

CLASSIFICATION OF MALOCCLUSION.*

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THE term "irregularities of the teeth," as it is usually applied to express teeth that are twisted or unevenly arranged, does not, in the author's opinion, properly express the full meaning of these deformities. It would seem that the term malocclusion would be far more expressive; for in studying the subject we must not lose sight of the importance of the dental apparatus as a whole and the important relations not only of the two arches to each other, but of the individual teeth to one another. The shapes of the cusps, crowns, roots, and the very structure are all designed for the purpose of making occlusion the one grand object, in order that they may best serve the purpose for which they were designed,—namely, the cutting and grinding of the food. Examined carefully, it will be seen that there can be no "irregularities" of the teeth if they are in perfect occlusion, but that all must be regular and even, each contributing to the support of the others, and all in perfect harmony. Not only this, but the jaws, the muscles of mastication, the lips, and even the facial lines, probably, will be in best harmony with the peculiar facial type of the individual.

Therefore, it would seem that the term malocclusion of any tooth or number of teeth would not only better express the true condition, but naturally and constantly suggest the paramount importance of occlusion in the study and treatment of these deformities, instead of making it secondary or even losing sight of it entirely, as has been too much the case in the past. The author has become firmly convinced that occlusion is the very basis of the science, and that in the treatment of cases, unless occlusion is established, the results will be largely of the nature of failures. So in the pages that are to follow we shall make occlusion the central thought, and on it base the classification of "irregularities" as well as the nomenclature; and will define orthodontia as being that science which has for its object the correction of malocclusion of the teeth.

DIAGNOSIS OF CASES.

In every case of malocclusion of the teeth presented for treatment the importance of a correct diagnosis of the true conditions, and the requirements, cannot be overestimated. Otherwise any plan of treatment will be very uncertain as to results; in fact, most apt to lead to failure with all of its embarrassments.

From an extensive intercourse with dentists and students I am impressed with the belief that although diagnosis is the question of greatest importance, it is yet apparently the least intelligently studied and comprehended.

In the beginning, I wish to thoroughly impress the necessity for complete separation of *diagnosis* from *treatment*. This statement seems necessary for the reason that I have so frequently noted a mental conflict in the endeavor to consider the two together in the

*From a forthcoming book by the author.

first instance, the question of treatment by appliances or by extraction apparently forcing itself into the first view before the facts upon which these should be based have had due consideration. As a matter of fact, if the diagnosis of any given case is first thoroughly mastered the line of treatment and the appliances necessary to bring about the various tooth-movements required are, in nearly every instance, clearly indicated, even to the devices necessary for retaining the teeth when correctly placed.

In order to diagnose all cases of malocclusion correctly it is necessary to be familiar with, first, the normal or ideal occlusion of the teeth; second, the normal facial lines. These must be so fixed in the mind as to form the basis from which to reason, and to intelligently note all deviations from the normal; and it must follow that without clear, fixed, and definite ideas as to the normal, the limits or boundary lines of the abnormal must also be vague and indefinite, and the line of treatment the merest empiricism.

A knowledge of the occlusion of the teeth being of the first importance, should embrace a knowledge of not only the normal relations of the occlusal surfaces of both permanent and deciduous teeth, but of their entire forms and structures. The growth and normal development of the jaws and muscles, together with the development of the teeth and the normal periods for taking their positions in the arches, should receive careful attention. Our perceptions of the subject would be broadened also by a comparative study of the occlusion of the teeth of the lower animals.

NORMAL OCCLUSION.

This knowledge is the basis of the science and the most important lesson to the student of orthodontia. The limits of this work will, however, permit of the consideration of only the most important of its many phases.

By referring to Figs. 1 and 2, which represent the teeth in the ideal occlusion, it will be seen that each dental arch describes a graceful curve, and that the teeth in these arches are so arranged as to be in the greatest harmony with their fellows in the same arch, as well as with those in the opposite.

The lower arch is somewhat smaller than the upper, so that in occlusion the labial and buccal surfaces of the teeth of the upper jaw slightly overhang those of the lower. The key to occlusion is the relative position of the first molars. In normal occlusion the mesio-buccal cusp of the upper first molar is received in the sulcus between the mesial and distal buccal cusps of the lower, the slight overhanging of the upper teeth bringing the buccal cusps of the bicuspid and molars of the lower jaw into the mesio-distal sulci of their antagonists, while the upper centrals, laterals, and cuspids overlap the lower about one-third the length of their crowns. The upper central being broader than the lower, necessarily extends beyond it distally, overlapping, in addition, about one-half of the lower lateral; the upper lateral occludes with the remaining portion of this tooth, and with the mesial incline of the lower cuspid, the mesial incline of the upper cuspid occluding with the distal incline

of the lower; the distal incline of the upper cuspid occludes with the mesial incline of the buccal cusp of the lower first bicuspid; the mesial incline of the buccal cusp of the upper first bicuspid occludes with the distal incline of the buccal cusp of the lower first bicuspid.

FIG. 1.

