

Original Communications.

OPEN-BITE MALOCCLUSION, ITS CAUSES AND TREATMENT.

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(Read before the National Dental Association at Its Twenty-first Annual Session, New York City, N. Y., October 23-26, 1917.)

IN the malocclusion which is characterized by open-bite, the front teeth are apart or open when the jaws are closed in an effort to masticate food. The extent of the malocclusion varies in its scope from conditions in which only the most distal molars occlude, to conditions in which all of the buccal teeth quite perfectly occlude with the labial teeth apart. In pronounced cases of open-bite, when the jaws are nearly or quite closed, with the lips in repose, the mouth is usually apart, often with a drooping of the lower lip, which, even with patients of more than common intellectuality, often produces the expression of imbecility.

Again, the forced effort to close the lips in many cases, as in bimaxillary malocclusions, will retract and retrude the muscles of the chin and give to the features an awkward receding chin effect, which enhances the deformity, as will be shown later in Figure 3.

The occluso-labial casts of a few typical characters of open-bite malocclusion are shown in Figure 1. The impressions for these were taken by pressing modeling compound against the teeth while the jaws were as fully closed as possible.

Occasionally the condition obtains far more upon one side than upon the other. Usually, however, the space between the

upper and lower teeth quite uniformly increases from the point of occlusion toward the front, just as if the mandible had been bent downward or straightened at the angles of the rami. In fact, in pronounced cases where only two or more molars on each side occlude, the back ones will at times seem to have been driven into their sockets thru the force of mastication, or prevented from growing to their full height, so that the tuberosities come into close proximity to the angles of the rami when the jaws are closed.

I have met with a number of cases, however, older than 25 years of age,

another part are due to a supra-occlusal position of the back teeth, a larger part are due to neither one nor the other, but to a mal-development of the mandible, in which the rami and body of the mandible has assumed a more obtuse angle than is normal.

In order to arrive at an appreciation of this theory, it would be well to come to a definite understanding and agreement in regard to the meaning of the terms "supra and infra-occlusion," or as has been suggested by a recently proposed nomenclature, "supra and infra-version." I think all will agree that these terms are merely relative terms,

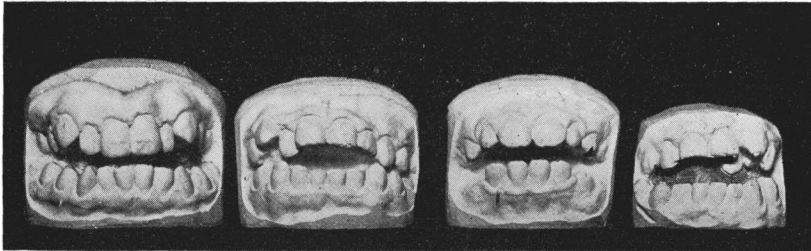


Figure 1.

where the entire forces of mastication had been sustained from childhood by single molars on each side, with no apparent intrusive movement.

Notwithstanding the fact that this irregularity is the sole characteristic of many pronounced dento-facial deformities, it nevertheless cannot be classified as belonging to any particular one of the three dento-occlusal classes of malocclusions, for the reason that it arises in every character of disto-mesial occlusion of the buccal teeth, and consequently in every class.

Unfortunately a few orthodontists in their writings have denominated this character of malocclusion as cases of infra-occlusion, while others quite as earnestly believe that they are cases of supra-occlusion, whereas, the fact is, while a part of the cases are due to an infra-occlusal position of the front teeth, and

like distal and mesial, labial and lingual, etc., and therefore should be employed to define positions or movements in relation to the normal or typical standard, and not as names or designations, *per se*, of a malocclusion.

The typical or standard line of the occlusal plane is that which arises when, with the dentures in normal occlusion and the lips in perfect repose, the occluding edges of the upper front teeth are even with the parting of the lips, tho the curve of the lower occlusal plane carries its front portion slightly above this. In other words, when the lips of esthetic facial outlines are in perfect repose, the standard line of a typical occlusal plane should be even with, or but slightly below, the lower edge of the upper lip.

There are people on every hand with normal occlusions, and with apparently

no dental irregularity, who cannot close their lips without an awkward and deforming effort, and when laughing or talking, the entire crowns of the front teeth are not only exposed, but the gums far above are in decided unpleasant evidence, and solely because the dentures, both front and back, upper and lower, are in a supra-occlusal position in relation to a typical dento-facial occlusal plane. In many of these cases the lips would reposefully close with perfect dento-facial outlines if all the teeth could be proportionately intruded. The fact that we at times see this condition running thru whole families, proves the cause to be that of heredity.

Occasionally, but far more rarely, the dentures are in the opposite, or infra-occlusal malposition. This does not refer to those frequent close-bite malocclusions commonly found in Class II, in which the lower front teeth strike into the gums back of the upper, with the incisal edges even with the lips when the jaws are apart, and which can only be due to an infra-occlusal position of the back teeth; but it refers to cases in which both the front and back teeth are in an infra-occlusal position in relation to a typical dento-facial occlusal plane, shown by the fact that the occlusal edges of the front teeth are in a marked intrusive position in relation to a reposeful parting of the lips, and also by the fact that when the jaws are closed in mastication, the lips in contact, are forced forward with a marked redundancy of lip tissue.

Only one well defined case of this character has appeared in my practice, shown in Figure 2, tho I am convinced by observation that there are many similar conditions. The plaster facial impression for the cast on the left was taken while the dentures were closed, as shown immediately below, and the one on the right was taken at the same sitting, but with the dentures held apart on a modeling compound bite, as shown immediately below. The facial and

dental casts below were made after all the teeth had been extruded to the standard dento-facial occlusal plane.

Let us suppose a not far fetched case of a child in a family of inherited supra-occlusions—as previously mentioned—who has acquired the habit of lip or tongue sucking, and has thus prevented the front teeth from growing to their full erupting positions, so that they are in distinct open-bite malocclusion, tho more nearly in normal relation to the lips and the standard occlusal plane. Should the case be regarded as one in infra-occlusion, or as one in supra-occlusion? To answer this, if it were possible to correct either condition, would you extrude the front teeth to their inherited deforming positions, or would you regard the supra-occlusal position of the back teeth as most at fault, and if possible intrude them and thus harmonize the entire dento-facial relations?

Moreover it is reasonable to believe that this same character of open-bite malocclusion arises in its entirety from heredity, the same as close-bite malocclusions in Class II, due to infra-occlusal position of the back teeth, frequently and distinctly arise from heredity.

There are a number of cases in my practice of bimaxillary protrusion with open-bite malocclusion, some of which bear no trace of having arisen from a local cause, tho of course this character, as in every well defined character of occlusion or malocclusion, may be afflicted with an open-bite of the front teeth, as instanced by the case of bimaxillary protrusion shown in Figure 3, in which the open-bite was caused by adenoids and the early continued habit of mouth-breathing. Note in the facial outlines the quite apparent straightened angle of the mandible, and in the dentures the close relations of the tuberosities of the upper to the angle of the rami,—a peculiarity that will be referred to later.

CAUSES.

