

# The Interception of the Open Bite in the Early Growth Period

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"Orthodontics is a study of dental and oral development; it seeks to determine the factors which control growth processes to the end that a normal, functional and anatomical relationship of these parts may be realized, and aims to learn the influences necessary to maintain such conditions once established."<sup>1</sup>

This profound definition has never been more applicable to any other phase of orthodontics than that of the open bite, its etiology and correction.

Caravelli (1842)<sup>2</sup> was the first to introduce the term "open bite" as a separate class from those already described by his predecessors while J. Lefonlon (1841)<sup>2</sup> advanced the biological phenomenon and mentions that irregularities are due to:

- 1) external muscular forces as the lips and cheeks,
- 2) internal muscular forces as the tongue,
- 3) occlusal forces.

He also recognized that sounds of speech could be causative factor for displacement of teeth as the result of tongue pressure.

The multiplicity of ideas pertaining to the etiology and treatment for the open bite are many and each one is deserving of close scrutiny in the light of the present-day understanding of growth patterns as described by Björk.<sup>3</sup> Etiology, as discussed by Hansen, Barnard and Case<sup>4</sup> documents the many conflicting opinions among the authors.

Straub<sup>5</sup> has advanced the theory of poor development to improper swallowing habits as the result of bottle feeding and has been a strong proponent of correcting open bite with speech therapy.

In turning to the textbooks for the methods of correction, one is confronted with a philosophy that extends to the areas of physiological, psychological, surgical, and mechanical forces of correction.<sup>1, 2, 6, 7, 8, 9, 10</sup>

Personal experiences with relapse in treating open-bite cases with vertical elastics, as advocated by Anderson, McCoy, Strang, and in many other texts printed before 1950, discouraged the acceptance of open-bite cases.

Anderson had little success in using the chin-cap and headcap, but Graber<sup>11</sup> has found that this appliance renders the best response in his practice.

McDonald<sup>8</sup> recommends removable and fixed appliances as well as the simple act of having the child learn to swallow holding a melting mint in the roof of his mouth with the tip of the tongue.

The fact that there is no single method of correcting the open bite has led the orthodontist to turn in ever increasing numbers to the speech therapists who are now being confronted with their share of the untreatable cases. What is the answer?

Frank<sup>12</sup> chides the orthodontist noting that he often does not have sufficient background in speech therapy or is unwilling to participate completely in the teamwork approach to the correction of speech disorders.

Snidecor<sup>13</sup> offers the suggestion that the majority of the open-bite cases need to be evaluated by the speech and hearing therapist in coordination with the orthodontist during the growth period. Following the orthodontic interceptive treatment, the patient should be returned to the speech therapist for a final evaluation of six to eight weeks.

Bloomer<sup>14</sup> states, "In studying these disorders it is not always possible to identify separate and distinct symptomatology and, indeed, the conditions seldom occur discretely. We do not even have a complete list of diagnostic terms which specifically relate the symptoms and the causes."

Richardson<sup>15</sup> notes that the lower anterior face height is significantly greater on the average in open-bite cases than in deep overbite cases. Also, the jaw and joint angles are significantly larger in cases exhibiting open bite.

No author makes any suggestion of the possibility that there could be a displacement of the supposedly constant development of the alveolar bone in which the removal of the causative factors releases or redirects growth into a favorable responsive direction attaining its full potential and extent of growth.

Björk has shown that in individuals the face alters dramatically during the teenage period and concludes that in cases of backward rotation, opening of the bite is difficult to prevent. It has been his policy to postpone treatment until the pubertal growth spurt is nearly over and delay extraction until then.

Without the sophisticated equipment that registers condyle position, and implants that reflect the directional growth, the orthodontist should reflect on a number of factors:

1. The implant technique is in its early stages of evaluation.
2. The vertical and horizontal growth patterns are not always constant.
3. The alveolar process and teeth often reflect the total functional balance or imbalance among muscle, ligaments, and the direction and extent of bone growth.
4. Displaced teeth or alveolar bone may be a causative factor for a continuation of an adverse growth pattern where poor function and skeletal relationship exist.

5. Will the implant technique show a remodeling of skeletal bone growth beyond the accepted change in tooth and alveolar process in long-term changes in muscular repositioning? (This should not be confused with the extent of bone growth.)

The etiology of the open-bite case is well documented in literature, and yet the orthodontist must constantly be aware of the dynamic and complex alveolar growth relationships which may eventually lead to the strong pressures that are exerted on the teeth and alveolar bone by the tongue and surrounding musculature which coordinate with one another to make the necessary seal in swallowing. The frequency for the need to swallow is well known.<sup>16</sup>

A great percentage of open-bite cases can be directly attributed to an unbroken constant and persistent thumb-sucking habit that eventually displaces the vertical incisal relationship between the anterior maxillary and mandibular structures. Thus the tongue in the swallowing act intrudes into this vacant area, even though the thumb habit may no longer be present. The growth pattern of teeth and bone permits the development of a noticeable speech defect on the part of the patient, which compounds the developing malocclusion. This is found particularly in using words containing the "s" or "z" sounds, where a "th" sound is usually substituted, with the tongue extruding farther anteriorly than in normal speech to fill the open gap.

Once the normal seal of the tongue during the swallowing act has been interrupted, it now may be further aggravated by many other impediments that eventually encourage a forward tongue-thrust.

In the study by Hanson, Barnard, and Case and in research by Peat,<sup>17</sup> Ricketts<sup>18</sup> and Klein<sup>19</sup> and others, a number of the hypothetical causes of

open bite may be enumerated, namely:

1. Narrowly constricted upper arch with a unilateral or a bilateral crossbite.
2. Enlarged tonsils and adenoids that prevent the tongue from moving posteriorly during deglutition.
3. Macroglossia.
4. Thumb sucking.
5. Early feeding methods and upper respiratory problems.
6. Tongue position.
7. Tongue and lip balance.
8. Mouth breathing, chronic tonsillitis and allergies.
9. Inherited maxillary arch which favors the development of tongue thrust.
10. Anesthetic tongue.
11. Rough rugae.

One or more of the above, combined with a steep mandibular plane angle or a poor growth pattern, and the orthodontist can plainly see that he is faced with a severe problem. Added to these can be a host of other clinically observable etiological factors among which are sharp fillings or broken sharp-edged teeth, frenums that separate anterior teeth, prematurely lost deciduous teeth, deeply grooved and infected tongues in which the individuals find relief by scraping on the incisal edges of the upper anteriors. Add to this the unknown etiological factors of musculature and related bony structure, glandular disturbances, neurological problems, organic disturbances, psychological problems, and we have the orthodontic nightmare!

For many years pedodontists and orthodontists have limited their mechanical therapy in open-bite cases to appliances that met with halfhearted approval of the psychiatrist and the pediatrician, but which were not the most desirable to the dental profession. To avoid a serious confrontation by our

learned brethren, the frustrated orthodontist turned to speech therapy in the hopes of redirecting the abnormal tongue problems which seemingly caused much of the unfavorable alveolar and dental growth. However, treatment of this type of malocclusion with speech therapy has been found only partially effective and, as Graber<sup>16</sup> so aptly stated, "Speech therapists became tongue tamers. They soon found that lion taming was more successful."

Failure to attain responses from speech therapy has been one of the orthodontist's avenues of escape from treating the open-bite case, because if the youngster failed to respond to the speech therapy, many of our leading orthodontists excused themselves gracefully from the need for appliance therapy<sup>20</sup> knowing that in most instances the completed case would be, at best, a compromise.

The orthodontist often hesitates to intervene when he hears of the numerous self-correcting open bites. It is quite possible that many of the self-corrected open-bite cases recorded in the literature take place during the transition from a mixed dentition to a permanent dentition when the posterior deciduous teeth are lost. The tongue automatically expands laterally to make a seal in the swallowing act, thus changing a forward tongue thrust habit to the posterior area during which time the anterior teeth and alveolar bone erupt to a normal position.

