

MANAGEMENT OF CHILDREN'S TEETH.

ILLUSTRATIONS: FIGURES 172-186.

The conditions calling for differences in the treatment of caries in children's teeth and the management of cases in them, in comparison with adults, are due to childhood purely. Caries in children's teeth is not different from caries in the teeth of adults. An inflamed tooth pulp or an alveolar abscess is the same in its nature in the deciduous tooth of the child as in the permanent tooth of the adult. So far as the tissues of the teeth are concerned, we may make fillings in children's teeth just the same as we make fillings in the adult's teeth. The tissues of the teeth are hard enough; they are strong enough. The differences we must make in operating do not lie in the tissues of the teeth, but are differences due to childhood. We are handling immature persons, whose nervous systems, power of reasoning and of self-control are not yet developed, and we have all of the difficulties that belong to this period of life.

The child is a bundle of impulses, each of which is ready to break into action without notice or restraint. Much too frequently the dentist's first meeting with the child is when it has been wrought up by pain until its nerve endings are all on the alert ready to take fright at the least suggestion of further suffering.

Children are quick to discover a failure to perform a promised service, and if that failure has resulted in pain to them in the attempted operation, or if the suffering, the relief of which was sought, continues, the child-thought is that it has been injured or deceived. They are not much disposed to excuse an operator for difficulties their own actions, or their resistance, have imposed. Their resentment is quick and sharp, and usually without reserve or concealment. On the other hand, they are just as quick to recognize a success. A child who has been tortured by pain and has rebelled and fought against a painful operation for its relief, will, after finding the promised relief and comfort, have a warm smile of confidence for the person who conferred the benefit and readily forget the pain inflicted. Such is the nature of the child. Children act from impulse rather than by processes of reasoning. Touch them right and they are easy of control; when touched wrong, they flash like powder. The important questions in dealing with the diseases of children's teeth that differ from dealing

with similar conditions in adults, is in obtaining that control of the child nature that will give opportunity to do for them that which is best; or to continue expedients that will succeed temporarily until increasing age and greater self-control will give better opportunity.

But this should be said: Never break down the courage of a child by any operation; never break down the nervous system of a child; never give a child a nervous shock that it will recover from tardily; better delay an operation, better do almost anything than do this. It is true that in some cases demanding the extraction of a tooth, we must perform the operation, cost what it will; we must relieve the patient of suffering; but children bear a shock of this kind quite well. If an operation that is very severe is over in a few moments, giving the child the opportunity to recover at once, the child usually will recover without difficulty. Tedious, prolonged operations, those that come day after day, break down a child's nervous system and destroy the child's courage. The child forgets a severe hurt quickly, but the nervous shock that comes from continuous and repeated operations is that which breaks down the child most. There is another thought that it is well for everyone to remember — to succeed with a child is of the utmost importance, if you wish to retain control of the child. To fail of success, is to make an enemy of the child. Therefore, the careful planning of operations for them is of special importance. Children do not forget these things readily; they grow up with an impression of hatred toward this or that person who has undertaken to make operations for them and has failed. On the other hand, if you succeed and gain the confidence of the child, it will grow up your friend and will make other friends for you. These are very important considerations in the handling of children.

In the handling of children the psychic influences are of importance. Some persons control children easily; children take to them, while they seem to shun others; particularly when it comes to operations that are painful, children fail to give them their confidence. Often persons who are skillful operators and able to command a large practice, can not operate well for children; children do not like them for some reason. Others seem particularly fitted for the handling of children in their distress; they control children easily. There is something in the approach that gains the confidence of the child. This can be cultivated in a large degree. Generally those persons who have a great love for children control them well. But this is not the universal rule.

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The vagaries of the minds of children are very difficult to understand. Often they will give their confidence to a stranger when they will not give their confidence, so far as painful operations are concerned, to persons whom they know well. One will often do well, on finding that he has failed in gaining the confidence of a child, to recommend it to someone else, or have someone else see it with him. Possibly he may gain the little fellow's confidence in that way and retain it afterward. This will often make a strong favorable impression on a child and it is of great importance in the management of a practice. We are too liable to neglect the little children; feel that operations for them are not of much consequence. But children make men, and their friendship tells in after-practice. One will often have to do that for children that will not seem to pay in dollars and cents; often it is necessary to spend time with them in which little or nothing is done; time for which one will not feel like making a proper charge. In many cases this is necessary. Often when a child is first brought to the dentist he should only temporize; not try to do this or that operation which seems necessary at the time, but do something to the mouth or to the teeth, something that will lead the child to suppose that an operation has been successfully begun; not something to deceive, but something to gain the confidence of the child; one should never deceive a child. If it is necessary to hurt a child, say so. Usually, with children, a deception is fatal to after-success. A dentist should not allow parents to deceive children in his office. Often the greatest difficulty in the management of children is the management of the parents. Parents should not deceive their children with regard to these operations. To tell a child it will not be hurt, and then inflict severe pain, is doing that child a wrong; it is lessening that child's confidence in humanity; and children ought to grow up with confidence in the integrity and honesty of those about them.

RELATION OF GROWTH AND SHEDDING OF THE DECIDUOUS TEETH TO THEIR TREATMENT.

While the main difficulties in the management of children's teeth are in the directions indicated above, there are matters pertaining to the progress of development of the deciduous teeth, the absorption of their roots in the process of shedding, their replacement by the permanent teeth and the development of the roots of these, that must have careful consideration at every step of operations upon the teeth of children. Considered from this

standpoint, we should regard all persons under fourteen or fifteen years old as children; for the development of the permanent teeth, exclusive of the third molars, which we need not consider, is not completed until about that time.

