. T., for assignment to duty.

First Lieut. Robert F. Patterson, relieved from duty in the Philippine Department, effective January 15, 1914, and will proceed to the United States.

First Lieut. Frank P. Stone, relieved from duty at Fort Ethan Allen, Vt., and will proceed to the Philippine Islands on December 5th, for duty.

First Lieut. R. E. Ingalls, August 14th, arrived at Fort St. Michael, Alaska.

First Lieut. J. R. Ames, September 12th, arrived at Fort Morgan, Ala.

H. M. Deiber, ACT.D.S., September 11th, arrived at Fort Crockett, Texas, for temporary duty.

First Lieut. F. L. K. LaFlamme, September 17, arrived at Fort Hancock, N. J., for duty.

For the week ending September 26th:

By Paragraph 4, S. O. No. 185, Headquarters Eastern Department, September 24th, First Lieut. F. P. Stone, granted twenty-five days' leave about November 3d.

For the week ending October 4th:

By Paragraph 6, S. O. 187, Eastern Department, September 26th, H. M. Deiber, ACT.D.S., granted twenty days' leave. Relieved from Crockett, and ordered to proper station before taking leave.

First Lieut. Robert T. Oliver, now on sick leave absence, is relieved from further duty in the Philippine Department.

For the week ending October 11th:

First Lieut. Robert T. Oliver is relieved from treatment at the Letterman General Hospital, Presidio of San Francisco, Cal., and will proceed to Fort Worden, Wash., for duty.

United States Patents

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING SEPTEMBER 1913.

September 2.

No. 1,071,952, to Leo Perzin. Artificial tooth.

No. 1,071,966, to Herbert W. Lorensen. Tooth-brush holder.

No. 1,072,015, to John A. Maker. Matrix device.

No. 1,072,357, to Charles J. Palmer. Dental device.

September 9.

No. 1,072,432, to Ernest M. Crane. Dental appliance.

No. 1,072,517 to Frank H. Skinner. Crown-pin extractor.

No. 1,072,518, to Frank H. Skinner. Dental instrument.

No. 1,072,519, to Frank H. Skinner. Dental appliance.

No. 1,072,520, to Frank H. Skinner. Double-acting pin-puller.

No. 1,072,521, to Frank H. Skinner. Pin-puller.

September 16.

No. 1,073,365, to Hedley Rutland. Artificial tooth.

September 23.

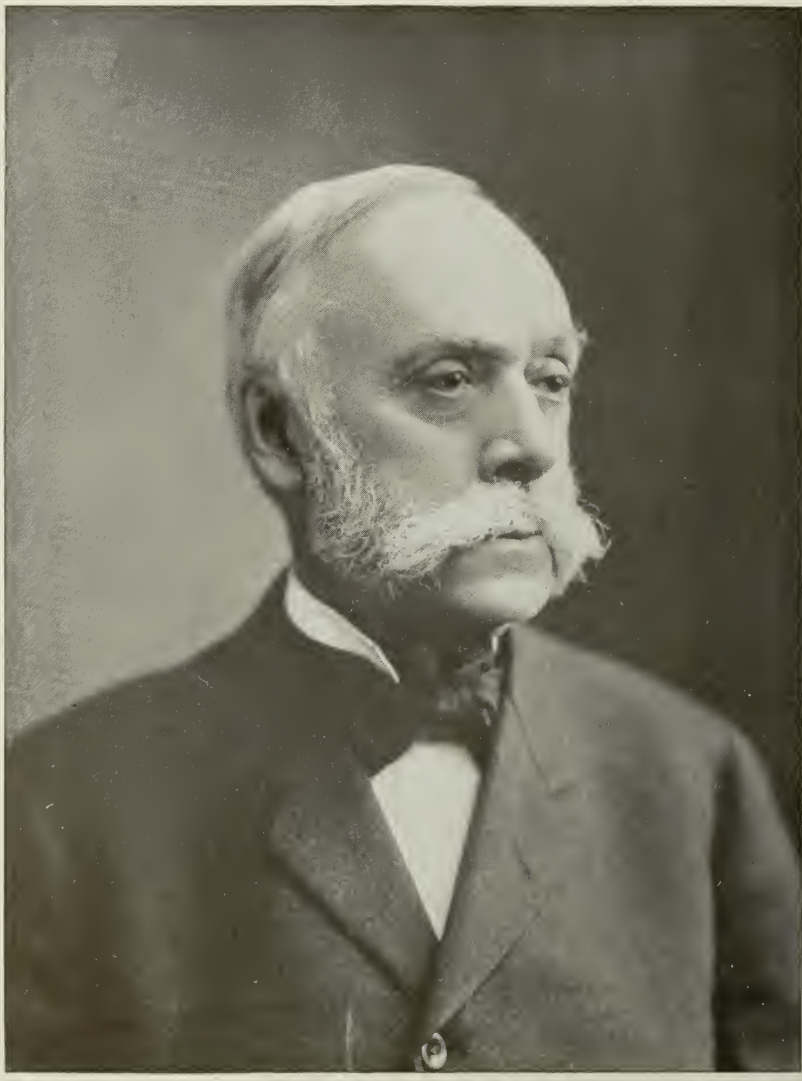
No. 1,073,893, to Leslie E. Eaton. Handle for dental impression trays.

September 30.

No. 1,074,169, to Ernest Fowler. Antiseptic tooth-brush receptacle.

No. 1,074,345, to Ernest C. Bennett. Artificial denture.

No. 13,621, to John L. Kelly. Dental instrument. (Reissue.)



DR. HENRY A. SMITH.

THE

DENTAL COSMOS.

VOL. LV. DECEMBER 1913. NO. 12.

ORIGINAL COMMUNICATIONS.

FUNDAMENTAL ERRORS IN ANATOMIC ARTICULATORS.

By JOSÉ VALDERRAMA, D.D.S. (Univ.Pa.), Madrid, Spain.

[Translation by the DENTAL COSMOS.]

AFTER a hasty perusal of the remarkable article on Anatomic Articulation published by Dr. Gysi (see "The Problem of Articulation," by Alfred Gysi, DENTAL COSMOS, January, February, March, April, 1910), I concluded that the problem of the articulation of artificial dentures had been definitely settled. The amount of data furnished was so great that, startled at first by the importance of his discovery, I felt that it would be impossible to add to the findings of this distinguished investigator. After a more careful study of his work, however, and having acquainted myself more thoroughly with his latest model, the Simplex articulator, I determined to make a thorough examination of the subject. To my great disappointment I found that the last word on this important subject had not as yet been spoken—that, in fact, the most important questions remained still unsolved.

PROFESSOR GYSI'S ONE INNOVATION.

Dr. Gysi seems to base his principle largely upon the studies of former investigators, but he further suggests a modification of the anatomic forms of artificial teeth;—this, in fact, appears to be the only innovation presented by Dr. Gysi. Although he succeeds in combating the common mistake of considering the curve of Spee as a compensating curve instead of a subsidiary curve, his work seems to lack the importance which it originally seemed to have in the construction of artificial dentures. The original part of his work consists in his clear determination of the compensating cusp and the modification of the occlusal surface of the molars, as well as the measure of inclination of the lingual surface of the upper incisors.

It is not my intention to minimize the merit of Dr. Gysi's work, for after many years of laborious study on this difficult problem he has given us some useful data that have contributed to a better understanding of the actual conditions of the temporo-mandibular articulation. Since Dr. Gysi, however, has overlooked some very important facts, I consider it my duty to attempt to rectify some of his mistakes by further research in this field.

BONWILL'S TRIANGLE.

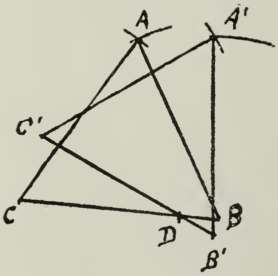
The gross error of all those who have undertaken the study of anatomic articulation lies in the fact that they have not given due consideration to Dr. Bonwill's remarkable ideas. They all try to demonstrate that he was wrong in his deductions regarding the anatomic articulator, thereby doing great injustice, I believe, to this investigator. In my opinion, all future efforts at designing an anatomic articulator will greatly profit from a more thorough study of Bonwill's maxillary triangle. In measuring some of Bonwill's triangles it is found that hardly any of them are equilateral, and this observation has led some to believe that Bonwill's statement was purely hypothetical. When judged from this point of view it is of course clear that Bonwill's law will not stand; but nobody has taken the trouble of finding out why this law does not hold good. Had efforts been made in this direction, the conclusion would have been reached that the maxillæ present a certain irregularity of occlusion, and naturally a law which is the expression of an ideal condition will not hold good in an anomalous case.

Even the ancient writers knew that there are mouths with teeth of abnormally large size, but in their observations they took into account merely the irregular arrangement of the teeth in the arch, without giving due consideration to the dimensions of the arch and of Bonwill's triangle. This relationship, of the significance of which I shall speak presently, is faithfully representable in accordance with Bonwill's triangle, for it is impossible to place the teeth correctly in the dental arch when the maxillæ are not of the proper dimensions. As soon as the maxillæ are restored to their normal proportions there will be sufficient space to accommodate the teeth in the arches, and all irregularity will disappear. There are cases, however, in which the proper relationship of the size of the teeth and the maxillæ is altered; then we have irregularities not exactly of position, but of lack of proportion in size, and this requires a special study.

ERROR OF ANATOMICAL ARTICULATORS IN LATERAL MOVEMENTS.

In the course of this investigation I shall discuss several points which have heretofore been misapprehended, and the consequent misrepresentations accepted almost as axiomatic truths. It is generally believed that the mandible in its lateral movement swings in the condyle; all the anatomic articulators were equally defective until Dr. Gysi in his articulator adopted an improvement in this respect. I shall prove, however, that he failed to profit from the teachings of Dr. Walker, who pointed

Fig. 1.



out the error in the lateral movements of the anatomical articulators (see Fig. 1).

The triangle A B C swings in point D instead of B. These points which in nature are true axes, we shall denote as axes of rotation. Dr. Gysi, however, studied the slant of the condyle through the eminentia articularis of the temporal bone so carefully that we owe to his investigations the present anatomic molds, which are correct as far as the inclination of the occlusal planes is concerned, though they are defective in their mesiodistal dimensions. The only cause for Dr. Gysi's error, as far as I can see, is that he failed to study Bonwill's triangle, and concentrated his efforts upon less important, though perhaps interesting details.

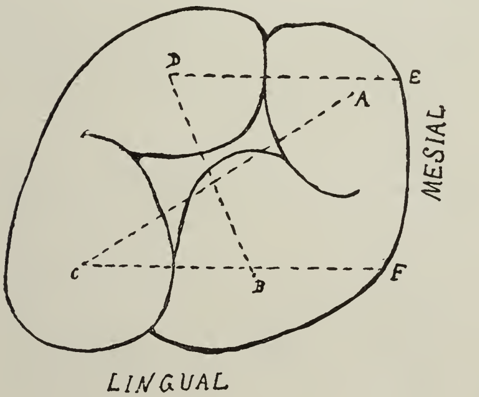
It has been fully established that a correct articulator must not only represent the movement of the condyle, but must also permit of setting up the models in such a manner that the alveolar borders occupy the same distance from the condyles as in the human mouth. It is furthermore of the greatest importance to maintain the greater or lesser parallelism of the alveolar borders in relation to the position of the condyles. Careful study of these details by investigators of note has resulted in the designing of articulators which facilitate the study of this relationship between the condyles and the alveolar arches. Preference is given, however, to the ideal arrangement of the teeth in relation to the condyles during the process of mastication, while in reality the relations of both of these factors, statically considered, should have been studied first.

DIMENSIONS OF OTHER TEETH REPRESENTED IN CERTAIN DIMENSIONS OF THE MOLAR.

We should first consider the simplest relation, viz, that of the teeth toward one another. If there be such a relation, how is it that, though we have anatomic articulators and aim to copy anatomic articulation, our artificial teeth are not made accordingly?

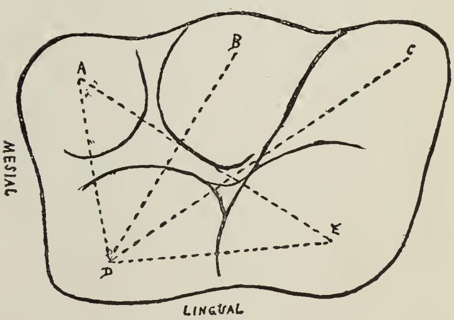
A macroscopic study of the teeth tends to show that the molars are a combination of simpler forms of teeth, and that, as can be seen in Fig. 2, the dimensions of other teeth are represented in this most complex tooth. For the purpose of our deductions we shall study the first molar, which is the most complicated but has the most important masticatory function and occupies the most important position in the arch.

FIG. 2.



The upper central incisor is equal in mesio-distal dimension to the distance between the mesio-buccal and the disto-lingual cusp, or A C. The lateral incisor is equal to the distance between the mesio-buccal angle and the disto-buccal cusp, or E D. The canine is equal to the distance between the mesio-lingual angle and the disto-lingual cusp, or F C. The first bicuspid is equal to the distance between the mesio-lingual and the disto-buccal cusp, or B D, and the second bicuspid is equal to the distance between the disto-lingual and the disto-buccal cusp, or D C. I have observed that when the first bicuspid is wider mesio-distally than the second bicuspid, which is most commonly the case, the first molar shows a greater distance from the disto-buccal to the mesio-lingual cusp than from the disto-lingual to the disto-buccal cusp.

FIG. 3



In the lower teeth the central incisor is equal to the distance between the mesio-buccal and the mesio-lingual cusp, or A D (Fig. 3). The lateral incisor is equal to the distance between the mesio-lingual and the disto-lingual cusp, or D E. The canine is equal to the distance between the disto-lingual and the mesio-buccal cusp, or E A. The lower first bicuspid is equal to the distance between the mesio-lingual and the middle buccal cusp, or D B, and the lower second bicuspid is equal to the distance between the mesio-lingual and the disto-buccal cusp, or D C. It is peculiar though less frequent, that when the lower first bicuspid is equal to the second bicuspid, the disto-buccal cusp is either absent or very rudimentary.

NATURE'S PATTERN FOR THE MORE IMPORTANT DIMENSIONS OF ARTIFICIAL TEETH.

Thus nature furnishes us with a pattern from which we should be able to reproduce artificially the most important dimensions of the teeth for our anatomic purpose. It is useless to try to obtain perfect results with sets of artificial teeth which resemble the natural teeth merely in color.

New molds have recently been put on the market which show an improvement over the old ones, this improvement consisting in the size of the molars and their masticating surfaces, which occlude with their antagonists in such position as to save the operator the tedious task of grinding off the unnecessary surplus of porcelain. I have noticed, however, that while some molds conform to the above-mentioned rule in regard to the mesio-distal dimension, this important rule has been entirely disregarded in other molds. This deficiency I am convinced, could be corrected if my observations were duly considered. This is not a presumptuous claim—for by moving forward and backward the first molar, and either narrowing or widening the mesio-distal diameter of the teeth as compared with what they really should be, we shall never be able to obtain the exact relationship between the condyles and the occlusal surfaces of the molars. The compensating cusp, therefore, will not have the right place either as regards position or as regards dimensions in relationship to the axes of rotation. The three points of contact demanded in the occlusal and incisal surfaces will not be correct, because the articulator is directly influenced by the models, viz, by the alveolar arches, so that these may allow room for teeth of sizes different from those which are naturally required.

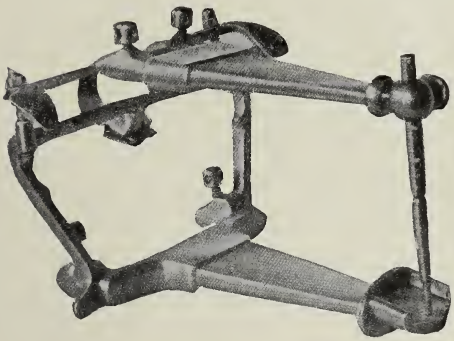
It seems strange that no special rule is followed in the selection of teeth for every individual case. There is a rule which has some merits, but is not scientific enough to be relied upon by the dentist who wishes to obtain accurate results. This rule is used for determining the position of the distal surfaces of the canine by the commissure of the lips when closed, but it is evidently unsatisfactory for obtaining exact results. It is ridiculous to employ a complicated arc to learn the exact position of the models on the articulator and the condyle path, and afterward use a method of more or less the same nature for the selection of the teeth.

Here we have to turn once more to the equilateral triangle. It has been emphatically asserted that articulation is not a haphazard movement, but one that is immutably based on well-established principles. If this is so, why do we not apply the same rule to the selection of artificial teeth? Each mouth requires a special size of teeth. The length of the side of the triangle may vary in different persons, as has been noted by Bonwill, who assumed a side of four inches to be typical, but the relative length of the side of the triangle as compared to the mesio-distal width of the teeth is always constant.

SHORTCOMINGS OF DR. GYSI'S "SIMPLEX" ARTICULATOR.

Dr. Gysi, in his endeavor to simplify all the operations necessary for obtaining the desired results, and to establish an anatomic articulation, introduced the Simplex articulator (see Fig. 4), with several accessories. But the problem is really not solved if we compare the efficiency of this apparatus with that of other anatomic articulators. The conditions to be taken into account in each case vary so greatly that it is unscientific to disregard their significance and to argue, like Dr. Gysi, that it is impossible to induce all practitioners to familiarize themselves with all the scientific detail necessary for the use of his articulator and for the exact reproduction of the movements of the mandible. If, of course, he is looking only for financial success, I have nothing to say against his Simplex articulator. On the other hand, if his idea was to present this articulator as an improvement over others, even though it be free from some of the imperfections of the Kerr, the Gritman,

Fig. 4.

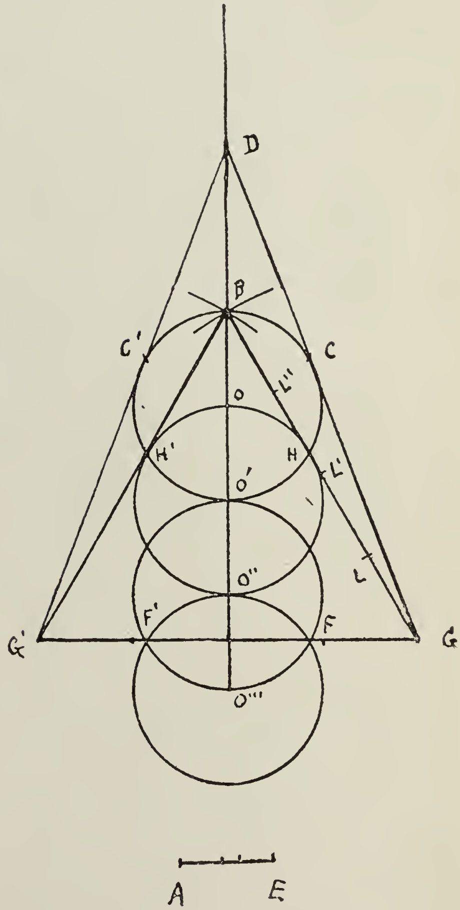


and other articulators, it possesses other defects in contradiction of Dr. Gysi's own statements which make it even worse than the others. Why should we emphasize the importance of the compensating cusp and of the axes of rotation, etc., and then proceed to say that these factors are not so essential?

ON THE RELATION BETWEEN THE SIDE OF THE BONWILL TRIANGLE AND THE MESIO-DISTAL WIDTH OF THE TEETH.

What, then, is the relation between the side of the triangle and the mesio-distal width of the teeth? I have formulated this relationship by saying that the sum of the mesio-distal widths of the central and lateral incisors and of the canine on one side of the mouth is equal to one-fourth of the total length of the side of Bonwill's equilateral triangle. Let us see how we deduct, *a priori*, the size of the three teeth mentioned from the one-fourth of the equilateral triangle (see Fig. 5). Let B G be the side of the equilateral triangle, and let the distance L G be equal to the line A E, below, or the sum of the mesio-distal widths of the central, lateral, and canine. With A E as radius, a circle O is drawn, B O being equal to A E, and we mark the arcs B C and B C′. Upon the prolongation of the diameter B O′, the distance O′ C is transferred, making B D equal O′ C, and the tangents D C and D C′ are drawn and prolonged. Around point O″ on the prolongation of the diameter B O′ another circle

Fig. 5.

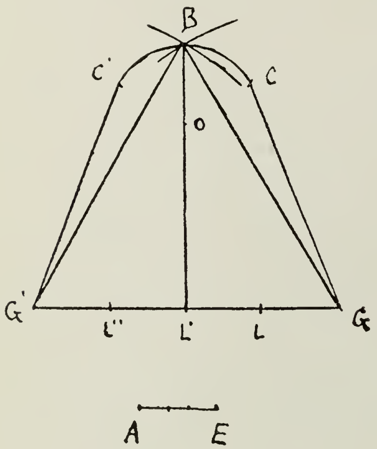


O″ is drawn with radius A E, and in the same way a circle O‴. The circumferences of circles O″ and O‴ intersect each other at F and F′. These two points are united, and the line F F″ is prolonged on either side until it meets the prolongations of the tangents D C and D C′ at G and G′. The lines B G and B G′ are drawn, and on one of the sides of the triangle B G G′ thus formed, the radius

A E is measured off, when it will be seen that A E can be marked off four times on a side, making G L plus L L′ plus L′ L″ plus L″ B equal 4 A E. In other words, the sum of the mesio-distal widths is contained four times in the side of Bonwill's equilateral triangle corresponding to the maxilla to which these three teeth belong.

We may employ Dr. Hawley's method for describing the parabola, it being better known than mine, and simply draw the circle O and the arcs B C and B′ and O′ H and O′ H′, then measure off the distance B D, draw the sectors B H and B H′

Fig. 6.



and the tangents D C and D C′, and prolong both to their intersection at points G and G′, which represent the condyles.

I prefer, however, a simpler method which is based on the previous observation and has the advantage of involving fewer lines and circles, therefore fewer possible errors (see Fig. 6). On the line G G′ starting from the point L′, the distance A E is measured off on either side, making L′ L plus L G equal L′ L″ plus L″ G′, G G′ to form the base of the equilateral triangle. The vertex B of this triangle is obtained by describing circles with radius G G′ around the points G and G′. In order to find the parabola we draw the perpendicular B L′, and from B measure off the distance B O, equal A E. Around O we describe a circle with a radius A E, marking off points C and C′, with a radius B O, which, as we have seen, is one-fourth of the total length of the side of the equilateral triangle. By drawing the lines C G and C′ G′, the parabola is obtained.

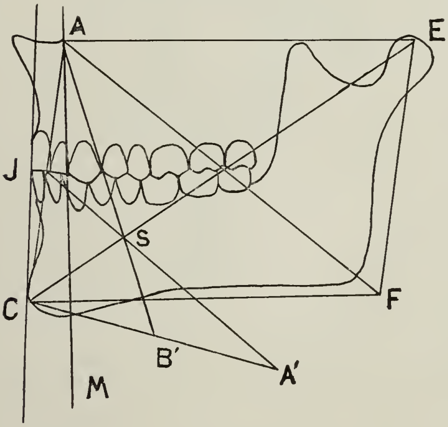
WELL-DEFINED RULES IN THE SELECTION OF ARTIFICIAL TEETH.

We very rarely find a case in which the lower is represented with exactness, but if due consideration be given to this law, little effort is required for discovering all the irregularities in the individual face, and not only those of occlusion—which is the only feature that Hawley, Herbst, and others have been able to establish. Even in fairly perfect occlusion, the law of the intermaxillary parallelogram and the law of the profile, which I have discovered, will be appreciated, though there be no absolute perfection in the occlusion under observation. I do not care to go into the details of this point, not wishing to offer tedious and complicated explanations.

It has been demonstrated that the selection of teeth is not a haphazard matter, but subject to perfectly fixed and well-defined rules. My remarks up to this point refer to the mesio-distal width of all the teeth, and I have proved that Dr. Gysi has overlooked this dimension in forming his new molds of artificial or "anatomic" teeth, as he calls them. It is inconceivable that such an intimate and exact relationship should exist between the side of the equilateral triangle of the maxilla and the sum total of the widths mesio-distally of the lateral, central, and canine, without there existing any relationship between these three teeth and the others of the set.

We know, then, the relative width of the artificial teeth to be used. In the following I shall show that the mathematical accuracy of my findings does not only apply to these dimensions, but holds good in any measurement we may take, and we shall see how the arrangement of these three teeth is related to the maxillæ. In Fig. 7, let us mark the four points of reference A E C F, proposed by me, and after having joined them and formed the intermaxillary parallelogram, let us draw the diagonals A F and E C. After making angle A′ C E equal angle A C E, and A′ C equal C A, C A′ is bisected at B′ and united with A. The line A B′ then forms a tangent to the distal surface of the upper canine in normal cases. The diagram makes us realize what important conclusions we may draw therefrom. A J is equal to J C, which in the perfect skull is equal to the gliding surface of the lingual surface of the upper central incisors. C B′ is equal to B′ A′,

Fig. 7.



therefore the point of intersection of A B′ and A′ J will coincide with the point S of the axis of symmetry C E. If it does not coincide, we at once see whether point S lies above or below the axis C E, that is, whether J C is longer than J A, or the reverse. Therefore without the patient having to open his mouth we note whether the line of occlusion is normal or not. What has been said of angle C A E applies to angle A C F, the line that in angle C A E is represented by A B′ coinciding with the distal surface of the canine, and we can therefore draw the same conclusion regarding point S, which in angle A C F we can call S′. In the diagrams, Figs. 8 and 9, which have been drawn from photographs of natural skulls, it can be seen that the distal surface of the canine is at variance with the rule, which is sufficient evidence for diagnosing mesio-occlusion, as confirmed by the point of intersection of the diagonals and by the line of profile. Supposing my rules to be mathematically correct, it is to the irregular cases that they apply most, because we can see to the

Fig. 8.

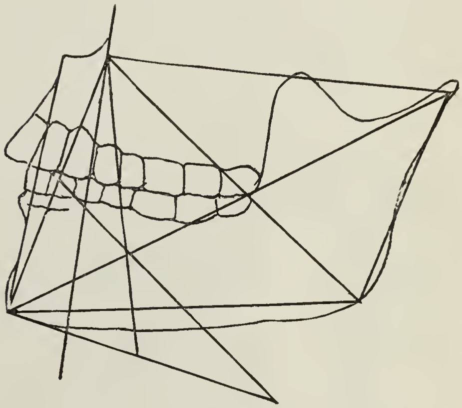
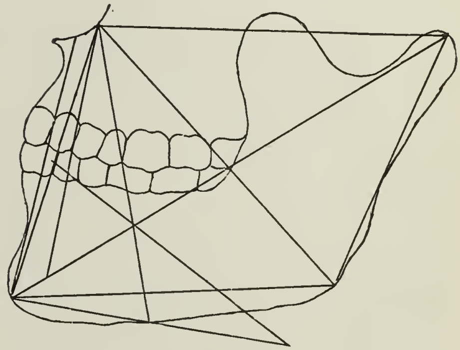


Fig. 9.



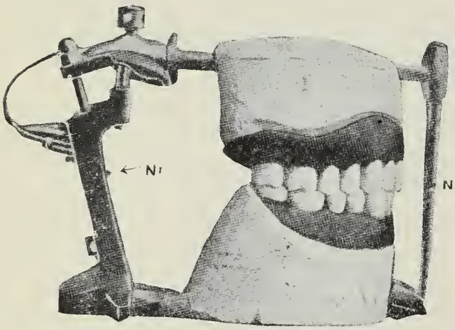
very millimeter how far they differ from the normal, which it has hitherto been impossible to find out, inasmuch as previous to my discoveries nobody knew the size or position of the teeth in the arches, nor their position and relation in the maxillæ, nor their relationship toward one another, nor their relation in regard to the rest of the skull.

Dr. Gysi states that in abnormal cases it is not advisable to make perfect prosthetic pieces; but let me ask, What rules has he given for distinguishing these abnormal cases and determining the imperfections which they present?

THE INCISOR GUIDE BASED ON AN AVERAGE MERELY.

A feature of greater importance in Dr. Gysi's articulator is the incisor guide and the axes of rotation in the mandible. This incisor guide (see N², Fig. 10) is all right as far as it goes, but although he has assigned to it the important function of determining the degree of inclination

Fig. 10.



of the lingual or gliding surface of the upper centrals, he has been obliged to desist from adjusting it in every case, and for this contrivance has determined from average use merely, thereby limiting its exactness. As to the axes of rotation, he first emphasizes the fact that it is impossible to obtain perfect mastication unless we reproduce the free movement of the mandible in our prosthetic work, while he then states that this theory cannot be applied to each individual case, and leaves off from his articulator all changeable and movable parts, adjusting everything to some arbitrary measure which is very different from the conditions actually found.

I cannot understand why all designers of anatomic articulators make the mistake of putting rigid bars between the condyles. Dr. Snow, and after him Dr. Gysi, have used the face-bow to determine the exact distance of the mesial point of the parabola as regards the condyle. He therefore must appreciate the enormous importance of this fact, which is nothing but an interpretation of Bonwill's triangle. Knowing the merit of this triangle, why should these men then insist upon destroying its equilaterality? What weighty reason have they for disregarding so deliberately an established principle?

THE THREE IMPORTANT FACTORS.

The problem of articulation is based on three important factors, the careful

Fig. 11.

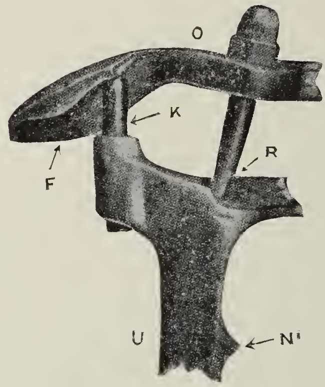
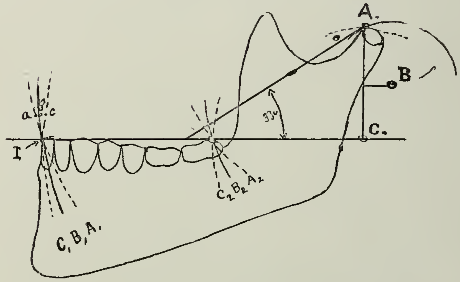


Fig. 12.



consideration of which will insure perfect results. These are—First, the condyle path. Second, the axes of rotation. Third, the size of the teeth. For a long time it was believed (and all anatomical articulators are based upon this principle) that it is only necessary to know the condyle path, until Walker, and shortly after him Gysi, showed the importance of the axes of rotation. I have demonstrated, further, how essential it is to consider also the mesio-distal width of the teeth.

Gysi remarks that it is very difficult to determine the first two factors—the third one he ignores entirely—since each case requires a great deal of careful testing, and after compiling all available data he formulated tables which enabled him to group into four classes the teeth to be employed, relating them to the condyle path. Each case presents a different condyle path, he says, but the variation is slight as far as these four groups are concerned, and he therefore gives his articulator a fixed and conventional inclination of the condylo-temporal slant (see Figs. 11 and 12). This is rational, since this path only indicates to us the degree of inclination of the slanting cusp surfaces. It does not matter whether we know their inclination or not, because this factor is present in every case, and in testing the articulation we can see whether the error is of any great account. The other two factors Gysi leaves out of consideration entirely. The axes of rotation he has tried to reproduce in his articulator; but, though recognizing the great importance of this factor, he fails to indicate a precise rule for readily determining these axes. He says that without an exact knowledge of these axes the canines cannot be placed in their correct position, which will prevent the lateral displacement of the plates.

Fig. 13.

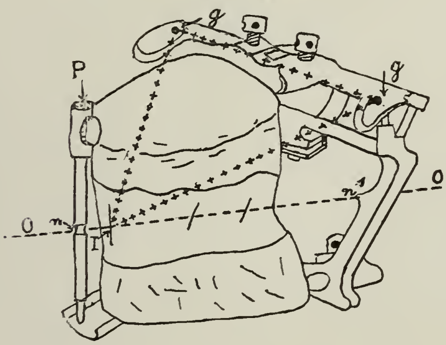
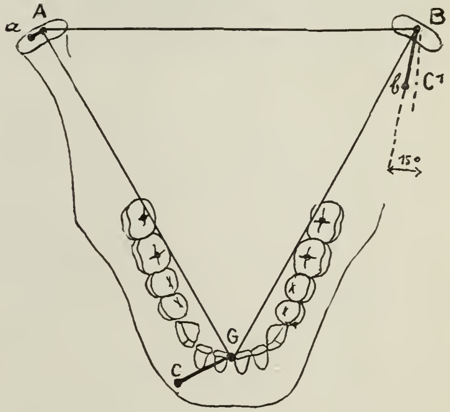


Fig. 14.

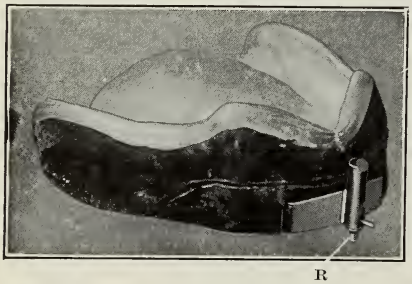


Neither does Gysi refer to the width of the teeth, because he fails to recognize the importance of this factor in its bearing upon articulation. The process of determining the axes of rotation is a rather complicated one, and Gysi was so fully aware of this difficulty that in his last articulator the axes of rotation occupy two fixed points representing the mean distance found in the cases observed by him. Where do we stand, then? Is it, or is it not, indispensable to know the exact situation of the axes of rotation? If it is indispensable, a method for their easy determination must be found, but Gysi should not have made the mistake of making them fixed in his articulator—because thereby he only contradicts himself.

After some study I have devised a method for determining mathematically in a few minutes the correct situation of the axes of rotation in every case.

Gysi employs the following process for determining the movements of the lower incisors over the lingual surfaces of the uppers. He inserts two plates of modeling compound held together by gum tragacanth in the patient's mouth (see Figs. 15 and 16). In the upper plate a graphite pencil, R, is fixed, which being influenced by a spring has a tendency to glide downward. The lower plate carries a horse-shoe-shaped metal plate S, to the upper surface of which a recording card is attached. Placing both plates in the mouth, the median line coincides with R and M. If the patient moves the mandible to one side, one of the lines M K will be marked by the pencil, depending upon whether the mandible is moved to the right or to the left. After learning the path of the lateral movement of the lower incisors over the lingual surfaces of the upper, we only have to remember that this path depends

Fig. 15.



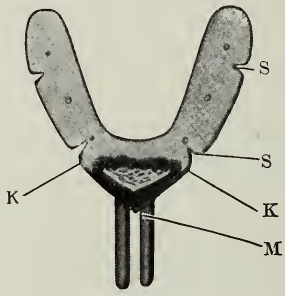
on the relationship of the axes of rotation to the mandible, the condyles being the true posterior guides of the mandible in this movement, in the same manner as the lingual surfaces of the upper incisors are related to the anterior portion of the mandible.

METHOD OF DETERMINING THE AXES OF ROTATION.

In order to determine the axes of rotation, I pick up the recording card on which the incisor path is drawn, and carefully measure the distance between K and the condyle. The modeling-compound plate being in correct occlusion coincides with their median line. After determining these two points, let us reconstruct Bonwill's equilateral triangle (see Fig. 17): Let A B be the base of the triangle, or the distance between the condyles; B C the side of the triangle, the measure for which I have obtained in the patient, and A C, the third side of the triangle with vertex C, on which I place the recording card that I have removed from the modeling-compound plate. As the position of the recording card at point C may vary from normal, I figure the distances between the end of the path C E or C D and the condyle. I have already pointed out that the triangle A B C will furnish us with some valuable data for perfect articulation, and we also know that the side A B gives us the width which the central, lateral, and canine should have.

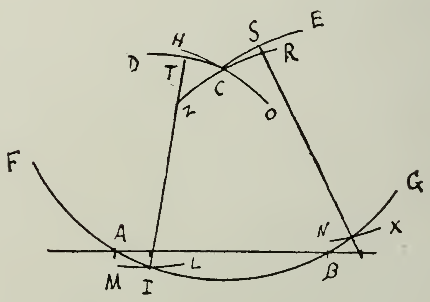
It is well to consider that in the cases in which there is a great difference in

Fig. 16.



the lengths of the sides of the triangle, we should not select at random any one of the sides and divide it into four parts in order to find the total width of the three teeth mentioned. In such cases, the average length of the sides of the triangle must be determined so as to

Fig. 17.



make an equilateral triangle and to obtain an harmonious result.

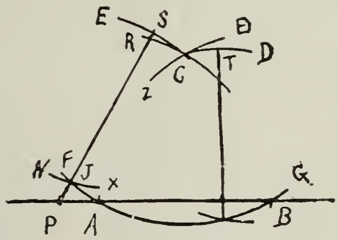
In order to determine the axes of rotation in a given case, I reconstruct the triangle and place the record card in position; using C as center, an arc F G is drawn so that it passes through the condyles A and B. With the same radius and using D as center I draw the arc M L, which will intersect arc F G in I.

Before proceeding farther, I wish to

emphasize the fact that the arcs of the path the centers of which lie outside of the line connecting the condyles are farther away from the base of the triangle than the regular slanting curve of the vertex; if the triangle swings upon each one of its corners—in other words, if the center of the curve C D lies upon the line connecting the condyles A and B —the curve C D will be found nearer the base A B than the curve C H, which is the one that passes through the point C if we make the triangle swing on A.