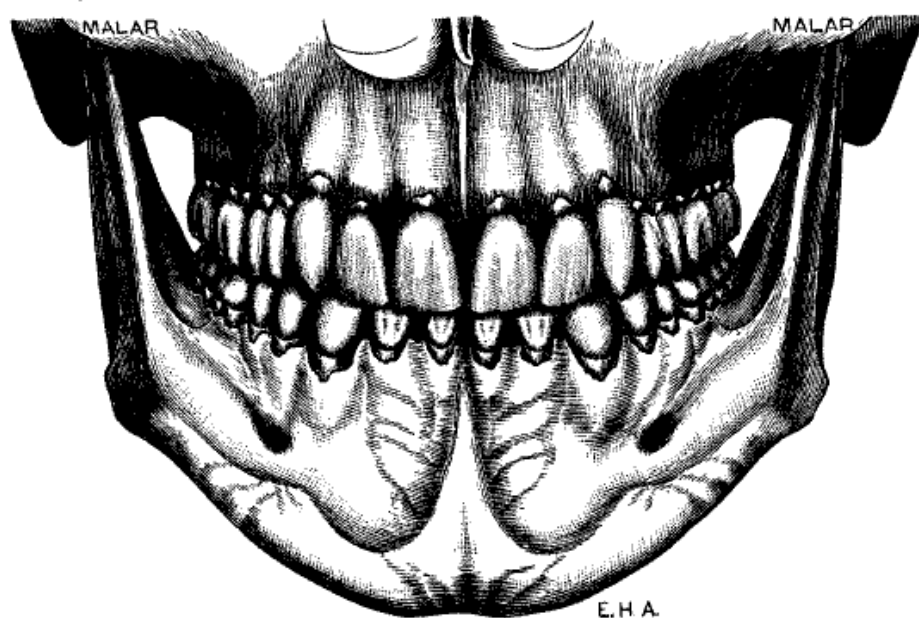
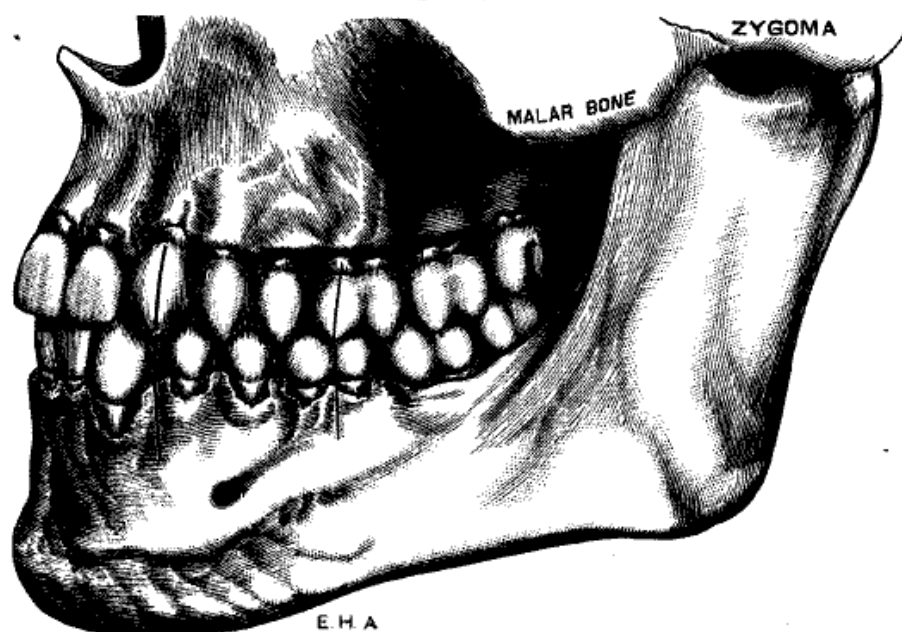


FIG. 2.



This order is continued through the bicuspids. The mesial and distal inclines of the mesio-buccal cusp of the upper first molar are received between the mesial and distal buccal cusps of the lower first molar, and the inclines of the disto-buccal cusp are received

between the disto-buccal cusp of the first lower and the mesio-buccal cusp of the second lower. This same order is continued with the second and third molars, the distal incline of the disto-buccal cusp of the upper third molar having no occlusion. It will thus be seen that each of the teeth in both jaws has two antagonists or supports in the opposite jaw, except the lower centrals and the upper third molars.

As the inclined planes match and harmonize most perfectly in the bucco-occlusal relations of the teeth, so there is a similar arrangement in the linguo-occlusal relations, except that the lower bicuspid and molars project beyond the upper into the oral space; likewise in the transverse arrangement, the buccal cusps of the lower molars and bicuspid pass between the buccal and lingual cusps of the upper molars and bicuspid, and the lingual cusps of the upper molars and bicuspid between the buccal and lingual cusps of the lower molars and bicuspid. The grinding surfaces are thus enormously increased in extent and efficiency over what would be possible if they consisted of a single row of cusps or of plane surfaces. But increase of masticating surface is not the only, perhaps not the most important, reason for this complex interdigitation of the cusps and inclined planes of the teeth. A very important office of the interdigitating cusps and planes is the part they play in the mutual support of the teeth. The sizes, forms, interdigitating surfaces, and positions of the teeth in the arches are such as to give to one another, singly and collectively, the greatest possible support in all directions.

Another important part played by the inclined planes of the cusps is in influencing the directions of the teeth while erupting and taking their positions in the arches. If, however, their influence is perverted, they may become mischievous factors in the production of malocclusion. When the teeth first emerge from the gums considerable displacement is often noticeable, but this need occasion no uneasiness, provided, as eruption progresses, their cusps pass into the normal influence of the inclined planes of the opposing cusps; but once passed beyond the normal influence into the abnormal they will not only be deflected from their proper relations in the arch, but will assist in the displacement of the opposing teeth, as well, oftentimes, as of those which are to follow in eruption.

So the dividing line between harmony and inharmony of occlusion is often very slight. Hence the importance of careful attention during the important period covering the eruption of the permanent teeth.

THE FORCES WHICH CONTROL OCCLUSION.

Harmony between the upper and lower arches and their teeth is also powerfully promoted by their normal action and reaction upon each other. As the teeth of the lower arch erupt before those of the upper, and are consequently to an extent fixed in their positions before their antagonists appear, it follows that the lower arch is the form over which the upper is molded. In other words, the

lower arch exerts a controlling influence over the form of the upper and the positions of the teeth therein. Of course, the upper reacts upon the lower, but it is unquestionable, in the author's opinion, that the lower arch is the more important factor, not the upper, as has hitherto been taught.

