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SPECIALISATION POLICY

A policy is a statement of a course of action decided on by a person or persons and the A.S.O.'s policy on specialisation was well discussed and debated both in the state branches and at the General Meeting in Melbourne before its adoption in March, 1973.

As stated in the A.S.O. Newsletter No. 1, copies of the policy were sent to various bodies in Australia for their information. As a result of this several replies requested more detailed information concerning the Society's criteria for selecting "approved institutions" and, in particular, the names of these institutions.

It is clear then that the Society will have to examine this question again and following a meeting of the A.S.O. Federal Council in Adelaide on 2nd March, the policy will be discussed at a General Meeting to be held in Sydney on Monday, 16th July, during the XXth Australian Dental Congress and the 61st Annual Session of the F.D.I.

The essential requirement of the policy is the period of two years' full-time training in which all clinical sessions should be directly supervised by university staff. The syllabus of the course should, in general, include most of the subjects specified by the A.S.O., but it is recognised that teaching institutions will, of course, conduct their courses in relation to their own particular interests and facilities. This recognition of institutions and of individual courses must be decided on their merits.

At present, the specialisation policy is used as the basis for considering applications for full membership of the Society, but correspondence with other bodies who have been sent a copy of our policy indicates that it is under consideration for their adoption also.

One important reason for establishing and announcing the policy was for the guidance of the state Dental Boards, and hopefully, to provide a starting point for the establishment of a national specialist register under the aegis of a General Dental Council of Australia.

J.F.R.
RECOGNITION AND DOCUMENTATION OF ORAL CLEFT CONDITIONS

K. GODFREY, M.D.S.*

In everyday practice, an orthodontist employs some kind of sorting-out process by which he distinguishes classes or types of clinical problems. These he then relates, from his storehouse of clinical experience to certain sets of clinical treatment objectives and procedures. Any practitioner would be hard put to refute the thesis that he follows fairly fixed formulae for dealing with the types of malocclusion, even allowing for other relevant treatment variables, such as age, sex and socio-economic class of his patients.

The practitioner might tend to put the malocclusions associated with oral cleft states into a further sorting category. This interpretation may not be fully justifiable, because he would likely further distinguish clefts of patients which involved the alveolar process from those which did not. Also, he could fairly readily separate bilateral clefts of the alveolus from unilateral clefts, and he might accept "degrees of severity" of malocclusions among those patients with cleft defects. Of course, there might be an inclination to support a still-prevailing attitude that any such malocclusion problem is always significantly severe. It was with such a philosophy that Draker (1960) developed his HLD malocclusion severity index which enabled New York children with oral and facial clefts to participate fully in the advantages of dental care offered in the State's crippled children's health care program.

Such categorization, i.e. "severe", of all cleft conditions, although justifiable as an expression of social conscience, might conceivably be psychologically detrimental to the individual child, or to his parents. There are numbers of children who, having had their basic surgical care satisfactorily completed, develop no more than "run-of-the-mill" malocclusions, or simply minor local malpositions of teeth. Yet these people are singled out for special attention, even over-zealous attention at times, suffering the stigma of being called "handicapped" or "crippled".

There is an additional and acceptable notion among orthodontists that cleft conditions may superimpose their peculiar influences on the basic development of the dental occlusion. Thus, an individual could have had predispositions to a particular type of occlusion or malocclusion which has become modified in varying manner by growth and development process associated with the particular cleft condition. There are further possible compounding factors, such as inferred by Friedl and Pruzansky (1972) in their question: "How can we separate the effects due to surgery from those incident on growth?" These writers, along with numerous others, and numbers of individual "Cleft Palate Clinics", have been concerned with the important activity of evaluation, as well as their actual delivery, of health care.

The evaluative procedures deal with many facets of growth and development of individuals with clefts. But so far as evaluation is a necessary exercise to try to discover why "some cases go well and some don't", it seems to be very much, in its physical aspects, an assessment of problems of residual malocclusion and nasal deformities. Cosmetic problems of lip repairs, and functional problems of the velo-pharyngeal sphincter are also important, but only among a minority of these patients nowadays.

Many articles and text books of plastic surgery partly testify to the significance to be attached to surgical methods in the primary repair of oral and facial clefts. But, by comparison with the variety of "proven" surgical methods, the variety of cleft conditions which they attempt to treat is infinite. Results of any therapy are naturally related back to the state of the neonate, but perhaps many practising orthodontists are insufficiently aware of such states among the

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patients who visit them years after the major surgery has been completed. Such knowledge of the original condition might well temper the practitioner’s clinical judgement and prognosis, both in terms of the growth progress of the child, and forecasts of future growth and development.

Essential to the identification of the primary cleft state is an adequate description which may be a function of classification. Several classifications of oral clefts have been suggested, but there is one which developed out of embryological observations and theory (Streeter, 1948; Stark, 1954), and which has gained substantial favour. Rather than the simple failure of tissue processes to unite or fuse, it is a failure of mesodermal (middle germinal tissue layer) penetration and subsequent breakdown, which is believed to lead to the formation of most oral clefts, including "submucous clefts" of the soft palate.

**Classification of cleft lip and cleft palate**

(after Kernahan and Stark, 1958)

- **Clefts of primary palate only**
  - Unilateral (R or L) → Total
  - Median → Total
  - Bilateral → Total

- **Clefts of secondary palate only**
  - Total → Subtotal
  - Subtotal → Subtotal
  - Submucous

- **Clefts of primary and secondary palates**
  - Unilateral (R or L) → Total
  - Median → Total
  - Bilateral → Total

It would be a mistake to regard this classification as satisfactorily accounting for all varieties and combinations of oral clefts. It should be noted that facial clefts are excluded.

**Classification of cleft lip and cleft palate**

These clefts may involve a part or whole height of the lip, frequently extending to the nostril opening, and into the alveolar process on either or both sides as far as the region behind the incisive papilla. A cleft reaching the latter region would be a "total", or "complete" cleft of the primary palate.

Although accepting the general basis of this classification, the embryologist Patten (1971) is critical of the terms used. He favours the term "intermaxillary segment", in place of primary palate, wishing to distinguish in the newborn's cleft, involvement of the prolabium (medial portion of the upper lip) separate from the medial alveolar process. It is noteworthy that he still adheres to the term "secondary palate" (see below).

Harkins et al. (1962), in a review of nomenclature of oral and facial clefts, introduced a variation and extension of the Kernahan and Stark Classification. They substituted "prepalate" for "primary palate", and "palate" for "secondary palate". These writers admitted the possible confusion of terms, and made the obvious and practical suggestion that a clinical description of a cleft condition should specifically name the affected structures (lip, alveolar process, hard palate, soft palate). It is perhaps unnecessary to pursue any terminological argument at present, except to say that "primary" has been adopted here as the group term, in the sense of "first in order of severity"; nasal choanae, for example, first gain opening into the oral cavity just behind the future incisive papilla region.

In the example of a subtotal or incomplete cleft of the primary palate (fig. 1), the central philtrum of the prolabium and the broken "Cupid's bow" of the red lip margin are easily recognized. This is a much less severe state than the example (fig. 2) of a right complete cleft of primary and secondary palates which, of course, is placed in a different class anyway. In both cases it will require the skill of the surgeon, not
simply to try to restore facial symmetry, but also to minimize disturbance of the alveolar process. This is likely, in turn, to affect the continuing formation of the permanent incisors.

Symmetry might not be a problem in the case of a bilaterally incomplete cleft of the primary palate (fig. 3). But this baby's prolabium is short, with the upper gum pad, or alveolus, abnormally exposed. A legitimate question might be: "Is there a deficiency of tissue?" (No attempt is made to answer this in this article.) Again, here, problems could arise, as a consequence of surgical interference to the local circulation, leading to hypoplasia and displacement of the permanent incisors during their formation.

Clefts of Secondary palate

These clefts may extend from the tip of the uvula into the soft and hard palate, as far forward as the region of the incisive papilla. The shape of the palatal cleft may vary from fusiform to ovoid, and there may, or may not, be a natural union of one half palatal shelf with the mid-nasal septum.

Surgical repair of clefts of the secondary palate may encourage development of maxillary arch contraction and dental crossbites, but hypoplasia of the buccal teeth seems to occur infrequently. It is unreasonable to blame surgery for the frequent cases of congenital absence of premolar teeth, because such absence can equally involve the mandibular dentition.

Clefts of Primary and Secondary Palates

The possible combinations of these two groups of clefts, so far as degrees of involvement of the respective parts are concerned, are truly multitudinous. As inferred from the previous descriptions, complete clefts of the primary and secondary palates link up, if they are "complete" or "total" clefts, at the incisive papilla region. The seemingly endless variety of oral clefts becomes more obvious when considering bilateral occurrences with secondary palate involvement. Perhaps, at first sight, the condition shown in figure 4 would be described as bilateral. But it clearly resembles a unilateral condition (c.f. fig. 2), in so far as there is only a right unilateral total cleft. Although the plastic surgeon may regard his repair as a bilateral procedure in this case, and treat it as an approximately symmetrical lip repair, dental and nasal asymmetry must be anticipated. In fact, there is no reason for regarding the bilaterally complete clefts (e.g. figures 5, 6, and 7) as potentially symmetrical. (In the possibly necessary rationalizing of parents of babies with clefts, some may feel "better-off" with a unilateral cleft child because the condition is not so extreme (severe?) as the bilateral condition; whereas the parents of the bilateral cleft baby may console themselves with the notion that at least it is not a "lop-sided" deformity.)

The asymmetry of bilateral complete clefts of the primary palate is well illustrated by these three dental casts. It does not mean that approximate symmetry might not be obtained. But neither a surgeon, nor anyone else, would care to forecast in precise terms the morphological outcome of subsequent growth and development. An important feature demonstrated by these individual casts is the extent of variability of size, shape and positions of the several parts of the primary palate, or intermaxillary segment. The combining, or joining, of these parts by surgery offers no prospect of a standard pattern of growth where there is such initial variability.

