THE RELATIONS OF THE DENTAL ARCHES TO PATHOLOGIC AFFECTIONS OF THE NASOPHARYNX AND ADJACENT PARTS.*

E. A. BOGUE, D.D.S., M.D.
NEW YORK CITY.

It is singular that a science or an art may progress for centuries on the borderland of important discoveries and fail of making them.

Adenoids were discovered only a little more than fifty years ago. The proper, normal arrangement of human dental arches was discovered less than twenty-five years ago. The intimate relation between these two discoveries has just begun to be understood. Until normal dental arches were discovered we did not know what proper mastication was nor the conditions necessary to its performance. These conditions comprise the full set of adult teeth standing in proper relations to each other.

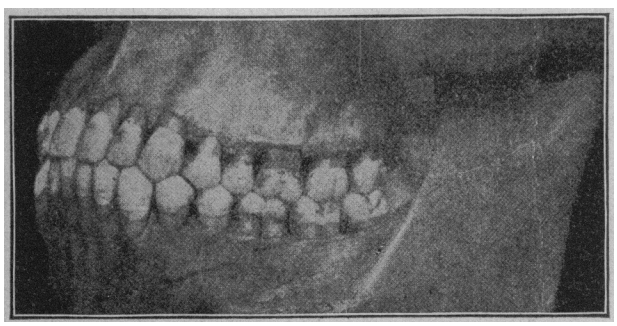
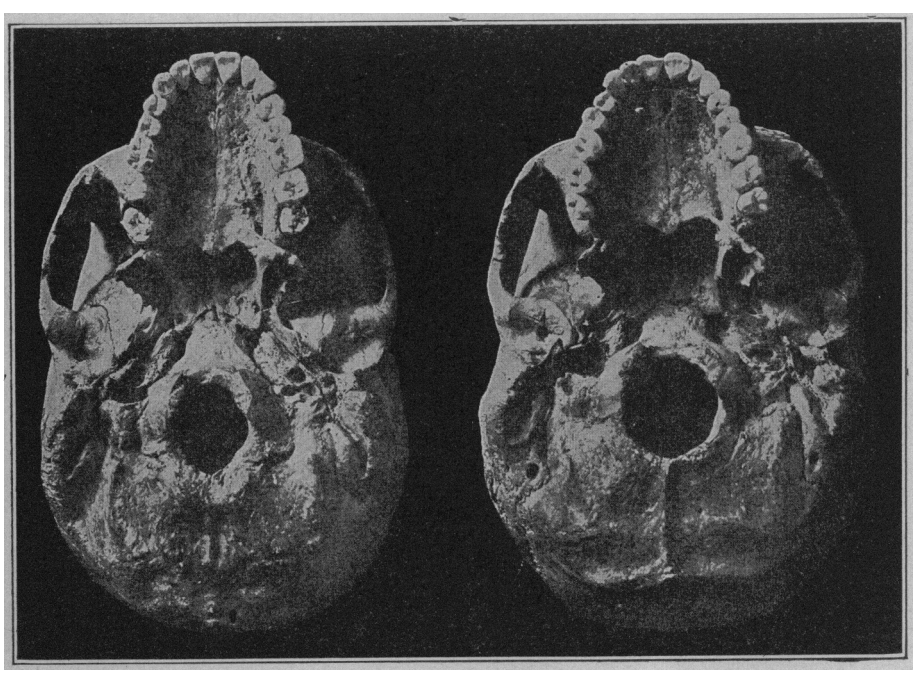


Fig. 1.—Normal dental arches showing the articulation of the teeth when in correct occlusion.



Figs. 6 and 7.—Two skulls with apparently perfect dental arches; 6 is according to measurements; 7 is too narrow. The nasal fossæ in 6 are ample; in 7 they seem insufficient; 6 must have been the skull of a vigorous person with a resonant voice, who lived to middle age, at least; 7 belonged to an individual who was frail and delicate and who died before reaching twenty years of age.

Now that we know something about the proper size and relations of the dental arches, we know how mastication should be performed to get the greatest degree of vigor from the food we consume, and we know what steps should be taken to permit the child afflicted with adenoids to close its mouth.