Until the recent study presented by Haryett, Hansen, Davidson, and Sandilands,<sup>21</sup> many of the necessary forms of desired appliance therapy designed by the dental profession had to be held in restraint by a fear of warping the patient's personality and acquiring symptom substitutions. The Canadian research team, in its extensive study, indicated that there is no increase in the percentage of psychological problems that develop, regardless of the form of

mechanical therapy, when there is good patient-dentist relationship. The study reported that the greatest percentage of successfully treated open-bite cases were those that had the palatal crib reinforced by spurs in conjunction with psychological indoctrination. Their sampling of sixty-six cases did not elaborate on cephalometric measurements nor can their case load be considered sufficient for "research" conclusions, but their project is of great significance in view of the conflicting philosophies of etiology and treatment.

In reviewing portions of the literature and having personally tried many of the recommended types of corrective appliances, it is interesting to note that many of the controls were placed in a position that confined the tongue distal to a theoretical horizontal line between the maxillary cuspids which is supposed to allow room anteriorly for the downward and backward growth of the anterior portion of the maxilla and incisors. Conversely, there have been other illustrations showing the tongue-thrust cribs resting directly on the cingulums of the maxillary anterior teeth and, in effect, seemingly negating the opportunity for the downward growth of bone and teeth in the anterior portion of the maxilla.

The blunted hay rake was without a doubt this writer's most successful appliance and, on numerous occasions after attaining the desired rapport with the patient and the parents, these prongs were sharpened to the point of drawing blood on the soft tissue pad of the persistent thumb sucker; but here again success was not always the rule. It was noted that the directional position of the prongs at times controlled either the tongue or the thumb, but only seldom were both of the alleged contributing causes controlled at the same time, particularly in the steep mandibular-plane angle open-bite cases.

An attempt was then made to search

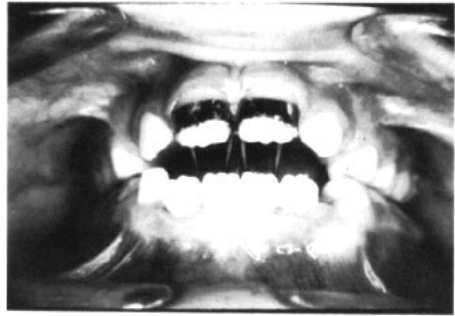


Fig. 1

for a more desirable approach to control the thumb and tongue simultaneously.

It is not uncommon for men to attend lectures, hear ideas expressed by others, then some years later without recalling where, when, or how the idea originated, incorporate into his practice something he thinks is new. Such is the type of appliance that has been employed totally or in part in the following cases. Fortunately, I was able to learn that this idea was possibly first used before 1945 by Dr. William R. Humphries of Denver, Colorado before chrome alloys could be electrically soldered without removing the temper in the metal.

The device is simple, two bands placed on the upper incisors, to which .040 or .036 round wire extensions are directed downward and lingually to telescope lingual to the lower central incisors when the mandible is in a closed position, Fig. 1. Occasionally, the two bands are joined together by solder or bars for greater stability. As the open bite improves, the wires are shortened. Occasionally, the shortened spurs are continued into the active treatment phase of banding. This appliance now has given the tongue a controlled larger "ball park" and a definite instant reminder to "keep the thumb out of the mouth."

If the orthodontist finds spaces in both upper and lower arches as the re-

sult of macroglossia, he should incorporate shortened prongs one and one half mm in length directed lingually during the full banding for treatment purposes in the anterior portion of the maxillary arch and leave one mm of the mandibular anterior pinch bands untrimmed on the lingual surface in order to produce an irritant to the anterior peripheral portion of the tongue.

It is expected that the operator will use prudent judgment about any appliance that is an irritant.

The following case reports illustrate the obvious changes that were noted in seven varying types of open-bite malocclusions.

#### CASE 1

Patient, R. R., a girl was seven years of age at the time the records were obtained, Fig. 2. There was a Class I malocclusion with a maxillary protrusion and a cross bite on the right side as well as an extreme open bite in the anterior incisal area. The patient also had a diastema in the maxillary arch with fibrous tissue passing between the central incisors and attaching into the palatine papilla. Though the patient was a persistent thumb sucker and tongue thruster her medical history was excellent and there was no problem regarding this phase of treatment. Speech therapy had been indicated by the school department but was considered by the speech therapist to be beyond his realm of control.

#### *Treatment*

At the age of seven years and eight months two bands were placed on the maxillary central incisors with four .040 wire prongs soldered to the lingual surfaces of the bands extending to a point lingual to the mandibular incisal edges so that in the swallowing act the .040 wires restrained the tongue from moving forward into the open space. Treat-

ment was simple and, as the bite closed, the wire prongs were cut shorter and periodically redirected for incisal clearance in the closed position. The prongs were needle sharp and directed in such a manner that the soft pad of the thumb was punctured on the first few visits following the placement of the appliance. The tongue had no indication of irritation. Cooperation in the patient was only fifty per cent; following the cementation the patient had sixteen appointments during the course of treatment, eight of which were failures. Bands were removed ten months later and the patient was referred to the oral surgeon for a maxillary frenectomy.

No further appliances were placed or used during the subsequent five years of observation, Fig. 2, right.

#### CONCLUSIONS

- 1) The cross bite was self-correcting.
- 2) The maxillary diastema was self-correcting following the surgery.
- 3) The open bite was corrected in ten months with two single bands with prongs. Chewing sugarless gum two hours a day during and following treatment was considered helpful during and after the course of treatment.

#### CASE 2

Patient L. L. was a seven year old girl when the records were first taken, Fig. 3. She had a Class I open-bite malocclusion with a persistent thumb-sucking habit, speech problems and tongue-thrusting problems with a large fibrous maxillary frenum. A mild diastema was apparent in the maxillary arch. The medical history was normal but the patient was extremely tense and nervous during the early stages of becoming acquainted.