It will thus be readily seen how greatly one arch contributes to the other in maintaining its form and size so that pressure, as, for example, on the labial surfaces of the upper incisors, would be resisted not only by all the upper teeth acting as keystones in an arch of masonry, but also by the teeth of the lower arch acting through occlusion.

Inversely, then, one arch cannot be altered in shape without modifying that of the other, nor can it be altered in size without soon exercising a marked effect upon the other.

This important fact is of the greatest interest to us as students of orthodontia,—namely, that in a case of perfect occlusion, as in the illustrative case shown, each tooth is not only in perfect harmony with every other, but helps to maintain it in its harmonious relations; *for the cusps interlock and each sloping plane serves to not only keep the tooth in position, to prevent it from sliding out, but to wedge it into position if slightly malposed*; that is, if not beyond the normal influence of the inclined plane.

A careful study of the relations of the inclined planes and the marginal, triangular, transverse, and oblique ridges, in connection with the movements of the jaw, cannot fail to impress thoughtful persons with the wonderful efficiency of the human teeth for incising and triturating the food required by man, and with the marvelous arrangement for self-cleansing and consequent self-preservation which they display.

The harmonious relations of the occlusal planes and of the dental arches are further assisted by another force,—namely, muscular pressure, the tongue acting upon the inside and the lips and cheeks upon the outside of the arches. The latter serve to keep the arches from spreading, as do the hoops upon the staves of a cask; the former prevents too great encroachment upon the oral space. I am satisfied that this muscular pressure is a far more important factor in relation to the study and correction of malocclusion than is generally recognized. It not only contributes to maintaining the teeth in their normal positions and to harmony in the size of the normal arches, but it is equally powerful in maintaining in-harmony in the sizes or relations of the arches and malocclusion of the teeth, when once established.

So it will be seen that the occlusion of the teeth is maintained, first, by the occlusal inclined planes of the cusps; second, by the support given by the interdependence of the arches due to their harmony in sizes when in normal relations; third, by the influence of the muscles labially, buccally, and lingually.

The illustrations show the result where these forces have acted normally,—a harmoniously aligned and occluded denture.

It should be borne in mind that these influences are none the less powerful in cases of malocclusion.

It is interesting and instructive to note the result of these forces even in the earliest indications of malocclusion.

Fig. 3 illustrates a developing form of malocclusion very common, and familiar to all observing dentists. The case is that of a child where the four lower permanent incisors are fully erupted, but one of them (the left lateral) has been deflected lingually (Figs. 3 and 4), the arches being thus deprived of the wedging and retaining influence of this tooth. The external pressure of the lips has closed the space and diminished the size of the arch.

FIG. 3.

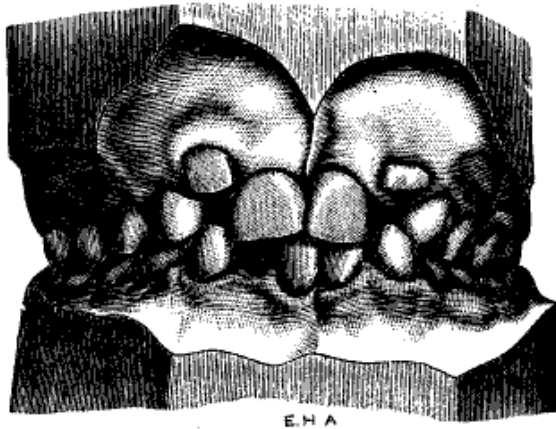
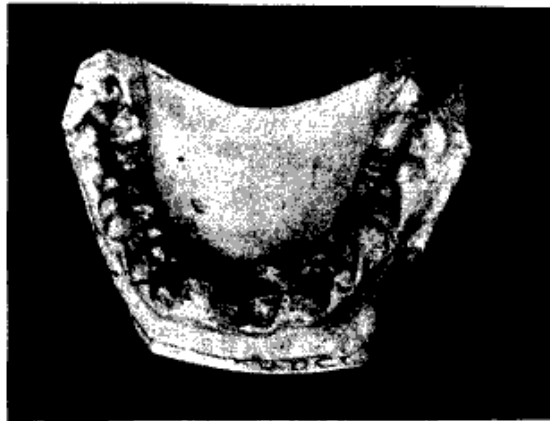


FIG. 4.



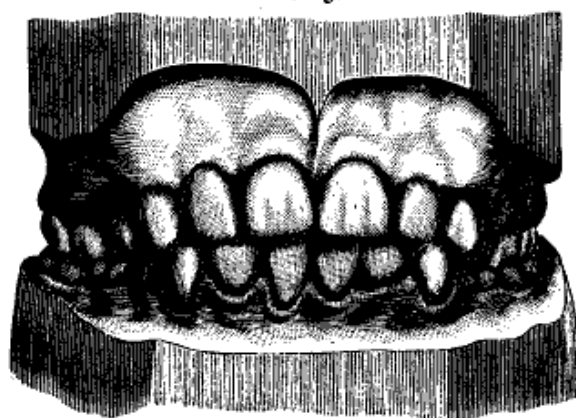
At the same time pressure of the lips and cheeks (aided by the occlusal planes) is gradually molding the upper arch to conform to the abnormal size of the lower.

It will thus be seen how effectually the maintenance of the malocclusion has been provided for, and how hopeless it is to expect nature to correct these deformities unaided. As well might we expect the self-cure of strabismus of the eye or curvature of the spine. How absurd, even pernicious, then, is the common advice of many dentists to parents to "let nature alone and the teeth will straighten themselves."