The deciduous teeth of one side of the upper jaw are represented in outline considerably enlarged in Figures 172, 173. In the first of these, the growth of the crowns and the roots of the teeth is represented by figures placed upon the individual teeth. In the second, the absorption of the roots of the deciduous teeth is represented in a similar way. The two, taken together, give a brief synopsis of the changes which take place, together with the average time in years occupied. The calcification of the deciduous teeth, according to this chart, Figure 172, begins in the central incisor at about the seventeenth week of uterine life. Reading from left to right, the position of the 0 on the various teeth represents the average calcification at birth, the figure 1 represents the growth of the roots at one year, the figure 2 the growth at two years, and the figure 3 at three years, when the growth of all of the roots of this set of teeth are complete. It must be understood that this is a representation of averages from which there are wide variations. Also, that it has little to do with the time of cutting, erupting or presentation of the teeth through the gums. The time of this is probably more variable than the process of calcification. Yet, careful study of cases shows that there is a fair relation between the calcification and the cutting of both the deciduous and permanent teeth that is of much value in the management of cases when the history can be obtained. While it does not invariably follow, it is so with sufficient frequency that we may reasonably expect that if the teeth of a child have been very late in erupting, the completion of the calcification (the growth) of the roots will also be later than the average time. This history is often of great value.

PREMATURE ERUPTIONS OF TEETH. Occasionally cases of premature eruption of teeth have been noted, i. e., cases in which the crowns have protruded through the gums before sufficient root has formed to serve as support to the crown, and as a consequence the crown has been displaced. Within the observation of the author, this has occurred only with the incisors. In one the central incisors were found erupted at birth. Other cases have been noted in which the teeth were erupted before there was sufficient growth of dentin to form sufficient root to maintain them in position. These latter have in each case been a single central incisor erupted soon after birth and much in advance of the other

teeth. These are supposed to have been due to accidental malpositions of the developing teeth.

We may fill the roots of deciduous teeth after removing the pulps that have become exposed from caries, or other cause, the same as we may fill the roots of permanent teeth. But it would be manifestly wrong to place arsenic in such a tooth to destroy a pulp or to undertake to remove a dead pulp, treat and fill roots in these teeth before the roots have completed their growth and the pulp canals have been narrowed to minute openings. Such a condition necessarily defeats the success of the procedure. Happily, we are seldom presented with cases seeming to call for such an operation at so early an age, but, occasionally, these do occur. Then, if the age is close to the time of the completion of the roots, a history of the age at which the deciduous teeth were erupted becomes of especial importance in the prognosis, and should often determine whether or not such an operation should be undertaken.

ABSORPTION OF THE ROOTS OF THE DECIDUOUS TEETH.

The next difficulty encountered is the absorption of the roots of the deciduous teeth preparatory to the shedding process. This is shown in brief in Figure 173. In this, the average date, in years, in the life of the child, of the beginning of the absorption is placed over each tooth. The progress of absorption, in years, is represented in figures placed on the root of each tooth at the point to which absorption has progressed, which may be read for each individual tooth at a glance. These figures represent averages from which there are wide variations. Of late, certain writers have used the phrase "decalcification of the roots of the deciduous teeth," to which there is serious objection. We should use either the word absorption, or resorption — not decalcification. If we place a tooth in a weak solution of an acid, it will be decalcified — i. e., the calcium salts, the substance which gives the tooth its hardness, will be dissolved out, leaving the body of the tooth, the basic animal substance, remaining. In this, the normal physical and histological form of the dentin is preserved in its completeness. In caries of the teeth the dentin is first decalcified by an acid, leaving a softened mass which is afterward decomposed, forming a cavity. Decalcification means something entirely different from what we mean by the word absorption, as used to represent the physiological removal of the roots of deciduous teeth, or the removal of bone, or of catgut ligatures used in

surgery, etc. In the absorption of the roots of the teeth, or any of these substances, the whole of the tissue is removed complete without a perceptible softening in advance. The whole process is something entirely different from what we know as decalcification.

Absorption of the root of the central incisor begins, practically, when the child is four years old and is ended at seven. The lateral incisor begins to be absorbed at five years and is ended at eight. The absorption of the root of the first deciduous molar is begun at seven and completed at ten years. The second molar has begun to be absorbed at eight and is completed at eleven. The absorption of the cuspid root begins at about nine years and is completed at twelve. In the formulation of this statement, it has been the endeavor to put it in a form that will be easily remembered. (1) In the absorption of the roots of the deciduous teeth the incisors begin, the central at four, the lateral, five; (2) skip a tooth and a number and the molars begin to be absorbed, the first at seven, the second at eight; (3) skip back to the cuspid which begins to be absorbed at nine years.

There is a difference in time in the absorption of roots of teeth between different individuals. Some will be a year or so early or as much late. Also, the time between the individual teeth of the person may be considerable. Perhaps this four and five years for the central and lateral is not quite the average; four and four and a half would be more nearly the average; but this is a figure that is easily remembered and is placed in that way, as being the closest proximation in whole numbers. Occasionally the lateral incisors fall away before the centrals, but that is rare. Often they fall away about the same time, or very close together; not six months between. Often again, there will be two years between. With the molars it is the same way. Often the second bicuspid will be in place before the first bicuspid, the molars having fallen away in this order. All of these differences may be found. It does not run absolutely as represented in the illustration, but this represents a fair approximation to the average.