In the same way, if the path curve C E lies outside of line A B, it will be found

FIG. 18.



farther away from the base A B than the regular arc C R.

We know, then, the point in which the arc M L intersects arc F G. Joining the middle of the arc D C with point I, it will be seen that the line T I intersects the base A B in one point, which is the axis of rotation of the curve D C. In the case of the curve C E, the arc N X is drawn with radius C B around point E; this arc will intersect the arc F G, and when the middle of the curve C E, or S, is connected with this point of intersection, and this line of connection is prolonged, the point in which it intersects the base A B is the axis of rotation of the curve C E.

When the triangle A B C is not equilateral (see Fig. 18) we proceed in the same way, only with the difference that we draw the arc F G with the radius B C when dealing with the curve D C, and with the radius A C when dealing with the curve C E. Thus the arc F G fits only the equilateral triangle, and is independent of the angles A and B when we have a triangle that is not equilateral. In drawing the arc N X corresponding with the cuve C E, we use, of course, the radius C A, and for curve D C the radius C B.

As is seen, this process is neither difficult nor complicated, though it has cost me many hours of hard work.

In the foregoing we have analyzed the three factors that we proposed to study, and the explanations given cover the entire problem of articulation in its most essential points. This means a great deal to the prosthetist who looks for results that guarantee stability and perfect occlusion in this work.

SUMMARY.

In conclusion, I will summarize my studies as follows:

First. The sum of the mesio-distal widths of the central, lateral, and canine on one side is equal to one-fourth of the total length of the side of Bonwill's equilateral triangle.

Second. The mesio-distal dimensions of the other teeth are not arbitrary, but stand in close proportional relationship to the dimensions of the first molar.

Third. The present anatomic articulators should be modified by rendering the distance between the condyles adjustable, so as to enable one to obtain the base of an equilateral triangle.

Fourth. In each case we must determine the axes of rotation, to adjust the set-screws which represent them in the anatomic articulator at the correct distance from the condyles, by means of the calculation herein suggested.

DEFORMITIES OF THE JAWS FOLLOWING TREATMENT FOR SPONDYLITIS.

By Dr. Med. O. TREYMANN, Zahnarzt, Berlin.

[Translation by the DENTAL COSMOS.]

THE paper of Dr. G. Lind of Amsterdam, on "Deformity of the Jaws Caused by the Extension Bandage in the Treatment of Spondylitis," published in the January 1913 issue of the DENTAL COSMOS, page 13, is of general interest to medical as well as dental practitioners, as the writer's observation is not an isolated one, but ever since Calot's therapeutic experiments in the treatment of gibbosity ("hunchback") it has repeatedly given rise to scientific researches in various countries, though no satisfactory solution of the problem has been arrived at.

The progress, however, that has been made in the field of orthodontia, together with the improvements in the orthopedic treatment of scoliosis (spinal curvature), is apparently bound to do away with the undesirable sequelæ by the institution of suitable precautionary measures. In his classic monograph, Ménard[2] in his chapter on "Pathologic Anatomy and Therapy of Spondylitis," speaks of deformities of the jaws being caused more or less frequently by months of wearing a corset with a collar-like head support. (See Fig. 1.) After mentioning the untoward effects upon skin and muscles, chest and abdominal organs, he says of the dental deformities: "Often the angle of the lower jaw is slightly altered, and the dental arches are displaced, the lower posteriorly, the upper anteriorly."

Ménard's statements were supplemented by the demonstration of three cases given by Drs. Spitzer and Werndorff,[3] in 1907, before the Congress of the German Society for Orthopedic Surgery, under the title of "Entropion [introversion] of the Mandible."

These jaw deformities had been produced within from three to six months by Calot's extension bandages extending around the chin, and they exhibited the following similar typical characteristics: "By the leather strap extending around

FIG. 1.

the chin portion of the mandible, the alveolar arches and the lower anterior teeth had been pushed back lingually two centimeters behind the upper teeth." In another case observed by Dr. E. von der Osten-Sacken in Professor Turner's clinic in St. Petersburg,[1] the temporomaxillary joint had been distended so as to produce subluxation of the mandible accompanied by extremely painful ankylosis. Upon cutting away the chin portion of the plaster collar, return to normal occurred within one year.

The investigations of Dr. von der Osten-Sacken published in the statistics of the orthopedic clinic of Professor Turner,[1] furnish us with some interesting data as to the origin of these jaw deformities the consequences of orthopedic treatment by braces, continued careful observation showing that, during the application of various appliances for extension, not only the chin-plate of the supporting corset, but the very weight of the head itself and the impediment in masticatory function, sufficed, especially during the period of second dentition, to produce a deformity of the alveolar arches, anomalies in the position of the teeth, and above all a retardation in the growth of the mandible. "The untoward stimulus need be neither permanent nor intense, only irritating and frequent."

Neither is this surprising, since modern orthodontia has proved how extensively the alveolar arches react not only toward mechanical, but also toward functional stimuli, whether of pathological or of physiological nature. Thus alveolar protrusion in children is produced mechanically by continual sucking of the middle finger, and upper prognathism combined with trapeze-shaped flattening of the mandible and the mandibular arch by sucking of the thumb, which acts as an inclined plane. In this category belong also the deformities caused by macroglossia, neoplasms, and cicatricial tension. Of functional origin are the deformities of the jaws in mouth-breathing, in paralysis of the facial nerve (see Perthes[4]), in ankylosis of the temporo-maxillary joint, in congenital absence or operative loss of the masseter and temporal muscles, as well as all the changes in the direction of growth of the body of the jaw and coronoid process due to changes in the direction of muscle strain during fetal life and after birth.

The published cases show that the faulty construction of the supporting corsets always produces a typical retardation in the development of the mandible longitudinally as well as a retroversion of the alveolar arches, while secondarily prognathism of the maxilla and its alveolar arches occurs.

A side view of the head as carried by the typical kyphotic, or hunchback, reveals a certain resemblance with the "bird face" in the micrognathous,[4] and the so-called Aztec heads described in anthropology, which are also to be ascribed to retardation of growth at an early stage of development. (See Fig. 2).

Fig. 2.

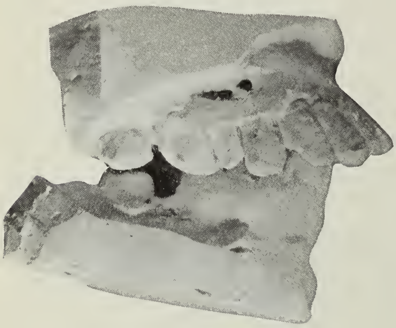
Patient of seventeen, with congenital underdevelopment of the mandible and trismus (v. Langenbeck, *Arch. f. klin. Chir.*, vol. i.)

From the above considerations it seems as if Dr. Lind's proposition,[7] to replace the chin-support of leather by an accurately fitting metal appliance made after an impression, would be as unsatisfactory as a retention coffin plate, unless at the same time the corset supporting the head is shaped so that the anterior mandibular arch is relieved of all pressure, and the burden of the weight is transferred to the occiput and the mastoid processes, so that the head is free to turn and mastication is unimpeded.

A certain degree of improvement in this direction might be obtained with those modern appliances which are employed in the orthopedics of the diseased spine, in scoliosis or kyphosis, by means of the "reclination" method instead of the "extension" method formerly employed.

It should not be left unmentioned that specially careful attention is to be devoted to the alterations in the jaws of tabetics that are being treated by the so-called suspension method, which involves considerable stretching of the spinal column; since, owing to trophic disturbances occurring in the trigeminal area, complete loss of sensation may ensue, followed by atrophy of the alveolar arches, and even brittleness and fracture of the bone. In these cases the employment of interdental splints for temporary treatment, and the most recent Angle appliances (see DENTAL COSMOS, January 1913, page 1) for prolonged treatment, seems to be indicated as a precautionary measure.

FIG. 3.



As an addition to the literature on these cases, the casts from a woman of forty years are reproduced (see Fig. 3) showing a jaw deformity which has remained as a sequel to treatment for spondylitis instituted during the patient's childhood, and which, owing to the application of suitable supporting appliances, has assumed a tolerably stationary character. The lower alveolar arches are shortened and narrowed, the bicuspids and first molars showing considerable inversion. The prognathous projection of the upper jaw is probably of secondary origin, due to pressure of the lower anterior teeth from below upward. Possibly we have to deal with compensating processes of growth according to Wolff's law of transformation. No history of hereditary influences was present in this case.

Judging from our present survey of this field of typical jaw deformities, modern orthodontia undoubtedly commands sufficient technical means to open a fertile field for its activity in co-operation with orthopedic clinics, and to offer the benefit of rational treatment to many of these pitiful cases.

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SOMETHING OF THE ETIOLOGY AND EARLY PATHOLOGY OF THE DISEASES OF THE PERIDENTAL MEMBRANE, WITH SUGGESTIONS AS TO TREATMENT.

By ARTHUR D. BLACK, A.M., M.D., D.D.S., Chicago, Ill.

(Read before Section II of the National Dental Association, at its annual meeting, Kansas City, Mo., July 8, 1913.)

THE consideration of diseases of the soft tissues adjacent to the teeth has always occupied a prominent place in the literature of dentistry, and yet a review of many articles cannot fail to impress the fact that there has been little effort to mention in detail and proper sequence the pathological changes which take place in these tissues, nor to separate definitely several of the most common lesions which we are constantly called upon to treat. As a natural result the profession has apparently failed to recognize and differentiate these lesions and has also failed to apply treatment during the early stages, while there is the opportunity to cure them. This seems to be partly due to the fact that the elapsed time between the initial lesion and the serious injury which requires the loss of the tooth for its cure is so great—often so long in a single case as the total number of years devoted to practice by many of our profession. I have records of several cases, the earlier years of these records having been made by men in practice before my time, in which more than thirty years have passed from the time of the original inflammation to the final loss of the teeth. It is, therefore, very difficult to secure complete data for individual cases, but we may learn much from the observation of many cases in different stages of progress.

If the statements which will be hereafter made are true, the attitude of the profession toward this group of diseases must be greatly changed. Instead of years of treatment, generally ending in lost battles, there must be more decisive early action, in which lies our hope of success. It is the intention that this paper shall present in detail information which the writer has been able to gather regarding the etiology and early pathology of three distinct conditions, and to follow each to its termination. This is done with the realization that these tissues are involved from other causes, but with the belief that those to be mentioned cover a very large majority of all cases. This presentation will be principally clinical, and the various suggestions made as to treatment will be those which seem to be rationally indicated by the conditions.

It should be stated that the writer has had access during the past winter to the manuscript of Dr. G. V. Black for a book on the pathology of the soft tissues adjacent to the teeth, and has not hesitated to draw very freely on that manuscript for material relative to deposits of calculus, credit for which is hereby given. It might also be said that the work of investigation in this field which has been done by your essayist during the past few years has been developed under the direction of the above-mentioned gentleman, and it is a pleasure to make acknowledgment thereof also at this time.

If we seek the initial lesions which lead to inflammations of the peridental membrane, we shall find practically all of them in one or the other of two tissues, the pulp of the tooth or the free margin of the gum—the gingivæ. The initial lesion is, then, a pulpitis or a gingivitis; in the one instance the first involvement of the peridental membrane is at the apex of the root, in the other, at the gingival line of the tooth. Except from occasional accidental causes, such as an inflammation resulting from a hole drilled through the side of a root, peridental inflammations do not start anywhere but at the end of the root or the gingival line. In this paper, consideration is confined to the group beginning at the gingival line.

If we recognize the fact that for every such case of inflammation of the peridental membrane there must be a preceding inflammation of the gingivæ, we should look first at the gingivitis, together with the various conditions which cause it, and follow the progress of the inflammation as it gradually involves and destroys the peridental membrane. We should at the same time have constantly in our minds the question of the treatment indicated in the various stages, which might check the further progress of tissue destruction.

SALIVARY CALCULUS.

Recent investigations seem to disprove the theories which have been held by the profession for many years relative to the manner in which salivary calculus is deposited. I quote the following from Dr. G. V. Black: "I am slowly, by each successive step, being driven to the conclusion that the thought of a precipitate of calcium salts from the saliva, so long held—by myself and all the rest—has been a myth. It seems now that calculus comes into the mouth as a finely divided and semi-fluid calcoglobulin, which, with the decomposition of much of the colloid elements, hardens into stony calculus." Particular attention is called to the fact that this calcoglobulin is very soft when it is first deposited, and from twenty-four to forty-eight hours are required for it to become hard. Another very important fact is that the outpouring of the calcoglobulin is decidedly paroxysmal, and each occurrence is of short duration, following within a few hours after a hearty meal. These paroxysms are due to a lack of balance between the amount of food taken into the system and the regular eliminative process. The kind of food ingested seems to make little difference; if the quantity is more than can be properly disposed of through the natural nutritional and eliminative processes, the excess is thrown into the system and is eliminated through the salivary and other glands and fluid excretory routes. These paroxysms are so definitely related to excesses of eating that one may determine in advance with considerable accuracy the time of beginning and the duration of the outpouring of the deposit; in fact, one may control the deposit by the diet. For the benefit of those who may not have read the already published papers on this subject, it may be stated that the study of the deposit is made very simple by the use of specially ground microscopical cover-glasses held in a gold frame in the mouth in the region of the buccal surfaces of the upper molars. These cover glasses may be removed and the deposit prepared for microscopical study without disturbing it.

Deposits of this material occur first on the surfaces of those teeth closest to the openings of the ducts of the parotid and sublingual glands, and in the most sheltered positions on those surfaces which are least affected by the natural scouring processes, viz, near the margin of the free gingivæ on the lingual surfaces of the lower incisors and the buccal surfaces of the upper molars. It may gradually spread to other teeth and other surfaces. Except in cases of long standing, the deposits are usually confined to buccal or lingual surfaces, and do not involve proximal surfaces. This deposit is at first white or very nearly transparent, and quite soft, and while soft it seems to cause no inflammation of the gingivæ. Attention is called to the fact that this deposit occurs on the exposed surface of the tooth, and not under the free margin of the gum. It does, however, encroach upon the free margin sufficiently to cause a slight inflammation of this tissue, as a result of which the gingiva becomes thicker and recedes a little, both of which changes give opportunity for additional lodgment, by presenting a broader shelf adjacent to the tooth. Additional lodgment causes additional inflammation and recession, and so the process continues, gradually destroying, first the gingivæ, then the gum tissue and peridental membrane, together with the alveolar process to which the latter is attached, exposing more and more of the root, until so much of the tooth socket is destroyed that the tooth becomes so loose that it may be removed with the fingers. The inflamed tissue bleeds on the slightest irritation, although there is seldom complaint of either pain or tenderness until the tooth has become quite loose. There is commonly an accompanying pyogenic infection of the soft tissues, but rarely a destruction of the peridental membrane in advance of the destruction of the overlying tissues. Our picture, then, of the typical case of salivary calculus is one in which there is a gradual accumulation of the deposit with a corresponding disappearance of the tissues overlying the crown and root surface, usually without the formation of pockets about the roots of the teeth, but generally accompanied by suppuration.

SERUMAL CALCULUS.

Serumal calculus is different from salivary calculus in the form, color, position, and source of the deposit. The nature of the deposit itself is, however, practically the same. It is thrown out with the serum into the subgingival space, and is deposited on the enamel under the free margin of the gum, or on the root if the peridental membrane has been destroyed. When the deposit is on the enamel, in the subgingival space, it is usually in the form of a dark brown flattened scale, or several of them, attached to the enamel. It is probably flattened while soft by the pressure of the overlying gum tissue. When it is on the cementum, it is more likely to be nodular in form and to present a much rougher surface to the overlying soft tissue. This form has been specially designated as pus-pocket calculus. In many cases these deposits are found on the enamel in the subgingival space, when no previous inflammation of the overlying soft tissue had been noted, and the question might be raised as to whether it is necessary to have a preceding inflammation, or whether the deposit might occur as a result of overfeeding, the excess of calcoglobulin in the fluids of the body being poured out into the subgingival spaces. This would seem likely in cases in which there are deposits occurring on many teeth at the same time. We certainly often see the deposit as a sequence to inflammations of the gingivæ. When the overlying gum tissue is thin, it is usually darker red than normally, or slightly bluish, over these deposits, and the diagnosis of the presence of the deposit can frequently be made on the appearance of the gum tissue. The presence of such deposits may be determined with a subgingival explorer or a scaler suitable in form to be drawn over the surface of the enamel without injury to the overlying tissue. After there is such a deposit, it serves to cause inflammation of the overlying tissue, even though the original cause of the inflammation may have been removed. This in turn causes the outpouring of more serum with additional deposits of calculus. The inflamed tissue becomes infected with pyogenic organisms and there is a gradual involvement and destruction of the peridental membrane. As the attachment of this membrane is destroyed, the gingivæ become shorter. Those fibers of the peridental membrane which are cut off from their attachment to the cementum disappear by absorption, as does the portion of the bone of the alveolar process to which they were attached. There is much variation in the appearance of the soft tissue overlying the deposits on the cementum; in some cases this tissue will appear to be quite normal, although the pockets may reach almost to the root-ends, while in other cases the overlying tissue will be considerably swollen and congested. There will usually be intermittent periods of tenderness and pain, patients being quite free from discomfort at other times.

The most important difference between this process of destruction and that resulting from salivary calculus is, that the deposits of serumal calculus are always under the soft tissue which surrounds the tooth, and the tendency is to form pockets which become gradually deeper, cutting the peridental membrane away from the cementum. With salivary calculus there is the gradual complete destruction of all tissue overlying the portion of the crown and root involved, and generally without the formation of a pocket. With serumal calculus the free gingivæ and gum tissue remain, while the attachment to the cementum is cut loose, and the fibers of the peridental membrane, also the bone to which they are attached, disappear.

TRAUMATIC INJURIES.

Very few of the articles in our literature mention traumatic injuries as a cause of disease of the peridental membrane, yet statistics which your essayist has gathered tend to show that about from one-half to two-thirds of all inflammations of the gingivæ are traumatic. On account of the resistance offered by the gingivæ to the severe punishment to which this tissue is subjected, the irritation is usually kept up practically continuously for years before the tissues are seriously involved, and we have therefore failed to associate the apparently trivial cause with the eventual serious result. It is to this group of injuries that I wish to call particular attention.

The injuries may be divided into two principal classes—those which are caused by foodstuffs which become wedged between the teeth on account of lack of contact or improper contact, and those caused by deviations from the normal smooth contour of the teeth, such as sharp cavity margins, imperfect filling margins, ill-fitting crowns, etc. The interproximal gum septum—the septal tissue—is involved much oftener than the buccal and lingual gingivæ, by reason of the fact that all food lodgments between the teeth involve this tissue, and because caries and filling operations are more numerous in proximal surfaces. In those cases in which there is impaction of food in the interproximal space, there is first a slight inflammation of the septal tissue, followed by a noticeable swelling of the buccal and lingual portions, as the central portion is depressed by the impacted food. Gradually the tissue is destroyed by the pressure and irritation of the food débris, and the process continues, involving peridental membrane and alveolar process. All of the inflammations of this group are very likely to be accompanied, after a time, by deposits of serumal calculus on the enamel or cementum underlying the inflamed area, and this in turn acts as an additional irritant. Cases of this group may progress independently of the trauma, owing to the inflammation caused by the deposits.

The epithelium covering the septal tissue is very dense, and resists to the utmost the irritations to which it is subjected; if not seriously injured, it will usually return to its normal condition in a short time after the irritation is removed. The progress of the destructive process is much varied in individual cases. In those in which the impacted food is removed quickly after each impaction, many years may pass without serious injury. Even in those cases in which the impacted food is not removed, it is surprising how much time may elapse—often years—before the peridental membrane is involved. The difference in the sensitiveness of the gingivæ in different individuals is most remarkable, some complaining severely of the pain caused by the slightest impaction, others insisting that they have felt no discomfort whatever, although they present many interproximal spaces jammed with food débris.

STATISTICS.

For several years your essayist has been collecting records of examinations of mouths which were receiving at least average care both by the patients themselves and their dentists, to determine, if possible, something as to existing conditions. It is apparent that we are not as a profession paying much attention to gingivitis, but delay instituting treatment until after the development of a definite pericementitis. Since a gingivitis must precede each case of pericementitis, and in view of the fact that our treatment of the peridental inflammations has generally been unsatisfactory, it occurred to your essayist that we should pay more attention to the areas of gingivitis.

The effort was therefore made to determine the condition of the average mouth as to gingivitis. A definite plan for mouth examinations was worked out, by which a record might be made of each area of gingivitis, with its apparent cause. The charts used have a space in which to mark the condition for each of the four sides of each root, and a separate space for each interproximal gum septum. The use of a system of numbers makes the recording of such examinations very simple.

In connection with a paper read before the Chicago Dental Society in April 1912,* there were published statistics of 376 examinations made by selected dentists in various sections of the country. Since then more have been added, bringing the total up to more than five hundred. Very careful instructions were sent to each dentist who made examinations, in order that they might be made as nearly uniform as possible. While it is recognized that the examination of the mouths of five hundred persons is insufficient as a basis for absolutely positive conclusions, yet the reports are so uniform in that they record areas of gingivitis in the mouths of most persons, that we cannot fail to recognize the fact that there are presented to each of us in practice, practically every day, several areas which should have more careful consideration and attention than they are receiving.

While considerably more than five hundred mouths have been examined, there will be presented at this time the summary for a tabulation covering exactly 500 cases, selected by eliminating the cards for all persons younger than twenty or older than thirty-five years, also by eliminating cards for all persons having lesions of the peridental membrane. This summary is, then, a record of the areas of gingivitis found in the mouths of 500 young adults, between twenty and thirty-five years of age, the average age being 26.3, none of whom have disease of the peridental membrane.

Of the 500 mouths, 25 were reported as having no gingivitis, viz, just 5 per cent. Of these 25, but 17 had all contacts in good form. Each of the other 8 had one or more open contacts, but no inflammation of the gingivæ at the time of the examination. In the mouths of the remaining 475 persons, there were reported 4265 areas of gingivitis, viz, an average of 8.53 per person for the 500 examined. Is not this statement alone very significant of the fact that the relationship of the gingivitis to disease of the peridental membrane is not sufficiently appreciated?

The 4265 areas of gingivitis may be classified as follows:

There were 1348 areas due to deposits of salivary calculus; these were in the mouths of 198 persons, making an average of 7.8 per person. It should be stated that reports recorded deposits on more than one surface of the same tooth in 123 instances, and the very large majority of these were lower incisors marked as having exhibited deposits both lingually and labially. The percentage of the 500 patients examined, who had deposits of salivary calculus, is 39.6. The percentage of all of the areas of gingivitis reported as due to salivary calculus is 31.6.

There were 563 areas reported as showing serumal deposits, and in which no other cause of the gingivitis was recorded. These were in the mouths of 75 persons, an average of 7.5 areas per person. The percentage of the 500 examined who had deposits of serumal calculus is 15. The percentage of all of the areas of gingivitis reported as having serumal deposits is 13.1.

There were 33 mouths in which deposits of both salivary and serumal calculus were recorded, making a total of 140 persons having either kind or both. This leaves 360 of those examined for whom no deposits were reported.

There were 2354 areas of gingivitis due to other causes than deposits, subdivided as follows: 783 were due to bad margins of fillings or crowns, 496 to lack

* *Dental Review*, vol. xxvi, 1912, p. 861.

of contact of proximal fillings or crowns, 305 to improper contact of proximal fillings or crowns, 263 to malpositions or atypical forms of proximal surfaces, 255 to lack of contact of teeth having no caries of proximal surfaces, 233 to caries of proximal surfaces, and 19 to worn contacts. If the areas due to malpositions, etc., to lack of contact of undecayed teeth, to caries, and to worn contacts, are not counted, there remain 1584 areas, the large majority of which are due to imperfect dental operations. These are more than 37 per cent. of all areas of gingivitis reported. The percentage of all the areas of gingivitis reported as due to trauma is 55.1. For all persons included in the tabulations there is an average of 4.7 areas of gingivitis per person due to trauma.

TREATMENT.

In the treatment of all diseases, we are today looking more and more for preventive measures. The more we know of etiology and early pathology, the better are we prepared to use preventive treatment. In the group of conditions under consideration a division can be made, on the one side of which treatment may be said to be truly preventive, on the other side of which it must generally be considered as palliative. The division rests on the determination as to whether or not there has been a detachment of considerable depth of the peridental membrane from the cementum. Previous to such detachment the prognosis is good for a quick recovery, if proper treatment is instituted; after such detachment there is generally no possibility of restoring to their normal condition the tissues involved, because the detached fibers have disappeared by absorption, as has the alveolar process to which they were attached. It seems rational, therefore, that we should make the utmost effort to apply effective treatment to cure the gingivitis, and thus prevent the more serious lesions of the peridental membrane.

The very simple facts mentioned relative to the character of deposits of salivary calculus indicate clearly that the prevention of gingivitis from this cause is a duty which should be performed by the patient under the guidance of the dentist. The patient may entirely prevent deposits by limiting his diet to his needs, or failing to do this, he may easily remove the deposit with the tooth-brush and plain water, by careful brushing twice daily. It should be made clear that the deposit is so soft at first that it may be very easily brushed off, but that it may become so hard within twenty-four hours that no amount of brushing will remove it. It is not sufficient that the dentist remove these deposits once in six months, and the patient neglect to use the brush properly and with sufficient frequency and regularity in the meantime, for, under such care, there will be some progress in the destruction of the soft tissue each year. A very simple statement to patients concerning conditions under which deposits occur, and the time required for them to become hard, should impress the necessity for conscientious care which many will gladly give. The dentist's duty should be principally that of an instructor in the management of these cases, supplemented by frequent examinations and the removal of deposits in positions which have escaped the brush of the patient. At each visit, the patient's attention should be called to areas which have not been properly brushed, and directions given for the care of such areas.

Cases of gingivitis accompanied by deposits of serumal calculus should be discovered early, and the deposits carefully removed. In each instance a search should be made to find an exciting cause of the inflammation other than the deposit, and this should be eliminated if possible. In those cases in which there is a tendency to the frequent recurrence of these deposits, the patient should be taught to flush out the subgingival spaces twice daily with physiological salt solution, using a large rubber bulb syringe. The end of the syringe nozzle should be so large that it may not be inserted between the free gingivæ and the tooth; it should be held in contact with the enamel, close to the margin of the gingivæ and carried along the margin, at such an angle that the solution will be forced into the subgingival space. This cleanses the spaces thoroughly without irritation and has proved very effective. Records should be kept of the positions in which these deposits are found, and careful examinations should be made at stated intervals to find and remove additional deposits.

Most of those cases of gingivitis which are clearly traumatic may either be prevented by greater care in our routine operations, or they may be cured by performing whatever operation is necessary to do away with the irritation. We all know well enough how to do these things, but their importance is not realized and they are not done. One case in the writer's practice will be cited: A new patient, a man of about forty-eight years, presented a few months ago for examination. No cavities were found, but the septal tissue between the lower right cuspid and first bicuspid, between the two bicuspids and between the second bicuspid and first molar, was slightly swollen and a deeper red than normal, also a little shorter than normal. There were no fillings, nor cavities, in any of these teeth, but the contacts were not tight and food evidently crowded through on to the gum tissue at each meal. The patient was told that it would be necessary to place a filling in one of the teeth. He expressed great satisfaction that something wrong had been discovered, and he added that at almost every meal he had eaten in ten years he had suffered pain caused by every attempt to chew on that side. He also said he had complained again and again to his dentist, but on each occasion he was told that he needed no dental service. A separator was placed between the second bicuspid and first molar, and it required very little movement to close the contacts between the two bicuspids and between the first bicuspid and cuspid. A mesio-occlusal cavity was then cut in the first molar and a gold filling placed, building out the mesial contour sufficiently to keep all three contacts tight. There never was a more appreciative patient than this man. His daughter of sixteen has since told the writer that a little jar of toothpicks, which had for years occupied a place on the table near her father's plate, has been dispensed with. Dozens of similar cases might be mentioned.

Where there is an open contact, causing food impaction, it is clearly our duty to close it, by whatever procedure seems best. It is not often necessary to cut a cavity in a sound tooth. Sometimes casts of the mouth will show that a certain cusp is striking in such a way as to force a contact open and a little grinding of the planes of one or two cusps will permit the closure of the open contact. Oftentimes the open contact is due to a "flat" filling in a neighboring tooth, and it will be necessary to correct the contour of the filling, either by replacing it or building it out. As in the case mentioned above, several contacts may be tightened by building out a single surface, and where there are open contacts there are usually fillings in nearby surfaces. If there is any one thing which more than all others has contributed to our failures to restore proper contacts in our operations, it has been our neglect to secure proper separation previous to or in connection with the placing of crowns and proximal fillings. The records which have been collected show an entirely too large number of inflammations from this cause.

It should be recognized that some cases present in which it will be inadvisable to attempt to maintain tight contacts, particularly where teeth are gradually moving apart following the extraction of a neighboring tooth, or where peridental inflammations have progressed far enough to cause a continued movement. In a limited number of cases, where proper contact cannot be maintained, a tooth should be extracted. Most cases of this type are those in which a third molar is loose enough to permit the force of the bite to push it away from contact with the second molar and allow food to be crowded into the interproximal space. In some of these cases contact, if restored, will be maintained but a short time, and the best procedure may be the extraction of the third molar.

The discussion of the treatment of all

of these cases should not be passed without mentioning the importance of doing whatever may be necessary in each case to promote the cleanliness and consequent health of the soft tissues adjacent to the teeth, in order to secure the best results to be derived from the fullest and most vigorous use of the teeth in mastication—which is only possible when all areas of tenderness or sensitiveness have been eliminated.

THE DENTIST'S DUTY IN COMBATING GINGIVITIS.

Consideration of the treatment of these conditions has been purposely limited to the treatment of gingivitis, for therein lies our hope for the future in combating diseases of the peridental membrane. Attention is now called to the fact that this work is not the work of the specialist in the treatment of diseases of the peridental membrane, but lies necessarily within the field of the general practitioner. He must be careful in his examinations of the mouth to make a record of the inflammations of the soft tissues; he must study the causes of these inflammations, and he must undertake at once the treatment necessary for their eradication and to prevent, so far as may be, their recurrence. He must at the same time be ever alert to the important part which his patients must undertake, and must be painstaking and indefatigable in teaching them the value of proper contacts and the serious conditions which eventually result from slight and seemingly trivial inflammations, to the end that he may secure and hold their co-operation in his efforts in their behalf.

In considering this group of diseases, attention is called to the large number of valuable contributions during the past few years to both medical and dental literature, by leading scientists, in which the relation of the local focus of infection to general systemic conditions is clearly established. The dental profession cannot turn a deaf ear to the declarations of these men. When a physician of known reputation in the field of clinical pathology,* announces positively several cases of death from endocarditis due to peridental infection, and other men, such as Mayo† and Billings,‡ have expressed themselves so positively on the relationship of the pyorrhea pocket to many serious lesions elsewhere, it is surely the duty of the dental profession to prevent and to eliminate such foci from the mouths of their patients.

In closing, let it be said again that the dental profession is not so much in need today of more specialists in the treatment of pyorrhea as it is of more dentists who will make it their specialty to prevent disease of the tissues attached to the teeth.

[See also *Discussion,* as reported under "Proceedings of Societies," this issue.]

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* Edward C. Rosenow, *Dental Review,* vol. xxvi, 1912, p. 293.

† "Constitutional Diseases Secondary to Local Infections." C. H. Mayo, *Dental Review,* vol. xxvii, 1913, p. 281.

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CANCER OF THE MOUTH: THE RELATION OF DENTAL AND GENERAL PRACTITIONERS TO ITS EARLY RECOGNITION AND SUCCESSFUL TREATMENT.

By G. BETTON MASSEY, M.D., Philadelphia, Pa.

(Read before the Section of Stomatology, American Medical Association, at Minneapolis, June 19, 1913.)

THIS clinical study is based on personal observation and notes of 68 cases of malignant growths of the mouth, of which 7 were sarcomas, 27 carcinomas and 34 epitheliomas.

As to the particular situation of the initial growth in the oral cavity, they may be classified as follows:

	Cases.
Gums and alveolar processes of lower and upper jaws	34
Tongue	18
Buccal surface of cheek	5
Floor of mouth	3
Fauces	3
Situation not stated	5
Total	68

Diagnosis.

A few words may be said of the early recognition and clinical characteristics of each group thus arranged:

GUMS AND ALVEOLAR PROCESSES.

(Thirty-four cases.) A large majority of these patients were first seen by me in a late stage, many after the inevitable result of neglect had occurred—the development of daughter tumors in the lymph nodes beneath the mandible. But 6 of the 34 patients were women. I have a strong general impression that these patients neglected their teeth for years before the appearance of the growth, and the prevalence of greater neglect in this respect among men than among women may account for the greater incidence of the disease in this situation in that sex.

Importance of a tentative diagnosis in a suspected case, and precautions to be observed. The first evidence of epithelioma on the gums is apt to be a raised, pinkish-white nodule that is insensitive to touch, and painless. It may or may not arise in an area already occupied by a leucoplakial infection. Ulceration follows, the ulcer having an indurated base and edges. An early carcinoma presents a greater resemblance to an inflammatory swelling, becoming quickly ulcerated and proliferant, with a tendency to bleed on touch. It is also insensitive and painless in the early stages and until secondary infection by pyogenic organisms, or the extension of the disease itself, invades sensory nerves.

A sarcoma, or an osteosarcoma, presents a smooth elastic submucous swelling without change of color, and with, later, it may be, ulceration. Induration and painlessness characterize each variety.

Pain may appear somewhat early in both carcinoma and sarcoma, but *an invariable characteristic of all malignant growths is lack of tenderness on pressure.*

Dental practitioners share with general practitioners the responsibility of seeing cases of mouth cancer in these early, curable stages—I do not say "precancerous" stages, for a cancer is as much a cancer at birth as a wild animal or any other entity. The responsibility of early recognition of cancer of the mouth is, in fact, placed more on the first practitioner consulted than usual, for patients recognize external cancers themselves at an early stage. Suffering from neglected teeth for years, they are slow to make personal diagnoses in these cases.

What, then, is the proper procedure on the part of the dental or general practitioner on discovering an elevated, pinkish-white, non-tender tumor, an indolent ulceration, or a proliferant growth, or a smooth tumor, each unaccompanied by pain or tenderness? On the course to be pursued by him at this time rests the patient's chance for life, and our only means at present to lessen the increasing mortality from these affections.

His first duty is to add careful palpation to intelligent inspection, and if induration is found to accompany the other symptoms mentioned, *he should make a tentative diagnosis of malignancy at once.*

Having made such a diagnosis—a diagnosis that requires alone the exclusion of syphilis in a few cases to be usually correct—he should prescribe radical treatment at once, meantime protecting his patient from detrimental procedures likely to increase the disease.

These detrimental procedures are—wounds or irritations of any kind short of complete destruction. He should not remove or permit to be removed a specimen for more complete diagnosis until preparations are made for immediate operation. He should under no circumstances extract a tooth near the growth, as this will lead to immediate extension into the cavity vacated by the tooth, and possibly cause infection of the regional lymph nodes. He should, in fact, treat such an incipient growth as he would a nest of hornets found by the wayside until all preparations for destruction are made.

You will notice that I insist that the way to give the patient the benefit of any doubt at this first examination is to assume malignancy until this grave diagnosis is disproved. The patient is safe under no other course. The history of some of the patients embraced in this study shows too often an opposite course, dictated by a natural disinclination to alarm, but leading to sad results. Questions to bring out these points were not always asked, but my records show the following facts:

Four teeth were extracted one after the other, as they became loose, from a beginning sarcoma of the upper jaw, before the condition was recognized.

A bicuspid was extracted for what appeared to be an ulceration about its root, in the case of a woman physician. In two weeks the growth had extended to and filled the antrum.

A third molar was extracted from the lower jaw of a woman, followed quickly by aggravation of the growth just appearing.

Case 13—"Dr. —— has been treating the gum since teeth were drawn, five or six months ago."

Case 14—"Noticed swelling in roof of mouth in latter part of August simulating an abscess. Had two teeth extracted; since that time it has grown progressively worse."

Case 27 had a tooth extracted before recognition of carcinoma alongside it.

Case 29 had a "sore mouth" for years.

Case 33 had "vile gums for years." His dentist discovered a white spot on gum one year ago, but no alarm was felt.

Case 39 had all his teeth extracted before a diagnosis of epithelioma was made.

Case 41—"One week after discovering sore in mouth had upper tooth extracted. The pain continued. Ten other upper teeth were extracted without avail."

Case 51 developed a crack or fissure after the extraction of a third molar, and when first seen had an incurable secondary growth in the neck.

Case 56 knew of no injury except extraction of teeth at site of growth, six months before being seen; at time of admission there was an incurable secondary growth in the neck.

TONGUE.

(Eighteen cases.) The etiologic connection of irritation from sharp edges of teeth was shown in three cases, according to the notes, and was doubtless true of others. Pipe-smoking was uncertain as a causative factor.

From the point of view of early diagnosis, absence of pain and tenderness was equally prominent as in growths of the gums. Palpation as a means of early diagnosis in tongue cases is even more valuable than in the former owing to the extreme softness of the normal tongue. Syphilis alone may be suspected by those not over-familiar with the wide difference in the appearance of the two infections, but it is not safe to waste much time in the medicinal test, for fear of glandular infection. A Widal test would not have this objection.

BUCCAL SURFACE OF CHEEK.