#### *Treatment*

Two bands were placed on the upper

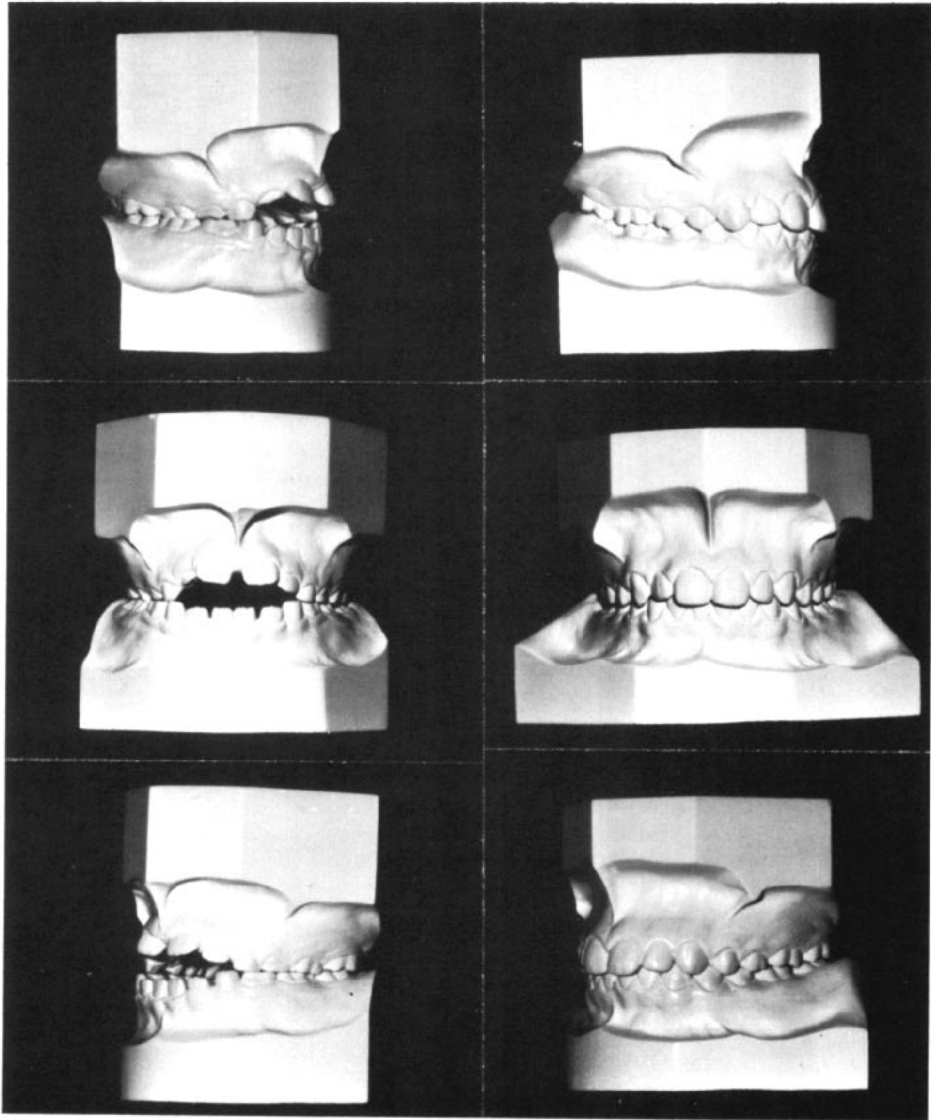


Fig. 2

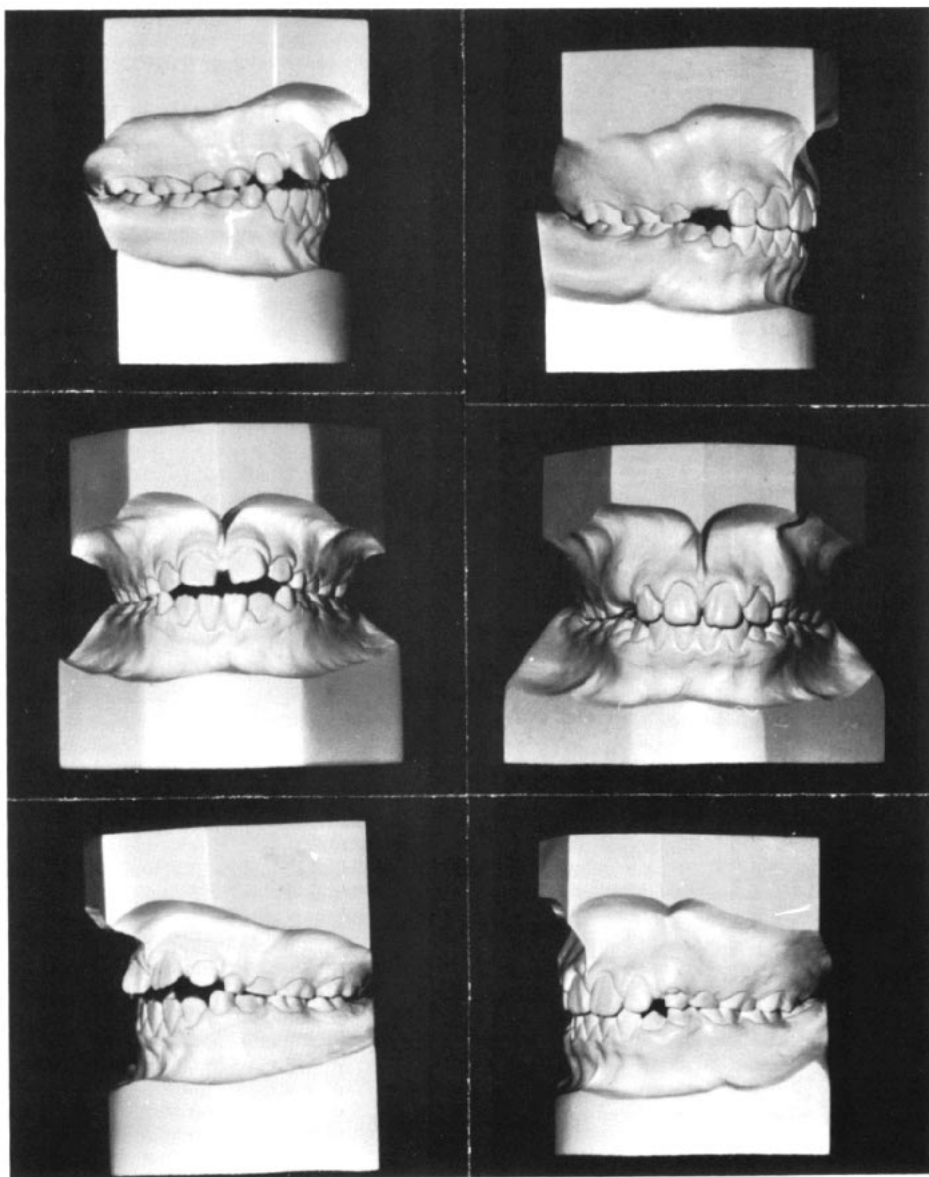


Fig. 3

central incisors with four soldered .030 wires directed lingually and downward in order to restrain the tongue and thumb sucking. Bands were removed four months later because the irritation was apparently causing the tongue to be inflamed. It was apparent in the headfilms, taken at the age of seven years four months, that the .030 wires were bent nearly horizontal and were the cause for the irritation to the tongue. The individual bands on the central incisors were removed and the maxillary arch banded. The four maxillary anteriors and the two first molars were banded and short blunt spurs attached to the lingual surfaces of the upper central incisor bands. It took nine months to level the arch and to close the spaces between the upper anterior teeth. A Kloehn headgear was used for three of the nine months at night time and the patient was instructed to chew sugarless gum a minimum of two hours a day.

Bands were removed and an upper retainer was delivered to the patient who was placed under observation. The frenum was not treated surgically.

There is no indication that spurs alone were helpful toward correction of this case; perhaps they were placed at an unfavorable angle and were not enough to withstand the chewing stresses that this patient exerted during closure. When the bands were placed with short spurs and a headgear used along with chewing sugarless gum, a favorable response to the closing of the open bite was rapid. It has retained its stability for twenty-two months. There is no indication of mandibular plane angle opening from the use of the headgear, Figs. 4 and 5.

### CASE 3

R. DeB., a girl, was seven years old at the time the records were obtained, Fig. 6. She had a Class I malocclusion with an open bite, reverse swallowing