When the absorption of the root of a tooth has proceeded some little distance, it would be improper to place arsenic in that tooth for the purpose of destroying the pulp. While the root is complete, arsenic may be used for destroying pulps in the deciduous just the same as in the permanent teeth, but one must have a care as to the time at which arsenic is used. Furthermore, if the root of a tooth is absorbed half way, a root filling could not

be made successfully if the pulp was destroyed and removed. The root canal would, in most cases, have a wide open end that would interfere with this operation. One must be on guard continually as to that. One must have in mind a clear conception of the conditions in the case in the placing of arsenic or in attempting to fill roots of temporary teeth. We may fill the roots of temporary teeth before the absorptive process begins, just the same as the roots in permanent teeth. The absorptive process will go on at the proper time; the root filling will stand up in the tissues, produce, apparently, no irritation, and the absorption will go on just the same as it will in a tooth with a living pulp. These little molars, the roots of which have been filled in this way, come away with the three legs of root filling — gutta-percha or gold, standing up in the tissue, seeming to have produced no irritation whatever.

ACCIDENTS DURING ABSORPTION OF ROOTS OF THE DECIDUOUS TEETH.

A number of what we may call accidents, occur during this absorption of the roots of temporary teeth. First, if there is an alveolar abscess at the root of a temporary tooth and that abscess is continuing in a chronic form, the rule is that absorption of the root will fail. The death of the pulp of the tooth does not interfere with the absorptive process. The question is simply as to the condition of the tissues about the end of the root. The absorption of these roots is a physiological process, and, in order for it to progress properly, the tissues about the root, the peridental membrane, must be in a physiological condition. If disease is going on there, such as we have in alveolar abscess, the absorptive process will be defeated and different kinds of trouble come up on account of it. Often a tooth is bodily pushed out of the way, the other tooth taking its place, seemingly, by physical force. In other cases, the permanent tooth is deflected from its proper position. The apical end of the root of a central incisor is occasionally pushed labially, while its neck is held nearly in normal position. Less frequently the same thing may happen to a lateral incisor or a cuspid, but the forms of the teeth replacing these are such that they are more liable to slip to one side and be deflected from their normal positions. The broad cutting edge of the central incisor is that which most frequently pushes the root of the deciduous tooth labially, causing the end of the root to protrude through the gum and sometimes into the lip of the child. These cases are not very frequent, and yet they are sufficiently frequent that we should recognize them when they

present. In case of alveolar abscess, the bone about the end of the root will be absorbed, leaving an opening in which there is only soft tissue. The crown of the permanent tooth comes down, moving forward and downward, and strikes the lingual side of the root of the temporary tooth and begins to push it away, as shown in Figures 174, 175, 176. A pathological condition here prevents the absorption of the root; pus is lying around it instead of normal tissue. The result is that the apical end of the root of the deciduous tooth is gradually pushed over to the labial, and the permanent tooth following up, the end of the root of the deciduous tooth is finally tipped out through the gums, under the lip, as illustrated in Figure 175, and, occasionally, cuts into the lip, as shown in Figure 176. Whenever the examination of a child near the age at which the deciduous incisors are shed, reveals a sore point under the lip and some bony substance appearing in the tissues, it should at once be supposed to be the apex of the root of the deciduous incisor, and, placing an instrument upon that and a finger upon the stump of the incisor, and moving it a little, it will be found that they move together, which will confirm the diagnosis. Then, of course, the remedy is to extract the root. It will generally be found that the permanent tooth is pushing the root out of its way. This will be met in practice quite often if one has many children to deal with. In the author's practice some years ago, a slight little girl was presented in whom a sore under the lip from this cause had been neglected until the lip had been cut through and the apex of the root was found in the "running sore" on the skin under the nostril. At the time, the little girl was very thin in flesh, anemic, and had a temperature of 101 degrees. Yet, the sore seemed in a chronic condition without any extended inflammation or swelling. It was reported to me that a physician had been looking after the case for some weeks, evidently without discovering the cause of the difficulty with the lip.

In the absorption of the roots of the deciduous molars, a difficulty is found that is somewhat different. Often the crown of the bicuspid will come between these wide-spreading roots, the roots will be absorbed only near their junction with the crown, and the ends of the roots will be left unabsorbed. These will be found sticking in the alveolar process or gums after the bicuspid has taken its place; sometimes abscesses occur in consequence of this, or occasionally considerable soreness without abscess. Occasionally the unabsorbed portion of the root will remain between the bicuspid and the proximating tooth, expand-

ing the arch and making room for itself. These are usually easily removed if the conditions are recognized. They produce very much less trouble than the roots of incisors. Recently a student brought me a lower first and a lower second bicuspid, which he had just extracted, to ask an explanation regarding a singular growth on the proximal side of the apex of the root of each one of the teeth. Upon examination, I found each of these to be the apical half almost entire of the roots of a deciduous molar, or possibly of the distal root of each deciduous molar that had remained in the jaw and had become attached in this way. One of them was slightly movable, and therefore was attached only by the fibers of the peridental membrane, though the attachment was very firm. The other was immovable and was evidently attached by cementum. No history of any difficulty from these retained bits of roots was discoverable. Occasionally the root of a cuspid will be found — a long root — being thrown out under the lip in the same way as the incisors. This root is occasionally so long that its end will be too high to pass out under the lip and the labial side of it will appear in the opening.

Occasionally an abscess will occur at the end of the root of a temporary molar before the enamel of the crown of the bicuspid has been completed, and, in that case, the pus may break into the enamel organ and destroy it, or a part of it, so that the enamel of the crown of the bicuspid will never be completed. Then it will come through as an imperfectly enameled tooth. I have observed a number of these cases, one in my own family, where an abscess occurred very early at the root of a temporary molar, in which there was a good deal of swelling and a good deal of pus. I suspected at the time that there would be injury to the bicuspid, and when the bicuspid presented the enamel was imperfectly formed, not having been completed. This has occurred a number of times under my personal observation. Sometimes these injuries closely resemble atrophy in appearance, but are readily distinguished from that class of injury by being confined to one or two teeth. But it is only occasionally that we get injury from alveolar abscess that has occurred quite early at the root of a temporary tooth.