(Five cases.) Two of these cases appeared to follow a biting injury from the teeth.

TREATMENT.

The treatment of malignant growths of the oral cavity resolves itself at present into a selection of the most radical method of immediate removal or destruction of all the infected cells, together with any secondarily infected lymph nodes, if present, in the neck. My own experience corroborates that of others that the Roentgen ray cannot be relied on to produce permanent results in growths within the mouth, in spite of its value in skin cancer. Good results have been reported of radium in epitheliomas in this situation, but the cases observed by me have not been permanently benefited.

In considering radical treatment, I wish to urge as a cardinal principle the acceptance of the theory of the parasitic nature of these affections as a present working hypothesis. Endocellular germs have not as yet been conclusively demonstrated in human cancer, it is true, though Dr. Erwin F. Smith, of the Bureau of Plant Pathology at Washington, has demonstrated them in plants. Yet the life-history of malignant growths gives conclusive proofs of the presence of specific germs in the stimulated cells of the human host, doubtless differing for each variety of growth, the chief indications of germ origin being the auto-inoculability of cancers, their growth by erosion of surrounding tissues, and their production of colonies in distant organs. Until parasiticism has been disproved it is wise to assume that it is true, and to take all precautions dictated by the hypothesis in guarding against operative reimplantation of living cells.

Excision, the accepted operation at present, should be successful in the early stages if the entire growth be removed without its being wounded. The difficulties attending the fulfilment of this condition of removal without wounding are necessarily great in a cavity of this nature, but they must be met if we are to avoid reimplantation of the disease in the fresh wound.

My own work has been entirely by the *electrical method* of ionic destruction *in situ,* in which the growth is devitalized and simultaneously impregnated with the ions of zinc and mercury developed from soluble electrodes of these metals thrust beneath the base of the tumor. Complete destruction may be accomplished in growths of considerable size in from fifteen to thirty minutes. The fact that the necessary current can be conveyed to the site of application by electrodes of any shape or curve permits an operation of this nature to be done in any part of the mouth through the labial opening without injury to overlying facial structures. Aside from the slight hemorrhage caused by the preliminary removal of a specimen for microscopic study, there is no operative hemorrhage whatever, even in extensive ionic operations, thus removing a fruitful cause of operative pneumonia, and permitting a better study of the field of operation.

For the information of those already familiar with this form of treatment I should state that in all recent malignant growths of the mouth of any magnitude I have employed the bipolar method of ionic destruction, in which the active, soluble needles are thrust beneath the growth and the inactive negative pole placed directly on or into its middle. This permits of any strength of current desired being employed, since it is a purely local circuit, no current traversing outside vital structures.

In growths too small for this procedure the unipolar method is still employed effectively, the indifferent pole being beneath the patient's back.

In these small growths, in fact (and it is with them and their early recognition and prompt treatment that this paper is chiefly concerned), general anesthesia is usually unnecessary, a current of a few milliampères, under local anesthesia, destroying an incipient harbinger of death in from ten to thirty minutes.

The sole element of danger in this method, in the more serious cases, is that of secondary hemorrhage, which may occur from the tenth to the eighteenth day after operation. This risk can be obviated at times by a preliminary ligation of the external carotid artery.

The danger of secondary hemorrhage is usually too great to permit of an extensive use of this method in the fauces, particularly in an extensive growth in the region of the tonsils.

Results of ionic method in mouth cases. Of the 68 cases studied, 49 were placed under the method of ionic destruction, many of them as a last chance in otherwise inoperable cases, with the following results:

	Cases.
Without manifest evidence of disease at present (3 to 16 years after operation)	15
Died shortly after operation	6
Improved	16
Unimproved	12
	49

The mortality percentage was 12.2.

Conclusions.

(1) Early malignant growths within the mouth are apt to be seen first, and in their curable stage, by dental practitioners. A reasonably certain diagnosis may be made in this stage by touch alone, detecting evidence of induration without tenderness.

(2) The discovery of a hard, non-tender growth within the mouth, of relatively slow appearance, should compel a tentative diagnosis of malignancy, and cause the patient to be immediately referred for further study.

(3) No teeth should be extracted near a suspicious ulcer or tumor of this nature, as a fresh wound in or near it will cause quickened growth.

(4) The growth should not be wounded for the purpose of verifying the diagnosis until all preparations are made for immediate and effective destruction. Wounds or irritating treatment invite lymph-node infection and distant metastases.

(5) A radical operation, which may be of slight severity in incipient growths, is indicated as soon after discovery as possible. In selecting the method of radical destruction or removal, the safest course is to regard all malignant growths as parasitic in origin—and therefore readily reinoculable by a defective operative technic—until this hypothesis is disproved.

DENTAL EDUCATIONAL HARMONY.

By G. S. JUNKERMAN, A.M., M.D., D.D.S., Cincinnati, Ohio,
DEAN OF THE CINCINNATI COLLEGE OF DENTAL SURGERY—DENTAL DEP'T OHIO UNIVERSITY.

(Read before Section II of the National Dental Association at its Annual Meeting, Kansas City, Mo., July 8, 1913.)

I CAN plainly hear the grunt and see the cynical smile of skepticism on the faces of those, if there be any, who have read the title of this paper, as the conviction reaches their minds that *there is no dental educational harmony.* In others, concern displaces cynicism, as with straining eyes they look and hope for a Moses who will lead the children of Israel from darkness into light. The golden opportunity for bringing the profession into renewed respectability surrounds us on all sides, yet internal contention and civil strife preclude the possibility of presenting to the enemy the solid and uniform phalanx that will attain the ideal goal for the profession and those it serves. I do not desire to censure, but to criticize, and above all, to be truthful as I see the truth. If any are hurt, my justification will lie in the old axiom that the truth usually does hurt, consciousness of which fact will be conveyed to me by the knowledge that, if a stone is cast among a pack of hounds, the yelp will come from the one that has been hit. Not being, however, of the class who are justified in casting the first stone, nor yet a stranger to the painfulness of the stony impact, I feel that I have learned enough charity to offer myself as "first aid to the injured."

PRESENT DISHARMONY.

The first act of a musical performer is to tune his instrument. When a number of instruments are to be played together, they are tuned to each other from a fundamental note; failure to do so makes an inharmonious and discordant performance, no matter how fine the instruments nor how expert the players. The dental educational bodies of this country are expert players, performing on superb instruments well tuned, but not tuned to each other. The result is a garble of disharmony in which the piteous struggle to reconcile B flat and C sharp creates such a din that everyone finds himself more often in a condition to *be* flat than to *see* sharp. To continue the allegory, it can be said that many are trying to play so fast that we find them a few bars ahead of the rest, in a hopeless state of "innocuous desuetude."

THE DENTAL COLLEGES' STANDARD OF REQUIREMENTS AND ITS INADEQUACY.

The three distinctive educational bodies known as the colleges, the examining boards, and the profession at large as expressed by dental societies, are each full of faults, which they are clanging with bass-drum and cymbal effect, thereby drowning the soft *sympathetic* notes of their *virtuous* strings. The result of the condition is that, although we all love music, we are doing everything not to get it. The dental colleges, through their Faculties Association, originally issued the manifesto that they were the judges of who is qualified to begin the study of dentistry and what should qualify such persons to enter upon its practice. Everybody was satisfied, and accepted the manifesto as law. Did the colleges tune up to the fundamental note? I am afraid not. From time to time, through suasion and threat the pitch was raised, but this was a manifesto not made, perhaps suggested, but rather accepted, by the colleges. Did the colleges tune up to these varying pitches? I am afraid not. There were some half-hearted strains at the strings, but the pitch was wofully flat, and discordant music resulted. I still contend that the colleges are the best judges of the material of which they can make dentists, and a sense of justice forces me to maintain equally and positively that, having issued a manifesto as to the competence of their judgeship, they should have stood flat-footed upon it. When they failed to do so, they lost their prestige. The loss of this prestige by the colleges is not beneficial either to them or to the dental profession generally, for the labor necessary to secure a diploma should be clothed with dignity and significance, which being denied, reflects discredit, from the student body, both upon the college and those who deny such prestige to the degree. The colleges might have regained their prestige if after accepting the new manifesto, they had lived up to it, or, having rejected it, had fought their battle for what they thought was right. Had they lost, defeat would have been far preferable to half-hearted and imperfect acquiescence, which aroused only suspicion and distrust. The insincerity of the colleges in complying with the preliminary requirements which they had promulgated in large part, or had acquiesced in, may carry some apology from the experience gained in trying to comply with them, and finding in many cases that such requirements were either premature, impracticable, or unjust to students and conditions—which conditions could have only been understood by those who were engaged in educating students for practice in the profession. Much to the credit of the colleges there has been very little *tenable* criticism from any source that has cast discredit on dental education *per se,* although some flings have been made about employing young teachers just out of college, when experience shows that they, above all, are better able to teach because of their more recent and familiar contact with the steps of the profession which older teachers have long since forgotten. It has not been the seed or the fruit, but the soil which was being cultivated that has been brought into question as being productive of high-class professional men. It might be said in explanation of this statement that the unprejudiced part of the profession has been forced to realize that the fruit was divided into first, second, and third class, and that there are consumers for each class. Communities that could not support a first-class man are perfectly satisfied with a second- or third-class man, and would have otherwise to do without any, much to their inconvenience and detriment.

The justice of the 15-unit minimum basis I will neither disclaim nor confirm, but content myself with discussing its features. If colleges require it, or are forced to do so, I contend that they should be permitted to administer it with discretion. All diplomas from an accredited high school do not express an equation. There is 30 per cent. difference between the highest and the lowest, ranging from the student that passes at 70 per cent. and the one that passes at 100 per cent. or thereabout. The same holds good if units are substituted for the diploma. The result is that under this system all students admitted to our dental colleges are not equal, and will be more *unequal* at graduation. This system, furthermore, puts a premium on opportunity, and opportunity is not a common possession. It is more likely to be the property of the rich, and aristocracy of wealth I am unwilling to bow to, unless it be wealth of mental attainment. If a 100 per cent. accredited high-school diploma represents 15 units, then a 70 per cent. diploma represents only 10½ units. A perfect two-year high-school student will have acquired 7½ units, which is only three units less than the record of the man who is admitted unconditioned with a 70 per cent. diploma, yet the conditioned man must make up 7½ units or discontinue his dental studies. Is this equity and justice? Many apt and diligent students are compelled to quit high school for lack of opportunity; then the opportunity comes, and they are denied the privilege of studying their chosen profession, although mentally well able to acquire the requisite number of units by the time that they receive their dental diplomas. As pertains to these ideas, I think that the dental colleges should be allowed to exercise discretion. It also brings into the foreground the potency of the "equivalent," a word which has been much abused, perhaps, but which cannot be eliminated in the face of justice and superior mental caliber. The blame for not exercising this discretion rests largely on the colleges themselves, because they are not practicing what they would like to exact from others in forcing students to make up their literary deficiencies before they enter the junior class. The colleges claim that only their product and not the raw material should be tested for certificates of practice, but they do not apply the same test to their candidates for diplomas. If they did, students would be given up to the time of graduation to make up their preliminary units as required by the colleges or the state laws. Were this the practice, a premium would be placed on mental capacity, and not on opportunity alone. Many students are bright enough to acquire all the dental studies and a large percentage of so-called preliminary units at the same time, thereby having all the preliminary as well as the dental units by the time they are called upon to use them.

DENTAL EXAMINING BOARDS AND THEIR SHORTCOMINGS.

If the dental colleges are guilty of insincerity, faults, and inconsistencies, the examining boards are no less free from the same undesirable qualities. This applies in many cases to the board member, as well as to the laws as passed or defectively administered.

The dental laws are enacted by the people, and for their protection. The people do not care how many dentists there are; they are only concerned about their quality. If we curtail the number, we create an inequality between the supply and the demand, and the people have to pay the bill by an increase in the price of services. The people are slow to awaken, but when they do, how long will they continue to make dental laws for such an end? and how long will they permit present laws to such an end to exist? The answer is too plain. We are educating the people more now than ever in the needs of dentistry, and they will demand that we give them true exponents of the profession to take care of their needs. The *defective* graduates are not the ones that should be feared by the people. These will quickly recover, or be consumed by the immutable law of the survival of the fittest. It is the *effective* graduate who, to the unwary and unsuspecting, presents a gilded front and an enticing entrance to his office, while in the palatial interior the hopeless victim to false diagnosis and advice of a pecuniary significance gazes from the operating chair upon walls hung with a high-school diploma, and a dental degree, and a highly ornamental state-board certificate. With such a picture as this before him—and there are many—any self-respecting and law-abiding dentist must often address the painful question to himself: Are the present dental laws a success, and do they protect the people? And the answer must be a logical, No.

The examiners should be legalized to examine only the college product in its finished state. This applies to the dental units, and to a simple verification of the preliminary units as a precaution to insure that the colleges comply with their catalog announcements. I think that all states should make or re-arrange their laws to cover completely such a procedure. If the colleges agree to this, and they should, no aspersions on their honesty could be implied, but such a verification would entirely remove any feeling of distrust, and restore that confidence between the two bodies which has so long been absent. Neither a person's nor a corporation's integrity suffers from investigation and verification of their acts.

Competence in others cannot be judged by the incompetent. The call of justice demands that anyone on trial shall be tried by his peers. The examiner should be as clever as the expectancy of the examined. A shoemaker or a blacksmith *per se* might examine correctly my physical properties, but I should be very incredulous of such men's ability to judge my dental and educational units from the standpoint of their technical knowledge of making shoes for man or beast. No dental examiner should be appointed to such office until he has qualified with at least a minimum of what he expects to find anchored in the brain and fingers of a dental graduate. Without such qualifications he becomes, when endowed with authority, an inquisitor, not an examiner. When we have *examiners* on our dental boards I am willing to be trustful, but apprehension and ridicule vie with each other, dependent on the degree of authority, when inquisitors sit in judgment on our college products. This is the viewpoint of our great student body, and their position in this respect, I think, is impregnable. Executive capacity and worthiness of authority are tested by credentials and examinations in other legislative departments, and there is every reason why our dental examiners should be submitted to the same test instead of to the test of political preferment. I believe that every dental law should contain a clause to compel each examiner to qualify both professionally and preliminarily before accepting his commission; it would insure justice and inspire confidence in the prescribed authority of each examining board. The authority of examining boards over the internal affairs of colleges as pertains to equipment and teachers is a waste of energy and expense. There is a higher power that works through the indisputable laws of the survival of the fittest that will quickly destroy any dental school with inferior teachers and equipment. It is a blessing that the power of wealth and endowment and the power of education are not commensurable. If it were so, many of us would be poor indeed, and education would be at a standstill. The virtue of a dental school cannot be measured by the size of its endowment nor by the number of its students. A healthy midget may triumph over a sickly giant, and the worthy product is all the public want.

The colleges and the examiners should work in harmony. What difference does it make to the public, whom you are supposed to be protecting, when or how education is attained, as long as it is attained prior to the time of using it? The college educators are the best judges of the material that goes to make their product, and if they use material out of which they cannot produce the finished product, they can never "get by" with it, because the examiners need not let them. Such an arrangement would secure high-class men for the profession, and would give the student of ability the chance that had been lost by the lack of opportunity. The colleges would have a larger field in which to exercise discretion, as it would be "up to them" to select good material, giving the student the justice of being judged by his ability instead of by the length of time-sentence to be served.

THE DENTAL PROFESSION'S UNFAIR ATTITUDE TOWARD DENTAL SCHOOLS.

The profession at large, being the third educational body, must come in for a large share of criticism, since by it were created the colleges, the examining boards, and the dental laws which they administer. The profession has taken itself too seriously; the individual members too often become competitors instead of co-operators. Even the commercial bodies of the country are discarding the old idea of competition, and adopting and practicing co-operation as being best for the individual as well as the masses. I am weary and soul-tired of the wholesale condemnation of colleges as practiced by the profession at large. Students want colleges and need them. While in them the student body co-operates, but when they once have received their diplomas, they assume the fierce and narrow-minded attitude of competition, damning colleges as a whole and promulgating theories for curtailing the quantity of their product. Such an attitude is manifest on every side, and if not exhibited in boisterous tirades and false accusations, there is a speak-easy vein in the atmosphere of dental deliberations that forces the conclusion on the college man that he is not wanted or is a drug on the market. Dental colleges bear the same relation to the profession at large that primary schools bear to the high schools and universities. Dental schools are intended to instruct in the discovered and well-established principles of the profession. Since these principles involve so many studies, it is impossible to make experts in any one of them, yet sets of questions are often submitted to our raw graduates that would do credit to the expert if he answered them after having had access to reference books. Dental colleges should not be expected to be research bureaus. They are busy enough when they create the professional dental surgeon. When their students pursue such studies as anatomy, physiology, and chemistry, it is done with a view to making these studies parts of the whole, and not making professional anatomists, physiologists, and chemists. There is a large field for the profession at large to establish research work and advance the principles of hygiene and prophylaxis, and there is a large unpaid debt that we owe our teachers which we can best pay by doing something that will reflect credit upon ourselves. By doing something ourselves, we increase the usefulness of dental schools that have to teach that something to compete successfully with progress. Dental schools can best shine by reflected light, and we are the reflectors.

MORE CO-OPERATION AND LESS COMPETITION WANTED.

If war is hell, then civil strife is the redistilled quintessence of it. Each educational body should attend to its own business. If they do so, they will find themselves too busy to criticize each other. There are bound to be failures, many failures, but the number is no greater in professional than in commercial economics, and we know that the commercial failures run by far into the highest percentage. I realize that it is difficult to reason with anyone who carries an empty market basket and a hungry stomach, but such individuals are usually competitors and not co-operators. I honestly and earnestly hope that the time is at hand when one may walk abroad twanging the dominant note among his fellow laborers, cherished and respected, and not shunned as if he had stolen something or as if suffering with some contagious disease, because he happens to be guilty of the atrocious crime of being a college man, an examiner, or a dentist.

UNRESTRICTED RECIPROCITY DEMANDED.

As a profession, we have too much to do. We must fight, not each other, but for each other. Accoutered in our uniforms and shining armor and cemented by harmony, we can march to renewed respectability, into the hearts and the very coffers of a suffering public. Instead of expecting alms, we can demand endowments if we but show the public that we are not preying on its misfortunes, but trying to prevent them. We need a national law or an *unrestricted* interchange of licenses. Some of our brethren of the North, in freezing snows and icy blasts, are longing for the balmy air and orange blossoms of the South, yet cannot seek them for fear of the big stick in the hands of some examining board that will prevent them from plying their vocation for a livelihood. Our brethren, too, of the South, worn by labor and care, who might be restored to usefulness by the invigorating air of the North, refuse to come and dwell among us, lest by the same cause they be placed in cold storage.

"MORE PLAY" RECOMMENDED FOR THE INDIVIDUAL PRACTITIONER.

A little educational harmony in the individual dentist would be appreciated by those who are trying to uphold professional dignity. The closeness of application—and necessarily the nervous strain—has a tendency to make of dentistry a somewhat hysterical profession. Seeing things far ahead that never will exist, and combating prospective conditions that never will arrive, has been the labor lost of many an overworked dentist attending our annual meetings, when his only mission should have been the seeking of rest and recreation. Penned up in our little offices where we continuously wield absolutism over our suffering clients, we not only become autocrats, but must necssarily absorb some of the morbid conditions of our environment. Autocracy and morbidity are two very bad lenses through which to view reforms. When we begin to get too strenuous in our criticisms, and alarming views present themselves to us, it is not necessarily time to grab the big stick, and smite some fearful adversary. The fishing rod and the reflections from some placid stream will effectually chase away the bogey man, and relieve the necessity for a murderous assault.

SUMMARY OF SUGGESTIONS OFFERED.

As a general summary to the foregoing discourse, I have the following propositions to offer: Laws to regulate dental practice should not traduce the dignity and significance of the dental degree. They should place their administration in the hands of those best prepared for justice and proficiency, freed from bias and prejudice. They should protect the college, the dentist, and the people from crooked and unfair practices. They should provide for graded certificates of practice, a feature that would give all communities at least a chance to have a dentist; and above all, laws to regulate dental practice should give universal suffrage to all of its practitioners, regardless of state lines. All laws should be protective, not exclusive.

Criticism and not censure has been my object, that we may secure harmony at any price. If this paper is discussed, I hope that it will be along these lines, feeling confident that, if he that has not sinned throws the first stone, there will be no stones thrown.

[See also *Discussion,* as reported under "Proceedings of Societies," this issue.]

THE EVOLUTION OF OCCLUSION, WITH SPECIAL REFERENCE TO THAT OF MAN.*

By RAYMOND C. OSBURN, Ph.D., Columbia University, New York, N. Y.

(Read before the Pennsylvania State Dental Society, at its annual meeting, Philadelphia, Pa., June 24, 1913.)

THE attempt to discover the reasons for existing conditions in any field of work forms one of the most important parts of scientific investigation. Along medical and surgical lines (of which dentistry forms a special part) advances are made chiefly by first discovering what are the normal conditions, and what things make for their normal development and continuation, in order to know what is abnormal, what agents produce abnormalities, and what steps may rightly be taken to correct untoward conditions and their effects.

Collaborating in this work on the human body for centuries, we have had the physician, the surgeon, and the student of anatomy; more recently the physiologist and pathologist, and still later the biochemist, the bacteriologist, the student of heredity, and the experimentalist, each adding his quota of in-

* This lecture was illustrated by about sixty lantern slides, which, for obvious reasons, cannot be reproduced here.

formation to increase the sum total of knowledge of the human frame. For it is evident that the proper development of man and the correction of abnormalities and diseases, together with the prevention of conditions that produce them, are paramount to everything else, from the standpoint both of the individual and that of the community, and no possible opening for attacking these questions should be neglected.

It is true that until recent years the great importance of the teeth, and of the mouth conditions generally, for the maintenance of health has been largely overlooked, but within the past few decades there has been a constantly increasing number of men interested in the normal and pathological conditions of the mouth and teeth. Within this time the human masticatory apparatus has been considered from nearly every point of view. Not, as we must all admit, to our entire satisfaction, for still "doctors disagree," and if not in as many points as formerly, there is yet far too great a lack of unanimity on many subjects. Until we have really come to a fuller agreement in all essential matters, no one who is interested in these questions can afford to withold his energies from the attempt to discover the ultimate truth regarding them.

THEORIES CONCERNING THE ORIGIN, ADAPTATION, EVOLUTION, AND FUNCTIONS OF THE TEETH.

There has been an abundance of theories concerning the origin, adaptation, evolution, and functions of the teeth; many of them were formulated here in Philadelphia, especially in the days of Leidy, Ryder, and Cope.

One of the most important of all dental theories had its origin here, viz, that concerning the "mechanical genesis of tooth forms," worked out in the eighties by Professors Cope and Ryder. In numerous papers these two scientists showed how in various groups of mammals the teeth are adaptively changed according to the character of the food and the movements of the jaws.

While this work dealt only with the broader aspects of the modeling of the tooth crown as a whole, it opened the way for a further and more refined study of the "mutual mechanical relations," as the subject was then called, of the individual teeth. H. F. Osborn, in his "Evolution of the Mammalian Molar Teeth," has laid great stress on the adaptive changes of the individual teeth, showing how, by cusps, styles, and lophs, the tooth crown is molded to the form best adapted to particular foods and to special methods of handling them. These principles have been of the greatest possible service not only in comparative odontology, but also in mammalian paleontology, in tracing the relationships of ancient and modern mammals.

The expression of "mutual mechanical relations" is only another term for what the dentist and orthodontist have come to know as "occlusion," and occlusion forms the basis of all restorative processes in dentistry and orthodontia. So important is this question that to my mind no one should attempt the restoration of malposed teeth to their correct position in the dental series without a full knowledge of the exact mechanical relations of the individual teeth to each other in the occlusal planes, cusps, and ridges. This knowledge should extend to the relations between teeth of the same and of opposing series, and to the whole dental arch as related to the type of dentition of the individual.

THE EVOLUTION OF OCCLUSION IN HIGHER ANIMALS.

The existing types of occlusion in higher animals have appeared as a result of long and tedious processes of evolution. Ever since the origin of the "gnathostome," or jawed, vertebrates, away back in the Silurian period, Nature has had always before her the problems of occlusion. In many cases, as we can readily see, she has solved them admirably, but again, judging by the evidence of the fossils, many a noble group of animals has passed out of existence because of inability to adapt the teeth and the jaw movements to the food at hand. Sometimes the teeth have been wondrously modified in the process of adaptation to some particular kind of food or the method of handling it, as in the cat, the muskrat, the horse, and the elephant; and again parts or even the whole of the dental series have been dropped out in response to food conditions, as witness the turtle, the bird, certain of the ant-eaters, the whalebone whales, the elephants, the manatees, etc.

In discussing the evolution of occlusion, the time at my disposal will permit me only to allude in the briefest manner to many phases of the subject.

OCCLUSION IN THE FISHES, AMPHIBIANS, AND REPTILES.

The most primitive conditions of occlusion begin with the fishes, where also we find the simplest forms of teeth and the simplest types of dentition. These are found in those sharks which have teeth arranged in the same manner as the scales or denticles of the skin, with which they are homologous, and the occlusion in such forms is merely the apposition of tooth-bearing surfaces.

The fishes, amphibians, and reptiles are capable of making only the vertical or direct up-and-down movement of the jaws, yet they have evolved numerous types of specialized teeth with many cases of occlusion of individual teeth. Perhaps it may occur to you that Ryder made too much of the jaw movements in his theory of the mechanical origin of the teeth. Yet it must be remembered that he was dealing especially with the origin of the crown pattern in the complex type of tooth, and such teeth occur only in mammals—possibly because they alone have been able to free the suspension of the jaw to the extent that other movements than vertical are possible.

The next higher mode of occlusion above the mere apposition of surfaces is that of the occlusion of rows of teeth. *Lamna,* one of the sharks, presents a very simple case of such linear occlusion in which lines of teeth are opposed. In *Squalus,* the common horned-dogfish, we see this carried to its logical conclusion in the formation of a very efficient cutting edge formed by each row of teeth as it comes into a functional position on the jaw.

But some of the sharks crush their food instead of cutting it, and this leads adaptively to a different type of occlusion. The Port Jackson shark, *Heterodontus,* has some specialized teeth for crushing. In some of the rays we find that a complete and even pavement of hexagonal teeth is formed. The next step leads to a fusion of the central blocks of the pavement (*Myliobatis*), and this finally to a complete fusion of the transverse series of teeth (*Æteobatis*).

In the bony fishes we find a very generalized condition in the pike, with patches of teeth opposing each other in the loosest form of general occlusion. The gar-pike has a linear occlusion in a nearly perfect raptorial dentition, while the tautog, also with linear occlusion, has teeth adapted for crushing the shells of mollusks and barnacles. The file-fish, *Alutera,* has an excellent incisorial apparatus, and here the occlusion is worthy of special mention, since a single row of teeth in the lower jaw is opposed to two, which nevertheless form but a single cutting edge, in the upper jaw. It will be noticed that the teeth are reduced in number as they become more specialized.

A still higher specialization is found in the teeth of the swell-fish or puffer, *Spheroides,* which are exceedingly powerful and trenchant and which are reduced to a single tooth on each side of the jaw. This process reaches its natural climax in the box-fish, *Diodon,* which has but a single broad tooth occupying the whole margin of the jaw.

I shall not allude to the teeth of the amphibians and reptiles generally, since in them we find little or no advance in the matter of occlusion—as they all, with perhaps a single exception, have only vertical jaw movement.

OCCLUSION IN THE REPTILE GROUP OF CYNODONTIA.

But among the reptiles one fossil group is of special importance to us. I refer to the group known as the *Cynodontia, Theriodontia,* or *Therapsida,* from which the mammals took their origin. Beginning with this group and extending up to the forms which can first be recognized positively as mammals, we find a series of changes taking place in the dental apparatus which are of the utmost importance. Here the complex lower jaw of the reptile becomes reduced to the dentary, so that the lower jaw is henceforth a single bone; the reptilian mode of suspension of the jaw, by means of a quadrate bone, is lost, and the mandible is thereafter attached directly to the temporal bone of the skull. Along with these changes occur certain very remarkable modifications in the dentition.

Heterodonty of the mammalian type is established, so that we distinguish incisors, canines, premolars, and molars; diphodonty appears, so that henceforth there are two sets of teeth instead of an endless succession; the teeth of the molar-premolar series begin to have complicated crowns and roots and closed pulp cavities, and they are implanted, by gomphosis, in separate sockets; the number of teeth in the permanent series approximates that typical of mammals, and we begin to find an interlocking of the teeth in a simple type of mammalian occlusion.

EFFECT OF SPECIALIZED JAW MOVEMENT IN MAMMALS UPON OCCLUSION OF THEIR TEETH.

The earliest mammals arrived on the scene of action with this wonderful endowment, and also, what is at least of equal importance, they were possessed of a plasticity that gave them the greatest capacity for evolution along a variety of lines. Apparently, the attachment of the jaw directly to the skull has made it possible to vary from the primitive vertical or up-and-down motion, to permit of lateral or transverse and of fore-and-aft movements as well. The teeth have been able to adapt themselves to a purely raptorial use, as in the dolphin and sperm whale; to a cutting and crushing function, as in insectivora, to a carnassial or flesh-cutting function as in the carnivora; to the crushing molar of the human; to the highly complicated grinding molar of the horse or elephant, etc.

It may be well to follow out the specialized types of jaw movement in the mammals, and see what is the effect of the occlusal forces upon the teeth.

All mammals have a vertical jaw movement by which the stress of muscular action is brought to bear on the food. In many species this form of movement alone is present, and in the most highly specialized cases the form of the teeth or the character of the jaw articulation is such as to positively prohibit movement in any other direction. Depending upon the character of the food under the vertical stress alone, the teeth may be simple and pointed, as in the porpoise, for a purely raptorial function in catching and holding the slippery prey; they may be simple and truncate, as in the walrus, in which they are used for crushing the shells of mollusca; or they may be molded into cutting edges, the lower shearing inside of the upper, as in the highly specialized true carnivora, in which the vertical shearing force is used for cutting up the food (cat). Probably all of these animals have been derived from more primitive forms in which the teeth were more complicated. Thus, by the examination of such forms, we can determine what happens to a tooth when it is subjected to stress in the vertical plane only.

In the majority of the ungulates we find that lateral movement has been specialized to a high degree of efficiency in addition to the vertical. The special adaptation here is for the purpose of triturating a hard and comparatively innutritious type of food. In response to the sidewise motion we find that the tooth crowns have become very complex and the enamel elaborately folded to produce longitudinal ridges with the softer dentin and cementum between, so that in the swing of the mandible from without inward the food is caught between the ridges and finely cut. The cow and horse exhibit the effects of this lateral movement upon the tooth crown to a high degree. All the complicated ungulate teeth, as far as we have been able to trace them, have been derived from simpler teeth, and thus we are enabled to see the result of lateral stress upon the conformation of the tooth crown.

The elephants have a fore-and-aft motion of the mandible in mastication, in addition to the vertical, and the teeth are complicated with transverse ridges and grooves to an astonishing degree. Yet the fossil ancestors of this group had much simpler teeth, and once more the effect of movement in a particular direction is clearly shown.

The rodents move the jaws, when masticating the food, in a sliding movement inward and backward, and here also we see the same principle of response to the character of the food and the direction of the stroke (muskrat).

EVOLUTION OF THE HUMAN DENTITION.

Now let us see what application of these principles, if any, can be made to the human dentition. In other words, Has the human tooth developed in response to one or more of the forces which, as we have already seen, appear to be responsible for the condition of the teeth as observed in lower animals?

Since man is a product of evolution, we naturally expect an affirmative answer, but the fact alone does not satisfy our curiosity, and we inquire further how it has come to pass. The answer is necessarily somewhat complicated.

The teeth of man are not highly specialized, like those of the cat or the horse, to a particular form of food. The natural food of man is certainly as much mixed as that of any other mammal—perhaps more so. If we may judge by the diet of other recent primates and by the character of the teeth of fossil ancestral primates, we may say that the group as a whole has always been omnivorous.

Mobility of the human mandible in all directions. The human mandible is extremely mobile, perhaps more so than that of any other animal, since it can be moved in all directions. The conformation of the articulation and the arrangement of the muscles are such that, from a position of rest, the jaw can be moved slightly backward, or shoved far forward; it can be moved widely in a transverse direction; or any combination of the lateral and longitudinal movements may be made. Not only do individuals vary in customary use of the jaw in chewing, according to habit, but the habit of the individual may be changed by some circumstance, such as the soreness or loss of a tooth; and moreover, the individual may vary the direction of the movement unconsciously a number of times during the course of a single meal. A little observation of a person chewing gum will illustrate, better than I can show in words, how, as the quid is shifted about the mouth, the motion of the jaw is changed and the masticatory force is applied in different directions. Observation of apes and monkeys will reveal that they also vary the movements of the jaw. The teeth and the character of the condyle in fossil primates, as far as we know them, indicate that they also were capable of making similiar varied movements.

THE MOLAR CUSPS IN MAN.

Since man is omnivorous and his jaw movements so varied we should naturally expect the crowns of the molars to be so formed as to permit all these motions to take place readily. The arrangement is that of a squared tooth crown with low cusps of nearly equal height (bunodont type) arranged in a very definite quadrate position. This type runs all through the primate series, though in many of them certain of the cusps are higher. This arrangement of the cusps has not always existed, however, nor are all the cusps equally old. Moreover, the upper and lower molars have arrived at their present condition by different methods of adaptation.

The most ancient feature of the human, or, for that matter, of the mammalian occlusion, is found in the alternate or staggered arrangement of the teeth, each lower molar biting in front and inside of its opposing upper molar. This relation, borrowed from ancestral reptiles, has been retained through all the ages.

Beginning with fossil mammals ancestral to the primates, we find a tritubercular or triangular type of molar essentially similar in the upper and lower series, but reversed in position so that the upper tooth crown possessed one lingual and two buccal cusps, while the crown of the lower molar had one buccal and two lingual cusps. The story of the adaptation in the upper and lower series is different from this point onward, so we must treat them separately.

The upper molar has retained these three primitive cusps—the protocone (mesio-lingual), paracone (mesio-buccal), and metacone (disto-buccal), and has added a fourth cusp (disto-lingual) to make the quadrangle. This fourth cusp, known as the hypocone, is developed from the cingulum or girdle of the tooth just behind the protocone on the lingual side of the upper molar. At the same time the tooth became squared up. The hypocone is therefore much younger than the other cusps of the upper molar, and it is still much more variable in size and form than the other and older cusps. Its nature as a cusp of the cingulum is often shown by the fact that frequently it partly surrounds the bases of the adjoining cusps. These four cusps make up the occlusal surface of the fully developed upper molar. Others, such as the "fifth" (*tuberculus anomalus*) and similar stylar cusps may appear on the cingulum, but as a rule these have no relation to the occlusion. The "fifth cusp" rarely is large enough to be functional, in which case it overlaps the lingual cusp of the opposing molar.

This "fifth cusp" and any other anomalous tubercles are neomorphs—that is, they have no predecessors in any of the primates. With the exception of the "fifth cusp" on the upper first molar and the upper deciduous molar they are very erratic in their distribution. Their explanation is in doubt, but since they occur only in the human, in which the jaw, as compared with that of other primates, has undergone a shortening process, it is barely possible that the appearance of these anomalous cusps is the expression of a compensatory action in the attempt to increase the breadth of the molar surface, which has lost something in length by the process of abbreviation.

The quadrangular form of the lower molar has also been derived from the original tritubercular tooth, but by a different process. Of the three original cusps only two remain, the mesio-lingual cusp of the triangle (paracone) having been gradually suppressed at the same time the fourth cusp was added to the upper molar. All of the hinder portion of the tooth has developed from the cingulum, and this bears two larger cusps, buccal and lingual, the hypoconid and entoconid, with the smaller hypoconulid, sometimes improperly called the "fifth" cusp, between them. Sometimes another (sixth) cusp is present, the entoconulid. It thus happens that the lingual cusps of the upper molars and the buccal cusps of the lowers are similar in origin, while the buccal cusps of the upper and the lingual cusps of the lower molars are different in origin. Yet, notwithstanding this loss, addition, and shifting of cusps, the original primitive feature of occlusion has not been interfered with, and the lowers still bite one cusp farther forward than the uppers, as they always have done.

The change from a triangular to a quadrangular form makes a more effective molar surface, since it covers the ground more fully and adds another cusp for holding and triturating the food. Since the primate mandible, and especially that of man, is movable in any direction, it is necessary that the cusps of the teeth should be so shaped and arranged as to permit these various movements without any interference. For this reason the cusps are low and of nearly equal height; they have a rounded or semi-pyramidal outline, and are arranged so that their points form the corners of a quadrangle. The connecting ridges are low and the intervening valleys shallow. No other plan than this would permit of such variety of motion, except that of a smooth crown, which would be of no use in grinding.

The relation of the cusps of opposing teeth is constant, and is of a very ancient order. The oldest date back to the beginning of the trituberculates, from which the primates, as well as probably all other existing orders of mammals, have originated; and even the youngest date back to the early primates of the lower Eocene period—a matter of some four million years, according to Walcott. In all this lapse of time neither the general features of the occlusion, nor the number, nor yet the arrangement of the cusps, has suffered any material change in the primate series leading up to man. If efficiency may be judged by stability, consider how perfect must be the dental arrangement which has persisted almost unchanged through years that can only be measured by the millions! And this, too, in a system which is generally recognized by comparative anatomists as one of unusual plasticity.

