PSYCHO-SOMATIC STUDY INTO THE TREATMENT, PREVENTION AND TREATMENT OF DRUG SICKNESS AND ITS RELATIONSHIP TO MENTAL DISORDER.

by

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INTRODUCTION

1. As in a previous paper (2) this essay starts with an attempt to define to the essential unity of health. The worker in any health field must necessarily have the broadest possible outlook and must attach the closest possible meaning to the word health. Not only must the various specialists within the profession of medicine understand and fully appreciate the endeavours of each other, but the physician must understand and appreciate the work of the dentist. The dentist must understand and appreciate the work of the physician and both must understand and appreciate that health encompasses within its scope such widely different fields of endeavour as psychology, housing, control of delinquents and abolition of poverty. Within the restricted field of prevention, control, and treatment of disease and disability, a realization of the complete inter-relationship between the efforts of all workers is essential if the object to be a desirable source of treatment in one direction is not to result in disturbance in another direction, and this book will try to demonstrate the need for conduct to proceed upon a realization. Psychology is a science which studies the various states of the human mind and as such it is a field of investigation, study and research of the greatest importance. Its close relationship with all forms of disease and the need for taking it into account in adopting means for prevention and treatment, seem obvious enough, but nevertheless there are today many failures to recognize this and it will be clear that the handling of the problem of mental suffering has been one such failure.
Physiology is a study of the functioning of the human body whilst psychology is a study of the functioning of the human mind. The one is as important as the other and a full appreciation of the place of each and their close relationship to each other is a necessary approach to our present problem. Edward Zales (3) stresses the need for a correct psychologic approach to patients requiring dental service and points to the need for adopting a correct attitude with children in particular. He says that there is a great need for both the general and the dental surgeon to prepare his patient both physically and psychologically for any treatment or operation. He points out that the tooth cannot be divorced from the personality of the patient any more than any other part of the body can, and the patient's personality should be given as much consideration as his physical symptoms. Bauza (5) says "There can be no health or happiness in the presence of long continued fear. By depressing physiological function it destroys co-ordination of the various organs and systems of the body . . . First comes the fear and worry, then the disturbance of function and later the organic lesion."

Zales (6) in discussing nerves or nervousness also draws attention to the close association between mental and physical disturbance. He says "The man with chronic indigestion or migraine may be just as much a victim of subconscious fear as the one afflicted by convulsive movements of the muscles."
Dentists in the course of their work frequently come into close contact with very young children. It is quite usual for children of 2½ years to make their first visit to the dentist and to continue at regular intervals thereafter. The dentist has an unusual opportunity of exercising a powerful influence over his young patient at a time when his mind is extremely impressionable and plastic. This influence extends far and away beyond the immediate dental field. The work which he is called upon to do is of necessity acting in character, and great care must be exercised when carrying out dental treatment and in giving advice for home care lest the teeth be cared for at the expense of mental harmony.

Any such mental disturbance can be, and often is, of a serious and lasting nature. Adler (7) says "It is in the first 4-5 years of life that the individual is established in the unity of his mind and constructing the relations between mind and body. He is taking his hereditary material and the impressions he receives from the environment and is adapting them to his pursuit of superiority. By the end of the fifth year his personality has crystallized. The meaning he gives to life, the goal he pursues, his style of approach and his emotional disposition are all fixed."

Horton (6) quotes Freud as saying "Educators . . . will transfer the main emphasis in education to the earliest years of childhood . . . the little human being is frequently the finished product in his 4th or 5th year and only gradually reveals in later years that lies buried in him."

The responsibility on the dentist therefore is clear, and his first care should be to avoid disturbing the child's sense of security. If he has been carefully handled at home, he comes to the dentist without any fear or apprehension and this mental state should be maintained.

Linton (3) says that the only true instinctive fears which a new born infant has, are those which are called forth by loud noises and lack of support.
As he grows older the infant acquires more and more fears and attachments for objects and people. These new fears and attachments are continually built into the child's character and, particularly in the early years, the utmost care must be exercised by parents, teachers, doctors and dentists to avoid building in senseless or harmful fears. Watson (8) refers to this as a process of conditioning and speaks of the new fears as "conditioned fears" and the new loves as "conditioned loves". He says that rage and temper are emotions which are present in the newborn infant and the stimulus that will call them forth is the holding or hampering of the child's movements. The mere holding of a child's head will frequently send it into a fit of rage. The effectiveness of holding or hampering any part of the body as a stimulus to anger and rage will surely be recognized by any practising dentist. Nothing will provoke a rage tantrum more effectively than continued forcible restriction of a child's movements. Watson describes how he was able to build a conditioned rage response into a very young infant by deliberately interfering with certain movements. Dentists have great opportunities for conditioning their young patients in different ways and it will be shown how, all too often, harmful responses are built in through over-concentration on the purely dental aspects of the problem before then without sufficient regard being paid to psychological results.

Zoe Benjamin (5) says "A fundamental principle in child management is that the emotions of fear and anger should be crowded as little as possible because of their effect upon the child's character." It has been said that if all children were perfectly handled at home they would approach the dentist without fear or apprehension, but of course this does not always happen, and the dentist is often called upon to exercise some form of discipline in order to
attend to his young patient's needs. The subject of discipline, though, requires a careful study if it is to be applied skillfully and effectively. If it is of a constructive nature it will stimulate and strengthen the child's character and morale, but if it is of a destructive nature and imposed on the child by virtue of adult superiority, it will engender resentment, anger and rebellion, instead of co-operation and friendliness. This now brings us to a consideration of habits, and it is to the study of one of these, namely thumb sucking, that this paper is devoted. The habit of thumb sucking has a most important psychological significance and it also has a great dental significance. Much has been written from the psychological angle of this subject just as much has been written from the purely dental angle, but I believe that no such sectional approach to the problem will suffice, and consequently the attempt is made in this paper to survey the problem as a whole.

Useful information has been obtained from more than 2,000 children of ages ranging from birth to 5 years. Individual observations have been carried out of some 150 children, 7 detailed histories of behaviour have been obtained, and 48 case histories relating to early infancy. In addition I have carried out extensive observations of parallel behaviour in siblings.

The theoretical evidence produced supported by these practical investigations will show that thumb sucking is primarily a psychological problem the treatment of which must conform to accepted psychological principles. It will be seen too that the methods of treatment most commonly used in the past have not conformed to these principles, have nearly always failed in their object, and have often caused considerable mental upset. Evidence will make it clear that thumb sucking has its origin in the disturbance of an instinctive
urge in early infancy and is broadly divided into two phases each of which require different handling, namely the pre-teething phase and the post-teething phase. The term pre-teething means that period, usually from birth to nine months, during which the infant relies almost entirely on the act of sucking to obtain its food, and the post-teething period refers to the time when the sucking in of food has been discontinued.

It should be noted too that whereever in this thesis the term "thumb sucking" is used it is intended to mean thumb, finger, or hand sucking.

The intention of this thesis then is not to prove by original work that thumb sucking can, and in many cases does, cause more or less serious dental deformity, because that has already been amply demonstrated by a number of observers, some of whose results are summarised herein. The intention is to accept the proof, which is already available, that thumb sucking is a potential menace to the dental structures and to proceed from this point with an endeavour to discover the true nature of the act of thumb sucking, why it occurs, how it can be prevented and how it can be treated. The aim will be by theoretical considerations and practical observations to provide an added knowledge and understanding of a practice, some of the most harmful results of which it is the dental profession's duty to correct. Nor will any attempt be made to deal with the purely orthodontic treatment involved in such correction, but the whole of the attention will be focussed on the thumb sucking act itself.

If, by a thorough understanding of the processes involved, this practice can be prevented, or, once started, can be discontinued without dental disturbance, then the need for such subsequent orthodontic treatment will be obviated.

Considerable attention will be given to the instinctive nature of the sucking act, and to the entirely new light which
is thrown on the whole dental approach to the problem of thumb sucking when this instinctive basis is appreciated. This thesis then deals largely with psychological considerations and strives to show how closely these inter-relate with purely physical considerations.

It is a study in preventive dentistry, not in orthodontic, and if it falls largely outside the field of what has hitherto been generally regarded as the field of dental science, then the humble suggestion is made that the compass of this field must now be enlarged.
Although it is generally accepted that the act of thumb sucking is a potential menace to eroding tooth and developing jaws, it seems advisable nevertheless to produce evidence of this and to show clearly that thumb sucking can and does contribute very materially towards serious malformation of the jaws and malocclusion of the teeth and is therefore a matter of great concern to dentists. It is important to establish this point beyond doubt and also to attempt to place the problem in proper perspective because there are many people who regard it as out of its proper proportion, just as there are others who deny that it is a problem at all. Many parents, teachers, kindergartners, nurses and others having the responsibility of training young children, find the breaking of this habit so difficult, and find so many nervous aspects associated with it, that they wonder whether the habit does really cause harm commensurate with the efforts necessary to control it.

Strain (10) passes off the habit as relatively unimportant by saying "All babies suck their thumbs, fingers or fists - it's part of babiedom. They suck their thumbs before they are born. But it is habit forming, you say, and protruding teeth will result. If that is the case, then the great majority of non and women ought to have protruding teeth, for the great majority sucked their thumbs in infancy and didn't, thank goodness, wear restrains. But they don't have - they have fairly respectable teeth."

Such a comment as this is full of half truths and is extremely misleading. It is probably quite true that a baby's thumb is very close to its mouth in its inter-erine position, but thumb or finger sucking is most certainly not a natural thing to do, all babies do not do it, and it is no more part of babiedom than is diarrhea or measles. Nothing could be
further from the truth than the inference that such a habit is of so little importance as to not warrant serious consideration and study.

Pursuing this subject further Strain says, "How few children one really sees sucking their thumbs after a year or two at school! Best of all, one of the studies which have been made on thumb malformation shows that even then thumb sucking has been continued persistently up to the fifth or sixth year, if the habit is corrected at that time no permanent disfigurement takes place. If thumb sucking persists into the sixth year correction may be necessary, and treatment, if sought, at this period usually yields successful results."

This statement is open to very severe criticism because the claims which it contains are unreported by any evidence whatever. They are a series of half truths giving a completely distorted picture of the true position, whilst at the same time there is a complete lack of understanding of the real nature of thumb sucking and also an absence of any constructive suggestion for dealing with the problem.

A survey of dental literature proves that, from a purely dental point of view, thumb sucking is an important factor with which to contend in our efforts to prevent malformation of teeth and jaws. It is not of equal importance at all ages, as it is hoped to point out later, but the following survey of relevant literature will, I believe, prove beyond doubt that the habit of thumb or finger sucking does in fact exercise a very powerful influence on the developing jaws and teeth.