Not very infrequently the failure of absorption of an abscessed temporary molar will hold back and delay the eruption of a bicuspid; and it is often difficult to determine the cause of this delay satisfactorily without an X-ray picture. This, however, will show the condition clearly enough to complete the diagnosis. These cases illustrate the peculiar value of keeping

accurate records of cases. A severe alveolar abscess may occur early at the root of a deciduous molar, be relieved by discharge of the pus, or the removal of the offending tooth, and be forgotten. When the bicuspid takes its place with imperfect enamel, no one knows what has occurred. If there is a record of the prior condition and the treatment, the two incidents become properly connected as cause and effect. A number of cases have occurred in the author's practice in which necrosis, as a result of these abscesses, has brought away the permanent tooth with that portion of bone immediately surrounding it. These things lead one to believe that the sufferings of children with these conditions are not sufficiently appreciated. It is certain that the little ones are much too often neglected.

The absorptive process seems to be very fickle in its beginning and in its progress, and there are many cases of variation from the normal. In some of these, the absorptive process seems to be hurried and it will be completed before the normal time so that a temporary tooth will drop away before the permanent tooth has come forward, and the child may be without a tooth for a year or two; whereas, in the normal process, when the little tooth drops away, the permanent tooth should present at once. These cases are not so frequent, however, as delayed absorption. Delayed absorption of roots occurs quite often, so that the coming tooth will be deflected from its position. If the absorption of a root of a lateral incisor or cuspid is delayed, the coming tooth will generally strike its lingual surface and be deflected to the lingual. Deflections to the labial are more likely to occur from other causes, but deflections to the mesial or distal, the tooth making room in the arch for both itself and the retained deciduous tooth, are occasionally seen. In case of the bicuspid, the crowns are normally between the spreading roots of the deciduous molars, and in case the absorption is delayed, generally the coming bicuspid is simply held back. In the upper jaw it may escape from between the spreading buccal roots and be deflected to the buccal, so that the tooth will come out to the buccal of its normal position in the arch. In the lower jaw they may be deflected either to the buccal or to the lingual, but they are more generally simply delayed, held back by the lack of absorption of the roots. Indeed, the absorption of the roots of the temporary teeth does not seem to be especially stimulated by the coming of the permanent teeth, for they are often absorbed when there is no permanent tooth to come. When that happens, the absorption occurs in accord with a process of nature, and

this process is varied somewhat, as I have stated. In the case where a permanent tooth fails to develop, which occurs occasionally with the lateral incisors, the absorptive process will generally go on and the little tooth drop away, notwithstanding the fact that there is no permanent tooth to take its place. The cuspid tooth, on the other hand, generally remains if there is no permanent tooth coming forward to take its place. If the cuspid happens to be deflected from its position from some other cause, or becomes impacted within the bone by taking a wrong direction, the deciduous cuspid often remains in its place, the absorption only partially removing the root, and may be found in its place on up to middle life, and in a few cases it may be seen continuing in its position and doing service until old age.

These retained deciduous cuspid teeth require somewhat careful handling. It is often difficult for us to know whether the permanent tooth is likely to come forward later or not. The author has seen them come forward as late as twenty, and in one case in which the person was twenty-five years old, but generally, if they do not come forward somewhere near their normal time, we need not expect them. Often much light may be thrown on this by an X-ray picture, which will show the position of the permanent cuspid. If it is not present that fact may be determined. It is often important that we retain these deciduous cuspids, not only for the appearance, but for the real service that they will do, and as they are liable to decay the same as other teeth, they require filling.

In handling these teeth, any considerable disturbance is likely to hasten the absorptive process and cause the tooth to loosen and fall away, or at least it has been observed in a number of cases where these deciduous cuspids, that seemed quite firm in their position, have fallen away soon after a filling was made. This observation has occurred so often as to suggest strongly that a considerable disturbance of the peridental membrane by much malleting is very liable to start up this absorptive process afresh and cause the loss of the tooth. Therefore, when it is necessary to make fillings, these teeth should be handled very cautiously.

Occasionally we find temporary molars remaining in position, and, in a few instances, a bicuspid is seen deflected mesially or distally and takes its place beside the temporary molar; but, generally, if they are deflected at all, they will be deflected to the buccal in the upper jaw or to either the buccal or lingual in the lower. These teeth do not often remain so late in life as

the cuspids, yet I remember one case in which the patient had one deciduous molar still remaining when he died, at about seventy-two. This little tooth had done service all these years, and, of course, where there is a possibility that a deciduous tooth will do this kind of service, it is important that it have the best treatment we can give it.

X-RAY
Latterly, the X-ray has come to be of great value to us. A picture will determine the position of impacted teeth, and in this way information is gained that will be of great value to us in determining whether or not a deciduous tooth should be retained. Generally, if an X-ray shows the permanent tooth in proper position, and apparently held back, the proper treatment will be the extraction of the temporary tooth, with the expectation that the permanent tooth will come forward; generally it will. Heretofore we have not had the opportunity to make this observation. If the permanent tooth was in its normal position, it was very difficult to tell whether it was there at all or not by any examination we could make, previous to the discovery of the X-ray. If it is deflected somewhat to one side or the other, we will find an enlargement that will enable us to detect its presence. Therefore, it is advised, where it becomes important as to the treatment of a retained deciduous tooth, that an X-ray be made in order to understand better the position of the permanent tooth.

