The Fourth Dimension in Orthodontia *

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Since the turn of the century, when Bogue advocated the expansion of the primary dental arch if developmental spaces did not appear, there have been differences of opinion on when a malocclusion should be treated. Not so long ago the opposite extreme was reached when treatment was deferred until all second teeth were in place. Of recent date we are witnessing a tendency toward beginning treatment in the mixed dentition.

Such profound reversals of opinion seem .to be common to all clinical sciences and may properly be viewed as "growing pains." The reasons behind them are frequently hard to discern. In the present case they seem to lie partly in our method of study and partly in our manner of viewing the results of our studies.

Our methods as a science have thus far been largely those of analysis. We have taken things apart and studied them individually. About each we have sought to establish broad generalizations which would facilitate communication. It is difficult to imagine how we could have progressed without first doing this because raw data is the material upon which all scientific studies must ultimately rest. And we have handled this raw data by approved methods. We have established means and probability curves and have controlled them by standard deviations and other statistical devices.

But generalizations of this sort have a danger, all too often not perceived, viz: that their too literal acceptance may blind us to their limitations. A probability curve is an excellent tool in the hands of the life insurance actuary, it is something quite different in the hands of the diagnostician facing an individual patient. An example or two will serve as an illustration.

We have studied tooth eruption against birthdays and have established a series of average values for each year of life. These values we tend to think of as normal, although we know that there is a large range of variation around each of them We have done the same thing in our measurement of jaw growth in the face of similarly large variations. Thus far we have proceeded safely; but unfortunately assumptions enter the picture here. Because there is a nice harmony between the *averages* of these two phenomena in each interval, we have assumed that they are, or should be, harmoniously integrated in the individual. A study of the two phenomena in the same individuals quickly reveals that there is not always this nice integration at every instant of time. They are frequently out of step to a marked degree.

To say this in a different way: tooth eruption is a variable. Newborn infants begin at about the same stage or level of dental development, but they begin to show marked differences in the order and time of eruption almost immediately. Through the early years of life, i.e., up until the close of the mixed dentition period, they continue to diverge so that there may be a difference of 6 years in the eruption of the second molars.

Jaw growth is similarly variable. Some individuals attain almost complete jaw growth by 14 or 15 years,

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while others spread their growth over 20 or even 21 years. If slow growth and slow eruption are linked in the same individual or if precocious eruption is accompanied by early growth attainment, all goes well, but if the two processes are not thus related there is the disharmony which we term malocclusion.

The fundamental differences between teeth and bones are too frequently overlooked. Bones attain their adult size by a process of slow enlargement. Teeth, on the other hand, realize their full size in a matter of months. Bones are subject to modifying factors, teeth are immutable once they are laid down. Hence when they erupt they can come into correct functional positions only if jaw growth has been sufficient to receive them by that time. The linkage of these and other variables in *time* plays an important role in the etiology of malocclusion; a role that is only recently coming to be appreciated.

In addition to teeth and jaws, however, it is imperative that thought be given to periodontal membrane, to alveolar bone as distinct from skeletal bone and to muscles. About each of these certain generalizations can be made.

About each of them it can be said that it exhibits, in the fully grown stage, certain characteristics of size, form, composition and physiologic response that make identification possible. Further than this, we know that each has gone through a process of growth which witnessed increase in its size and perhaps modification in its form. But here generalization must stop and scrutiny must be directed to particulars, because, upon examining any one of them in numbers, it is found that they are not all alike. Variation is the invariable rule, not the exception. And it is the integration of these variables with each in many cases that is the factor which determines whether a case will develop a good occlusion or a malocclusion. It would seem time for us to begin to integrate some of the things we have learned about these various matters; to change from analysis to synthesis.

It has been said that although all faces are alike and can be identified as human, yet all differ, and the recent works of Downs, Wylie and the author, among others, have indicated the reasons why these differences exist. It has been shown quite conclusively that the complex of bones known as the face varies from individual to individual because each part shows a wide range of variation. The result of an apparently chance combination of parts gives us the final form of the face. It has further been shown that the proportions of these parts is laid down at a relatively early date and that once laid down they change very little throughout the developmental period. Not only do the parts within any given area have a tendency to remain stable but the relationship between parts, as between maxilla and mandible, are determined at an early age and henceforth do not tend to change. This type of stable interrelationship is exemplified best by the groupings of the Angle classification which do not change unless treated.

Promulgation of this concept apparently has given rise to an attitude of resignation on the part of certain orthodontists who have reasoned that if proportions are unchangeable there was little that one could do to influence the dentition toward a more normal configuration. This is true as far as it goes but it neglects certain important factors. The chief of these is growth and the nature of the growth followed by any given individual.

Of course bones differ in their form and their configuration. This is so self evident as to need no elaboration. Furthermore, the same bone differs in different individuals in the matter of the absolute size attained in growth. Thus we have some people with large maxillae, others with small maxillae. This ultimate size may be called the total potential of that particular bone. The next factor, however, is the rate at which it attains this potential. Some individuals attain the full potential growth at a relatively early age, indicating a rapid rate of growth. Others stretch the attainment of their potential over a long period of years. However, the two may ultimately attain the same size. In the case of the teeth we encounter similar variations. All of us know of the wide range in form that is encountered in the dentition. We are equally aware of the factor of absolute size of the teeth, some individuals having very small teeth and others having very large teeth. We know likewise that the teeth of different individuals are apt to erupt in varying orders and one can only state an approximation of a human order of dentition. It requires but a moment's reflection to realize that the orderly arrangement of the teeth in the arch would depend almost entirely on the manner in which these variables were grouped in any individual.

If what has just been said can be accepted as facts, and they are matters of our common observation and knowledge, the following question must inevitably present itself. If the teeth are immutable in their size and form once they are laid down long before their eruption, and if jaw growth is a steady and continuous process, why do not more malocclusions tend to become better with the attainment of greater size? Actually they do as I shall show later, but for the moment I can only point to those relatively minor derangements which occur during the growth period and are followed by complete recovery in the stages which Broadbent has so aptly termed the "ugly duckling." The reasons why so many malocclusions, particularly of the crowded type, do not improve once the teeth have erupted is due to another system which is a part of our field of operation. This is the musculature.