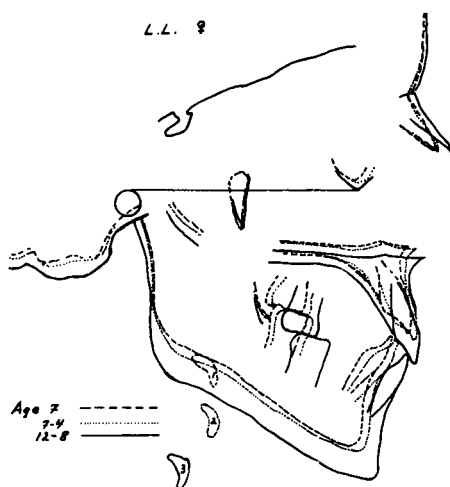


Fig. 4

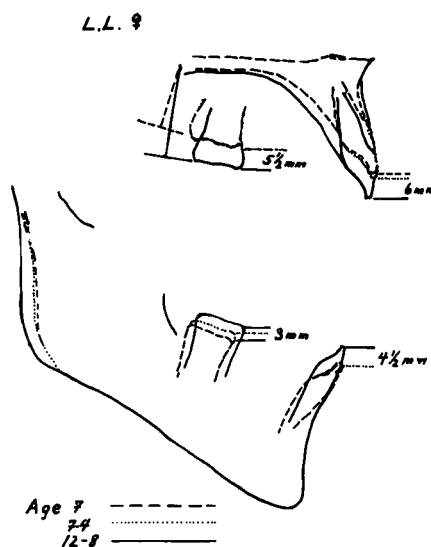
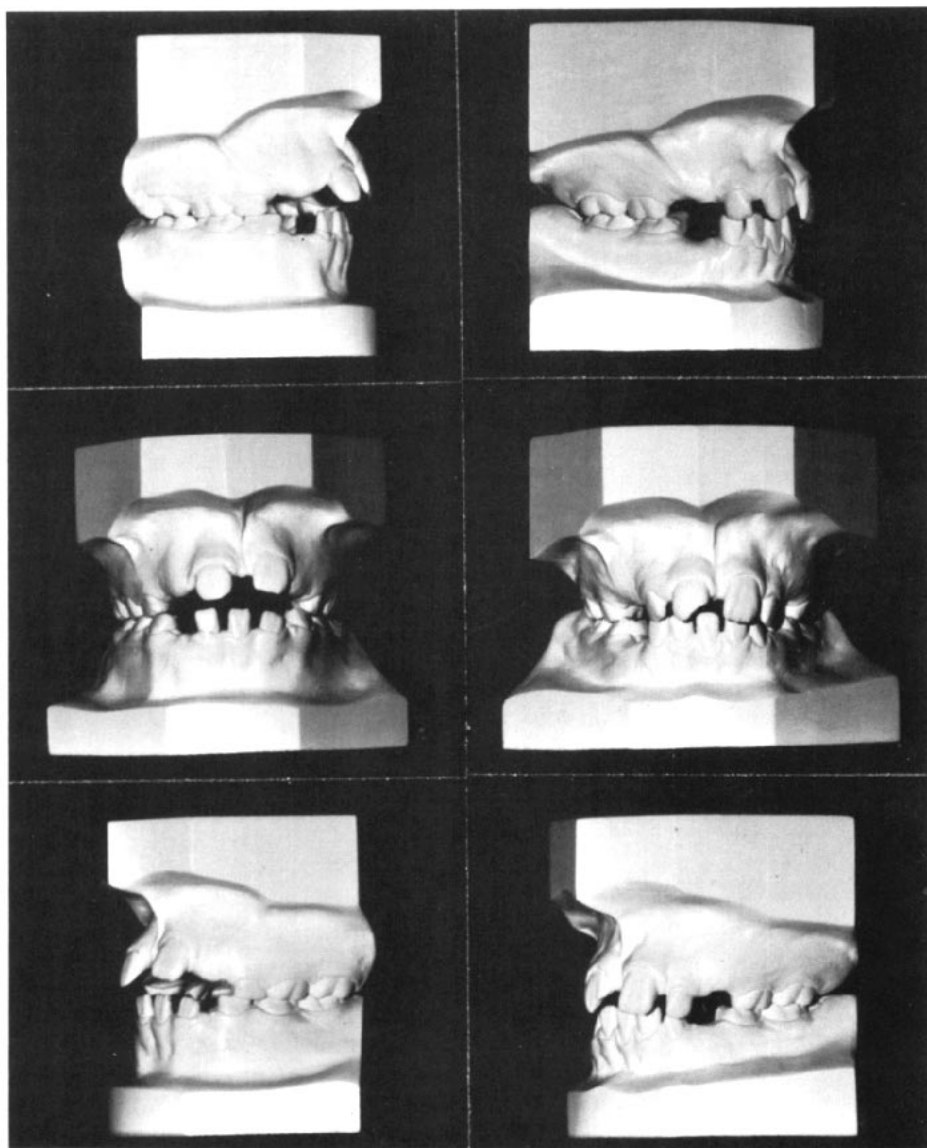


Fig. 5

tongue habit, a maxillary diastema and a frenum between the upper central incisors complicated by a lingual version of the maxillary laterals with the unerupted permanent cuspids crowded between the laterals and the unerupted first premolars. Roentgenographic examination of the mandibular arch showed a similar arch crowding. Speech deficiencies were markedly apparent.



**Fig. 6**

### Treatment

Two bands with .040 spurs were placed on the maxillary centrals. Bands were removed nineteen months later following a noticeable improvement in speech and in the closure of the open bite. Observation has continued for two years while an interceptive guidance program is being conducted.

The cephalometric tracings of this case and all others are superimposed on SN, registered on S; the maxillae on the palatal planes and ANS; the mandibles on the lower border and pogonion.

It is interesting to note the eruptive pattern of the lateral incisors shows 7 mm of descent from the palatal plane while the maxillary molars and the centrals show a 0 to 0 ratio of descent, Figs. 7 and 8. In comparing the vertical growth of the mandibular molars and centrals superimposed on the lower border of the mandible at pogonion, the mandibular incisors have a 2.5 mm greater growth vertically than the mandibular molars.

### CASE 4

Patient D. D., a girl 8 years 1 month of age at the time the records were obtained. There was a Class I anterior open bite with a cross bite on the right side of the molar region, Fig. 9. This patient had a persistent thumb habit, tongue thrust habit, speech impediment, but a wonderful, calm, mature and intelligent outlook on life. The patient was receiving medication for a kidney infection, otherwise there was no abnormal medical history.

### Treatment

Because of the cross bite in the molar region and the need for control of the thumb and tongue, a lingual arch was constructed for expansion of the molar area; soldered to the anterior portion of the lingual arch were four sharp prongs directed downward and placed