Any post-natal cause, such as tongue or thumb-sucking, the mechanical action of which tends to inhibit normal

open-bite malocclusion can be definitely traced to the early long continued habit of mouth-breathing, which may arise from any abnormal interference with

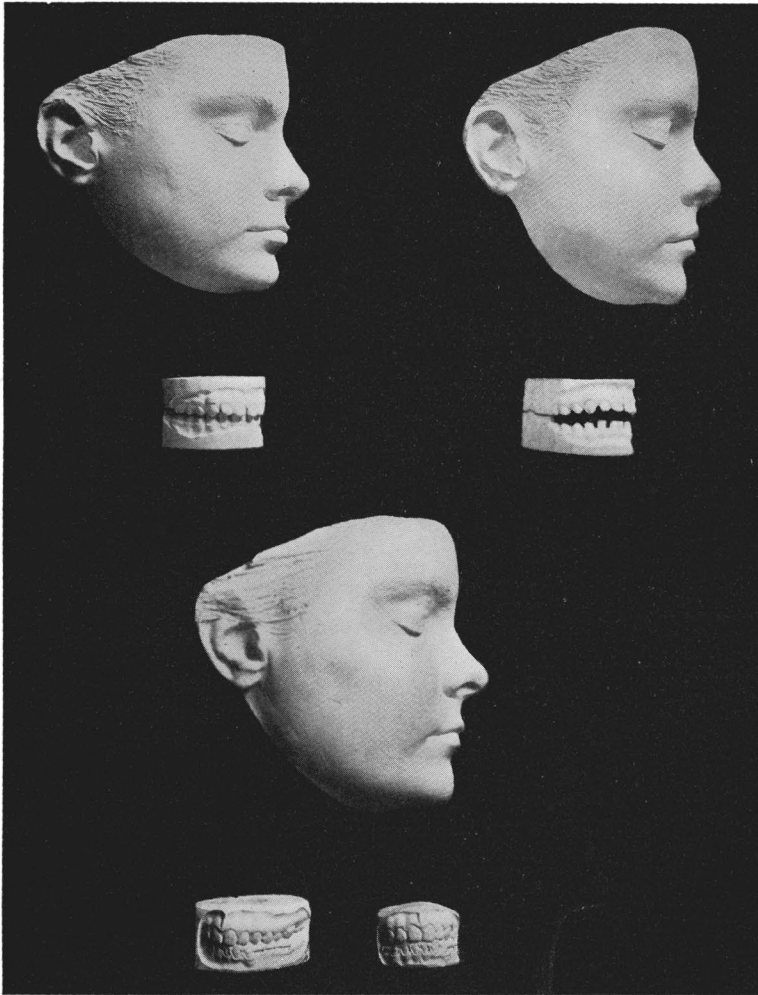


Figure 2.

growth development of the early erupting permanent teeth, and which continues thru the first stages of secondary dentition, is very liable to leave an infra-occlusal position of the front teeth. But the most prolific of all the causes of

the natural freedom of the nasal air passages.

The theory of the peculiar action which probably arises from this cause and which results in open-bite malocclusion, was first presented in a paper

read before the Odontological Society of Chicago in 1894, and later in a paper read before the American Institute of Dental Pedagogics in 1905. At the latter meeting, Dr. Cryer in discussing the paper spoke of the theory as "very probable." The present presentation of this cause is therefore not new, but in as much as it has received no recognition by the many writers upon this subject, I am taking the liberty of again rehearsing briefly the evidence of this "very probable" theory, with the hope that it will elicit in the discussion, the reasons for not accepting it as one of the established causes of open-bite malocclusion.

"The production of open-bite malocclusion from early mouth-breathing is due to long continued mechanical forces of the ligaments and muscles, mostly during sleep, applied to the developing mandible of childhood at a time when the quality of the bone renders it peculiarly susceptible of being easily deflected from the form of its natural growth."

When the jaws are widely apart during the long sleeping hours of childhood, the mandible under the strain of the various forces is similar to that of a lever of the second kind. The condyles resting in their sockets are the fulcrum, the power which forces and holds the jaws open are the hyoid muscles attached to the mandible beneath the chin, and the weight acting in the other direction is the masseter and internal pterygoids attached at the angles of the rami. Again, when the jaws are widely open, the condyles with the intervening inter-articular fibro cartilages are pressed against the posterior inclined planes of the articular eminences and under the strain of the capsular ligaments, tend to carry them back into their sockets with a force that is directly communicated to the rami. Both these influences acting upon an undeveloped mandible during the early years of its immaturity in form, will tend to straighten it, or more correctly speaking, will prevent the rami from fully assuming their natural ap-

proach to right angles in relation to the body of the mandible.

To more fully illustrate this theory, glance at Figure 4, which was taken from Gray's Anatomy, and is intended to show the relative size and shape of the mandible at birth, puberty, and adult development, during which time the relation of the rami to the body changes

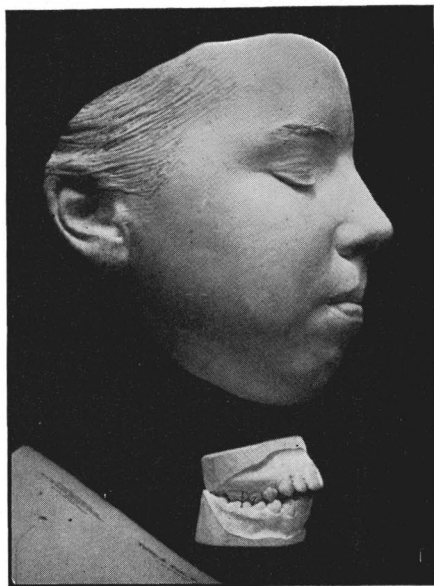


Figure 3.

from a decidedly obtuse to nearly a right angle.

Figure 5 is made from one of Dr. Cryer's illustrations of normal occlusion. In that shown on the right, the mandibular portion of the picture was removed, cut at the angle, and replaced in the position it might assume during childhood under slight continued force exerted in the direction of the arrows by the muscles while holding the jaws wide apart.

In many cases of open-bite malocclusion, caused by early continued mouth-breathing, the relations of the rami and body may be seen, from a profile view of the face, to stand at a more obtuse angle

than is normal, and with the frequent production of prognathism; both of

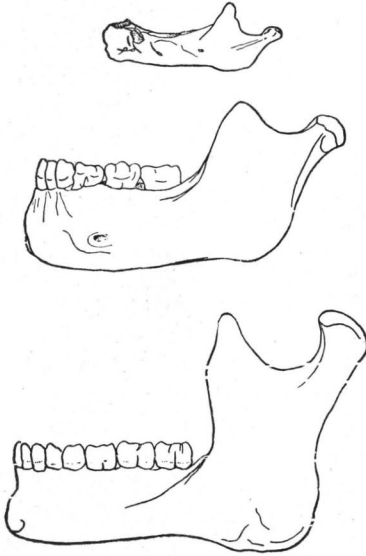


Figure 4.

which are well shown in Figure 6. The dental models shown below the facial casts were made from impressions taken

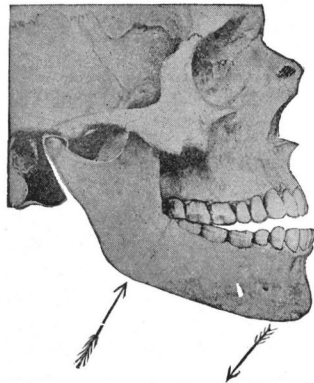
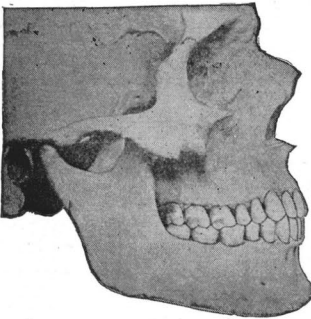


Figure 5.

in the usual manner by pressing modeling compound against the front teeth, with the mandible in its most posterior position.

