CHAPTER II.

MALOCLUSION.

Forces Governing Maloclusion.—In beginning the consideration of malocclusion let us remember that it is but the perversion of the normal in the growth and development of the denture—the side-tracking, as it were, of Nature in some of her normal processes of building, and we repeat, that as a basis from which to determine its extent and complexity we must have firmly fixed in our minds a thorough knowledge of the normal denture complete and its co-related parts.

We know that every case has a simple beginning in its variation from the normal, and that very often a single tooth, from slight cause, being deflected from the normal may and usually does involve others. The dividing line, then, between the normal and the abnormal in the beginning is very slight, but always clearly defined, so that the normal in occlusion is the only logical basis for determining the variation therefrom and the extent of the abnormal—malocclusion—and, as we shall see, the same forces that contribute to maintaining the teeth in their normal positions and harmony in the sizes of the arches, are equally powerful in maintaining inharmony in the sizes and relations of the arches and malocclusion of the teeth when once established.

In a large percentage of cases of malocclusion the arches are more or less contracted, and as a result we find the teeth crowded and overlapping. In these cases the lips serve as constant and powerful factors in maintaining this condition, usually acting with equal effect on both arches, and effectually combating any influence of the tongue or any inherent tendency on the part of Nature toward self-correction. In other words, the arches, narrowed and diminished in size, are so maintained by force from the lips, equal in power to that exerted for their normal maintenance when of normal size and relation, with the teeth in normal occlusion. Likewise each inclined plane of the cusps once out of harmony serves not only to maintain the inharmony, but to increase it, upon each closure of the jaw. It is interesting and instructive to note the result of these forces even in very early indications of malocclusion.

Fig. 9 illustrates a very common and familiar form of developing malocclusion. 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, Fig. 10. 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. At the same time pressure, principally from the lips and cheeks, aided by the occlusal planes of the lower deciduous molars, is gradually molding the upper arch to conform to the diminished size of the lower.

It will thus be seen how effectually the malocclusion will
be maintained and how hopeless it is to expect Nature to correct this deformity unaided. These same influences may be traced in a similar manner in any case of malocclusion.

Recognizing the potency of these influences, it must be apparent that cases of this kind, instead of being self-corrective, will become more and more complicated as time goes on and as each succeeding permanent tooth is erupted. How absurd and unfortunate, then, is the common daily advice from dentists to anxious parents to "let the teeth alone and Nature will correct them unaided."

In all such cases the positions of the erupting permanent lower incisors should be guarded with zealous care, and should be forced to take correct positions and be maintained therein, and thus assist in directing the teeth of the opposing arch into correct relations and be compelled to fulfill their important part in the full normal development of the alveolar process. This is the golden opportunity for beginning intelligent interference for the prevention of what might otherwise become complicated cases of malocclusion. This also applies with equal force to any other lower tooth that may erupt into abnormal position, especially the lower first molars. Then, unless there be unusual tendencies toward malocclusion, the positions of the teeth of the upper arch will be directed normally.

For the reason previously stated, if the teeth of the lower arch be permitted to remain in malposition even to the slightest overlapping of one or more of the incisors or canines, the arch will be diminished in size just to that extent, and as a result of pressure of the lips there will be a corresponding contraction in the upper arch and some form of bunching of the teeth.

The influence of the lips in modifying the form of the dental arches is an interesting study, and almost every case of malocclusion offers some noticeable and varying manifestation of it. In those cases where there is normal occlusion of the teeth it will be noticed that the lips and cheeks are also normal and perform their functions normally. The upper lip will be found to rest evenly in contact with the gums and upper three-fourths of the labial surfaces of the upper incisors, leaving, however, about one-fourth of the occlusal ends of the central incisors and laterals, and the points of the canines, to be covered by the edge of the lower lip, so that normally there is a restraining force exerted upon the upper incisors and canines by both upper and lower lips. This force is exerted automatically in response to almost every emotion, and results in maintaining the teeth in harmony with the graceful and beautiful curve of the normal individual arch.

In cases of malocclusion strikingly characteristic abnormalities in lip function are often noticeable, leading to the suspicion that more often than is recognized the peculiarities of lip function may have been the cause of forcing the teeth into the malpositions they occupy. The lack of the requisite amount of pressure from the lip is strikingly noticeable in the positions the incisors assume in cases belonging to Division 1 of Class II, in which the upper lip but partially performs its function, exercising little restraining influence upon the labial surfaces of the upper
incisors, the result being that these teeth move forward and protrude in a more or less pronounced manner. In these cases the over activity of the lower lip assists in augmenting the protrusion, for in closing the lips the inner edge of the lower is forced against the lingual surfaces of the upper incisors instead of their labial surfaces. In cases belonging to Division 2 of Class II the upper lip is found to be well-developed, exerting its full force upon the upper incisors, and as we shall see, causing their bunching and the lingual position of their crowns, and thus establishing and maintaining a comparative harmony as to the sizes of the two arches, though in abnormal relations.