All this does not mean that it is useless to attempt to predict the results of treatment. This is, in effect, a tautology, because a prediction, or forecast, is the necessary predicate of any treatment proposals.

It should be evident from even this cursory review of oral clefts that descriptive language with classification is likely to be always inadequate in setting out to evaluate the progress
of cleft lip and cleft palate care. As in many other fields concerned with clinical morphology, “a picture is better than a thousand words”; or, better, a picture (and a radiograph?) and a set of model replicas. Some present inadequacies of other aspects of case documentation have already been noted. (Chi and Godfrey, 1970). Nothing short of universal documentation from the neonatal stage onwards, will allow effective evaluation, particularly of the basic surgical procedures which may make or mar the cleft baby and his family for the rest of their lives.

Summary

The Kernahan and Stark classification of oral cleft conditions has been briefly reviewed and illustrated. But this classification, although useful, is not adequate to catalogue the varieties of these conditions.

All those people contributing to the care of children with these cleft conditions must be as conversant as possible with the problems, which are multidisciplinary.

It must be a general demand that complete clinical records and back-up organization are essential if treatment methods are to be adequately evaluated and better advice made available, so to obtain further improvements of the lot of this not insignificant but still socially silent minority.

BIBLIOGRAPHY


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Surry Hills, N.S.W., 2010.
THE CHALLENGE OF GROSS MALOCCLUSIONS WITH THE BEGG TECHNIQUE


1. Development of the Begg Technique in Japan.

Orthodontics in Japan before 1960 was considerably influenced by other countries located in similar geographical latitudes. The sphere of influence extended from the United States, in the east, to Western Europe where the German influence was particularly strong. It is noteworthy that the concepts of the Angle school and the edgewise appliance, which constituted the major force in American orthodontics, did not exert any real influence in Japan at that time. This was due to the fact that many pioneering Japanese orthodontists had studied with Drs. Mershon, LeRoy Johnson and others who were regarded as anti-Angle orthodontists. Therefore, we can say that the technical methods used in Japanese orthodontics before 1960 were chiefly based on the philosophy of the labial and lingual appliance schools in America and that of the functional school in Germany.

Nevertheless, during the same period many diagnostic procedures developed by American orthodontists, such as cephalometric assessments and model analyses, were instrumental in clarifying various treatment problems arising from the unique dento-cranio-facial complex of the Japanese. As a result of the application of these procedures much of our orthodontic knowledge, previously acquired through clinical experience, can now be scientifically confirmed — one example being that the majority of the malocclusion cases of the Japanese require the removal of some dental units.

Without the assistance of a multi-band technique various difficulties associated with the successful treatment of extraction cases could not be overcome with the use of the labio-lingual or functional appliances. The major obstacles we encountered included failure to open the bite, incomplete space closure, undesirable inclination of neighbouring teeth or teeth bordering an extraction space, as well as imperfect interdigation. Having experienced these problems we realised that the techniques we employed were not clinically adequate.

In 1961 Professor Enoki of our Department found an able tutor for solving these orthodontic complications in the person of Dr. Begg, practising in the same latitude on the other side of the Equator. Dr. Enoki immediately flew to Adelaide to seek Dr. Begg’s guidance and as a result of this visit the longitudinal relationship between the orthodontists in Australia and Japan became established on a formal basis.

With their new knowledge of the light wire technique, and with personal encouragement from Dr. Begg, Professors Enoki and Motohashi, together with their co-workers, sought to master their former treatment problems. In 1966 Dr. Begg himself visited the Nippon Dental College and offered a great deal of valuable advice. Three years later, in 1969, Dr. Sims presented the first complete light wire course in Japan. Between these visits we also received assistance from Drs. Kesling and Rocke.

In 1966 Professor Enoki presented a report on the results of five years of light wire practice to a meeting of the Begg Society held in Miami, Florida. Since then many treatment results and clinical findings have been reported by the staff of the Department of Orthodontics at Nippon Dental College.

2. Characteristics of the Japanese malocclusion.

Before presenting four case reports involving the treatment of gross malocclusions, it is important that brief reference should be made to some of the characteristics of the dento-cranio-facial complex of the Japanese. This will enable the reader to understand our orthodontic problems in clearer perspective.

It is generally accepted by orthodontists in Japan that the majority of malocclusions found in the Japanese call for the extraction of dental units. Our extraction approach should not be considered as a compromise form of treatment. Rather it is based on considerations of phylogeny, ontogeny and variations characteristic of a biological entity. Cases of malocclusion in the Japanese are largely explained by the anatomy of the cranio-facio-dental complex and variations in the size and form of teeth peculiar to our race. Characteristic of the Japanese malocclusions is the high incidence of reversed occlusion (mandibular protrusion) and crowding.

In a survey of Japanese school children it was revealed that among those aged from eleven to
twelve years, 16 per cent had reversed occlusion consisting of anterior cross-bite and Class III malocclusion. A further 8.4 per cent demonstrated crowding or cases of high labial cusp. When the permanent teeth are considered alone, it is reasonable to assume that the incidence of the latter would be higher than 8.4 per cent.

From the anthropological aspect, the cephalic index also constitutes a definite racial characteristic. Although the cephalic index of the Japanese population is usually classified as brachycephalic, our own survey gave the incidence of hyper-brachycephaly as high as 86.7 per cent in males and 87.7 per cent in females. Orthodontic patients, or persons who possess some form of malocclusion, have a naturally high index which in some individuals is close to 100. An individual with this degree of brachycephaly is usually described as having facial features that are broad and shallow in depth and a dental arch that is broad and roundish in shape. In our clinical experience it is quite rare to come across a patient with a narrow dental arch corresponding to the so-called compression anomaly. For this reason few orthodontic problems exist which can be corrected by means of expanding the dental arch. On the contrary, the problems that we see most frequently are related to shortness in the length or depth of the basal or coronal arch form.

The antero-posterior position of the basal arch in the Japanese can be compared with that of the Caucasian race by means of x-ray cephalometry. Profilograms reveal that the position of both point A and point B is located more posteriorly in the Japanese. The Japanese face is more retruded, not only in points A and B, but also in such points as Nasion, ANS, Pogonion and Menton. Of these landmarks, Pogonion is shown to be markedly retruded. From these findings, it can be assumed that the FMPA naturally has a larger value. In fact, the mean value of the Japanese FMPA (28.5 degrees) is much larger than the Caucasian mean of 21.9 degrees; the range varies from a maximum of 35 degrees to a minimum of 22 degrees.

In our clinical experience, it is not often we find a patient having an FMPA value larger than 35 degrees. Tweed considered that such cases had a poor prognosis or required extraction. It would seem that Japanese facial height is larger than that of Caucasians because of the greater FMPA value in the former. With regard to the mandible, the Japanese value for IMPA is 95.3 degrees. This is far larger than that reported for Caucasians, indicating that our lower anterior teeth are labially inclined. Furthermore, since our FMPA value is also large, the inter-incisal angle tends to be small (120.8 degrees) due in part to the labial proclination of the upper anterior teeth (SN-UI 107.9 degrees). The procumbency of both upper and lower anterior teeth is one of the factors which contributes to the impression that the oral area appears to be protruded in the Japanese. These cranio-facial features collectively constitute a big handicap in the treatment of the Japanese orthodontic patient.

Mention should also be made of the tooth morphology of the Japanese. Generally speaking, the mesio-distal diameters of our teeth are significantly larger than those of Caucasians. This is particularly true for the upper lateral incisors, first premolars and lower first molars. Moreover, the shovel-shaped incisors typical of the Mongoloid race result in a greatly increased labio-lingual thickness of the crown. This contributes to a large overjet. Therefore, when we treat a Japanese patient we try to make the overbite very small in the finishing stage. Otherwise, a post-treatment protruding effect will be evident.

From these morphological features, it is evident that the Japanese possess certain characteristics which increase the incidence of tooth-jaw discrepancy or skeletal dysplasia.

Apart from these morphological considerations, there is a further factor which often creates additional orthodontic problems. This involves the general neglect in Japan of the deciduous teeth. Such neglect is responsible for the great number of teeth lost at an early age. As a result, many children are found to have a mutilated dental arch even during their mixed dentition stage.

Another feature that should be emphasized is the incidence of so-called anterior cross-bite among Japanese patients. This occurs when under-development of either the maxilla or middle face predominates. These malocclusions generally belong to the Angle Class I classification. However, in some instances they constitute highly pronounced Class III malocclusions in association with the super-normal development of the mandible.

The malocclusions of the patients under treatment in the Department of Orthodontics, Nippon Dental College, Tokyo, can be grouped as follows: 45.3 per cent with crowding, high labial cuspids, bimaxillary protrusion or maxillary protrusion due to a tooth-jaw discrepancy. A further 41.8 per cent of the malocclusion cases consist of Class I anterior cross-bite and Class III problems.

In those cases of malocclusion caused by a tooth-jaw discrepancy, an extraction is indicated in many individuals as the only course available in our treatment planning. We extract teeth in approximately 90 per cent of the patients. Moreover, in cases of reversed occlusion, extraction of maxillary teeth is frequently indicated because the basal arch of the Japanese is smaller in width and in length. Often it becomes necessary to eliminate the crowding in the permanent dentition even though the normal overjet may have
been attained during the mixed dentition stage. The frequency of extraction is 67 per cent in these types of malocclusion. This group includes 10 per cent of cases in which an extraction involves only the mandibular dental arch.