The plasticity of the primate and human tooth is probably not less than that of other mammals. This is perhaps more readily seen in cases of brachycephaly and dolichocephaly—short-jawed and long-jawed types. The related apes *Colobus* and *Cynocephalus* have widely different skull forms. The teeth of the latter are much longer mesio-distally than those of the former, yet the pattern is the same and the occlusion identical. It is as though a sculptor were to take two identical wet clay forms and draw one out and compress the other to make them fit different spaces.

PRACTICAL SIGNIFICANCE OF OCCLUSION TO DENTIST AND ORTHODONTIST.

In the races of man we have similar cases, though not quite so marked. There are brachycephalic races and individuals, dolichocephalic races and individuals, and all sorts of intermediates, and the teeth are exactly adapted by nature to the type of the individual as a part of his constitutional inheritance. It behooves the dentist and the orthodontist to consider this phase of the question with the greatest care.

The foundations of the study of occlusion have been soundly laid, as a result of the labors of numerous scientists. To be sure, differences of opinion exist, even at present, with regard to the origin of certain of the primitive cusps, but the importance of the interlocking of the cusps in their mechanical relations, which we know as the occlusion of the teeth, is generally conceded. However, the value of this mechanical relation to the individual, which is so clear to him who has investigated the subject, is often slighted by the careless and overlooked by the ignorant.

Because frequent cases of malocclusion appear in the human, and often do not seem to interfere greatly with health, some dentists have been inclined to make light of the whole subject. But nature has adapted a particular arrangement of the teeth to the needs of man as she has to every other vertebrate animal. If anyone doubts the importance of occlusion, let him investigate the subject in wild animals, in which very frequently the lack of proper occlusion is directly responsible for death.

Civilized man, to be sure, is able to offset some of the deleterious effects, by cooking and mechanically grinding his food; but even so he cannot entirely escape. Numerous cases of nervous and other troubles, some of them at first quite puzzling, have already been traced to imperfections of the dentition, and who can say how far the evil effects may extend in the human system? The animal organism is so nicely balanced that any untoward condition, though its first effects may seem unimportant or even be unrecognizable, may in the end, either singly or combined with others, produce most baleful results.

Defects in occlusion may appear harmless, but such abnormalities are insidious because they work all the time. The dentist, therefore, should make himself familiar with every detail of the human occlusion, should study it in every type, and especially should take careful account of it in each individual, in order that operative work of whatever character shall do no injury to this intricate mechanical system, and that restorative work of whatever character may conform as closely as possible to the particular phase of occlusion with which nature has endowed each individual of the human species.

PHYSIOLOGY OF NITROUS OXID AND OXYGEN ANALGESIA AND ANESTHESIA.

By CARL G. PARSONS, M.D., Denver, Col.

(Read before Section II of the National Dental Association, at its annual meeting, Kansas City, Mo., July 8, 1913.)

AT the present time there are two main theories as to the nature of narcosis. Meyer and Overton, on the one hand, contend that a loose physico-chemical combination of the fatty constituents of the cells and the anesthetic causes an inhibition of cellular chemism. Verworn, on the other hand, claims that—"The factor which produces the characteristic symptom-complex of narcosis is, under all circumstances, the suppression of the power to carry on oxidations—an acute asphyxia of the cells." The theory of Meyer and Overton would seem to apply to anesthesia produced by alcohol-derived drugs, and that of Verworn possibly, to some extent, to gas anesthesia.

THE SPECIFIC ANESTHETIC ACTION OF NITROUS OXID.

Nitrous oxid possesses a specific anesthetic action, viz, a temporary non-toxic molecular change in the brain-cells, proved by the following reasons, most of which are mine: The early induction of analgesia when nitrous oxid is inhaled in the pure state, before cyanosis appears; the fact that when combined with the proper percentages of oxygen, with the patient showing even an over-pink color, anesthesia is profound and satisfactory; the fact that characteristic symptoms of anoxemia are not present during a correct gas-oxygen anesthesia; that, if anesthesia were due to cellular asphyxiation, pure nitrogen combined with oxygen would give results equally as good as nitrous oxid and oxygen, but if enough oxygen is combined with the nitrogen to give the patient a pink color, no anesthetic results are obtained (Teter); if an anoxemic nitrous oxid and oxygen narcosis is conducted for any length of time, an asphyxial acidosis, due to suboxidation, will occur in a large number of cases, but with a pink gas-oxygen anesthesia, the above does not obtain. As stated by Teter, when cyanosis does occur with nitrous oxid and oxygen, it is concomitant, and is usually seen during early anesthetization, or when the air-way is obstructed.

Cellular function is almost entirely suspended, but more so by alcohol-derived narcotics because of greater cell destruction, yet afferent—centripetal—impulses are blocked very much more by gas-oxygen anesthesia, thus preventing shock. There is a difference between undiluted nitrous oxid and gas combined with oxygen. The former, when a few breaths are inhaled, soon produces asphyxial symptoms; there is marked venous engorgement; the work of the heart is increased, and headache often follows the administration.

THE ACTION OF OXYGEN.

Nitrous oxid given with varying percentages of pure oxygen produces a scientific narcosis by harmonizing with the law of anesthetic accommodation, and thereby gives a more tranquil and safer anesthesia. In regard to oxygen—"It is not an ordinary pharmaceutic substance endowed with a special therapeutic virtue, but it is a vivifying element by which organic metamorphosis, the *circulus vitalis,* is possible." (Demarquay.)

It is said that pure oxygen possesses analgesic properties when inhaled. This is quite true, and further, all respirable gases produce varying degrees of analgesia. Rapid breathing of atmospheric air (Bonwill method) will produce analgesia. By means of the oxygen control, nitrous oxid can be given safely by skilled anesthetists to moribund patients. The inhalation of pure oxygen is pleasant and exhilarating; there is a sense of warmth felt in the entire body, tingling occurs, and perspiration is produced. Acapnia is prevented by gas-oxygen anesthesia. Acapnia means deficient carbon dioxid in the body; it is produced clinically by pain, ether, excitement, sorrow, fear, and rapid artificial respiration, all of which cause excessive respiration—hyperpnœa—with a consequent elimination of carbon dioxid.

THE VALUE OF NITROUS OXID IN ANOCI-ASSOCIATION.

The valuable researches of Crile in regard to the principle of anoci-association places gas-oxygen in its proper sphere in that respect. Anoci-association simply means doing away with harmful or nocuous associations in the patient during a surgical operation. It is accomplished by having the patient in a tranquil frame of mind before the operation; by the preliminary use of narcotic drugs; by peripheral nerve blocking; and by the use of gas-oxygen, and small amounts of ether, if necessary. Crile says—"Anoci-association may further be promoted by the use of pleasant nitrous oxid instead of the irritating, suffocating ether; provided only that the anesthetist is an expert in this anesthetic."

THE QUESTION OF SHOCK.

Considerable contention has arisen over the subject of so-called primary shock. Shock, in general, means depression, and the surgical pathology is varied. Exhaustion of the vaso-constrictor center, the result of injury, is one condition present in shock. Henderson claims that acapnia is the primary cause of shock. Many persons speak of primary shock when in fact the real condition is reflex inhibition—commonly cardiac. This dangerous phenomenon is usually seen during incomplete chloroformization. Whether or not vagus inhibition occurs during gas-oxygen analgesia or anesthesia is a question. It probably does not, because nitrous oxid and oxygen has a specific property of blocking afferent nerve impulses from the very beginning of the inhalation of the gases. At any rate, personal experience, and the fact that no such condition has been reported, would tend to bear out the above statement.

REFLEXES DURING NITROUS OXID AND OXYGEN ANALGESIA AND ANESTHESIA

The reflexes during gas-oxygen analgesia and anesthesia are more active in the various stages of narcosis than when ether or chloroform is the anesthetic used. Nitrous oxid is not a toxic nor depressing drug, like the latter, consequently there is more muscular tonicity and more active reflexes. The special reflexes made use of during gas anesthesia are the conjunctival (lid reflex), tarso-corneal reflex (Parson's reflex, produced by pressing the margin of the superior tarsal plate against the cornea, directly over the pupil, producing reflexly an inward retraction of the lower lid), and the pupillary reflexes, including reaction to light and marginal motility, and the crossed concomitant. The degree of anesthesia depends upon the comparative activity of the reflex, viz, the less active the reaction, the deeper the narcosis.

Much more could and will be written about the physiology of this important gas, but this article is only intended to bring out a few points of practical importance.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

CROWN AND BRIDGE WORK, PAST AND PRESENT.

By J. L. HOWELL, D.D.S., Denver, Col.

(Read before Section I of the National Dental Association, at its annual meeting, Kansas City, Mo., July 8, 1913.)

THE ideals of yesterday are the realizations of today, and the ideals of today must, and will, be realizations of the great tomorrow.

We are standing upon the threshold of a new epoch in dentistry, with its apostles of new and progressive thought, who have the power to catch and hold the attention of the money-mad public —Dr. Evans teaching and preaching and driving an unthinking public to give more thought and attention to oral hygiene and general sanitation, while that valiant and renowned philanthropist, Mr. Horace Fletcher, the layman and the apostle of right living, by teaching us the value of proper foods and how to masticate them, has done our profession a great and lasting good indirectly by teaching the general public the necessity for good dentistry, that good digestion and good health may follow. Such men as these have helped to start the general public to "thinking dentistry."

HIGHER STANDARDS OF DENTISTRY IMMINENT.

At this time let me sound the warning that owing to this oral hygiene and oral prophylaxis education which the public is receiving today, the people tomorrow will ask and demand of us a better and more prophylactic dental service, demand that the dentist be an oral surgeon, an artist, and a mechanic all in one, and that he be able to "stand to and deliver the goods."

And when that tomorrow arrives the dentists will have discarded the practice of inserting the ill-fitting crown with its projecting band and the unfinished filling with its overhanging ledge and unpolished wall. He will have discarded the old idea of non-devitalization of the pulp in crowning; the "no cure" idea for pyorrhea alveolaris, the "too young" idea for the regulating of children's teeth, and the practice of promiscuous extraction in orthodontia, as well as many other ideas and practices that are prevalent today, but which are fatal to good dentistry. In that junk-heap of discarded methods and ideas will be found the old, filthy, microbe-breeding stationary bridge. Instead, we shall see the dentist who takes pride in his work, loves his profession, and is ambitious to *best* serve his patients, making and placing the removable prophylactic molar and bicuspid bridge, a removable bridge, more simple and easy of construction than any we have now. This, I hope and feel sure, will be perfected in the next few years.

I wish to call special attention to the fact that now all of our time and skill is spent in trying to duplicate nature in her best and loveliest design, in restoring the usefulness and esthetic beauty of diseased, broken-down, and lost teeth. And to that usefulness and beauty the dentist of tomorrow is going to add prophylaxis as his standard of requirement.

A dentist cannot possibly serve his patients well unless he understands the underlying principles of crown and bridge work and puts these principles into practice. The dentist who falls a victim to the temptation of taking short cuts in order to hurry his work—and it is difficult sometimes to withstand that temptation—will fail to achieve the best results for his *clientèle.*

PREPARATION OF TOOTH FOR A CROWN.

I dare to assert that there is not a dentist who has not heard, time and time again, in his college course a description of how to prepare and crown a tooth, yet for the benefit of those who may have forgotten, I will hurriedly call attention to the essential requirements that are necessary in preparing a tooth for a crown. The first requirement, of course, is devitalization and filling of the canals; the second requirement is adjusting of the band; the third requirement is contour of the band; the fourth requirement is contact and occlusion; and, in crowns for any of the anterior teeth, we will add a fifth essential requirement that must be considered from an esthetic standpoint—and that is, form and color.

DEVITALIZATION DEMANDED.

There was a time when the majority of the dental profession thought it a crime to destroy the pulp of a tooth for crowning purposes, and even today some so-called good dentists are of that opinion. But to me—and I believe that I am backed in my opinion by the very best men in our profession—it seems a blundering mistake if one fails to remove the pulp and to fill the canals to the very apex before the crowning of a tooth. It is sometimes necessary to cut the crown almost entirely away in order to get access to the crooked and irregular canals. In such cases it is advisable to have an X ray made, which I find a great help in speeding my work, with a certainty of success. I feel that it is imperative, before setting a bridge, to have a skiagraph made, to make sure that the canals are filled to the apex.

REMOVAL OF ALL ENAMEL.

The second step in the process of making a crown, after filling the root-canals, is to remove every vestige of enamel from the root, using carborundum stones, sandpaper disks, and enamel cleavers, as the aim is to build a crown that will duplicate the original, natural enamel crown. After the enamel has been entirely removed from the tooth, the greatest circumference of the tooth will be found to be about one-sixteenth of an inch under the gingiva, or at the line of contact between the enamel and the cementum. From this line toward the occlusal surface or edge, the diameter of the dentin diminishes, and the enamel increases in thickness.

DOUBLE BANDS SUGGESTED.

The fitting of bands for molars so as to get a proper fit and to keep it while contouring the bands for excessively bell-shaped teeth, is one of the two original ideas I have to present in this paper—that is, they are original as far as I know.

The great trouble I had up until a few years ago was to get the band to fit and at the same time have the proper contour at the gingival margin. As a rule, it had the reverse contour; that is, it fitted and paralleled the dentin of the tooth, but did not protect the delicate membrane of the gingiva because it did not have the proper contour, and if I gave it the proper contour it was too uncertain in putting on and off. But after repairing a poorly fitting but well-made bridge by removing the enamel from the abutment teeth and making a narrow band for the abutment roots, contouring the gingival portion of the bridge abutment crowns, forcing the bridge crowns down over the new band that I had made for the abutments, I found that I had a beautifully contoured and well-fitting bridge, and after soldering and polishing I was so well pleased with the fit and contour of the crowns that I have used that method for fitting and contouring all gold crowns I have made since then.

ADJUSTMENT BAND.

The technique is as follows: The first band, which we will call the inner or adjustment band, should not be over one-fourth of an inch in width, unless the festooning of the gingiva is decidedly marked, and should be cut from 30-gage plate. The band is to be a trifle short of the measurement of the tooth under the gingiva. In taking the measurement, I use the Hollingsworth copper strips, as they can be forced up under the gingiva better than wire or waxed floss. One end of the band is filed to a knife-edge thinness, the other end is lapped over, with the knife-edge end on the inside, and the band is soldered with a very small amount of 22-karat solder. This band is then forced over the prepared root down to the gingiva with a sharp instrument, and the gingival line is marked upon the band, mesially, distally, buccally, and lingually. The band is removed and trimmed as marked, is replaced on the tooth, forced down over the tooth until it extends under the gingiva a little less than about one-sixteenth of an inch, and then burnished to the walls of the tooth. If this has been done properly, the band will be greater in circumference under the gingiva than at the occlusal end—in other words, it will be slightly cone-shaped. Then, with a sharp instrument, the gingival line is marked on the band, an impression is taken, the band is removed from the tooth, placed in the impression, and a model is run and finished in the laboratory. As I said in the beginning, the second essential principle to be considered in making a crown is to fit the adjustment of the band, and now we have the adjustment band on the plaster model.

CONTOUR BAND.

The third requirement that is absolutely necessary to be considered in the making of a perfectly serviceable crown is contour. It is as essential that a crown should have a perfect contour as that it should have a perfect adjustment at the gingival margin. The first is necessary to prevent irritation to the gingiva, the second to prevent the food from crowding down upon the gingiva and starting an irritation that so often leads to that dreaded disease, pyorrhea alveolaris.

To obtain a good and sure contour, a measurement of the band on the model is taken at the gingival line, and the band width is cut so as to bring the band buccally and palatally to one-thirty-second of an inch of the cusps of the occluding teeth. This band we will call the outer or contour band. It should be cut so that it will have a greater circumference at the occlusal edge than at the gingival, that is, in large bell-shaped molars. One end is filed, lapped and soldered as was done with the inner or adjustment band, using a small amount of 22-karat solder. The contour band is returned to the model and contoured as desired, using spreading and contouring pliers for the purpose, so that the band assumes the proper curves and angles labially and lingually, also insuring perfect approximal contact. The rest of the crown can be finished after any favored method, either by carving the cusps in casting wax, casting and soldering the cast cusps to the band, or by carving the cusps in a metallic carving compound and swaging them in 32- or 34-gage pure gold plate, using a coat swager with soft rubber between the gold plate and the plunger. The cusps are flowed flush with 22-karat solder, or with 22-karat gold, or coin gold, and soldered to the band with 18-karat solder. The crown is then polished, feather-edged at its cervical margin, gold-plated, and well burnished.

All crowns and bridges should be gold-plated before being cemented into place, except the split posts, tubes, and telescope parts in removable bridge work, to prevent unsightly oxidizing of the soldered parts as well as to cover up the cadmium in the solder, which some authorities claim to be poisonous to the system.

By following the method described, a crown is obtained that will always go to place without any danger of the band stretching and going too far down under the gum and impinging upon the gingiva, thereby starting future trouble for both patient and dentist. Such a crown will hold without risk of breaking or tearing, and will bear the greatest amount of stress and strain when used for abutments in Morgan, Roach, or Gilmore bridge and plate attachments.

There is a great variety of factory-made or "ready to set" crowns on the market for the anterior teeth, and I am sorry to say that they seem to be most universally used. But for fear of exhausting your patience, and out of charity, we will refrain from commenting upon their use.

I have never become a convert to the theory that a cast adaptation crown is as satisfactory as the banded Richmond crown or the banded baked porcelain crown. For insuring the greatest efficiency in anterior crowns, no crown made with cast adaptations is equal to the crown made with the band, cap, and post. While the bands are difficult to fit and take more time, perseverance, and skill, yet in the end it pays to employ this crown, owing to the protection offered to the root against fracture and against the micro-organisms of the mouth.

FITTING BANDS FOR A RICHMOND CROWN.

The many failures with the Richmond crown are due to the fact that the proper technique of fitting the band is not followed. Teeth, as before stated, as a rule are slightly conical in shape when the enamel is removed. Therefore, in order to obtain a band that will have the same contour as the enamel portion that extended under the gingiva, we have to be very careful and painstaking in our technique. I do not believe that there is any branch in dentistry where a man's skill and patience are so severely taxed as in the making and fitting of a Richmond crown. The technique of making and fitting a Richmond band is as follows:

The tooth is ground to within $\frac{1}{8}$ of an inch of the gingiva labially, and not nearly so close palatally, the measurement taken, a band is cut a little short of the measurement, fitted to the tooth, and festooned so that it will go up under the gingiva less than one-thirty-second of an inch. The band is then removed and feather-edged with a file and burnisher, making sure that it is festooned sufficiently mesially and distally. Then it is replaced on the tooth and forced down so that it will stretch enough to extend under the gingiva a little less than one-sixteenth of an inch, at the same time becoming slightly conical in shape. While the band is on the tooth, the labial portions of the tooth and band are ground with a round carborundum wheel even with the gingiva; then, with a homemade instrument that is bent and ground so that it takes on the curve or festoon of the buccal portion of the gum and is so made that it will fit the neck of the tooth, the gum is held down and out of the way so that the carborundum wheel will not lacerate it. The band and tooth should not be ground down over one-sixty-fourth to one-thirty-second of an inch below the gum line. Before removing the band, a piece of pure gold plate, well annealed, and a trifle larger than the occlusal surface of the tooth, is burnished over the end of the tooth and band, the band is slipped off, the piece of pure gold is re-annealed, fitted closely to the band, and soldered. The cap thus obtained is replaced on the tooth, an impression is taken, and the crown is finished in the laboratory. As I said before, in my opinion the shortcoming of the Richmond crown lies in the lack of *adjustment* and *contour* of the band. Therefore, after running a model and placing it on an articulator, a facing is ground to fit the cap with a perfect joint, and backed with pure gold or platinum foil, or both, as the case may demand. In about fifty per cent. of cases I find that it is necessary to use both platinum foil and gold plate, 36-gage, in backing facings, using the platinum foil to back the occlusal or cutting half, to give the facing its natural bluish tinge, while the gold is necessary to give a yellowish tinge to the gingival third.

For contouring the band, the facing is waxed to the cap, allowing the facing to stand out over the edge of the band from about one-third to one-half of the width of the band labially. Upon removing the appliance from the model, a V-shaped space will be noted between the labio-cervical margin of the facing and the band. This V-shaped space is filled with very narrow strips of pure gold cut from 34-gage gold plate, and so narrow that it practically becomes gold wire; this is covered with Parr's hard wax flux, invested, and soldered. The solder will follow the pure gold strips and a band perfectly contoured labially, mesially, and distally is obtained. Before taking the crown from the investment, two pieces of 30-gage gold plate are placed upon the palatal portion of the band so that there will be plenty of gold on the band to give the crown, when finished, the proper contour on the palatal margin, as well as to impart to it the additional strength needed for the prevention of root fracture.

REMOVABLE VS. STATIONARY BRIDGES.

Practitioners today seem to make too many stationary bridges and too few removable or prophylactic bridges. The one great fault we find with the stationary molar and bicuspid bridge is the filthy, germ-breeding, odoriferous existence it leads. Only in rare instances do we find a mouth with long slender teeth on which a serviceable prophylactic stationary bridge can be placed. How often do we find cases in which the conscientious dentist, in his anxious dilemma, has compromised and put in a half-serviceable, half-sanitary, stationary bridge, making the molars only one-half to two-thirds as wide as they should be, and calling this a sanitary bridge—and "letting it go at that"—because that seemed to be the best he knew.

The one permanent or stationary bridge that is being used extensively and is commendable, in that it is artistic, serviceable, and comparatively sanitary, is the cast inlay abutment bridge used for canines and centrals, also for bicuspids and molars where there has been considerable absorption from pyorrhea. One reason why I think we like this type of bridge is because all of us can make a more perfect inlay in less time than it takes to remove the enamel from a central incisor and fit a band properly. In this, however, as in every other branch of dentistry, there are bound to be a great many failures by men who are honest and sincere, yet who have not a sufficiently mechanical turn of mind to know or properly judge where such bridges are indicated, how much stress and strain will be brought to bear upon such a bridge, and how much it will stand.

TECHNIQUE OF MAKING INLAY ABUTMENTS.

As to the technique of making an abutment inlay, it is important to have the inlay cover the whole of the occlusal surface of the tooth if the abutment is a bicuspid or canine, thus preventing fracture of the tooth. The cast gold inlay alone must not be depended on for strength, but an iridio-platinum wire must be used for a post, which is set deeply into the canal and bent at right angles so that it will not interfere with the articulation of the occluding teeth. The cavity is filled with inlay wax, so as to cover the iridio-platinum post. The inlays are cast and replaced in the cavities, an impression is taken, models are made, and the bridge is finished in the usual way, excepting the soldering process. It is necessary to invest and solder twice in making a cast inlay abutment bridge, on account of the contraction of the solder when changing from the molten to the solid state, while in making a crown abutment bridge it is only necessary to solder once.

I am especially partial to the removable bridge, using the Peeso removable attachments. These abutment attachments are the telescope crown and the split pin and tube, which are used for the lower bicuspid and molars separately and in combination. The telescope crown is what the name implies, viz, the telescoping of one crown over another with such fine adjustment that the capillary attraction holds them together rather than mechanical friction.

The split pin and tube are used in conjunction with the telescope crown, also for the anterior teeth when we use porcelain facings.

The most satisfactorily artistic as well as prophylactic bridge is the removable bridge having as attachments the split pin, tube, and cast inlay abutments.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

CORRESPONDENCE.

MUSIC AS AN AID IN N_2O+O ANALGESIA, AND IN DENTAL OPERATIONS IN GENERAL.

To the Editor of the Dental Cosmos:

Sir,—Few of us, I think, fully realize how important a part mental suggestion plays in the practice of dentistry in general, to say nothing of its influence in the successful use of nitrous oxid and oxygen for analgesia and even for anesthesia.

When one pauses to think of all that is being accomplished by those who are using this agent, he wonders, at first, why its use is not far more general. It seems to the writer that the explanation lies in the fact that it is impossible to obtain the best results unless the subject be taken up more thoroughly than is possible in the time which most busy practitioners are willing to take for it. The mere installation of an apparatus and reading of accompanying directions is not enough to pave the way to success in this work. It must be undertaken in a thoroughly scientific manner; if this be done it will well repay any dentist, who is at all fitted to do the work, for all the time and effort he puts into it, by enabling him to do better work in less time and without inflicting any pain in connection with his operations.

Having used the nitrous oxid-oxygen combination with the most gratifying results for about two years, it has occurred to me that other readers of the Cosmos who are interested in the subject might also be interested in an experiment which I have been carrying on for the past three months in connection with this branch of the work and which has seemed to add considerably to the value of the procedure. This experiment consisted, first, in the installation in my operating room of one of the modern graphophones. Now, as the patient is being carried under the influence of the gases, I find that in the majority of cases their attention is fixed on the music. This is continued throughout the operation, if it is cavity preparation or anything which can be done during analgesia, or until the patient is unconscious, if it be a case for anesthesia. In either instance, if the subject's mind be properly directed by mental suggestion, the result is most gratifying. It gives the patient something to think of besides the impending operation, and altogether the plan proves to be a most beneficial adjunct to the nitrous oxid-oxygen method.

Also, in many cases of nervous patients and children, in which, inasmuch as there will be no actual pain inflicted in operating, it is not considered necessary to use the gases, I find that the music helps considerably to divert the patient's mind.

This is not a theory, but a procedure which has proved of inestimable value to me in practice, and I offer it to the "other fellows" through you, in the hope that some of them may be able to help their patients to overcome the dread of the dental chair, as I have been able to help mine.

The day has come when good dental operations do not necessarily mean the infliction of almost unbearable pain.

J. Neales.

Providence, R. I.

PROCEEDINGS OF SOCIETIES.

NATIONAL DENTAL ASSOCIATION.

Seventeenth Annual Meeting, held at Kansas City, Mo., July 8 to 11, 1913.

(Continued.)

SECTION I: Prosthetic Dentistry, Crown and Bridge Work, Orthodontia, Metallurgy, Chemistry, and Allied Subjects.

Chairman—HARRY E. KELSEY, Baltimore, Md.
Vice-chairman—FRANK T. TAYLOR, Boston, Mass.
Secretary—J. H. WALLACE, Omaha, Neb.

(Continued from page 1164.)

THURSDAY—*Second Session.*

The second meeting of Section I was called to order on Thursday evening at 8 o'clock by the chairman, Dr. Harry E. Kelsey, Baltimore, Md.

The first order of business as announced by the chairman was the reading of a paper by Dr. J. L. HOWELL, Denver, Colo., entitled "Crown and Bridge Work, Past and Present."

[This paper is printed in full at page 1245 of the present issue of the COSMOS.]

Discussion.

Dr. M. E. VANCE, Omaha, Neb. The essayist of the evening has given us a dissertation on the ideal in crown and bridge work, but how many of us follow that ideal? There is no need of my enlarging or commenting upon the essentials for successful crown and bridge work which the essayist has outlined, but I wish to urge greater adherence to these essentials. All that Dr. Howell may say of better crown and bridge work will not benefit us unless we put his suggestions into practice. Many practitioners attend dental meetings and witness clinics and demonstrations of how best to prepare teeth for the insertion of crowns and bridges, and yet they continue to do the work in the same manner as before, which I am sure is not proving satisfactory to themselves or their patients. This is a rather severe commentary on the dental profession, which claims advancement and progress. Yet how many mouths contain dental work which makes us almost blush for shame!

It has been my pleasure since coming to Kansas City to know Dr. Howell personally, and to discuss with him in detail the manner in which he constructs bridge work. I question whether any of you could follow the essayist's short description sufficiently well to be able to construct this work in the way he does. I have received a great deal of benefit in this direction from a study-club to which I belong, where we spend two or three days in going over some special class of work. For instance, at one meeting we study amalgam fillings, at another the construction of crown and bridge work, and at another plate work. Some fifteen or twenty of us get together, discuss these subjects and do the actual work in the mouths of patients provided for us. In this club there are a number of competent demonstrators.

When in college we were supposed to work in an ideal way, but most of us were hardly able to do what we would today consider ideal in any line of work when we were students.

I wish to say a word about the porcelain crowns—such as the Logan, the Twentieth Century, or the Davis crown—the application of which Dr. Howell does not favor, preferring the Richmond crown to all these. With the Logan crown or the Twentieth Century crown I have been very successful in reproducing the natural tooth. I rarely construct a Richmond crown, because I feel that it is almost impossible to overcome the irritation around the gingival margin. I had the pleasure of seeing this afternoon some beautifully constructed Richmond crowns made by Dr. Howell, but the great amount of irritation which I have seen from time to time, due to poorly constructed bands of Richmond crowns, has led me to feel that the great majority of dentists are either not capable or not willing to properly construct such a piece of work. Unfortunately, I have seen a great deal of porcelain crown work which is neither creditable to the operator nor the dental profession. But with proper care and technique, and if a man has any ability at all, it seems to me that he can adjust a porcelain crown to the root of a tooth and make a margin that is far better at the gum than a gold band. Moreover, the color change produced by gold or platinum in the facing is nearly always detrimental. I do not think it is possible to obtain as good color in a Richmond crown that is backed with gold as in an all-porcelain crown. The contour of the crowns that are on the market today will fill the needs of almost every case. To be sure, there are difficult and almost impossible cases which it seems impossible to remedy with anything, but in the great majority of cases I think the porcelain crowns we buy are far better than the Richmond crown. The majority of dentists, in my opinion, are not able to bake porcelain crowns that are equal to those of the manufacturers.

In the preparation of the roots for crown work, the enamel cleavers for the four corners of the tooth, if I may so express it, are very essential. The four sides of the tooth can be ground off with stones of different kinds, but the four corners of the tooth are too often neglected, and if these corners are left untrimmed, a band extending under the gum is sure to cause pyorrhea alveolaris sooner or later.

I wish to say a word in behalf of the cast abutment for bridge work. It seems to me that the saving of tooth structure which we are able to accomplish today with the cast inlay as an abutment argues well for its employment. In years gone by we had to make either porcelain or gold crowns for these abutments, but today we can extirpate the pulps and save practically the entire labial surfaces of bicuspids and canines, if we employ the cast inlay.

Fixed bridge work has been unsuccessful because we have tried to make crowns over teeth without first paralleling the walls of the two abutment teeth.

Dr. J. K. Will, Bonner Springs, Kans. In regard to the Richmond crown, the last speaker said that we cannot obtain the proper color. But, if the gold is held behind the facing and allowance is made for the changes of the shade, the shade will be exact.

In grinding Logan or Twentieth Century crowns I find that by using articulating paper I can obtain perfect adaptation to the roots.

As to the questions of paralleling the abutments for bridges, we can usually get the bridge in place, even if the abutment teeth diverge somewhat.

Dr. J. H. Blachly, Manhattan, Kans. I would like to say a word in regard to the cast joint. If a patient presents a badly broken-down joint which it is impossible to correct by means of the Richmond crown, a solid crown can be obtained by the careful use of the cast joint between the porcelain and the root, especially if we use a detached post, thus getting a result that is esthetic in appearance and will be of great service to the patient.

Dr. J. V. Boswell, Springfield, Mo. Several years ago I favored the use of the banded crown, but have come to the conclusion that a properly inserted all-porcelain crown is the acme of perfection. The trouble encountered with non-banded crowns in a great many instances is due to the careless way in which they are set. In the Logan crown, for instance, we recognize that the pin is rather too soft, but it has the advantage of being made of a noble metal, and unless the root-canal has been unduly enlarged, it will stand in most cases. My method of setting the Logan crown consists in using the Ivory No. 9 clamp and, with a rubber dam on the root, grinding down the stub as desired. In this way I can almost perfectly fit the joint. One great trouble in setting a Logan crown, or any all-porcelain crown, is that we leave the back of the root too low. Of course it is necessary to cut the labial portion high enough to hide the joint; the joint should not be left exposed behind, but the face of the root should be given a slant, which will offer resistance to any force that is brought to bear upon the crown. That is, the face of the root and the base of the crown should be shaped and fitted at as nearly a right angle to the direction of stress as possible. Then the stress will tend to force the crown toward the root, instead of away from it. If a clamp and the rubber dam are used, the field of operation is clearly visible, and the operator can see what he is doing. I do not believe it is possible to have an anterior banded crown remain in the mouth any length of time without producing an untoward condition of the gum. In bridge work, of course, we are almost compelled to use banded crowns if we want permanence, and we have to choose the lesser of two evils. If the abutment teeth are converging, I do not believe in placing a removable bridge of the type described, for an ordinary fixed bridge can be made and placed in most of these cases, if the abutments are properly prepared.

Dr. N. C. Christensen, Omaha, Neb. With regard to the banded crown, I do not think it necessary to allow the band to extend up to the alveolar process, if the root is properly prepared, and this I consider a very necessary feature for the success of the crown. In some cases which I have observed, the root had been crushed and the mesial portion pushed off, presenting a condition which is very difficult to repair. A band properly prepared with good judgment is, in my opinion, a good appliance in such complicated cases.

The color of a Richmond crown can be preserved for many years, if the gold is properly swaged against the facing so that no moisture can get in. I have several patients in whom such crowns have been standing as long as eight and nine years. If necessary, the color can be modified by using platinum. It is desirable that the manufacturers supply us with teeth of natural color, which can be changed to a deeper shade by proper backing.

Dr. W. S. Zeile, Sydney, Australia. I am making removable crown and bridge work successfully, and am glad to see that in the seven years, since I was last in this country, the methods have not been changed in any particular detail. I find that the split pin is of very little value for the purpose for which the essayist uses it, and I would like to ask how he spreads the pin in the center without disturbing its fit, and without spreading the end of the pin that first fits into the tube?

Dr. F. H. Skinner, Chicago, Ill. For hygienic reasons, I believe, we must avoid large fixed bridges. The method which Dr. Howell has described this evening is one of the most perfect methods of removable bridge work that we have, but I think it has a few objections. Dr. Howell, you introduce a tube into the root-canal and run a split pin into the tube, do you not?

Dr. Howell. Yes.

Dr. Skinner. I think the objection to this procedure is the trouble encountered in enlarging the root-canal in most teeth to accommodate a split pin and tube without weakening the root. For this reason I have, for some time, soldered to the abutment a nut or tube threaded on the inside, and screwed a split pin into this tube, allowing a platinum tube to go over the pin, and building the crown around the tube. I prefer the use of split pins to telescoped crowns for the attachment of removable bridge work, for they can be tightened if necessary, and better cosmetic results can be obtained; also, if one side of the split pin should break off, the pin can be unscrewed and replaced without any trouble.

Banded crown abutments add strength to the roots and form firmer attachments, but unless the root is very conscientiously prepared, the band accurately fitted, and the crown contoured so as to protect the soft tissue, irritation will result.

Dr. J. F. Wallace, Canton, Mo. From the discussion it seems that we have no fixed rules for making a crown or bridge. The conditions under which we must do the operation, and under which the crown or bridge must stay, must be taken into consideration, if the appliance is to be a success. A crown or bridge that may be a success in one instance may probably be a total failure in another instance, and it is the operator's duty to study the conditions to which the appliances must be adapted, and under which they must remain in the mouth. We cannot possibly be successful if we confine ourselves to any particular form of construction of artificial substitutes. The banded crown may be ideal in one case, but an absolute failure in another. The audience seems averse to the banded crown, but there are cases in which it is fully indicated. Someone mentioned the case of a badly decayed or crushed root, and suggested that, in order to remedy this, a band must be made to extend beyond the decayed margin. In such a case a cast matrix between the root and the crown is indicated. After all, the operator's gumption in studying conditions and reaching conclusions is the most important factor.

Dr. M. T. O'Neill, Vienna, Austria. Dr. Bryan of Basel, Switzerland, has devised a very satisfactory method of removable bridge work, which consists in attaching the bridge to its abutments by the use of a screw. This method has been described in dental journals several times. It is especially adapted to teeth in which we have to restore a certain portion with porcelain. The bridge can be easily removed and cleansed, and, if the porcelain breaks, a great variety of facings are available for repairing it.

The essayist's description of his bridge work is very instructive. The split pin, on which several of the speakers have been commenting, I have seen in a great number of cases, but have found very few in which the elasticity of the material will last over a few months,

As to the banded crown, I think that the majority of dentists do not use enough pains in fitting the band. We must not forget that, if we allow the band to encroach on the tissues, inflammation will ensue. Probably the only way to avoid this is to be sure that the circumference of the band is not larger than the original circumference of the tooth. It takes a great deal of pains to do this work, but, if properly executed, it will repay us in the end.

A Member. I have been waiting to hear something said about the essayist's method of contouring the band so as to restore the contour of the enamel that has been removed. In a banded crown, that is, I believe, one of the most important features, next to the fitting of the band on the root. We should aim to fit the band to the root as we fit a hoop to a barrel—in contact everywhere. I do not, however, believe that it is absolutely necessary to use a band to prevent the splitting of the root, especially in the six anterior teeth. In these cases, I firmly believe, the porcelain crown with the cast base is the most suitable. This crown will produce less irritation of the gum tissue than a banded crown, no matter how carefully the band is fitted. In order to prevent the root from splitting it is necessary to put the strain on the lingual side of the root. This can be accomplished by cutting a square in the lingual side and making the casting so that it fits well into this square. Any force exerted on the lingual surface of the crown will then be thrown to the lingual surface, and splitting of the root is prevented much more successfully than by any band.