Recognizing the potency of these influences, it must be apparent to every thoughtful observer that cases of this kind, instead of being self-corrective, will become more and more complicated as time goes on and each succeeding permanent tooth is erupted. In all such cases the positions of the incoming permanent incisors should be guarded with jealous care, and be maintained by corrective procedure if necessary, when, unless there be unusual influences or tendencies toward malocclusion, the positions of the teeth in the upper arch will be directed normally. (Fig. 5.)

On the other hand, for the reason previously stated, if the teeth of the lower arch are permitted to remain in malposition, even to the slightest overlapping of one or more of the incisors or cuspids, the normal size of the arch will be diminished to that extent, with a corresponding contraction of the size of the upper arch by some form of bunching as a result of the influence of the lips.

FIG. 5.



E. H. A.

The absurdity, then, of correcting the malpositions of the teeth of the upper arch alone, without equal attention to those of the lower, as is so often done, becomes apparent. These same influences may be traced in a similar manner in any of the cases hereinafter illustrated.

LINE OF OCCLUSION.

When the teeth are in normal occlusion the line of greatest occlusal contact will be found to pass over the mesial and distal inclined planes of the buccal cusps of the molars and bicuspid and the cutting-edges of the cuspids and incisors of the lower arch, and along the sulcus between the buccal and lingual cusps of the upper molars and bicuspid, thence forward, crossing the lingual ridge of the cuspids and the marginal ridges of the incisors at a point about one-third the length of their crowns from their cutting-edges. This we shall call the line of occlusion.

This line describes more or less of a parabolic curve, and varies somewhat within the limits of the normal, according to the race, type, temperament, etc., of the individual, and must be determined in any given case of malocclusion by the judgment of the operator

after a careful study of the features, facial lines, forms of teeth as related to temperament, etc.

In the diagnosis of cases it is important that we should have this definite line as a more accurate base from which to reason than the coarser outline, as indicated by the incisive and occlusal ends of the teeth.

NOMENCLATURE OF MALOCCLUSION.

All teeth found out of harmony with the line of occlusion may be said to occupy positions of malocclusion, and each tooth may occupy any of seven malpositions or their various deviations and combinations.

A definite nomenclature is as necessary in orthodontia as in anatomy. The indefinite outlines and mere phrases heretofore used are totally inadequate. The terms for describing the various malocclusions should be so precise as to convey at once a clear idea of the nature of the malposition to be corrected. The author therefore suggests the following, which, while perhaps not perfect, still seems to be a great improvement over present usage.

For example, a tooth outside of the line of occlusion may be said to be in buccal or labial occlusion; when inside this line, in lingual occlusion; or, if farther forward mesially than normal, in mesial occlusion; if in the opposite direction, in distal occlusion; if turned on its axis it is in torso occlusion. Teeth not sufficiently elevated in their sockets would be in infra-occlusion, and those that occupy positions of too great elevation would be in supra-occlusion.

These different malpositions, in their modifications and combinations, form the basis for limitless variations of occlusion from the normal, from the simplest to the most complex, in which may be involved not only the malpositions of all the teeth, but even the relations of the jaws, resulting in marked deformities and producing appearances even repulsive.

CLASSIFICATION OF MALOCCLUSION.

As already stated, there can be but seven distinct positions which teeth in malocclusion can occupy. These, with their inclinations, form combinations practically limitless in variety, to the casual observer presenting differences so distinctive as to render each apparently wholly dissimilar from all the others. Failure to grasp the underlying principles has given rise to the teaching that, as each case is so radically different from all others, it necessitates the invention and construction of an appliance to meet its special requirements.

In reality all cases of malocclusion may be as readily arranged in well-defined classes as plants, animals, or the elements; and by thoroughly mastering the distinguishing characteristics of occlusion and of the facial lines peculiar to each class, the diagnosis of any given case is greatly simplified.

At the same time, familiarity with the possibilities of tooth-movement and with the changes requisite to each distinct and separate

class, to attain harmony in occlusion and in the facial lines, and a knowledge of the standard appliances designed for each special

FIG. 6.

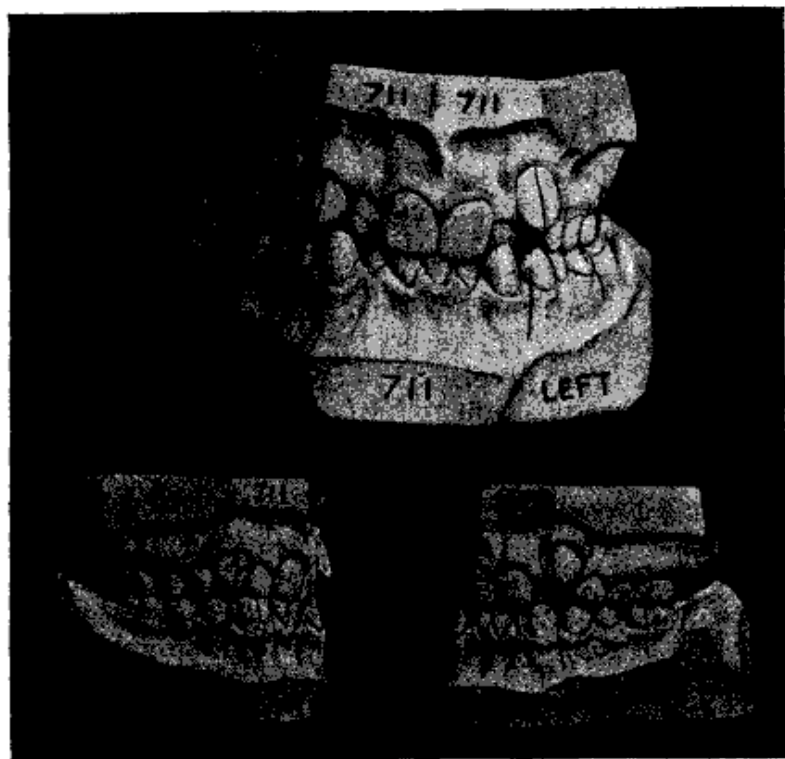
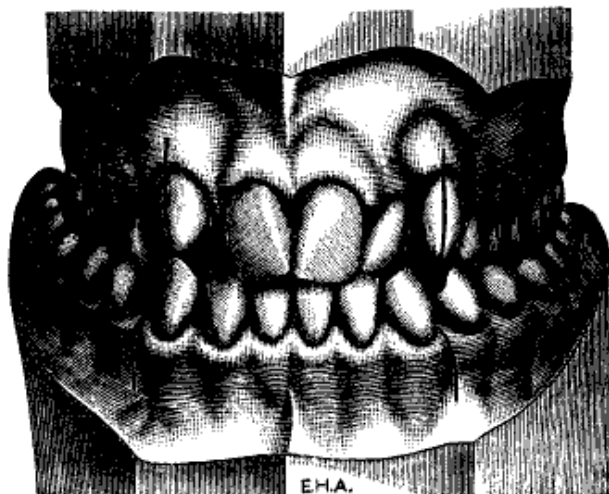