From the considerations that have been enumerated, it is clear that what is accepted as the normal occlusion in the Caucasoid races is somewhat different in the Japanese, who have a unique combination of cranio-facial features and dental morphology. Although Dr. Angle's classification of malocclusion is applicable to the Japanese, we must bear in mind the large differences that exist in the relationship between the cranium, denture and denture pattern.

For these reasons, an occlusion that the Japanese orthodontists regard as normal may well constitute a bimaxillary protrusion in your mind. Based on our finished models and photographs, your concept of a nice-looking person may also differ from ours.

3. Case Reports.

Following our introduction to this fascinating and efficient technique, we could not resist the urge to challenge anew those types of malocclusion which we had previously had to reject or found to be very difficult to treat successfully. These extreme cases of malocclusion, it must be mentioned, are subjectively determined by us. It is a question of whether you agree with our determinations or not.

A challenge is always offered by whatever is stronger than us and when we have successfully achieved our initial purpose, and thus broadened our capability, our joy is great and keen. It must not be forgotten, however, that there is always present in a challenge an element of risk. This element of risk, to our way of thinking, is greater in the problem of a post-treatment relapse rather than in any technical shortcomings during active therapy.

Some of our cases lack sufficient long-term evidence of their stability because of the relatively short time that has elapsed since debanding. Nevertheless, the treatment results of four of the eight cases of gross malocclusion presented before the Fifth Australian Orthodontic Congress have been selected for inclusion in this paper because of their particular clinical interest.

ACKNOWLEDGEMENTS

I wish to express my appreciation to Dr. Milton R. Sims, Reader in Orthodontics, Department of Dental Health, The University of Adelaide, South Australia, for his advice in the preparation of this paper. I also wish to thank Professors Kei Enoki and Kosuke Motohashi, Dr. Makoto Hioki, Dr. Yutaka Maeda and the staff of the Department of Orthodontics, Nippon Dental College, Tokyo, Japan, for their valuable assistance.

Department of Orthodontics, Nippon Dental College, 1-9-20, Fujimi, Chiyoda-Ku, Tokyo, 102, Japan.
CASE 1

A male patient aged 13 years 4 months with a maxillary protrusion. Lower left and right second premolars were impacted. Four first premolars were extracted and treatment carried out with the Begg technique. Active treatment time was 18 months. FMPA underwent little change but the occlusal plane to FH considerably increased. In this case the axial inclination of the upper incisors would have benefited from additional lingual root torque.

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Fig. 1 — Case 1. Before treatment. Age 13 years 4 months.

Fig. 2 — Case 1. After treatment. Age 14 years 9 months.

Fig. 3 — Case 1. Before treatment.

Fig. 4 — Case 1. Stage one. Torquing auxiliaries and uprighting springs in position.

Fig. 5 — Case 1. After treatment.
Fig. 6—Case 1. Tracings before and after treatment superimposed on S-N, registered at sella.

Fig. 7—Case 1. Treatment effects demonstrated by superimposing tracings of the maxilla and the mandible.

Table 1—Case 1. Measurements from tracings made before and after treatment.

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Case 2. (Figs. 8-14 and table 2)

A case of mandibular protrusion in a female patient aged 15 years 11 months. Her first premolars were extracted and treatment carried out with the Begg technique. Active treatment period was 18 months.

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Fig. 8—Case 2. Before treatment. Age 15 years 11 months.

Fig. 9—Case 2. After treatment. Age 17 years 4 months.

Fig. 10—Case 2. Before treatment.

Fig. 11—Case 2. Stage three. Reverse torquing auxiliaries and uprighting springs in position.

Fig. 12—Case 2. After treatment.
Fig. 13 — Case 2. Tracings before and after treatment superimposed on S-N, registered at sella.

Fig. 14 — Case 2. Tracings superimposed on the maxilla and on the mandible.

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<td>118.0</td>
<td>119.6</td>
</tr>
<tr>
<td>L2-AP</td>
<td>4.7</td>
<td>13.0</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Table 2 — Case 2. Measurements from tracings made before and after treatment.
Case 3. (Figs. 15-21 and table 3)

A female aged 19 years 7 months.

This patient had incompetent lips accompanied by swallowing and tongue thrusting habits. Four first premolars and the lower left first molar were extracted before active treatment. The removal of the first molar was obligatory due to its poor prognosis. In order to close the bite, box-type elastics were used on the four intermaxillary hooks. Active treatment time was 23 months. After debanding, a tooth positioner was prescribed.

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overbite</td>
<td>-9.5 mm</td>
<td>3.7 mm</td>
</tr>
<tr>
<td>Overjet</td>
<td>1.0 mm</td>
<td>3.2 mm</td>
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</tbody>
</table>

In open bite cases anchorage bends should be used only for the preservation of maximum anchorage. Anterior teeth should not be tipped back or depressed by the anchorage bends. Elongation or elevation of the four anchorage molars must be minimized. At the commencement of active treatment inter-maxillary elastics (Class II or Class III) are always used with the Begg technique. Furthermore, vertical elastics, in addition to intermaxillary elastics, are also required to close the anterior open bite. At the end of the first stage the vertical relationships of the upper and lower anterior teeth are brought to the position of so-called normal overbite of 2 or 3 millimetres.

Fig. 15 — Case 3. Before treatment. Age 19 years 7 months.

Fig. 16 — Case 3. After treatment. Age 21 years 5 months.

Fig. 17 — Case 3. Before treatment.

Fig. 18 — Case 3. Stage one. At the commencement of treatment.
Fig. 19 - Case 3. After treatment.

Fig. 20 - Case 3. Tracings before and after treatment superimposed on S-N, registered at sella.

Fig. 21 - Case 3. Tracings of the maxilla and the mandible superimposed.

Table 3 - Case 3. Measurements from tracings made before and after treatment.
Case 4. (Figs. 22-28 and table 4)  
An example of mandibular protrusion associated with an open bite in a male aged 16 years 9 months. Two upper second premolars and the lower left second premolar were congenitally missing. Therefore, only the lower right premolar was extracted. Active treatment period was 15 months.

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overbite</td>
<td>-3.1 mm</td>
<td>1.6 mm</td>
</tr>
<tr>
<td>Overjet</td>
<td>-3.6 mm</td>
<td>3.3 mm</td>
</tr>
</tbody>
</table>

Fig. 22 — Case 4. Before treatment. Age 16 years 9 months.

Fig. 23 — Case 4. After treatment. Age 17 years 11 months.

Fig. 24 — Case 4. Before treatment.

Fig. 25 — Case 4. Stage one. At the commencement of treatment.

Fig. 26 — Case 4. After treatment; upper and lower retainers in position.
Fig. 27 — Case 4. Tracings before and after treatment superimposed on S-N, registered at sella.

Fig. 28 — Case 4. Superimposed tracings of the maxilla and the mandible.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMA</td>
<td>28.5</td>
<td>40.4</td>
<td>29.5</td>
</tr>
<tr>
<td>OP</td>
<td>11.6</td>
<td>19.0</td>
<td>11.0</td>
</tr>
<tr>
<td>SNA</td>
<td>83.0</td>
<td>81.7</td>
<td>82.1</td>
</tr>
<tr>
<td>SNA</td>
<td>78.7</td>
<td>81.7</td>
<td>82.1</td>
</tr>
<tr>
<td>ANB</td>
<td>4.3</td>
<td>2.0</td>
<td>0.1</td>
</tr>
<tr>
<td>IMPA</td>
<td>95.3</td>
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<td>67.5</td>
</tr>
<tr>
<td>U1-SN</td>
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<td>114.0</td>
<td>108.0</td>
</tr>
<tr>
<td>L1-AP</td>
<td>4.7</td>
<td>11.5</td>
<td>9.5</td>
</tr>
</tbody>
</table>

Table 4 — Case 4. Measurements from tracings made before and after treatment.
A LABORATORY INVESTIGATION OF THE BOND STRENGTHS OF SOME DENTAL CEMENTS, INCLUDING THREE ZINC POLYCARBOXYLATE CEMENTS*

M. F. MANNING, M.D.Sc., M.Sc.

It was virtually a century ago that the zinc oxide-eugenol and zinc phosphate cements were introduced to the Dental profession. No claim was ever made for chemical adhesion of the phosphate cements to tooth structure, but Smith (1971) believes that the excellent sealing properties of zinc-oxide-eugenol could be the result of a chemical bonding through a chelation reaction.

Smith (1968) introduced the zinc polycarboxylate cements and stated that chemical adhesion to the calcium and proteinaceous portions of tooth substance could be achieved under suitable conditions. See fig. 1.

Some Theoretical Aspects of Adhesion

Parker and Taylor (1966) define adhesion as, "the joining together of two dissimilar materials" and a popular belief is, that it is due to a molecular attraction occurring at an interface between an adhesive and adherend (Retief 1970).

These molecular forces are divided into chemical and physical:

(A) Chemical
Chemical adhesion involves intramolecular forces which result from electron transfer, or, sharing of electrons which give rise to electro-valent (ionic) and co-valent bonds respectively. Once chemical adhesion is achieved it is not easily reversed (Retief).

(B) Physical
Physical adhesion should not be confused with a mechanical locking but is concerned with the attractive forces of Van der Waals which are molecular fields associated with polarized co-valent bonds. A bond is described as being polar when unequal sharing of electrons occurs between atoms.

If two solids had absolutely smooth (atomic scale) planar surfaces and were brought together in a vacuum, all attempts to get them apart mechanically would result in failure in the bulk of one of the two solids (Parker and Taylor 1966). Values for strength of adhesion resulting from this theoretical situation will always be far greater than any value obtained in practice because Van der Waals forces act only where microscopic points make contact.

An essential requirement for an adhesive is that it fills all spaces between the two surfaces of the adherends.