As will be shown later, the teeth once erupted are placed and held in an environment that is completely dominated by the muscular system. And in this system we must deal with the same large range of variation that we find in all other living systems. Investigations have shown that when a muscle is laid down it is endowed from the first with the same number of fibres that it will have when fully grown. The difference between the infant and the adult muscle lies wholly in the length and breadth of the individual fibre. This immediately poses questions about the growth process which transforms it from one to the other. The growth of muscle, like that of any other tissue or organ, is subject to the same laws of variation in total size attainment, rate of growth, and to a lesser extent in form.

However, muscle has a quality that is different from that possessed by any other tissue, viz, its apparent need to contract until it reaches a sufficient degree of resistance to stop its shortening. Hence, in the case of the dentition, if jaw growth has not attained the appropriate size for the accommodation of the teeth that have erupted, the muscle, being attached to the same bones conforms to the smaller size of the arch and tends to maintain the same degree of tension throughout its subsequent growth. Thus, we have a condition in which a temporary disharmony between tooth eruption and jaw growth is perpetuated by this adaptive attribute of the muscular system and the malocclusion tends to be maintained by it.

The muscle groups which constitute the environment of the teeth are those comprising the tongue on the inside and the buccinator muscles, principally, on the outside. These two muscle masses are vastly different in the time of their growth. The tongue must be ready for full function at the instant of birth since it plays such a vital part in the function of deglutition and is probably closer to its adult size at birth than most other parts of the head. It grows at a very slow rate but at birth it may be relatively very large. During the period of the deciduous dentition it has almost complete control over the alignment of these teeth and the lack of crowding in the deciduous dentition bears mute testimony to this fact. The lips and cheeks being more concerned with the teeth, alveolar process and the mimetic musculature around the lips are of slower growth and attain their full development only with adulthood. As, however, the growth of the jaws continues the lips and cheeks come to play a more important role and the tongue becomes more or less passive. Muscular control, therefore, changes from the lingual to the labial and buccal aspects with growth.

Before turning to a consideration of specific examples of certain of the things that have been discussed, another matter should be pointed out. All investigations conducted thus far on such matters as the time and eruption order of the teeth and the growth and development of the jaws have indicated that the greatest range of variation occurs during the very time when the ordthodontist is attempting to manage malocclusions. To put this another way, babies bear more resemblance to each other in size attained at birth, and adults bear more resemblance to each other at the time when growth is fully attained, than do children who are going through the process of growth. If one plots the growth of different parts according to the factors that have been enumerated thus far, he quickly finds that his curves all fall close to a common level at the beginning and tend to approach each other as they near the cessation of growth. Between these two points, however, the range between the greatest and the least is extremely wide.

When we now consider that we are not dealing with an integrated interaction between variables but rather with one in which they are not strictly integrated in time, it becomes a mystery as to why there is not more, temporary malocclusion at least, than we see in the population. The best manner of making

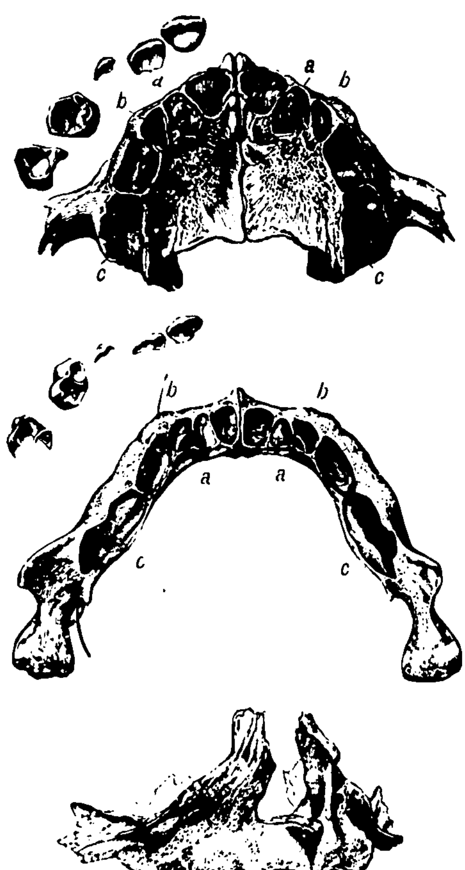

Fig. 1. The jaws at birth, showing the lack of alveolar process and the partitioned open troughs carrying the primary tooth buds.

all of the foregoing clear would be to describe the average normal unfolding or development of the human dentition and to indicate while doing so the nature of the factors responsible for certain frequently observed considtions. A start may be made with birth.

(Fig. 1) At birth the jaws are completely devoid of their tooth bearing portions, the alveolar process. The tooth buds of the primary dentition lie in open troughs which are in the main or skeletal parts of the jaws, each bud separated from its neighbors by thin bony partitions. At the posterior end of each arch the x-ray reveals a cyst like space; (Fig. 2) that in the mandible lying between the inner and outer angle and that in the maxilla lying high above the level of the primary tooth germs, just anterior to the sphenopalatine fossa. These are the crypts of the first permanent molars. At this stage then there is no alveolar process and no teeth are in the mouth.

The tongue, as has been mentioned previously, is well grown and fully active. It occupies the entire mouth cavity and has contact with the cheeks

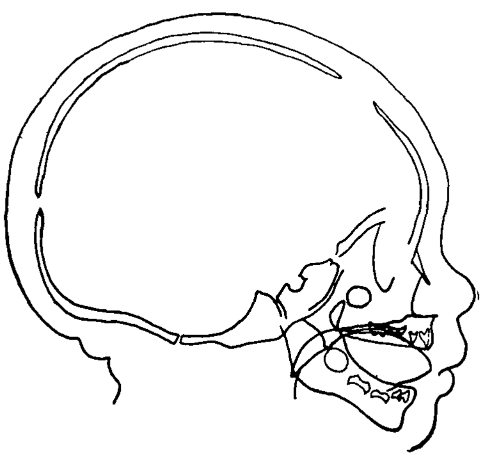

Fig. 2. Tracing of a lateral cephalometric x-ray of a newborn, showing location of first permanent molar crypts, the lack of alveolar process and the tongue occupying the entire oral cavity.

and the lips throughout its entire oral extent. Its mere backward and forward movement makes of it an elastic plunger in a muscular tube and it is fully ready to function at birth. The lips and cheeks, or at least the muscles contained in those structures, have been working since before birth and are at a relatively high level of functional development.