Dr. Howell (closing the discussion). I wish to thank the audience for the consideration, criticism, and extended discussion accorded to my paper. It always seems remarkable to me how much success so many operators obtain from different methods. Each operator obtains better results with his own favorite method than with any other, according to the law of the personal equation. I am partial to the Richmond crown, because in my hands it has given so much satisfaction. I have been trying to learn other methods, in order to obtain results with the least expenditure of labor. I have been trying the method of casting the joint, but have never yet been able to make a joint without a cleft, and such a joint cannot be kept absolutely prophylactic. I intended to bring with me a three-teeth bridge that I inserted nine years ago, using banded Richmond crowns as abutments, for a patient who since that time has been all over the world. When this bridge was inserted he had four natural teeth left on that side, and was wearing a partial plate. During his absence he lost a central and a lateral incisor and canine, and when, on returning to Denver, he came to me he had only a right lateral and central and two right molars left, which were so loose from pyorrhea that they could almost be removed with the fingers. I remembered having made a note when I inserted the bridge that the two abutment teeth were affected with pyorrhea, as much as the other teeth left in the mouth. Yet after nine years these two abutment teeth with banded contoured Richmond crowns were absolutely solid, although the natural teeth had either been lost by pyorrhea or were hopelessly loose. The patient insisted on having the bridge removed and a full gold plate made. I had intended to show the bridge and the extracted teeth here, in order to demonstrate what a great amount of tartar had accumulated on the four teeth which I extracted and what a small amount on the teeth that had been crowned.

If one can get better results by using the cast gold base, as my friends claim, he should use it by all means, but personally I have never been able to obtain a perfectly fitting cast base for a Logan crown, even if I use articulating paper. Moreover, it takes three times as long to get a perfect adaptation as to make a perfectly fitting band and contour by the method described. The great fault of the Logan crown is not so much getting this joint here [indicating], as in the mesial, lingual, buccal, or palatal joints, because there is always some little overhanging ledge there, which holds food and starts inflammation.

It is true that in many cases the Richmond crown is a failure, but this is not due to the system, but to the mechanism of the finger-tips and to lack of skill on the part of the operator. After twelve years of practice I find this to be the only system that will universally answer all the requirements, if applied properly. It takes a great deal of time to get good results, however, and many practitioners are inclined to take short cuts. I have seen fifty or more fractured roots on which unbanded crowns had been used, and I object to that form of crown on account of this risk of fracture as well as for prophylactic reasons.

The correct color can be readily obtained, if a facing of suitable shade is selected, and platinum and gold is used for the backing. As a rule I can get as perfect color as with a Logan crown, although I am partial to the Logan crown as far as artistic effect is concerned; but we cannot sacrifice durability to esthetic appearance, although our crowns must be as nearly esthetic as possible.

One of the speakers said that it was impossible to fit a band and not produce irritation of the gum. I wish I could show some of the cases in which I have used the Richmond banded crown. I have had, of course, failures in some Richmond crowns. I have had to remove one or two such crowns when gingivitis was present, and made a banded porcelain crown, allowing the porcelain to extend down over the band, thus providing a heavy band of porcelain, which is, I admit, unsightly when out of the mouth, but when set will allow the gum to remain in a healthy condition. I have inserted many of these crowns in cases where there seems to be some idiosyncrasy of the gum tissue against tolerating gold even when properly burnished.

Dr. Zeile wants to know how the pin is spread. There are two ways of doing this. If the pin is ground off to this point [indicating], and opened with a fine instrument, it will split in this manner [indicating].

Another method is as follows: I do not grind off this little flare [demonstrating], but leave this end of the wire bent and only cut about one-half. In the cases where I have used this method I have had only one bridge come off owing to a spread pin. There seems apparently no wear and tear on these abutments in five and a half years. It seems they hold by capillary attraction. In other words, a certain amount of moisture present does not allow the pieces to come together, and yet there is a better and tighter fit if such moisture is present. The best way is not to grind the pin off here [indicating], but to make the split from here to here [indicating] obtaining the spread from here to here [indicating], rather than at the end.

Section I then adjourned.

SECTION II: Operative Dentistry, Nomenclature, Literature, Dental Education, and Allied Subjects.

Chairman—J. R. Callahan, Cincinnati, Ohio.
Vice-chairman—Joseph D. Eby, Atlanta, Ga.
Secretary—J. P. Marshall, St. Louis, Mo.

Tuesday—*First Session.*

The first session of Section II was called to order on Tuesday afternoon, July 9, 1913, at 2.30 o'clock, by the chairman of the section, Dr. J. R. Callahan.

The Chairman announced as the first order of business for Section II the reading of a paper by Dr. G. S. Junkerman, Cincinnati, Ohio, entitled "Dental Educational Harmony."

[This paper is printed in full at page 1231 of the present issue of the Cosmos.]

Discussion.

Dr. Henry W. Morgan, Nashville, Tenn. The paper to which we have had the pleasure of listening has been very carefully read several times by me, and I feel quite confident that I but re-echo the sentiment that fills the hearts of all present when I say that Dr. Junkerman's conclusions are pretty generally accepted by the profession everywhere—viz, that there should be harmonious co-operation between the profession, the boards of examiners, and school men, and that this would lead to less fear of the adverse criticisms which go forth and poison the minds of the public, doing injury to the profession and still more to the schools. Those who carelessly circulate such reports are lowering themselves in the eyes of the profession as well as in those of the public. This is a plea for harmony; it does not ask for the sacrifice of any principle, but simply for hearty accord and further co-operation, for a full, just and intelligent survey of the problems which are to be solved, and in which each of these bodies we have alluded to have an equal interest.

He who knows the sacrifice that the professional dental educator is called upon to make, and anyone who will follow the history of our dental institutions and but briefly survey them for one moment, knows that they all have the best interests of the profession at heart. We have heard this morning the eloquent address of Dr. Price on the demands that are being made for higher education in the profession of dentistry. How many scientists have we in the dental profession? We cannot hope to make scientists of all our students, but we can impart to them a love of science.

A dental school in order to survive must in the future be a nursery of research. If we do not step in, as Dr. Price has shown us this morning, and assume our part in the responsibility of caring for that branch of preventive medicine which that celebrated surgeon of Chicago said a few weeks ago was the next important domain for the dental profession to occupy, how can we expect to raise any claim for higher professional standing? It rests upon us, and since, as the essayist says, the mouth is the most infected portion of the entire alimentary canal, we shall have to dig deep down into the science that underlies oral conditions, and all schools must become research bureaus.

The *Dental Review* for June published a clipping from the Northwestern University folder enumerating thirty-odd towns that need dentists. No doubt many of you realize that we are not supplying the annual loss of dental practitioners. Unless the colleges are allowed some discretion as to preliminary educational training, and increase the number of graduates, they cannot do justice to the rapidly growing importance of dentistry, and fill the demand for dental services, and soon we shall find ourselves in the embarrassing position depicted by the essayist of this afternoon. What are we going to do? How can we face our legislatures and ask for revised statutes when we know that we are not supplying the demand for dental surgeons?

I do not mean to say that I believe in having no regulations whatever for the entrance of students into dental schools. In the school I have the honor of being connected with, the university entrance committee passes on all credentials measuring up to the requirements of the National Faculties Association, and these in turn are *visé*'d by the state superintendent. I do believe, however, that we shall have to relax somewhat and supply the demand, else our legislatures may take the bridle off, and pandemonium may result.

I wish to congratulate the essayist on the very forcible manner in which he has presented these questions, and to invite careful reading of the paper after it has been published.

Dr. Chas. McDowell, Rapid City, S. D. In discussing the timely and efficient paper by Dr. Junkerman, I will confine my remarks to the third section of the "inharmonious brass band," as he calls it, viz, the profession at large, to which I belong. Incidentally I may smash a drumhead or dent a cornet in the other section. I played in a band as a youngster and after we had learned to harmonize sufficiently, we went out on the prairie back of the depot and practiced marching, and it is in this very respect that this third section, the profession at large, falls down. We are not in step. Vast numbers of the public have no ear for harmony; but if we make a noise, and keep step with it, they are impressed. Our responsibility is great; we should see that colleges are giving the best that can be given, and that they do not put quantity above efficiency. If a certain standard of education be required for admittance, it should be maintained in all colleges. But the spirit of "getting the money" has not been dormant in these institutions. No school should be run as a dividend-paying institution. The state should back up and control this department, and close any schools that are being run for profit.

It should be a shame that a university dental department, with some of the brightest and best teachers in its faculty, should be closed because it did not pay financially, though every teacher devoted his energy to producing efficiency and turning out graduates that passed various state boards with the lowest ratio of failures.

Dr. Junkerman states that "Much to the credit of the colleges, there has been very little tenable criticism from any source, to cast discredit on dental education," and then goes on to throw stones at the examining boards, stating that they are inquisitors, inconsistent, and the product of political preferment. The profession at large also seems to him to be a mighty discordant group. Now, while we have been hit, let us look at the stone-bruise on the colleges, and then all convalesce together. The preliminary mental qualifications for admission to dental colleges have been stated. Does it not occur to you that there should be some method of determining a prospective student's mechanical and constructive ability? I have known students, as you all have, who have studied three years, and four, and have then been given a diploma, although in reality they were so awkward that they could hardly sharpen a pencil. I believe it will hardly be denied that any graduate of a recognized school can pass the mental or written tests in the state board examinations; the failures are in operative and prosthetic technique.

Let us hasten the time when we can have uniformly controlled colleges, with a national law broad enough to recognize that a man capable of performing dental service for a citizen in South Dakota is qualified to do the same for a resident of Boston.

I do not quite agree with the statement in Dr. Junkerman's paper that "The dental laws are enacted by the people for their protection, and that the people do not care how many dentists there are —they are only concerned about the quality.

It is a fact that, if it were not for some of the progressive, public-spirited dentists that drafted protective laws for the people, a good many states would not yet have examining boards. How many states at present meet the expenses and allow salary enough to maintain a board without the practicing dentists themselves contributing to its maintenance by a yearly diploma registration fee? Though this fee is small, it is wrong. The people reap the benefit, and the state should pay the expense and allow salaries besides.

Another statement in the paper to which I call attention, not in criticism, but in fairness to those examining boards that are free from politics, is this: "Executive capacity and worthiness of authority are tested by credentials and examinations in other legislative departments, and there is every reason why our dental examiners should be submitted to the same test, instead of the test of political preferment."

First: Let me ask how many would voluntarily take those examinations for what glory or salary there is in the position?

Second: State board appointments can be removed from politics by each state society, if the society wishes. As an example, we in South Dakota at our annual meeting select two members of our society, whose names are sent to the governor with the request that one of the two fill the vacancy, and so far every governor has respected our choice. I believe every state society is a good judge of who should be upon the state board. Competitive examinations for dental examiners would be a useful innovation, but the board should be a national one.

I am in accord with Dr. Junkerman as to the lack of educational harmony, and with his permission would like to suggest that the public be included in this educational harmony. The profession at large must assume the responsibility of enlightening the public as to what they ought to expect from us, and of showing them what we are doing for the good of humanity. If we will decide on the noise we must make, and then each enlighten the community with which we come in contact, and keep step, we will be doing part of our share in this dental educational harmony.

Dr. Truman W. Brophy, Chicago, Ill. I very much enjoyed the paper read by Dr. Junkerman. Some thoughts, however, were expressed by him that are not in exact accord with my experiences of the past few years, though I have no reason to doubt that he has some justification for his viewpoint. As far as I am able to judge the conditions of today as compared with those which existed a few years ago, great improvements have been made. I am not in sympathy with the opinion of the essayist, and of the last speaker, regarding the spirit of discord in the profession. There is no profession in which there is such a general feeling of good-will and harmony as exists in the dental profession today.

In corroboration of my statement, look for a moment into the history of medical education in this country and review the literature thereon, especially the reports of the committee having in charge the work of medical education in medical colleges. Some of you, perhaps, will be surprised when I state that at Atlantic City as recently as five years ago that committee reported that fifty per cent. of all the medical schools in the United States were so ill-equipped and so deficient in their qualifications for teaching, in faculties, buildings, apparatus, etc., that the very best interests of the public would be subserved if that fifty per cent. of the colleges were to be closed by the government or by some power that might be able to do so.

What have we here? I look about and see before me different bodies of men in the dental profession—absolutely honest, I believe, in their purposes, each one doing all that he can to advance the interests of the profession and to guard the interests of the public. Is it possible for one to name a man on a board, a teacher in a dental college, or a member of the profession, who has not the best interests of the profession at heart? Does anyone believe that these men to whom I have referred are dishonest? Do you not believe that each is doing his very best to elevate the profession and care for the people? Go with me to the cities of our country where men have sacrificed almost everything in caring for poor children in the public schools. Point out, if you can, members of any other profession who have done as much in a philanthropic way—and then talk of general discord. I do not know where there is any general discord.

In Chicago three years ago there were three colleges, and we called our faculties together and organized an association of the colleges of that city, with this object, viz, that we might exchange views, might improve ourselves, so that each and every man engaged in dental educational work in that city might profit in such a way as to be able to do better work. In this association there exists perfect accord, and its members have all been greatly benefited.

I would suggest to the gentlemen who have said that there is discord in the profession, to try to have the members of the board meet the faculty members, sit down to a dinner together and discuss the essence of dental education and the aim of the profession in a general way, and I know that they will be able to exchange views in a way that will prove mutually beneficial to all.

There is another phase of the paper with which I do not agree, and that is the suggestion that some men are engaged in educational work for the money that is in it. You all know that the salaries of dental teachers are not in proportion to the amount of time and sacrifice made in educational work. You also know that every man who takes upon himself the great task of the educator is a financial loser. Teachers generally are inadequately compensated for their services. I therefore do not like to hear the author of a paper declare that certain institutions are managed for financial purposes. For my part I would like to see these institutions endowed in the magnificent manner exemplified by the Forsyth brothers of Boston. I would like to see money advanced in sufficient quantity to equip laboratories, and I cannot speak too enthusiastically regarding the work that is being done here today. I do not know how much money has been raised this morning for the purpose of scientific research, but I am sure that it is a considerable sum, and that all the money will be raised that is necessary to equip laboratories for that good purpose. Then let the boards of examiners, the teachers in the dental schools, and those interested in the progress of the profession, get together and discuss this question in the right spirit and with the determination that there shall be harmony and progress. Then the best interests of the profession will be advanced, and we shall obtain results that no one at the present time is dreaming of.

Nay!—we should not have discord in the dental profession; and we shall not have discord in the dental profession. Harmony must prevail. The magnificent body of men assembled here today must stand as one man, resolved to do the very best possible work to advance its interests. Over the mantelpiece of the Union League Club in Chicago are inscribed these words: "*Welcome to all loyal hearts.* We join ourselves to no party which does not carry the flag and keep step to the music of the Union." Let this apply to us. We should not allow any opportunity to pass to loyally carry the flag and keep step to the music of the profession.

Dr. Junkerman (closing the discussion). I shall have very little to say in closing the discussion.

In reply to Dr. Morgan's comment on the question of research work in dental colleges, I would say that I did not mean my remarks to apply in the sense in which he referred to them. I referred to the need for research work in colleges after the students have obtained the degree of Doctor of Dental Surgery. As far as the universities are concerned, the more they can do the better, but first these men must be educated to the degree.

With regard to harmony in dentistry, I admit what Dr. Brophy has said. We are harmonious, but Dr. Brophy has lived long enough to know that one specked apple may contaminate the whole barrel eventually. There are a lot of things, as Dr. Brophy says, that we should talk over together; and he is quite right in his intimation that the best way of approaching one's fellow man is to invite him to a good dinner. I would like to take out to a good dinner some of these individuals who have a tendency to misunderstand the purposes and intentions of the colleges, and then I could probably convert them. Dr. Brophy says there is harmony in the profession—but *not educational harmony,* say I. That is what I intended to emphasize in the paper. It is only by educational harmony that we can present a solid phalanx and accomplish the results we wish for the public and for ourselves.

Another matter referred to is the money made in dental colleges. I do not see how that is possible. I do not know of any college that declares a dividend; if there is one in this country that does, I am ignorant of it. I agree with Dr. Brophy in the statement that probably no other set of men make such sacrifices as do teachers, and especially dental teachers. It is necessary for them to do so. We become practically "possessed" with the subject of dental teaching. We get into it like the preacher who receives a "call" to preach; we teach because we love to. I know a great many teachers who do a great deal of work for a few dollars of compensation, but they stick to it. Why? Because they love it. Dental teachers have received the call to teach, and nothing could stop them from teaching and preparing the youth for the profession.

The next order of business for Section II, as announced by the Chairman, was a lantern lecture by Dr. Howard R. Raper, Indianapolis, Ind., entitled "The Value of the Radiograph in the Practice of Modern Dentistry."

Dr. Raper's lecture consisted in a *résumé* of the papers on "Dental Radiography" as published in the *Items of Interest* for 1912. The lecture was discussed by Dr. L. E. Custer, Dayton, Ohio; Dr. R. Ottolengui, New York, N. Y., and Dr. Truman W. Brophy, Chicago, Ill.

The section then adjourned until a later session.

Wednesday—*Second Session.*

The second session of Section II was called to order at 2.30 o'clock Wednesday afternoon, July 9th, by the chairman, Dr. J. R. Callahan.

The Chairman announced as the first item on the program for the afternoon session a paper by Carl G. Parsons, M.D., Denver, Colo., entitled "Physiology of Nitrous Oxid and Oxygen Analgesia and Anesthesia."

[This paper is printed in full at page 1243 of the present issue of the Cosmos.]

Discussion.

Dr. J. S. Jackson, Denver, Colo. Dr. Parsons gives a very minute, concise, and scientific treatise on the physiologic action of nitrous oxid and the combination of nitrous oxid and oxygen in analgesia and anesthesia. He records an observation which all anesthetists have noted, viz—"A few breaths of nitrous oxid inhaled soon produce asphyxial symptoms. There is marked venous engorgement; the work of the heart is increased, and headache often follows its administration." This quotation and the entire paper impress me most strongly with the danger involved in the administration of anesthetics, even nitrous oxid, which is claimed by its admirers to be the safest of all anesthetics, though this has not been proved. In their efforts to prove the safety of gas-oxygen anesthesia, they decry the safety of nitrous oxid, with or without air. Perhaps one of the most dangerous symptoms of nitrous-oxid narcosis is blood pressure in all cases; especially is this true in patients advanced in years. If we suppose the blood pressure to be from 20 to 30 mm. of mercury above normal, and if by the administration of nitrous oxid this pressure is raised another 20 or 30 points, rupture of a sclerotic artery might be caused, giving rise to a very serious condition. We are all aware that oxygen is not a panacea for the deleterious effects of nitrous oxid. It may lead in combination with nitrous oxid to more serious and mysterious symptoms than nitrous oxid alone. It seems to be taken for granted that oxygen can be introduced by the lungs as readily as food is carried into the system through the stomach, and that by its administration all the organic operations of the economy can be roused to increased activity, but it has been proved that not more than a certain proportion of oxygen, such as exists in the atmosphere, can be absorbed by the lungs. It should also be remembered that oxygen, when inhaled in large quantities, is so far from being a stimulant that it relaxes and debilitates the system, in fact induces narcotism. Happily the gas-oxygen combination, or any other anesthetic, will not be administered as recklessly as has been done in the past. The administration of ether and chloroform mixed is difficult, because of the difference in the density of the two gases. Perhaps somnoform has given us the idea of a definite anesthetic mixture. With the reasonable safety of nitrous oxid alone, and mixed with a known quantity of oxygen, and a skilled anesthetist who can follow symptoms by intuition, beyond the shadow of a doubt as to when to increase and when to decrease the quantities and proportions, the responsibility of success or failure is left where, perhaps, it properly belongs, viz, to the "man behind the gun," the anesthetist. Very little is known of respiration, and that little seems to be far from right. If a patient is short of breath, or anything is wrong with him that looks like failure of respiration, as much chemically pure oxygen is administered as the pulse will tolerate—when the one substance that might, for a time at least, restore the respiratory centers to normal activity is carbon dioxid!

I think the principle of gas-oxygen anesthesia is faulty, if not wrong. In its administration we diminish the amount of carbon dioxid, nature's respiratory stimulant, and have no means except rebreathing to replace it. Let us get right, therefore; we lack knowledge of the functions of man himself, and not until we understand the respiratory and circulatory system more fully can we hope for an anesthetic that will deaden the sensibilities and yet keep and leave the patient in a normal condition.

Dr. O. Cunningham, Kansas City. We may add two reasons why nitrous oxid is an anesthetic agent independent of oxygen; one is, Anesthesia can be obtained in children by administering from forty to fifty per cent. oxygen with nitrous oxid; another is, If nitrous oxid is breathed for ten or fifteen seconds, the effects are easily felt. One may hold his breath for a minute or longer without getting any analgesic effect. This, together with what Dr. Parsons has said, is fairly conclusive to me that nitrous oxid is a true anesthetic agent.

I believe the administration of nitrous oxid anesthesia has been sadly neglected as regards the proper selection of cases. It is true that many of the cases that take nitrous oxid and oxygen apparently the best, involve the greatest risk. We can divide the cases that present complications into four divisions: First, complications due to obstructions such as adenoids, etc.; then three more divisions in which complications principally arise in connection with respiratory exchange, viz, the exchange of oxygen between the lungs and the blood. As a person develops from adolescence, the lungs keep pace with the body. Early in childhood the body weight is greater in proportion to the lung capacity. This is gradually overcome, but often, after adolescence, an individual takes on additional weight, which interferes with the administration of nitrous oxid through the limitation of oxygen.

Suppose an individual weighs one hundred and fifty pounds at adolescence, then within a few years takes on thirty additional pounds; a true respiratory exchange would add two per cent. oxygen, instead of which four or five per cent. of oxygen should be added. This is probably because there is also a delinquency in the cardiac functions and in other organs of the body, as well as in the lungs.

Another limitation of gas-oxygen anesthesia is in the case of anemia. A person whose hemoglobin amounts to only 50 per cent., will require fully 50 per cent. of oxygen. This proves that the deficiency in hemoglobin limits the oxygen-carrying capacity fully one-half; but if the hemoglobin is 50 per cent., we do not add oxygen in the same proportion. Another limitation is toxemia, which also has to do with the respiratory exchange. If the patient has from thirty-five to forty respirations per minute, he would be getting about double the supply; this would indicate that the toxemia has nothing to do with the hemoglobin limiting the oxygen-carrying capacity. With the hemoglobin about one-half, we would have to use fully 50 per cent. of oxygen.

I believe that the time is coming when a careful selection of cases will be considered in analgesia as well as in prolonged anesthesia with nitrous oxid and oxygen.

In the use of nitrous oxid in dental work, we sometimes desire to secure prolonged anesthesia in some operations, but since analgesia has come into use, one dentist will usually employ nitrous oxid to the stage of complete anesthesia, even if he has only one or two teeth to extract, while another will employ analgesia. When we induce anesthesia for the shortest available period, we really need no oxygen, although oxygen is very good to have at hand, and affords a little longer working period. In analgesia, the amount of air admitted to the mouth supplies all the oxygen needed, as the normal individual requires only about ten per cent. The nitrous oxid administered for this purpose need not be under positive pressure; although, if prolonged anesthesia is desired, an inhaler is needed, and positive pressure. The positive pressure inhaler is to be avoided merely because of the inconvenience of the soft palate pressing against the tongue and in case the tongue drops back, creating an excessive intrapalatal compression.

Dr. Wm. C. Teter, Cleveland, Ohio. Although I am not on the program to discuss this paper, having met Dr. Parsons recently in Cleveland and having expressed my desire to hear his paper on the subject of nitrous oxid and oxygen, I am very glad to take part in the discussion, as the administration and study of this anesthetic is the greatest part of my life-work.

The physiological properties of nitrous oxid and oxygen, I believe, are less definitely known and understood than those of any other anesthetic agent. A number of theories have been advanced. Dr. Crile has written considerably upon the subject, yet I cannot concur in his belief regarding the anesthetic properties of this agent. My knowledge of the subject has not been gained by research work along this line, but is based wholly upon ten years of clinical experience and actual work in major and minor surgery, and in the extraction of teeth. Although in my practice I have not used analgesia for a number of years, I sometimes administer it for other dentists.

Cyanosis is no part of anesthesia. Nitrous oxid is not always responsible for the cyanosis that appears in the initiatory stage of anesthesia. There may be obstructions such as have been spoken of here; the patient may struggle or other complications may arise that produce cyanosis, and oxygen alone is not always indicated for overcoming that condition.

I think cyanosis or the livid color or bluish cast of the complexion will occur almost always in the beginning of the inhalation of nitrous oxid and oxygen in the average person in very good health and with plenty of red blood, but not necessarily in a weak and anemic patient. Cyanosis is due to the crowding of nitrous oxid in the desire to obtain the proper anesthetic tension. It can be overcome if a longer time is consumed in producing anesthetic tension. In ether and chloroform anesthesia a considerable period of time is consumed in obtaining this tension, and more time should be taken when nitrous oxid and oxygen is the anesthetic agent employed.

The asphyxial element at commencing is a hindrance to anesthesia. The more asphyxia, the farther away the patient is getting from real anesthesia. The asphyxial character of nitrous oxid, therefore, is entirely separated from its anesthetic property, and a proper amount of nitrous oxid with oxygen will not cause asphyxia.

In the administration of nitrous oxid and oxygen, we find that the administration of warm gas under positive pressure and its gradual mixture with oxygen are the greatest factors in preventing both cyanosis and asphyxia.

Much has been said about shock resulting from the administration of this anesthetic. In my opinion the administration of nitrous oxid and oxygen produces no shock to the system. It is non-irritating to the respiratory tract and to the lungs, and I do not believe that it has a chemical action upon the cellular tissue. It is a mechanical compound or mixture with molecular action upon the blood corpuscles acting upon the brain centers that produces sleep, not unconsciousness—because unconsciousness is not always anesthesia. When ether or chloroform is used as an anesthetic, I believe that as much shock results from the anesthetic as from the traumatism of the operation. Another factor that tends to inhibit shock in the administration of nitrous oxid and oxygen is the fact that phagocytosis is not affected; the patient retains all the resistance necessary to combat the shock from the operation. In a person of low vitality, if ether is given, the resisting power is considerably reduced, therefore shock is produced by the anesthetic. If, in addition, there is shock from the operation, the patient has less chance of regaining consciousness. I believe, therefore, that in regard to shock, very much is to be said in favor of nitrous oxid.

Dr. Crile of Cleveland has recently written about the use of novocain, which he has been employing in his practice, as an agent which acts upon the periphery of the nerves. This suggestion, I believe, is one of the best that has been made to the surgical profession for a long time. I also believe that by administering nitrous oxid and oxygen, together with the use of this local agent, a careful surgeon can do away with the major part of shock.

The use of carbon dioxid is based largely on theory at the present time. I was in New York City a short time ago and heard Professor Henderson of Yale speak upon this subject. He admitted that there is a great deal of mere theory in connection with it. He has an apparatus consisting of a little motor, which he employs to administer carbon dioxid. He mentioned the case of a boy who had both limbs cut off in a streetcar accident and to whom he administered the carbon dioxid and kept him alive for some time, though he finally succumbed to the shock and loss of blood. Still, the result in this case was quite problematical as to how much the gas contributed to prolonging the boy's life. He stated also that it would not do to administer too large a dose of that gas.

In my anesthetic work, I obtain carbon dioxid in the mixture by the rebreathing method. In a number of experiments conducted at St. Luke's Hospital, and reported by Dr. Chas. K. Teter, the patients were made to breathe back and forth into the bag, and the contents of these bags were saved and analyzed. It was proved that they contained from four to eight and one-half per cent. of carbon dioxid, depending, I think, largely upon the amount of nitrous oxid required to maintain anesthetic tension.

Dr. Jackson spoke of the safety of nitrous oxid and oxygen. In the earlier days of the revival of the use of nitrous oxid in the dental profession, the safety of the administration of this agent was chiefly spoken of. It is a proved fact that it is the safest anesthetic if properly administered. I do not believe, however, that it is the safest anesthetic in major surgery in the hands of the novice. If I were compelled to take an anesthetic and I had the choice between taking nitrous oxid and oxygen administered by an inexperienced man or ether administered by an experienced man, I would prefer the ether. But that does not disprove the fact that nitrous oxid and oxygen is the safest anesthetic which can be employed, if properly administered.

In case of a cessation of breathing, as has been said, oxygen is not always called for. This is a fact, because oxygen cannot be given if nitrous oxid and oxygen anesthesia is being induced, as in all probability the patient, if he has good color, has already too much oxygen, and therefore will hesitate in breathing until he needs more oxygen. In the analgesic stage, the patient can hold his breath a long time; he is not actually holding his breath by any conscious effort, but his system does not demand any more oxygen, and therefore does not take in any more.

Children, as Dr. Cunningham has said, will take a larger percentage of oxygen, in a majority of cases, after anesthesia is induced, though in my tonsil and adenoid work I find that some children as young as two years of age really require more nitrous oxid with more pressure to secure quiet anesthesia than is required by adults. I have frequently resorted to the addition of a small quantity of ether in those cases, simply because in the child the respiration is so fickle that, by the time he has been quieted with nitrous oxid and oxygen, the operator has to be very careful, lest respiration cease or the child be thrown into clonic spasms.

I realize that the essayist's paper and the discussion largely pertains to the administration of nitrous oxid and oxygen in major surgery. I also realize that this is a meeting of dentists, and that there is a wide difference between the administration of this gas in major surgery and its administration in the practice of dentistry. For the benefit of our medical brethren, I want to disabuse their minds of the opinion that it is easier for the dentist to give nitrous oxid and oxygen in his practice than it is in major surgery, because the opposite is true. Prolonged anesthesia for oral operations is seventy-five per cent. more difficult to get and to maintain satisfactorily than when the face inhaler can be used and all air excluded, as for major surgery. In dental operations we have to contend with the air that is breathed through the mouth when the latter is open and the muscles are relaxed. The atmospheric pressure of fifteen pounds to the square inch compels the patient to breathe through the mouth, therefore no effect is obtained from the anesthetic unless the gas is forced, and forcing the gas involves other difficulties.

I do not agree with Dr. Cunningham regarding asphyxia induced by the gas. In the old method of giving nitrous oxid with the common gasometer and face inhaler, the air-valve was opened after the first few inhalations in order to overcome the depressing asphyxial effect. This was not done to produce anesthesia, but for the comfort of the patient. It takes as long or longer to produce nitrous oxid anesthesia in a manner comfortable to the patient, than it does to produce nitrous oxid and oxygen anesthesia with the nasal inhaler. If the patient is watched carefully, and he is not fighting the anesthetic, and oxygen is added gradually, all sense of suffocation or distress on the patient's part can be overcome. It is better, therefore, to administer nitrous oxid and oxygen regardless of the fact that anesthesia can be obtained with nitrous oxid alone. After the operation is begun, and the patient commences to breathe through the mouth, it is necessary to force the gas to the point where it will be taken into the lungs.

In extracting this is easier than in throat work, because in extracting cases sterile sponges can be used to pack the mouth, preventing a certain amount of the air being breathed in that way, and if the mouth be packed solidly enough, the patient can be compelled to breathe or will breathe through the nose. Therefore the gas will not have to be forced.

I never advise the use of the face inhaler to induce anesthesia for extracting teeth. Even if we have only one tooth to extract, we do not know in advance how much suffering the extraction of that one tooth might cause. Some of the most difficult and painful extractions are caused by teeth which may appear as if they would come out easily. I never want to assume the risk of inducing anesthesia thinking that I can remove a tooth in thirty seconds without the patient feeling it, for I may not be able to do it. In all my extracting, therefore, I use the nasal inhaler, so that I may be prepared for any emergencies.

As to analgesia, I believe that fully nine-tenths of our operators are working in the first stage of light anesthesia. It requires very little gas to produce analgesia in the majority of cases. While many operators advocate the use of nitrous oxid and oxygen for analgesia, I would advise the use of a great deal of air, because the capacity of the lungs demands so much volume. With every inhalation and exhalation a certain amount of gas or air is taken into and expelled from the lungs. No great volume of nitrous oxid and oxygen is required to produce analgesia.

I would not depend upon nitrous oxid and air alone, for oxygen has some analgesic properties in addition to being preferable for many other reasons, and I believe it is safer to use nitrous oxid and oxygen at all times instead of nitrous oxid alone.

Dr. R. D. HAMMOND, Winfield, Kans. I would like to inquire as to the advisability of the administration of oxygen after the patient has gotten over the effects of the anesthetic?

A MEMBER. It occasionally happens that the heart stops beating for a moment, but the pulsations will resume after four or five inhalations of nitrous oxid. I would like to have the essayist explain that phenomenon.

Dr. MORGAN. Many times there is a form of hysteria that follows anesthesia; I want the speaker to touch upon that phase.

Dr. W. L. REED, Mexico, Mo. I would like to inquire what is the test by which the essayist may know that he has complete anesthesia. Is it the eye test, or the facial appearance, or the breathing?

Dr. O'BRYON, Lawrence, Kans. I have heard it stated that nitrous oxid and oxygen for analgesia is not dangerous at all. I would like to know if that is true?

Dr. LEE, Greenfield, Mo. Which is the better, to start with pure nitrous oxid, or oxygen, or to start with a little oxygen combined with nitrous oxid?

Dr. H. S. DANIELS, Mexico, Mo. Is it necessary to have an assistant administrator?

Dr. PARSONS (closing the discussion). I had hoped that more questions would be asked about the theory that anesthesia with gas-oxygen is due to anoxemia. I have in my paper given the reasons why nitrous oxid has true and specific anesthetic properties, and have stated that the limitation of oxygen has nothing to do with producing a satisfactory anesthesia. I mentioned the above for a specific purpose, namely, to emphasize the true nature of this valuable drug, so that you may be able to produce better analgesias and anesthesias. Some patients color up quickly under nitrous oxid and oxygen; they seem to be susceptible to nitrous oxid. To overcome this condition and produce a pink color, a greater amount of oxygen is needed. This causes in turn an apnœa, a transient cessation of respiration from an overabundance of oxygen. This fact should be kept in mind, and should occasion no alarm to the administrator.

In regard to the safety of nitrous oxid and oxygen, I will say that in competent hands it is the safest general anesthetic we have, but on account of the small margin between no anesthesia and profound anesthesia, it is a very difficult anesthetic to administer, and, with a tyro, deaths are very likely to occur—indeed, not a few have occurred within the past few years. When analgesia or anesthesia clinics are held, it behooves the spectators to have a profound respect for the gases being used, and not to joke and jolly with the patient during the induction of anesthesia.

The question is often asked why nitrous oxid, the properties of which were discovered in 1842, has only recently attained its present universal use in surgery. Three reasons may be given in answer to this: First, a better understanding of the physiological action of gas and oxygen; second, perfection of apparatus, and third, specialization of practitioners in anesthetics and their administration.

My paper was short, it being intended only to bring out a few important physiological points. I did not touch on the subject of rebreathing, but I might say that rebreathing, to a certain extent, and at proper times during anesthesia—when apnœa or acapnia occurs, for instance—is allowable and of advantage, if the administrator possesses a profound knowledge of the physiology of respiration.

The heart may stop momentarily after a few inhalations of pure nitrous oxid, probably due to vagus stimulation, or perhaps to a sudden dilatation of the right heart. However, I have never observed this condition, because I always induce anesthesia slowly.

Hysteria may follow the administration of nitrous oxid and oxygen as well as after other anesthetics in neurotic individuals.

Many times I have been asked about primary shock occurring during the performing of operations in the analgesic stage under nitrous oxid and oxygen. I believe there is no danger; at least, no cases of untoward symptoms have been reported, and personally I have never observed any. Many operators speak of primary shock when, in reality, they mean reflex cardiac or respiratory inhibition. The two conditions are entirely different and a differential diagnosis should be made. Since nitrous oxid and oxygen produces central nerve blocking from the very beginning of administration, it is difficult to see how either of these two conditions could occur.

Nitrous oxid and oxygen analgesia and anesthesia should be induced from the beginning with a combination of both gases, which insures a better and more scientific narcosis.

Someone asks regarding the administration of oxygen following anesthetization. Following all anesthetics it is a distinct advantage to give a small amount of oxygen. This gas overcomes any cellular anoxemia that might be present, and also oxidizes acidosis bodies, if they be present.

In regard to an assistant, it is of advantage to have one, for a number of obvious reasons.

In conclusion, let me impress upon you the importance of the law of anesthetic accommodation, viz, that—"Living units of the animal body will more readily adjust themselves to altered conditions of existence when the conditions are applied gradually." Therefore, with all anesthetics, the narcosis should be induced gradually and uniformly.

The next order of business for Section II was the reading of a paper by Dr. Arthur D. Black, Chicago, Ill., entitled "Something of the Etiology and Early Pathology of the Diseases of the Peridental Membrane, with Suggestions as to Treatment."

[This paper is printed in full at page 1219 of the present issue of the Cosmos.]

Discussion.

Dr. Henry L. Banzhaf, Milwaukee, Wis. I can hardly hope to add anything of great value to this splendid paper, except possibly to emphasize a few of its important items.

We all realize that the future of dentistry depends upon the young men in this country. From Maine to California we have groups of young practitioners doing scientific work, following in the footsteps and extending the work of our older scientists, and I think we should show our appreciation of their efforts. I take great pleasure at this time in expressing my appreciation of the character of the work that is being done by our younger fellow practitioners, and of the character and quality of the work that is represented in this paper.