Wettability
An adhesive must completely wet the surfaces of the adherends to ensure intimate contact. Basically the surface energy of the adherend must be greater than the surface energy of the adhesive and there must be an attractive potential, or affinity between the adhesive and adherend.

Changes in Wettability
Bangham and Razouk (1937) discovered changes in the free surface energies of solids. Zisman (1964) stated that a solid possessing a high free surface energy will quickly attract and be covered by low energy substances in the neighbourhood.

Changes in the Adhesive, affecting Adhesion

(A) Volume Changes
Bowen (1967) found joint stresses in the order of 1280 - 1660 p.s.i. resulting from the hardening of an unfilled resin. The presence of any free polar molecules in the set adhesive could attract water molecules (if environment was moist) and cause swelling.

(B) Thermal Changes
Zisman (1969) states that the most common cause of internal stresses in adhesive bonds is the difference in thermal expansion coefficients between adhesive and adherend.

(C) Film Thickness
Buonocore (1963) believes that a thin film of adhesive will resist lateral deformation better than a thicker one. Zisman (1969) has shown theoretically and confirmed by experiments that the thinner the adhesive layer, the stronger the join. According to Bowen (1971) this only occurs when failure is within the adhesive.

There are other additional factors such as flexibility of adhesive, flows in the surface of the adherend and pressure applied during bond formation which must be considered.

* Presented before the Australian Orthodontic Congress, Melbourne, 9th March, 1972.
Enamel Surface of Human Tooth in Relation to Adhesion

Buonocore (1970) states that enamel undergoes a variety of ionic substitutions, confined largely to the outermost layer. This has prompted Zisman (1961) to say that enamel possesses a fully reacted, low energy surface not ideally suited for bonding.

There is also a tightly bound fraction of water plus a capillary passage through enamel, demonstrated by Bergman and Siljestrand (1963), both of which could interfere seriously with the adhesive join.

Buonocore (1970) and Smith (1968) both state that an ideal adhesive for tooth structure would be one that is hydrophilic but capable of displacing water.

Materials and Method

The following seven cements were tested for shear and tensile bond strengths:

<table>
<thead>
<tr>
<th></th>
<th>M.F.G. Co</th>
<th>P/L Ratio</th>
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<tbody>
<tr>
<td>Zinc Polycarboxylates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durelon</td>
<td>ESPE</td>
<td>2:1 (wt)</td>
</tr>
<tr>
<td>Carboxet</td>
<td>Kerr</td>
<td></td>
</tr>
<tr>
<td>Poly-C (Lining)</td>
<td>De Trey</td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Zinc Phosphate</td>
<td>S. S. White</td>
<td>0.8 gm:0.2cc</td>
</tr>
<tr>
<td>Copper Phosphate (black)</td>
<td>Caulk Co.</td>
<td>1. gm:0.2cc</td>
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<tr>
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<td>0.7 gm:0.2cc</td>
</tr>
<tr>
<td>Reinforced Zinc Oxide</td>
<td>Opotow - EBA</td>
<td>1.7 gm:0.2cc</td>
</tr>
<tr>
<td></td>
<td>(Alumina)</td>
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</tr>
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Freshly extracted human teeth were used throughout experiments and were stored in a physiological saline solution at 37°C.

The teeth were mounted in small blocks of artificial stone so that the labial (buccal) surfaces were visually horizontal (fig. 2). Teeth could then be removed and re-positioned readily.

Stainless-Steel Patch Brackets

These were formed using Rocky Mountain continuous roll band material (250 in X.006 in) and band forming pliers for anterior teeth (S. S. White No. 155). Band was positioned to obtain maximum enamel coverage of the labial (buccal) surfaces. A "vulcarbo" separating disc was used to trim the mesial and distal edges approximately 1 mm. short of the contact areas. This step was repeated and the two patches were welded together. The patch was made more rigid by first welding and then soldering the tags of a preformed, ring-shaped attachment to the centre of the patch. The attachment ring was approximately 3 mm. diameter constructed from Remanit®, spring hard, stainless steel wire (1.32 mm. diameter. (See figs. 5 and 6)

Note: Prior to formation of patches, any organic material adhering to enamel surfaces was removed with a bristle brush plus xxx fine pumice (Ainsworth Dental Co., Sydney, Australia) and water.

Relocating Patches

Teeth were re-positioned on the stone models and steel patches were accurately relocated and held in position with a small quantity of zinc oxide-eugenol cement placed in the central part of seating surface of the patch. A maximum of five models were then placed on an Omnivac 111 precision vacuum adapter and a sheet of Omnidental (Omnidental Corp. U.S.A.) temporary splint material was formed over each steel patch, tooth, and side walls of each stone model. (See fig. 3 and 4)

A no. 15 scalpel blade was used to remove the patch from the splint material.

Area of Steel Patch

A new flat piece of the roll band material (approximately 1 cm. length) was trimmed using a metal guillotine. The surface area of one side...
was estimated using an Etalon Vernier scale and weighed on the Mettler balance (type H6T).

A new patch, corresponding to the exact size of each window, was formed. Care was taken not to reduce the thickness of the band material while adapting to the enamel surface. This new single thickness patch was weighed on the Mettler balance and the surface area calculated.

Surface Preparations and Cementation Procedure

Before cementation a light buff (xxx fine pumice) was given to the labial (buccal) surface of each tooth, followed by a cleansing with chloroform (degreasing agent) and then absolute alcohol for 20 sec. each. Finally compressed air (20 p.s.i.) was applied for 20 sec.

The seating surface of each steel patch was polished electrolytically for 10 sec. using a 75% phosphoric acid solution and any acid remaining was washed away and the metal surface dried with the compressed air.

A thin film of silicone grease was applied around the margins of the splint cover (to prevent cement adhesion) and positioned on the tooth and stone model.

Standard procedures were observed for mixing each cement. Cement was applied to both enamel and metal seating surface to help reduce air voids and the patch was then positioned in the window. A 2 Kg. Wt. which was estimated to be a clinical (approximate) cementation force, was carefully lowered onto the patch attachment and left for 10 minutes. The model assembly was then returned to the saline solution.

Shear Bond Tests

Maxillary central incisors were found suitable and employed throughout tests. Two holes were drilled (prior to cementation) approximately 4 mm. apart in the root face surface to accommodate a 1.32 mm. diameter wire which was bent into a "U" shape. (See fig. 5)

Initially a short piece of the same wire was soldered to the free ends, but this was altered later to allow the ends to be tied to prevent dislodgment. Remanit wire of 0.79 mm. diameter was used to attach the tooth and patch bracket to the arms of the Hounsfield Tensometer as in fig. 5.

The wire arm was then able to adjust position on the "U" shape section so that shear stresses were induced in the cement. Six separate tests were carried out for each cement at 30 min. and 24 hr.

A loading rate of 0.07 cm/min. was employed (Phillips et al. 1970).

Tensile Bond Strength

Bicuspid teeth were preferred for tensile tests so that a hole approximately 1 mm. diameter could be drilled in a mesio-distal direction through the centre of the crown and level with attachment on the steel patch. (Fig. 6)

Wire arms similar to ones in Shear tests were used for attaching tooth plus attachment to the Tensometer.

Six separate tests were carried out for each cement at 30 min. and 24 hr.

Note: Usually a small excess of cement remained on the enamel surface following cementation of the steel patch and it was felt that removal could weaken the bond. Swartz and Phillips (1955) showed that any excess cement did not influence their results significantly.

Constant Load Test

Constant loads produced by lead shot in plastic cylinders were suspended from the metal attachments to induce shear and tensile stresses in the cement bonds. A load of 420 gm. was used.

Figure 7
initially. This was considered by Mizrahi (1968) to be a maximum orthodontic force for teeth with single roots. (See fig. 7)

After three months the fourteen cement bonds remained intact. 20 gm. increments were then added every 48 hr. until a maximum load of 820 gm. was reached. During each addition of lead shot the cylinder was removed from each tooth. The sudden changes in stresses in the cement bond were considered to represent a clinical situation to some degree.

RESULTS AND DISCUSSION

Sites of Bond Failure

All the conventional cements exhibited failure in adhesion at either the cement/metal, cement/enamel interface, or both. On the other hand, the zinc polycarboxylate cements failed in cohesion and the area involved ranged between 60% - 100%. This cohesive failure suggested that the adhesive strength between the metal and the cement was greater than the cohesive strength. No reason could be ascertained for the partial adhesive failure in some cases. Smith (1971b) believed that the process of acid etching would make some of the metal ions available for chemical adhesion with the polycarboxylate cement.

Shear Bond Strength

Results are summarized in fig. 8. The values obtained for the three zinc polycarboxylates, Kryptex and copper phosphate cements were much lower than those obtained by Mizrahi and Smith (1969a and b). It was felt that one of the main reasons for the difference may have been the lower cementation pressure that was used in the present investigation, resulting in a thicker film of cement. Also Mizrahi and Smith may have obtained more stresses in shear during test procedures because they employed flat, polished enamel surfaces.

A lower mean value for Carboset was obtained at 24 hr. compared with the mean value at 30 min. Although this difference was statistically insignificant, it was felt that the difference may have been due to variance in cement area involved in cohesive failure and/or as a result of variation in curvature of the enamel surfaces.

An increase in bond strength of 1 Kg./cm.² (approximate) at 24 hr. for Durelon and Poly-C compared favourably with results of Mizrahi and Smith (2 Kg./cm.² at 48 hr.).

Shear strength values for the carboxylates were found to be significantly higher than shear strength values for the four conventional cements. Of the four conventional cements, the reinforced zinc oxide was found to be significantly higher than values for the other three.

\[ 5\%, t=10.426 \text{ and } P=1.003 \]

Newman (1969) has suggested 10 lb. to be a maximum environmental force for anterior teeth. The conventional cements do not compare favourably with this value, but there is a safety factor of 2 for the polycarboxylates (bond area .5 cm.² approximately).