FIG. 7.



class as best suited to produce these changes, will reduce the difficulties of treatment to the minimum.

In diagnosing cases of malocclusion we must consider, first, the mesio-distal relations of the dental arches; second, the individual positions of the teeth. In what is said upon diagnosis and in the

FIG. 8.

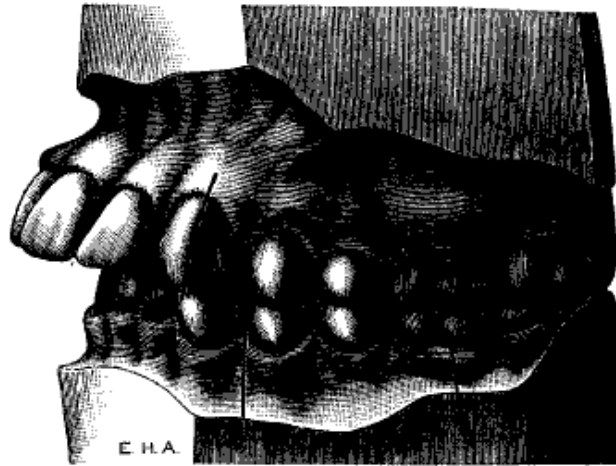


FIG. 9.

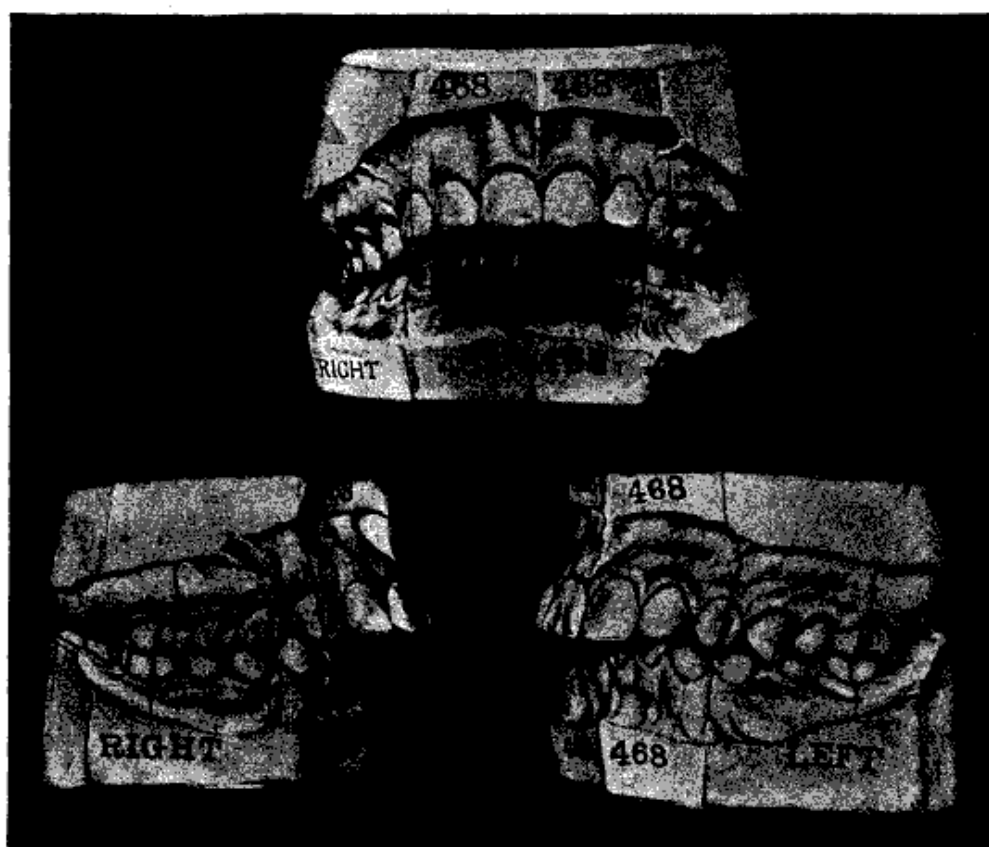


classification which follows, for convenience, two points have been selected from which to note variations from the normal in the arches. These points are indicated by dark lines in the engrav-

ings, which show the normal relations of the cuspids and mesio-buccal cusp of the upper first molar with the buccal groove of the lower first molar.