A somewhat singular phenomenon occurs occasionally with deciduous teeth that have been retained longer than the usual time of shedding. This is most often seen in the molars. The general rule is that, when these teeth are not shed at the usual time, they are carried upward (toward their occluding teeth) by the growth of the bones, and remain in occlusion. Sometimes, however, this seems to have failed and the deciduous molar, or the two of them, retain their position in the bone, and the growth of the jaws and the movement of the permanent teeth carry the occlusion away from them. These teeth are then often almost overgrown by the gums. I have models of a case in which all of the deciduous molars were retained in this way in a boy almost fifteen years old. The occlusal surfaces lacked eight and one-half millimeters (one-third of an inch) of coming into occlusion, when the permanent teeth were closed together.

In the case just cited, X-ray pictures were made which showed the bicuspid in place between the roots of the deciduous molars. These teeth were then removed. Only a little absorption had occurred in the crotch formed by the spreading roots,

and the crowns of the bicuspid were found uncovered in the wound. Generally such teeth should be removed at once if the X-ray shows the succedaneous teeth in proper position.

Occasionally these cases, as the one just cited, give an object lesson in the movements of the teeth that are made concurrent with and forming a part of the movements in the lengthening of the face, which occurs in the change from the child to the adult.

TREATMENT OF CARIES OF THE DECIDUOUS TEETH.

This is one of the most difficult subjects in dentistry. Not that caries in these teeth is in any wise different from caries of the permanent teeth, but the conditions under which we must treat caries of the deciduous teeth are very different from the conditions under which we treat caries in the teeth of adults. We have the child to deal with, and occasionally the little child, for we may find caries beginning in their teeth as early as two years old, and occasionally earlier. When it occurs so early, we may feel certain that caries is going to be very severe and that it will destroy the teeth quickly unless some remedy that is effectual is used. And the question is, how are we to apply our remedy to the teeth of the baby? None of us like to hurt a child; none of us like to perform such an operation as seems to be required by force against its struggles and its cries. Just there is the difficulty, and it is practically the only difficulty, so far as making fillings is concerned. We may make fillings in these teeth just as well as in the adult teeth; there is nothing in the condition of the tissues of the teeth that will hinder making these fillings, and if the extensions are made sufficient to protect the area of liability to decay, fillings will stand well. True, none of us have observed so many fillings for these little folks as for grown-up people, but enough of them have been observed for us to feel sure of this statement from the clinical standpoint. This is strongly supported from physical examination of the teeth. The technical procedures in making fillings in these teeth would be the same as in making like fillings in the teeth of adults and will not be discussed here. Where we find conditions in which we can make fillings, we should not hesitate to make them.

The general rule is that we can not make metallic fillings for these little folk; we will have to resort to other methods. In many cases we can not reasonably make the proper excavation. These teeth are as painful as the teeth of older people,

and our sympathy for the child will prevent us from doing that which seems necessary to be done. We must temporize in our treatment. How can we temporize to advantage, becomes the question. Can we make successful use of prophylaxis by artificial cleaning of the areas of liability to caries and in this way prevent caries? In highly susceptible families, this would have to be begun very early to be successful. While the teeth should be kept generally clean, the more especial attention should be confined to the areas of liability. These are occasionally found with beginning decay of the enamel within a few months after they come through the gums. Is it possible to handle these bad cases in this cleaning process? Those who are especially interested in the development of this method of combating caries will do well to try handling the little ones in very susceptible families.

TREATMENT OF DECAYS OF THE DECIDUOUS INCISORS AND CUSPIDS.

In consideration of other methods, there are certain conditions peculiar to the child that are important for us to consider. We may say that by the end of the third year (speaking of the deciduous incisors and cuspids particularly), the growth of the jaws and the development of the permanent teeth in the region of the roots of the deciduous incisors have begun to carry these little teeth slightly apart; at least, the effect of the growth will prevent these teeth from dropping together if the contacts are cut away at this age. And, as the child grows older, the tendency is for these teeth to stand apart. This we can take advantage of in the treatment and do that which we can not do with the permanent teeth. We can cut them apart freely, make spaces between them, and these spaces will be self-cleaning and remain permanent; that is, after the child is about three years old. The teeth will then be in contact as shown somewhat enlarged in Figures 177, 178. One of the best methods of treatment for decays of slight depth that have started in the proximal surfaces of the incisors or the mesial surfaces of the cuspids — such as are shown in Figures 179, 180, is to file them out, or file them partly out. With a small chisel or an 8-3-6 hoe excavator, chip away the undermined enamel. Make the cavity as broad as possible in that way so as to reduce the amount of filing. Then with a thin jeweler's file, cut them flat from labial to lingual. Do not cut the full depth of the decay in the dentin, but only the depth of the enamel. That can be filed away without arousing sensitiveness, and, when necessary, may be done a little at



FIG. 179.



FIG. 180.

FIGS. 179, 180. Caries of the deciduous incisors of such moderate degree as to permit of treatment by cutting, followed by the use of silver nitrate. Figure 179 is the labial view and Figure 180 the lingual view.



FIG. 181.



FIG. 182.