Until three or four years ago, I was greatly distressed with the free deposition of salivary calculus upon the lingual surfaces of the lower teeth and the buccal surfaces of the upper molars in my own mouth. For reasons which seemed important to me at that time, I gave up the eating of three meals a day, and for three years and more, except on specially festive occasions, I have limited myself to breakfast and dinner, and have since had very little trouble, if any at all, in keeping my teeth clear of these deposits.

It appears from what the essayist says that it does not make very much difference what the quality or character of our food may be, but that the quantity we eat is the important factor. So, after all, we are brought back again to the old thought of faulty alimentation, faulty metabolism, and perhaps most of our patients, as well as we ourselves, eat too much.

The essayist's slides showing faulty contact points have greatly interested me. It is always a source of astonishment to me that some dentists, after repeatedly listening to complaints of food packing between the teeth, can make the remark to their patients, after having examined their mouths and with faulty contacts staring them in the face, "You require no dental service." This paper should teach us to realize that we should provide separation by the means at our command, since there is no excuse for any dentist allowing his patients to suffer from faulty contact points.

About two years ago I heard Dr. G. V. Black made the statement that he advised his patients to wash these food pockets with normal salt solution. I have followed this method for a period of a year or two with splendid results.

The new thought emphasized in the paper is that we should be careful and thorough in making our diagnoses of cases of gingivitis, and institute treatment before active and septic pericementitis has developed.

In many cases the occlusion on the right side is quite perfect, while on the left side there is an open bite or malocclusion due to malposed teeth. The essayist has called our attention to the fact that it is necessary to correct such malocclusion by grinding the cusps or removing a third molar which might be the cause of the trouble. Since the advent of the gold inlay and the improved methods of fitting crowns and making perfect contact points, it is certainly possible for us to practice preventive dentistry, and to provide our patients with occlusion on both sides, thereby preventing lesions due to the causes that have been pointed out.

The essayist has cited the warnings of Drs. Mayo and Billings in regard to the possibility of endocarditis resulting from peridental infection. While I have had no experience in the observation of that trouble, I have often noticed excessive nervousness in patients suffering from pyorrhea and exhibiting excessive deposits of serumal or salivary calculus.

We do not need one or two hundred instruments for curing pyorrhea; we do not need a larger army of men who are specially prepared to treat that disease, but we need a larger army of men with more earnestness, more scientific knowledge, and a better understanding of etiology, oral pathology and bacteriology, and the chemistry of digestion, men who will use their brain to practice preventive dentistry more intelligently.

Dr. Prime, Oxford, Neb. I would like to ask the essayist whether he knows any method whereby he can maintain contact when the first molar has been lost, and the bicuspids have separated as a result.

Rev. Dr. O. Homburger, Chillicothe. I would like to ask by what method the essayist would bring about contact between a second and third molar in the lower jaw.

Dr. J. R. Callahan. It is not customary for the chairman of a convention to enter into the discussions, yet I take the liberty to say that this paper, to my mind, is one of the strongest pleas for prevention. The great aim of all modern medicine and surgery, including dental surgery, is prevention. Here is a comprehensive plea in that direction.

A point which the essayist has mentioned, I have taken advantage of, and its adoption might be of benefit to others. When a patient asserts that he brushes his teeth thoroughly two or three times per day, and yet is unable to keep them free from stains and deposits, the dentist should have grave doubts as to the thoroughness with which his directions are followed by this patient. If he can impress upon the patient's mind that the stains and deposits, when they first lodge upon the teeth, are quite soft and can be easily removed by careful brushing, good progress will be made toward prevention.

Dr. Black (closing the discussion). I will first answer the questions which were asked. Dr. Prime asks how to restore the contact between the bicuspids when they have separated as the result of the extraction of the first molar. It depends a good deal on the conditions presented in each case what we should do. I am glad this question has been asked, because it gives me an opportunity to impress further the fact that we cannot have any set rule of procedure, but must institute treatment upon the evidence obtained in each individual case. There might be a case in which the second molar was pretty far away from the second bicuspid, and a cavity was present in one or both of these teeth; it would then be best to insert in that mouth a bridge which would serve to maintain the contact between the bicuspids and the anterior teeth. There might be the other extreme in which the second molar was very close to the second bicuspid, so that a filling might be placed in any one of the three teeth, which would serve to restore and maintain the contacts of all of them. In another case, if there were considerable space between the second bicuspid and second molar, and a slight space between the bicuspids, an examination of the occlusion might show that the second bicuspid had moved distally as far as it could, the planes of the upper teeth preventing it from further movement. In this case I might cut a cavity in one of the bicuspids, and build out the filling to contact.

There are other cases in which the movement of the teeth has been so great that food does not wedge between them. In such cases the patient might be better off if left untreated, because, if there is a wide separation between two teeth, food does not pack between them, and the gum septum will usually not be inflamed.

In answer to the question of Dr. Homburger, I would like to take a look in his mouth, because here is another individual case. Here is a man outside of our profession, and in a better one—viz, the ministry. I would like to inquire why he asked that question.

Rev. Dr. Homburger. Food has been lodging between these teeth; there has been no other trouble so far as I can discover, other than the discomfort of picking the food out.

Dr. Black. Here is a typical case. Perhaps we should extract the third molar, or possibly it would be best to cut a mesio-occlusal cavity in it and insert a filling or an inlay, making a proper restoration of the contact. Perhaps there is, as is quite common, a mesio-occlusal filling in the second molar, and separation was not resorted to in inserting it, therefore the tooth has moved too far mesially, in which case all or part of the filling should be removed, and another filling placed which would restore both the proper width between the first and second molars, and the contact between the second and third molars. It is our duty to study each case and find out what has brought about the condition which permits the impaction of food, and then do whatever is necessary to correct it, even though that may be, in some cases, the extraction of a tooth. In this case, if nothing is done, the patient may eventually lose both the second and third molars, because the peridental membrane will become diseased between those teeth, and be gradually detached from the roots. The infection which sets in may spread from that position all around the arch. I consider that there is no greater service we can do to our patients than to make careful examinations of the soft tissues, and correct these inflammations.

We should make an accurate record of the condition of the patient's mouth, aside from the cavities which are present. The examination should include an inspection of the free margins of the gums, and wherever there is inflammation present, it should be recorded, and its cause noted. The means of treatment of each area of inflammation should be recorded, and when the patient returns six months later, he should be re-examined to see whether the gingivitis has disappeared, which means an important accomplishment toward the prevention of pyorrhea.

A lateral abscess should be treated in just the same manner as any other abscess. An incision ought to be made to let the pus out, and after the abscess is once drained, the inflammation will subside sufficiently to allow the pus to discharge alongside of the root, as it has probably done for months or years before. To prevent the recurrence of such an abscess, it might be best to extract the tooth, or to cut away some of the tissue and thus eliminate the pocket.

Dr. Banzhaf speaks of the use of medicines. In my opinion, the day is past—though exception may be taken to this general statement—for the use of antiseptics in the treatment of diseases of the peridental membrane. What has been the indication for the use of antiseptics in the treatment of these diseases? The micro-organisms which we wanted to destroy. General surgeons used to argue the same way and to do the same thing ten or fifteen years ago; they now call that the age of antiseptic surgery. You will hardly be able to find a surgeon in the country today who is using that method. They do not use powerful antiseptics, because they have found that they do more harm than good, because any antiseptic which is strong enough to destroy micro-organisms is also strong enough to interfere with the healing process of the tissue. If a surgeon of today opens an abdomen in a case of appendicitis, and finds the appendix ruptured and the abdomen more or less infected with pus, he does not apply an antiseptic, but washes the abdominal cavity with sterile water or normal salt solution, for the purpose of removing as many of the micro-organisms as he can without interfering with the resistance of the tissues, thus leaving them in the best possible condition for working out their own healing. This is the age of aseptic surgery, and this treatment we should apply in infections of the peridental membrane. Only an experienced observer can appreciate the difference in the action of the tissues in response to this treatment as compared with their behavior following the use of the strong antiseptics which we formerly employed.

(To be continued.)

DENTAL SOCIETY OF THE STATE OF NEW YORK.

Forty-fifth Annual Meeting.

(Continued from page 1183.)

The next order of business was the Report of the Correspondent, Dr. E. B. Prentiss, New York, entitled "Oral Radiography in its Relation to the General Dental Practitioner," as follows:

Report of the Correspondent.

ORAL RADIOGRAPHY IN ITS RELATION TO THE GENERAL DENTAL PRACTITIONER.

I had about decided upon another subject for this year's report when a hint dropped by Dr. Hillyer led me to change my plans, the result being the theme announced, "Oral Radiography." It has been my purpose to treat the subject from the standpoint of the general dental practitioner rather than of the specialist.

I have obtained the opinions of some of the best experts in this country, knowing full well that their experienced advice will be invaluable to the dental practitioner who is about deciding to undertake this special work. A great many men have felt the need of an X-ray equipment so convenient as to be brought into use frequently and enabling the finished pictures to be obtained in a very short time; yet they have hesitated to instal an outfit until obtaining fuller knowledge concerning the practicability of such work, and better acquaintance with the dangers to be encountered, and the precautions to be taken, the equipment to be selected, etc.

Keeping these points in mind, I addressed the following letter to several men who have had long experience in this line of work, and especially in dental and oral radiography:

My dear Doctor,—As Correspondent of the New York State Dental Society I am addressing this letter to you. You will be rendering a distinct service to our society and be of great assistance in helping to solve a perplexing problem if you will give us your personal opinion and clinical experience in regard to the following questions:

(1) Do you consider it practical, and if so, essential, that the general dental practitioner should have installed in his office an apparatus for Oral Radiography?

(2) What particular apparatus do you consider the best suited to the needs of the dentist?

(3) What training is necessary in order to become proficient in the safe management of such equipment?

(4) In your opinion, is the danger of injury from the use of the X ray to be seriously considered?—and what precautions should be taken for the proper protection of the operator when handling the same?

An early reply will be greatly appreciated in order that I may include it in my report to be given at the annual meeting of the State Society in May.

Thanking you in advance for any information you may be able to give,

Very truly yours.

In reply I have received seven letters from men who have made this work a distinct specialty—as follows:

Dr Howard R. Raper, of the Indiana Dental College, Indianapolis, Ind.

My dear Doctor,—I consider it both practical and essential that the general dental practitioner have a radiographic outfit in his office. Otherwise the radiograph will not be used as often as it should be, and as a result the greatest and best dental service will not be rendered.

The general practitioner of dentistry needs an X-ray coil of such size as to make good dental radiographs on films held in the mouth in exposures of from ten to twenty seconds. The more difficult work, requiring the use of a larger X-ray coil, should be sent to specialists. Of the smaller machines, such as I would advise the practitioner to buy, there are two types. (1) The Ruhmkorff, or induction coil, and (2) the Tesla, or high-frequency coil. If the supply current be "direct," buy a small induction coil. If the supply current be "alternating," buy a suitcase high-frequency coil. A word of warning regarding the suitcase high-frequency coils: While one or two makes are really quite efficacious, by far the most of the coils of this type are mere toys. Insist upon a demonstration before purchasing one of them. If the buyer does not consider expense, he may purchase a large induction coil, or the latest type of coil, called interrupterless coil, or transformer. The heaviest kind of work could be done with these machines.

Personally, I had no training at all. I never saw a radiograph made until I made one myself. It is not necessary, therefore, that a man have the work demonstrated to him. He can learn from reading. When I recall the number of books on electricity, photography, and general radiography that I read to gain my knowledge of the subject, the chaff I had to wade through to get, after all, but a few facts, it seems to me that in giving the profession my book "Elementary and Dental Radiography" I have made the problem of self-education a very simple one for the practitioner who wishes to take up the work.

I know of no place where a man may take a postgraduate course in the work. Though I have considered the establishment of such a course some time during the summer months, at the Indiana Dental College, I have concluded that it would be impracticable. I would not care to try to teach men who were too lazy to learn from the text-book on the subject. True, a man studying from a text-book may need a little special personal assistance—but only a little, which he could probably receive in ten or fifteen minutes from any radiographer. The course given in our colleges should consist of from ten to twenty lectures, and clinical experience in one or more cases.

X rays are dangerous or not—just as arsenic is dangerous or not—according to the manner in which they are used. Improperly handled, they will cause cancer and death; properly handled, they will produce no disastrous results whatever. If the operator will observe a few simple rules, he may practice radiography a lifetime and never produce any pathological effect on his patients. No man should, under any circumstances, engage in the art of radiography without using a lead screen or cabinet for personal protection. To all who contemplate engaging in the work, I would say, Buy a lead screen first, then the balance of the radiographic outfit. The writer uses a homemade lead screen, the lead of which is one-eighth inch thick. No sensible man with open eyes and good ears would stand on a railroad track and allow a train to run over him—because it is such a simple matter, you know, to step off the track. Likewise, no sensible man, whose eyes are open to the dangers of the X rays, will expose himself to their deadly action—because it is such a simple matter to stand behind a screen.

Lewis Gregory Cole, M.D., New York, N. Y.:

My dear Doctor Prentiss,—Replying to your letter of March 22d, I would state that I believe it would be just about as practicable for the general practicing dentist to make radiographs of the head and teeth, and properly interpret them, as it would be for me to attempt to fill teeth or put in bridges.

Harold S. Vaughan, D.D.S., M.D., New York, N. Y.:

Dear Doctor,—I consider it practicable for the general dental practitioner to have an X-ray apparatus in his office. As to its being essential, that depends on whether the dentist wishes to do the work himself or refer it to others. If such an apparatus were at hand, its benefits would be utilized more frequently.

The induction coils of such makes as the Kelley-Koett, Wappler, or Kny-Scheerer are very practical and give good oral radiographs with three to five seconds' exposure. For the heavy work of the general roentgenologist the interrupterless transformers are best suited, but they are not necessary for oral work. The high-frequency or Tesla coils are cheaper but less powerful; and require exposures of fifteen to thirty seconds or more, and are therefore of less value, though satisfactory oral work can be obtained with them.

The beginner should be instructed by a competent radiographer as to the necessary precautions about exposing the patient to the X rays—bearing in mind that some persons are more susceptible than others. The dangers to the operator are to be seriously considered and precautions taken to screen the tube from him. This can be accomplished

—(1) By a lead or lead-glass screen around the tube. (2) By operating the apparatus from behind a lead screen. (3) Best of all, by operating the switch and rheostat from outside the room, the operator looking through a small lead-glass window, the side of the room being lead-lined.

E. W. Caldwell, M.D., New York, N. Y.:

Dear Doctor,—In answer to your letter of March 22d, I have to say:

(1) I think it practical, but essential only in towns where no roentgenologist is available.

(2) Induction coil apparatus.

(3) It depends largely upon the patience and the ability of the man. Some men learn to do creditable work in a few weeks and others fail after years. Fortunately the dental work is not difficult.

(4) Danger should be considered serious. Lead screen with rubber gloves, shield for tube, etc., should be used.

Dr. C. Edmund Kells, Jr., New Orleans, La.:

Dear Doctor,—I take pleasure in replying to your letter of the 22d.

(1) A few months after Professor Roentgen announced his discovery I installed an apparatus, and have never been without one since; during the past year have probably used it more than ever.

As now perfected it is a practical proposition, and I consider it essential to a practice which strives to give its *clientèle* the very best service possible.

(2) For dental work the most powerful systems are not necessary. A 12-inch coil with chemical break will take skiagraphs with films held within the mouth in from three seconds down to a flash, according to the density of the parts; this on ordinary films and not using a screen. With quick films and with screens this time can be greatly cut down—that is, the three seconds can; the flash, of course, could not.

(3) You have got me there—because it must all depend upon the man. However, this should not be learned from a "correspondence school," but from a good safe operator—which can be quickly done. After the "learning," a little patient work is necessary, that's all.

(4) With the proper "plant," capable of rapid work, and using *all* well-known safeguards, the danger from the use of the X rays for *dental work* is a negligible quantity. The precautions are—*a*, Tube incased in a ray-proof cover of some kind. *b*, The use of a filter. *c*, Short exposures and not repeated indefinitely the same day. *d*, Operator always wearing gloves.

I trust I have covered the ground sufficiently. If not, I will be pleased to give you any further information in my power.

And now, in turn, I would like to ask you a question: Do you think it would be interesting to have a practical demonstration of X-ray work at the coming meeting of the National at Kansas City?

By *practical* demonstration, I mean a full equipment taking skiagraphs for the dentists or their patients and developing and finishing the pictures "while you wait."

Sinclair Tousey, M.D., New York, N. Y.:

Dear Doctor,—Replying to your inquiry, there is no reason why a dentist should not become an expert radiographer—and several have done so in different parts of the country. So that my counsel against the use of this method by the general dental practitioner is not from any doubt of his ability, but from my knowledge of the time and study and the cumbersomeness of the apparatus required to produce satisfactory results with safety to patient and operator. Several friends of mine who installed the apparatus in a moment of enthusiasm continue to send their patients to a specialist because they have not been able to give it the study required to become proficient. And we all know that it was in radiography about the mouth that X-ray burns were most frequent in the early stages of the science. The dentist should not take it up for occasional use in his practice unless he is able to give sufficient time and study to it to become expert.

(1) I do not consider it practical for the general dental practitioner. But the X ray is essential to dentistry, and in every locality there should be some physician or dentist expert in its use in its application to dental radiography, to whom dental cases may be referred.

(2) Of course a photographic dark-room is required for developing films.

The least cumbersome and most easily handled X-ray apparatus is a high-frequency coil like the largest portable Victor apparatus. This has the advantage of moderate cost, but of course requires longer exposures and does not give as good results where the whole face must be penetrated, for radiographs of the antrum or the entire jaw. For this work I personally use my largest apparatus, a 15-kilowatt direct current converter, forming an outfit measuring 10 x 4 x 8 feet, in addition to quite a ponderous tube-stand and protective shield. The exposures are from an eighth to a quarter of a second. In connection with the smaller outfit it is essential that the X-ray tube be inclosed in a protective shield (say of lead-glass), which limits the X ray to the proper part of the patient and protects the operator entirely.

(3) The operator should spend a considerable number of hours in an X-ray laboratory learning the manipulation of the apparatus, how to regulate the degree of vacuum in the X-ray tube, and how to develop the films. This facility can be acquired in any X-ray laboratory, but the proper posing of the patient is something requiring special study. Another matter which is almost universally neglected is the study of the X-ray dosage. A person may see radiographs made and note the absence of disagreeable consequences without ever knowing the safety limit of exposure. I was called into a case in a western city where a doctor had been using the X ray successfully for seven years, and finally attempted to make a radiograph of a man's hip twelve inches thick. No pictures resulted from either of two attempts, but a terrible burn followed, which had to be cut out like a cancer, and there was a suit for $50,000 damages. The exposures were longer and stronger than any he had ever made previously, and before applying them he should have known how to measure the dosage and what the effect would be.

The necessity for a knowledge of X-ray dosage enters into dental radiography in the way of determining how many exposures, and of what strength, may be made in a case requiring a number of pictures. The fact that the X ray has a cumulative effect is of vital importance. The same dose divided up in the course of a week has just as much effect as if it were one continuous exposure.

(4) The danger of injury to the operator is very great, and the only safety lies in absolute protection from exposure. I made the mistake in the beginning of considering it necessary to hold the film in the patient's mouth, and though I tried to protect my hands with opaque gloves, my fingers are marred by keratoses which fortunately have never developed into epithelioma, but which resist all effects at cure. A few exposures produce nothing but benefit to the individual patients, but a great many exposures, from their cumulative effect, are extremely dangerous to the operator. Regardless of the inconvenience, the X-ray tube should be inclosed in an opaque shield, because indiscriminate repeated exposures of the operator standing near a naked X-ray tube produce sterility, various blood diseases akin to leukemia, loss of hair, dermatitis, or epithelioma.

The operators whose deaths are recorded in the papers every few months are probably men who thought that their X-ray work would not be extensive enough to require special precautions. One special thing is that the fluoroscope should never be used either for examination or for testing the radiance.

Dr. F. T. Van Woert, Brooklyn, N. Y.:

Dear Doctor,—(1) I do consider it practical, and while not essential, think it would be a great advantage to any practitioner to instal in his office an apparatus for oral radiography.

(2) There are a great number of apparatus on the market, but I think those manufactured by Waite & Bartlett, or the Wappler Mfg. Co., are as practical as any, and within the means of almost anyone.

(3) There is very little training necessary for one to become proficient enough in dental radiography for all practical purposes.

(4) I am of the opinion that the X rays are very dangerous and should be very seriously considered—particularly by the operator. But there are appliances which make it simple to eliminate this danger and which are supplied by anyone manufacturing coils and the like. One thing, in particular, all operators should refrain from—holding the film in position when it is exposed to the rays. The patients should be instructed to do this, as the damage to them is practically *nil*. It is a pretty well established fact that the X rays are cumulative—that is to say, the effect of a single exposure is retained by the subject and each succeeding one is piled upon it, until enough has been accumulated to produce a very serious pathological condition. Hence, anyone anticipating the installation of an X-ray apparatus should purchase the same from someone familiar with all the requirements to eliminate the dangers.

Also the following, from general dental practitioners who have not had any experience in the personal operation of the X ray:

Dr. C. N. Johnson, Chicago, Ill.:

Dear Doctor,—I am just in receipt of your letter asking for my impressions regarding

Oral Radiography. I can answer only the first one, and that in a very imperfect way.

I consider it practical, but not essential, that the general dental practitioner should have an apparatus installed in his office. Without question radiography will clear up many of the conditions which could not well be cleared without it, and it is probable that the more expert one becomes in its use the wider the range of service. In justice to my present point of view I think I must say that I do not believe radiography is quite so reliable in solving certain problems as some of its advocates seem to think. And those who are the most enthusiastic in its praise are quite likely to read into a radiograph of the jaws certain evidence which is not always borne out by facts. For instance, I have found it quite unreliable in diagnosing abscess cavities, their extent, etc. It is very valuable for locating embedded teeth, or other impacted hard substances, and we could not well do without it; but in a large city with experts doing this work I find it more convenient to refer the patient to them than to operate an apparatus in my own office.

Dr. Rudolph H. Hofheinz, Rochester, N. Y.:

Dear Doctor,—In answer to your letter of March 22d, I beg to say, that Oral Radiography has become an essential factor in diagnosing dental lesions both of a pathological and a mechanical nature. It is my opinion that a practitioner with a competent assistant could have an apparatus installed in his office. This would be more a matter of convenience, however, than necessity.

Oral radiography does not differ from general radiography, and can be obtained by any good radiographist. A higher degree of special efficiency and interest may be gained if the radiographist be a practicing dental surgeon. A rational solution of this question would readily be found if the orthodontist made a specialty of radiography in connection with his own work. He resorts to its use more frequently than the general operator, and his dental intelligence would greatly assist the general practitioner.

A radiographist must have a thorough technical knowledge of his apparatus, and that in itself reduces the danger of injury to *nil*. He must have a well-trained eye for photography, without which he is very apt to look at a picture from the wrong angle. Personally I prefer the result of a specialist in radiography, be it oral or otherwise, to that of the general practitioner who only occasionally uses the apparatus.

Dr. Frank W. Low, Buffalo, N. Y.:

Dear Doctor,—I prefer to go with my patient to an expert. I can so demonstrate what I want to know about, that the expert can make a more satisfactory exposure than I can; at least until I have become an expert. This I have never even tried to become.

Leuman M. Waugh, D.D.S., Buffalo, N. Y.:

Dear Doctor,—Your letter has not been forgotten. I have had the unfortunate experience of training a new assistant, and the woman whom I selected has been very slow in grasping things, and as a result my correspondence has suffered. I know it is too late now, but to show my good-will, I shall tell you what I had in mind.

My opinion will not be based on experience. I am about to put in an apparatus, and your report will help me in the selection of what I need. You ask especially for an answer to question No. 1.

I do consider it eminently *practical*. I believe it to be *essential* to the most efficient dentistry. However, I do not believe that it need be a part of every general practitioner's equipment. In fact there are many who would not use it often enough to really master it. In some practices in the remote districts a prejudice against it would have to be overcome. What I do believe that there is a crying need for, is *dentists* who are sufficiently versed in the normal structure and pathology of conditions about the mouth and face, who will take up the work and not only do radiography for dentists, but will interpret the picture, make a diagnosis, and if desired outline the treatment. I might say much about disappointment resulting from work done by men who have not especially studied conditions about the jaws and who do radiography for dentists, but the above positively expresses my opinion.

I shall not venture to answer the other questions, except No. 4. In conversation with Dr. Raper, I learn that he feels that nothing short of a well-made, preferably a home-made, lead screen should be used. When this precaution has been taken he feels as safe as may be; but since the work is only ten years old, no one knows what it may do when followed longer. Personally, I am satisfied to take it up and do all that my practice may demand.

The replies received have treated the question in such a thorough manner, have gone into such minute detail, and have been both so favorable and unfavorable, that I cannot do better than to leave the subject for your discussion, and feel that, thereby, those who have been in doubting frame of mind may be able to come to a very definite and safe conclusion as to the course to be followed.

I wish to add that Dr. Geo. M. MacKee of New York, who had done a great deal of special work along this line, has very kindly consented to be present and give his views in person. I have therefore not included his reply in the main body of this report.

Respectfully submitted,
E. B. PRENTISS, *Correspondent.*

Discussion.

Dr. GEO. M. MACKEE, New York. I desire to thank the president and members of the society for allowing me the privilege of the floor. I also desire to thank Dr. Prentiss for his kindness in inviting me to discuss this question in person, and for his trouble in obtaining a postponement of one day to allow time for me to come from Washington, D. C., where I was attending another meeting.

I find, by reading the various letters that Dr. Prentiss has received, that there is quite a difference of opinion with regard to the use of the X ray in dentistry. For instance, as extremes, we have Dr. Cole, a radiologist, who considers it about as practical for the general dentist to make a dental radiograph as it would be for Dr. Cole to attempt the filling of teeth. On the other hand, some men who are not radiologists consider it both practical and essential that every dental office be equipped for dental radiography. I do not wish to take a position at either end of this chasm, but place myself in the center—namely, I desire to be conservative.

Being a radiologist and a specialist it is difficult not to be a trifle biased and a little in favor of high specialization in all lines. But I will endeavor to be broad-minded, and to discuss the question in such a manner as to help rather than hinder you in an effort to decide what can be done and what should be done.

The questions asked by Dr. Prentiss are fairly specific, although a trifle ambiguous, but in order to save time and to avoid digressing I will first read and then specifically discuss each one to the best of my ability.

"(1) Do you consider it practical, and if so, essential, that the general dental practitioner should have installed in his office an apparatus for oral radiography?"

The main factors here are "essential" and "practical." Let us consider, first, the practicability. Certainly there are no insurmountable obstacles in the practice of oral radiography. The success of the work will depend largely upon the man; if he has the necessary incentive, ambition, energy, and money, there is no reason why he should not undertake the work. In other words, from a scientific standpoint such an undertaking is practical. On the other hand, it is difficult for me to conceive of a general dentist being able to devote the time necessary to become proficient in radiographic technique and interpretation without letting his general practice suffer. Particularly is this so in the case of the busy practitioner who must accept small fees. It must be remembered that it requires several years of effort before one can master the proper technique and give a trustworthy opinion or interpretation. I should say that from a financial standpoint it would be foolish for the average dental practitioner to enter this field, and when everything is considered I should say that it is not practical for him to do so.

There is one way out of this difficulty, however, and that is, if the general practitioner is unable to spare the time for the work, he can obtain an assistant, give him sufficient time for acquiring the necessary skill, equip a laboratory, and place the matter upon a practical, scientific, and profitable basis. I would like to say here that the making of suitable radiographs is not nearly as difficult as their interpretation and verification. I have been doing this work for over ten years. I have no difficulty, with the apparatus obtainable at present, in producing a suitable set of radiographs in most of the cases, but I feel, in spite of years of experience, that I still know very little about interpretation.

To sum up this question, I will say that the practicability depends entirely upon the individual. The sum total of the work requires time, skill, care, and money. If these can be given, then the work is practical. In a general way I should certainly say that it is not practical for any but a few favored dentists to do this work.

Now as to the "essential" feature, or the necessity for each general practitioner doing his own radiographic work. In the first place, is it necessary for every patient to be radiographed both before and after dental work? I should think not, but such a question is not within my province to decide. If such is the case, it would really seem advisable for every dentist to do his own radiographic work, and perhaps in time it will come to this. At the present moment, however, it would seem safe to assume that only a certain percentage of cases require radiographic examinations. The actual number of such cases falling within the practice of any one man, based upon my own experience, would not justify one in saying that an equipment was essential to every office. No matter from what angle one starts to argue these subjects, the paths all lead to the financial question. It is doubtful if the patient would be saved any money in case the dentist did the work, for the latter would naturally charge a fee commensurate with the time, expense, etc., of the operation. This fee is hard to obtain, especially in the case of the general dentist. Most of you are underpaid as it is, and yet, small as are your fees, the patients object to them. It is always possible, by properly approaching a radiographer, to obtain a reduction in fee to almost any extent—at least the fee can and will willingly be made in accordance with the size of your own fee, the income of the patient, and the scientific interest you may have in the case. Would you be willing to do more than that? In all cities, large or small, there are radiographers to whom cases can be referred. To my mind, what is most needed just at present is a more friendly, more thorough, and more scientific co-operation between the dentists and scientific men who are making radiography a specialty.

I know some dentists who are doing excellent radiographic work, but they are, for the most part, either limiting themselves to radiography, are oral surgeons, or, if they have a large general practice, they have an assistant who devotes himself almost exclusively to radiography. It is my experience that one dentist will hesitate to refer a radiographic case to another dentist—the reasons for this are obvious.

Without further discussion, allow me to say that I do not consider it essential for the general dentist to assume the rôle of a radiologist. The advisability of his doing so is a different matter, and rests entirely with the individual.

"(2) What particular apparatus is considered best suited for the needs of the dentist?"

This matter is of no great importance. Suitcase outfits are useless, as are, also, static machines, for the simple reason that they will not produce enough current. A Ruhmkorff coil with an electrolytic interrupter offers the most for the money. With this apparatus perfect results can be obtained. The newer and more expensive types of apparatus, such as the interrupterless transformer, offer advantages in greater speed and less trouble. Speed, of course, is essential in many instances, as it precludes the blurring of the image due to motion. If the parts to be radiographed are stationary, slow exposures will produce as good results as rapid ones, with much less expense in the way of tubes, etc. With a coil, satisfactory film radiographs of the teeth can be made in from 1 to 5 seconds; plate radiographs can be taken in from 5 to

20 seconds, and the accessory sinuses in from 20 to 45 seconds, providing a direct primary current can be obtained. With an alternating current more time must be allowed. With the transformer, the exposures would be as follows: Film radiographs, 1/4 to 2 seconds; plate radiographs, 1 to 5 seconds; accessory sinuses, 5 to 15 seconds.

Additional essential apparatus are a suitable radiographic table or chair, a tube-stand with protecting shield, one or more X-ray tubes, milammeter, protection booth for the operator, a good dark-room, as well as innumerable small items.

"(3) What training is necessary?"

In the first place, one need not be an electrical engineer, and no special electrical training is necessary. One must, however, understand his apparatus, and should, in fact, understand the fundamental features of all types of X-ray apparatus, so as to appreciate the limitations and possibilities of these various types before a purchase is made, and to obtain the greatest amount of satisfaction and safety in their use. One must become a thorough student of the X ray, for it is an exceedingly dangerous as well as useful agent. The training necessary for a beginning can be obtained by studying text-books and reading articles on the subject that are found in reliable dental, medical, and other scientific journals. Also by attending courses such as the one given by the Second District Dental Society.

"(4) In your opinion, is the danger of injury from the use of the X ray to be seriously considered?—and what precaution should be taken for the proper protection of the operator when handling same?"

The X ray is a very dangerous agent, and should only be employed by those who are expert in its use. One must understand the nature of the rays of varying quality that are emitted from every tube when in action. One should know what quality of ray is employed when the exposure is made and the amount of this quality used during the exposure. In addition, one must be familiar with the quantity of any given quality of ray that it is safe to employ on any of the various parts of the body. Without this knowledge one never knows when to expect an injurious reaction on the part of the patient's skin, nor how to avoid it. There are various types of apparatus designed for the estimation of the quality and quantity of ray, but time will not allow me to even enumerate them.

The protection of the operator is a comparatively simple matter. Under no circumstance should he ever allow the ray to fall upon his own person. Whenever the X-ray tube is in action he must be in a lead-lined booth, having a lead-glass window, and containing the switches, etc., so that he can see and manipulate the apparatus without leaving the booth during the exposure. The operator who takes proper precautions will never receive the slightest injury. On the other hand, carelessness or indifference may lead to disastrous results either to the patient or operator, or to both.

Dr. HENRY W. GILLETT, New York. I shall approach this subject in my discussion from the same standpoint as has the Correspondent, namely, that of the general practitioner. I am familiar with the work only as done for me in my office, and I will report my experience from that standpoint.

Most of what I shall say will apply to the first question asked, therefore I am going to refer first to other questions, and get them out of the way.

With regard to the second question—"What particular apparatus is considered best suited to the needs of the dentist?"—the point I desire to mention is that in my own office we have installed an apparatus which takes up no floor space except that occupied by the tube-stand. This we find a great convenience.

I will make no reference to the third question.

With regard to the fourth I will state my position in this way: We must necessarily accept the view that the X ray is a dangerous agent and one to be handled carefully. From that aspect I deem myself particularly fortunate in having as my assistant Dr. L. E. Palmer to carry out the details of the work. I said to him in the beginning, "See that you yourself and the patient are well protected," and I have left to him the detail of accomplishing this result. I have once or twice consulted him as to whether he felt satisfied that he had gone far enough in securing self-protection as well as protection of the patient. He assures me he has done so, and I am convinced that he takes every proper precaution in that direction. I believe that safety for both patient and operator is easily assured, but I feel that it is very important that the necessary steps to insure safety shall invariably be observed.

With regard to the first question, that is, as to its practicability and as to whether it be essential that the general practitioner should have in his office opportunity to make constant use of the X ray, I think we have heard enough from the reports to feel convinced that it is readily practicable—it certainly has proved so in my own case. As to whether it be essential or not, I would phrase my reply somewhat like this: I believe it to be essential to the practice of dentistry with the highest efficiency. I find myself utilizing the X ray probably a dozen, if not twenty times, now, where I used it once before I had it in my own office. As an example, it occurred one day last week that I wanted eleven different teeth radiographed in one day. It is quite a common thing for me to send three, four, or five patients into the X-ray room in one day, and I believe that every operator who provides in his own office convenient opportunity for its use will find himself making constantly increased use of that opportunity. The ability to say to patients, "Please step into the X-ray room," in contradistinction to saying that you wish them to go to Dr. So-and-so and have a radiograph made; of being able to have the wet film in eight or ten minutes, and to examine it for yourself as you go on with your work, instead of waiting until the next day; of being able to judge immediately for yourself concerning the particular case you are at the moment operating upon; the convenience of being able to get a correct view of the anatomical relations of the operating field, and if necessary to make at once a new radiograph, or to say to your associate that you would like to have a radiograph at a slightly different angle, as the one in hand does not bring out what you wish to see, instead of waiting another day for it from the hands of the specialist—the convenience of these factors so far overshadows the inconvenience, the expense, and the difficulty of the installation and the detail work involved that I have arrived at the point where I would scarcely know how to do without my X-ray outfit. It has become essential to the proper conduct of my practice. I am saying this not only from the viewpoint of my own personal convenience, but from the standpoint of living up to my responsibility to my patients.

The question of expense has been raised, and I want to refer just here to a very practical point. I find it much less expensive for the patient to have a fee entered of ten dollars for a radiograph than it is to have the operator spend an hour or two hours trying to find out something that ten minutes in the X-ray room would define accurately. I find it of much greater advantage to them to pay a fee for a radiographic examination, where indicated, with its usual prompt disclosure of conditions, than to pay what would frequently prove an equal or larger fee for time spent in searching for obscure causes of pathological manifestations or for inefficient treatment of undefined conditions. Chronic ill conditions in our field usually become simple when accurately diagnosed. Frequently a radiograph will show the futility of any course of treatment, and so save the patient a series of sittings and the operator a humiliating failure with its attendant loss of prestige. The ability to accurately diagnose septic conditions in the mouth, the ability to locate and define obscure abscess conditions, the ability to define advanced pyorrheal conditions, is of the very greatest advantage to our patients, and the opportunity offered for a prompt diagnosis is of the very greatest service to them. I have had two cases within a few days which have been sufficient in themselves to have warranted in my estimation all the expenditure and all the effort that has been made in my office in the installing and in learning the use of the outfit. I believe that I have saved the lives of two patients within a fortnight because I had at hand the apparatus to define the things I wanted to know and define them promptly. In one case the discovery was incidental. When investigating conditions about a third molar, we discovered extensive septic conditions about the first molar, and I am convinced from the subsequent history of the case that these conditions were responsible for pathological manifestations that had been puzzling the patient's physician for a period of two years, and which began to improve within twenty-four hours after the operation resultant from the discovery made by the X ray. In the other case the patient had been in my hands for years with conditions which were worse than I suspected, and had reached the stage where he was threatening suicide, and because I was able to put my hand promptly on the information I wanted, I think I have started him on the road to recovery.