(Fig. 3) Between birth and the third month of life the alveolar process begins to develop by growth at the margins of the troughs previously referred to and during this period the alveolar height

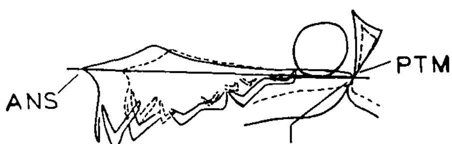

Fig. 3. Depicting the marked increase of alveolar height from birth to the third month of life, prior to any tooth eruption.

is doubled. This is prior to any eruption of the teeth. Thus, the tongue on the inside and the cheeks on the outside are first separated by the projection of the alveolar processes between them. To further increase this height the teeth now begin to erupt, beginning at the midline and progressing backward. These likewise separate the cheeks, lips and tongue and it should be easy to see how the interaction of the forces of these two antagonistic muscle masses would dictate the size and form of the arches as well as the axial inclination of the teeth.

X-rays taken at birth, such as the one shown, indicate that the jaws are developed to a stage sufficient to permit the accommodation of the entire primary set of teeth, even were these to erupt simultaneously. This arch will remain as it is until approximately six years of life and hence it is understandable why the statement is so often made that malocclusion is absent in the deciduous dentition. Actually, a potential malocclusion may be present in the form of malrelation of the jaws and the statement that would better describe the immunity of this age would be, that there was an absence of crowding in the deciduous arches.

But even at this early age the non-integration of certain factors can foretell subsequent malocclusion. One such condition lies in the relative degree of development of the tongue on the one hand and of the maxillary and mandibular bones on the other. In not a few cases the tongue of the newborn is too large to be accommodated within the arches and the infant, to avoid choking, must carry it forward. In some cases it cannot even be accommodated within the lips. The teeth, however, erupting on time, are forced to assume positions that reflect the cushion that the tongue represents and we are apt to see narrow arches and a protrusion of the tongue, sometimes completely outside of the lips.

Fig. 4 shows an extreme example of this type of case. It required a period of 14 years for jaw growth to overtake the tongue and enclose it. The ultimate result is a well nigh perfect occlusion with all third molars in place by the fourteenth year. Orthodontic treatment could not have improved it.

Before going further into a consideration of muscular factors it seems desirable to pause to consider the growth of the alveolar process. The crowns of the teeth, both deciduous and permanent, are formed within the bodies of both mandible and maxilla. Longitudinal records of growing children have shown that the teeth tend to remain at a stationary level until coronal growth is completed and approximately a third of the root is formed. They then start their movement occlusalward and they progress at a more rapid rate than they increase the length of their roots. Their eruption is at a higher rate than is the growth of the margins of the alveolar process, which they overtake and pass. The alveolar process gradually builds up and embraces the teeth at the cervical region as they come into occlusion.

Orthodontists know from experience how extremely easy it is to modify alveolar bone. It should therefore be readily understandable how the equilibrium between tongue and cheek could affect alveolar process and tooth position while this process was in its formative stage. These statements apply, of course, to those cases in which the anteroposterior relationships of the jaws are normal or Class I.

In those cases in which there is departure from this normal relationship, that is, in Class II and Class III jaw relationships, there is an inevitable alteration of the muscle forces. The line of attachment of the buccinator muscle which completely encircles the denture, is approximately at the same level as the intangible boundary between skeletal or base bone and alveolar process. It is thus easy to see how a marked deviation of normal mesiodistal relation of the jaw would affect the action of the musculature. In addition to this, there is variation between individuals in the position in which the tongue is carried, some carrying it high in the vault and others deep within the confines of the mandible. These two types are seen in those cases where the upper arch is entirely too large for the lower and the lower telescopes up within it on closure. This can be further accentuated by a Class II relationship. The infant, in addition to his morphologic handicap is very apt to form undesirable habits of tongue position, lip position and swallowing, in an effort to adapt to its handicap. The Class III type on the other hand is very apt to

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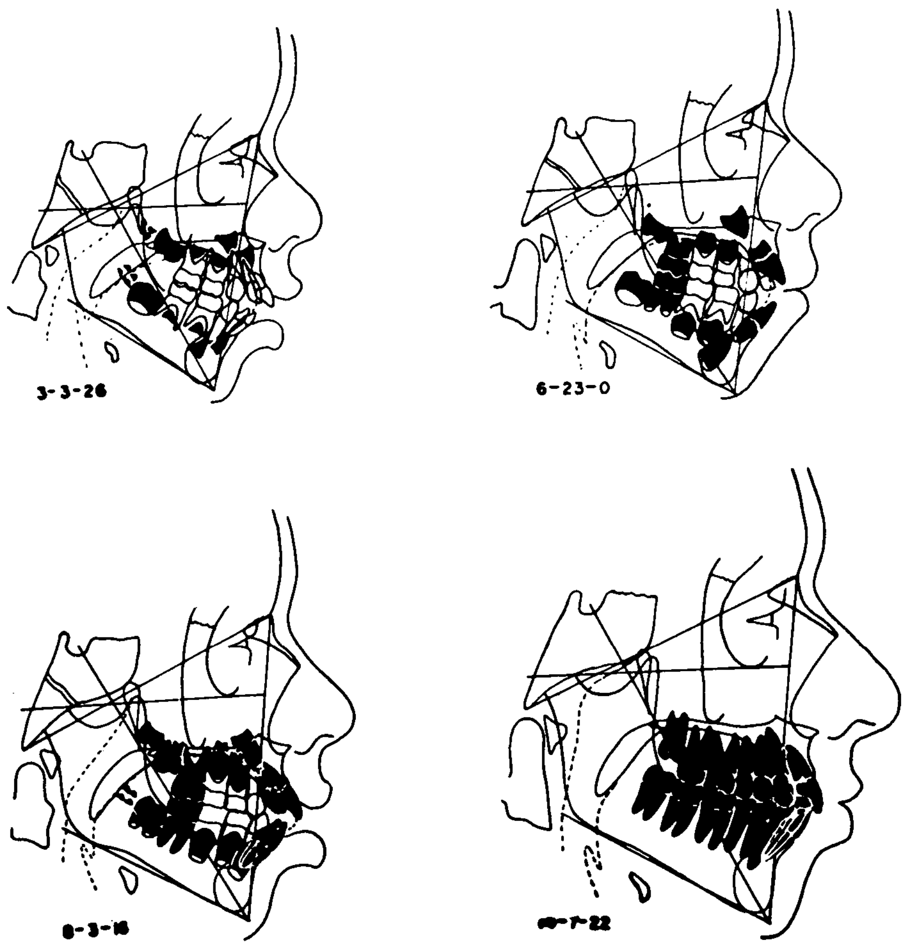