Sillman (11) says "A force of certain intensity and duration will change the position of the teeth and the surrounding structures. It makes no difference whether the force is applied with an orthodontic appliance or a thumb, but we do have to be sure that such a force is operating."
Scheuchert (12) reports an analysis of 23 children who were known thumb suckers and the examination revealed definite structural deformation, the degree and nature of which was directly proportional to the method, time and intensity of the habit. Abnormal forces exerted in line with natural course of growth resulted in over-development whilst those in opposition to natural growth resulted in lack of growth and distortion.

Johnson (13) commend this investigation of Scheuchert's and particularly his description of the forces involved in thumb sucking. These he summarises as follows:

"There are three abnormal forces exerted in thumb sucking:

(a) The passive forces of the digit held between the arches.
(b) Abnormal constriction of the cheeks against the sides of the arches.
(c) Abnormal muscular pressure of the digit against the palate.

These forces begin in the plastic age of infancy and are often continued throughout the formative period of childhood. Scheuchert (12) describes the devastating results of a sucking technique in which the muscular pressure of the thumb or finger was exerted against the palate causing a permanent depression. Forward distortion of the maxillary bones was noted and X-rays suggested very strongly that a consequent lowering of the nasal space had resulted, accompanied, in one case, with a deflection of the nasal septum which almost blocked the nasal space on that side.

In another article Scheuchert (12) describes his examination of these 23 thumb and finger suckers. Their ages varied between 6 years and 14 years. Twelve children were aged 6, and eight children were aged 7. The Year Book of Dentistry, 1888, summarises his findings as follows:

"In all his patients the thumb sucking habit was well established before the age of 1 year and in most cases before 6 months."
The table showing the malocclusion features reveals the following:

1. All were practicing the habit when the models were made and had been since infancy.

2. All were in malocclusion and in 83 cases it was pronounced.

3. Most regional and general types of malocclusion were represented and were equally prevalent in younger and older children.

4. Class 3 was absent and excessive overbite usually present in children was present in only 3.

5. Certain types were very prevalent: maxillary incisor protrusion mandibular incisor retrusion, open bite, short bite, narrow arch and class 5, div. I.

6. Mouth breathing was common and did not always accompany protrusion.

7. The high percentages and physical similarity of cases indicate that they owe their origins to causes common to all and that these causes are definite, such as habitual, extrinsic mechanical forces. Such uniformity of abnormal patterns could hardly occur with such frequency if they were due to perversion of general growth from constitutional causes.

It is concluded that thumb-sucking and finger sucking are prevalent habits and that malocclusion invariably results while the habit is in force. These major abnormal forces, one passive and the active, are exerted and cause malocclusion by mechanically inhibiting or exaggerating inherent growth processes. Pernicious secondary habits of the tongue and lips and of mouth-breathing are formed and frequently persist after thumb-sucking ceases. Abnormal pressure of the cheeks during sucking is closely associated with deficiency of laterarch growth and abnormal muscular pressure against the palate is important in causing class 2 malocclusion. While there is a tendency toward self-correction of simple types of anterior malocclusions on cessation of the habit, provided secondary
habits are not factors, this is unlikely with these cases with gross malocclusion.

In addition to the evidence of dental deformity which this article of Steinhardt's provides his initial observation that in all 29 of the children studied the practice of thumb sucking was well established before the age of 12 months and in most cases before 6 months. It is of the utmost importance because it provides strong support for his conclusions, presented later, that the thumb sucking act in nearly every case commences at the oral stage of the infant's life.

Johnson (13) reports having examined a group of 339 children having varying degrees of malocclusion. The ages of these children varied from 3 to 13 years but only 9 of these were over the age of 14. Of these 339, 173 or 51.49% had sucked the thumb or fingers. It was not claimed that in the cases of thumb or finger sucking that this habit was the only etiologic factor involved in the malocclusion. It was stated, however, that of the 339 cases, in 173 there were thumb or finger sucking, and with the exception of 3 cases, the thumb or finger sucking habit may have been an etiologic factor in the existing malocclusion. The 3 cases excepted showed no ill effects of the habit, the thumb sucking having been only occasional. Johnson gives a table showing the results of investigations carried out by Hellman, Lewis, Steinhardt and himself. All studied children having varying degrees of malocclusion. Hellman studied 254, of whom 65.03% were thumb or finger suckers. Lewis studied two batches, first of 179 contained 24.1% of thumb or finger suckers whilst the second batch of 161 contained 27.43%. Johnson's own figures as previously stated were 939 children examined of whom 17.49% were thumb or finger suckers.

He next gives attention to the very important question as to the length of time these children had been sucking thumb or finger and he was able to demonstrate the following
Facts:
1. Sucked thumb or finger for one year or less.
2. Had broken the habit by the end of the third year.
3. Had indulged the habit for ten years or longer.

He makes the further point that occlusion of the deciduous dentition may correct itself after the thumb sucking is broken if normal function of the lips exists. If normal function does not exist in all probability occlusion will persist. He therefore advocates the prevention of the habit in infancy. Ras (14) carried out extensive observations on 50 children aged from a few days to 3 years and in general the effects of thumb sucking observed in these children can be divided into two main classes:

1. The open bite frequently associated with malocclusion and protrusion of the upper incisors. There were gradual transitions between the two classes. A lower protrusion was sometimes noted as a typical deformity originated by the advancing of the lower jaw by the bent third and fourth fingers.

Open bite is caused by purely vertical stress on the front teeth accompanied in most cases by only a slight compression. The thumb may be responsible when it exerts its main pressure upwards while bitten on by the lower teeth. The degree of abnormality associated with the sucking habit is dependent both on the intensity and duration of the habit as well as on the pliability of the jaw bone. The greatest deformities will develop in association with unfavourable influences such as rickets, bottle feeding and an abnormal mandibular protrusion at birth. On eruption, the front teeth protrude and are shortened and it was noted that the teeth on the sucking side were hindered in their eruption by the constant pressure, a proof that in that particular area the alveolar process was forced up in toto with the teeth grown.
A further important observation is that when protrusion of the upper front teeth has resulted from thumb sucking, the front teeth usually lie on the lower lip causing an imperfect closure of the lips. The constant pressure of the lower lip also contributes towards an increase of the protrusion. In such cases spontaneous correction of the abnormality is quite impossible, and a condition of traumatic periodontitis may develop, the over-bite may be aggravated by the interposition and sucking of the tongue.

Under favourable conditions a complete cure of these abnormalities may be affected providing the sucking habit is stopped very early and that neither too great compression of the arches nor a frontal narrowing are present. A correction of these abnormalities may be expected at the earliest at the time of changing the tooth, as the erupting tooth rectify small abnormalities of the jaws by their growth impulse.

Boas publishes photographs of 23 children in various thumb-sucking attitudes and in most cases he also gives photographs of their models (Figs. 1, 2, 3, 4, 5). Several are described in great detail both as to sucking technique and resulting malocclusion and the evidence is altogether convincing that finger and thumb sucking does in very many children directly cause extensive malocclusion and distortion of the jaws and in many more cases it is a powerful contributing factor.

Silver (15) reports 40 cases of malocclusion in which thumb sucking is recorded, 63% of these become progressively worse and included 9 class I, 10 class 2 and 1 class 3. As 61% of these which became worse were class 3 cases it might be inferred that the habit has contributed to the distal relationship. Improvement occurred in only 15%. This consisted of a change in the anterior segment and not in the distal relationship. The condition remained unchanged by the habit in 20% of cases, all class I. One important fact stands out: if the habit is stopped after the age of six, the chances of improvement are not as good as when stopped under six. He concludes his
References to thumb sucking by saying that faulty habits are particularly thumb sucking definitely influence a deviation from normal occlusion and should be discouraged at an early age.

Carr (10) speaking of the technique of thumb sucking says that if the palm of the hand is directed towards the resulting uncomfortable position of the canines the thumb and fingers to exercise a counter-pressure in order to stabilize the fingers and relieve strain. Continued pressure by this action is enough to result in tissue changes. Then the thumb is placed high on the inclined plane of the palate, there is an anterior movement of the pre-maxillary bones together with the teeth which they support. He is active while the thumb out this very bad lip habits result from thumb sucking. Once bad lip habits, once acquired, make self-corrective of the original irregularity impossible.

Silleron (13, and 17) in his extensive study of occlusion from birth to seven years, makes some extremely important observations on the habit of thumb and finger sucking. While recognizing the potential and actual harm from the habit, he stresses the effects at different ages and produces a considerable amount of evidence to show that from birth to three years, thumb or finger sucking is not a cause of malocclusion. Other writers have sought to prove that thumb sucking, even in the first six months can cause considerable alteration of the jaws but Silleron disputes this. He reports having made a study of over 1000 new born babies and to have culled over 300 models of their gums, and he followed this with a parallel study of 13 children from birth to five years, including 13 to 15 sets of consecutive casts for each child. He says that before and during the eruption of the deciduous teeth the child experiences the urge to bite on the overlying gums and because the gums are not in contact the necessary stimulation is made possible only with the aid of inserted fingers or foreign objects, and by the
protrusive and lateral movements of the mandible. This urge to bite is a physiological process and usually passes uneventfully before the age of 3 years. During this time, interference by holding adults, he says, is apt to rob success of non-suckers, and thus create a habit. Under such conditions displacement of the teeth will occur.

The following examples are some of those which he reports:— One is a child of 1½ years who sucked her thumb until she was 2½ years. Her teeth were beautifully arranged at 18 months and casts made during and after the sucking had ceased showed no disturbance of the alignment of teeth or shape of the jaws. This child's brother started sucking his left index finger at three months and accompanied this later by intense biting which continued till he was 18 months old. Casts made at 9 months showed a displacement of the left maxillary incisors, casts at 17 months, which was 8 months after the sucking and biting had ceased, showed a partial spontaneous correction. At 2 years, or 11 months after the cessation of sucking or biting, the displaced teeth were in good alignment.

Another child sucked his thumb so vigorously from 3 months to 3 years 2 months that it caused a callous formation. Little effect on the position of the teeth at this period was noted however. With the birth of a sister, though, his sucking efforts were increased, and casts made at 4 years and 2 months showed a marked increase in the protrusion of the upper teeth. It was brought home to him by explanation how his sucking habit was causing displacement of his teeth. He dropped the habit and casts made at 5 years shows spontaneous correction of the protrusion.

In another paper (11) Sillman substantiates his claim that thumb sucking is not a cause of malocclusion within the birth to 3 year group by publishing a table showing the results of an examination of 15 babies who were thumb suckers and 15
non-suckers. Of the sucking babies 3 had good incisal regularity against 7 with irregularity, whilst of the non-suckers 7 had good incisor alignment and 11 had irregularities. 11 of the suckers had good occlusion and 3 had malocclusion, whilst 15 of the non-suckers had good occlusion and 2 had malocclusion.