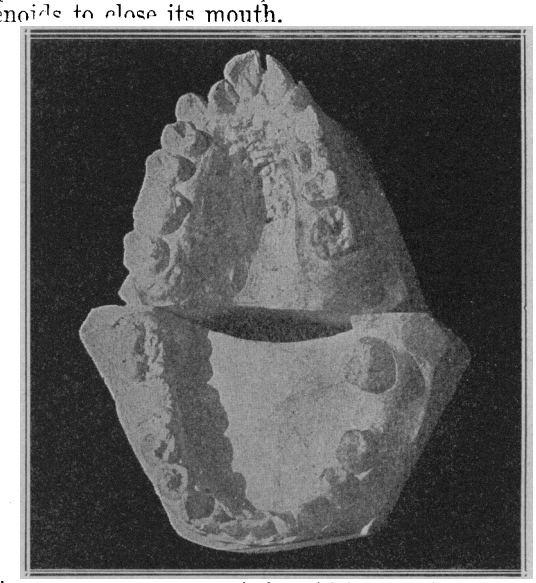


Fig. 8. Showing result of the withdrawal of the tongue of a mouth breather from its place in the roof of the mouth, confining its action to the mandible.

Dr. I. B. Davenport of Paris discovered in 1886 what normal dental arches were; also that in civilized communities normal dental arches were rare. A few years afterward the late Dr. Bonwill of Philadelphia discovered that a mathematical relation existed between the width of the permanent upper central and lateral incisors and cuspid and the entire arch, and from the measurements of these three teeth he was able to construct the entire arch as it should be when normal (Fig. 1).

When thus normally arranged, it is found that all the teeth growing in one jaw articulate with the teeth of the other jaw so as to furnish the largest area of grinding surface. The cusps and the sides of the cusps, and the sulci into which they fit, all combine to furnish not only the best masticating surfaces, but to form dental arches that for strength and durability can not in the human species be excelled. The cusps of all the grinding teeth in such arches, interlocking with their antagonists, prevent any variation in position of any of the teeth either laterally or anteroposteriorly.

Dr. Hawley of Columbus, Ohio, recognizing these facts, adapted Dr. Bonwill's discovery to the use of the orthodontist. The result is that to-day by measuring the width of one upper central incisor we may determine approximately the shape and size of the arch in which that tooth belongs, and may draw it on paper so accurately that we may work to that arch with confidence.

* Read in the Section on Diseases of Children at the Fifty-eighth Annual Session of the American Medical Association, June, 1907. Some of the illustrations and part of the text have been omitted, but the article will appear in full in the reprints and in the Transactions of the Section.

If there is any slight variation in the sizes of the various teeth in the same mouth, and we work up to the model, Nature will make all proper correction in the way of diminution and adjustment to type without assistance, and at the same time without any injury to size or strength or the adaptation of the arches to each other (Figs. 6 and 7).

When, therefore, irregular teeth and narrow dental arches are found, with the characteristic physiognomy that we all recognize as associated with adenoids, we expect in nearly all cases to find not only nasal stenosis, but that the irregularity of the teeth is in proportion to the degree of deflection in the nasal septum and diminution in the nasal passages.

Having had this idea impressed by clinical experiences, I went in March, 1905, to the Smithsonian Institution at Washington and spent a week examining skulls, mostly aborigines, together with a number of children's skulls of mixed origin. I carefully examined all of the children's skulls, and as many of the adult ones containing fairly good sets of teeth, as I could master in that length of time. In all the skulls that I examined a pronounced deflection in the nasal septum was invariably accompanied by an irregularity of the dental arches, greater or less according to the deflection of the septum.

I had not time to examine carefully with the necessary measurements as to whether the height of the palatal arch bore in all cases a direct relation to the irregularity of the teeth, and, therefore, consequently to the straightness of the nasal septum. In a number of cases, however, I felt sure that this was the case. I think that a high V-shaped arch of the palate becomes lower by spreading slowly the arch of the upper teeth laterally to their correct normal positions. In a growing child, however, the ordinary arch may become higher from spreading, but from the limited length of time in which these cases have been under observation no more positive statement can yet be made.