The abnormally frequent contraction of the upper lip, manifest in the cases of patients suffering from snuffles, forces the upper incisors more or less inwardly, producing an end-to-end bite and an abnormal wearing of the cutting edges of the upper incisors. Doubtless, also, peculiarities of disposition, and their manifestations in the movements of the lips, in many instances so modify the force exerted upon the teeth as to influence the form of the dental arches.

Another striking instance of the lack of the requisite amount of force exerted by the lips and cheeks upon the external surfaces of the arch is presented in certain cases of patients suffering from cleft palate which involves the intermaxillary bones and upper lip. The lateral halves of the arch spread abnormally to a greater or less degree, in some instances the teeth of the upper jaw closing completely outside those of the lower, as in Fig. 11.

Dr. Black reports a case in which a portion of the cheek was lost from carcinoma. The normal external force being thus released from the molars, they were forced outward as a result of normal pressure of the tongue.

The result of pressure from the tongue in exerting force upon the inside of the arch is also a factor; we are convinced, of great importance in determining the form of the arches and the positions of the individual teeth.

That when normal in size, tone, and function, it exercises a gentle force upon the inside of the arch, which is in perfect harmony with the force exerted by the muscles upon the outside in maintaining the correct balance in muscular influence upon the teeth, cannot be doubted; and so, it is reasonable to suppose that when abnormal in size and function, it may and does exert a modifying influence on the size of the arches and positions of the teeth. As yet we know very little as to the extent of this influence, but we have many proofs of its existence.

That tongues vary considerably in size in different individuals is well known, yet owing to their peculiar muscular arrangement and their variability in size and form when being examined, it is difficult to study them accurately. The author has seen instances of the arch being so
enlarged by the influence of the tongue as to create a space between many of the teeth, as in the cast shown in Figs. 12 and 13. He has also seen instances where the abnormally narrow form of the arch seemed to him to be due to the lack of proper size and activity of the tongue. It would be interesting to know how the arches have been modified in those rare cases where the tongue has been lost.

Classification of Malocclusion.—As we have seen, there are seven distinct positions which teeth in malocclusion may occupy, indicated by their deviation from the line of occlusion. These different malpositions form combinations in cases of malocclusion which are practically limitless in their variations.

The same rule that holds good in the dissimilarity of normal dentures is equally true of cases of malocclusion, for not only do we find the same typical differences in forms, sizes, color, etc., of the teeth; and in form and size of dental arches, but we further find that, although the number of cases is legion, in no two is the arrangement of teeth in malocclusion just alike, even in those strikingly similar cases of Division 1, Class II.

Yet notwithstanding this endless variation which has led to endless confusion in diagnosis and treatment among the old-school writers and practitioners, as we shall see all cases of malocclusion fall naturally into a very few distinct and easily recognized groups, or three great Classes, with their Divisions and Subdivisions, and when so classified the extent of the variation from the normal in each case is easily comprehended and the requirements of treatment made manifest.

These classes are based on the mesio-distal relations of the teeth, dental arches, and jaws, which depend primarily upon the positions mesio-distally assumed by the first permanent molars on their erupting and locking. Hence in diagnosing cases of malocclusion we must consider, first, the mesio-distal relations of the jaws and dental arches.
as indicated by the relation of the lower first molars with the upper first molars—the keys to occlusion; and second, the positions of the individual teeth, carefully noting their relations to the line of occlusion.

Class I is characterized by normal mesio-distal relations of the jaws and dental arches, as indicated by the normal locking on eruption of the first permanent molars, at least in their mesio-distal relations, though one or more may be in buccal or lingual occlusion. When the first permanent molars erupt and lock in normal mesio-distal relations it makes possible, as we have seen in our study of the normal, the normal locking of each subsequent tooth that erupts, and only under such conditions is this possible. But, as we have also seen, even with a normal beginning, that is, with normally occluded deciduous teeth, normally locked first permanent molars, and jaws and dental arches normal in their mesio-distal relations at the time of this locking, some one or more of the anterior permanent teeth, from a great variety of causes, may be deflected from their normal course, carrying with them to varying degrees both approximating and antagonizing teeth until possibly they may all be involved in malocclusion, yet without disturbing the mesio-distal relations of the first molars, arches, or jaws.