CASE A.S

Fig. 4. Lack of integration between tongue size and jaw growth is shown in these tracings at three, six and eight years; by fourteen and one-half years jaw growth had been sufficient to enclose the tongue and thus reduce the malocclusion.

carry the tongue low and here we have the characteristic flaring out of the mandibular border, the crushing in of the alveolar process and teeth and an almost complete lack of tongue support anywhere within the arch. This leads to the characteristic Class III type of jaw structure at a rather early age.

In spite of the fact that there has been considerable written about the process of eruption, there has been remarkably little work of a quantitative nature done on it. The statement has been made repeatedly that at the time of or prior to the eruption of the permanent teeth there is a destruction of the alveolar process that held their predecessors and that the eruption of the permanent set is accompanied by a complete rebuilding of the alveolar process. The amount of destruction and of rebuilding, however, has not been measured until recently. In a thesis just completed at the University of Illinois it has been shown that beginning as much as a year before the eruption of the permanent central incisors and before the deciduous teeth are lost the crest of the alveolar process is attacked and may be cut off in the form of sequestra. (Fig. 5) This loss can amount to as much as 7 mm. When now the permanent teeth erupt they must completely rebuild the crest of the alveolar

Fig. 5. Loss of alveolar crest and formation of sequestra prior to shedding of deciduous incisors. Subsequent re-building of the crest does not necessarily restore the original alveolar height after eruption of permanent incisors.

process to this extent and of course beyond it if additional height is required. The same study has shown that this rebuilding requires a period of three or four years before the previous height of the alveolar process is regained. The increments added to the free margin of the alveolar process are apparently not as great as has been quite universally taught. And here again we are faced with variation.

The study referred to revealed that in some cases the permanent teeth upon eruption rose only one or two millimeters beyond the level of the former alveolar process, while in other cases eruption seemed to be associated with a rapid building of the alveolar process to the extent of 10 or 11 mm. The major point of growth for increased height was found to be in the incisal region and this would seem to explain another frequently observed condition in the deciduous dentition, namely, the extreme overbite. If the incisors erupt to what might be considered average or normal height but at the same time the eruption of the molars does not keep pace with them, the denture is left with a wide freeway space which, upon mouth closure, permits a marked overriding of the two incisal segments. We say the patient has a deep overbite. At the present time we are completely in the dark as to what causes this lagging in molar eruption in the deciduous dentition. But another piece of work recently completed indicates that if the jaws are kept from complete closure by the insertion of a simple bite plane there is invariably some eruption of the posterior teeth. This would seem to indicate the wisdom of intercepting this type of developing malocclusion at a rather early age.

The period of the replacement of the deciduous incisors and canines by those of the permanent set is probably the most critical stage through which the dentition goes. There are a number of reasons for this, aside from the marked differences in size of the teeth of the two dentitions. First of all, the deciduous dentition has been the form around which the lips and cheeks have been operating for a period of four or five years. They have become adapted to the size and form of the primary arch and all of their neuromuscular reac-

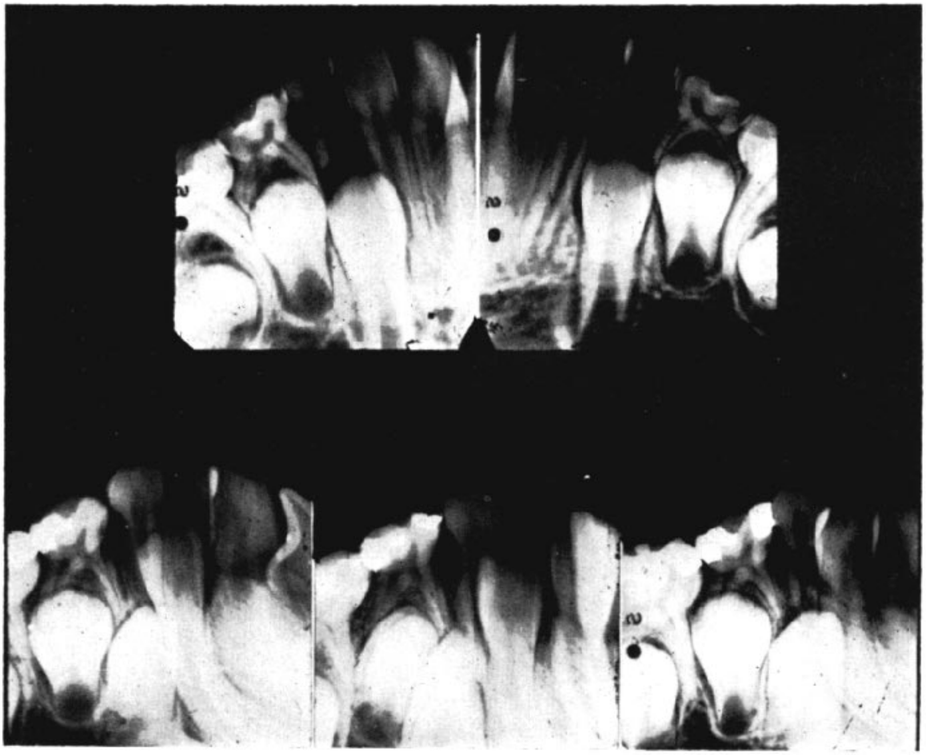

Fig. 6. Dental x-rays of separate cases illustrating interferences to incisor eruption produced by disharmony between jaw growth and eruption time.