He goes on to examine the question of when the sucking habit may cause a deformity, and he points out that although, up to the age of 3 years, little or no harm may be done, nevertheless it is possible that a passive sucking force may be turned into an active one. Over anxious parents, who continually harass the child in order to break the habit, only make him suck all the harder, and a chain of tensions is set up which is more detrimental psychologically than the possible dental deformity. The chances are that the child would eliminate this habit with a minimum of dental and psychological trauma if he were given appropriate care without adult annoyance and interference.

These observations of Sillman's are regarded as extremely important because they dovetail so closely with the purely psychological considerations of the problem of thumb sucking, and it is hoped, a little later, to demonstrate this more fully and to show, as has already been mentioned, that the problem is, in fact, one and not two separate problems.

In trying to assess the importance of the purely dental aspect of the problem one must be careful not to oversimplify one's approach. No simple "Yes" or "No" answer can be given to such a question as, "Does thumb sucking cause malformation of the jaws?" Any more than such an answer could be given to the question, "Does diphterial bacillus cause diphteria?" The presence of this bacillus can often be demonstrated in throat swabbing of healthy people but that does not mean that it is a perfectly harmless organism. It does mean that these particular people possess a defensive mechanism which is efficient
enough to overcome the invading organism and so prevent in-
fection taking place.

So with thumb sucking, there are, no doubt, some children
who suck their thumbs and cause no damage to their jaws. Per-
haps these children have very well developed and strongly built
bodies which are capable of withstanding the abnormal pressures
brought to bear during the thumb sucking process; perhaps too,
the sucking technique is not very vigorous, or not indulged in
for long periods at a time.

No doubt too, self-correction does take place with some
children after thumb sucking has ceased, provided normal lip,
cheek and tongue function still exists, but where this normal
function does not exist, then self-correction is impossible.

Silicani's observation that little or no permanent harm
may result up to the age of 2 is conditional upon two important
factors, firstly that the practice should not continue past
that age or secondly that no secondary harmful habits should
develop. At the same time too it should be remembered that the
longer the habit continues the harder it is to correct it and
the greater becomes the likelihood of secondary harmful habits
of lip and tongue developing.

Photographs of models which appear in Figs.6-18 are all
of children who were active thumb suckers at the time and the
thumb sucking was diagnosed as the direct cause of the resulting
malocclusions. The ages of these children range from 7-17 years.

Photographs of the 16 year old boy (Figs.15-20) who has
been a persistent thumb sucker from early childhood depict a
deformity which is well nigh incurable. Thumb sucking was
diagnosed as the cause.

There is no room for doubt then that thumb sucking is
capable of causing, and in very many cases does actually cause,
extensive malocclusion with resultant impairment of masticatory
function and probable increased susceptibility to dental caries
and gingival infection.
Fig. 1. This child is using a similar sucking technique to that shown in Fig. 4 - 455, except that the forefinger is not tucked over the nose. As far as her teeth are concerned, this might easily be a more harmful method because the hand is receiving no support from the forefinger and consequently the amount of leverage tending to force the upper teeth forward and the lower teeth backward, would be much greater. In addition the anterior teeth are frequently prevented from erupting into proper position, resulting in an open bite.

(HAAS. 14)
Fig. 2. Models of child shown in Fig. 1.

(HAAS 14)
Fig. 667.—Girl, age seven years, showing class II, division I, caused by tilting.

Fig. 668.—Same case as at left.

Fig. 6. Another reproduction of a Bass (14) photograph demonstrating the effect of prolonged dummy sucking.
Fig. 4. Two thumb sucking techniques. Fig. 453 shows an accessory movement being made with the other hand. In this case it is a tugging at the collar, but many other such movements have been observed, including twisting a lock of hair, pulling the ear, rubbing the chest and clutching a woollly object.

(Haas 14)
Fig. 5. The finger sucking demonstrated in this series is fundamentally similar in character to thumb sucking. That it can cause considerable malocclusion is evident, but generally speaking it is less harmful from a dental point of view, than the thumb sucking techniques already demonstrated.

(Means 16)
Figs. 6 and 7. A class II malocclusion, caused by thumb sucking. This boy (Brian O.) was aged 9 when the models were prepared and had been a persistent thumb sucker for several years.
Figs. 8 and 9. These models belong to a boy of 7 years (John J.) who has also been a persistent thumb sucker since infancy using the technique shown in Fig. 1. The extreme backward displacement of the lower anteriors caused by pressure from the back of the thumb is quite typical.
Figs. 10 and 11. These models belong to Carol J., aged 9 years whose case is reported in some detail under Case Discussions. The malocclusion is severe and orthodontic treatment is impossible until the thumb sucking ceases.
Figs. 12 and 13. Models of a girl aged 17 who was still thumb sucking. The result is seen in the projecting upper anterior and the open bite.
Fig. 2.—Secondary habits. A, protrusion originally caused by thumb-sucking, exaggerated by resting lower lip between arches. B, protrusion and open bite increased and maintained by holding tongue between arches, accompanied by mouth breathing. C, protrusion and open bite caused by thumb-sucking accompanied by tongue and lip habits and mouth breathing.

Fig. 3.—A, extensive open bite with narrow arches but without protrusion or retraction. The muscular force of the thumb was upward in the center of the palate. B, obvious results of sucking middle finger while index and third fingers pressed against buccal segments of arches.
Figs. 15, 16 and 17 are photos of an 18 year old boy who is still a persistent thumb sucker. Fig. 15 shows the technique used and Figs. 16 and 17 show the very considerable facial disfigurement resulting from the habit.
Figs. 12, 13 and 14 are from the same 18 years old boy and they show the appalling distortion resulting from thumb sucking.
Fig. 21. Heather G, whose case history is reported on page 227 demonstrates her thumb sucking technique.

Fig. 22. Severe malocclusion caused principally by Heather's long standing practice of thumb sucking.
Ears: Figs. 24. Heather's facial expression provides evidence of malocclusion noted in Fig. 22. There is difficulty in bringing the lips together in a natural restful position.
Fig. 25. Another typical thumb sucker.
One of the very first instincts of the newborn infant is to suck at his mother's breast, and this too is one of his very first pleasures. This sucking is an instinctive act, and a powerful organic pleasure and associated with it too, is soon built up a strong sense of security.

It can be seen then that when a strong instinctive act promotes the first organic pleasure and at the same time satisfies an infant need for a sense of security, there are very powerful associations built round this act of sucking.

Halse (18) says "Nature seems keen to enjoy in a pleasureable way every function of his body and the instinct for pleasure is just as much a hunger as the instincts of preservation. So the baby in the sucking urge must do two things: he must satisfy physical craving for food and he must also satisfy animal cravings for pleasure. To fail to satisfy either of these instincts means death, physical death in the one case, emotional death in the other."

Halse points out that the baby will quickly show hostility even to the loved mother if the breast which gives so much pleasure is with drawn before he is completely satisfied. If there is a continuation of such frustration and thwarting in his pursuit of pleasure as he grows into childhood he will inevitably learn to react to his environment with hate and vindictiveness. So important is the pleasure derived from sucking that very often the baby will seek anything he can get to his mouth till he learns into adult. Loss of the nipple leads to belligerence, fear and anxiety. Anxiety quickly gives way to anger and the impulse to suck may give way to biting as an expression of resentment. If fealty is not fully realized follows a painful birth, the infant will suffer persistent fear and anxiety and as a result will begin to expect life always to be frightening and uncertain. It is while the child is at
the oral stage that the baby first becomes aware of the world outside himself and if he continually experiences unhappiness and is frustrated in his craving for satisfaction, then the world will appear to him a hostile and disappointing place.

Halse summarizes his chapter on the oral stage of life by stressing the dependence of the child's happiness upon the emotional attitude of the parents. These attitudes, he says, show themselves in a multitude of ways and are very quickly sensed by young children and their thoughts, emotions and personalities are strongly influenced by them. It is not so much that we say as how we say it, and still more what we do that impresses the child. Breast feeding is vitally important because this is his first introduction to the world and during this period he is absorbing one of the deepest and most lasting impressions of his environment. Every effort this phase has passed these impressions will strongly influence and color all his activities.

Some advice such as their thumbs or fingers from birth and care must be taken that the situation is handled correctly, for there is little doubt that lasting harm can be done to the baby by a too enthusiastic and misguided interference with the act. The continual removal of hand from mouth, the binding of elbows and other forceful methods, inflict a terrible sense of frustration. Let this sense of frustration become associated, as the child grows older, with one or both of his parents, and his resentment will remain always in his unconscious mind and will result in an unbridgeable gulf between parent and child which neither will understand or fully grasp, but which will cause much unhappiness to both. The parent will in most cases fail completely to recognize the part which he himself has played in bringing about the unfortunate situation, and of course the child will be quite unable to account for his serious mal-adjustment in relation to his parent.
See Benjamin (5) stresses the need for companionship on the part of the young baby and points out that this need from about two months onwards is becoming steadily stronger. The mother should set aside a couple of hours every day specifically as play time and devote her individual attention to the baby. If the baby is deprived of this companionship which he is beginning to seek, he will be thrown back on himself as his first outward movements towards social life are baffled. This, she says, results in his seeking pleasure in himself instead of from others and is often marked by the onset of habits of thumb sucking and even masturbation. Even if thumb sucking has been indulged in previously, the lack of companionship will tend to strengthen the habit rather than weaken it as should be happening and, such habits will indicate a sense of insecurity on the baby's part in his mother's love. The tendency then is for him to find substitute pleasures and satisfactions through connections of his own body, whereas the thoroughly happy, well adjusted infant will not indulge in such practices.

Speaking of a baby's need for a sense of security Fryor (10) refers to the first fear or sense of displeasure coming from sudden loud noises, too much restriction of movements, and a feeling of falling and to the necessity therefore for avoiding rough and sudden movement. To contribute to his sense of security he should be placed up gently, held close, and in putting him down it should be done carefully so as to avoid any sense of falling or lack of support. One of the baby's principal needs from the outset is for a sense of security in his position in the family.

It will be noted here that Fryor is in agreement with Vinton (9) as to the ill-effects of hampering or "too much restriction" of the child's movements.

Susan Jusnes (21) speaking of child development under
5 years refers to the fact that one child does for one person under certain conditions is no reliable guide as to that he may do for another in a different situation. She speaks too of the "hair trigger action of external events" (e.g., loss of nurse or mother, severe treatment for bedwetting, sensible interference with thumb sucking . . . etc.) causing a profound redistribution of internal forces at any point of experience which may alter the course of the child's development in a way that could hardly be foreseen at an earlier age.

She says that in early infancy thumb sucking can often be controlled by placing the baby's arms in his wraps in such a way that he cannot easily get his hands to his mouth, for instance by having wraps fairly closely fitting over the shoulders but loose over hands and arms. This will discourage him where the desire is not urgent but if he is very determined and the need for this form of satisfaction is very strong it will then fail. No success can be expected either, unless underlying causes and contributing factors are first corrected. If his arms were tied down, the persistent sense of irritation and frustration would most likely do more harm than the thumb sucking. Enthusiastic advocates of those severe measures forget that the baby is not a machine with a life of its own in which this or that part can be moved or pushed about at our will.