When one considers the mechanism of the cause, it will be seen that this straightening of the mandible, while not inhibiting its growth in other dimensions, increases the distance from the point of the chin to the condyle with a protruding movement of the body of the mandible and its contained lower denture. Again, when one remembers that the prime cause of obstructed nasal breathing and its resultant open-bite malocclusion, is adenoids, which in itself is the prime cause of inhibited development of the maxilla and which results in the common upper retrusions, one can then appreciate why it is that open-bite malocclusions are so frequently found in Class III, and also why, in so many of these cases, the mandible appears to be so decidedly prognathic in relation to the upper; but which however, may be partly due to a visual effect in comparing the immediate relations of even a moderately protruded lower with a decidedly retruded upper—the one enhancing in appearance the disharmony of the other.

In three of these cases, as in many others of the same pronounced character, the mandible is bent appreciably to one

side, as shown by comparing the relations of the upper and lower front teeth. This condition may be due to an unevenness in the action of the forces, or per-

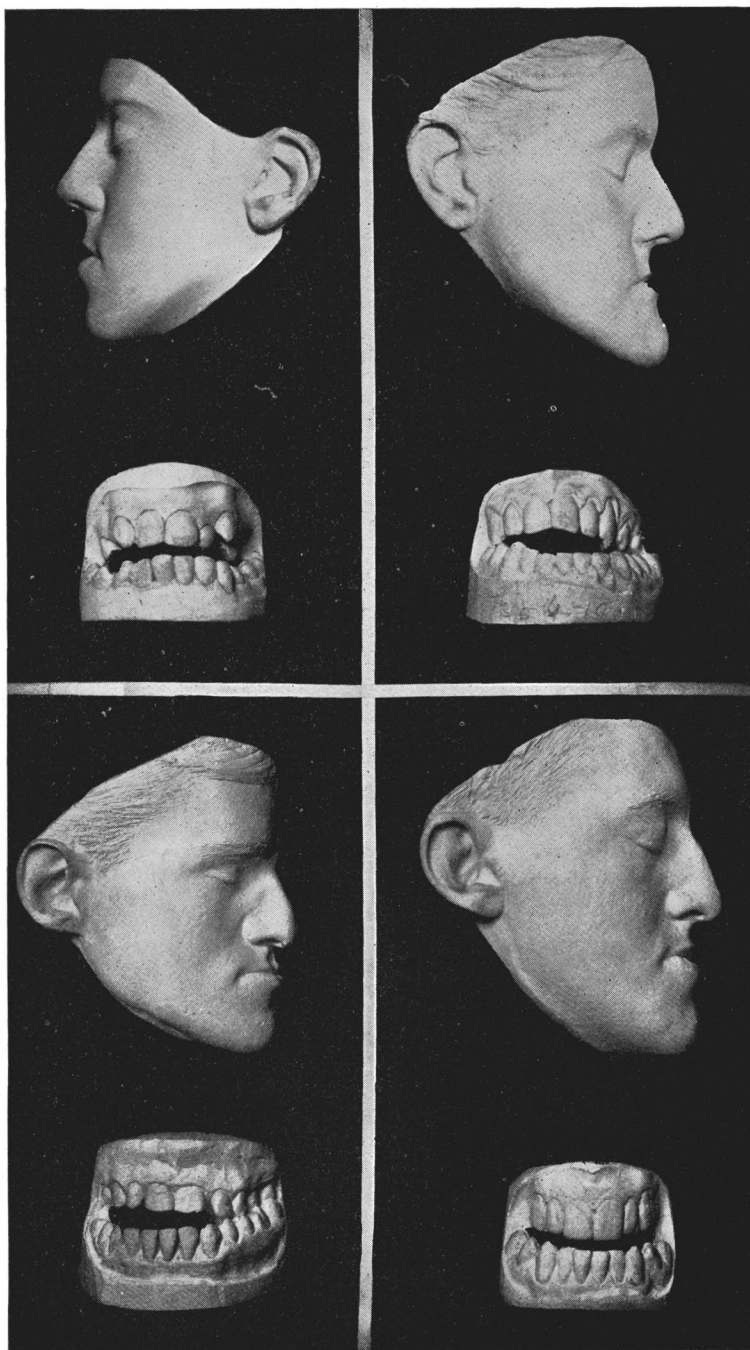


Figure 6.

haps what is more probable, it arises when the mother, either from thoughtlessness or possible necessity, causes the babe to lie upon one side far more than upon the other, and which in itself results at times in a permanent bending of the mandible to the opposite side. This continued forced position of the mandible to one side during the very early years of its yielding immaturity, when a very slight continued pressure will result—if not corrected—in a permanent bending of the bones, is probably brought about in the following manner. The condyle upon the one side is forced firmly against the posterior articular wall and the other condyle with the ramus, being held forward by the position of the body of the mandible, is under the strain of the ligaments and muscles, and perhaps the sliding facet of the articular eminence, tending to force it back into its socket, with the result that this slight continued force during growth development, prevents the ramus and condyle upon that side from assuming the natural angle in relation to the body. At all events this abnormal straightening of the mandible frequently carries the contained lower buccal teeth into pronounced mesial malocclusion upon that side, and often produces a decided open-bite malocclusion. It is also possible that this strained position of the mandible may cause a reverse action upon the opposite side. The most unfortunate part of this condition is, that it is too frequently not discovered and intelligently corrected before it is too late.

Figure 7 illustrates this character of open-bite malocclusion. It is that of a Miss 17 years of age whose mandible was bent far toward the right when the condyles were in the position of a masticating closure of the jaws, as can be seen by the relations of the upper and lower front teeth. The profile plaster cast does not begin to show the extent of the facial deformity which this pro-

duced when viewing the patient from the front.

While listening to a very able paper read by Dr. B. W. Wienberger of New York, at the recent meeting of the American Society of Orthodontists, which was extensively illustrated with lantern slides showing all the stages of fetal development, and with radiographs which were intended to show certain physical influences during utero gestation which he believed might cause malocclusion, I wondered if it were not possible that certain open-bite and lateral malocclusions might arise from the intra uterine forces. The only objection—if any—to the acceptance of the theory that intra uterine forces in abnormally displacing and bending the immature bones of embryo, are causes of certain malocclusions, etc., is the well known wonderfully recuperative power of nature to fully restore seeming physical wrecks at birth to beings of perfect normality. And yet as in the bending of the mandible after birth, may it not be possible before birth or during the operation of accouchement, that the bones of the child are forced into abnormal forms where they are allowed to remain, causing these conditions which could be easily corrected if discerned.