In the average case the arches are more or less shortened and reduced in size, with a corresponding crowding of the incisors, as shown in Fig. 14.

It will be seen that the complicated malocclusion, illustrated in Figs. 15 and 16, also naturally belongs to this large class. The first permanent molars have erupted and locked in normal relations, the malocclusion being confined principally to deviations from the line of occlusion of the incisors and canines, the two arches being much shortened from their full normal contour in front, especially the upper, which is complicated by the procumbent lingual impaction of the right upper canine.

Fig. 17 represents a less complicated and very common form of malocclusion belonging to this class—the result of the premature loss of the right upper deciduous canines which has disturbed the normal process of development of the denture. The upper incisors on the right side have been forced by the lip to occupy positions lingual to the line of occlusion, thereby compelling the right permanent canine, upon its eruption, to occupy a position of much labial prominence, but as the jaws and the molars are normal as to their mesio-distal relations, the case is easily diagnosed as belonging to this great class.

Fig. 18 illustrates what at this age of the patient is a simple case belonging to this class, but which, if not treated, will develop into one of complexity similar to the one shown in Fig. 14.
Figs. 19, 20, and 21 illustrate another case of pronounced malocclusion in which the incisors, already in positions of marked lingual and torsal occlusion, are being carried still farther out of harmony with the line of occlusion by the eruption of the canines. By noting the relations of the first molars the case is easily distinguished as belonging to this class.

Fig. 22 illustrates a rarer type of malocclusion belonging to this class. Although the mesio-distal relations of the jaws and first molars are normal, yet the lower first permanent molar, as well as the deciduous lower molars and the canine on the right side, have locked in buccal occlusion, and thus is established the beginning of that pronounced and complex type of deformities which, when fully developed, are characterized by the lateral displacement of the mandible and twisting of the mouth, as illustrated in Figs. 408 and 406.

It must be borne in mind, however, that the condition of buccal occlusion of the lower teeth is only an incident in malocclusion and may also be found in cases belonging to any other class.
MALOCCLUSION.

Fig. 23 shows another case in which all the teeth are locked in malocclusion. The mesio-distal relations of the

jaws and first molars are normal (indicating the class to which the case belongs), but the molars of both lateral
halves of the lower arch, together with the premolars and

canines, are locked in buccal occlusion, with much lingual
displacement of the upper molars, premolars, and canines. All of the incisors are also involved.

MALOCCLUSION.

Fig. 24 shows a case where there is infra-occlusion of both upper and lower incisors, with probably slight supra-
occlusion of the molars. Although these conditions may be found in cases belonging to any class, yet the normal

mesio-distal relations of the molars place this case in this class.

Fig. 25 shows still another variation in malocclusion which also obviously belongs to Class I, as the first molars
and jaws are in normal mesio-distal relations. As the upper
incisors are in marked labial positions, the case, if but
superficially examined, might easily be wrongly diagnosed,
as is often done with similar cases, as belonging to that
distinctive and pronounced type of malocclusion, Division I of
Class II, the distinguishing characteristics and plan of
treatment of which are radically different.

We might give almost without number illustrations of
the various forms which teeth in malposition may assume
in cases belonging to this great class, for the variations
are limitless; yet they would all agree in the essential
characteristics, namely, normal mesio-distal relations of the jaws and first permanent molars.

The effect of malocclusion upon the facial lines is always to disturb their balance and harmony, and this in direct proportion to the extent of the malocclusion. This phase of the subject will be discussed at length in the chapter on Facial Art, as well as in the chapters on Treatment.

**FIG. 25.**

**Class II.**—When from any cause the lower first molars lock distally to normal with the upper first molars on their eruption to the extent of more than one-half the width of one cusp on each side, it must necessarily follow that every succeeding permanent tooth to erupt must also occlude abnormally, all the lower teeth being forced into positions of distal occlusion, thereby causing more or less retrusion, or lack of development, or both, of the entire lower jaw. This condition of distal occlusion is the determining characteristic of this great Class, of which there are two Divisions, each having a subdivision. The great difference in the occlusion of the teeth in these two Divisions is manifest in the positions of the incisors, the one being protrud-
ing and the other retraction, as shown in Figs. 26 and 27. Each of these Divisions has a Subdivision.

Division 1 is characterized by distal occlusion of the teeth of both lateral halves of the lower dental arches, the lower molars having taken this position on their eruption and locking; a narrowed upper arch, lengthened and protruding upper incisors, short and functionless upper lip, lengthened lower incisors, and thickened lower lip which rests cushion-like between the upper and lower incisors, increasing the protrusion of the former and the retrusion of the latter. This form of malocclusion is always accompanied and, at least in its early stages, aggravated, if indeed not caused, by mouth-breathing due to some form of nasal obstruction.