The baby can be prevented from getting his thumb to his mouth but often the price paid is continual nervous strain, upset and helpless anger, all of which may spread most harmfully over the whole mental life.

She says that to lessen the habit and help the baby grow out of it easily one must be sure that he is getting full satisfaction at breast or bottle. His attention too must be directed away from his thumb during feeding hours by constructive means such as giving him more companionship than would otherwise be
necessary, and leaving him alone in his cot as little as possible when awake. He should be talked to and have his play shared, such as play with rattle, picking up and throwing down his spoon or toys and in various other ways occupying him and leaving him as few opportunities as possible to turn in on himself for amusement.

Renee Lane (23), in discussing weaning, claims it to be a very delicate process and one which is important for the whole of the child's life. He stresses the need for substituting some other form of pleasure for that of the mother's breast and for giving the child the necessary encouragement and help to stretch out for a wider form of pleasure and so enable him to pass lightly and easily through, what is to him, an internal emotional experience. If the change is abruptly made, desire will not go forward to new and wider experiences of mind but will retrogress to some substitute pleasures of the same type as the one surrendered. Thumb-sucking is the obvious substitute.

At weaning time Lane says that it is important to increase all capacity for enjoyment, to give the child plenty of toys and opportunities for suitable play and to avoid any punishment or suppression of regressive tendencies. Although food values remain the same the degree of pleasurable sensation derived from the partaking of food is immeasurably less and it is the amount by which the new method of eating is less pleasurable than that found at the mother's breast which determines the amount of energy set free for mental growth. Provide it with fresh fields of creative occupation and it will go forward, but if there is a lack of proper mental interests to pursue it will be directed back to earlier pleasures or else remain fixed at the same point and become employed in unworthy and debilitating substitutes like thumb-sucking.

Haron Earegy and John Anderson (23) suggest as a possible cause of thumb sucking, even among breast fed babies,
the failure to fully satisfy the sucking instinct through overhasty feeding at the breast. This could result in a sufficiency of food but an insufficiency of sucking movement. Thumbsucking which persists beyond babyhood must be regarded as an infantile habit which still persists. It provides a pleasure faintly echoing that enjoyed at the mother's breast and he comes to depend on it more and more for comfort when tired, hungry, bored or emotionally upset. It is claimed that mechanical means are useless and so too are soothing and rapping for these latter will have the effect merely of driving the child to seek his one sure way of escape and comfort — sucking his thumb. An interesting point made, too, is that noted by several other observers, namely that whilst the thumb is in the mouth all other stimuli remain more or less completely blocked and objects which usually arouse fear will fail to produce any effect.

Efforts must be made to determine the cause of the thumb sucking and the instance is quoted of a lad of 3 who despite plenty of toys, a sandbox, and a swing, still sucked his thumb and hung about indoors. Then/playsmate about his own age was discovered nearby, the playmate accomplished very shortly that months of rapping, mechanical means, threats and promises had failed to do.

The persistence of thumb sucking in an older child may be his way of obtaining his attention from mother. He may be jealous of a new baby and feel deprived of attention for which he craves and to suck his thumb is the one sure way of getting it.

Then thumb sucking as a habit is well established in later childhood it usually becomes a means of warding off attacks of various sorts, and it becomes necessary to find out in what the child needs a fortress to hide/rather than to try and 'break' the habit itself. It serves no good purpose to talk to the child about the habit and this should be avoided, because otherwise he will revert to it as a defense against criticism.
Without substituting some desirable activity to occupy him it is quite hopeless to conquer the habit. Perhaps he has exhausted the possibilities of his play things, or has outgrown them, he has no playmates or he needs more attention and affection from his parents.

These comments of Foerster and Anderson are considered to be an extremely valuable contribution to the knowledge of the thumb sucking act.

Watson (6) agrees with those who claim that thumb sucking in early infancy should not be regarded too seriously and he points out too, how many infants are born almost with thumb or finger in mouth owing to their position in uterus. In their first few months their hands rarely travel below the umbilicus and it becomes natural therefore for the mouth to be discovered before any other part of the body. Sucking movements will begin immediately the fingers touch the mouth because such movements do not have to be learned. They are well established in most infants at birth.

he says Thumb sucking has serious physical effects on the child for his hands gather germs from everywhere and these are next transferred to the mouth where they find the food warm and moisture ideal for breeding. Continuation of the habit will contribute largely also to malformation of teeth and jaws.

Watson claims though that the effect of thumb sucking on the child’s personality is the most serious of all. He says, “It is an infantile type of reaction which, when carried over beyond the age of infancy, ends in a pernicious habit almost impossible to break. Indeed if carried through adolescence in a modified form of nail biting, finger biting, cuticle picking, or finger picking, it becomes practically impossible to break. It is then classified as a neurotic trait.

The act brings with it a kind of soothing or quieting effect like a drug. As long as the individual is allowed to
engage in it he is perfectly docile in all his reactions. Could
him about it, try to check it and he becomes irritable and
worry. Apparently when the child has his fingers in his mouth
he is, speaking broadly blocked to all other stimuli. Hence
the persistent thumb sucker cannot be as easily made to respond
to toys and other objects upon which we normally train children.
The outside world doesn't get a good chance at him. He doesn't
conquer his world. He becomes an "exclusive", an auto erotic.
With his fingers safely in his mouth the child may sometimes
not even react to dangerous stimuli."

In order to correct the habit he suggests that a start be
made in early infancy by keeping hands away from mouth as much
as possible, and wrapping so as to make it difficult to get
hands to mouth. If the habit still persists, have diet checked
and if necessary corrected, and if these measures still result
in failure more drastic measures are called for and loose flannel
mitts without thumb and finger division are suggested. These
are worn to all nightgowns and day dresses and should be used
continuously for a fortnight. According to degree of persis-
tence the mitts can be made of progressively rougher material.
The aluminium mitts suggested by many are condemned by Watson
as being clumsy and ineffective as too are the elbow splints
so often advocated. These latter he regards as cruel because
the child cannot rub an irritation or brush away a fly or mos-
quito. Aloe and taping he also regards as quite ineffective,
as too is scolding. Punishment has been tried by sharply
rapping the finger with a pencil, but whilst this is claimed
to be most effective when the experimenter is present, it might
the old habit reasserts itself.

It is my belief that Watson and others who discount the
seriousness of thumb sucking in early infancy and who suggest
that it is an act which comes more or less naturally to all
babies, quite fail to understand the true nature of the act.
And having failed to understand its true nature, it follows that they fail too, to understand the fundamental principles of sound treatment. The obtrusive methods advocated are not only quite ineffective, as evidence to be produced later will show, but they can be extremely harmful. The strongest objection too, must be taken to the punishment method suggested by Catron, if only because this implies very strongly that there is a moral issue involved in the process of thumb sucking. This cannot be refuted too strongly. The process is completely amoral and any attempt to introduce moral issues will only result in making an already difficult problem, more difficult and more complicated.

If on the other hand, instead of discounting the seriousness of thumb sucking in the young infant, every effort is made, as soon as/practice shows itself, to discover and correct the underlying cause then it will very soon disappear and subsequent difficult treatment problems will not arise.

Freed (24) has made a most valuable contribution to the understanding of the processes involved in thumb sucking and the following extract is quoted verbatim:

"Thumb sucking which manifests itself in the nursing baby and which may be continued until maturity or throughout life, consists in a rhythmic repetition of sucking contact with the mouth (the lips) whereas the purpose of taking nourishment is excluded. A part of the lip itself, the tongue, which is another preferable skin region within reach, and even the big toe may be taken as objects for sucking. Simultaneously, there is also a desire to grasp things which manifests itself in a rhythmical pulling of the earlobe and which may cause the child to grasp a part of another person (generally the ear) for the same purpose. The pleasure deriving is connected with an entire exhaustion of attention and leads to sleep or even to a motor reaction in the form of an orgasm (underlining mine)."
Pleasure sucking is often combined with the rubbing context of certain sensitive parts of the body such as the breast and the external genitals. It is by this need that many children go from thumb sucking to masturbation.

Kindear himself has recognised the sexual nature of this action and openly emphasised it. In the memory, thumb sucking is often treated in the same way as any other sexual naughtiness of the child. A very strong objection was raised against this view by many pediatriists and neurologists, which in part is certainly due to the confusion of the terms "sexual" and "genital". This contradiction raises the difficult question, which cannot be neglected: namely in that general traits do we wish to recognize the sexual manifestations of the child? I believe that the association of the manifestations into which we gained an insight through psycho-analytic investigation justifies us in claiming thumb sucking as a sexual activity and in studying through it the essential features of the infantile sexual activity ... Let us insist that the most striking character of this sexual activity is that the impulse is not directed against other persons but that it gratifies itself on its own body; to use the happy term invented by Havelock Ellis, we will say that it is autocratic.

It is, however, clear that the action of the thumb sucking child is determined by the fact that it seeks a pleasure which has already been experienced and is now remembered. Through the rhythmic sucking on a portion of the skin or mucous membrane, it finds gratification in the simplest way. It is also easy to conjecture on what occasions the child first experienced this pleasure which it now seeks to renew. The first and most important period in a child's life, the sucking from the mother's breast (or its substitute) must have acquainted it with this pleasure. We could say that the child's lips behaved like an erogenous zone and that the excitement
through the warm stream of milk was really the cause of the
pleasurable sensation. To be sure, the gratification of the
erogenous zone was first united with the gratification of taking
nourishment ... But the desire for repetition for the sexual
gratification is separated from the desire for taking nourish-
ment; a separation which becomes unavoidable with the appear-
ance of the teeth, when the nourishment is no longer sucked in
but chewed.

One hesitates to join issue with so eminent an authority
as Freud, but I do believe that his basic contention is in-
correct. He says that "the act of thumb-sucking is determined
by the fact that it seeks a pleasure which has already been
experienced and is now remembered." But very young infants
sometimes suck their fingers and I find myself quite unable to
believe that they do so because they remember a similar
pleasurable experience. Furthermore, that would seem to finally
dispose of this theory is the statement by Dr. Dava Hughes
that new born infants often suck some part of their hands or
fingers even before being put to their mother's breast. In
such cases they could have had no previous experience.

Katherine Bridges (25) in discussing mannerisms such
as twitchings, flinchings, finger twisting etc., speaks of
thumb-sucking as "the most common of all childhood mannerisms."
The persistence of mannerisms, she says, depends in part on
reoccurrence of aspects of the original situation in which they
occurred, in part upon emotional accompaniment and reinforce-
ment, and sometimes upon deficient learning or adaptability.
If he is nagged or scolded to break his habit or mannerism he
may continue it to attract attention, to assert himself or to
revenge scolding or punishments. In such case he finds relief
and self-satisfaction and therefore pleasure and so he con-
tinues the habit.