As I have learned to look on the etiology of lymphoid growths as being generally identical with that of more or less narrow dental arches, I shall associate the two affections in our consideration.

I want to show that if taken early, say at about the sixth or possibly the seventh year, the correction of irregularities in the positions of the temporary teeth corrects impending irregularities in the permanent teeth. That process results not only in an enlargement of the dental arch, but, so far as is now known, in a straightening of the nasal septum by spreading the upper maxillary arch, gaining a consequent enlargement of the nasal passages and incidentally of all the adjacent bones of the face, nose and head.

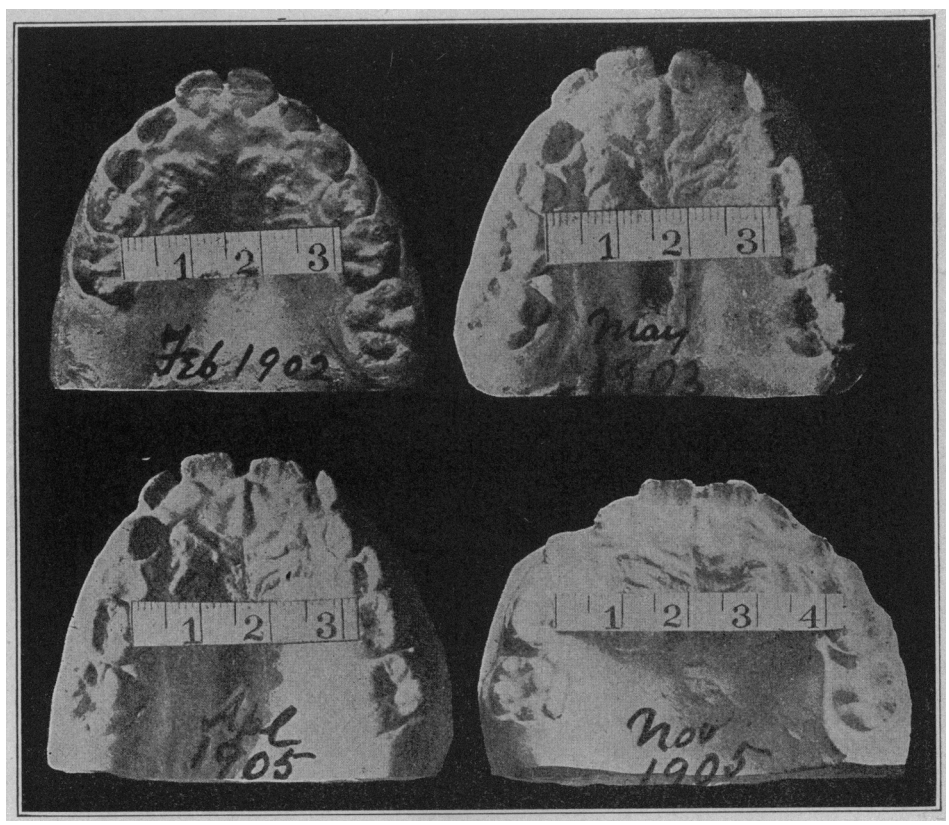


Fig. 9.—Four models of the same mouth showing scarcely any lateral growth for three years and a lateral enlargement of 1 cm. in seven months after an expansion arch had been adjusted.

I want to show, too, that the diagnosis of impending irregularities in and among the permanent teeth is almost as clear at six years of age or earlier, while the temporary teeth are still in the mouth, as at twelve when the permanent teeth are visible.

I wish to show that operations for rectifying the conditions above mentioned are more safely performed, with less pain, with apparently less general disturbance to the nervous system and more quickly than at any later period in life.