Of course, in determining the mesio-distal variations *all* of the teeth are to be taken into consideration, but the points indicated have long been favorites with the author in beginning the diagnosis of cases, for the reason that the first molars and cuspids are far more reliable as points from which to judge, owing to the fact that they are found to occupy *normal* positions far more often than any

FIG. 10.



of the other teeth, the molars being less restrained in taking their positions, while the cuspids, owing to their history and great size, force their way usually into relatively normal positions in their arches.

Class I. Fig. 6. Relative position of the dental arches, mesio-distally, normal, with first molars usually in normal occlusion, although one or more may be in *lingual* or *buccal* occlusion. Cases belonging to this class far exceed in number those of all other classes combined (see table), ranging from the simple overlapping of a single incisor to the most complex, involving the positions of all of the teeth of both arches. (Fig. 7.)

The average case, Fig. 6, is where the malocclusion is principally confined to the incisors of both upper and lower arches.

FIG. 11.

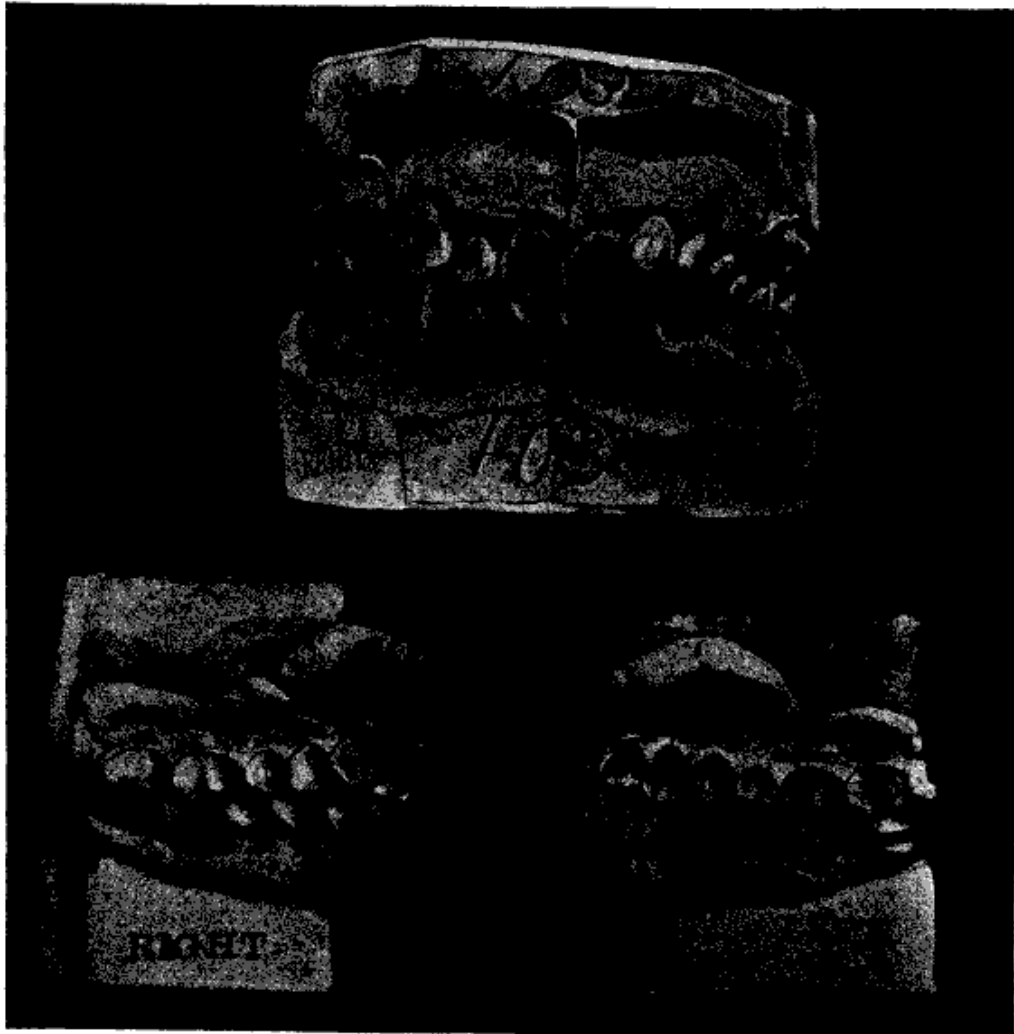


FIG. 12.



Class II. Relative mesio-distal relations of the dental arches abnormal; all the lower teeth occluding distal to normal, producing very marked inharmony in the incisive region and in the facial lines.

Of this class there are two divisions, each having a subdivision. The first division is characterized by a narrowing of the upper arch, lengthened and protruding upper incisors, accompanied by abnormal function of the lips and some form of nasal obstruction and mouth-breathing. (Figs. 8 and 9.)

FIG. 13.



The general characteristics of the first subdivision are the same as in the first division (Fig. 8), only of a less degree, in that one of the lateral halves only is in distal occlusion, the relation of the other lateral half being normal, all as shown in Fig. 10. Patient also a mouth-breather.

The second division (Fig. 11) is characterized by less narrowing of the upper arch, lingual inclination of the upper incisors, and by more or less bunching of the same, as in Fig. 11; and is associated with normal nasal and lip function (Fig. 12).

The peculiarities of this subdivision are similar to those of Division 2, Class II, just described, except that one of the lateral halves only is in distal occlusion, the other lateral half being normal, as in Fig. 13.