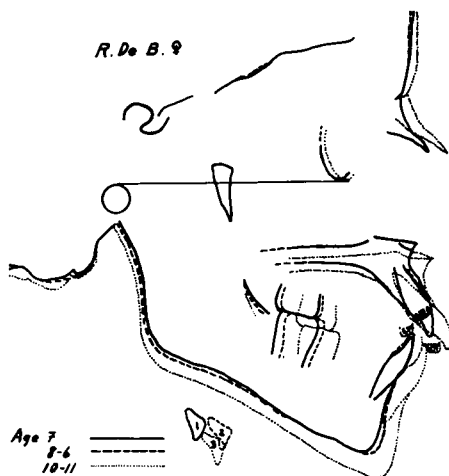


Fig. 7

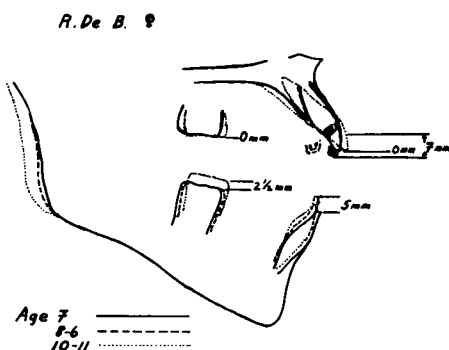
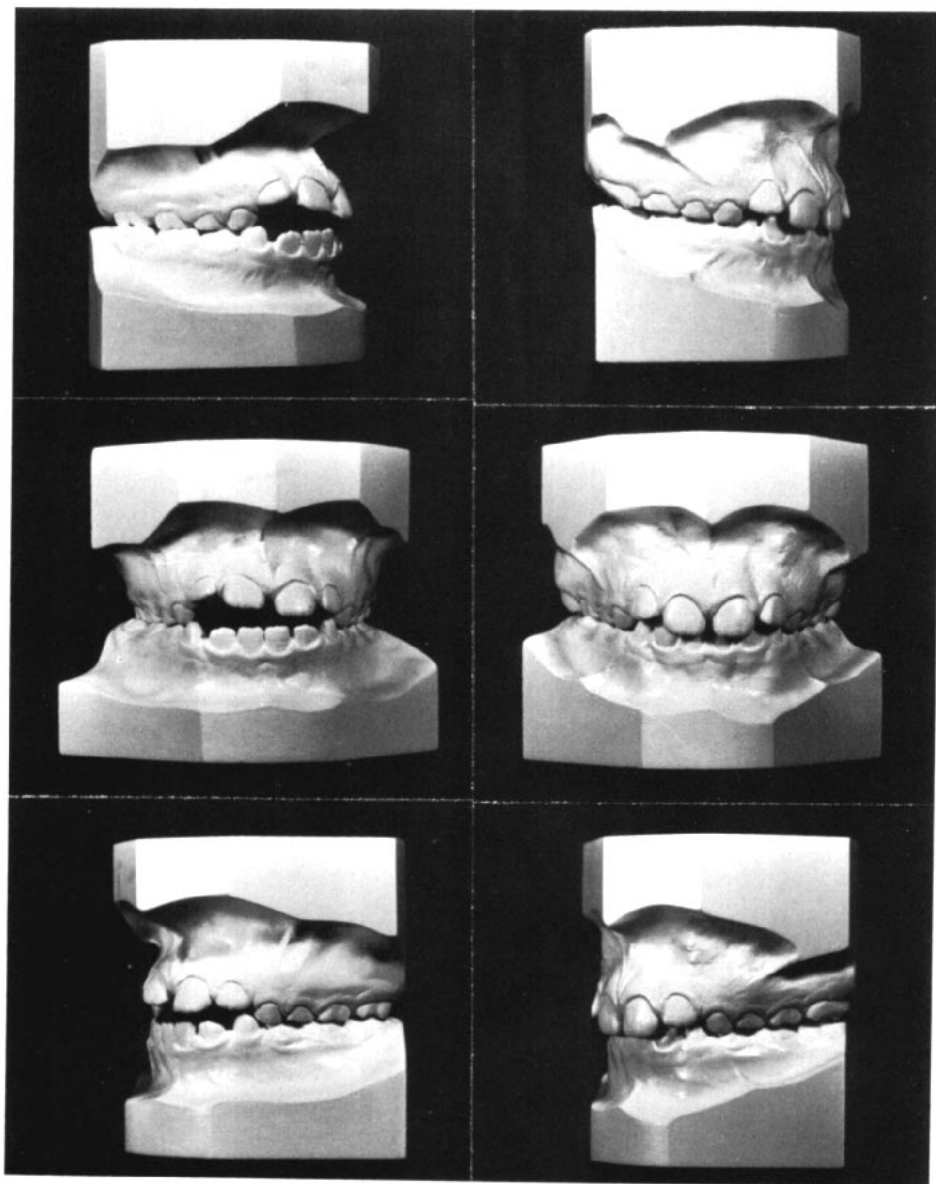


Fig. 8

in such a manner as to telescope behind the lower central incisors when the mandible was in closed position.

The appliance was removed eight months later with the cross bite corrected and the apparent cause of the open bite completely controlled, Fig. 9 right.

There is an indication of a favorable (and possible release of alveolar) growth in the anterior portions of both the maxilla and mandible with the interceptive appliance that was used to correct the open bite, Figs. 10 and 11. Observation has continued since the removal of the bands two and one half years ago. Complete banding will be initiated in the near future following

**Fig. 9**

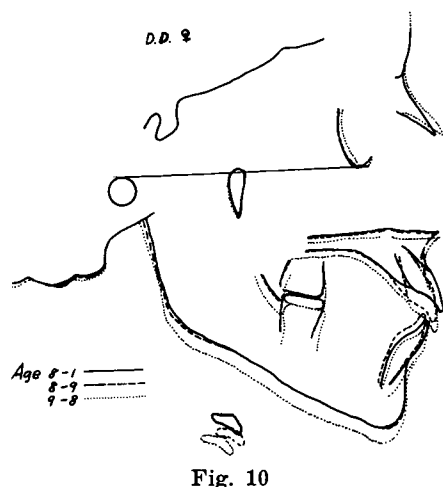


Fig. 10

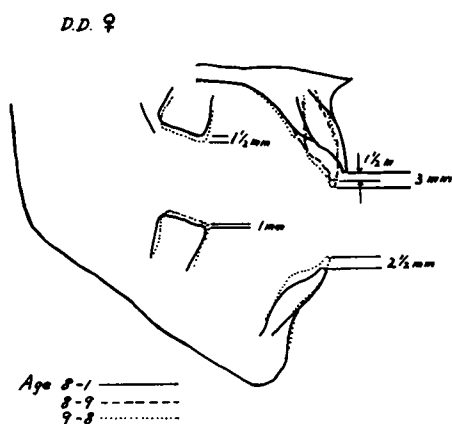


Fig. 11

the eruption of the second premolars.

This case shows the excellent control that is exhibited by the combination of a lingual arch for expansion and spurs attached to its anterior curved portion for the control of the thumb and tongue thrusting condition.

#### CASE 5

Patient B. S. was a girl age nine at the time the records were taken. Models disclosed a Class I extreme open bite with a cross bite on the left posterior segment, Fig. 12. The open-bite malocclusion was aggravated by thumb

sucking, mouth breathing, tongue thrusting, inarticulate speech and an apparent macroglossia. The medical history was favorable.

#### Treatment

It was felt that any attempt to correct the cross bite with a split-palate appliance or lingual arch would increase the open bite, therefore the upper centrals were banded with sharp spurs to arrest the tongue thrust and the thumb sucking habit.

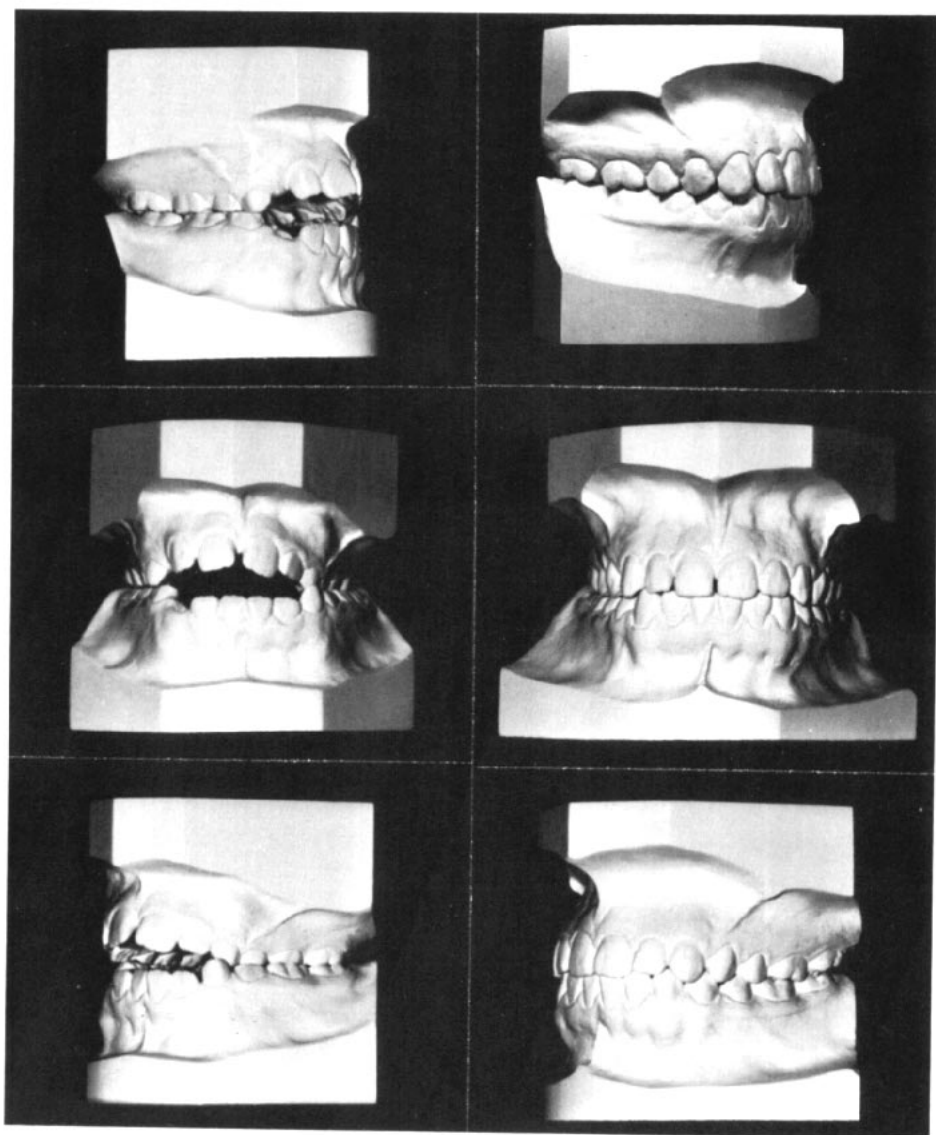
Response was slow yet apparent. Cooperation in appointments with the patient and the parent was less than fifty per cent. After twelve months of slow change, sugarless chewing gum was prescribed for two hours a day.