The occlusion of a typical, fully-developed case is shown from the right and left sides in Figs. 28 and 29, where it will be seen, by examining both lateral halves of the dental arches, that all of the occlusal characteristics are manifest. Not only are all of the lower teeth effectively locked in distal occlusion in these cases, but the mandible is also distal in its relation to the maxilla and usually smaller than normal. It is quite normal in form, although the compensating curve of occlusion is greater than normal, due principally to the elevation of the lower incisors from lack of function, while in some instances the lower molars occupy a plane lower than normal in the line of occlusion. The upper arch is always abnormally lengthened and narrowed, as shown in Fig. 30.

It seems unnecessary to add illustrations of other cases belonging to this Division, as there is such remarkable similarity between them, the malocclusion differing principally in the degree of the prominence of the upper incisors, and this depending largely upon the age of the patient, all cases being progressive from the time of the eruption and abnormal locking (into distal occlusion) of the points of the cusps of the lower first permanent molars, as shown in Figs. 31 and 32.

The marring effect on the facial lines of cases belonging to this Class are as constant, noticeable, and pronounced as the degree and peculiarities of the malocclusion. Fig. 33 shows two faces typical of the inharmony of the facial lines caused by this form of malocclusion. We shall, how-
ever, discuss this phase of the subject more at length in the chapters on Facial Art and Treatment.

Subdivision. Division 1 has the same characteristics as the main division, except that the distal occlusion is unilateral, as shown in Fig. 34. The lower left first permanent molar erupting has locked in normal mesio-distal relations, per-

mitting the premolars and canines on this side also to assume normal relations on taking their positions in the arches, while on the right side the lower first permanent molar has erupted and locked in distal occlusion, thereby compelling the lower premolars, canines and incisors also to lock in distal occlusion, and necessitating the distal locking of the lower second and third molars on this side when they erupt. The result of this malocclusion is inharmony
in the relations of the dental arches to the extent of the
width of one premolar tooth.

The lines of the face are of course marred correspond-
ingly to the extent of the malocclusion, and in a manner
similar to the cases of the main division.

Division 2 is characterized specifically also by distal occlu-
sion of the teeth in both lateral halves of the lower dental
arch, indicated by the mesio-distal relations of the first
permanent molars, but with retraction instead of protru-
sion of the upper incisors. In this division there are no
complications from pathological conditions of the nasal
passages, hence the mouth is kept closed the normal
amount of time, and the lips perform their functions
normally, which causes the retraction of the upper incisors
during their eruption until they come in contact with the
already retracted lower incisors, resulting in the crowding
of the upper teeth in the canine region. Such a case is
illustrated in Fig. 35.

In cases belonging to this division there is much similar-
ity, although more variation than in the first division of
this class. The width of the arches is more nearly normal
and there is less abnormal elevation of the lower incisors,
probably on account of their better opportunity for per-
forming their function. There is usually an abnormal
overbite of the upper incisors, naturally resulting from
their being tipped downward and inward from their
normal outward incline, with the teeth of the lower arch
usually quite even and regular as to arrangement.

In the harmonizing of the anterior part of the upper
arch with that of the lower through lip pressure the mal-
arangement of the incisors varies considerably, which,
not infrequently, however, assumes one of two different
and more or less constant types, as well illustrated in Figs.
27 and 35.

Naturally the marring effect on the facial lines, due to
malocclusion, in cases coming under this division is notice-
able and characteristic, as illustrated in Fig. 68, the re-
treating jaw and compressed upper lip alone often making
diagnosis easy.

Subdivision Division 2 has the same characteristics as the
main Division except that one of the lateral halves of the
dental arches only is in distal occlusion, the other being
normal, as in the Subdivision of Division 1. A fully de-
veloped typical case of this kind is shown in Fig. 36. It
will be seen that the molars on the left side have, on
erupting, locked distally to normal, compelling a distal
locking of all the other lower molars and the premolars.
on this side, and the crowding and bunching of the incisors and canines of the upper arch, thereby approximately harmonizing the sizes of the two arches.

The effect of this form of malocclusion on the facial lines is shown in Fig. 70.

Class III, Division 1 is characterized by mesial occlusion in both lateral halves of the dental arches. The extent to which the mesial occlusion must exist in order to place the case in the division of this class is slightly more than one-half the width of a single cusp on each side, as in Figs. 37 and 38, but in cases that have been allowed to develop—and these cases are always progressive—the mesial occlusion becomes greater, even to the full width of a molar, or more, as in Figs. 39 and 40.