TREATMENT.

In the correction of all cases of open-bite malocclusion, especially for young patients, which are due to an infra-occlusal position of the front teeth, direct intermaxillary elastics, aided by the resiliency of small spring arch bows, are invaluable.

As open-bite malocclusions are nearly always associated with other irregularities which demand correction, the methods employed in many cases for at least the first part of the operation, should be those which will permit and aid in the extrusive movement of the front teeth. The present popular return to the very light resilient arch bows is very favorable for this purpose. The hook and

bracket attachments on the intruded front teeth enables the patient to readily lace the elastics in place, removing them only at meal times. If the teeth of only one jaw are in infra-occlusal position, the opposing teeth should be prevented

teeth after wearing the apparatus with elastics attached, shown below. This was only the beginning of a more extensive operation which required a variety of apparatus, but always constructed, even during retention, for keeping up the



Figure 7.

from an extrusive movement with a more rigid arch bow or retainer firmly attached to a sufficient number of teeth for stability, and which carries spurs for the attachment of the elastics.

Figure 8 is from the dental models of a patient about 13 years of age. On the right is shown the position of the front

teeth after wearing the apparatus with elastics attached, shown below. This was only the beginning of a more extensive operation which required a variety of apparatus, but always constructed, even during retention, for keeping up the

direct intermaxillary forces. The model on the right below shows the position of the dentures when finished. If the infra-occlusal position evenly opens the bite mesially from the back teeth, and the teeth of both jaws are involved the spurs for the elastics may be attached directly to the arch bows, Nos.

22 or 23, which will evenly distribute the extrusive force, as shown in Figure 9.

For older patients with longer standing pronounced cases of open-bite malocclusion, the correction and retention is attained with far greater difficulties. The causes, extent, and peculiarity of the malocclusion, together with complications which are commonly present, must always govern the treatment, which will depend largely upon the skill and

tice are complicated with retruded upper dentures and maxilla, demanding a bodily labial movement of the front teeth, in connection with a protruded mandible and lower denture, demanding a retruding movement of the lower front teeth, I have found that the auxiliary, intermaxillary and occipital forces are of the greatest importance in closing the open-bite. In fact, I am confident that I could not have obtained equal results

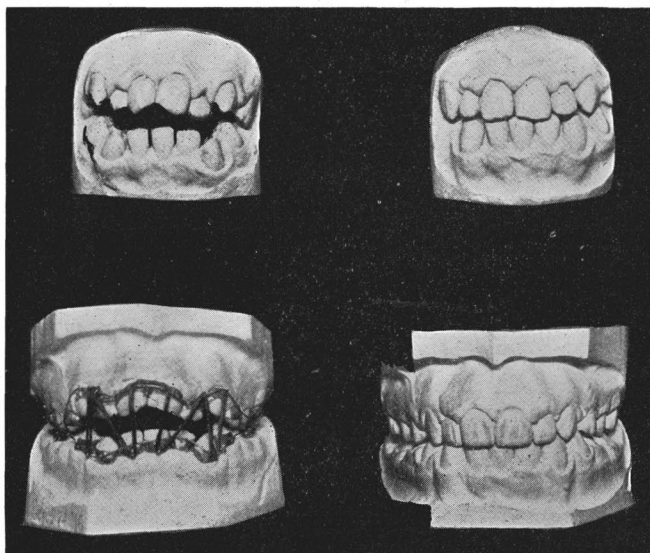


Figure 8.

ingenuity of the operator and his ability to cut loose from stereotyped commercial appliances, for those which are specially constructed to meet the demands of the case in hand.

For older patients, in pronounced cases caused by mouth-breathing, where only one or two molars on each side imperfectly occlude, I freely grind the occluding surface, in connection with the readjustment of positions, to increase as far as possible—or advisable—the area of occlusion, and then correct the balance of the open-bite with extrusive movements.

As many of these cases in my prac-

without the aid of the occipital apparatus arranged to apply its force to the lower front teeth in an upward and backward direction, as shown in Figure 10.

In those cases where the lower denture is carried far to one side by the lateral bending of the mandible, as was previously shown in Figure 7, there is very little hope, after twelve years of age, of accomplishing anything toward a restoring movement of the mandible, or in other words, a permanent movement of the chin toward the median line. But a surprising dental and facial correction will always ensue by moving the front teeth of one denture to the right, and the

other to the left toward their normal occluding relations, thus harmonizing the dento-facial appearance. If, in these cases, the lower denture is protruded, as commonly obtains, a first lower bicuspid may be extracted on the protruded side,

bow was made to pass thru open tube attachments on all the front teeth to correct and hold them in alignment. The bow was fixedly attached to the right lower cuspid, tho its distal end, on that side, passed thru a single molar an-

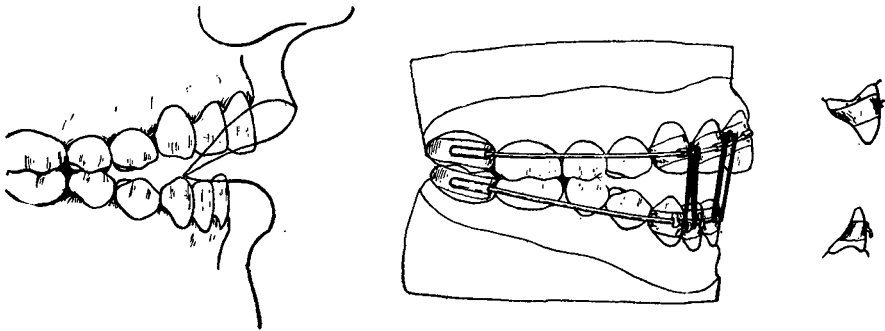


Figure 9.

and the forces applied so as to carry all the lower front teeth and opposite bicuspid over to that side mesio-distally and lingually to close the space.