Tensile Bond Strength

Values for the zinc polycarboxylates were approximately 50% of the values obtained by Mizrahi and Smith (1969a and b). These investigators obtained comparable results in shear and tension, but in the present investigation, higher values were obtained in tension than in shear.

Parker and Taylor (1966) state that a given adhesive will tend to be weaker in shear than in tension.

Again the values for the carboxylates were much higher than values for the conventional cements at 30 min. and 24 hr. (fig. 9)

Increase in bond strength at 24 hr. varied from 1 Kg./cm.² for Durelon to 4 Kg./cm.² (approx.) for Carboset. Mizrahi and Smith (1969a and b) observed an increase in bond strength of 10 Kg./cm.² for Poly-C at 48 hr.

A ratio of approximately 3:4:1 was obtained for the polycarboxylates relative to the copper phosphate and silicophosphate cements. This agreed with the findings of Mizrahi and Smith. When the carboxylates were compared with zinc phosphate cement these authors obtained a much
higher ratio (16:1 approximately), but the ratio of 3:4:1 in the present investigation was comparable with the results of Phillips et al. (1970). Again the conventional cements were not considered favourable when compared with an oral environment force of 10 lbs. whereas the poly-carboxylates gave a safety factor of 3-4 which is nearly twice as good as these cements in Shear.

Constant Load Tests

At the end of the two-month period following the maximum loading of 820 gm. all of the cement bonds remained intact. Although this demonstrates that loads well in excess of the maximum orthodontic load of 420 gm. as suggested by Mizrahi (1968) can be applied for a period of time, it must be remembered that the test procedure did not simulate a clinical situation. In the oral environment Cameron et al. (1963) believed that the rates of force application more closely resemble impact forces.

Conclusion

1. Of all cements tested, only bond strength values for the reinforced zinc oxide were similar in shear and tension. The remainder of the cements were significantly higher in tension than in shear.
2. The shear and tensile bond strength values of the silicophosphate and two phosphate cements were significantly lower than the mean values for the reinforced zinc oxide which in turn were lower than values for the zinc poly-carboxylates.
3. Similar bond strength values were obtained for the three zinc poly-carboxylates except in tension where carbonates was found to be significantly higher than Poly-C and Durelon at 30 min. and 24 hr.
4. It would appear that the four conventional cements that were tested would be unsuccessful (bond area approximately .5 cm.²) if employed in a clinical situation where suggested load values of 10 lbs. could be experienced in shear or tension.

However, compared with this maximum value, there would be a safety factor of "3" for the zinc poly-carboxylates in shear, and a safety factor of "4" for the same cements in tension.

Summary

A laboratory investigation was carried out whereby stainless steel patch brackets were cemented directly to the labial (buccal) surfaces of some extracted, single rooted human teeth. Seven different types of dental cements were used and a Hounsfield Tensometer employed to estimate the ultimate tensile and shear bond strengths of the cements.

The ultimate tensile and shear bond strengths of three zinc poly-carboxylates were found to be significantly higher than values obtained for four conventional cements which comprised two phosphates, a modified phosphate, and a reinforced zinc oxide cement. The mean tensile and shear bond strength values for the three zinc poly-carboxylates were comparable, except in tension, where the mean value of one was significantly higher than the means for the two others.

Constant load values leading up to a value which was approximately twice that of a suggested maximum orthodontic force (for single rooted teeth) were applied in shear and tension over a period of time without failure of any of the cement bonds.

It would appear that the zinc poly-carboxylate cements (bond area of .4 - .5 cm.²) are capable of resisting in shear and/or tension a load value of 10 lbs. which has been suggested to be a maximum in a clinical situation. A clinical trial involving the cementation of this, or a similar type of bracket directly to the crowns of teeth with a zinc poly-carboxylate cement is indicated.

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Royal Dental Hospital of Melbourne, c/o Flemington Rd. and Elizabeth St., Melbourne, 3000.
ORTHODONTIC EDUCATION IN THE UNITED STATES

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TERRY J. FREER, Ph.D., B.D.Sc., F.D.S., D. Orth., R.C.S.**
ROBERT M. LITTLE, D.D.S., M.S.D.***

Introduction

Orthodontic education is presented to the undergraduate in the dental curriculum and is available to the dentist in graduate and postgraduate programs of long duration or in continuing education courses of short duration. Regardless of the program, the objective is to improve orthodontic knowledge and clinical competence.

Undergraduate Dental Education

The philosophy of undergraduate orthodontic education varies markedly among dental schools. The courses range from a one-year lecture series and no clinical work to lectures and clinical exposure throughout all four years. To date the trend has been to increase the exposure to orthodontics. Most undergraduate programs now include material on growth and development of the cranio-facial complex and development of occlusion for freshman (first year), laboratory technique instruction for sophomores (second year), orthodontic theory lectures for juniors (third year) and seniors (fourth year). The clinical work usually involves diagnostic work-ups and minimal treatment. After a preliminary diagnosis the patient is either referred to the graduate or postgraduate program for comprehensive treatment, treated by the undergraduate student or advised that no treatment is necessary. In general the undergraduates do not treat skeletal malocclusions. Treatment is generally limited to the cases that are of dental origin in which tipping of teeth is required and can be completed within a year. Both removable and fixed appliances are utilized, the problem dictating the choice of appliance. Clinical exposure in most programs is limited generally to the junior and senior years. In this type of program a student may receive 200 to 300 hours of orthodontic instruction over four years, the objectives being to train the dentist to identify occlusal and facial deviations, provide treatment where appropriate, and to refer the individual for specialist care when necessary.

In the future, undergraduate orthodontics will be greatly influenced by current trends in dental education. Specifically, the shortened curriculum and more elective time being considered by many schools will affect the amount of orthodontic education provided. If the shortened curriculum is implemented at a school it could reduce the formal orthodontic course content. On the other hand, if more elective time is available it could permit individual students to enter the specialty of orthodontics earlier or to obtain more orthodontic education for application in other phases of dentistry. However, if the student pursues other subjects during his elective time he would probably receive less orthodontic education.

Another factor to consider in undergraduate orthodontics is the projected role of the general dentist in the future. Hopefully, caries and periodontal disease will be greatly reduced considering the current microbiological research. Therefore, consideration should be given to training general practitioners to the sub-specialty level in the undergraduate program or even allowing specialization at the undergraduate level. The Curriculum II program at the University of California educated orthodontists in this manner for over 30 years, but presently this program no longer exists. For recognition as an orthodontist the American Dental Association's Council on Dental Education now requires that the individual must spend two academic years in an approved program after graduation from a dental school.

Graduate and Postgraduate Education

Graduate and postgraduate orthodontic programs are designed to educate dentists for the specialty practice of orthodontics. These programs are under the purview of the American Dental Association's Council on Dental Education and the individual institution. The educational objectives for either a graduate or postgraduate orthodontic program are "to increase individual knowledge and competence, to encourage creative ability and the capacity for critical analysis, to coordinate orthodontics with other related health disciplines, and to contribute to the growth and stature of the specialty and the profession in the public interest." To accomplish these objectives it is required that a program should be a minimum of two academic years of full-time residency. The difference between a postgraduate program

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and a graduate program is that in the former a certificate of proficiency is awarded at the completion of the program whereas in the latter an advanced degree is awarded in orthodontics or a related field while a certificate of proficiency in orthodontics is earned. The educational and entrance requirements are similar in both the graduate and postgraduate programs. In 1971 there were 51 formal graduate and postgraduate orthodontic programs in the United States. There were 23 graduate programs and 13 postgraduate programs, the remaining programs allowing the student to work for a degree if desired. The total number of positions available in 1970 was 371 (114 postgraduate and 257 graduate). Five new programs are scheduled to begin before 1974.

The duration of programs ranges from 18 months to 36 months with the majority lasting approximately 23 months. These are divided almost equally between public and private dental schools, with two programs based in private hospitals, although associated with Universities.

Presently most University programs do not award stipends whereas the hospital programs provide resident stipends. The University programs may provide financial support through fellowships, loans, and part-time teaching appointments, the level of support varying from institution to institution. Tuition ranges from $150 to $3,000 per year, private dental schools generally being at least twice as expensive as the public dental schools. The cost of equipment ranges from nil to $1,000 for the program. The cost of living varies, as one would expect, the differential between large metropolitan areas and smaller cities being marked in some instances.

Recommended content for graduate and postgraduate programs was approved in 1970 by the American Association of Orthodontists' Council on Orthodontic Education. The recommended basic courses and seminars and the course hours are shown on Table I. In addition, 300 course hours are recommended in such subjects as speech, psychology, pediatrics, anthropology, photography, teratology, auxiliary utilization and interspecialty relationship.

### Continuing Education

A wide variety and large number of orthodontic continuing education courses are presented each year. For example, in 1971 there were over 125 continuing education courses in orthodontics. This does not include the courses that were announced in such associated areas as occlusion, photography, and practice management. Usually these courses are specifically designed for either the non-orthodontist or the orthodontist. The courses designed for non-orthodontists are usually for general practitioners; as of late, however, orthodontic courses have been designed for oral surgeons, periodontists, pedodontists, and prosthodontists. Undoubtedly the number of these courses for allied specialties will continue to increase.

Continuing education courses are usually sponsored by dental schools and/or dental organizations, the most successful being jointly sponsored. The courses are announced through various dental publications. Included in the announcement are the pertinent data such as the sponsor, location, instructors, topics, dates and whom to contact for further information.