In cases belonging to this class the teeth in their respective arches vary from quite regular arrangement to considerable crowding, especially in the upper arch. There is usually a lingual inclination of the lower incisors and canines, which becomes more pronounced as the case progresses, and which is due to the pressure of the lower lip in the effort to close the mouth and disguise the deformity.

Other characteristics are considered in the chapters on Treatment.

In this class the marring of the facial lines is more noticeable and unpleasing than in either of the other
classes, in advanced cases amounting to a striking deformity, as shown in Figs. 608 and 609.

Subdivision. Division 1 differs from the principal Division only in degree, one of the lateral halves of the arch only

being in mesial occlusion, the other being normal, as shown in Fig. 41, the arches crossing in the region of the incisors, which often occasions much loss of their tissue by abrasion. That this classification will be found to embrace all cases met with is more than probable. There still remains, however, one possible class, viz., where one of the lateral halves of the lower arch is in mesial occlusion while the other is in distal occlusion, but cases having these characteristics are so very rare that further reference to them seems unnecessary, the writer having seen but two or three cases.

In diagnosing cases according to the above classification

the reasons previously given, that the uppers are in correct position mesio-distally.

In developing cases of the second and third classes when the teeth of the lower jaw have not locked into distal or mesial occlusion the full width of a cusp on one or both sides, the beginner may be a little puzzled as to the proper classification, but upon careful inspection a majority of the inclined planes will be found to favor one particular Class, Division, or Subdivision, the co-relation of the first molars being, of course, the most important factor, but the other characteristics receiving due consideration.

The loss of a tooth or teeth by extraction is shortly
followed by such marked changes in the positions of the crowns of the remaining teeth as to sometimes render diagnosis more difficult. By the determination of the extent of

Fig. 41.

the tipping of teeth, due to this loss, the case is resolved into its original condition, from which it can be easily diagnosed.

It would be easy to imagine other groups into which cases having similar characteristics in appearance might be assembled, which has been done recently to a confusing number by some writers of the old school, who, basing classification upon superficial symptoms instead of fundamental principles, have arranged cases in classes variously named for one or other conspicuous symptoms, such as "open bite," "saddle-shaped arch," "V-shaped arch," "narrowed upper arch on one side," "narrowed upper arch on both sides," "prominent canines," "inlocked laterals," "protruding upper incisors," "retruding lower incisors," etc., etc. But such classifications are erroneous and doubtless arose from a superficial study of one or the other of the dental arches, without due consideration of their relations, or of the dental apparatus as a whole from the basis of normal occlusion, for these are not true classes but usually only symptoms of causes and may be an accompaniment of cases found in any of the true classes.

A brief recapitulation of the classification is here given for convenience of study and for ready reference:

Class I.—Arches in normal mesial-distal relations.

Class II.—Lower arch distal to normal in its relation to the upper arch.

Division 1.—Bilaterally distal, protruding upper incisors. Primarily, at least, associated with mouth-breathing.

Subdivision.—Unilaterally distal, protruding upper incisors. Primarily, at least, associated with mouth-breathing.

Division 2.—Bilaterally distal, retruding upper incisors. Normal breathers.

Subdivision.—Unilaterally distal, retruding upper incisors. Normal breathers.

Class III.—Lower arch mesial to normal in its relation to upper arch.

Division.—Bilaterally mesial.

Subdivision.—Unilaterally mesial.
Out of several thousand cases of malocclusion examined, the proportion per thousand belonging to each class was as follows:

Class I. ........................................ 692
Class II.
   Division 1. ................................  90
   Subdivision ................................  34
   Division 2. ................................  42
   Subdivision ................................ 100

Class III.
   Division .................................... 34
   Subdivision ................................  8

1000

A writer of a recent text-book, in making use of the author's classification, has abridged it by omitting to name the Classes, Divisions, and Subdivisions, using only the terms "unilaterally mesial or distal," "bilaterally mesial 
or distal," etc. A moment's reflection should convince any thoughtful person of the grave error of such an incomplete classification in treating of a subject involving such great variations and complexities as malocclusion of the teeth. For if a case is spoken of as simply in unilateral or bilateral distal occlusion it would convey only a very imperfect description of its true condition, as under such a classification it might belong to one or the other of a great group of deformities whose general characteristics differ greatly in other respects and call for widely differing plans of treatment. In other words, it would not classify with any definiteness and would necessitate a lengthy description in order to convey to the listener's mind its true condition; while under the author's classification if a case be spoken of as belonging to a certain Class, Division, or Subdivision,