tions are conditioned to it. It must be remembered that the lip and cheek musculature is attached to the very bones upon whose growth we are depending for the increase in size in the anterior region, and hence any slowness of this growth is apt to result in a muscular pattern that is actually too small for the age of the child and for the changes that are bound to occur with the eruption of the larger teeth. It must further be remembered that the teeth of the permanent set, like those of their deciduous predecessors, are formed deep in the bodies and not in the alveolar processes of the jaws. In order to erupt it is necessary for the old alveolar bone to be cleared away and for new bone to be built to embrace the roots of the permanent teeth as they erupt. For these reasons the absolute size of the anterior portions of the jaws is of extreme importance even before the teeth attempt eruption. If the jaws have grown at an average or better than average rate we may expect to see the tooth germs arrange themselves evenly in the bone, so that they have little or no difficulty in their eruption. If, however, the growth is slightly behind the eruption of the permanent teeth, we may find them attempting to come up into an arc that is too small to receive them. Probably more often than we realize, correction of such disharmony takes place coincident with the eruption of the teeth. Figure 6 indicates this phenomenon. These films are from three or four different cases and they show a variety of situations that may face one in the management of the dentition at this age. In the lower left hand film there is the distressing situation where the permanent lower lateral will remove both the deciduous lateral and canine, the type of condition once called ectopic eruption. In the upper pictures there has been a shearing of the mesial surfaces of the roots of the deciduous canines, but the laterals have come up and taken their place quite satisfactorily. In the other two pictures the mesial surfaces of the deciduous canines show absorption bays which indicate the position at which the crown of the lateral once lay. In all but the first case one can only infer that although the permanent laterals started in a very unfavorable position, they gradually cleared themselves of interference through growth of the jaws. One can explain the phenomenon in no other way. If, however, growth does not rescue them, the teeth will be crowded.

This period witnesses another chain of circumstances which leads to quite similar clinical symptoms but which basically is quite different. If teeth, which have enjoyed the benefits of good jaw growth at a deep level are forced to erupt into an arc too small to receive them due to a deep overbite, all of the benefit gained by the growth is lost and a malocclusion of a strictly environmental type is set up. We all know how difficult to handle this situation can be. Here the simplest type of treatment will frequently pay. The insertion of a simple bite plane will remove from the lower incisors the crushing force of the deep overbite and not infrequently those teeth will align themselves without further mechanical interference (Fig. 7)

Usually before the time that the incisors of the baby set have begun to shed, the presence of a Class II or Class III malocclusion will be evident by the occlusion of the deciduous molars. However, there are cases which tax the powers of observation of the best orthodontist and he is not quite certain whether he is going to have to deal with an abnormal mesiodistal relation until the first permanent molars have erupted. Upon the eruption of these teeth, however, his question is settled for him and if the dentition presents a Class II malocclusion this seems to be the logical time to treat it. Before going further into the question of this type of management I should like to review just a moment the facts that have been uncovered by investigation in the management of malocclusion by headcap treatment.

It has been shown that by the use of the Oppenheim method of management the upper six year molar is not necessarily driven distally as was formerly held to be the objective in Class II treatment, but rather it is maintained in space while the rest of the jaw grows forward and the mandible proceeds downward and forward in an uninhibited manner. Thus, in the treatment of Class II malocclusions by headcap we are actually holding back the molar segment of the maxilla until the mandible grows forward into a Class I relationship at which time the case is considered treated completely so far as the Class II condition is concerned. Bearing this in mind, it would seem that the earlier such methods of management are employed the more rapid would be the treatment because during the period of the deciduous dentition the mandible is growing at a rate that is higher than it will subsequently enjoy. Personally, I have no experience with this, but based on logic this would seem to be the best time to treat. However, most treatment is deferred until the first permanent molars are in place because of patient cooperation.

I do not intend to dwell on the treatment of the usual Class II Div. I malocclusion, for this has been admir-