The value of the radiograph in root-canal work cannot be overestimated; the value of having it at hand for the prompt answer of the many questions that come to us in dealing with obscure conditions in root-canals is very great. To cite another case as a concrete example: Within two or three weeks I have been able to entirely change conditions in an important tooth because I had definite information to start with as to what had happened to that tooth. I was able to unravel the difficulties that had perplexed two previous operators on the Pacific coast, and in a short time to arrive at a simple solution of what had been a complex case; and it was just because I had the apparatus at hand, so that on inspection of the first film I could say to my associate, Dr. Palmer, "Please give me a film from this angle." With the information resulting from the second film I was able to start right in my work—when to have taken the wrong course with the tooth would probably have meant its sacrifice.

I scarcely need dwell at all to this audience on the comfort of being able to know before entering root-canals something concerning their length, direction, size, etc., but I do want to say a word concerning something which I believe will come to the front before long—that is, self-protection for the operator as related to the results of his work in root-canals. This thought was planted in my mind by Dr. F. T. Van Woert during our trip to Chicago last winter to the Brophy dinner. Every operator in this room has realized repeatedly in the past that his root-canal results were frequently different from what he had supposed them to be when he had completed his operation. With the radiograph we have a way of determining what the efficiency of our root surgery has been after it is completed. Now let us suppose a condition of affairs which may readily arise—that an operator believes he has found all the canals there are in a tooth, and that he has filled each one of these canals to its apex. Let us imagine that he has failed to find some canal, or that he has failed to fill the apical third or half of a root-canal. Suppose that septic conditions develop and the case gets into hostile hands, and there comes an occasion for the review of these conditions before the courts—a situation quite possible. What is going to be the reply of the operator to the court when asked why he did not take advantage of the known facilities of his profession to determine, when he had finished this work, whether or not it was properly performed? What answer can be made to the question, Why did you not protect your patient from these possibilities? I have given a good deal of thought to the hypothesis presented by Dr. Van Woert somewhat along these lines, and I am beginning to feel that the certainty of safety, the certainty of self-protection, and, beyond that, the certainty of knowledge that we have done our best for the patient, can only come to us when we adopt as routine practice the radiographic inspection of our surgical work in root-canals. I am convinced from consultations I have recently had with medical men that the time is close at hand when they are going to demand from us the elimination of abscess foci from our field. I am strongly of the opinion that any practitioner who will provide himself with the means for diagnosing the conditions in advance, and for inspecting his work at its completion, will much more readily accomplish this result and will have much greater satisfaction in the practice of his profession.

Dr. A. R. Starr, New York. I have not had any practical experience with the X ray, and unfortunately know very little of its physical properties, but I do appreciate its advantages from the diagnostic standpoint. We appreciate it to such an extent in the college with which I am connected that we have a series of lectures on the subject every year, and every student is obliged to take a practical course of demonstration of its use before he can graduate, and is also obliged to take a special examination on the subject. That is how much we appreciate its diagnostic value, and that is how much we anticipate the probability that the use of this method may sometime become general. Personally I wish I could have an X-ray picture both before and after every operation upon root-canals, because, as I said in a previous discussion, some of us, I think, would get quite a shock if we could see these radiographs of root-canal fillings. It is undoubtedly of great value not only in root-canal work but in many other ways. Dr. Gillett mentioned the advantage in estimating the length of the root-canal, and that factor alone will be of great aid to us in our work upon root-canals.

As regards the danger to the operator and patient, I cannot speak from personal experience, because I have not used the X-ray apparatus, but I do not believe the danger feature is entirely eliminated at the present time. I have had an example of that in my practice quite recently. A patient who lived out of town had a condition which required the use of the X ray. I advised her to go to a specialist in New York for a radiograph, but because of the fact that she lived so far away and did not have time to stay in the city to have the work done, she went to a local hospital in the town in which she lived and had an X-ray picture taken. The operator told her that it was rather an old apparatus, and that he would have to make considerable exposure to get a proper picture. I believe she was subjected to an exposure of three minutes, and that patient received a burn on the side of the face and lost her hair over an area of nearly two square inches upon that side of the head. It seems to me that there is no excuse at the present time for such results.

As I said before, it would be of great benefit to us if we could take a radiograph of every root-canal operation, and we should keep a record of those radiographs, for it would be an excellent means of instruction. The chief difficulty in following that plan would be the financial one. There is no question about the scientific advantage of it, but probably there would be difficulty in some cases in getting sufficient remuneration for the amount of time expended. I think as a rule patients are more willing to pay a good fee to the specialist than they are to the general practitioner, and I firmly believe that one of the reasons why pyorrhea specialists are so successful in combating that disease is because they charge such a fee that they scare the patient into taking proper care of their own mouths.

Dr. Leslie E. Palmer, New York. The practical side of the paper has been so well covered by the preceding discussion that I merely want to make a few rambling remarks, possibly touching a few high points on the other side, and go into a little of the practical detail of doing X-ray work.

In the beginning I wish to say that I think it is certainly an advantage to any practice, and an essential to every well-equipped office. The letter written by Dr. Raper possibly expresses my thought on this subject better than any of the others, but my one criticism on his letter is that it would tend to lead one to think that the use of the X ray is a perfectly simple matter. It is not entirely simple, any more than any other problem you handle in your dental work. It requires practice, and with practice it does become simpler. As Dr. Gillett said, the great advantage of doing the work in your own office is the greater frequency with which you make use of the X ray. If one sends the work out to a specialist, even if he is in your own town, it generally takes twenty-four hours before he can expose the film, develop it, and have it thoroughly dried and returned to you; whereas, in a large majority of cases, if this work is done in your own office it means simply that the patient has to leave the chair for a few minutes to have the picture taken, and this can be finished up while the patient is still in the chair, and you can go ahead with an added knowledge of what you are dealing with.

Until some few years ago, in order to get the proper preliminary knowledge necessary for using the apparatus, it was necessary to delve through large treatises on the subject, pick out what seemed the most interesting, and then, after securing the necessary amount of theory, go ahead and find someone who had had some practice, get some of his knowledge, and combine the two. The articles by Dr. Raper that appeared in the *Items of Interest* about a year and a half ago have eliminated all of the superfluous material and compressed the thing into a nutshell, as it were, and I very strongly recommend these articles to anyone interested in the work. Even though one has had a great deal of experience, there is much to be gained from them. After having covered these articles rather thoroughly, combined with the demonstration that the manufacturer gives who sets up the apparatus, you are, I think, in position to work out your own salvation.

As to the different types of apparatus, as Dr. MacKee said, the coil is probably the most satisfactory. The big interrupterless machine is too powerful and too costly to be a necessity in the dental office, while the high-frequency machine does not carry sufficient power.

The rays are without question dangerous, and this should always be borne in mind and guarded against. They are a possible element of great danger, and should be always recognized as such. The two first results that one may experience from over-exposure are burns and sterility. The burns are not those we ordinarily know which raise blisters, but more in the form of a dermatitis, not especially sore, but look more like sunburn. I have had none myself, but have seen them developed on others rather seriously.

The question of sterility is one that we must always consider. There is no doubt but what one constantly exposed to the rays will be rendered sterile. That brings up the question as to a few of the things we need to do to guard against such possibilities. In the beginning the men who used the X ray regarded it very much as we regard the electric light, and used it with the same amount of freedom. At one time nothing was thought of standing in front of the fluoroscope and having the bones of the body shown up, and the men who did that from day to day are the ones who suffered from serious results such as we read of in the papers from time to time. To get down to the definite dental work, one should always insist on the patients' holding the film themselves. It does not take long, and the patients can hold it in place where directed. They only have to stand the rays for a few seconds and it does not affect them, but you who would be exposed to the rays very often, cannot stand it three or four times a day, week after week. Never stand in front of the tube, because most of the strong rays come from that side of the tube. Do not use a fluoroscope unless you are perfectly protected. For the protection of the patient the tube should be covered and should have only a small opening to allow the rays to come out. As further protection a sheet of aluminum interposed between the patient and the tube will absorb many of the soft rays and give an equally good picture. The X-ray apparatus as set up in running order seems to be a pretty complicated affair, but after one becomes accustomed to the use of it and dissects the various parts, it is not so complicated as it would seem at first sight.

I cannot help feeling, notwithstanding some of the beautiful dental radiography that is done by some of the medical specialists, that the dentist is much better equipped to produce and interpret dental results than anyone else.

Dr. PRENTISS (closing the discussion). Owing to the lateness of the hour and because of the fact that, while I myself have had no experience in this work, it has been so ably discussed by those who have had experience, I will not say anything further in closing. I wish, however, to thank all who have taken part, and those who have answered the letters of the Correspondent; and especially to thank Dr. MacKee, who made the trip here especially for this occasion, for the able and efficient discussion he has given us.

(To be continued.)

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EDITORIAL DEPARTMENT.

A GENERATION AFTER.

ONE cannot take even a superficial view of current dental literature without noting the widespread interest that is being manifested, both within and without the ranks of the dental profession, in the causes, prevention, and treatment of dental caries. Three decades ago, when Miller announced the results of his studies of the problem, and explained in detail the steps by which he had arrived at his conclusions as to the causation of this all but universal human disorder, the effect produced upon the dental mind was both varied and interesting. A few who were familiar with the history of the subject, and whose training in allied lines of thought enabled them to correctly estimate the value and importance of Miller's researches and ultimate findings, sympathetically applauded the greatness of his achievement; but in the main the announcement of the discovery of Miller was caviar to the general, and was regarded as possibly an academic and scientific triumph, but nevertheless one having but little interest or real importance to the practical dentist.

Like many great scientific discoveries, Miller's findings were in a sense born in advance of the recognized need of the time. He had solved the problem of how caries is produced, but had not satisfactorily explained why it is produced; his researches did not throw a direct light on the correlated problem of susceptibility and immunity to dental caries, in which aspect of the question was involved the solution of the practical problem of the prevention of caries. No one realized more fully than did Miller the necessity for further investigation before we could arrive at a satisfying answer to the question of the practical dentist—or, indeed, of his patients: "What can we do, in the light of all this scientific investigation, or as a result of it, to prevent dental caries?" It was to the solution of this question that the mind of Miller was directed when his life's career was suddenly terminated.

There are few short cuts to the truth, and the building of scientific knowledge must be by slow, painstaking endeavor if the finished structure is to endure. Hence it was necessary to begin at the foundation of the caries problem, and to determine first of all what it is, and what factors enter into its production. *That* Miller did; and because his splendid work, in clearing the ground and laying the foundation of our knowledge firmly and well, did not eventuate in a complete structure ready for occupation, only those technically interested in what may be regarded as the architectural features of his scientific building really appreciated what he had accomplished.

In the period intervening since the announcement, a generation ago, of Miller's results, the need for more light on the problem of dental caries has stimulated thought and investigation all tending toward its solution, so that in due course we may know the "why" as well as the "how" of the causation of tooth decay. The importance of the problem, it goes without saying, consists in the fact that it is not simply a scientific one within the limits of dental professional interest, but it concerns the health and happiness of humanity—and that in an amazing degree, if we consider all the factors involved in the disorder itself and the importance of its sequelæ. The problem of caries is engaging general attention as a sanitary and sociological question, hence the pressure of the demand—both intrinsic and extrinsic, so far as dentistry is concerned—for the kind of investigation that will ultimately bring out a full and satisfactory answer to the problem of dental caries, *i.e.* how it is originated, what causes its production, and how it may be effectually prevented.

The demand for an answer to these phases of the question is practically manifested in the large volume of work that is now being collectively done in the study of caries; and while the importance of much that is being reported from time to time in our literature may not seem to have a self-evident or important bearing on the subject, it is to be remembered that the work of proving what it is *not* is equally as important as the work of proving what it is—so that the ground is being cleared by the elimination of theories and views which, while they remain, serve to obscure the real truth. Thus, while much that is being now done is of the nature of negative proof, the work is none the less valuable because it is negative. On the whole, we seem to be approaching the goal toward which all this effort of scientific research has been tending; the atmosphere of dentistry seems to be pregnant with the spirit of discovery, and we may confidently look forward to the solution in the near future of our great problem, which when solved will enroll the dental profession among the benefactors of humanity.

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Dental Jurisprudence: The Law Relating to Dentists and the Practice of Dentistry. By Wm. E. Mikell, Professor of Law in the University of Pennsylvania. 8vo, 570 pages. Price $2.75 net. Philadelphia and New York: Lea & Febiger, 1912.

While not every dentist need be his own lawyer, he surely owes to himself, his family, his patient, and his profession a clear understanding of his relations to the commonwealth. Dental colleges have come to realize the necessity of legal knowledge for their students, and have embodied courses on this subject in their curricula; and an increasing number of states are requiring by law a knowledge of dental jurisprudence as a prerequisite to the right to practice dentistry. The eminent usefulness of such knowledge becomes apparent from a minute's consideration of possible civil suits for claims or damages or criminal suits for malpractice in which a dental practitioner may innocently become involved—and many have been the trials and mistrials that have wrecked dentist's lives.

The subject-matter is here presented by one who is not only an eminent authority, but whose genuine sympathy with the class of readers and clients to whom his book is addressed is agreeably felt. It is surely more than a mere coincidence that Philadelphia is the writer's residence, and that he is the third in a notable triumvirate that have given the dental profession a treatise on its legal status—R. J. Williams in 1884 and W. F. Rehfuss in 1892 having preceded him. The style is facile and fluent, singularly free from burdensome legal "jargon," and the chapters on the status of the dentist, the right to practice dentistry, relation between dentist and patient, liability of patient to dentist, liability of dentist to patient for breach of contract, for malpractice, and to the state and to jury duty, and the dentist as a witness, encompass every situation and circumstance under which a dental practitioner may confront the law. Chapter X contains the statutes of the United States, Great Britain, and their colonies, governing the practice of dentistry. Most of these statutes are reprinted in full, but in a few cases sections not of immediate use or interest to dentists or dental students have been omitted.

As a business investment, the time spent in reading this book seems more valuable than a perusal of the rambling and vapid "business talks" which have recently been spread broadcast among dentists. If a dentist must be a business man, he must first of all know the legal rights and privileges that pertain to his profession, which is now recognized both by statutory law and by judicial decisions as a specialty of medicine and surgery.

In the Introduction, Dr. Edward C. Kirk stands sponsor to this remarkable work, thus concluding: "The work is confidently recommended to teachers as a trustworthy text-book, and to the dental profession at large as a reliable reference work on the subject within its scope. It embraces an amount and character of information which, when included as part of the educational equipment of the dental practitioner, cannot fail to safeguard him from the unfortunate consequences of many acts in which from ignorance or inadvertence he may too easily become involved."

As a matter of taste, the time-honored traditional legal size and sheepskin binding might perhaps add to the general excellence displayed in the mechanical execution of this volume.

The American Pocket Medical Dictionary. Edited by W. A. Newman Dorland, A.M., M.D. Eighth Edition, revised and enlarged. Price $1.00 net. Philadelphia and London: W. B. Saunders Co., 1913.

This new edition of this ever-useful cicerone has been carefully revised, and a large amount of new matter has been added, in which the new terms that have appeared in dentistry come in for a liberal share of recognition.

The method of printing the phonetic transcription of many terms seems to us less useful than a brief derivation of the word would be. A phonetic transcription, as a rule, is more difficult to read than the term *per se,* and experience shows that such transcriptions do little good toward eradicating solecisms, provincialisms, fads, or affectations from professional language. Derivations, on the other hand, especially of rare and new terms, help to fasten these terms in the mind. It would, however, seem unnecessary, and even undesirable, to print the Greek words from which so many of our terms have been derived, in Greek type, which to a great many perusers is no more than a vague memory of student days, and to the majority simply "Greek." The practice of marking the accented syllable in every term, as adopted throughout the book, is commendable.

Aside from its most practical value, which needs no further comment, this little 32mo giant of 677 pages, in smart flexible leather cover and gold edges, commends itself by its decorative appearance in a way that we do not usually associate with modern medical books.

Microscopy, Bacteriology, and Human Parasitology. A Manual for Students and Practitioners. By P. E. Archinard, A.M., M.D. Second Edition, revised and enlarged. Illustrated with 100 engravings and 6 plates. (The Medical Epitome series.) Price $1.00 net. Philadelphia and New York: Lea & Febiger, 1912.

This handy epitome offers to the dental student an attractively and fluently written discourse most suitable for collateral reading in conjunction with the lectures given in dental schools on bacteriology and hygiene. For reviewing or quiz purposes the liberal number of questions appended to every chapter is very useful—and books that offer that feature have always proved popular with students.

The dental practitioner, too, unless he belong to that large class of whom it has been said that they "live in a cavity," will find the present little volume very helpful in keeping him posted with the technique of bacteriology, and he may find here enough inspiration regarding the inoculation of culture media with bacteria, the inoculation of animals, infection and immunity, anti-bodies and opsonins, to start a little research of his own, to try to make his own autogenous vaccines for his pyorrhea patients, and to make his own diagnoses of tuberculosis, syphilis, glanders, tetanus, and a score of other infections that may be manifested in the mouth.

The illustrations and typography of the book measure up to the usual high standard of the Medical Epitome series.

PHYSIOLOGY. A Manual for Students and Practitioners. By A. E. GUENTHER, Ph.D., and THEODORE C. GUENTHER, M.D. Second Edition, thoroughly revised. Illustrated. (The Medical Epitome series.) Price $1.00 net. Philadelphia and New York: Lea & Febiger, 1912.

What has been said of the volume on Microscopy and Bacteriology of this series applies equally well to this book, the general arrangement and typographical features of which are the same. Perhaps a more liberal supply of illustrations would add to its other attractive features.

Text-books on physiology generally deter by their imposing volume. Here the subject-matter is attractively condensed without omission of any essentials, and the dental student and practitioner, both, will find what they must know on secretions, digestion, circulation, respiration, metabolism, and the muscular and nervous mechanism—the one, in order to connect this important subject intelligently with the many other overlapping branches of his study; the other, in order to practice dentistry professionally, not as a mere mechanic but as a doctor of dental science.

REVIEW OF CURRENT DENTAL LITERATURE.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, April 1913.]

SCHOOP'S METAL-SPRAYING PROCESS.

By ZAHNARZT A. LICHTWITZ, GUBEN.

For the last thirty years experiments have been made with the aim of discovering a process for distributing metals in any thickness desired over a given surface by a direct spray. The most promising of these methods have been invented by the German engineer Schoop, who first sprayed molten metal by means of a jet of gas or vapor under high tension over properly prepared surfaces, thereby producing a resistant coat. The second method he evolved consists in hurling finely powdered metal against the surface to be coated under gas pressure of from two to three atmospheres. The third invention of Schoop consists in a small and handy metal-spraying apparatus, which quite resembles a plumber's torch, and by means of which noble metals, fed into the apparatus in wire form, and glass, can be atomized. The thickness of the resulting metal coat can be regulated to any desired thickness from thousandths of a millimeter to ten millimeters. The coat obtained is uniformly dense and homogeneous, and can be made adherent or removable. The hardness of an atomized coat is harder than that of a cast one, resembling rolled or swaged metal. The temperature at which the atomized metal is being discharged from the apparatus is so low that even highly inflammable materials can be coated, and the finger can be held in the spray without injury.

On the basis of these facts, Lichtwitz believes that the metal atomizing process, after some experimentation, can be made applicable to making metal plates by simply coating the prepared model, and attaching teeth directly thereto without the interference of troublesome backings, to making splints and prosthetic appliances after resections, even to making gold fillings, thereby considerably enhancing the accuracy of the work and simplifying the technique. In his opinion this method is destined to displace entirely the casting process, which he considers to be a failure, and he invites experimentation with this new method.

[*La Odontología Argentina*, Buenos Aires, April 1913.]

DIATORIC PORCELAIN CROWNS FOR MOLARS WITH PULP-CHAMBER RETENTION. By Dr. Emilio Barrena.

A method is presented for replacing badly broken-down molars with diatoric porcelain crowns in such a way as to insure sufficient strength to withstand the stress of mastication. The devitalized tooth is ground down with a carborundum stone to about 1 mm. above the cervical gum margin. The pulp chamber is squared with a fissure bur the end of which has been filed off to prevent perforation of the bottom of the cavity chamber. The root-canals are then treated and filled. Should any portion of the tooth be destroyed below the gum margin, the overlying gum is forced away by packing with gutta-percha. When the tooth is thoroughly prepared, an impression of the root and bite are taken in modeling compound, and a suitable crown is selected of such a length that its lower border comes to within a distance of from 1 to 2 mm. of the cervical margin of the root, when the root is in occlusion with its antagonist. A piece of casting wax is then softened, shaped into a cone, pressed into the diatoric crown, and the crown and wax are then pressed in place in the pulp chamber, and the patient is requested to bite, to insure correct articulation. The surplus of wax on the cervical margins is trimmed away with a warm spatula. Crown and wax are then removed from the root together, and invested and cast, thus obtaining a gold base which perfectly fits the pulp chamber. This base is polished out of the mouth, and after grooving the pulp portion of the cast gold base and the interior surface of the pulp chamber wall, to insure increased adhesion, the crown is cemented to place. This method can be adapted to all kinds of facings, the resulting crown being sufficiently strong to serve as a bridge abutment.

[*British Dental Journal*, London, September 15, 1913.]

VULCANITE AND VULCANIZATION. By Chas. Rippon, Dewsbury.

Rippon offers a few practical hints regarding dental rubbers, as follows: For ordinary cases, all dental rubbers, if vulcanized according to the instructions sent with them, give good results. A dental rubber may, according to its content, be adapted to any desired case. Heavily filled rubbers—pink and white—make perfect cores for thick cases, which may be vulcanized at the ordinary temperature and time without fear of their being porous. Heavily filled rubbers are less liable to alteration on revulcanization than the ordinary base rubber, viz, those rubbers less heavily filled. The purer the rubber, the more flexible will be the vulcanite, but the greater will be the alteration on revulcanization. When a flask is to be closed in the vulcanizer, this must be done before the temperature reaches 247° F., at which point rubber begins to harden. The usefulness of a self-closing flask is very apparent. Care must be taken to have sufficient water in the vulcanizer to insure the steam being always in a saturated condition during the period of vulcanization; hot air does not give the same result as steam, being slower and less reliable on account of its lesser conductivity for heat.

[*L'Odontologie*, Paris, April 15, 1913.]

BACTERIOLOGICAL RESEARCHES REGARDING THE VALUE OF ANTISEPTIC CHEMICALS. By J. Miran, Vannes.

Miran reports the results of bacteriologic experiments conducted in the Pasteur Institute, with instruments contaminated with streptococcus bacilli and sterilized subsequently with cyanid of mercury. The purpose of this investigation was to test the merits of the habit of many operators of dipping or immersing for a longer time their instruments into an antiseptic solution after using them in a patient's mouth. Cyanid of mercury solutions of 2:1000 and 4:1000 in combination with sodium borate were employed, and nickeled instruments which had been contaminated by streptococcus bacilli were immersed in this solution for two hours. Despite this apparently thorough sterilization, streptococcus cultures could be made on gelatin from these instruments. Even after four hours' immersion, streptococcus cultures were obtained, and it was only after leaving an instrument in a 2:1000 cyanid of mercury solution over night that no cultures could be obtained. These experiments show the entirely illusory bactericidal effect of antiseptic chemicals, even mercury compounds, which are the most efficient at our command. The belief of many practitioners, therefore, that the immersion of instruments in an antiseptic solution will render these sterile, is exploded.

[*Journal of the American Medical Association*, Chicago, October 4, 1913.]

THE RESPONSIBILITY OF THE DENTIST AND PHYSICIAN IN REGARD TO MOUTH INFECTIONS AND THEIR RELATION TO CONSTITUTIONAL EFFECTS. BY DR. T. B. HARTZELL, MINNEAPOLIS, MINN.

Anatomic and physiologic considerations show that the teeth and the protected interstitial areas present a most favorable field for bacterial growth. These bacterial breeding-places, together with the deep pockets which form in the presence of the heavy bacterial coat that the protected tooth surfaces usually bear, give rise to a multitude of organisms which of necessity pass into the stomach and bowels, and frequently alter, by their products and presence, the whole chemistry of digestion, so that an infected mouth may produce four distinct pathologic effects: First, that produced by the dissemination of bacteria through the medium of lymphatic drainage; second, that produced by bacteria through the open bloodvessel; third, the damage sustained by the individual through the change in the chemistry of digestion caused by bacterial poisons; fourth, that produced by a general bacteremia, which not infrequently is a direct result of the dissemination of bacteria in the blood stream. Statistics gathered by the writer in a community with a young and vigorous population, and covering 1020 cases of mouth infection, show that there is about one case in every ten in which severe constitutional lesions occur. There really seems to be no function or tissue of the body which may not be reached by infections occurring in, or originating through, lesions in the oral tissues. It seems eminently proper, therefore, that physicians should scrutinize more closely the mouths of their patients in all their routine examinations, should insist on radiograph examination to discover impacted and diseased teeth, and should advise the extraction of diseased teeth, unless the patient is in the hands of a competent dentist who comprehends the vital relation which diseased and impacted teeth bear to the general health of the individual.

[*Deutsche Zahnaerztliche Wochenschrift*, Leipzig, No. 6, 1913.]

GOLD CROWN WITH REINFORCED CUSPS. BY DR. SCHMEDING, BREMEN.

Schmeding reviews the disadvantages inherent in the current methods of making gold crowns. The method of adjusting a ferrule to the prepared root, swaging a cusp and soldering it to this ferrule, necessitates accurate fit of the cusp to the ferrule, hence considerable grinding; moreover the line of solder is almost always visible, since the solder is of a lower karat than the gold plate. The one-piece swaged crown is of good appearance, but the cusp being no thicker than the barrel, the crown is quickly worn through. Reinforcing of the cusps by flowing solder into the crown frequently produces inaccurate fit. If the cusp is cast to the ferrule, the latter must be thicker than when a swaged cusp is employed; moreover, the union between the ferrule and the cast cusp is sometimes so unsatisfactory that soldering must be resorted to after all.

The writer has designed a method by which cusps of a thickness of 0.5 mm. are obtained. After obtaining an impression, the crown is swaged in one piece of gold plate of 0.25 mm. thickness, and tried in the mouth as to articulation, allowance being made for a second hood or cusp of 0.25 mm. thickness. This other cusp is then swaged of 0.25 mm. thickness, fitting accurately over the masticating surface of the one-piece crown, and slightly extending over the sides all around. This extension allows of a better reproduction of the contact points, and gives the crown a better shape. The reinforcing cusp is then soldered to the crown. After polishing, the crown appears as if it had been made of one piece, and its durability is assured.

[*Oesterreichisch-Ungarische Vierteljahrsschrift fuer Zahnheilkunde*, Vienna, No. 2, 1913]

SPLINTING LOOSE TEETH BY MEANS OF A REMOVABLE APPLIANCE. By Zahnarzt E. Luniatschek, Breslau.

The appliance suggested is designed to allow for the immobilization of several loose teeth by an appliance that engages no more than two firm adjoining teeth. In order to immobilize four loose lower incisors, for instance, the writer devitalizes these, together with the two canines. The root-canals of the latter are enlarged, and hollow tubes threaded inside are inserted. On the labial surface of each of the incisors, above the cervico-marginal ridge, a hole is bored horizontally with a bur of the diameter of the threaded tubes, in such a way that they will be approximately parallel to one another. The tubes are then cemented to place, ground down flush with the lingual surface, and a screw post with cone-shaped head is screwed into each one. An impression is then taken of the lingual surfaces of the teeth, and a lingual bar is cast into which countersunk holes are bored for the reception of the screws, which will fasten every tooth individually to the bar. The vertically situated screws in the canines can be tightened with a watchmaker's screwdriver, while for the horizontally placed screws an old bur suitably ground down and fitted at the other end with a lead or tin ball to facilitate manipulation is used as a screwdriver. For esthetic purposes, one or more facings can be cemented to the bar by means of suitably shaped backings cast together with the bar.

The writer claims for his appliance the advantage of easy removal, possibility of making alterations and repairs, sufficient immobility, no interference with treatment of the gingival tissues, and esthetic appearance. It seems, however, that besides the fairly complicated construction of this appliance, the necessary devitalization not only of the loose teeth, but especially that of the firm abutment teeth, is open to objection.

[*American Journal of Surgery*, New York, June 1913.]

REPORT ON NITROUS OXID AND OXYGEN ANESTHESIA. By S. Leigh, M.D.

[*International Journal of Surgery*, New York, April to September 1913.]

OXYGEN AND ANESTHESIA. By F. H. McMechan, M.D., Cincinnati, Ohio.

SHOCK. By A. W. Colcord, M.D., Clairton, Pa.

THE PREVENTION OF SHOCK. Editorial.

TRAUMATIC SHOCK AND THE EMPLOYMENT OF BLOOD-PRESSURE ESTIMATION IN ITS PREVENTION AND TREATMENT. By J. C. Bloodgood, M.D., Baltimore, Md.

[*New York Medical Journal*, New York, November 1912.]

THE GWATHMEY-WOOLSEY NITROUS OXID AND OXYGEN APPARATUS. By J. T. Gwathmey, M.D., and W. C. Woolsey, M.D., New York.

The advantages of nitrous oxid and oxygen in general anesthesia are so well known to dental practitioners that it seems almost superfluous to dwell upon this anesthetic mixture at length. The growing popularity, however, which nitrous oxid and oxygen is gaining in general surgery is so remarkable that a brief mention of some of the many articles on this subject that have appeared in medical magazines at short intervals may not be amiss, as it may reassure the dentist who has been employing this anesthetic in his practice, of the wisdom of his choice.

Says Dr. Leigh: "The profession is rapidly getting to view this matter in its proper light, and I think I can safely predict that in a year or two there will hardly be a well-equipped hospital in this country that will be without a proper apparatus and a well-trained anesthetist administering what is undoubtedly, so far, the safest and best of anesthetics—nitrous oxid and oxygen." The complicated and expensive machines which have flooded the market have in this writer's opinion done as much as the untrained anesthetists to bring the method into disrepute.

Colcord finds that nitrous oxid anesthesia causes a rise at first in blood pressure, due to partial asphyxia, then a gradual fall, seldom getting below the normal line. We find in this form of anesthesia an absence of the wide excursions of the blood pressure during cutting or manipulation of the tissues, hence a lesser tendency to vaso-motor exhaustion and shock.

Colcord's painstaking survey of what has been accomplished in the field of prevention of shock is substantiated by Bloodgood's observations. "The two factors," he says, "over which we have the greatest control during operation, are the trauma of the operative procedure and the toxicity of the general anesthetic. Ether has been substituted for chloroform because it is less toxic. At the present time nitrous oxid and oxygen is taking the place of ether, for the same reason." In order to block most or all sensory afferent nerve impulses, he employs local infiltration anesthesia with novocain, in this way temporarily disconnecting the brain from the wound. When this method is used, nitrous oxid and oxygen has another advantage over ether and chloroform—the general anesthesia is so light that painful manipulations excite reflexes. The patients move, muscles contract, so that, under this method, one has almost as good an index of the efficacy of local infiltration as when the patient is awake. Nitrous oxid and oxygen, therefore, obliterates psychic shock and produces no toxic shock. The local anesthesia obliterates the traumatic shock. The best index to the patient's condition before, during, and after the operation is the behavior of the blood pressure, which should be continually watched.

McMechan suggests the use of oxygen during the induction of anesthesia in all subjects whose respiration or circulation is inefficient, and personally employs it until both circulation and respiration have been moderately stimulated, at which time he begins to induce narcosis. (*cf.* Gatch, *Journ. Amer. Med. Association*, November 11, 1911.) For hazardous risks concomitant oxygenation should be used continuously throughout narcosis. In all other cases—aside from intraoral or nasal technics—it finds its acme of usefulness intermittently, to meet the exigencies of individual cases, and more especially at the close of narcosis in all instances when, by rebreathing, over-ventilation of the lungs can be established, and the remnants of the anesthetics in the alveoli of the lungs and in the circulation of the patient and cellular tissue can be washed out, as it were. McMechan also describes a modified Gwathmey apparatus attached to an autogenor of his design.

The Gwathmey-Woolsey nitrous oxid and oxygen apparatus is fully described by the originators themselves, who claim for it, among other advantages: Absolute and perfect control of the gases flowing at a low pressure; ease of warming the gases whenever the patient's condition demands it; an even automatic flow of gases, as adapted to analgesia, and small size and portability.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, October 1913.]

DENTAL DISEASES AMONG SCHOOL CHILDREN AND THEIR EFFECTS UPON EFFICIENCY. BY F. P. WURFSCHMIDT, KONITZ.

When in 1911 W. G. Ebersole published the results of the National Oral Hygiene Educational Campaign among the "Marion School dental squad" of Cleveland, Ohio (see DENTAL COSMOS, June 1911, p. 787), and the principal of this school, Cordelia L. O'Neill, indorsed the success of this experiment in dental hygiene from the teacher's point of view (see "Oral Hygiene As It Appeals to Educators," DENTAL COSMOS, December 1911, p. 1393),* a great deal of skepticism and some belittling and injudicious criticism was encountered. Neither was the number of cases observed sufficiently large to allow of overwhelmingly convincing conclusions. Still, a way had been shown by which to determine the benefits of this movement from a scholastic point of view.

The correctness of the statements made in the publications alluded to is fully indorsed by the investigations of Wurfschmidt, who since 1906 to date has observed the influence of dental disease upon the efficiency in public-school scholarship of no less than 836 boys and 805 girls, ranging in age from seven to fourteen years. By the aid of an elaborate system of statistical tables, the individual items of investigation in which have been culled from the publications of the most

* For a full explanation of the school hygiene experiment at Cleveland, with tables, etc., see "Experimental Oral Euthenics," etc., by Prof. J. E. Wallace Wallin, Ph.D., DENTAL COSMOS, 1912, vol. liv, pp. 404-13 and 545-66.

notable German, English, and American dental school hygiene advocates and educators, the writer proves convincingly that the pain due to dental diseases attracts the child's attention to his suffering and away from the subject of instruction. This distraction may last a shorter or longer time, and be more or less intense. Other pain caused primarily by toothache or sensations of unease have the same effect. The loss in time incurred by toothache is quite remarkable when we read that this dentist, since 1904, has treated 600 school children during school hours, who were sent to him by the teachers on account of severe toothache. These children, without exception, belonged to very poor parents who were unable to pay for dental treatment. The percentage of children, therefore, kept away from school by toothache is very considerably larger than this number would indicate, since the greater number of children in this school were able to pay for dental service and were treated by private dentists.

The influence of dental disease upon the other organs also greatly affects the scholastic efficiency of the child. The general sensation of malaise deprives the child of its natural vivaciousness and ambition, prevents clear and ready conception of the instruction offered, impedes concentration and retention of the impressions received. A feeling of fatigue, dulness, and sleepiness prevails, which may assume the proportions of mental derangement. Nervous disturbances and loss of sleep due to toothache frequently hold children back in their studies, and the continual pain in some instances leads to permanent impairment of apperception, preventing the child from forming any inspiring interests, and from digesting the early impressions so important for his future.

Thus what every capable teacher has long known is here demonstrated statistically, viz, that poor marks in scholastic work, lack of attention and failure to be promoted stand in direct ratio to dental disease, and that poor teeth constitute a grave menace to the physical and mental welfare of a people.

Among the many measures that have, within recent years, been taken in Germany to combat this long-neglected national disease, the writer mentions the encouraging fact that Prof. Dr. Kirchner, director of the Prussian Ministry of the Interior, is working on a bill contemplating legislative measures for the combating of dental caries on a nation-wide scope.

[*Oesterreichisch-Ungarische Vierteljahrsschrift fuer Zahnheilkunde*, Vienna, No. 2, 1913.]

ALVEOLAR ATROPHY AND PYORRHEA ALVEOLARIS. BY ZAHNARZT A. KASARNOWSKI, ST. PETERSBURG.

After reviewing the dissenting opinions of such authorities as Younger, Hopewell-Smith, Miller, Michel, Arkövy, and many others, this writer proposes the differential terminology indicated in the title of his lengthy paper, summing up as follows: Alveolar atrophy comprises those retrograde disturbances in nutrition which either occur as physiological phenomena—viz, senile atrophy—or are of pathological origin—viz, sclerotic, rhachitic, and traumatic atrophy. All these forms of alveolar atrophy occur without concomitant inflammatory phenomena. The atrophy of the gingiva keeps pace with that of the alveoli, and no pockets are noted. Gingivitis, no matter of what nature, must not be considered as the cause of pyorrhea alveolaris, although it is always present in the latter disease. The most marked symptom of every case of pyorrhea alveolaris is the exudation of pus from the alveolus. Pyorrhea alveolaris, therefore, is a purulent inflammation of the alveoli caused by the action of ectogenous or hematogenous bacteria which find their primary lodging-place in the alveoli. Since pyorrhea occurs in the absence of tartar, there is no reason to consider tartar as the exciting cause of the disease. The deposits covering pyorrhetic roots are of secondary nature, and, being foreign bodies, must always be removed in treatment. The recession of the gums in pyorrhea progresses more slowly than the atrophy of the alveoli. As long as gingival tissue remains, the disease may be improved. The gingival tissue cannot grow to roots which have lost their pericementum, but it can approach them, and thus support them mechanically; laceration, excision, etc., of the gingival tissue is therefore contra-indicated.

Periscope.