Full banding was initiated twenty-six months after spurs were first placed; during that time there was an indication of a separate growth response in the anterior portion of the maxilla and mandible. A maxillary lingual arch was used to assist in the cross bite correction as well as cross elastics in the posterior region.

Thirty-three months later the bands were removed; it must be noted that sixty per cent of the appointments had been cancelled or failed and, contrary to my avid dislike for this type of therapy, in the final two months vertical elastics were used to assist in the final vertical closure of the maxillary and mandibular anteriors.

Retention was a combination of an upper retainer and a lower cuspid to cuspid with vertical spurs soldered to the lingual bar extending 1 mm above the incisal edge (as used by Rathbone). This cuspid to cuspid arch was removed four months later. The case has maintained stability for twelve months, Fig. 12 right.

The maxillary and mandibular incisors have exhibited a greater incremental growth vertically than the posteriors with the mandibular incisors dis-

**Fig. 12**

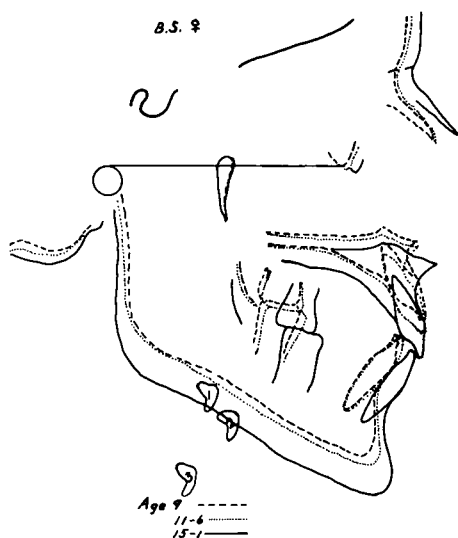


Fig. 13

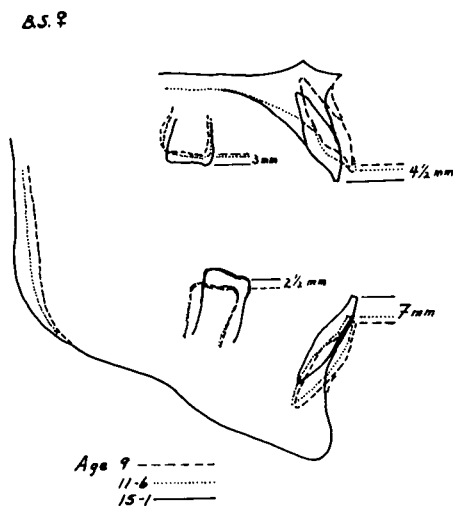


Fig. 14

playing a greater degree of growth, Figs. 13 and 14.

Sugarless gum chewing is continuing as a functional form of therapy.

#### CASE 6

Patient N.S. was a girl 5 years and 6 months of age.

There was a Class II extreme open

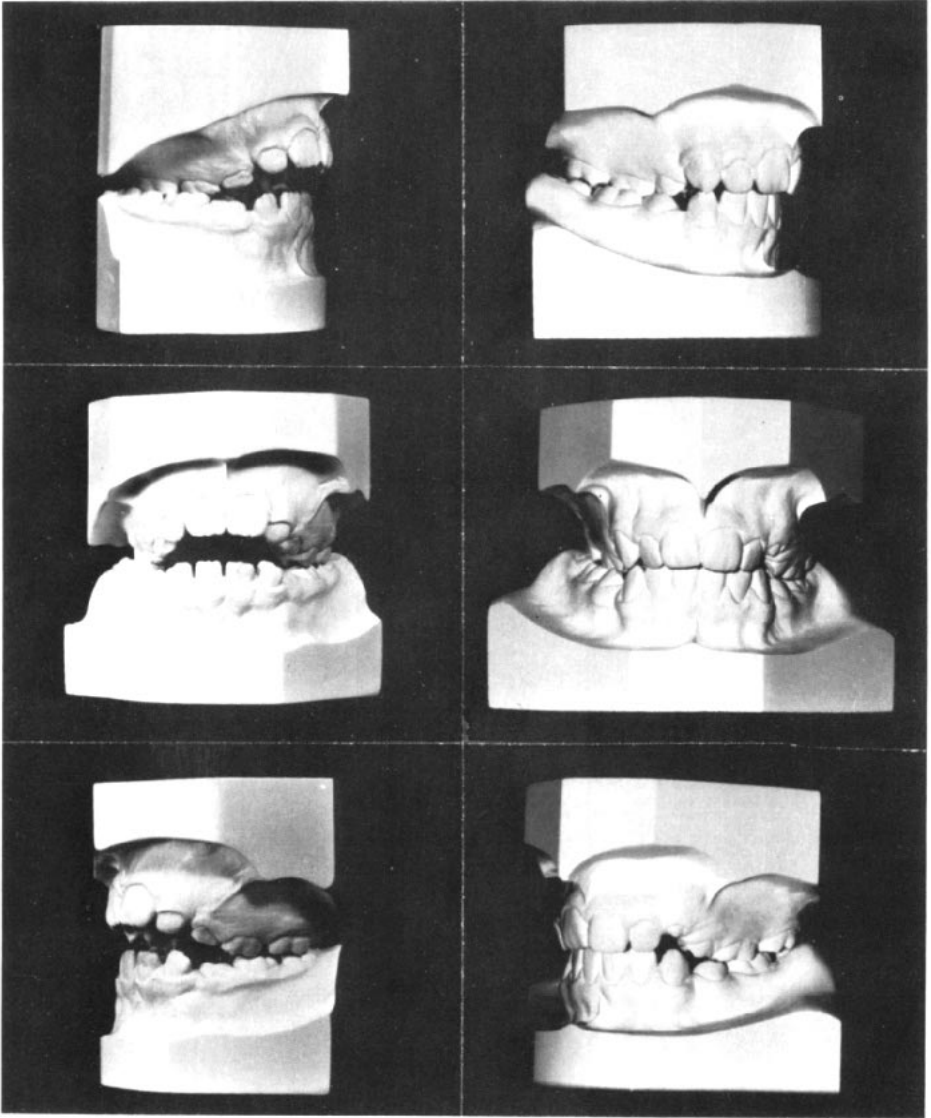
bite with a bilateral cross bite (Fig. 15). This case had been dismissed by other orthodontists to await surgery at maturity. The patient was a mouth breather, thumb sucker and had allergies as well as large tonsils and impaired speech; she also had an extremely unfavorable growth pattern.

#### Treatment

It was decided that the extremely steep mandibular plane angle would increase if the posterior segments were expanded, and the open bite would become unmanageable. The tonsils were removed and, at the age of 6 years 7 months, the maxillary central incisors were banded with lingually soldered .040 round wire spurs directed to a position slightly behind and below the incisal edge of the mandibular incisors. Sugarless gum chewing was prescribed for two hours a day.

Fifteen months later there was a marked change in the anterior open bite. Superimposing the headfilm on SN at S disclosed six mm of maxillary alveolar and incisal growth that had taken place in the anterior segment, Figs. 16 and 17. The maxillary molars appeared to have assumed a more vertical alignment and allowed the mandible to swing upward and forward. This is the reverse of Root's Class III treatment.