It should be noted here that a degree of self assertion
is essential in even the infant and is bound up in his need for
satisfying the impulse of mastery. This impulse of mastery, although it must be properly directed like all other basic impulses, is nevertheless essential to normal development and happiness. Frustration and mishandling of this impulse can and does cause considerable unhappiness, and not infrequently results in fixing a habit or mannerism which would otherwise have been but a passing phase.

Bridges further points out that the exhibition of mannerisms is frequently associated with unsatisfied drives or biological needs. He may be hungry, lonely for companions, in need of attentions or affection, tired and sleepy or he may need to go to the toilet. Then too emotional disturbance or excitement may be accompanied by mannerisms. These may help in relieving emotional stress; and with some of them such as thumb-sucking and masturbation, an emotional activity may be induced which is of an opposite nature; thus normal equilibrium and tranquility are restored.

Mannerisms may be exhibited in many different situations such as disappointment over failure in a test, distress at some physical discomfort or hurt, or when he is angry, fearful orcry.

Dealing more specifically with thumb sucking she expresses the opinion that in all probability too much importance has been attached to it as a behaviour problem; firstly because it is the commonest of childhood mannerisms and may be considered more normal than abnormal and secondly because it runs a definite course in development when not interfered with, appearing usually in the first year and disappearing by the fifth year. It appears to perform a definite function and is gradually supplanted by more adequate behaviour in the course of development.

Thumb and finger sucking occurs frequently in moments of emotional stress when there are unsatisfied drives, which are finding no outlet in occupational activity, but as his skills and resourcefulness develop, he finds more adequate means of
satisfying his desires.

She goes on to say that thumb sucking, occurring as it does so often when children are hungry, tired and sleepy, substitutes pleasant for unpleasant experience. It brings comfort and relief from tension and seems to act as a salve in disappointment, distress and annoyance. It helps to bring sleep more quickly and altogether has a stabilizing effect on emotional equilibrium and helps in the solution of difficult adjustment problems. The important point is made that as children grow older they become less frightened of being annoyed or tired. They learn then that tiredness will pass with sleep, and they can ask for food when hungry or for help when in trouble. Thus the emotional determinants of thumb sucking gradually disappear. They are too that adults do not suck their thumbs and they imitate them.

In many cases, she says, thumb sucking becomes as an extremely obstinate habit when adults adopt a negative attitude towards it and instead of redirecting the child’s energies and finding it a substitute notion, they could and interact with his freedom, thereby increasing his distress. Selective and backward children having little resourcefulness or variety in skills may also cling to the thumb sucking habit.

Bridges in yet another writer who, despite her useful observations relating to neurotics, nevertheless attempts to belittle the importance of thumb sucking and who regards the act as "more normal than abnormal." One is almost led to believe too that in many cases it actually serves some useful purpose."

In evidence whatever is produced in support of such claims, nor any explanation, if it is a normal act, why it appears in some children and not in others.

Evidence has already been produced in this thesis of the serious physical damage which can result from thumb sucking
and it is hoped also to produce evidence of its true nature and psychological effects. In other words it is hoped to show that it is neither "unimportant" nor normal, but quite the reverse.

R. H. North (23) writing of sexual problems of childhood makes certain comments which are very relevant. He says:

"You are familiar with Freud's useful concept of sublimation — a process, he conceived, by which the energy of the sexual urge is directed into creative activities in the intellectual, aesthetic or social sphere, and so satisfied. I hold that if this proposition is true, we must also accept as a corollary the converse proposition that when creative energies, directed to socially acceptable ends, are persistently thwarted and frustrated, they are apt to become degraded into primitive forms of seeking satisfaction. I call this the law of degradation. As a therapeutic tool I find it more useful than the concept of sublimation, because I am continually being consulted about the appearance of primitive forms of seeking satisfaction, but no one ever feels it necessary to ask an opinion about the manifestation of sublimated energies. To put my concept into readily understandable language, I use the analogy of the degradation of physical energy to heat, and say that just as physical energies when obstructed become degraded to heat, so obstruction degrades life's energies to preoccupation with the bodily organs. If you find the thermometer of your motor car showing "dangerous", you search for an obstruction in your mechanical system; it would be useless to pour water on the engine or pack it in ice. I recommend that, when you are called upon to deal with a sexual problem, you should search for some impediment or obstruction in the patient's life energies. It is no use imposing limitations or using punishments or threats of consequences. You will only find the energy appearing in more and more degraded form."

Klop (13) attributes continuation of thumb-sucking in a child to a feeling of insecurity with himself and with his
parents. With other children he is shy and acts with them as if he were afraid they would harm him. He seeks comfort symbolically, from his mouth just as in earlier days he found security and satisfaction in his mother's arms whilst he was being suckled. His reserved manner is seen as a wish to escape back to his earlier security.

An important alternative is that he may be the victim of insecurity caused directly by tension in one of his parents or by a state of tension existing between his parents. In this case too he regresses to the comfort which he can obtain from his own body.

From this survey of the writings of many well known psychologists on the subject of thumb sucking it will be seen that despite the availability of a certain amount of very useful information, there is nevertheless a lack of any complete and detailed understanding of the true nature of the process. There is little or no mention of the possible dental deformities which may result and I was unable to find any worthwhile statistics or reports of practical investigations to support the many opinions which have been expressed. The attempt will be made in this thesis to fully support conclusions with statistics and reports of actual observations.
The instinctive nature of the child's act

The action of sucking, like any other action, can either be reflex, instinctive or purposeful, and it is important to study its exact nature, because upon this will inevitably depend the whole technique of handling the problem.

Martin (52) says:— "Behaviour patterns, so far as they be observed, imply nervous levels and nerve centers patterns; function implies corresponding organic development and structure. Thus we have in progressive order — (a) the spinal reflex or sensory motor activities; (b) instinctive behaviour; and (c) voluntary or intelligently purposeful and deliberate behaviour which corresponds to the spinal, thalamic and cerebral levels of the nervous system respectively."

Speaking of reflex action, Martin says:— "The stimulus is appreciated as mechanical in character. The strength of reactions is regulated within certain limits by the strength of the stimulus and the response is automatic. The 'all or none' law is operative at this level. The limits are those imposed by the facility of nerve conduction and muscular fatigue."

Speaking of instinctive behaviour he says:— "This form of behaviour has been narrowly described as a chain or complex of reflexes. But while it is possible to reduce an instinctive disposition to such, the essential element of integration and organisation is lacking in this analytic reduction."

He very helpfully examines in detail the sucking activity and says:— "Examine a simple form such as the sucking instinct or the food response of an infant. If one reduces this to a series of reflexes then the result is as follows:—

(a) Contact of lips with the nipple causes
(b) Closure of the gums, stimulating in turn
(c) Muscular contraction of the mouth, thus forcing a flow of milk.
(d) This latter stimulus then causes swallowing response in the throat forcing the food down the gullet — more —
(e) Its presence further causes contraction until its 
flow into the stomach promotes -
(f) The flow of the gastric juices, and so on.

But such a train of reflexes totally ignores such things as
the preparedness of the organism and the integration of all
its parts into one co-ordinated action of food response. A
condition of hunger or satiety prepares the organism. If
there were no preparedness, then there would be no acceptance
or avoidance of food. Such forms of instinctive behaviour
are not to be compared with the automatic action of a reflex.
Again, if the bottle be removed before the child's hunger is
satisfied there is an angry protest and struggle instead of
a simple form of activity such as a reflex."

Martin notes certain characteristics of instinct as
follows:

"1. The instinct acts apperceptively or averse to or
    from the object, but there is no such discrimination
    in the spinal reflex. Thus, the stimulus is not a
    mere mechanical application to a known organ, but is
    appreciated as part of a situation.

2. The instinct affects the whole organism involving
    viscera as well as voluntary muscles. These respond
    generally with the development of an effective unity,
    while the reflex is purely local in extent.

3. Again by means of the emotional state, the final action
    is internally regulated or modified. Reflex response
    is due to the strength of the stimulus and the 'all or
    none' law operates.

4. Again, if the instinctive act fails in one direction,
    the organism attempts a variation of activity in its
    response. There is no discrimination in the reflex; and

5. Until the instinctive disposition is nature, the particu-
    lar function will not be operative."

His definition of an instinct is: - "An innate disposi-
tion or behaviour pattern common to the species which causes the organism to respond immediately in such a way as to attain ends without previous instruction and without foresight of the ends."

The sucking action is undertaken by babies in exactly after they are born. In tuition is normally necessary and although some improvement in the actual technique does take place as the infant matures, nevertheless, it is able to suck quite efficiently immediately after birth and in such a way as to derive all its normal nutritional requirements. It is obvious, therefore, that the act is not a voluntary or purposeful one. The reflex act is, as has been pointed out, a purely mechanical one. It operates when a stimulus is applied, but ceases to operate when the stimulus is taken away. It is clear from Martin's descriptions that the sucking act is a purely instinctive one.

It is desirable though, that there should be a perfectly clear understanding of what is meant by instinctive, because "instinct" and "instinctive" are words which have come to be used very loosely in general conversation and also by many writers.

Blata (35) gives us his definition as: "By instinct is meant an innate, unlearned pattern of behaviour common to all members of a species, stable in its mechanism and efficient in its operation."

Stout (44) comments that: "In accordance with the generally accepted theory of evolution we must suppose that animal instincts are inherited behaviour dispositions favourable to the survival of the species possessing them, which have become the possession of all members of the species through the operation of the laws of natural selection."

Flugel (35), speaking of Lebogoll and his "Herrie Psychology" says: "Among the Psychologists who in the early years of the twentieth century were most in touch with
the neurological work with which we have just been dealing, the foremost was undoubtedly McDougall. In 'Physiological Psychology' and 'Mind Brain' and elsewhere, he suggests the sympa as the seat of consciousness and develops a theory of inhibition by drainage, on a physical analogy with the mutual interferences along the various channels of supply which constitute our household water, gas and electric systems, as then the stream of water issuing into our head basin is lessened when we turn on the tap in our bath. According to this theory, inhibition is always the negative aspect of a positive process, the whole event consisting in a redistribution of energy rather than a mere prevention of something that would otherwise occur."

This theory provides the basis for the technique of redirection of the thumb sucking activity into some other more desirable occupation. Once thumb sucking has become strongly entrenched as a habit, in the post-weaning period "a redistribution of energy rather than a mere prevention" is seen as the only method whereby the habit can be corrected without, at the same time, causing more or less severe mental disturbance.

Flugel further says that the theory seems to fit in admirably too with the 'displacement and sublimation' doctrines of the psycho-analysts and also; (as McDougall himself has pointed out in a recent paper) with the phenomena of the conditioned reflex as demonstrated by Pavlov.