Class III. The relation of the jaws is abnormal, all the lower

teeth occluding mesial to normal the width of one bicuspid, (Fig. 14), or even more in extreme cases (Fig. 15). The arrangement of the teeth in the arches varies greatly in this class,

FIG. 14.

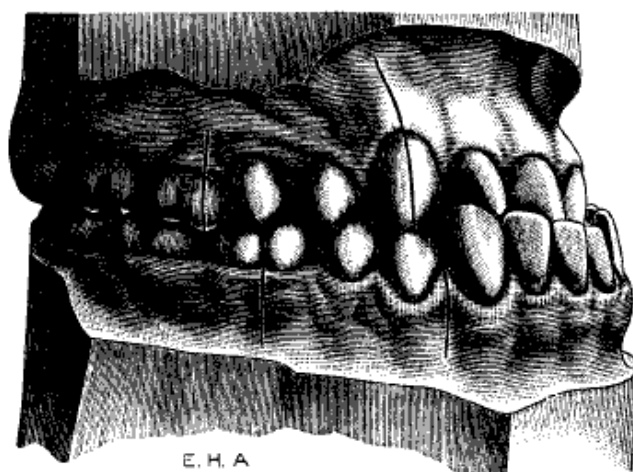


FIG. 15.

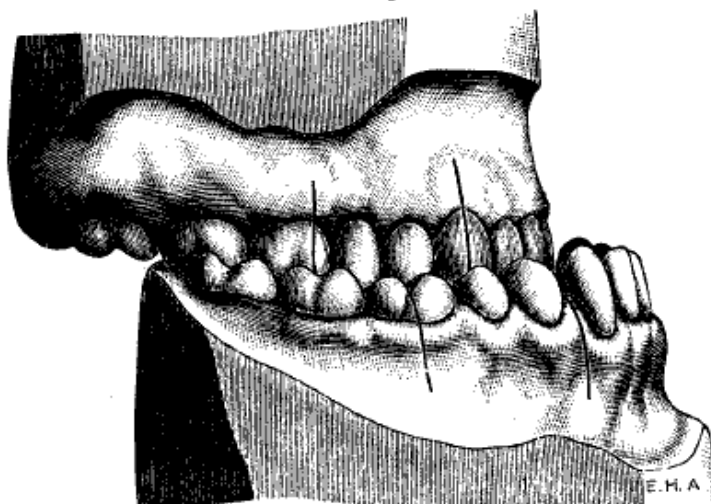
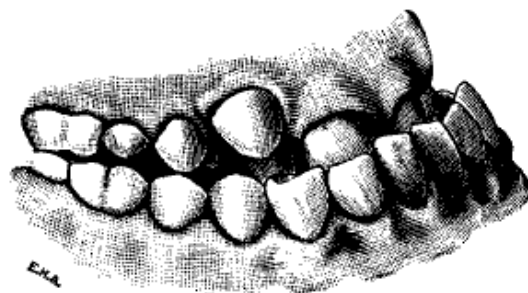


FIG. 16.



from that of quite even alignment to considerable bunching and overlapping, especially in the upper arch (Fig. 16). There is usually a lingual inclination of the lower incisors and cuspids,

which becomes more pronounced as the patient grows older, due to the pressure of the lower lip in the effort to close the mouth.

The inharmony in the size of the arches is usually due to the inharmonious development of the maxillary bones, the angle of the lower jaw being more obtuse than normal; or it may be the result of over-development in the body of the jaw. Occasionally cases

FIG. 17.

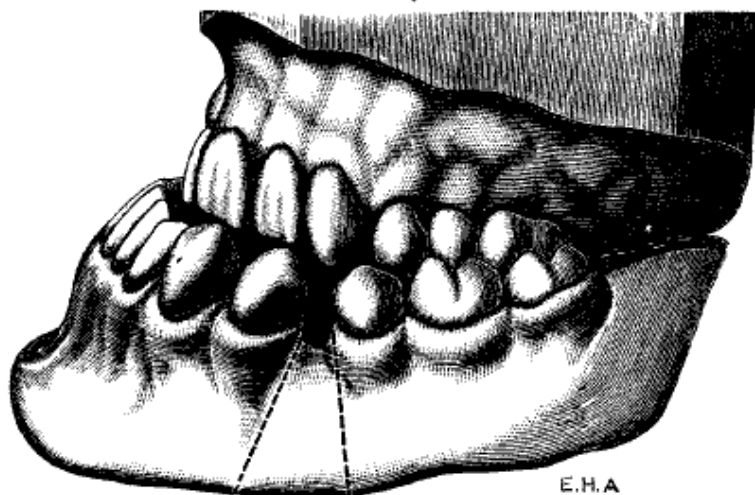


FIG. 18.