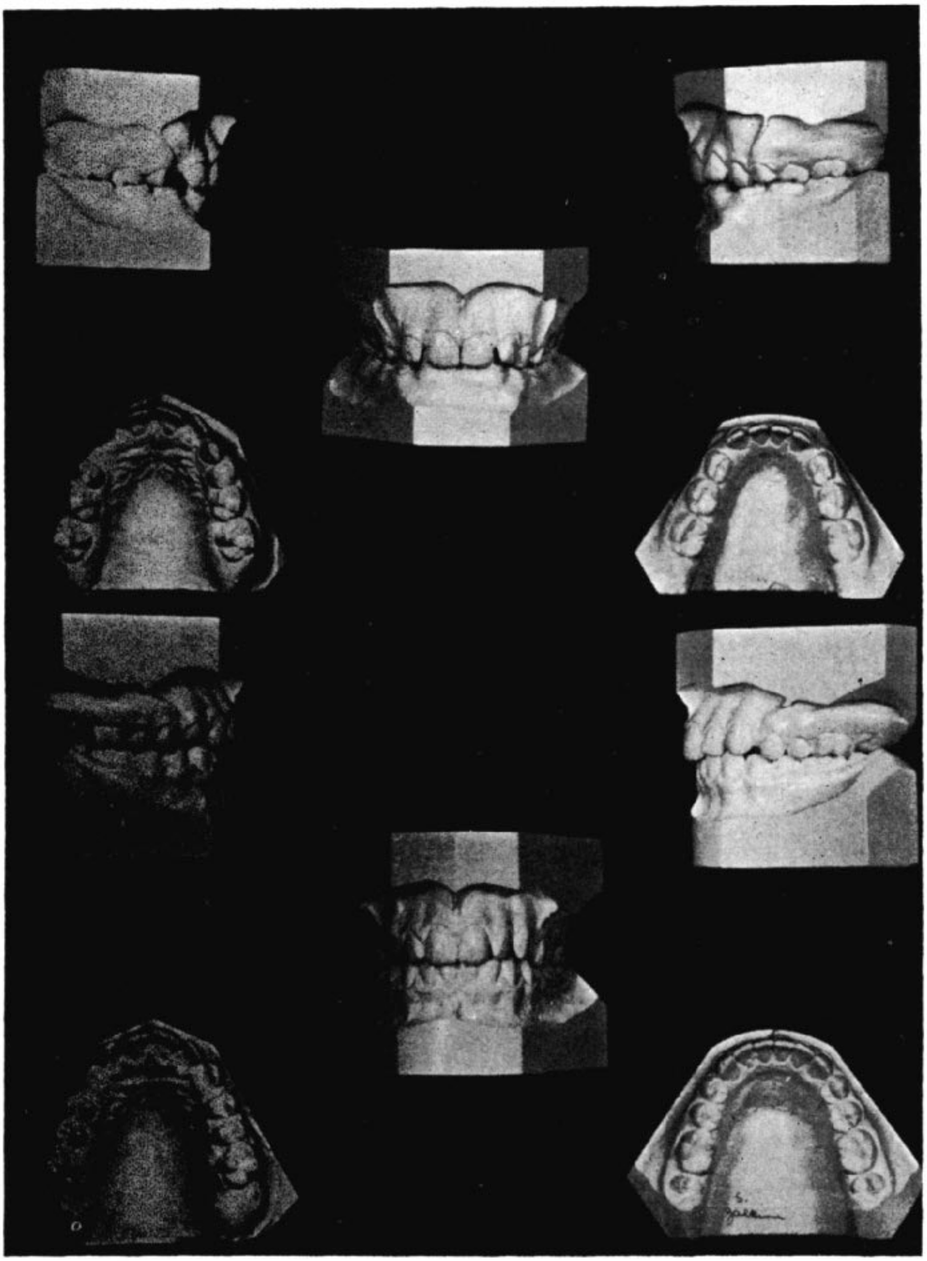

Fig. 7. *Above,* the malocclusion produced by the environmental effect of a deep overbite; *below,* the correction gained by use of a simple bite plane.

ably covered a number of times by Kloehn, Nelson and others, and does not need further comment here. I should, however, like to direct attention to those cases of Class II which present in addition to the usual molar relationship a jumbled and irregular condition of the incisors, either upper or

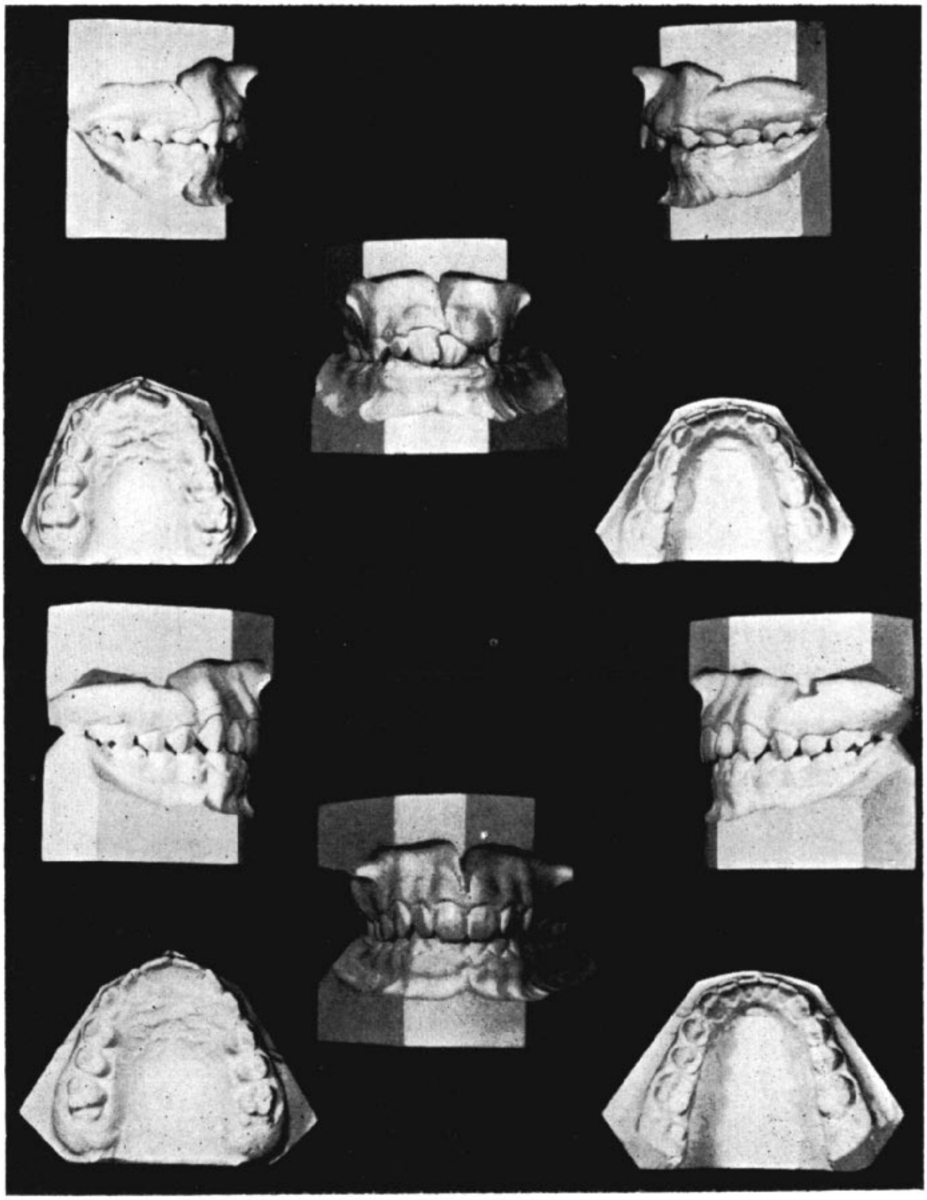

Fig. 8. A Class II/I malocclusion (above) treated with a headcap and biteplate; the result (below) was gained without exerting any extra-oral force on the anterior teeth.

lower or both. The response to treatment of these cases is one of the most remarkable experiences that I have had in practicing orthodontia. I have selected two cases as examples.