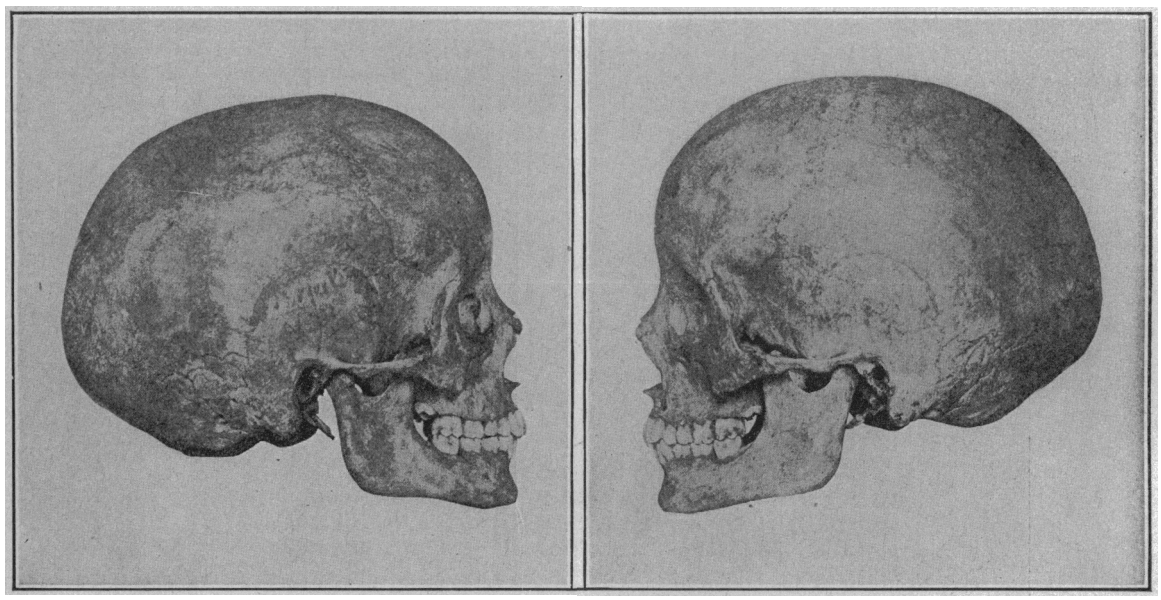
These operations, performed thus early, are more likely to remain permanently successful than if done at a later period, and that they have an influence which we can but little appreciate on the permanent well-being of the individual in after life. Vocalization, enunciation, mastication and breathing are brought nearer to

perfection than they could otherwise be, and the personal appearance is much improved.

It seems to me that in many, if not most, of the cases of contracted arches and adenoids, influences that came into operation after birth, and which we can understand much better than we understand heredity, are largely responsible for these conditions.

The statement that the tongue within, and the cheeks and lips without, are the main instrumentalities in the formation of the dental arches from the early stages of embryonic life, right on until maturity, is not by any means new; yet few practitioners realize the muscular and mechanical power of the tongue.

A few days since I undertook to prevent a lad of ten years from placing his tongue over a tooth that I wished to examine. Three fingers and my thumb holding a mouth mirror were unable to control its movements. This muscular organ, when the mouth is closed, lies against the roof of the mouth, and as it grows its lateral enlargement presses the dental arches outward, and so enlarges the upper jaw to its proper size, as well as the lower jaw or mandible against, which it is always pressing (Fig. 8). Inflammatory conditions, coupled with this withdrawal of the tongue, inevitably arrest the development of these parts. The cysts of the permanent teeth remain bunched in their insufficient spaces, and year after year goes by with scarcely any perceptible variation in the width of the upper jaw (Fig. 9). The attending physician may advise an operation. But usually, long before the mother consents to surgical interference, the arrest in development of the jaw, nose and adjacent parts has been established.



Figs. 12 and 13.—Two sides of the same skull. Articulation incorrect on one side (Fig. 12) and correct on the other (Fig. 13).

The constant breathing through the mouth, the dragging influence of the muscles of the jaws and cheeks, all combine to keep the arch of the jaw narrow and to prevent the healthy normal flow of lymph. But worst of all, this mouth-breathing causes the withdrawal of the muscular and pushing tongue from its place in the roof of the mouth, where by the growth and constant pressure of that tongue the lateral growth of the upper jaw is promoted.