Any fixed appliance cemented to the maxillary first molars would not have permitted the uprighting of these teeth and would have prevented the favorable angle change that took place in the mandible. No other form of treatment was used during this period except periodically shortening the spurs and redirecting their angulation. Four months later it was decided that the premature extraction of the first premolars was necessary to allow the permanent cuspids to erupt into more favorable positions. The spurs continued in use and at the age of 10 years 11 months treatment was initiated for the



**Fig. 15**

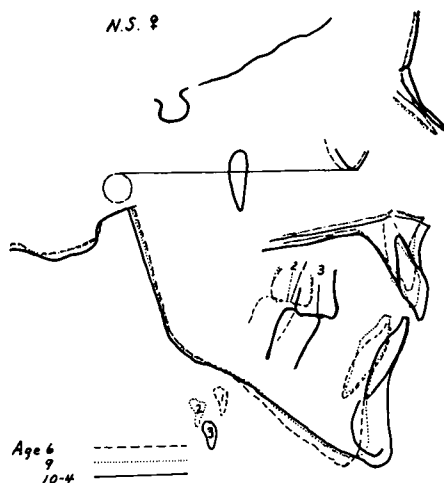


Fig. 16

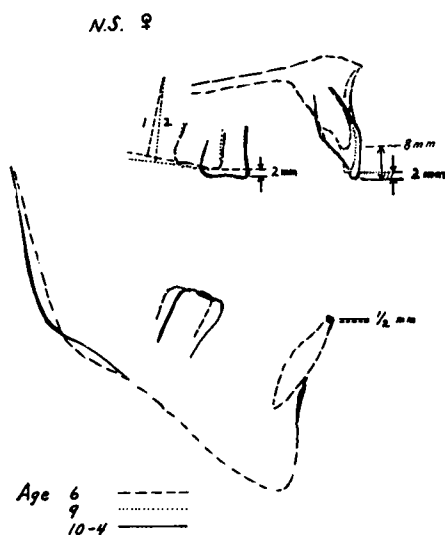


Fig. 17

removal of the maxillary first molars. (Prior to the removal of these teeth an x-ray evaluation had been made of the usefulness of the third molars. It was decided that there was a favorable chance that the future eruption of the third molars would eventually replace the space occupied by the second molar). The maxillary second molars were in a more advantageous position for

expansion and it was mechanically possible to use reciprocal force for moving the second molars mesially and the second premolars and cuspids distally. Treatment is still in force ten months from the date of full banding. Progress is excellent.

The open bite is completely under control and the new mandibular plane angle has remained stable.

Note that no vertical elastics have been used to date.

### CASE 7

Patient E. W., a boy, was 13 years 1 month of age at the time records were obtained. There was a Class I (Fig. 18) open bite with a cross bite in the upper right first and second premolar area. There was an apparent accompanying double protrusion with a steep mandibular plane angle.

There was no history of thumb sucking but the medical history of asthma and speech impairment was considered as one of the primary causes for the open bite.

### Treatment

Bands were placed on the maxillary central incisors with four sharp .045 prongs directed lingually and downward to restrain the tongue from extruding into the anterior open bite during swallowing.

Favorable changes were noted in the open bite in six months with this single type of control, so a separate maxillary lingual arch was constructed with a light .020 finger spring soldered on the right side to correct the cross bite in the maxillary first and second bicuspid area.

Full banding was initiated at age fourteen followed by the extraction of all four first premolars. The maxillary space closure was accomplished with a Lasher prong facebow while the mandibular cuspids were retracted with an R. M. closing loop spring. The man-



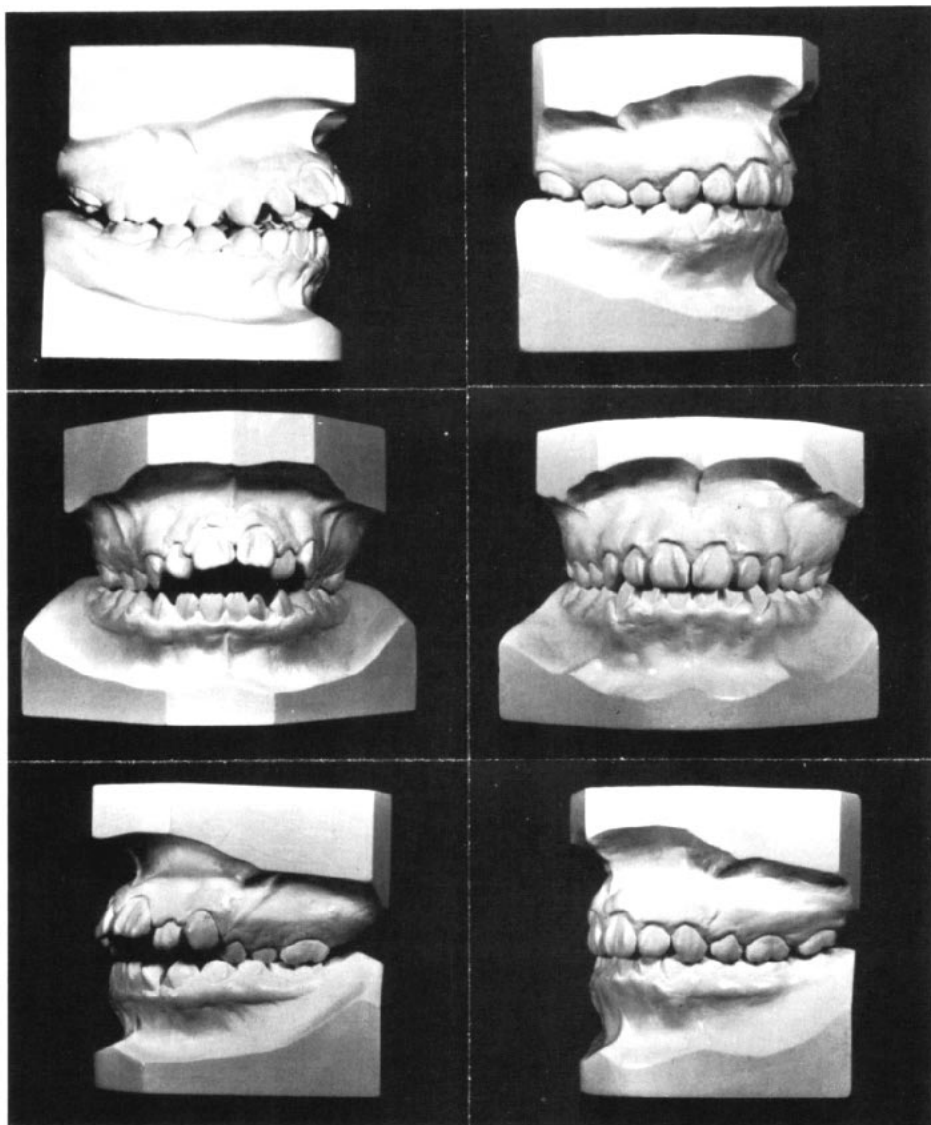


Fig. 18

dibular anteriors were subsequently retracted with an .016 square arch with vertical loops. Light elastics were worn for a midline correction in the anterior portion of the arches for three weeks prior to the removal of the bands. The second phase of treatment time was nineteen months. No vertical elastics were used.

A positioner was used for eight months and sugarless gum chewing was prescribed for two hours during the day.

#### Comments

Excellent growth and distal movement was attained in the anterior portion of the maxillary and mandibular bone and tooth structure.

Much of the favorable result, Fig. 18, can be attributed to the arrest of the tongue-thrust habit, correction of the cross bite, and extraction of the first premolars. Extraction of the teeth permitted the total distal movement and actual bending of the alveolar bone in "Arc of Contraction," Figs. 19 and 20. This contraction assisted in the closing of the open bite. Normal function of the teeth and jaws has improved the speech.

#### DISCUSSION

To discuss the individual open-bite case in all aspects it would be extremely helpful to bring the knowledge of the speech and hearing pathologist, otolaryngologist, physician, dentist, and orthodontist to the round table to develop a complementary teamwork for the benefit of the patient.