This is accomplished in my practice as shown in Figure 11. It shows the plaster casts in an articulator in the

chorage tube for alignment security. Its motive force was from a three-band stationary anchorage on the left side. The directions of this force upon the lower front teeth were toward the left, lingually and extrusively. In addition to this, and the regular disto-mesial elastic on

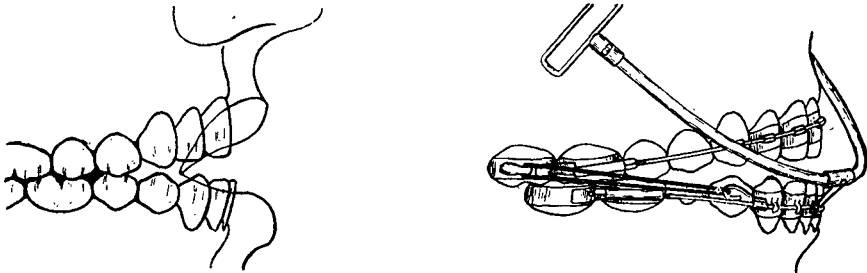


Figure 10.

original occlusal position of the case illustrated under Figure 7, with a duplicate of the lower apparatus which the patient wore to correct the open-bite malocclusion, and move all the lower front teeth to the left and retrude them, and move the upper front teeth to the right. After extracting the lower left first bicuspid in this case, a No. 22 arch

the left side, intermaxillary elastics were attached to hooks upon the lingual surface of the right lower cuspid, to extend to attachments on the left upper cuspid. This force is distributed thru the medium of the arch bows to the entire front portion of both dentures, tending to pull the lower to the left and the upper to the right. This may be further

supplemented with short elastics, as shown, from hooks on the lingual surfaces of the upper right bicuspid and molars, to attachments on the buccal surfaces of the teeth below. The latter resort is the common method in my practice for the lateral shifting of buccal occlusion. It would seem as if this apparent complicated arrangement of elastics would be a very difficult one for the frequent necessary readjustments at meal times; but patients—especially the young ones—soon learn to remove and readjust the elastics far more quickly and adroitly than a skilled operator.

clusal plaster casts of four cases of pronounced character of open-bite malocclusion, all caused by early mouth-breathing, and which was presented to show the straightened and prognathic form of the mandible. The cases illustrated by the two upper facial casts were published years ago to show principally the quite remarkable effect of a bodily labial movement of the upper front teeth. I now wish to call your attention to the results obtained in the two cases below, particularly because of the ages of these patients and the short time expended in the operations.

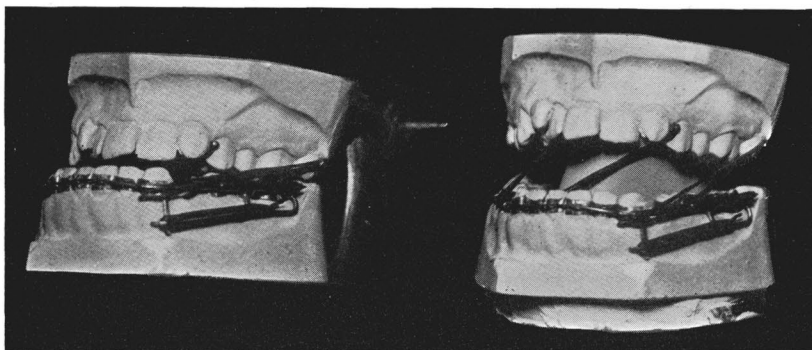


Figure 11.

To produce a bodily distal movement of the left lower cuspid, rootwise labial and lingual bars were soldered to the cuspid band with hook attachments for elastics to extend to rootwise attachments on the anchorage. To further insure and sustain a bodily movement of the cuspid, a small tube was firmly soldered to the cuspid band which telescoped into the anchorage tube with an easy sliding movement. The arch bow passed thru these tubes to engage with a distal nut, as shown. This is one of the common methods in my practice, either with elastic or screw force, for closing spaces after the extraction of buccal teeth, by a bodily disto-mesial movement of the adjoining teeth.

Please turn again to Figure 7 which illustrates the beginning facial and oc-

Figure 12 is that of a young man twenty-one years of age for whom the operation for correction was commenced May, 1910, and ended, as shown, May, 1911. The mandible in this case was bent to the right carrying its left body and buccal teeth far forward of their normal position, which in connection with the retruded upper, placed the lower left buccal teeth, in a closure of the jaws, fully the width of two bicuspid in mesial malrelation to the uppers; while on the right side the disto-mesial malrelation was hardly the width of a single bicuspid. The early loss of the first lower molar on the right side, however, had permitted the second and third molar to drift forward and thus diminish to that extent the original occlusal malrelations of these teeth. On

the upper left side, the loss of the crown of the first molar allowed the third molar to close into this space, and thus decrease to that extent the original open-bite.

labial teeth, more upon the left side than on the right, and with the usual care, with special apparatus, to close the buccal spaces by a bodily disto-medial movement. Nothing is so conducive

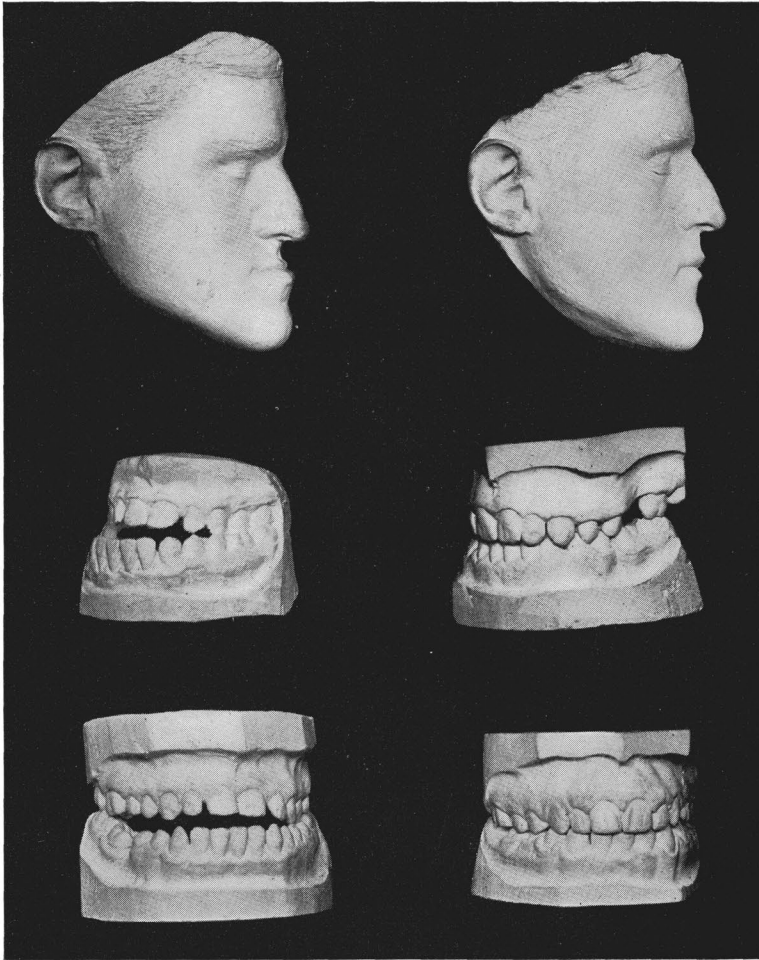


Figure 12.