In this thesis an effort is being made to unravel the behaviour problem which not only connotes at birth, but is deeply rooted in the whole human organism; and McDougall's whole attitude towards the subject of instinct is strongly applicable.

To quote Flugel (55) again: "McDougall's realisation of the role of instinct is all important for the understanding of behaviour. Instincts are hereditarily determined channels for the discharge of nervous energy." They are 'psycho-physical dispositions' to use a term of his. He goes on to say:— "It is the essence of the hormic view that instincts provide us with
primitive desires and purposes which continue to express themselves in various ways according to the past experience and the present situation, until they are satisfied. In the course of this process of seeking satisfaction, instinct undergoes complication and modification, so to speak, at both ends. They come to be aroused by objects other than those by which they are innately set in motion...and they express themselves in behaviour different from that which is innately determined."

This is of great importance and significance in our consideration of thumb sucking because although the habit may start through lack of satisfaction of a simple, primitive instinct associated with food getting, there is also an emotional end to be satisfied, and if this food-ex-emotional end is unsatisfied, then it seems very probable that one of the complication and modification of which Flugel speaks, takes place. Thus, instead of the infant being satisfied naturally at the breast, he may turn in his search for this satisfaction to his readily available finger or thumb. His sense of security is at its maximum when he lies in his mother's arms while being fed. It can be seen that if he, for any reason at all, should turn to finger sucking, this will become strongly associated with his sense of security and it has been frequently observed that then young children are in need of comfort they very readily turn to thumb or finger sucking. This content of Flugel's illuminates too, the oft-expressed view that thumb or finger sucking is a natural act. This is not so, but it is an instinctive act which has undergone "complication and modification". It will be remembered too that one of the characteristics of an instinct mentioned by Martin is "If the instinctive act fails in one direction, the organism attempts a variation of activity in its response."

It follows naturally therefore, that in seeking the solution of thumb and finger sucking, we must trace back to where these
complications commenced. Efforts must be made to see that natural instinctive urges are satisfied in a desirable fashion, and thus will be avoided undesirable modifications.

William McDougall is probably one of the most generally accepted and famous psychologists of our time. His "An Introduction to Social Psychology" was first published in 1908 and has gone through many editions since then. In general, his ideas are fully acceptable today, and, as has already been pointed out, his work on instinct and the views which he expresses are not exclusive of other schools of thought—notably the psycho-analytic school. For the purpose of elucidating the problem of thumb sucking his views on instinct are regarded as fundamental, and the whole approach to the treatment of the problem has its basis in his teachings.

He makes clear what he means by the words 'instinct' and 'instinctive' when he says (53) "Many professed psychologists there is now a fair agreement as to the usage of the terms 'instinct' and 'instinctive'. By the great majority they are used only to denote certain innate, specific tendencies of the mind that are common to all members of any one species; racial characteristics that have been solely evolved in the process of the adaptation of the species to their environment, and that can be neither eradicated from the mental constitution of which they are innate elements, nor acquired by individuals in the course of their lifetime."

It would appear that the whole key of the thumb sucking problem is contained in the following quotation: "The process (instinctive) unlike any merely mechanical process, is not to be executed by any purely mechanical obstacle, but it is rather intensified by any such obstacle and only comes to an end either when its appropriate goal is achieved or when some strongly incontestable tendency is excited, or when the creature is exhausted by its persistent efforts."
If we accept the contention that sucking is a purely instinctive process then this dictum of McDougall's disposes once and for all of the hope of checking or breaking the thumb sucking habit by the use of more or less mechanical obstacles such as elbow splints, sticking-plaster, mittens and the like. This explains too, how it is that children can be subjected to these restrictive procedures for long periods of time without such procedures having the slightest success. One child, (C.W., aged 5 years 6 months) had his elbows bandaged regularly every night for six months in an effort to break the thumb sucking habit. One night at the end of this period, he managed to work the bandage loose and immediately resumed his thumb sucking. There are many instances of similar experience, and it is obvious that in order to achieve any success, then an entirely new approach based on McDougall's dictum is essential.

It is of great importance too, that we appreciate the emotional content of an instinctive act. McDougall stresses this and it is entirely consistent with the views of Susan Isaacs and others who point to the need for emotional satisfaction as well as nutritional satisfaction in the sucking of an infant.

McDougall says (86):- "We soon justified in believing that each kind of instinctive behaviour is always attended by some such emotional excitement however faint, which in such ease is specific or peculiar to that kind of behaviour. Analogy with our own experience justifies us also in assuming that the persistent striving towards its end which characterizes the mental process and distinguishes instinctive behaviour most clearly from mere reflex action, implies such mode of experience as we call emotive - the kind of experience which, in its more developed forms is properly called desire or aversion, but which in the fluid form in which we sometimes
have it, and which is its general form among the animals, is a mere impulse or craving, or uneasy sense of want. Further we seem justified in believing that continued obstruction of instinctive striving is always accompanied by a painful feeling - its successful progress towards its end, by a pleasurable feeling - and the achievement of its end by a pleasurable sense of satisfaction."

The behaviour of calves, which is described later, exemplifies very clearly the impulse or craving of which McDougall speaks and the whole paragraph provides support for the contention that the process of tail or ear sucking in calves is a similar one to that of thumb sucking in infants. Both are undoubtedly modifications of the instinctive sucking-feeding act and consequently the whole approach to the problem of thumb sucking must be based upon a recognition of its instinctive origin whilst treatment must proceed always along lines which are consistent and not in conflict with the mode of operation of all instinctive behaviour.
5. SOME CHARACTERISTIC FORMS OF BEHAVIOUR

Attention has already been drawn to the necessity of avoiding oral frustrations at the period of oral satisfactions, and how sucking at the breast not only satisfies nutritional requirements but also emotional and sensual cravings as well. Susan Issacs (21) says that the infant not only uses his mouth as a means of obtaining nourishment, but he also thinks and loves with his mouth. He loves with his mouth and experiences his mother's love through her gift of the breast. She describes the affectionate pleasure in the touch of the breast, and the love play indulged in after the original urges of hunger are satisfied. He sucks a little then licks the nipple slide out of his mouth, gurgles, kicks and smiles, and then turns back to across the nipple again with his lips. If, however, the nipple is withdrawn the picture changes to one of anger and distress. He screams, reddens and stiffens his body in protest. If then, the nipple is returned to him, he relaxes once again. The highly important point is made that to give the breast at this age is to give love and to withhold it is to withdraw and withhold love. With this in mind the whole business of feeding and weaning assumes a far deeper significance.

Eva Roberts (21) provides most valuable complementary evidence in her report of a detailed examination of 20 infants aged 7-8 months. Fifteen of those infants were known to be thumb suckers and fifteen were known not to be. The report discloses a close relationship between the length of feeding times and the onset of thumb sucking, and in this way would appear to dovetail in with the contention that not only must nutritional requirements be satisfied, but also that emotional and sensual satisfactions must be met. When feeding time is too short, then these latter requirements are unfulfilled and the substitute of thumb sucking is reported to. Roberts points
out that in general, those who were not thumb suckers enjoyed a longer feeding time than the thumb suckers. None of the non-thumb suckers had a feeding time per day as short as 50, 40, or even 30 minutes at any time in the seven months, although there were periods of that length of time in the schedules of the nine of the thumb suckers. Conversely, instances of feeding time per day of as much as 80 minutes occurred at some time in the schedules of all infants who did not suck their thumbs and in the schedules of only 3 of the thumb suckers. Relationship between time spent in feeding during each day and thumb sucking was clearly indicated: percentage of thumb and finger suckers rose as feeding time decreased and fell as it increased.

Thumb sucking also began in a number of cases following a diminution in the feeding time and it is suggested that this accounts for the onset of the habit whilst the feeding time is still fairly long but was preceded by an even longer period. Short feeding times and decreased feeding times, account, within the survey of the 20 children studied, for all but two of thumb or finger suckers.

She gives the following chart showing the distribution according to the average feeding time per day during the first nine months for the entire group of 30 infants and for the two sub-groups, as follows:

<table>
<thead>
<tr>
<th>Average Feeding time - Min. 24 hrs.</th>
<th>No. of Finger Suckers</th>
<th>No. of Non-Finger Suckers</th>
<th>Percentage of Finger Suckers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 40 mins.</td>
<td>3</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>40 to 60 &quot;</td>
<td>5</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>70 to 90 &quot;</td>
<td>5</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>100 to 120 &quot;</td>
<td>2</td>
<td>7</td>
<td>22</td>
</tr>
<tr>
<td>120 and over</td>
<td>-</td>
<td>3</td>
<td>-</td>
</tr>
</tbody>
</table>
Jervis (39) speaks of sucking activities apart from food-getting, and he stresses that although at first, infant sucking is designed to serve primarily for food-getting, the action soon displays a larger role. The impulse may become relatively independent of feeding, with the sucking assuming an activity which seems to be undertaken for its own sake, and then the baby will suck even though his appetite for food is satisfied. His observation that the mechanism of sucking appears to take on a "drive of its own" is most important. "Any baby," he says, "has a certain amount of sucking apart from nursing, almost from the time of birth." But, as has already been pointed out, it is important to differentiate between the vague and formless technique of the young baby, and the not specific action of the older child. He conjectures as to what exact sucking in the infant, independent of food-getting, arises from an imbalance between exertions involved in getting food, and the child's impulse to suck.

In doubt the exertion involved in sucking is one of the factors which must be properly adjusted if the balance of the feeding situation is not to be upset, but it is only one factor out of several. Judith G. (see Part II, Case History No.1), was getting all the sucking exertion she needed at 3 - 6 months but a deficiency in the quality of the mother's milk via the factor which caused an imbalance in the feeding process, resulting in an imperfect satisfaction of her instinctive needs and this in turn caused her to try and make good the deficiency by sucking her own fingers. When full satisfaction was restored, by complementing her breast feeding with the bottle, the finger sucking ceased.

Levy (41) is quoted by Jervis as having noted that a baby may show a desire to continue its sucking after its desire for food has been satisfied; and especially is this true if his need for food is quickly satisfied with a minimum amount of exertion; no clinical evidence is produced in support of these observations, but they do correspond closely with the findings of
Ina Roberts.

Levy tells the story by way of analogy, of the behaviour of young calves, and he says that a calf which is not allowed to suckle its mother, but is taught from the start to feed from a pail, is likely to seek for some time after being fed, an accommodating ear or tail of another calf, or any other object which is handy. Such continued sucking may, indeed, be due to the fact that the pail-fed calf probably gets smaller portions than the suckling calf. Sucking continues, he says, even when the calf must realise that there is not much nourishment in it.

This sucking on the part of the calf, seems to correspond exactly, to the thumb sucking of the infant and to confirm its instinctive nature. My own animal observations, reported later, support those made by Levy. They go further, however, and demonstrate very clearly the instinctive nature of the sucking-feeding activity and show how any disturbance or frustration of this instinctive urge will inevitably lead to the use of a substitute until the urge is satisfied.