This withdrawal of the tongue not only allows the arch of the jaw to remain narrow, but it causes the eruptive force of the teeth to be expended in an antero-

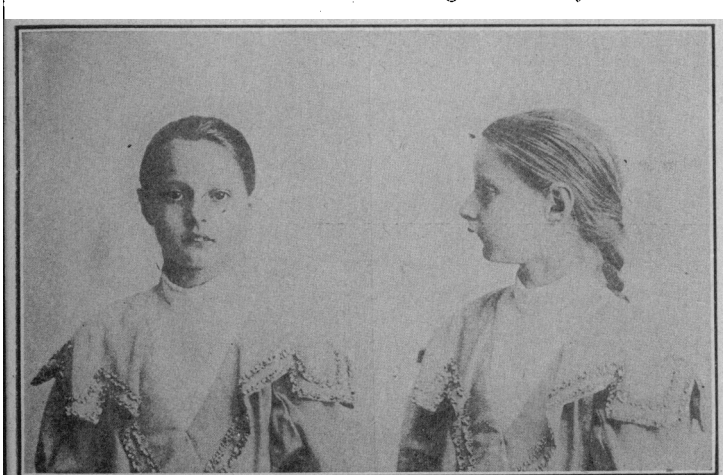


Fig. 14.—Showing progress made in about four months by a patient. Appearance of patient at time of applying apparatus, Oct. 27, 1906.

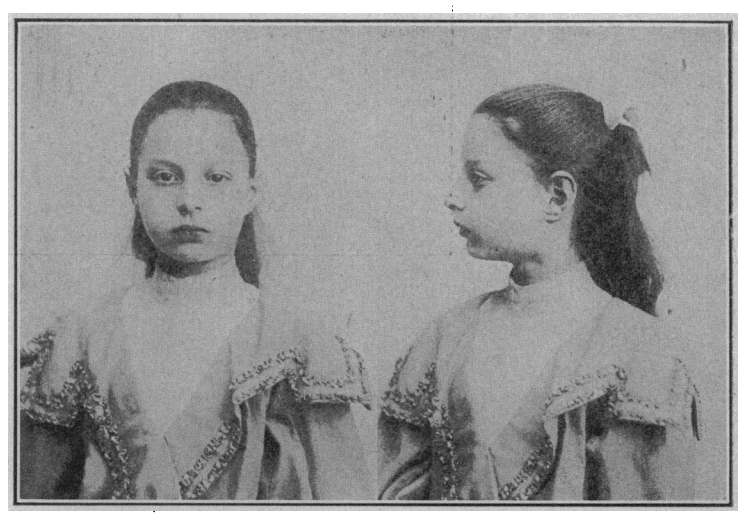


Fig. 15.—Same patient as shown in Fig. 14 after wearing apparatus. Taken Feb. 22, 1907.

posterior direction. From the time mouth-breathing is established, lateral growth is almost excluded till relief is afforded by surgical means. Surgical interference will, of course, generally be considered necessary, and might mean either an operation on the adenoids, or the faucial tonsils, or both, or the relief afforded by orthodontia, or all three.

If orthodontia is resorted to, either before or after operation for adenoids, and the operation can be begun about the sixth year, the crypts of the upper bicuspid teeth will at that age be lying embraced by the three roots of the deciduous molars, and will themselves have no roots.

When, therefore, the deciduous molars are moved into the positions they ought to occupy they carry with them these crypts of the permanent teeth, which, after the deciduous teeth have fallen out, develop their own roots in the positions to which they have been transported and become rooted there. No injury has been inflicted on the permanent teeth by the appliances used in orthodontia and the retaining appliances, being attached to the deciduous teeth, fall off when these teeth are lost, having fulfilled their function of retaining in position the teeth that have been moved until they have become firmly established.

The operation on tonsils or adenoids alone is not always successful in restoring nasal breathing. Just recently a lad of about eight years of age, who had been operated on twice for adenoids, still continued to breathe through the mouth until an expansion arch was placed on his teeth, when in a few weeks, without his attention having been called to it, he voluntarily closed his mouth and began breathing through his nose even in sleep.