The treatment consisted first in the extraction of the first left lower molar, the latter being chosen in this case because it contained a large amalgam filling and probably a devitalized pulp. This was followed with a bodily retruding movement of the lower bicuspid and

to irritation as inverted V shaped spaces between buccal teeth following the extraction of molars or bicuspid, or in attempts at extensive regulation with single molar anchorages permitting inclination movement, and destruction of perfect masticating occlusion. This

movement of the lower, in connection with the upper bodily labial movement, and the artificial closure of upper first molar space, resulted in quite a perfect masticating occlusion, and a remarkable

uate course at the University of Chicago, and has now entered the law department of that school. He is six feet tall, of robust figure and apparent rugged health. This perfect mental and physi-

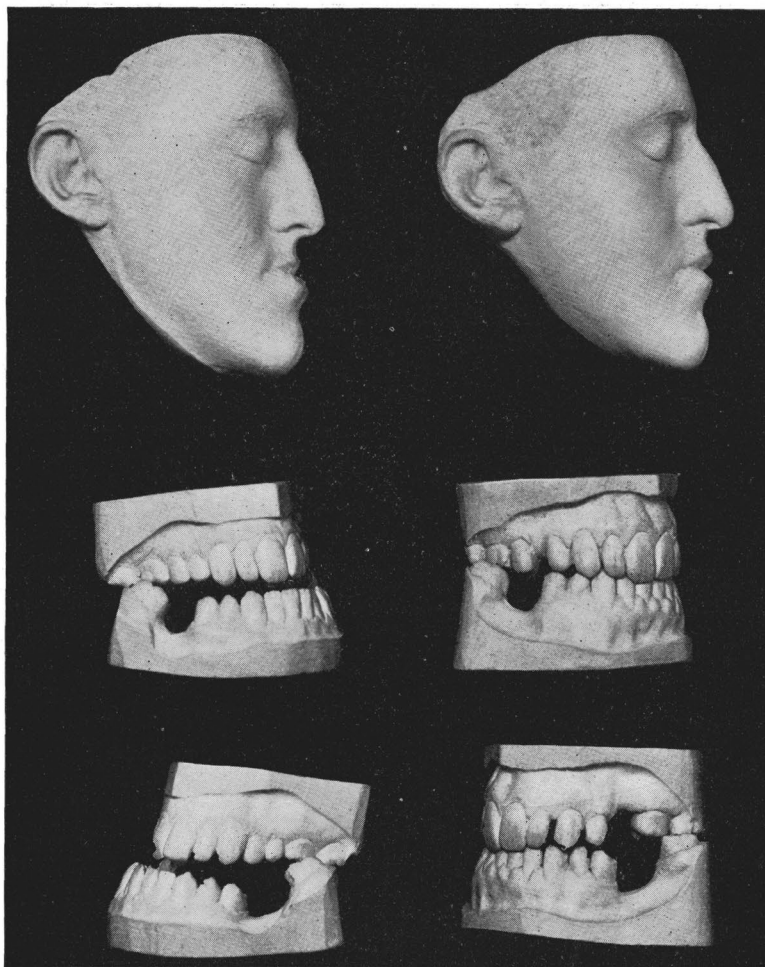


Figure 13.

improvement in the physiognomy, which the final plaster cast inadequately portrays.

In Figure 13 is shown the plaster casts of a man 24 years of age, a graduate of the University of Michigan, who has recently finished a special post-grad-

cal condition is mentioned because it is remarkable in view of the fact that early untreated adenoids and long continued mouth-breathing, inhibited the development of the maxilla and caused a malformation of the mandible and an open-bite malocclusion, which permitted a

very imperfect masticating closure upon only the disto-occlusal borders of the second lower molars, so that during all his life from early childhood he has never been able to hardly approach the mastication of food.

The treatment in this case was commenced October 4th, 1916—about one year ago. At the present time I regard the correction as about two-thirds completed. The principal treatment has consisted in a bodily labial movement of the upper front teeth, and a retruding and extruding movement of the lower labial teeth and bicuspid.

The difficulties on the lower were increased by the loss of the first permanent molars which were extracted at about twelve years of age, which permitted the second molars to tip forward to a decided mesial inclination. The treatment here consisted in shifting the back teeth to proper occlusal relations, and then by grinding their occluding surfaces to partially close the open-bite. The occluding position of the original dentures shown on the left, were kindly placed by Dr. Hart J. Goslee in exact duplication of the beginning labial bite model.

The entire distal, lingual, and extrusive movement on the lower was accomplished with the intermaxillary and occipital forces. Ultimately there will be a perfect interdigitating occlusion of the bicuspid, and the first molar spaces being supplied with artificial teeth will enable him for the first time in his life to perfectly masticate his food.

About two weeks ago all the apparatus was removed and the impressions taken for the dental and facial casts, shown on the right. He is now wearing a six-band retainer on the lower front teeth which carries the intermaxillary hooks for retaining elastics to the upper, as is usual in such cases. The first lower molar spaces carry bridge retainers. The upper is supplied with the usual working retainer, the technic construction of which was fully described in a

paper read before the American Society of Orthodontists, and will be published with the proceedings of that meeting in the Dental Items of Interest and in the International Journal of Orthodontia.

If the successful results shown in these two cases and the many which I have been publishing, for the past twenty-five years, can be accomplished by me, there is no reason why every orthodontist, with a reasonable amount of ingenuity and skill should not accomplish the same results; as they certainly will when they cease their attempts with inadequate visionary commercial appliances, and adopt true principles of mechanics applied to bodily and other movements of the teeth. To me, their efforts seem more like beating around the bush in a frantic effort to avoid certain principles of practice, either because I have introduced them, or because Dr. Angle has not in some form presented them.

DISCUSSION.

Frederick C. Kemple, New York City.

Mr. Chairman and Gentlemen:

It has been a pleasure for me to listen to this very interesting paper, and it is a pleasure to have this opportunity to publicly congratulate the essayist on some of the excellent results he has obtained in his treatment of these extreme conditions of malocclusion, particularly in those cases in which the patients had reached adult life. Usually the orthodontist, who has had some experience, undertakes the treatment of such cases with a feeling of considerable uncertainty as to the results. I refer to such classes of malocclusion as No. 13 shown on the screen. The patient, male, twenty-four years of age, six feet tall, massive boned and in rugged normal health, so far as the essayist was able to discern. Except for the malocclusion—or rather the lack of occlusion—of his teeth, the essayist described him as a splendid specimen of physical manhood.

And yet this man for many years had been unable to masticate any food; only the cusps of four molars could be brought into occlusal contact, and, in his effort to masticate, he could do little more than puncture his food in spots. But the essayist tells us, in spite of this *almost complete lack of occlusion*, the patient had never experienced any apparent symptoms of indigestion or mal-assimilation.

This case, and it is not an isolated one by any means, tells a profound story if we will only harken to it. It illustrates well the fact that the health of the individual is not *always* immediately and certainly jeopardized by malocclusion of the teeth, even in some cases where the malocclusion is rather extreme. If he will harken to it, it ought to warn the orthodontist not to allow himself to become an alarmist when advising parents of the urgent necessity for correcting all forms of malocclusion. The parents of our little patients are usually very practical common-sense people and they frequently want to know "what is going to happen if the teeth are not straightened," "how is it going to affect the child's health?" In what way, because of having had his teeth straightened, is the child going to be better, either physically or mentally, than the parents whose teeth are not perfectly straight? These are points on which the parents often ask for information, and it is up to the orthodontist to answer such questions intelligently and reasonably without allowing his views to be too much warped by his specialty.