Restoring the Color of German Silver.—German silver which has lost its luster during manipulation can be brightened up again by heating and dipping in oxalic acid. —*Schweizerische Vierteljahrsschrift fuer Zahnheilkunde.*

Seventy per Cent. Alcohol Most Suitable for Disinfection.—According to Beyer's investigations alcohol has its greatest disinfecting power at 70 per cent. Absolute alcohol is a less effective disinfectant.—*Muench. Med. Wochenschr.*, per *Deutsche Monatsschrift fuer Zahnheilkunde.*

Collecting Spilled Mercury.—Mercury that has been spilled on the instrument table or the floor can be collected conveniently by drawing a circle around it with a very wet sponge, as the pellets do not easily run over the wet circle.—*Schweizerische Vierteljahrsschrift fuer Zahnheilkunde.*

Instrument for Inserting Silicate Cement Fillings.—By burring a hole into the end of a broken excavator and cementing into it a piece of celluloid, a serviceable instrument for inserting silicate cement fillings can be made. The celluloid can be filed to any desired shape.—*Deutsche Zahnaerztliche Zeitung.*

Antagonizing Model of Metal for Setting Up Teeth.—In setting up the teeth for an upper or lower denture, it is practical to pour a model of the antagonizing jaw in Spence or Melotte metal. Such models are more durable, and are not worn or broken in articulating the teeth to them, thus insuring an accurately articulating plate that requires no grinding or resetting of teeth.—*Oesterreichische Zeitschrift fuer Stomatologie.*

First Dentition in the Monkey (Macacus Rhesus).—The young Macacus Rhesus —with probably others of this species—at six weeks of age possesses twenty deciduous teeth, which erupt practically at the same time, while in the young of the anthropoid ape and man not the slightest symptoms of an eruptive process are noticeable at such an early age, with the exception of congenitally erupted teeth, which are a rare anomaly. The eruption of the teeth in the Rhesus is one rapid uninterrupted process, while in the anthropoids and in man the various types of teeth erupt at certain definite intervals. —J. Scheff, *Oesterreichisch-Ungarische Vierteljahrsschrift fuer Zahnheilkunde.*

Condition of Extracting Forceps.—In order to perform a satisfactory extraction, the forceps must be in first-class condition, and their edges must be sharp. It is practical to warm the forceps before extracting, whereby the pain is reduced. The analogy of the warmed razor used for satisfactory shaving may be cited in this connection.— M. J. Crépieux-Jamin, *Bulletin du Syndicat des Chirurgiens-Dentistes de France.*

Strengthening Bridge Work and Preventing Distortion in Soldering.—In order to render bridge work more durable and to prevent breaking or tearing at the soldered joints, these joints should be strengthened with iridio-platinum wire. It is even better to unite the abutments first by an iridio-platinum wire soldered to them, and to incorporate this wire into the body of the bridge when soldering. In this way, distortion during the soldering operation is also prevented, and an accurate fit of the bridge in the mouth assured.—*Oesterreichische Zeitschrift fuer Stomatologie.*

Method of Avoiding the Cement Line in Porcelain Inlays.—After preparing the cavity according to accepted principles, the gold or platinum foil is burnished and filled with Harvard cement while in the cavity. A metal wire, which is allowed to protrude sufficiently to allow of easy manipulation, is embedded in this cement filling, which, after it has set, is withdrawn together with the matrix, which will be found to adhere firmly to the cement. Over this first matrix, a second one of the same gage is carefully burnished and pressed so as to insure absolute contact between the two. The second matrix is then withdrawn, and in it the porcelain inlay is baked. In this manner the thickness of the matrix is entirely eliminated, and such an accurate fit of the inlay is obtained as to leave no visible cement line.—*La Province Dentaire.*

Disposing of Vulcanizer Steam.—It is often urged that the vulcanizer should be allowed to cool down gradually, and this advice is good, but it is difficult to follow in the great majority of cases owing to want of time. An easy method of disposing of the steam is to affix one end of a small length of flexible tubing to the blow-off tap and to put the other end in a pail of water. The result is no smell, no noise, no steam or moisture blown into the workshop, the vulcanizer is cooled down in a few minutes, and plaster of Paris and other stock are saved from the ill effects of dampness.—A. Ernest, *Ash's Monthly.*

Necrosis Due to Stale Novocain Solution.—It is still a common practice among dentists and medical men to use for infiltration anesthesia novocain which has been kept in solution for some time. The consequences in two cases have made the writer careful to use only fresh solutions. He states that every possible precaution for asepsis was taken; but the 2 per cent. solution, kept closely corked, and boiled before using, had been made several weeks previously. In one case 3 cc., in the other 7 cc. of this was injected. In both cases the results were alarming; persistent analgesia, much swelling, and in the latter case dangerous hemorrhage, lasted for many days. The writer injected 5 cc. of the solution of novocain into his forearm, and thereby provoked extensive edema and tissue necrosis which persisted for several weeks. He considers that no appreciable decomposition of the drug could have occurred, as its anesthetic properties were unimpaired. He also excludes the action of living organisms on the tissues, for the solution was sterilized before use. He inclines, therefore, to the view that the solution had become infected with organisms, the toxins of which might yet be potent after boiling.—*Deutsche med. Woch.*, per *British Dental Journal.*

Interdental or Intermaxillary Lacing in Mandibular Fractures.—This method is very simple, and the oldest known, it being mentioned by Hippocrates. It is suitable for simple fractures in the incisor region. Wire ligatures are passed through the interdental spaces on each side of the fracture. Three ligatures are applied, the first taking in one tooth on each side of the fracture, the second two teeth, and the third three teeth on each side. The longest ligature is tightened first, and the shortest last. This method allows movement of the jaw. By using intermaxillary lacing, the lower jaw is absolutely immobilized by being laced to the upper. This may be done by applying Angle's bands to the upper and lower teeth, and lacing them together by wires passing around studs on the buccal surfaces.

A much more satisfactory method is that devised by Dr. Pickerill and described in the *British Medical Journal.* A wire ligature of silver or gilded copper is passed around two teeth, preferably bicuspids in the upper jaw, and another around the corresponding teeth in the lower jaw; the ligatures are left loose. These horizontal ligatures are then connected by a vertical wire, which is also left loose. Both sides of the mouth having been laced in this way, the horizontal ligatures are tightened. The lower jaw is next made to articulate correctly with the upper, and then the vertical ligatures are tightened up. The patient lives on a diet of soup, porridge, arrowroot, etc. Such food can pass between the teeth around the back of the last molar. The mouth is kept clean by using antiseptic mouth-washes. This method is also useful in "first aid," in which cases string or catgut can be substituted for wire ligatures.—J. L. Saunders, *New Zealand Dental Journal.*

A Few Therapeutic Agents.—Formocresol, consisting of equal parts formalin and cresol, is without doubt a specific for putrescent pulps, rendering the contents of the root-canals aseptic in one or two treatments.

Euroform paste consists of orthoform 1 dram, europhen $1\frac{1}{2}$ drams, petronol $2\frac{1}{2}$ drams, petrolatum (white) $2\frac{1}{2}$ drams, and is an excellent anodyne for pain following extraction. A small piece of gauze is saturated and packed in the socket for a few hours.

Phenol-sulfonic acid is prepared by the reaction of concentrated sulfuric acid upon phenol; 97 parts by weight of acid are gradually added to 93 parts by weight of phenol. This is an ideal bone-stimulant to be used in chronic alveolar abscess where there is slight necrosis. It will also be found useful as a counter-irritant in pyorrheal pockets, and for desensitizing remnants of pulp in the apical region.

Euca-percha compound is a solution of dental base-plate gutta-percha in eucalyptol compound, this compound being composed of menthol 64 grains, thymol 96 grains and eucalyptol 4 fluidounces. When used as a root-canal filling, to be followed with a gutta-percha point, it is superior to chloroform and gutta-percha, on account of the antiseptic action of the thymol and menthol.—A. N. Kearby (citing from J. P. Buckley), *Texas Dental Journal.*

Malignant Disease of the Tongue and Mouth.—Robert Abbe says that sarcoma of the round or spindle-cell type is apparently congenital in origin, though long latent, and may best be cut out. Carcinoma, on the other hand, is always the result of irritation, either by a tooth, a dental plate, tartar, a pipe-stem, or tobacco. Tobacco seems to be the most frequent offender, for advanced cancer of the mouth is extremely rare except in one who has been an excessive smoker or has chewed tobacco. It is usually after twenty or thirty years that the beginning of an epithelioma shows, and insidiously advances. It usually starts either at the contact points of the pipe or streams of hot smoke on the tongue, or in the folds where the nicotin lies in the mouth, or where the quid rests between cheek and gum. The practical lesson is that, when the first spot of leucoplakia appears, it is wiser to cease the use of tobacco at once and forever. When the inside of the cheek is extensively invaded by carcinoma, it may still be cured by excising a part of the cheek, but half of the lower jaw must be excised to permit free play in eating and to obtain sufficient sound tissue to close the defect. The writer concludes that thorough surgery is the supreme reliance in malignant disease of the mouth, and early operation the patient's chief hope of cure. Radium has its uses, but in advanced cases of cancer its good effect is transient; in giant-cell sarcoma and in leucoplakia, however, it is a specific.—*Med. Record* per *N. Y. Med. Journal.*

Malignant Disease of the Mouth and Pharynx.—Trotter holds that more mistakes are made in the direction of pronouncing tumors inoperable than in attempting operations which cannot be completed. The reason for this, he believes, is that in advanced gland cases of malignant disease of the mouth and pharynx, the principal mass is usually under the upper end of the sterno-mastoid and fixed to it near its insertion. This gives the erroneous impression that the growth is fixed to the spine. Glands beneath the muscle are also likely to appear ill-defined and diffuse, when they are in fact not so. When glands not under the muscle are indefinite and accompanied by brawniness of the skin and edema, it is generally quite useless to operate. Trotter regards it as being very remarkable how the common and internal carotids and the vagus escape involvement in gland masses until very late. Such masses tend to spread backward and involve the muscles on the floor of the posterior triangle long before they attack the common carotid. When the common carotid and vagus are involved, it is doubtful whether the operation should be carried out, and much would depend on the kind of primary growth and the condition of the patient. Removal of these two structures is a serious addition to the danger of the operation in itself, but it implies such extensive disease that cure is practically impossible. The limits of operability, then, lie less in technical difficulties than in the uselessness of the operation.—*Lancet* per *Journ. Amer. Med. Association.*

A Simple Method of Gold Plating.—The method of gold plating here described is both simple and inexpensive, and can be readily carried out by anyone who has an electric power supply. The first requisite is the bath, for which any glass or porcelain vessel of sufficient size will answer, although the best shape is that of a rectangular tank, deep and narrow, because such a bath requires the minimum quantity of solution to work it. Into this bath about 125 to 150 gm. of cyanid solution are poured; an anode of pure gold—a plate two or three centimeters square—is fixed at the positive pole of a current of 110 to 220 volts, with a 10 or 16 candlepower lamp resistance, and a strip of German silver is atttached to the negative pole.

To hasten the action, hydrochloric acid is poured into the bath over the gold anode, and this chemical at once produces a brisk effervescence, the fumes of which must on no account be inhaled. After two or three minutes the cathode, *i.e.* the strip attached to the negative pole, is withdrawn.

If the deposit of gold is slow in appearing, a few drops more acid should be poured over the anode. The quantity of hydrochloric acid required varies according to the intensity of the current, and the correct amount can be ascertained in the following manner: If effervescence continues after both anode and cathode are removed, there is an excess of acid, which can be corrected by adding more cyanid solution till effervescence ceases; a yellowish deposit at the bottom of the bath, near the anode, shows that the current is too weak—to be remedied either by replacing the 10 candlepower lamp resistance by a 16 candlepower one, or by adding a little more cyanid solution; blackish deposit of German silver at the cathode indicates an excess of current or of acid, and the addition of more cyanid will put this right.

When the bath has been regulated, it must be protected from the air and dust. The piece to be plated is immersed from two to three minutes, being of course suspended from the negative pole in place of the German silver, which is only employed to get the bath into proper working order. Successive layers are obtained by immersing the piece for a couple of minutes, brushing with a wire brush, and re-immersing.

It is essential that the piece be perfectly clean, and absolutely free from the slightest trace of grease. The best way to insure this is to use a wire scratch-brush. The actual cost of working is very small, as the same solution can be used repeatedly, and there are no batteries to be renewed.—*Edwards' Dental Quarterly.*

Disintegration of Metals at High Temperatures. Condensation Nuclei from Hot Wires.—In a preliminary account of experiments upon the disintegration of metals, more particularly the platinum metals, the theory was put forward that the disintegration of the platinum metals was due to direct oxidation. The fact that platinum does not, under any circumstances, combine directly with oxygen has caused a diffidence in suggesting that the influence of oxygen is other than catalytic, and there are, moreover, certain experimental facts which at first sight appear to militate against the theory that tne disintegration is due to direct oxidation. In the present experiments, the wire is heated by a current developed from an alternater and transformer set and placed within a chamber where various gases can be measured as to pressure. The rate of loss of weight of the Pt-wire is roughly proportional to the oxygen pressure, which points to the formation of an endothermic oxid. Experiments in a constant-volume gas chamber, in which the loss of Pt to loss of oxygen is determined, give results which approximate in the case of air to 2Pt : O, and in the case of oxygen to Pt : 2O. It does not seem probable that this large amount of oxygen is simply absorbed: it must be combined chemically, at any rate for the most part. During the cooling of the oxid after its formation at the hot wire some decomposition takes place, and the amount of decomposition will be greater the lower the oxygen pressure. If we assume that the quantity of oxygen absorbed by the deposit is small, the composition of the oxid in the experiments in oxygen must be either PtO_2, or some higher oxid. If the oxid is also present in the deposit in air, there must be a considerable amount of Pt mixed with it, this Pt being the result of dissociation of the oxid during cooling.—J. H. T. ROBERTS, *Philosoph. Magazine*, per *Brit. Dental Journal.*

Diagnostic Symptoms of Ludwig's Angina.—When the teeth are the starting-point, the inflammation involves the periosteum of the lower jaw and thence all the surrounding tissues. No matter how it commences, it spreads along the connective tissue by direct continuity. In these cases it is not transmitted by lymphatics. The lymphatic glands do not become enlarged by infection carried to them through the lymph-stream from the infected focus, but are involved by the connective tissues surrounding them.

The disease is characterized by febrile disturbances, chills and high fevers, which are soon followed by difficulty in mastication and deglutition, and this may suddenly occur in an otherwise healthy individual. In the region of the submaxillary gland a hard, indurated, and sensitive tumor makes its appearance, which cannot be definitely outlined as in a more superficial glandular involvement. There is an infiltration of the connective tissue which surrounds the muscles of the neck, and of the alveolar lingual sulcus, the soft palate, and the pharynx. Marked redness of the skin does not manifest itself at first, but later, where the swelling has invaded the cellular tissues of the whole of the affected side, the neck is distended, hot, red, and inflamed, and it conveys a boggy sensation to the palpating finger and readily pits on pressure. When the sublingual cellular tissues become engorged, the tongue is of necessity forced upward, causing the mouth to open and the tip of the tongue to protrude. There is more or less ankylosis of the jaws, and the partially open mouth allows a free escape of saliva, which is of a foul odor. If this condition is not relieved, spontaneously or surgically, the pressure symptoms become more pronounced, the tongue presses backward and downward against the glottis, causing constriction, edema, and death.

Two of the features which are usually constant in this condition are the woodlike hardness of the floor of the mouth and the marked dyspnea.

Of 106 cases reported by Thomas, the primary focus of infection, dental caries, was noted in 36 cases, the third molar being involved in four. So far as reference to special teeth is concerned, they were always molars, usually the third lower, those nearest to the submaxillary region.—C. N. RUSSELL, *N. J. Dental Journal.*

Hints, Queries, and Comments.

PYORRHEA ALVEOLARIS ALLIED WITH KIDNEY- AND GALL-STONES.

I have had under observation during the last six months two very interesting cases in which a severe development of pyorrhea occurred coincidentally, or as a precursor of—in one of the cases a very large kidney-stone, and in the other a severe development of gall-stones.

Case I. Mr. S., age about forty-five, has had a chronic case of pyorrhea which I have been able to hold well in hand for two or three years, but which a few months ago became rather violent. His first symptom of a serious nature was an attack of acute neuralgia, the focal point of which I found in a pocket well under and between the bifurcation of the roots of the lower second right molar. Increased irritation and inflammation of the whole area of the two arches was noted at this time. The patient was atonic and had general symptoms of malaria. After two or three days of treatment I removed the tooth for the relief of the neuralgia, which was successful, but the pyorrhea continued to develop violently, and nothing I could do appeared to check it. I referred the patient to two or three other men without result, and by this time his mouth was in a very badly inflamed and offensive condition.

The acuteness of the inflammation gradually subsided in a degree, but left the pocket streaming with pus. After some two or three weeks the patient developed boils upon the back of his neck, which continued until I lost touch with him for a time, and one day he appeared at my office having just come from the hospital, where he had gone for the removal of a large kidney-stone of such development that the kidney itself was removed. The unusual activity of the pyorrhea had subsided.

Case II. Mrs. J., age about fifty, of splendid physical appearance and a mouth that always gave the appearance of perfect health, was one in whom, during years of observation I had never noticed a symptom of pyorrhea. A few months ago she developed very rapidly a serious case of pyorrhea, involving nearly all her teeth and with pus pockets extending in one or two instances well toward the end of the root. Treatment during two or three weeks was unsuccessful, after which she developed a severe case of gall-stones and was operated upon for their removal.

My own limited observations of pyorrhea have led me in recent years to always suspect these allied troubles, and where the symptoms are acute I always advise an examination; yet in all the literature upon the subject I have seen very little discussion of the alliance of these conditions, and of the faulty metabolism which, it appears reasonable to deduce, influences the development of them.

I should like to know the observations of those who are making pyorrhea a serious study, relating to this alliance of pyorrhea with other calcific deposits.

P. D. Brooker, D.D.S.

Columbia, S. C.

PRESERVING THE FOIL MATRIX FOR A PORCELAIN FILLING WITHOUT DISTORTION.

The foil matrix for a porcelain filling may be safely protected from harm by placing it in a bottle filled with water—the bottle should be filled so full that no air-bubble remains after the cork has been inserted.

To remove the matrix, the bottle is inverted and the matrix allowed to settle on the cork. Holding the inverted bottle over the sink, the cork is slightly loosened and the water allowed slowly to escape.

A foil matrix may be safely sent by mail when protected in this manner, as no jar will distort it.

C. M. Torrance, D.M.D.

Frankfurt, a/M., Germany.

Obituary.

DR. HENRY A. SMITH.

Died, September 10, 1913, in Cincinnati, Ohio, in his eighty-first year, Henry A. Smith, A.M., D.D.S.

For more than half a century, Dr. Henry A. Smith, who passed away on September 10th, at his home in Cincinnati, Ohio, has been one of the best-known practitioners in his home city. He was dean of the Ohio College of Dental Surgery for over thirty years, and during this period of fruitful activity became one of the leading authorities in his profession in the middle West. The deceased was an enthusiast in advancing research work in dental surgery, and his efforts were crowned with distinctions that were awarded him throughout the country. Not only did he devote his life to imparting his great skill and learning to others, but he was ever indefatigable in performing the duties which a large and select practice imposed upon him.

Dr. Smith was born at Oxford, Ohio, on February 28, 1833, and received the degree of D.D.S. from the Ohio College of Dental Surgery in 1857. His prominence in dental art and science earned him the deanship of the Ohio College of Dental Surgery, which also honored him with the title of emeritus professor of operative dentistry. He took a very active part in dental society matters, and was a member of the National Dental Association, the Ohio State Society, and local dental societies. His interests in studies relevant to his chosen profession were evinced by his work in the domain of the arts, which culminated in the degree of A.M. being conferred upon him by the Miami University of Oxford, Ohio.

The deceased is survived by a widow, two daughters, and one son, Dr. Henry T. Smith, of the Ohio College of Dental Surgery.

Interment was made at Oxford, Ohio.

DR. P. H. WRIGHT.

The following obituary notice and accompanying resolutions were prepared by the Committee on Necrology of the Mississippi Dental Association, and adopted by the association at its meeting in June 1913:

Dr. P. H. Wright of Oxford is dead. "Death rides on every passing breeze; he lurks in every flower." When one is basking in the pleasant breezes of happiness and prosperity, it does seem sad that he must die; but there is a Providence that shapes our ends—there is an overruling Power that decides our destinies, and determines the length of the days which we are each to enjoy. Let us accept this dispensation in the right spirit, and while we mourn his absence from this association and from the familiar scenes of life, let our sorrow be softened by the reflection that his soul is in heaven, and that he has escaped the remaining ills of earthly life.

Dr. Patrick Henry Wright, eldest son of Patrick H. and Anna Clark Wright, was born near Tyro, Tate county, Miss., June 11, 1862, and died at Oxford, July 5, 1912. In his early life he professed faith in Christ and joined the Baptist Church, always taking an active part in church work, and living a consistent Christian life. He was married to Miss Julia E. Ward of Senatobia, Miss., February 1888. She died October 8, 1897, leaving three children, Pauline, Anna, and Fred Wright. He married again, in February 1900, his second wife being Miss Mary Kimbrough of Oxford.

Dr. Wright received his literary education in the common schools, with one year at the State University, and was graduated from the dental department of Vanderbilt University in 1887. He first practiced at Senatobia, removing in November 1887 to Oxford, and here he continued in active practice up to the time of his death.

Dr. Wright joined this association in 1887, and in the twenty-five years of his membership had many honors conferred upon him; among them, being president, as also president of the Board of Dental Examiners. We have never had a more loyal and enthusiastic member. He was always willing to do what he could to promote the interest of this association. He was also an honorable member of the National Dental Association, and we have known him to travel almost across the continent to attend one of its meetings.

Dr. Wright was one of the best dentists our state has ever had, and always enjoyed a lucrative practice. He was a man of ability, a sterling friend, a most genial companion, kind and sympathetic, of unswerving devotion to the principles of right and honesty. These he manifested nowhere more markedly than in all his professional relations. He was always an ethical, studious, and observant practitioner; quiet, modest, and most considerate and careful of the feelings of his fellow man.

Dr. Wright was a good citizen, always manifesting a lively interest in anything that was for the good of his town, county, and state. He was most charitable in his nature, never turning anyone away who was in distress, or in financial need. His character was unblemished and his home life beautiful. He was a kind, generous, devoted husband and father, a dutiful son and loving brother.

In the death of Dr. Wright, our State Association and the dental profession of this country loses a most worthy and honorable member.

RESOLVED, That we offer our tenderest sympathy to the bereaved family. May Heaven vouchsafe to them consolation and peace in their bereavement!

RESOLVED, That this token of our sympathy be placed upon our minutes, and a copy properly prepared and sent to the family of our friend and co-worker.

W. T. MARTIN,
ROBT. K. LUCKIE,
J. E. HARGIS,
Committee.

Brief Necrology.

Dr. W. T. DUNCAN of La Salle, Ill., on September 30, 1913.

Dr. EVERETT J. MITCHELL of Hattiesburg, Miss., on October 18, 1913.

Dr. L. C. PORTER of Montgomery, Cal., on September 5, 1913, of cancer.

Dr. E. F. GLENN of Charlotte, N. C., on September 1, 1913, of paralysis, in his sixty-second year.

Dr. JOHN WM. WALLACE of Louisville, Ky., on October 19, 1913, of neuritis and complications, in his sixty-second year.

Dr. JOSEPH V. IRELAND of Logansport, Ind., on September 17, 1913, of paralysis, in his forty-first year. Deceased was a graduate of the Indiana Dental College.

Dr. CHAS. E. DUNN of Louisville, Ky., on September 25, 1913, of a complication of diseases, in his seventy-third year. Deceased was a graduate of the Baltimore College of Dental Surgery.

Dr. EFFINGHAM WAGNER of Montgomery, Ala., on October 22, 1913, following an operation, in his fifty-sixth year. Deceased was a graduate of the Baltimore College of Dental Surgery.

Dr. WM. E. KEARNS of Pittsburgh, Pa., on September 18, 1913, of pneumonia, in his forty-third year. Deceased was a graduate of the University of Michigan, College of Dental Surgery.

Dr. BARRY W. HAYES of Palmyra, Wis., on August 31, 1913, after protracted illness, in his twenty-sixth year. Deceased was a graduate of Marquette University, Department of Dentistry.

Dr. WILLIAM R. MEEKER of Louisville, Ky., on September 18, 1913, of injuries received in a streetcar accident, in his seventy-eighth year. Deceased was a graduate of Ohio College of Dental Surgery.

Dr. EDWARD ROCHETTE of Billings, Mont., on November 20, 1913, following an operation for appendicitis, in his forty-fourth year. Deceased was a graduate of University of Minnesota, College of Dentistry.

Dr. JAMES T. STUART of Montgomery, Ala., on October 30, 1913, in his forty-third year. Deceased was a graduate of the Baltimore College of Dental Surgery, and at one time dean of the Milwaukee Dental College.

Society Notes and Announcements.

PANAMA-PACIFIC DENTAL CONGRESS.

The work of organizing the Panama-Pacific Dental Congress is progressing in a most satisfactory manner, and it is confidently expected that by January 1, 1914, twenty months before the opening of the congress, all the preliminary work of organization will have been accomplished.

A few foreign countries and a few of our states have yet to appoint executive committees to carry on their part of the work of publicity and securing program and memberships. Within the next two weeks invitations will be sent to those who are selected by the Committee of Organization to act as officers of the various sections of the congress, and in each case an urgent request will be made for a prompt reply, that there may not be experienced in this matter the delay which in some cases has attended the appointment of state and national executive committees.

Three hundred thousand "stickers," bearing the seal of the congress and the date on which it will convene, have been sent to dealers in dental and pharmaceutical preparations throughout the world, all of whom have expressed a willingness to attach them to every package and letter sent to their customers between now and August 30, 1915. Demands are already being made for more stickers, and probably one hundred thousand more will be distributed. The congress will in this way be brought to the attention of every dentist in the world, not once, but many times, and no one will be allowed to forget the date on which he should be in San Francisco to participate in what promises to be the world's greatest dental congress.

Work is progressing rapidly on the auditorium in which the congress will meet, and it will undoubtedly be housed in one of the largest and most complete buildings ever erected for such a purpose.

The congress will be in keeping with the exposition of which it forms a part, and every effort will be made to provide for the comfort and entertainment of every member. That work on the buildings for the Exposition is advancing rapidly may be noted from the fact that the Machinery hall is now over eighty-five per cent. finished. This building is 968 feet long and 368 feet wide; over 7,500,000 feet of lumber has been used in its construction, and it is the largest frame building in the world.

Arthur M. Flood, *Sec'y*,
San Francisco, Cal.

INTERNATIONAL DENTAL CONGRESS.

It has been thought advisable to arrange so that those who wish to attend the International Dental Congress, in London, next summer, may go on the same steamer, if they wish.

The plan is to arrange to sail on a steamer leaving New York immediately after the closing of the National Dental meeting, which will be held in Rochester, N. Y., from July 7th to 10th.

Those who wish to join the party sailing at that time will please notify me, at 560 Fifth ave., New York City, at as early a date as possible, in order that the steamship company may know how many to provide for.

Herbert L. Wheeler,
Transportation Committee, N. D. A.

OHIO STATE DENTAL SOCIETY.

The forty-eighth annual meeting of the Ohio State Dental Society will be held in Memorial Hall, Toledo, December 2, 3, and 4, 1913. The program of papers and clinics carries the names of men of worldwide reputation. At a "Health and Science" conference on Wednesday evening we expect the governor of the state, Hon. James M. Cox; the presidents of the National Dental Association and of the American Medical Association; Dr. Kirk, editor of the Cosmos; Dr.

Simon Flexner of Rockefeller Institute, and Dr. McCampbell, secretary of the State Board of Health.

Make hotel reservations early and arrange to attend the best and biggest meeting this society ever held.

F. R. Chapman, *Sec'y.*

MINNEAPOLIS DISTRICT DENTAL SOCIETY.

The Minneapolis District Dental Society will hold its annual meeting in the Masonic Temple, Minneapolis, Minn., January 16 and 17, 1914. From the data now at hand, this meeting promises to be a gathering of many of the best men in the country.

A. A. Zeirold, *Sec'y,*
902 Donaldson Bldg., Minneapolis, Minn.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

The regular meeting of the Academy of Stomatology will be held Tuesday, December 16, 1913, at the College of Physicians, Twenty-second street above Chestnut street, Philadelphia, Pa., at 8 p.m. Mr. Wm. W. Atkinson will read a paper entitled "The Vital Aspect of the Amalgam Alloy Question, and Some Practical Suggestions."

Norman L. Jameson, *Sec'y,*
1429 Spruce st., Philadelphia.

INSTITUTE OF DENTAL PEDAGOGICS.

The next annual meeting of the Institute of Dental Pedagogics will be held in Buffalo, N. Y., January 27, 28, and 29, 1914. The Executive Committee is planning to present an exceptionally interesting program, which no dental teacher can afford to miss.

J. F. Biddle, *Sec'y,*
Pittsburgh, Pa.

MARQUETTE DENTAL ALUMNI ASSOCIATION.

The Marquette Dental Alumni Association will hold its eighth annual clinic, and dealers' and manufacturers' exhibit, at the auditorium in Milwaukee, on January 22 and 23, 1914.

E. A. Flancher, *Sec'y,*
Milwaukee, Wis.

NATIONAL DENTAL ASSOCIATION.

Meeting of 1914—Date Advanced.

At the urgent request of the Local Committee of Arrangements at Rochester, the Trustees of the National Dental Association have advanced the date of the next meeting one week; therefore the eighteenth annual session will be held in Rochester, N. Y., July 7, 8, 9, 10, instead of July 14, 15, 16, 17, 1914, as originally selected. The officers, the local committee, and all other committees are going to put forth every effort to make this meeting, which is the first under the reorganization, the best in the history of the association, and we feel confident that the increased membership and interest in our association will prove a decided advantage in many ways.

Homer C. Brown, *President,*
Columbus, Ohio.
Otto U. King, *Gen. Sec'y,*
Huntington, Ind.

KINGS COUNTY (N. Y.) DENTAL SOCIETY.

School Oral Hygiene Work.

The first meeting of the Kings County Dental Society for the year 1913–14 was held at the Brooklyn Masonic Temple on Thursday evening, October 9, 1913.

The chairman, Dr. Simon Shapiro, in his inaugural address reviewed the various activities of the society during last year, showing its progress, and then spoke of the bright prospect for the coming year. He laid particular stress on the excellent work accomplished by the Oral Hygiene Committee, it having succeeded in establishing a dental clinic in school No. 109 in the Brownsville section of Brooklyn, where ten dentists of that section are giving dental services gratis to the poor children of the school. The outfit and supplies were obtained by voluntary contributions, with the hearty co-operation of the dental supply depots. Similar clinics for other sections of Brooklyn are being contemplated by the society for the near future.

The essayist was Dr. Alfred Russell Starr, professor of operative dentistry in the New York College of Dentistry, who presented an instructive paper on the preparation of cavities, more particularly those for gold inlays.

The paper was heard with close attention by his audience. Dr. F. T. Van Woert discussed the paper, followed with remarks by Drs. Prensky, Nevin, Robbins, and Herman.

The officers are as follows: Simon Shapiro, president; L. M. Robbins, vice-president; S. H. Filler, secretary; Benj. Shapiro, treasurer; A. Sternhartz, librarian. Executive Committee—M. William, chairman; Max Jaffe, M. Nevin, H. C. Offenbach, and J. Herman. Oral Hygiene and Infirmary Committee —J. F. Lief, chairman; Julius Pensak, secretary. Membership Committee—A. Friedenberg, chairman. Law Committee—L. M. Robbins, chairman. Committee on Ethics—A. Ritt, chairman.

FLORIDA STATE DENTAL SOCIETY.

At the thirteenth annual meeting of the Florida State Dental Society, Atlantic Beach, the officers elected for the ensuing year were as follows: J. W. Darsey, president, Palatka; G. B. Tison, first vice-president, Gainesville; W. E. Van Brunt, second vice-president, Tallahassee; A. M. Jackson, recording secretary, Lakeland; Alice P. Butler, corresponding secretary, Gainesville; C. L. Nance, treasurer, Tampa.

Alice P. Butler, *Cor. Sec'y.*

PENNSYLVANIA BOARD OF EXAMINERS.

The next regular examination of the Pennsylvania Board of Dental Examiners will be held in Philadelphia and Pittsburgh on Wednesday, Thursday, Friday, and Saturday, December 10, 11, 12, and 13, 1913. Application papers can be secured from the Department of Public Instruction, Harrisburg.

For further information, address

Alexander H. Reynolds, *Sec'y,*
4630 Chester ave., Philadelphia, Pa.

NEW JERSEY BOARD OF EXAMINERS.

The New Jersey State Board of Dental Examiners will hold their regular annual meeting and examination in the Assembly chamber of the State-house, Trenton, N. J., on December 1, 2, and 3, 1913. Applications must be filed at least ten days prior to date set for examination.

After January 1, 1914, all applicants for a license to practice dentistry in New Jersey—"Shall present to said board a certificate from the superintendent of public instruction showing that before entering a dental college, he or she has obtained an academic education consisting of a four years' course of study in an approved public or private high school, or the equivalent thereof."

Also, after January 1, 1914, a bridge, consisting of three or more teeth exclusive of abutments, and one Richmond crown, will be required as a practical test in prosthetic dentistry, in place of a full set of teeth soldered upon a gold or coin-silver plate hitherto required.

For further particulars, apply to

Alphonso Irwin, *Sec'y,*
425 Cooper st., Camden, N. J.

TEXAS BOARD OF EXAMINERS.

The next regular meeting of the board for examination of applicants for certificates entitling them to practice dentistry in Texas will be held in San Antonio, Texas, beginning December 15, 1913, at 9.00 A.M. The meeting will be held in the Chamber of Commerce hall. The fee of $25.00 should be in the hands of the secretary by December 10th. For official application blanks and further information address

C. M. McCauley, *Sec'y,* Abilene, Texas.

CALIFORNIA BOARD OF EXAMINERS.

The next meeting of the Board of Dental Examiners of California for the purpose of examining applicants for a license to practice dentistry will be held in San Francisco at the College of Physicians and Surgeons, beginning on December 3, 1913, at 10 A.M. All applications must be filed with the board on the morning of December 3d. Each application must be accompanied by a fee of twenty-five dollars, and the necessary credentials—diplomas or licenses from other states —together with a recent unmounted photograph of the applicant.

For further particulars, address

C. A. Herrick, *Sec'y,*
133 Geary st., San Francisco, Cal.

IOWA BOARD OF EXAMINERS.

The next meeting of the Iowa State Board of Dental Examiners for the examination of candidates will be held at Iowa City, Iowa, commencing at 9 A.M., December 1, 1913.

J. A. West, *Sec'y*,
417 Utica Bldg., Des Moines, Iowa.

IDAHO BOARD OF EXAMINERS.

The Idaho State Board of Dental Examiners will meet in Boise, Monday, January 5, 1914, at 9 A.M., in the State Capitol building.

Albert A. Jessup, *Sec'y.*

SOUTH DAKOTA BOARD OF EXAMINERS.

The next regular semi-annual meeting of the South Dakota State Board of Dental Examiners will be held at Sioux Falls, S. D., on Tuesday, January 13, 1914, at 1.30 P.M. Applications for examination should be made between the dates of January 1st and 10th.

Aris L. Revell, *Sec'y*, Lead, S. D.

DISTRICT OF COLUMBIA BOARD OF EXAMINERS.

The next examination of applicants for license to practice dentistry in the District of Columbia will be held at the George Washington University, January 5, 6, 7, and 8, 1914. Applications should be in the hands of the secretary two weeks before the date of the examination. Fee, $10.00.

Starr Parsons, M.D., D.D.S., *Sec'y*,
1309 L st., N.W., Washington, D. C.

WISCONSIN BOARD OF EXAMINERS.

The Wisconsin State Board of Dental Examiners will convene in Milwaukee, at the Hotel Maryland, December 15, 1913, at 10 A.M., for examination of applicants to practice dentistry in Wisconsin. High-school diploma, application, and $25.00 fee, to be filed with the secretary five days prior to the above date. Dental diplomas to be presented in advance of the examination.

F. A. Tate, *Pres't*,
W. T. Hardy, *Sec'y*,
422 Jefferson st., Milwaukee.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending October 18, 1913:

First Lieut. G. D. Graham granted leave of absence for three months.

First Lieut. Minot E. Scott will proceed to Fort Leavenworth, Kans., for duty. Granted leave of absence for three months.

For the week ending October 25th:

First Lieut. F. P. Stone relieved from unexecuted portion of duty per paragraph 13, Special Orders No. 177, Hdqrs. Eastern Department, and directed to return to Fort Ethan Allen.

First Lieut. J. R. Ames ordered direct to Key West Barracks, when duty at Jefferson Barracks, Mo., is over.

For the week ending November 1st—(No changes).

For the week ending November 8th—(No changes).

United States Patents

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING OCTOBER 1913.

October 7.

No. 1,074,761, to David Weiss. Tooth-brush.

October 14.

No. 1,075,541, to Arthur W. Browne. Bracket.

No. 1,075,826, to Augustus K. Hoffman. Dental tool.

No. 1,075,978, to C. Joerin, Jr., and A. C. Joerin. Dental water filter and heater.

No. 1,075,979, to Arthur M. Kaehr. Tooth.

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