A simple therapy for a tongue and thumb inhibitor has been presented which does not permit the continuation of either objectionable habit. During the period of therapy it must be recognized by all parties concerned that the patient will not be able to eat or speak in a normal manner. The speech pathologist will readily recognize that func-

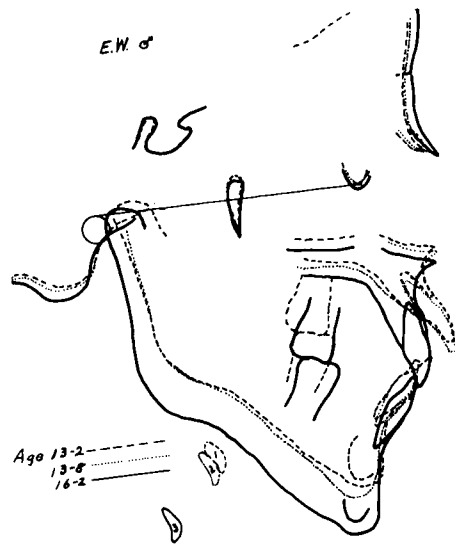


Fig. 19

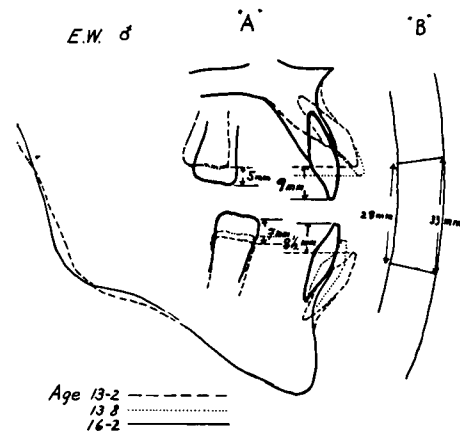


Fig. 20

tional therapeutic relationship of the tongue to speech must be postponed until there is a more favorable incisal relationship between opposing jaws. The parents must be made aware of the fact that biting into sandwiches and leaving the slice of meat untouched by the patient will be continued until the open bite has closed. It is a fruitful reward for the orthodontist to see the day when the patient can perform the

normal acts of mastication with the anterior teeth and hear the speech therapist say, "Dismissed."

There is a hypothetical implication that a mandible will swing downward and backward in steep mandibular growth patterns if the erupting molars do not upright from improved function on the posterior units. Impairing the freedom of the first molars by banding in the posterior area with tissue rest of the appliance in the maxillary anterior area may prolong or increase the open-bite malocclusion. Correction of second molar cross bites can frequently develop a wedge action that produces an open bite that challenges the mechanical ingenuity of any clinician.

The "Arc of Contraction" must be considered as an asset when extraction of premolars is utilized, because here is an automatic assistance for closing the open bite if the anchorage is protected.

The open-bite case discussion would not be complete unless one included a brief note regarding those cases in which the orthodontist creates an anterior open bite using individual cemented guide planes<sup>22</sup> purposely to acquire a repositioning of extruded linguallally-locked incisors in the maxillary arch. To discuss this treatment in its entirety would involve a complete thesis because in the treatment of this type of case the orthodontist must be aware of several factors:

1. The speed of controlling the cross bite without excessive trauma to the tissue.
2. The desirability of attempting to treat the case utilizing the physiological force controls.
3. The avoidance, if possible, of any appliance therapy that first intrudes the roots of the teeth in cross bite, risking possible root resorption of teeth or pulpal involvement, and then later extrudes the tooth or teeth in the final realignment of the arch.

4. The avoidance of prolonged use of any form of bite-opening appliance in which the posterior teeth are out of occlusion for an extended period of time, thus instigating a possible elongation in the posterior segments in which the seal is broken during swallowing creating a progressive anterior opening of the bite.

At the conclusion of a favorably treated open-bite case it would be wise for the orthodontist to refer the case to the speech therapist for evaluation and treatment.

Those cases that seem to treat with favorable results regardless of the type of therapy are in the mixed dentition with a good growth pattern, displaying unilateral cross bite or no cross bite with broad malar processes, good palatal width with favorable vertical and horizontal growth and a low mandibular plane angle.

#### SUMMARY

Evidence presented by Haryett, Hansen, Davidson and Sandilands<sup>21</sup> in their study indicates that the orthodontist no longer needs to limit his treatment to mild forms of appliance therapy in the correction of severe open-bite cases. The operator, who has good rapport with a patient who is truly desirous of breaking the thumb-sucking or tongue-thrusting habit, may judiciously use a sharp-pronged inhibiting appliance without fear of creating undesirable psychological problems or displaced habits.

Sharp prongs, electrically soldered on the lingual aspect of the maxillary central incisors which are directed downward and backward and extend approximately one mm below the incisal edge of the lingual surface of the mandibular central incisors, offer these advantages:

1. The tongue has greater intraoral

freedom not found in the presently acceptable intraoral appliances.

2. Permits the tongue to seek a more natural rest position.
3. Eliminates much of the need for pretreatment speech therapy.
4. They are easily reduced in length and can be effectively redirected as the bone and tooth structure responds to treatment.
5. Can be incorporated into full-banded cases during the active period of treatment.
6. Bands can be reinforced with solder and joined together for greater strength in incisal stress; short additional spurs can be soldered at right angles for specific persistent tongue habits.
7. The roots of the maxillary incisors are less subject to trauma than those of the lower central incisors when they are banded individually with spurs.
8. Uprighting of the distally angulated maxillary molars may arrest the beginning of a posterior wedge action that would increase the open-bite malocclusion.

Perhaps the most important aspect of this type of therapy is that there is greater freedom from mechanical controls on the posterior and the anterior teeth, which in turn permits the environmental structures to adapt more harmoniously to the interplay of function between bone, teeth, and musculature in growth.

The limited number of cephalometrically treated cases indicates that with sharp prongs soldered to the maxillary central incisors, there are growth responses and changes that involve more than the acceptable belief "that most of the treatment will have to be devoted, as a rule, to vertical movement of the maxillary teeth."<sup>8</sup>

It is apparent that three separate or combined changes can take place in the

correction of an open-bite case when sequence cephalometric tracings are compared superimposing on SN at S and then comparing the individual superimposition of the mandible (lower border of mandible and pogonion) and the maxilla (anterior nasal spine and palatal plane).

1. Mandibular plane angle can change.
2. Maxillary and mandibular incisors erupt with relative equality.
3. Occasionally maxillary incisors erupt to a greater extent than mandibular incisors and vice versa.

One cannot conclude a presentation of this type without being concerned with the cross bite of the anterior teeth. Anterior cross bite of individual or multiple teeth will often necessitate mechanical intervention that can produce a posterior or anterior open bite. A simple guide-plane on the malposed anterior unit offers a physiologically nontraumatic appliance that in the swallowing act gently controls the repositioning of the teeth in cross bite in contrast to the unmeasurable mechanical forces often found in other forms of treatment philosophies for this malocclusion.

Chewing of sugarless gum appears to be very helpful in developing a more positive control for completion of many orthodontic cases because of the built-in functional form of therapy.

Finally, it is recommended to orthodontists to throw away the analysis sheets in open-bite cases, be patient, and enjoy the fruits of whatever success you may have in gaining knowledge and skills in this highly unpredictable type of growth pattern.

In reflection on the importance of speech, one may refer to the work of Choy<sup>23</sup> in his evaluation of Hawaiian skulls. No open bites were recorded. The "S", "T", and "Z" sounds are not in the native Hawaiian language which

contains only twelve letters; most of the vowel-consonant combinations require a lateral posterior expansion of the musculature of the tongue. This might be catalogued as just one small spoke in the total number of supports to the cog in the wheel that develops favorable occlusion. One must also look at the history of their relaxed living, the diet, the fun of singing Hawaiian folk songs, and the total enjoyment of life which was no doubt passed on to the unfrazustrated offspring who found little need to suck the thumb, which is frequently the precursor to the cause of the open-bite case.

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