The first case is shown in Fig. 8. This is of a girl and shows the models taken one month prior to treatment. This case was managed with nothing but a headcap at the beginning, although subsequently a bite plan was employed; there has been aligning of the incisors

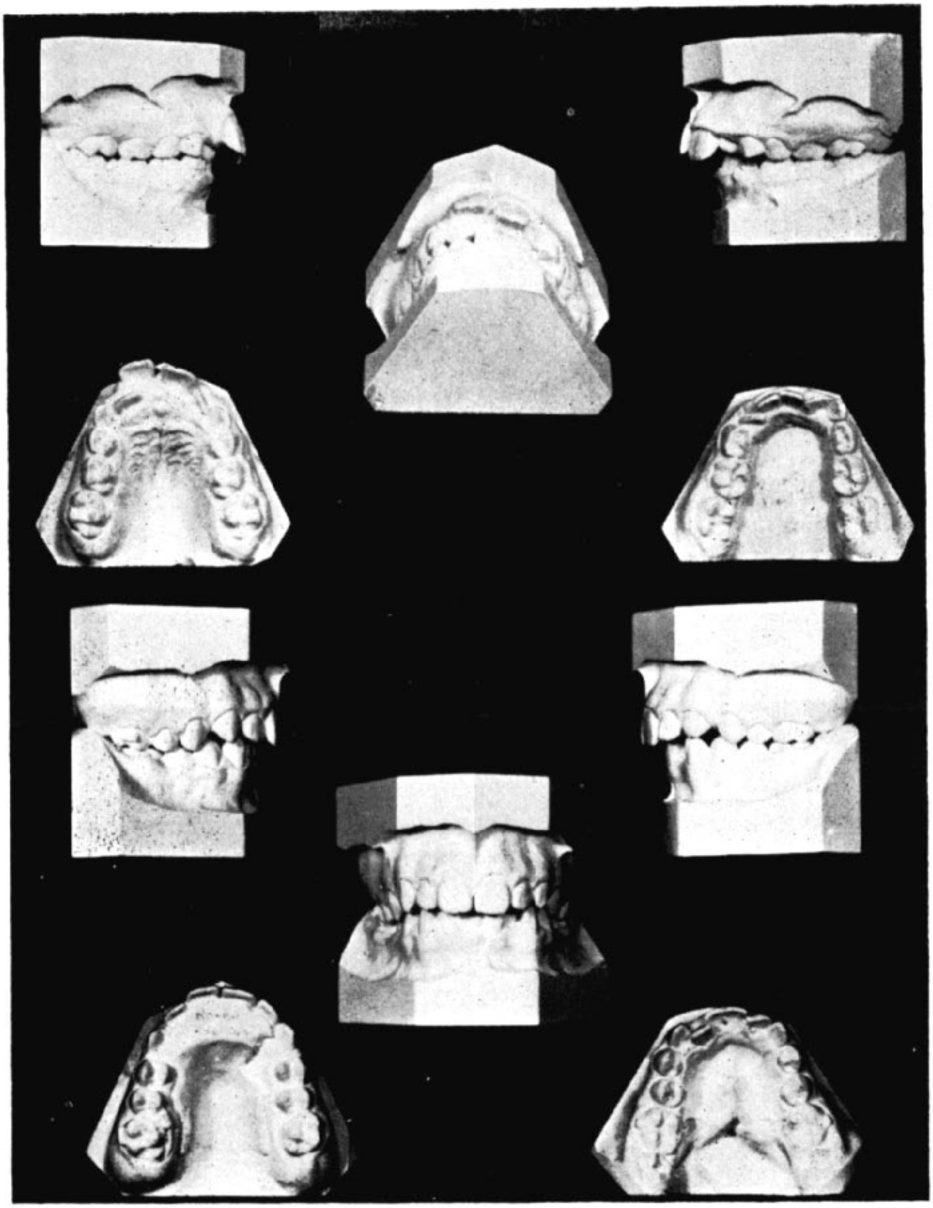

Fig. 9. A Class II/I malocclusion (above) treated with a facebow and neckband, so adjusted as to keep the incisors entirely free of the cervical traction. A biteplate was employed after a Class I molar relationship was gained and a lingual archwire was added to the lower teeth when the case appeared as in the lower series of casts. (See Fig. 10).

and normal eruption of the canines, without any pressure ever being brought to bear on them. There has been rounding and expansion of both upper and lower arches and this case will not require further treatment.

The next case (Fig. 9, above) is that of a boy and it will be seen that he had a constricted maxillary arch with marked protrusion of the upper incisors. The laterals were placed lingually with insufficient space for their correct alignment. The lower jaw was similarly narrow, having conformed to the upper. The lower left canine space was completely absent, and in addition to this, the two laterals lacked space for their alignment. There was a deep overbite and a marked overjet.

For the first period of treatment bands were placed on the upper first permanent molars and a face bow with arch was so designed as to carry the full weight of the neck band traction against the molar tubes. At no time during the entire treatment were pressures allowed to fall on the anterior teeth. No bite plane was used until a Class I molar relation was attained and no appliance was used on the lower arch. The upper arch has increased in width materially; the upper incisors have aligned themselves almost perfectly and the upper arch does not look as though it had ever enjoyed anything but normal growth. The lower arch has expanded to match the upper. The space has all but completely opened for the lower right lateral. The lower left canine which was completely lacking in space has erupted in good alignment with the buccal teeth. (Fig. 9, below) The remaining therapy consisted of applying a lingual arch in the lower jaw, with a pair of finger springs to manage the laterals while the extra-oral force was continued. Figure 10 illustrates the case as it is now and I doubt that I shall be able to convince the parents that the remaining details warrant the placing of a complete appliance.

These cases indicate the necessity for directing attention to certain matters about which we have been in complete ignorance. What forces have been responsible for the increases in the length of the arches and what has brought about the remarkable rotations and the correction of other details that have transformed them from crowded denti-