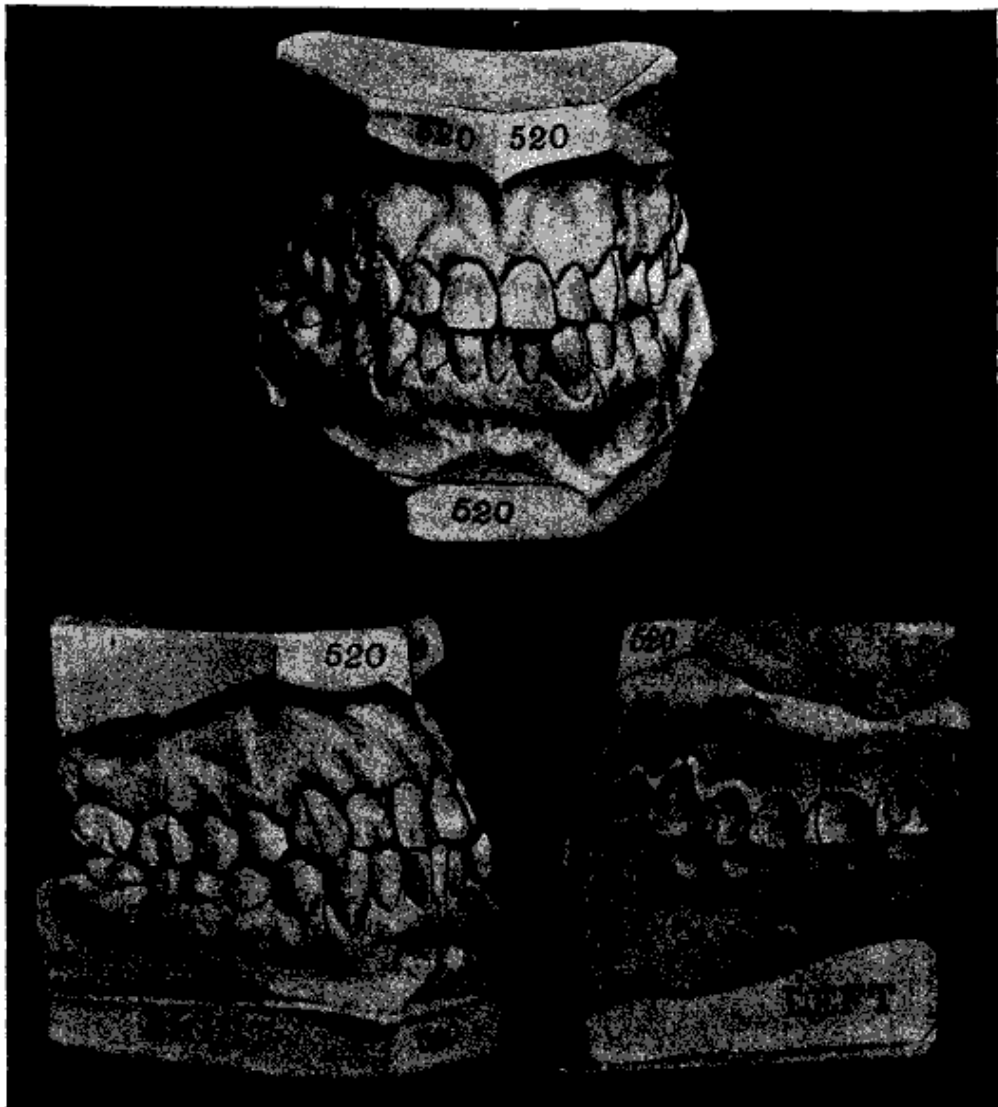
are met with where there seems to be over-development in certain localities of the body, as in Fig. 17. Another model in the author's collection shows local over-development of both the lateral halves between the bicuspid, one space being greater than the width of one bicuspid, the other not quite so great.

In other cases met with the jaw seems to be normal in form, the

protrusion apparently being caused by the temporo-maxillary articulation being farther anterior than normal, this probably being due to the gradual sliding forward of the condyles and to modifications of the fossæ.

In all cases of malocclusion belonging to this class the marring of the facial lines is most noticeable, amounting in some instances to most pronounced deformities (Fig. 18).

FIG. 19.



This class also has one subdivision, the general characteristics of which are the same as those of the main class, except that the inharmony is less in degree, in that one of the lateral halves only is in mesial occlusion, the other lateral half being normal, as in Fig. 19.

It is quite probable that all cases met with will be found to be embraced in the above classification. There still remains, however, one possible class,—viz, where one of the lateral halves is in mesial occlusion while the other is in distal, but cases having these

characteristics are so rarely met with that no further reference to them is necessary.

In the above classification it will be seen that each of the lateral halves of the arches should be considered as distinctive, yet of equal importance in diagnosis.

Often cases are met with in which a number of the teeth apparently occlude upon the points of the cusps, suggesting at first sight two classes; but upon careful inspection it will be found that a majority of the inclined planes favor either one or the other of these classes.

The loss of a tooth by extraction or otherwise is usually followed by such marked changes in the positions of the remaining teeth that both diagnosis and treatment are greatly complicated. Therefore great care and judgment should be exercised, making allowance for the tipping of teeth and other changes which have taken place as a result of extraction.

CLASS I.

Relative position of the dental arches, mesio-distally, normal, with malocclusions usually confined to the anterior teeth.

CLASS II.

Retrusion of the lower jaw, with distal occlusion of the lower teeth.

Division 1.

a. Narrow upper arch, with lengthened and prominent upper incisors; lack of nasal and lip function. Mouth-breathers.

b. Same as *a*, but with only one lateral half of the arch involved, the other being normal. Mouth-breathers.

Division 2.

a. Slight narrowing of the upper arch; bunching of the upper incisors, with overlapping and lingual inclination; normal lip and nasal function.

b. Same as *a*, but with only one lateral half of the arch involved, the other being normal; normal lip and mouth function.

CLASS III.

a. Protrusion of the lower jaw, with mesial occlusion of the lower teeth; lower incisors and cuspids inclined lingually.

b. Same as *a*, but with only one lateral half of the arch involved, the other being normal.

OUT OF SEVERAL THOUSAND CASES OF MALOCCLUSION EXAMINED THE PROPORTION PER THOUSAND BE- LONGING TO EACH CLASS WAS AS FOLLOWS:

CLASS I.....	692
CLASS II.....	
Division 1.....	90
Subdivision 1.....	34
Division 2.....	42
Subdivision 2.....	100
CLASS III.....	34
Subdivision	8
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	1000

Before entering upon a careful analysis of cases of malocclusion and their diagnosis it will be necessary to consider another important phase of the subject,—namely, the relation of the features to the occlusion of the teeth.

(To be continued.)

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