The nature of the processes involved are strikingly demonstrated by comparing the behaviour of calves of dairy cattle with those of beef cattle.

Dairy cattle which are normally weaned from their mothers at birth and are fed from a bucket, invariably turn to substitute sucking, whereas the calves of beef cattle, which remain with their mothers and suckle for 6-7 months unimpeded, never do. In the one case the instinctive sucking urge is completely frustrated and in the other it is fully satisfied. The human infant is a much more sensitive being, and the whole feeding mechanism is a much more delicately poised process than it is in the calf, but nevertheless both are born with the same strong natural instinct to derive food and satisfaction from the act of sucking and if full satisfaction is not achieved in the manner innately intended, then some substitute will be
sought. In the case of the calves, it will be the finger of an attendant or the ear or tail of another calf, whereas in the human infant the substitute will be his own thumb.

Lov y (51) gives an example of a child who resorted to thumb sucking when one bottle feeding was dropped from his daily schedule and discontinued the thumb sucking when this feeding was resumed. He sums up his attitude by stating that a lack of balance between the exertions involved in getting sufficient food and the infant’s impulse to suck, may contribute to thumb sucking, but the habit of thumb sucking, especially as the child grows older, is complicated by so many influences that attention to this factor alone could not solve the problem.

Judith J. (case history not:) believed in exactly the same manner as the infant described by Lov y. She took to thumb or finger sucking for the second time when her 10 o’clock food was discontinued suddenly at the age of 3 months and she ceased thumb sucking when the food was re-introduced.

Lov y only partly understands that is happening though, and this lack of understanding is made very clear when he looks for a cause of thumb sucking which will be the same both for infants and older children. By considering all ages together he finds the problem completely confusing, because he fails to appreciate fully the instinctive nature of the infant’s sucking act and all that this implies, and consequently he fails to take into consideration the ‘complication’ and ‘modification’ of which Flugel (52) speaks. It is this complication and modification which makes thumb sucking look like an entirely different problem as the child grows older, but actually it is the same problem in a different guise and requiring different handling.

Kerner (51) says that the great significance of correcting infantile sucking lies perhaps less in the immediate results than in the prevention of the child carrying over into later years exquisitely infantile modes of reaction.

The important point is that if harmony can be established at an early age - if feeding and environmental conditions can
be perfectly adjusted in early infancy with instinctive demands fully satisfied, then thumb or finger sucking will probably never develop.

Thumb sucking then, should be recognised for what it is, merely the evidence of some maladjustment in the child's environment which if corrected at once, will almost invariably result in the practice being discontinued.

It should be recognised too, that thumb sucking in the vast majority of cases starts in the oral stage of existence owing to some disturbance of the smooth functioning of his sucking-feeding routine. The extreme importance of paying the closest attention to every detail in this feeding routine is shown in the case of Judith C. On the mistaken or misunderstood advice of the clinic sister, Mrs. C. abruptly discontinued the 10 o'clock feed at 8 months. Immediately it was discontinued Judith became upset and started thumb sucking. Realising that some avoidable disturbance had developed, her mother reported it and on re-introducing the night feed, the thumb sucking stopped and she went off to sleep without any trouble. A month later after a very gradual reduction of milk given each night it was possible to drop the 10 o'clock feed without any disturbance at all and the thumb sucking did not re-commence. If instead of this intelligent approach, Mrs. C. had refused to modify her attitude to the 10 o'clock feed, and had, as has so often been done, attempted to stop the thumb sucking by means of sitzems, splints or some other repressive means, then undoubtedly the practice would have continued more strongly than ever, until it became fixed as a habit.

If an infant is continually frustrated during the oral stage of his existence and is ever seeking satisfaction and being disappointed, then it is very natural for him to obtain some substitute satisfaction if he can, and the conveniently placed thumb or finger provides this. If now, instead of thoroughly investigating the feeding situation to find the reason
for the thumb sucking, theareas are splinted or other forcible
means are adopted to stop it, it can easily be seen how bouldev-
ment, fear and frustration are made doubly strong. LeDoughall's
reference to the painful feeling engendered by continued obstruc-
tion of instinctive feeling is now applicable. Unless under-
lying maladjustments are corrected, no amount of bandaging or
physical restraint will have any useful result whatsoever.

Dentists are very apt to think of thumb sucking merely
as one of the causes of malocclusion. In doing so though, their
vision is too superficial, for thumb sucking itself is but a
symptom of some deeper maladjustment, and treatment of the
symptom without elucidating the cause is only a means of storing
up trouble in the child's mental life.
Dr. T. Dixon Hughes has informed me that he has frequently seen infants suck some part of their hands or fingers immediately after birth, and there is little doubt that, at least within the first few days, many children have already discovered their hands, and have learned to suck some part of them. It becomes important, therefore, to study the nature of this action at different ages.

In the new-born infant, specific and co-ordinated movement is practically non-existent; the thumb or finger sucking in the way in which it is performed by, say, two or three year-olds, is quite impossible.

Anderson (37) discusses these early movements and says that:— "In the early stages of all responses studied genetically, behaviour is more generalized, partakes more of the nature of mass activity, and involves more of the whole organism than is true of that behaviour observed later in time . . . . Early behaviour seems to possess some degree of fluidity, diffuseness and lack of organisation, in contrast with its later fixity, precision, and organisation."

Photographs taken by Gesell (59) (Fig. 36), show this lack of specific and precise movement very clearly. Page 213 shows very well what Gesell calls "idle, willy-nilly" poses. Note that in Page 230 he says - "the hands often approach and contact the face; eyes, fingers and mouth come to developmental juxtaposition" (122). Again in Page 231, as well as in Page 230, it is seen clearly how frequently the hands find a position close to the mouth. Indeed, in Figure 5, on Page 231, the fingers are held in the mouth, while on Page 229, the infant of one hour old has made a similar discovery. Gesell's comments here are important when he points out the tendency throughout the neonatal period to assume a fetal attitude which brings the hands near the face. He agrees with Anderson's
general description when he points out how the hand posturings are very diversified and only infrequently do both hands simultaneously assume the same attitude. At first glance, page 225 would appear to depict an infant in the typical thumb sucking position, with thumb in mouth valer surface upward. However, this is not so; for although the hand and thumb are undoubtedly very close to the lips, the hand is carried a little too high for the thumb to be actually in the mouth. Furthermore, no such specific and organized movement would be possible at this age. It does show, however, that even at this age (this child is a premature infant with a foetal age of 23 weeks), the hands and fingers have been discovered with the mouth; and the mouth at this early age is by far the most sensitive organ which the child possesses.

He cannot focus properly with his eyes, nor has his hearing developed to any extent, but his mouth is sensitive and delicate and with it he can investigate and discover things which he cannot do with his eyes and ears. It is largely because of this that the young infant will frequently try and cram anything, from his own hands to all manner of external objects, into his mouth for investigation. In his early discovery of his hands, the infant has a ready means of finding substitute satisfaction for his sucking instinct should full satisfaction be denied him at the breast. In the first few weeks of life, therefore, it is important to notice these movements because persistent hand and finger sucking will probably indicate some maladjustment in his feeding. As his hand and finger movements are, at this stage, completely unco-ordinated, any part of the hand or any finger which happens to come into contact with his lips will be sucked. The movements have not yet become specific and set, and proper adjustment at this stage will prevent them from doing so. If, however, adjustment is not made, then the action will rapidly become more and more specific as the child
gets older, until eventually, one finger of one hand sucked in one specific and particular manner will result. The habit is then deeply fixed, and despite correction then, or elimination of the original misadjustment, the habit will still strongly persist.

Anderson (37) quotes Jensen (33) as finding that mass activity on a baby's part disappears after the nipple is put in the baby's mouth, and that sucking becomes disorganized as the baby becomes satiated. Since the Jensen study was confined to the newborn, no pictures of the development of the sucking response are given, but Pratt, Nelson, and Sun (39) find that, with increasing age the stimulus for sucking becomes more specific. Generalized activity if continued, will not ensure a stream of milk. Undoubtedly there is a relation between the speed with which this selective process covers, and the intensity of the drive, and the adequacy of its satisfaction.

Anderson concludes his reference to this matter by saying:— "With increasing age the process of diverting the organism, so to speak, becomes more and more difficult since each new activity or skill has to compete with others already established. The early acquired skill or activity not only gains by virtue of its priority, but also by virtue of its capacity to block other acquisitions."

It will be readily seen, therefore, that if an infant should start sucking his thumb, and efforts are made by purely restrictive means to prevent him from doing so, attention is immediately focused upon the act by the opposition encountered, and renewed efforts will be made to overcome this opposition. This will not only fail to stop the act, but instead it will become fixed more strongly than ever. If the infant has discovered his thumb with his mouth, and by sucking it he can help to satisfy a powerful, deep-seated and hitherto unsatisfied or partially satisfied instinct, then efforts to obstruct him will only stimulate him to persevere in his efforts
to overcome the obstruction. To try and dam back a strong
instinctive urge because some of its manifestations are deemed
to be undesirable, is like trying to dam back a river because
some of the land through which it flows is wanted for other
purposes. If the river is pursuing an undesirable course,
then obviously the thing to do is to provide an alternative
channel and to divert the stream into a new channel and away
from the old one; and if an instinctive urge cannot be fully
satisfied by the means innately intended for it and is finding
satisfaction by means of undesirable acts, then alternative
acts of a desirable nature must be provided and the stream
of instinctive energy diverted in the direction of the new
acts and away from the old ones.
PLATE 24.—Ocular close-up of a mature-stage fetal-infant in incubator. He lies in a quiescent, accustomed right t-n-r attitude. Visual awareness is probably meager, but the eyes spontaneously make small, well-defined excursions. Only the left (occipital) eye is visible. It moves inward and slightly downward (1, 2), holds this position for a second, moves laterally (3), and then returns to a yet more inward pose (4). Later the eye directs forward and immobilizes as though for sustained fixation (5, 6). Meanwhile the hand has opened and partly closed again. These eye-hand movements are intrinsically determined and do not rise from retinal stimulation. Similar movements undoubtedly occur in utero.

(Fetal age: 38 wks.)
PLATE 25.—The hands and feet of the fetal-infant assume a large variety of postures, both nondescript and configured. When local tonus is low the fingers of the young-fetal-infant may arrange themselves in idle willy-nilly poses (1). During sleep the fluctuating tonus permits variable haphazard or limp posturings (2, 3). When tonus is stronger, fingers and toes alike react with patterned fanning to a sudden stimulus. Note the Babinski spread with ulnar deviation of the minimus in the hand following a startle response (4), and in the foot (6, 8). The toes are equally capable of flexion and extension (5, 6). A mild Babinski response suggests an attempt to grasp an object; an exaggerated response suggests repulsion and release. The mobility of the great toe and the adjacent cleft recalls arboreal antecedents, when feet as well as hands were nimble and prehensile (7, 8).