FIGS. 181, 182. The same as Figures 179, 180 after filing away some of the proximal surfaces and treatment of the areas of decay with silver nitrate. Figure 181, labial view. Figure 182, lingual view.

a time on different days. Leave the decayed material in the dentin where it is. Do not disturb it or attempt to remove it. The removal of this is particularly painful to the child. Cut away the angle of the tooth and follow straight toward the gingival, leaving the surface flat, being careful to incline the file so as to cut most from the lingual surface, making a V-shaped opening as shown in Figures 181, 182. In making these cuts, it is best to note carefully the position of the gum septum, and, if possible, avoid cutting so far that the gum tissue will overlap the cut surface; for this will often make a little pocket in which it will be difficult to prevent decay starting afresh. The little fellows, unless there is something that hurts to prevent them, are good feeders and will bite through foodstuffs enough to keep these spaces pretty well cleaned and it is now easy to supplement the natural by artificial cleaning. When these have been cut in this way and finished with polishing tape or the disk, if some decay is left or some dentin is exposed, it should be treated with silver nitrate. To do this, first lay a crystal of silver nitrate on a glass slab and crush it. Have some water and an orangewood stick cut to a point ready (an ordinary wooden toothpick with a flat end may be used). Put a single small drop of water on the crushed crystal and make as nearly a saturated solution as possible. Slip the rubber dam over the teeth, hold it with the fingers of the left hand, dry the cut surfaces and apply this solution to the cut surface and the decay in the dentin until it is well saturated. Now, if it is possible to place the cut surfaces directly in the sunlight for ten minutes, do so. The mirror can be used to reflect the sun's rays directly onto the cut surface. If the direct rays of the sun can not be had, use the brightest light available, and, if possible, continue it longer. If time enough can not be given at a first trial to obtain a full black color of the carious dentin, try again at another sitting and another until it is obtained. Generally, after one or two sittings, the child will learn just what is wanted and plenty of time can be given. Each carious area, such as shown in the illustrations, should be treated in the same way.

The object in this treatment is to fill the part of the dentin softened by decay with the insoluble salt of silver that has been precipitated by light, and incidentally to destroy the organisms in it. That portion of silver nitrate, which has not been precipitated by light, dissolves out within a short time and is gone; it is of no value. It is useless to endeavor to treat such

Silver
nitrate

Light

As filed

decays with silver nitrate without this exposure to light. But when the full black color is obtained, decay is generally effectually stopped. To do this requires such control of the child as will enable one to use the file a little at a time and succeed in shaping the surfaces and in polishing them. This may be done with a thin stone in the engine and finished with disks. In this work the child need not be troubled with the rubber dam or any close confinement. But in applying silver nitrate, the rubber dam should be used. Applications made without it will generally be useless. One should make no attempt to tie on the rubber dam. Indeed, nothing should be done that is likely to cause pain. When this has been held in position for ten minutes, or longer, if the child is not too restless, throw a stream of water on it to wash away superfluous silver nitrate and end the sitting for the day. When it is apparent that the first application is ineffective, make another after one or two days. Repeat this as often as may be necessary. All exposed dentin and the decay should assume a full black color. Sound enamel will not be stained. Any silver nitrate precipitated on the surface of the enamel will disappear within a few days.

* Generally decay is effectually stopped by this treatment if the teeth and cut surfaces are kept fairly well cleaned. The cleaning may be done by the mother or the nurse after proper instruction. The dentist, however, should see these cases frequently to know that the cleaning is well done. He may find it necessary to repeat the treatment with silver nitrate occasionally. Sometimes we find caries of the enamel beginning in the gingival thirds of the labial surfaces. If these can be discovered before the enamel rods have fallen out, they may be cleaned, using caution not to break away the frail enamel, and treated with silver nitrate without further preparation. Then the cleaning with the brush should be effective.

Either this incipient decay of the enamel or the deeper decays of the proximal surfaces will be stopped, provided the surface is such that it can be kept fairly clean. In this treatment one will escape most of the painful part of the operation in the treatment of these cases, for the little filing that is to be done will generally not be very painful. This is applicable to the proximal surfaces of incisors and cuspids and to labial cavities. The labial cavities, from which enamel rods have fallen, can not be cut away very completely, but we can break away the enamel and trim it carefully so as to make these depressions as smooth as possible and then treat them in the same

way, and, by proper instructions to parents, they may be kept clean by brushing, and the teeth, although mutilated and out of shape, will be useful to the time of their shedding. All cases treated in this way should be carefully watched, and if any sign of the recurrence of decay is noted, the silver nitrate should again be applied.

A word of caution should be said about the use of silver nitrate, and it is an important one. It must not be used if the decay has approached near the pulp of the tooth. There is nothing else that will cause so severe a toothache as silver nitrate used over a pulp that is nearly exposed by decay. Personally, I have had a few very memorable experiences with it. The pain was so severe and so uncontrollable that I felt compelled to sacrifice important teeth. One may use silver nitrate with perfect freedom wherever there is a good coating of sound dentin over the pulp, but we must not risk affecting the pulp. Of course, up to a certain age we have the recourse of destroying the pulp and removing it, but after the beginning of the absorption of the roots that recourse is lost to us. Treatment with silver nitrate should be confined strictly to shallow cavities. It is not well suited to deep cavities in which there will be accumulation. Its success depends much upon strict cleanliness and free washings by the fluids of the mouth and by foodstuffs after the treatment. Other plans of treatment must be employed for deeper cavities. The application of the silver nitrate seems to be of much benefit also in beginning caries of enamel. When it has been precipitated freely among the loosened ends of the enamel rods, decay does not rebegin so readily and such vigorous cleaning is not necessary to hold it in check.

A word as to the handling of children in this class of cases. A dental school clinic is not a suitable place to handle little children. We are practically debarred by the conditions from teaching this clinically in schools. If I am to handle children, I want to know the parents; I want to know that they are depending on me to manage the teeth of their children and that I will have their assistance and sympathy in this management. I will not undertake, further than for present relief, the handling of children of strangers, and I would not advise anyone to try to do it. Remember that in undertaking to treat decay of these teeth, it is a thing that one must begin to-day and follow it up from week to week and from year to year, until the shedding time of these teeth, and one should have that particularly in view and have the parents particularly impressed with this necessity.