### Educational Opportunities in Orthodontics for Australian Dentists in the United States

Information is available in the Journal of the American Dental Association and the American Journal of Orthodontics on most of the continuing education courses offered each year. Meetings of the National and Regional bodies of the American Association of Orthodontists also offer associated continuing education courses. If the orthodontist desires a more prolonged and detailed educational experience, affiliation with a dental school as an instructor may be considered. Inquiries should be directed to individual dental schools through

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**Table I**

| Recommended Basic Courses and Seminars for Graduate and Postgraduate Orthodontic Programs |
|---------------------------------|---------------------------------|----------------|----------------|----------------|
| Growth and development seminars | Functional head and neck anatomy | Cephalometrics | Orthodontic diagnosis and treatment seminars | Biomechanical principles and materia technics |
| 60 hours                         | 60 hours                         | 300 hours     | 100 hours      | 60 hours       |
| Oral physiology lectures and seminars | Embryology, genetics and applied histopathology | Research methodology and biostatistics | Research and special studies | Clinical orthodontics |
| 40 hours                         | 80 hours                         | 40 hours      | Variable hours | 1200 hours     |
| Orthodontic literature seminars |                                 |              |                |                |
| 100 hours                        |                                 |              |                |                |

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the departmental chairman. There are also research opportunities available in dental schools as well as governmental agencies such as the National Institutes of Health.

For general practitioners desiring to obtain an orthodontic education in the United States, a list of orthodontic postgraduate and graduate programs, deadlines for submitting applications, number of students admitted each year, date on which the program begins, duration of the program, and names of departmental chairmen may be obtained from the American Association of Orthodontists, 7433 Delmar Boulevard, St. Louis, Missouri 63130, U.S.A. Additional information on educational programs available to dentists may be obtained from the American Dental Association.2,3

BIBLIOGRAPHY

Much consideration is being given to orthodontic education, as well as the requirements for specialisation, however, perhaps it might be wise to pause a while and meditate upon what is likely to be the role of the orthodontist in the community of the future.

One question which now arises is, are we moving towards a socialised health service, and if this does eventuate and ultimately include dentistry, then what place will orthodontics have in such a service.

In the past, public health programmes in orthodontics have been largely the province of dental institutions, and surveys have shown conclusively that a very great proportion of the child population is in need of some form of correction of dental irregularity.

At the same time, it is generally accepted that orthodontics largely entails problems which are beyond the scope of the general practitioner in dentistry, therefore, it is important that this be kept in its proper perspective should public funds become involved. The Dental Board, Queensland, has a gazetted register of specialists in the various branches of dentistry, and this has been in operation since 1960, but for any National register there must be reciprocity among the States, so the A.S.O. policy on specialisation in orthodontics could well play a very important role in the establishment of such a register. In order to achieve such a role, however, our policy will need to be more specific, so the sooner members have further discussion on the significance of our policy in relation to a National Register the better.

On present planning, a general meeting of the Society is to be held in Sydney on Monday, 16th July. It is vital that as many members as possible should make an effort to attend that meeting.
MUSCLE PRESSURES AND TOOTH POSITION:
A REVIEW OF CURRENT RESEARCH*

WILLIAM R. PROFFIT, D.D.S., Ph.D.†

Over the years, orthodontic ideas about environmental influences on the dentition have fluctuated widely. Implicit in Edward Angle's ideal of 32 natural teeth in perfect occlusion was a belief that this was possible for every individual—and that environmental influences had led to the malocclusion, preventing the original potential from being realized. Orthodontists in the 1920's and 1930's were quite concerned about the effects of various habits and muscular pressures on the teeth. This "environmentalist" point of view found its greatest exponent in Alfred P. Rogers, who used various exercises and muscle therapy exercises in his orthodontic practice, largely instead of orthodontic appliances (1).

The reaction in the late '30's and '40's to obvious relapses after non-extraction treatment led to an accompanying re-evaluation of the environment-heredity roles in producing malocclusion in the first place. For Tweed, the basic reason for extraction was a hereditary discrepancy between tooth mass and jaw size (2). For Begg, extraction was necessitated by modern man's diet which prevented attritional reduction of tooth mass (3). With both treatment approaches, there was little concern about the environmental factors which concerned the orthodontic leaders of the earlier generation and philosophy. The dominance of this point of view was reflected in the strong technical rather than biological emphasis of the period.

In the 1950's in the U.S., Walter Straub struck a responsive chord when he pointed out difficulties with open bite problems, whether or not extraction treatment was used (4). The muscular environment was blamed for these problems. This renewed interest in muscular influences led to orthodontically-oriented research in which new electronic techniques were used to study the magnitude, duration and wave form of oral muscular pressures. Such studies had not been possible in the earlier era. Research of the last 15 years has produced answers too slowly to satisfy many clinicians, so muscular forces are currently somewhat out of vogue, but the pendulum swings of opinion are being dampened out as greater knowledge leads to better overall perspective.

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*This paper is adapted from a presentation to the 1972 Australian Orthodontic Congress, Melbourne.
†Professor and Chairman, Department of Orthodontics, University of Kentucky College of Dentistry, U.S.A.

Fig. 1—Strain gauge pressure transducers mounted in a palatal appliance, internal view. A—foil strain gauge at end of cantilever beam, B—mounting platform, partially covered with wax, C—lead wires from transducer, D—calibration guide.
possible to place the transducer in a thin metallic housing and cement it directly to the teeth, attach to arch wires, etc. Since the mounting of a transducer can affect its sensitivity, accuracy requires that each transducer be individually calibrated after being mounted (figure 3).

Any time instrumentation is introduced into the mouth, or other areas of the body, there is a possibility that the physiological activity being studied will be altered by the presence of the recording instrument. This phenomenon, called "physiologic reactance" by Code (7), is a very real hazard in the mouth, particularly when lingual pressures are to be recorded. The pattern of tongue activity is likely to be changed to avoid the pressure transducers. If the devices cause discomfort, avoidance is all but guaranteed. To combat this, in our studies a dummy lingual appliance is worn by subjects for approximately 48 hours prior to placing the actual recording appliance. This allows accommodation to the appliance to take place, which can be evaluated by the disappearance of speech distortion. There are no sharp projections on the recording appliance, and speech difficulties do not reappear when it is placed.

Analog pressure waves are produced by tongue or lip contacts with a transducer. Pressures, duration of contact, area under the pressure curves (time-pressure integral), and time relationships between pressure curves at multiple recording locations may all be measured by hand, but the volume of data requires computer assistance for more than small-scale studies. At Kentucky, an IBM 1800 computer is connected directly to the pressure-recording instrumentation, and data are fed immediately to the computer while being monitored in the lab. Calibration sensitivities of each transducer are taken into account while the calculations to produce pressure and time data are carried out. With the computer, data are reported in only a few minutes. Computed data are also retained on magnetic tape at the computer for later statistical calculations. Developments in electronics in the late 1960's led to improved stability of both the transducers and the amplifying system were necessary before this computer application was possible.

The most recent technical step has been development of a portable system which can be used for pressure recording outside the laboratory. A special portable amplifier was constructed to build up signals from the pressure transducers to the level required for recording on analog data tape (figure 4). This equipment was used in central Australia in 1972 to obtain labial and lingual pressure measurements on members of the Walbiri group of aborigines whose dental development has previously been studied extensively by Barrett, Brown and others at Adelaide University, Faculty of Dentistry. The data tapes were analyzed by the computer at Kentucky in the same way as data generated in the lab there.

**Summary of Current Data and Its Clinical Implications**

Two broad questions of interest to orthodontists may be asked with reference to studies of labial and lingual pressures: (1) what do they reveal with reference to the etiology of malocclusion, and (2) what are their implications for stability or relapse after orthodontic treatment?

**Muscle pressures and etiology.** This question, so pertinent to the changing views of orthodontists over the years, revolves around the validity of the "equilibrium theory" of tooth position, or, more correctly, around the contributions of the tongue and lips to the equilibrium. Since the teeth do remain in a stable position most of the time in most people, and since tooth movement is observed when additional forces are exerted (as by orthodontic appliances, by a poorly-designed...
partial denture, or by contracting scar tissue after an injury), it is apparent that there is an equilibrium which can be upset.

Direction, duration and magnitude of muscular force or pressure are important variables which must be identified before data can be evaluated. Almost all workers have used pressure transducers which were sensitive in only one direction.

The transducers were mounted to record horizontally-directed pressures. Vertically-directed forces, as discussed below, may be significant in establishing the vertical position of teeth, but these have been little studied.

Early workers observed that maximum lingual pressure outweighed labial pressure at all intra-oral locations. There was a great deal of variability between subjects, but neither group nor individual values showed any evidence of an equilibrium on this basis. Lip pressures are of longer duration than tongue pressures, and there may be resting lip pressures of some magnitude. Taking these duration figures into account, however, still does not produce a balance of functional pressures. Typical peak pressures during swallowing are, in the maxillary incisor region, 75 ± 20 gm/cm² lingual, 55 ± 15 gm/cm² labial; in the maxillary molar region, 140 ± 50 gm/cm² lingual, 30 ± 15 gm/cm² buccal. The amount of variation is for a group. Individuals reproduce themselves much more closely (6, 8, 9, 10). Time-pressure integrals come closer but still do not balance. Taking duration factors into account as fully as possible, Lear carried out an experiment using a summation of four-hour recordings, with extrapolation to 24 hours from a knowledge of the subject's activities. Over this longer period, there was still no balance of muscular forces (11).

Other evidence also indicates that horizontal tooth position is not sensitive to pressures during swallowing and speech. There is no relationship between the increment in maxillary intermolar width and lateral tongue pressure during swallowing in children (10). Bilaterally symmetric dental arches are common, but symmetric lateral tongue pressures are rare. Most individuals have definite "sidedness" in tongue pressures, with stronger pressure during swallowing and speech on one side. The majority are left-tongued (10). Oral...
cavity volume, as measured from head films and dental casts, has a correlation coefficient with tongue pressure during swallowing of only 0.50 (12). Perhaps one should speak, not entirely facetiously, of a "semi-functional matrix".