In directing attention to this thought, I do not minimize in the slightest the importance of mastication in its relation to health, nor do I mean to lower in the least degree the ideals of orthodontia, but if the specialist, in any branch of the healing art, will serve the public best, it is essential that he retain for himself a fair perspective, and not allow his specialty to rob him of his sense of proportion and relative values.

In the treatment of open-bite malocclusion for adult patients I have had little experience and can offer little in the way of discussion of the part of the paper that deals with these cases. I wish to say, also, that I am entirely grateful for my lack of experience in the treatment of this particular type of cases. For young patients, children about the age of eight or nine years, with similar forms of malocclusion—i. e., open-bite in the incisor region—I have found several that yielded to very simple treatment, such as the gentle pressure produced by allowing the upper arch wire to rest lightly against the upper incisors, this slight pressure has seemed to produce sufficient stimulation of the tissues to cause further eruption, resulting in a satisfactory occlusion of all the teeth, including a normal incisal over-bite. The original positions of the teeth in these cases suggest the possibility that tongue biting may have been the prominent factor in producing the open-bite, altho I have no history confirming this suggestion.

In those cases in which this simple treatment has not been successful, I have used the up-and-down pull of light rubber elastic bands hooked vertically from the upper to the lower arch wires; the arch wires, having been adjusted to rest when passive at about the incisal third of the crown, are gently sprung toward the gingival margin and are either carefully ligated to the incisors, or are allowed to rest on little spurs on the labial surfaces of bands which have been previously cemented to these teeth.

I shall be pleased to learn more about the so-called "midget appliance," which the essayist has used on some of the cases shown here with such evident satisfactory results. Some of the specimen parts of this appliance which I have had an opportunity to examine are most delicate in structure, and, judiciously applied, I can see wherein, in many cases, it might be used to decided advantage.

One feature of this appliance which to me appears to be of particular value is that its attachment to the individual teeth need not be a stationary or rigid attachment, that it can be used in a manner that easily permits each tooth to have its individual mobility, while at the same time exerting a very gentle pressure, continuous over a considerable period of time. I have never been able to see any advantage in any regulating appliance that is designated to include several teeth in its rigid grasp, without allowing more or less individual tooth mobility. And, notwithstanding the fact that many orthodontists obtain excellent results with such appliances, I believe the appliance itself possesses a very distinct disadvantage in the treatment of the large majority of cases of malocclusion. The fact that some operators obtain excellent results with these appliances is entirely offset by the fact, that equally excellent results are obtained by other operators with very simple appliances which have practically no rigid attachments, and which allow the teeth individual freedom. While different forms of appliances vary greatly in their degree of efficiency for the work intended, it is in every instance the intelligence and skill of the operator that that is the prime factor in producing successful results, in the treatment of malocclusion, and not the particular form of appliance used. Failures are sure to result from the incompetent application of the most efficient appliance, while often excellent results are obtained by the intelligent use of inferior methods.

The essayist has spoken of mouth breathing and adenoids as being the primary cause of some particular forms of malocclusion. I do not believe we know very much about the *primary cause* of these different types of malocclusion. The theory, that the cause of most of these forms of malocclusion, is simply an effort on the part of the organism to adapt itself to decreased function

or disuse, seems to me to be the most reasonable. In the development of the organism it takes generations to bring about certain anatomic changes, but these changes eventually come with change of function just the same. There is an insistent and persistent variability in structure which accompanies all variations in function. When an organ is not used it falls into degeneration. In the present state of civilization our masticating apparatus is not used in a manner to keep it developed to a high state of efficiency, and in nineteen out of twenty cases the malocclusion is, in my opinion, due to our present civilization, and is the result of lack of use. And this is not a condition that can be overcome by education. You cannot teach the public to masticate, no matter how hard you may try. If necessity should compel them to use coarse, hard food for a few generations, the result might be different.

I have known some children who were mouth breathers during sleep from the time they were two years of age until they were twelve, and yet had well developed dental arches and beautiful occlusion of the teeth, as nearly normal as one ordinarily finds. If children can breath thru the mouth for ten or twelve years, during the period when the bones and other tissues are most plastic, and yet develop a normal occlusion, it is pretty strong evidence that mouth breathing is not the primary cause of the malocclusion in these cases.

The essayist also spoke of the position of the mandible being influenced by the mother having the baby on one side most of the time, if the baby is placed on the left side, that would press the mandible toward the right side. Now if a child is placed on his left side and he is not comfortable, he will soon be found on his right side. As soon as a baby is old enough to move, he does not remain on one side, but gets into a position where he is most com-

fortable, and I do not believe that any change in form which takes place before he is old enough to move himself is going to be permanent, if the child is ordinarily healthy.

I would also like to ask Dr. Case about those cases of supra-occlusion of both the upper and lower arch where the lips expose not only the entire teeth but a considerable part of the gum; he spoke of these cases as supra-occlusion. In very many of these cases we find both the upper and lower teeth in almost normal occlusion. I have questioned whether in these cases, this condition may not be just an individual characteristic or variation, a little over-development of the alveolar process and perhaps a short lip as well. For the ramus must also be over-developed in these cases in order to permit the teeth to occlude properly. In such conditions, I do not think there is anything we can do to improve it. The shape of the entire mandible cannot be changed in these cases.

I wish to thank the essayist for the pleasure of listening to his paper, and for the privilege of discussing it.

R. Ottolengui, New York City.

I am somewhat in the position of a Southern gentleman who kept a flock of very fancy poultry, and in spite of the greatest care he kept missing one quite frequently. He asked his Negro servant what he should do about it, and the Negro, desiring to disprove any relation to the disappearance of the chickens, said: "The best thing to do is to set a trap and may be you can catch the thief." The trap was set and the next day that same Negro was found in the trap. I feel very much like that negro. Knowing very little about this subject, I asked Dr. Case to write this paper. Now, however, I feel that I know a great deal about it and when I get a case of this kind hereafter, I will know just what to do. I will have cards printed with Dr. Case's name and address and I will give

these to such patients, and send them to Dr. Case.

I have been interested in what Dr. Case said of the etiology as well as in his method of treatment in these cases.

There is another point I would make in reference to Dr. Case's "bimaxillary protrusion" cases. Whenever Dr. Case shows a picture of bimaxillary protrusion, the patient invariably has a receding chin; that makes the protrusion more apparent than tho the subject had a long chin. In the earlier days we heard so much about the restoration to normal that I wondered what is normal. One day I asked an artist this question: "What is beauty? Is a woman beautiful because you think her beautiful or is she beautiful because I think her beautiful, or is she beautiful regardless of what you or I think of her?" He replied: "There is no standard of beauty; we cannot take lines and make measurements according to alleged symmetry and draw a beautiful face. The woman you think beautiful is beautiful to you, and the woman I think beautiful is beautiful to me and the most beautiful woman is the one who is beautiful to the greatest number of people." I have a work on the races of the world and it is illustrated with pictures of the beautiful women of the world of every type, photographs of actual faces, not artists' pen drawings, and in these "typically beautiful" faces one can find every type of deformity. There are many with bimaxillary protrusion, yet these are attractive to their tribesman. May there not be something of atavism in these cases?