Of course, we can not expect much assistance from the child, as the rule. Yet, many of them become enthusiastic and do their part most bravely. Furthermore, the prophylactic work with the tooth brush must be done by the parent or the nurse, and this should be insisted upon, and when we have made a silver nitrate treatment we must expect to have the child brought to us and examine these teeth from time to time and see that decay has not again started and is making inroads. We may, if decay is again starting up in some part of a surface that has been treated in this way, treat it again and stop it again, and again, if necessary.

There are some objections to this method of treatment. The first objection is that it makes the cut surfaces of the teeth very black, and often this will show through the enamel and give it a very bad appearance. This adds to the disfigurement caused by the necessary cutting. For this reason, it is a very objectionable practice from the esthetic standpoint, and yet, with all of its objections, it is often the best we can do. Parents will object to the discoloration of the teeth in many cases; yet, if the child is very sensitive, we can scarcely do better than to use this method. The teeth can be made to look very much better by other methods of treatment, however, methods that will be more painful to the child.

WE MAY EXCAVATE THE CAVITIES AND FILL WITH CEMENT, HILL'S STOPPING, OR BASE PLATE GUTTA-PERCHA. Where we can succeed in making the necessary excavation, this should be preferred, but to fill with these materials at all successfully, we must excavate the cavities quite thoroughly. In filling these little teeth with cement, I should not insist upon extensions of the cavity — extensions for prevention — but should simply remove the decay, cutting away the overhanging margins of enamel and making the filling without any considerable effort at extension. Unfortunately, the cements are not reliable and in many cases they will wash out from these little teeth very quickly; in some other cases again, they seem to stand quite well. Sometimes cement fillings, put in early, stand until the teeth are shed. But whenever fillings of this class are used, the child should be seen frequently and the fillings renewed if they waste away, or are found to be very leaky from shrinkage. Extensions of decay beside the filling will also require treatment. We need to watch these teeth much closer than we watch the teeth of older persons, for changes occur rapidly; the predisposition to decay is often very severe, so that the

teeth decay very quickly indeed, and, unless we keep a very close watch of them, we will find that they have decayed badly in the interim. In this connection, it is especially unfortunate that our cements are so unreliable. A cement that we may use this week and find afterward that it is doing good service, may not be good next month. These changes that occur in the cements are very vexatious. No means has yet been devised by which they can be prevented, but very earnest search is being made. Of course, wherever we can, a gold filling is the right thing to make, but the cases where we can make gold fillings successfully in the teeth of little children are very few. It should be undertaken only when we have the most positive assurance that a really good filling can be made. Also, we must be especially careful to preserve the courage of the children.

THE TREATMENT OF DECAYS IN THE OCCLUSAL SURFACES OF
DECIDUOUS MOLAR TEETH.

In these we should not care particularly for the color, and we may use any of the filling materials without the color objection that pertains in the incisors. If we obtain control of the child before the decays are large, we may break away the enamel from about the cavity, open it as widely as possible, and then use silver nitrate, not, in this case, entirely for the purpose of stopping decay, but for the purpose of relieving the sensitiveness. For this purpose it should be used in almost precisely the same manner that we would for the stopping of the carious process in shallow cavities. After the action of the silver nitrate for a week or ten days, having applied it two or three times, we will generally find that the sensitiveness has been relieved, and then we may cut out the decay and make a filling. In the meantime, especial care should be taken in washing the cavities clean after eating and keeping them so that they will be washed freely with the fluids of the mouth. The difficulty with these decays in the occlusal surfaces is that, unless we can open them very wide, they will fill up with food which will ferment and the decay will again progress, notwithstanding the treatment with silver nitrate. Therefore, this treatment should be mainly for the purpose of obtunding the sensitiveness in order that we may excavate and make a filling. In this, we are running the risk of considerable discoloration of the dentin that will show through the enamel. We will not always succeed well with this process; sometimes the sensitiveness will remain and hinder us from making a sufficient excavation, but the case will be the

✓ better for the use of the silver nitrate in the limiting of the decay that will occur, even if we do not entirely succeed. We may repeat this again and again, if the cavity is not so large as to encroach too near the pulp of the tooth. When these have been excavated, they may be filled readily with amalgam, or with gold in some cases. When a case can be handled sufficiently well to fill with gold, one should not use silver nitrate and have the tooth blackened about the margins of the filling, but should excavate and fill the cavity just the same as for an adult. There is no difference whatever in the operation except that we have the child to deal with. Taking it all in all, amalgam seems to be the best material for filling this class of cavities, though oxyphosphate of copper cement is often doing excellent service.

TREATMENT OF DECAYS IN THE PROXIMAL SURFACES OF DECIDUOUS MOLAR TEETH.