These data do not indicate that there is no equilibrium, only that the conditions defining it are not yet understood. It is probable that duration of pressure will have to be considered differently in the future. To obtain orthodontic tooth movement, light pressures suffice if they are maintained continuously or nearly so. Heavy pressures of short duration, on the other hand, have little effect. Resting pressures seem remarkably like the effective orthodontic forces, while pressures from occlusion, speech, mastication, swallowing and other activities would all be too short-acting to be effective orthodontically. At present it does seem evident that teeth are not pushed into malocclusion by tongue or lip activity. It is increasingly unlikely, for instance, that the degree of bimaxillary protrusion can be related to tongue pressures during swallowing.

Another factor which may need consideration is the geometry of the dental arches. Allan Brader hypothesizes that the radius of curvature of the arch influences the stresses on it, just as is true for other closed containers (13). Recent experimental evidence indicates that the relationship is not as simple as Brader hoped, for resting pressure multiplied by radius of curvature is not a constant (14). Nevertheless, arch curvatures may indeed influence the equilibrium situation. By analogy to engineering principles, it would be surprising if they did not.

All the above relates to horizontal position of teeth in the arches. Vertical position, on the other hand, may be influenced by functional activity. The mechanism of tooth eruption remains poorly understood, but the forces accompanying it are only a few grams. Vertically directed intermittent forces accompanying swallowing and other activities might well be able to influence the rate or amount of eruption and thus create an open bite. Clinical observations support this hypothesis. Unfortunately, there are as yet no pressure data to support the concept.

Muscle pressures and relapse. To the extent that the etiologic factors which caused malocclusion remain active after orthodontic treatment is completed, relapse toward the original malocclusion can be expected. Putting the teeth into a stable position has often been equated with putting them into a position which the musculature will accept. This view again, of course, reflects an underlying concept of environmental factors as important in determining tooth position. Orthodontists frequently observe that in the presence of a "tongue thrust" swallow there is a tendency for both anterior open bite and maxillary overjet to recur after correction. Two inferences are often drawn: (1) the tongue is responsible for the changes in the occlusion, and (2) the relapse occurred as the tongue pushed the anterior teeth into new positions. The discussion of equilibrium factors above suggests that while the first inference may be more or less correct, the second is almost surely incorrect.

It has been shown that horizontal changes in tooth position due to functional pressures are unlikely. An increase in overjet, as well as return of anterior open bite, can accompany changes in vertical position of teeth. All that is required is rotation of the mandible, with greater eruption of posterior than anterior teeth. Typical cephalometric findings in such relapse are shown in Figure 5. In this instance, as in most post-orthodontic patients, vertical growth occurred after treatment. Even when there is no growth, however, open bite and increased overjet develop, not through direct movement of the anterior teeth to new positions, but through differential eruption and rotation of the mandible. The rest position as well as the occlusal position of the mandible may alter as this occurs.

Fig. 5—Relapse into mild open bite and overjet following orthodontic treatment. Vertical changes, with mandibular rotation, account for the altered dental relationships (courtesy M. Sims, Adelaide).
Retention difficulties due to tongue and lip activity are frequently expected in the aftermath of orthodontic-surgical correction of severe malocclusions. Radial changes in the volume of the oral cavity are made quickly with surgery. In some European centres in the past, it was common practice to reduce the size of the tongue at the time of jaw surgery, in the hope of obtaining greater stability of the dental correction. Surgical procedures on the tongue have been shown not to be necessary in most instances, however, because of the marked physiologic adaptation which occurs post-operatively. The tongue is carried lower in the mouth, as demonstrated by a change in hyoid position (15). Studies of tongue and lip pressures show these are little changed after operation in most patients, and that stable results without tongue reduction occur in these individuals. Occasionally, a marked change in pressure patterns is seen post-operatively, and then the failure of physiologic adaptation may require further treatment. It is not known whether the tooth movement which occurs in these cases (for when relapse not related to growth occurs after surgery, jaw segments remain stable while teeth alter their horizontal position on supporting bone) is related to functional or resting pressures (16). These cases may represent the tolerance limits of imbalance in functional pressures.

Future Research Areas

It seems apparent that clarifying relationships between muscular pressures and tooth position will require work in two major areas:

1) the effect of pressure duration on its effectiveness in influencing tooth position. Resting pressures are probably more important than pressures during swallowing or speech, but how to build time factors into an equilibrium equation has not been solved. It is important clinically to know how large is the area of muscular tolerance of tooth position, the "tough of muscular equilibrium", and to use this information in determining arch form after orthodontic treatment. A better understanding of equilibrium factors will be required in order to accomplish this. Hopefully, the studies of pressure patterns in Australian aborigines, which are being under-

taken now, will allow further elucidation of the equilibrium components.

2) the effect of muscular pressures on vertical rather than horizontal tooth positions. The vertical component of tongue and lip forces has received little attention, but these forces, studied jointly with the forces of eruption, may explain many aspects of malocclusion which are related to vertical dimension. Research in this area is only beginning.

REFERENCES


Department of Orthodontics,
University of Kentucky College of Dentistry,
Lexington, Kentucky 40506, U.S.A.

A radiographic method using a standard size dental film to assess the development status of the first metacarpophalangeal joint has been described.

Cross-sectional and longitudinal studies of the joint and comparison with statural height changes of a group of boys and girls aged 10 to 16 years were made.

Onset of ossification of the sesamoid takes place regularly and at the time of the adolescent growth spurt. The duration of this spurt coincides with the duration of the sesamoid development.

In the group of subjects longitudinally examined, the maximum height increment was always recorded after the adductor sesamoid commenced ossifying and usually at the time the typical seed shape was radiographically manifest.

Commencing epiphyseal-diaphyseal fusion of the proximal phalanx at the thumb joint is found to mark the completion of the two maturational events which have been related.


Two hundred and thirty-five sets of casts of post-treatment of orthodontic patients were studied. There were extraction and non-extraction cases.

Mesio-distal crown measurements of all teeth (second and third molar's excluded) were taken.

"Bolton Analysis" internmaxillary tooth size relationships were calculated for each case. These were anterior ratio, overall ratio, posterior ratio, and posterior arithmetic difference.

Mean values for these ratios in extraction and non-extraction cases were calculated and tables prepared to facilitate practical application of anterior and posterior ratios.


The effects of four direct bonding systems on the enamel surface were examined visually and with the aid of a scanning electron microscope, with particular reference to the effects of their etching solutions.

It was observed that the manufacturers' recommended exposure times, of the etching solutions tested, were inadequate for the tooth samples used. New exposure times were advocated, but their effects on bond strength of the adhesives need to be studied.

It was shown that the recovery of the etched enamel surface by polishing was generally good but still microscopically incomplete.

The clinical significance of such treatments of the enamel surface associated with direct bonding systems needs to be further studied.


This thesis reviews the theory of Begg torquing auxiliaries and reports a laboratory investigation of load deflection characteristics of these auxiliaries in a typodont set-up. Two- and four-spur auxiliaries were bent from 0.014 inch and 0.016 inch diameter stainless steel wires with initial angulations of 0°, 30° and 60° and arch diameters of 25, 20 and 15 mms.

The relative effects of these design variations were studied. Although it was not possible to analyze the complex moments of force conditions of the clinical situation, ways of varying the magnitude and rate of force delivery by an auxiliary spur were discussed.


A laboratory investigation was carried out whereby stainless steel patch brackets were cemented directly to the labial (buccal) surfaces of some extracted single rooted, human teeth. Seven different types of dental cements were used and a Hounsfield Tensometer employed to estimate the ultimate tensile and shear strengths of the cement bonds.

The ultimate tensile and shear bond strengths of three zinc polycarboxylates were found to be significantly higher than values obtained for four conventional cements which comprised two phosphates, a modified phosphate, and a reinforced zinc oxide cement. The mean tensile and shear bond strength values for the three zinc polycarboxylates were comparable, except in tension, where the mean value of one was significantly higher than the means for the two others.

The mean values obtained for the shear and tensile bond strengths of the conventional cements were, in turn, found to be significantly higher than what was considered a maximum value for an orthodontic force that could be applied to single rooted teeth.

It would appear that the zinc polycarboxylate cements (cement bond areas of 4.5 cm² as used
in the present investigation) are capable of resisting in shear and/or tension a load value of 10lbs, which has been suggested to be a maximum in a clinical situation. A clinical trial involving the cementation of this, or a similar, type of bracket directly to the crowns of teeth with a zinc polycarboxylate cement is indicated.


Writings on the malocclusion conditions and dento-facial deformities associated with scoliotic patients and their use of the Milwaukee brace have been reviewed.

A group of 29 patients using these braces was compared with the same number of randomly chosen patients with malocclusion matched by sex and age. Comparisons were made of the types and extent of malocclusion, and of cephalometric data for these two groups.

Vertical linear measurements of the face were significantly reduced in the scoliotic group. This group also had a greater preponderance of Class II Division 2 malocclusion, although spacing, particularly of upper incisor teeth, was more common than in the non-treated control group.

The extent to which these malocclusion and dento-facial changes may be reversed in late adolescence remain to be studied. Means of attempting to prevent or control these changes were also reviewed.

K. Godfrey

SIXTH AUSTRALIAN ORTHODONTIC CONGRESS
to be held in Sydney, Australia
5th-9th August, 1974

Organising Committee Chairman .... Dr. Robert Y. Norton.
Honorary Secretary .... Dr. Phillip Kinsella.
Honorary Treasurer .... Dr. Neville J. Cox.
Director of Scientific Programme .... Dr. William J. Harvey.