F. M. Casto, Cleveland, Ohio.

I wish to compliment Dr. Case most heartily for the very excellent work that he has done in these cases and for the most satisfactory result that he has obtained. I wish also to thank him for coming here and giving us so freely of his time, knowledge and experience.

He has presented many indisputable facts, and it is most opportune that they should be recorded at this time. He has presented cases which are unquestionably the most difficult with which the orthodontist has to deal and which present some of the most complex problems to be overcome in treatment. The age at which many of these cases have been taken also materially complicates the diagnosis and treatment.

The cases of open-bite malocclusion present many phases which have to be taken into consideration in arriving at a proper and correct diagnosis of the same, some of which are: (1) Those in which the mesio-distal relation is normal; (2) Those in which the mesio-distal relation is abnormal; (3) Those in which the occlusal plane of the lower arch is out of relation and harmony dento-facially; (4) Those in which the occlusal plane of the upper arch is out of relation and harmony dento-facially. (5) Those in which the occlusal plane of both the upper and lower arch is out of relation and harmony dento-facially; (6) Those in which the alignment of the teeth is regular; (7) Those in which the alignment of the teeth is irregular; (8) Those in which the angle of the mandible is wrong; (9) Those cases due to habits, as thumb, finger, and tongue sucking (tongue sucking being most difficult to correct); (10) Those cases which may have been produced by faulty treatment by the orthodontist.

In the case of tongue-sucking, especially when it is of long duration, it is almost impossible to correct the habit and to maintain a normal occlusion, and a normal occlusion cannot be maintained unless the habit can be cured. The following are some of the factors in treatment. 1. Restorations of function is the greatest and most important determining factor in the ultimate success in these cases. 2. One must establish normal occlusion as nearly as is possible and maintain the same, in order that the

necessary stimulus may be furnished for the development of the bone, which is to hold the teeth in their new positions. 3. The use of the teeth and functions of the mouth must be interfered with as little as possible during the treatment. 4. The anchorage must be carefully considered before the treatment is begun and during the same; it presents an entirely different problem than does the anchorage in the average case of malocclusion. 5. The permanent intrusion and extrusion of the teeth is a most difficult proposition, and it is a matter upon which there has been much discussion, in fact some men claim that there is never a permanent intrusion or extrusion of the teeth. I think, however, that this depends largely upon the viewpoint of the individual. There is no question but that the line of occlusion is changed in its relation to the alveolar process or better perhaps, the jaw bone. When the lower incisors have been intruded and the molars and bicuspsids extruded, thereby establishing the correct occlusal plane. If measurements were made before and immediately after the operation, from the mesial edge of the incisors and the lower border of the jaws and at the occlusal edge of the bicuspsids and molars and the lower border of the jaws, it would be found that the distance between these points would have been changed considerably; namely, the distance after treatment would be greater in the cuspid and molar region and less in the incisor region. This of course would be due to the extrusion of the bicuspsids and molars and the depression or intrusion of the incisors. Now, if the same measurements were taken, say five years after treatment, the distance between the incisal edge of the incisor teeth and the lower border of the jaw would be found to have increased and probably would about correspond to the original measurement in this area. This fact might lead the casual observer to believe that the incisor teeth had be-

come extruded and had assumed their original position; this, however, is not the case. The lengthening is due to the natural development of the bone in the body of the mandible and is a condition much to be desired.

The methods used by Dr. Case have proved most efficient in his hands and are deserving of serious consideration by the orthodontist. I try never to fuss about method when satisfactory results have been obtained. Men ever will so long as orthodontia is practiced, use divers methods for obtaining the same results, so also is this true in all phases of dental practice.

I wish again to thank Dr. Case for presenting this most excellent paper and discussion of open-bite malocclusions. I consider his efforts a most valuable contribution to our literature.

Hart T. Goslee, Chicago.

I have no desire to take up your time at this late hour, but I would be very remiss if I did not take occasion to say to the members of this Section that I have seen all these cases. I do not say this to imply in any way that Dr. Case's word is not sufficient, but I have been very closely associated with Dr. Case in much of his work, and wish to add my testimony as to his success in treating these difficult cases of malocclusion. I have been watching his work for twenty years and the results that he has produced in one year in some of these cases are wonderful, indeed they are nothing less than marvelous. And particularly is this true of the case of the young man to which he has referred so extensively, and which case I have observed closely since the beginning.

Dr. Case: I am going to keep you here only long enough to make a very few remarks. I think, I mentioned in my paper that in one form of open-bite malocclusion, the front teeth were prevented by some local causes—such as

thumb, tongue, and lip sucking, etc.—from growing to their normal height. In other words, they were left in an infra-occlusal position. But this is most certainly not the only cause.

That it is mainly caused by adenoids and early mouth-breathing accords perfectly with the conditions we find. If any continued form of mechanical force could be directed upon an undeveloped mandible of childhood in the same direction, magnitude, and duration, that is exerted by the muscles in mouth-breathing, it would be very reasonable to expect exactly the conditions we find in open-bite malocclusions. In other words, the mandible would be straightened, or in a more obtuse angle than normal where the rami joins the body, thus causing the back teeth to strike first. There are a number of other reasons to substantiate this claim, as mentioned in my paper.

The fact that a very large proportion of mouth-breathers do not have open-bite malocclusions, is no proof or even common evidence against the theory, as Dr. Kemple seems to think. Because the mass of people are constantly escaping the results of causes that have proven fatal to the few, is it proof that these causes are never operative in that way?

Again, in the case of a mandible having been bent far to one side of its normal position with the production of an open-bite and decided lateral malocclusion, the same forces if exerted upon the mandible of a baby, that is exerted by the muscles and ligaments upon the ramus and condyle upon one side when the jaw is held during a lengthy period toward the opposite side, might very reasonably result in exactly the character of malocclusion we find, which is most evidently due to a unilateral straightening of the mandible.

As to our intuitive impressions of facial beauty in its relations to what constitutes perfections of harmony in facial

outlines, I am pleased to say that Dr. Ottolengui has expressed that which I have been trying to teach for many years. While it is true that the outlines and contours of many faces which are commonly regarded as beautiful, if analyzed on the mechanical basis of our conception of facial harmony, would be found very faulty, it nevertheless does not lessen the frequent unpleasant impressions which are produced by certain dento-facial malocclusions, nor our appreciation of correction along the lines of facial harmony. It is, however, a fact that facial beauty is largely a matter of association and intuitive education. The Hottentot with her protruding lips and

deforming adornments, who is considered a perfect beauty by her own people, would produce a far different impression upon us. As an illustration of this, mothers have told me they did not care to have certain very apparent imperfections in their little one's faces changed. They came because their physician or dentist had told them the teeth did not occlude perfectly for healthful mastication, etc. The mother's love made even imperfections of the loved ones faces dear to them.

Our conception of beauty depends so largely upon many other things outside of artistic harmony, the old saying that beauty is only skin deep is trite but true.