These are difficult in the extreme to handle. The deciduous molars are larger than the bicuspid which come in their place, and they are in many cases considerably crowded when the permanent incisor teeth come through. The deciduous cuspid tooth is also smaller than the tooth which will replace it. If we cut the proximal surfaces of the deciduous molars, they usually fall together very quickly, consequently we are, in a measure, debarred from that method of handling proximal cavities in them; and yet not entirely, for, if we can treat these cavities when they are small, we may, by a different method, cut them out without separating the teeth so far as to be in trouble from their dropping together. Generally we will find these decays beginning pretty close to the occlusal portion of the surface, or near the marginal ridge, and the form of the crown is such that if we slope the cut well to the linguo-gingival, i. e., slope our cutting toward the gingival on the lingual, we may cut away considerably without entirely destroying the contact of these teeth, or, if we destroy the contact, leave enough of enamel upon the proximal surface toward the buccal so that it will come against the enamel of the next tooth, making a new contact that will be good and sufficient. The occlusal surfaces of the deciduous teeth are represented somewhat enlarged in Figure 183. In Figure 184 they are represented as the proximal surfaces should be cut in this treatment. Generally decay has occurred in the bucco-lingual center of the occlusal third of the mesial surface. We may make a cut in this way, sloping linguo-gingivally, and leave a portion near the buccal angle of the surface to make a new contact. They

will not drop together sufficiently to let the cut surface make a contact. The danger in cutting away the proximal surfaces of the permanent teeth is that the flat cut surfaces are liable to come together, by the twisting of the teeth in their sockets, and make a flat contact that holds food and debris which will very certainly cause decay. If we can cut the deciduous teeth as Dr. Robert Arthur recommended for the permanent teeth (which, by the way, has gone entirely out of use now because the teeth would drop together and make flat contacts), we can hold the deciduous teeth in position and keep the surfaces in a form that will be self-cleaning until the normal time of shedding. One should be especially careful to make cuts of such form that food going into them will slide toward the lingual and pass out in that direction, and in this way keep the cut surfaces continually clean. If we cut these boldly apart, cutting away the entire proximal surfaces, the teeth will usually not come together entirely because of the wide spreading of the roots. In cases in which I have done this, difficulty is experienced from the fact that there is a broad gum septum exposed, and in the act of mastication, food is forced upon it and it becomes so painful that the child will almost refuse to chew meats or any food that requires considerable mastication, and the teeth become almost useless if cut sufficiently to keep them apart, i. e., if the whole proximal surfaces are cut away so there will be no contact. We must always be on our guard about cutting too far, and this treatment should be used only in cases in which cavities are neither large nor deep. We may use silver nitrate in these cases and not cut out the entire decayed area, just the same as in the incisor teeth.

It will often become necessary to treat the distal surface of the second deciduous molar after the first permanent molar has taken its place, as represented in Figure 185. In that case, the distal surface of the temporary tooth may be cut as shown in Figure 186, but in no case should the mesial surface of the permanent molar be cut in this way. If that tooth has a decay, every step in its treatment should be to the end of placing finally a filling in perfect form. Temporary expedients may be necessary to gain the conditions for a successful operation, but when these conditions can be had, the filling should be made.

Filling these proximal cavities is a difficult proceeding on account of the sensitiveness and on account of the difficulties of position. The teeth are generally strongly bell crowned; the gums usually come up into the interproximal spaces very near to the contact, even though we find some decay; it is only after

decay has progressed for a considerable time and food has lodged, that the gums are out of the way. One of the difficulties of the treatment by cutting is that we will come upon the gums.

Another difficulty is the proximity of the pulp of the tooth. The pulps in the deciduous molars are large and we are liable to encroach upon the pulp too closely if the cavities are too large to cut out in the way mentioned. Of course, where we can control the child to prepare these cavities and make fillings, even though we can not make much extension, it is still the better method to make fillings rather than cut away the surfaces, and for this purpose I should say that there is nothing better than a good amalgam filling, if well put in and polished properly afterward. This matter of care in putting in these fillings, however, is just as important as it is in the teeth of adults. We should not neglect any detail because we are handling a child, for, with them, decay is so much more rapid that any little neglect of this kind will tell more quickly than it will in the teeth of adults. The polish should be well made. If we can handle a child to put in the filling, we can at a subsequent sitting obtain a good polish and then the filling will be serviceable.

Thus far it has been presupposed that the children are brought to the dentist sufficiently often that he may be able to follow up the treatment. Not only this, but it is supposed that children have been brought to the dentist early enough so that he has been able to handle these decays before they are large; and, where this is done, one ought to succeed in the treatment of these teeth. But the difficulty that confronts one in practice is that parents too often bring their children after decay has progressed so far that toothache has already occurred. Parents do not realize that decay is going so far; they may notice that there are decayed spots in the teeth and be anxious about them, but at the same time, are likely to put off all effort at treatment until the child has a sleepless night with toothache. The child is already tortured with pain; anything one may do will hurt the child inordinately and one has the worst possible condition to begin with. In this case we are reduced to the alternative of temporizing or immediate extraction. The first effort will be to relieve pain, and for the present nothing else should be done. If possible, the child should be made comfortable, and the treatment continued at a subsequent sitting, after the child has slept and recovered its composure. If the pulp is exposed, which will generally be the case when the excavation is made, you may destroy it, remove it and fill the roots, and in this way succeed,

provided the absorption of the roots has not begun. That must be looked into carefully, but if the child is brought at an age when the absorption of the roots has begun, there is practically no alternative but to extract the tooth or cut away the pulp by the use of cocaine and fill the remaining portion of the canal, running the risk of alveolar abscess. It is generally best to extract the tooth as the alternative, notwithstanding the injury that is liable to result. We are presented with conditions in which we are unable to do anything else, and we should not try to do the impossible. Wherever the age of the child will allow, carefully destroy these pulps and fill the roots, and in this way preserve the teeth. That operation has been done sufficiently to fully test its merits, and we know that it is as successful as it is with the teeth of the adult, provided we use sufficient caution as to the time at which it is done.

It should be remembered always that success in the treatment of these teeth depends on the same care as the treatment of the teeth of the adult. The fact that they are to serve only for a short time is fully counterbalanced by the other fact that the tendency to caries is much greater in the child; so that because of any little neglect in operating, decay will recur more rapidly and the fillings will be more quickly undermined and destroyed. For this reason, careful attention should be given to every detail of the operations upon them.