SILENT CLINICS
Planning is under way for this section of the scientific programme and it is hoped to mount an interesting display comprising case reports, special techniques, messages concerning philosophy, etc.

Maximum participation of members is sought, and those willing to contribute are asked to contact Dr. Richard Hay, 11 Anderson Street, Chatswood, N.S.W. 2067.

In addition, State Branches will appoint liaison officers to foster interest and offer advice.
NEWS AND NOTES


Those members wishing to join the A.S.O. Group travelling to this Congress are reminded that they must indicate their full acceptance by 1st May next.

Australian Society of Orthodontists' Foundation for Research and Education.

As announced previously Professor D. Woodside, Associate Dean and Chairman of the Department of Orthodontics at the University of Toronto will be the Foundation lecturer for 1973.

He will be doing a lecture tour in October/November, and a two day course will be held in each capital city. Full details will be published in the next issue of the Journal.

Vth International Conference of Oral- and Maxillofacial Surgery, to be held in Madrid from 21st-25th April, 1974.

Participation.

This Conference is for Fellows of the International Association of Oral Surgeons, and is also open to all health professionals interested in the subjects to be developed.

Scientific Activities.

The main scientific activities of the Conference will be:

Symposia:
A. The Tongue.
B. Facial Asymmetry.

Study Workshop.
The training of the oral surgeons throughout the World.

Correspondence:

Further information concerning the Conference may be obtained from:
Dr. D. Jose Alonso del Hoyo,
Secretary, Vth International Conference of Oral Surgeons,
P.O. Box 46078,
MADRID. SPAIN.

2nd International Congress on Cleft Palate

Place and date: The Congress will be held in the “Falkoner Centre” in Copenhagen, Denmark, from 26th-31st August, 1973.

Language: The official language of the Congress will be English.

Congress fee: Approximately US $60 for participants, and US $40 for companions is estimated.

The Scientific Programme will be presented as panel discussions, free communications, small group workshops (colloquium), films, and exhibits — with emphasis on interdisciplinary topics.

Social Programme. Receptions in Copenhagen are planned and excursions in the surroundings will be arranged for participants and their companions.

Correspondence re application form:
To the Secretariat,
2nd International Congress on Cleft Palate c/o Dis Congress Service,
36. Skindergade,
DK-1159 Copenhagen K.,
DENMARK.
PRESIDENTIAL BRANCH REPORTS
Australian Society of Orthodontics

WESTERN AUSTRALIA*
As in previous years, 1972 has been a quiet year for Branch activities. There has been three meetings during the year with lectures presented by Mr. Vince Williams and Mr. Bill Brogan and a case presentation by Mr. Ted Barham.

Three of our members, Messrs. Kirkness, Brogan and Dignam presented lectures to the A.D.A. members.

It was obvious that lectures which were clinically orientated proved to be the most popular. Photographs, slides, X-rays, etc. do help to stimulate discussion. Members should be encouraged to collect well documented cases so that lectures can be made more stimulating and provocative. This will also help in providing suitable materials for table clinics for future Congresses.

The A.S.O. prize in Orthodontics at the University of Western Australia will be presented this year to the most successful student in Orthodontics.

The membership of our Branch remains unchanged.

As stated by previous Presidents, the success of the Branch depends on the interest and enthusiasm of its members.

In conclusion I would like to thank Mr. Peter Heagney for his help and efforts as Secretary/Treasurer.

K.P.L.

QUEENSLAND†
It is my pleasant duty to present the 17th Annual Report of this branch of the Australian Society of Orthodontics and to review the activities of the past year. Our meetings for the year, were as follows—

3.2.72 Dr. R. James — “Physical properties of Dentaurum Wilcock and Unisil Archwires”.

Dr. B. McKenna — “A comparison of two lateral Skull roengenographic techniques to determine the necessity for a cepholometer”.

Dr. N. Goodrick — “Impacted canines and their Management”.

5.3.72 Dr. R. Moyers — “Abnormal tongue behaviour”.

Members of A.D.A. were invited to attend.

7.6.72 Dr. J. Williamson — “Facial pain and T.M.J. Dysfunction”.

22.7.72 Dr. J. Keys — “Comparison of Intrusive forces developed in various gauges of Wilcock Archwires”.

Dr. Hass — Audio-Visual “Rapid Maxillary Expansion”.

Dr. R. Wenck — A case report.

Held in Toowoomba, members of their sub branch of A.D.A. attended the meeting. A very enjoyable joint evening social followed.

13.10.72 Dr. D. Robertson — “Ankylosed Teeth”.

7.12.72 Annual Clinic Day — guest lecturer Dr. R. Abbott presented three papers.

“First Stage Begg Lightwire Treatment and pretreatment in mixed dentition”.

“Third Stage Begg Lightwire Treatment”.

“Practice Management”.

Also Dr. S. Paul spoke on “Partial Anodontia”.

Several members displayed case reports and items of interest.

A feature of the clinic day was the large number of interstate visitors, orthodontists coming from South Australia, Victoria and New South Wales. In particular we were honoured to have Federal President, John Reading with us.

Undoubtedly some of the credit must go to your committee, who in their wisdom selected and obtained Dick Abbott as guest lecturer.

My thanks to all those who participated in the year’s program and to our Patron, Dr. Sagar, for his interest in our activities and his willingness to make available to us the facilities of the Dental School for our meetings.

Following on from recommendations at the last annual general meeting, three important tasks were undertaken and completed during the year.

1. Economics Survey:

A questionnaire on fees charged for a wide range of orthodontic services was circulated to all full members to which 100% reply response was received. These were analysed by an economics committee, a report compiled, and sent to all state members.

2. A Radiographic Service:

A group practice of radiologists at the instigation of the A.S.O. have installed a Unitek head holder and Siemens Orthopantomograph in their rooms.

Brisbane orthodontists can now have whatever x-rays they require taken at this centre, which in practical terms means excellent quality x-rays, which can only raise standard of treatment and diagnosis in orthodontics. It also allows patients to take advantage of the Medical Benefits Scheme.

*Presented to the Annual General meeting of the Branch 20th November, 1972.

†Presented to the Annual General meeting of the Branch, 7th December, 1972.
3. Duties List for Each Income State Executive:

To allow a smooth take over by the incoming executive after each Annual General Meeting, a list of duties and responsibilities for the President, Secretary and Treasurer has been compiled. It is anticipated that this list will be improved on each year and in the future will form a basis for State By-laws.

This year we held our Clinic Day in association with the Queensland Branch of A.N.Z.S.O.S. In a state where membership of speciality groups is small, this is one way of improving depth of discussion following lectures and also gets us off the narrow road of orthodontics for a while.

Our membership stands at twenty eight, an increase of four since 1968, there being twelve full members, eleven associate members, three provisional and two honorary life. There are three of our members on leave of absence. Our treasurer reports a satisfactory bank balance. I feel we have fallen down over the last few years in members presenting case reports at our meetings. Perhaps the new executive might look into this as only two members gave reports this year. Our congratulations are offered to John Moffatt, as Editor of the Australian Orthodontic Journal, for the high standard of this publication and also for his election to the position of Federal Vice President.

In conclusion, my thanks to the members of the committee and to those appointed to the special committees who assisted me so ably during this, my second term as President.

R.F.H.

BRANCH REPORTS

VICTORIA

On November 15th last Dr. J. Martin, first assistant in the Department of Medicine of the Austin Hospital gave a lecture entitled "Calcium and bone" and he discussed the developments over the last ten years in this field with particular emphasis on calcitonin. This was an absorbing lecture, which embodied as well possible lines of research in the future.

The meeting was also the annual general meeting of the Branch and the following were elected as office bearers for the ensuing twelve months:

President .... J. D. McDonald.
Vice-President .... G. G. Quail.
Hon. Secretary .... S. Jacobs.
Hon. Treasurer .... B. A. Borghesi.
Councillor .... A. J. Sutton.

The President communicated to the meeting the sad news of the tragic passing of Mr. Peter Botting in England and Professor Ernest Hixon in Argentina. Both were as a result of accidents.

S.J.

WESTERN AUSTRALIA

At the annual general meeting of this Branch held on Monday, 20th November, 1972, at A.D.A. House, Perth, the following office bearers were elected for 1973:

President .... K. P. Lee.
Hon. Secretary/Treasurer .... T. Y. W. Lam.
Councillor .... V. M. Williams.

The guest lecturer for the evening was Dr. Keith Godfrey, Senior Lecturer in Orthodontia at the University of Sydney. His subject was "Some Surgical Aspects in Orthodontic Treatment".

T.L.

QUEENSLAND

The annual general meeting was held at the Gateway Inn, Brisbane, on Thursday, 7th December, 1972, when the Branch was pleased to have Dr. R. Abbott and Dr. S. Paul as the clinic day lecturers.

Election of office bearers for 1973 resulted as follows:

Patron .... J. A. Sagar.
President .... G. H. P. Bolton.
Vice-President .... S. Paul.
Hon. Secretary .... K. M. Hoole.
Hon. Treasurer .... D. E. Robertson.
Auditor .... R. James.
Councillor .... A. F. G. Campbell.

At the Branch meeting held on the 1st February, 1973 in the Owen Pearn Memorial Lecture Theatre, New Dental College, Turbot St., the main business to receive consideration was the programme for 1973. Meetings will be:

6th March: Special meeting.
Lecturer, Professor C. F. Ballard, who will speak generally about orthodontic education and services in the United Kingdom.

6th April: Case presentations and discussions by K. O'Keeffe, R. Rickleman, and D. Robertson.


Oct/Nov: Two day course by Professor D. Woodside.

7th December: Lecturer: J. Smythe, who will discuss periodontal implications of an orthodontic topic, e.g. occlusion.
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