While the adenoid operation in cases of narrow arches is not always successful in restoring nasal breathing, it is never successful in restoring the harmony of the features, the power of correct articulation, or the power of thorough and normal mastication. This requires a special operation, an expansion laterally of one or both dental arches, and a bringing into articulation and—so far as possible—into regularity all malarticulated teeth.

This process, as already stated, when undertaken at a very early age, tends toward a normal enlargement and development, not only of the upper jaw and the nasal passages, but of the other bones lying above the upper maxillary, thus ensuring greater regularity in size and position of the antra and all the other sinuses of the face (Fig. 11).

The early diagnosis of cases of irregularity is readily made if one carefully notices the articulation of the deciduous molars (Figs. 12 and 13). In normal cases the articulation is always correct; that is, the anterior cusp of the lower second deciduous molar articulates forward of the corresponding deciduous molar above, and the upper molar is astride the buccal row of cusps of the lower molars.

Whenever these upper and lower deciduous molars articulate in any other way than this, there is sure to be irregularity in the permanent teeth if they are allowed to develop without interference. The reason for this is, as has already been shown, that the crown of the permanent tooth is embraced by the roots of the deciduous molar.

If the first permanent molars, which erupt immediately posterior to and in contact with the second deciduous molars, are not properly articulated, it will be impossible that the other grinding teeth should be. If the upper arch is abnormally small, we may be certain that there will not be room for the anterior permanent teeth unless an enlargement of the arch is resorted to.

If such enlargement takes place sufficiently early for the roots of the permanent teeth to be formed after their crowns shall have been drawn into correct positions, there will never be irregularities in the positions of these teeth, and it follows, of course, that they will stay where they belong.

The articulation of regularly arranged permanent teeth, when all the members of the arches are present, is such that nothing short of a fracturing force can dislocate them. The regularity of the teeth in normal arches is also one of the chief factors in their resistance to decay, for the teeth are then in position, if they are properly formed, to be practically self-cleansing, if the food taken in is of the right sort and is thoroughly masticated.

Dental decay always comes from agencies external to the teeth; so if they can be kept clean automatically or otherwise, there will be no decay. Defects in formation, of course, preclude the possibility of automatic cleansing.

DEFORMITIES OF THE VULVA FROM EARLY AND LATE INDURATING EDEMA.

ROBERT W. TAYLOR, M.D.

NEW YORK CITY.

(*Concluded from page 101.*)

KRAUROSIS-LIKE CONDITION.

In the early days of the previous case there were appearances which suggested that form of atrophy called kraurosis vulvæ. Now it is generally admitted that this affection begins in a quasi-inflammatory manner, with pain and pruritus and hyperemia of the mucous membrane, localized at first at the clitoris and urethral orifice, and from there extending in a serpiginous manner over the whole vulva. Very soon hyperplastic and atrophic changes set in. In one of my cases coincident with the subsidence of the infiltration, atrophy gradually developed and persistently progressed. In two years the large and small labia had nearly disappeared, and looked like atrophic tissue covered with membrane which resembled cracked or crumpled parchment of a dirty brown color. The structure of the mucosa was entirely obliterated. The vulva no longer protruded; the clitoris was obliterated; and the parts around the urethra and vagina were stenosed by a leucoplakia-like tissue, which was shriveled and shrunken.

These conditions certainly were kraurotic; indeed, from my studies I am led to believe that kraurosis vulvæ is not an affection *sui generis*, but that it develops from a number of conditions—vaginitis, vulvitis, vaginal discharges and uterine disorders. In my cases the kraurotic conditions were only remotely connected with syphilis.

LEUCOPLAKIA AND EPITHELIOMA.

Another case of mine was that of a woman, 54 years old, in whom indurating edema of the vulva went on to atrophy, with the peculiar parchment-like wrinkle of the tissues. In the vulvar sulcus a leucoplakic condition developed and lasted for several years, when epithelioma developed and in two years the growth reached the size depicted in Figure 8. In this case the early symptomatology was largely that of kraurosis vulvæ. Following the atrophy, hyperplasia of the epithelium of the vulva