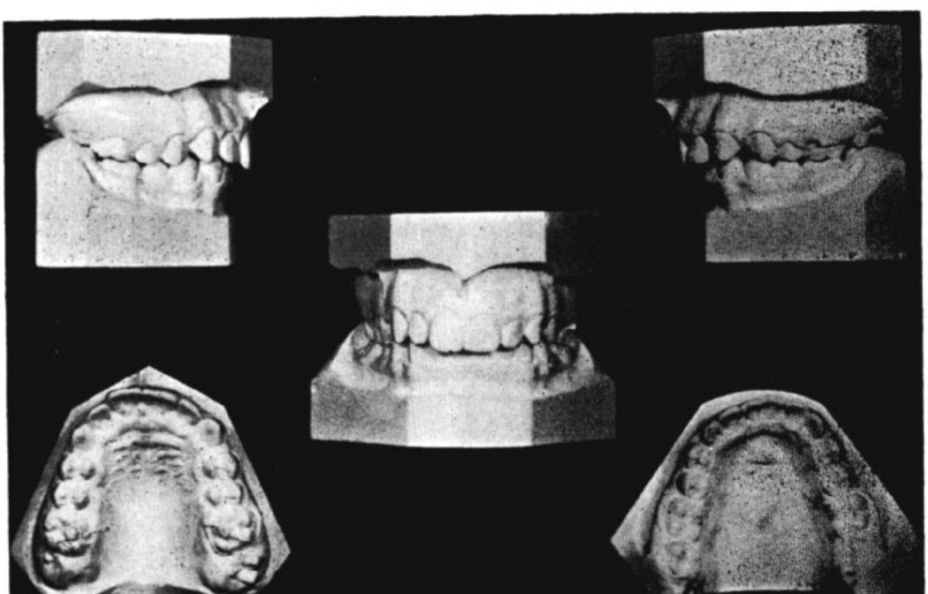

Fig. 10. Final plaster casts of case shown in Fig. 9.

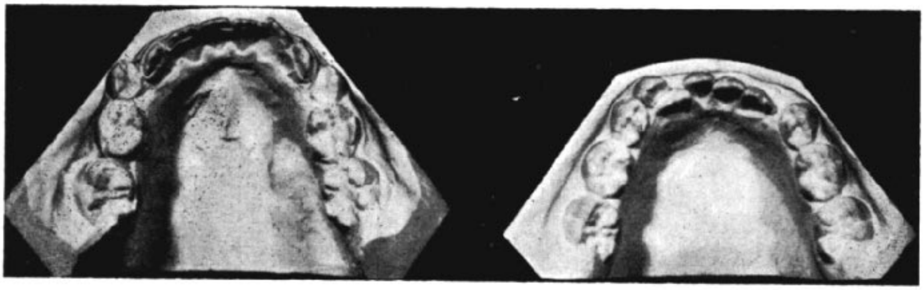

Fig. 11. Malocclusion produced by lip sucking habit (right). Apparent correction of incisor teeth with simple passive device (see text) was retained with a cuspid-cuspid retainer; continuation of the habit resuled in driving he anterior segment back which caused blocking of the first pre-molars buccally (left).

tions to this even alignment? One can only postulate on the possibilities but I am inclined to believe that they are beautiful examples of the fact that the bones and jaws should be thought of as connective tissue organizations and not as the hard inflexible structures that we usually visualize in a museum specimen. Apparently when force is applied to a tooth tensions are set up to remote parts of the bone and the predetermined pattern is given an opportunity to express itself through uninhibited growth.

I believe that habits should be broken as soon as they are detected and certainly a strong effort should be made to eliminate them by the time the dentition is changing from deciduous to permanent. It has not been discovered how to break all habits but a few can be quite successfully managed. I refer to the tongue thrust or resting position and to lower lip sucking. The best device that I have found for the first is a pair of bands on the lower canine teeth connected by a lingual bar with vertical spurs to bridge the gap between the upper and the lower teeth. This must never be employed without the consent of the parent and patient and it is surprising how frequently the child shows no fear and no disinclination to cooperate in this regard; indeed, I have had several ask me to replace the appliance when the patient felt that the habit was returning.

One of the best examples that we have ever seen of the force of muscle traction or pressure was that of a case that was presented in our clinic several years ago. These were two sisters, identical twins, one of whom had a lip sucking habit and the other who did not. In the girl with the habit extreme pressure was being brought to bear on the lower incisor teeth (Fig. 11, right). These had been pushed back into the mouth blocking eruption of the canines and the lower lip bore the evidence of the marked sucking habit that was responsible. A baffle was made in the form of an acrylic shield attached to an arch carried by the first permanent and deciduous molar teeth. The shield was advanced to the position in which the lower incisor teeth should have been. This device was worn for only a short period of time when the permanent incisors came forward and aligned themselves perfectly and the canines erupted. Thinking the case treated, the appliance was removed and a cuspid to cuspid retainer was placed. Imagine our chagrin when, several months later, the patient erupted her first bicuspids in a completely buccal position. (Fig. 11, left) The lower six anterior teeth had held, but were driven back as a segment blocking out the bicuspid teeth. The habit had not been broken.

It should be apparent by this time that my own answer to the question of when a malocclusion should be treated would be the same as for almost any other abnormal condition or disease, namely, when it is seen. The objective of early interference is not treatment, but (1) the removal of factors which are slowing growth, (2) the prevention of the seemingly inevitable result of a lack of harmony between the eruption of the teeth and the growth of the jaws and (3) in Class II cases the adjustment by growth of parts that are out of harmony in their relations to each other.

This type of simple treatment is not recommended for the orthodontist who is impatient. It will probably not satisfy those who wish to see quick results. Lack of cooperation is sometimes trying and waiting for growth is apt to prolong the period of management. One must have faith that the average child will eventually grow and that he will grow more toward the normal. One can also rely on the fact that profiles flatten with age and that the severe malocclusions and disharmonies, so prevalent and disfiguring in childhood, are not so apparent in the adult. And if the final result obtained by simple means is not all that one would like, it is still possible to take care of minor details with a brief period of conventional appliance therapy. In short, early, simple treatment makes easy cases out of difficult cases and many conditions can be managed at the earlier period that are not susceptible to successful management later. Finally, and most important of all, cases managed in this way carry no scars that can be blamed on orthodontia, they are healthy as to roots and periodontium, and obviously, the caries rate is what it would have been if no orthodontic management had been undertaken.

We have heard a great deal about the deterioration of the human dentition, i.e., that Man's jaws were growing smaller at a faster rate than were his teeth and that as a consequence malocclusion was on the increase. The latter may be true, although I know of no work that proves it. That the first premise is correct seems extremely doubtful in the light of evidence seen in practice. That our modern environment may be laying a heavy hand on our jaws may be true but it would appear that the potential of adequate growth and development is still with us. Our task is to determine how to take the brakes off that potential and permit it to express itself.

This paper then is a plea, not that we discard what we have learned by our analytical methods, but that we begin to put the pieces back together again. For too long we have been looking at the trees—let us now study the forest.

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