(Fetal ages: 28, 31; 31, 35; 37, 37; 35, 31 wks.)
PLATE 28.—Billions of muscle fibrils and of neurons are maturing in the facial musculature and its central connections. The face is never idle long. Asleep, waking, or awake, it is active. With activation of the T.N.R., the hands often approach and contact the face. Eyes, fingers, mouth come into developmental juxtapositions (1, 2, 3). The lips contract in a gastric smile (2), the occipital hand churns the cheek in a T.N.R. stretch (3), the lids part unequally (4); the head stirs (5); the mouth opens (6). All this and more takes place in the twilight between sleep and wakeness.

(ages in days: 8.9; 9.9; 9.9)
PLATE 29.—The virtuosity of the facial musculature is evident. A well-drawn grimace supervenes (1), the lower lip pulls in, possibly as a neuromotor prophecy of far-off mastication (2). And now a profound though asymmetric yawn, which paradoxically may either herald sleep or promote waking (3). Eyes, hands, mouth, and tongue are simultaneously active in (4). Wakefulness expresses itself in tonic immobilizations as well as activity patterns (5, 6). The face looks more perceptive, more alert for this reason; but the hand postures, with the extreme deviation of the little finger, are still reminiscent of fetal infancy.

Iges in days: 9.9; 9.9; 10.10
Plate 51.—The infant is an hour old in photograph 1. He tends now and indeed throughout the neonatal period to assume a fetal attitude which brings his hands near the face. The muscle tone is low. The tone has improved on day 3, and the sleep is more natural; the fingers touch the lips, inducing mouth movements (2). The hand posturings are very diversified, and only infrequently do both hands simultaneously assume the same attitude. Often one is extended while the other is flexed (3, 5, 7). At times the digits react coordinately as in flexor closure and in active extensor fanning (7). They relax in faccid, cupped extension during sleep (6, 8, 9). The individual digits also move independently, producing bizarre postures. The small digit frequently deviates in extreme abduction (4, 7), a pattern characteristic of fetal-infancy, and again revived as an aesthetic embellishment of fine precaution in later infancy! The thumb usually is loosely adducted into the palm. In the course of a year, it pivots outward and acquires the power of opposition, a supreme evolutionary and ontogenetic achievement which leads to the contrivance and command of tools.

(Ages in days: 1, 5, 5; 4, 4, 6; 13, 14, 14)

Fig. 26.—Photographs by Gesell (30)
The evidence produced is conclusive that the sucking process is an instinctive act having roots deep in the human organism. It is a stream of energy which must be satisfied and there can be little doubt that thumb sucking in the human infant, like ear and lip sucking amongst calves is a symptom of an underlying maladjustment, a symptom of an unsatisfied, or partly satisfied, instinctive urge. The new born human infant finds food, security and comfort in its mother’s arms, and its first and most urgent need is to satisfy the sucking instinct by means of which it can obtain food and nourishment. The human infant unlike most animals, is completely and utterly dependent upon its mother or mother substitute for a considerable time after birth. The calf, during its sucking period can be more or less independent of its mother; it can feed for itself, but the human infant cannot. The conditions of warmth, comfort, security and nourishment which the infant experiences in its mother’s womb is continued, to a very large extent, during its sucking period. The satisfaction of the sucking instinct, therefore, is inextricably linked, from the very beginning, with feelings of security, comfort and protection as well as with the assuagement of hunger. The feeding of the young infant, is a delicately balanced proceeding and the continued disturbance of this balance will inevitably lead to a disturbance of normal natural behaviour. Then a dairy calf is weaned from its mother immediately after birth its nutritional requirements can be satisfied quite easily by feeding it from a bucket, but this means that its instinctive sucking urge is completely denied, with the result that it turns to substitute sucking of another calf’s ear, lips, tail etc. The human infant cannot be fed in this way, and it can only exist at first by sucking its food. If it is weaned from
its mother, then it must be provided with nourishment by means of some sucking device such as a nursing bottle. The processes of weaning the calf from its mother and feeding it with a bucket, and weaning the human infant from its mother and transferring it to a bottle are similar in character, but they differ in the degree of disturbance. Although with the human infant the change is less violent in as much as it is from one form of sucking to another, nevertheless it can still be, and in many cases is, a very great disturbance. As has already been pointed out, the human infant requires not only food, not only the physical exercise provided by sucking, but in addition it requires the satisfaction of these feelings of security, protection and comfort with which the sucking-feeding process is so closely linked. Although there are many cases on record where children have, of necessity, been weaned from their mothers much earlier than the normal weaning time and have shown satisfactory physical growth, and have not turned to any substitute sucking such as thumb or finger sucking, yet by statistics show that this substitute thumb sucking is more prevalent amongst artificially fed children than breast fed children. (See Part II). The difference is not as great as one would expect at first glance though, and the explanation of course, lies in the fact that most babies that are weaned early or have the mother's milk complemented with bottle feeding, are treated thus because they cannot, for various reasons, be fully satisfied at the breast. The change over in these cases, therefore, to full or partial bottle feeding, is designed to restore the feeding routine to a proper balance and to ensure as nearly as possible that the baby's instincts are fully satisfied. In such cases the change would tend to prevent thumb sucking rather than encourage it. The greatest care and the closest attention to detail though, is necessary if the artificially fed child is to remain in perfect adjustment with his environment. For instance, if his food
is carefully prepared both as to quality and quantity; if his feeding bottle and utensils are thoroughly sterilized; if the feeding tett is such that he will feed neither too quickly nor too slowly; if his mother nurses him just as she would if she were feeding him at the breast; if she remains quiet and relaxed and the whole environment is calm and peaceful, then artificial feeding may approach very closely to the conditions of an ideal breast feeding. In such circumstances it is possible for most infants to satisfy their instinctive requirements. If on the other hand, despite the provision of the correct amount and quality of food, various requirements are neglected; if for instance, instead of being nursed in the arms of his mother or mother-substitute, he is left in his cot with his bottle propped up on a pillow, if at feeding distraction and tension, if there is noise, and most particularly if the feeding rate is too quick, then it would be impossible to avoid feelings of frustration and dissatisfaction. The sense of protection, security and comfort would be partly or completely destroyed. The finely adjusted balance of the feeding situation would be upset, and variations in behaviour would have to be expected.

In a like manner it is no means follows that because an infant is breast fed, he is fully satisfied and well adjusted to his environment and to his mother. Indeed there are very many breast fed babies that give evidence of some maladjustment by turning to thumb sucking. There can be no doubt that the breast fed baby has a much better chance of having his physical and emotional requirements satisfied than the artificially fed baby, but it is equally certain that there is still the need for close attention to detail in his feeding technique. It is quite possible for the mother’s own milk to be of a quality which is unsuitable for her infant; (see case history Judith C. Part II) her nipples may be such as to demand too great an effort from the infant,
resulting in feelings of frustration and resentment; her
will may come too easily thereby requiring insufficient
effort on the baby's part. Then, too, she might be nervous,
cared for and upset by home conditions and these feelings of
disturbance are very readily transmitted to the baby. It
might be impossible for feeding to take place in a quiet calm
and restful atmosphere and thus, despite the infant's nutri-
tional requirements being satisfied these various other
factors may result in a complete destruction of what might
be called the feeding balance. As a result, one would ex-
pect to observe behaviour problems, and one of the commonest
of these is thumb sucking. The act of sucking at the mother's
breast is the very core of the young infant's existence and
with it are linked, as has been shown, strong feelings of
comfort, security and protection. If for any reason, this
central act of sucking becomes unsatisfactory, the infant's
feelings of security, comfort and protection are also upset.
He will then endeavour to satisfy his sucking instinct by
turning to a substitute, generally his own thumb or finger,
just as the calf, if cheated of its sucking satisfaction
will turn to the ear, teats, tail etc. of another calf for
a substitute. There is no doubt that this substitute
thumb sucking does promote quite strong feelings of security,
comfort and protection because of its close association
with the genuine feelings of security, comfort and protection
experienced whilst sucking at the mother's breast. The
important point to realise though is that this substitute
sucking is not a real satisfaction, and there is no real
security or comfort or protection associated with it.
It is a pure fantasy, and the more it is indulged in, the
more is built up a substitute sense of security. The un-
reality of fantasy associated with it increases until the
time comes when the sucking of one's thumb is used as a means
of retreat, and of escape from unpleasant realities.
Several writers have observed (28) how some young children aged about 3 to 5 years, whilst busily sucking their thumbs, seem immune to events which, under other circumstances promote feelings of fear and distress. The explanation of course, is that they have retired into their world of fantasy and are no longer affected by the real events happening about them. The whole process is one of conditioning which started when the young infant associated feelings of security closely with the act of sucking at its mother's breast. When the child is two or three years old, the mother's breast is long forgotten but the sense of security, albeit a false one, is still promoted by the sucking act and its own finger provides the vehicle. The fantasy process perhaps had its beginning when the infant first experienced feelings of frustration when the proper balance surrounding its feeding was upset and it found substitute satisfaction in its thumb. To suck a thumb now is to escape from reality to fantasy and it will be seen that the reverse process too will operate. One of the commonest times when children suck their thumbs is at story time. Habitual thumb suckers at the Lady Cootic Child Centre, Sydney, have frequently been observed at story time listening with rapt attention and sucking hard at their thumbs all the time. By a process of conditioning, thumb sucking promotes a sense of fantasy and conversely fantasy promotes thumb-sucking and so with the commencement of the story, or fantasy, the thumb sucking commences also. In one of our daily newspapers recently, appeared a photograph of a group of children watching the arrival of Santa Claus. Here indeed was fantasy and here too were a number of thumb suckers as reference to Fig. 27 will show. The boy in the front row, third from left is sucking hard at two fingers, whilst the girl on his left has the typical thumb sucker's position, even to the extent of the forefinger hooked over the nose. The boy third from the right appears to have only
just taken his thumb from his mouth, and it is all ready to go back again.

Perhaps the commonest situation of all though in which young children suck their thumbs, is when they are going to sleep (Fig. 53) and it is the situation in which the persistant thumb sucker will continue to operate after the practice has been discontinued in all other situations. The original stimulus undergoes a series of modifications to bring this about and the available evidence suggests a chain of events starting then the baby's sucking-feeding instinct is unsatisfied during the normal feeding process and he turns to thumb sucking as a means of obtaining this satisfaction. As previously pointed out, sucking at the breast generates strong feelings of comfort and security, and the baby soon discovers that thumb sucking canis forth similar feelings, albeit they are only fantasy feelings. When hurt, upset or tired, he will then suck his thumb in order to produce those feelings of comfort and security. In this way thumb sucking and security feelings become conditioned to one another, and the one will call into being the other. Then the baby is tucked up in his cot, comfort and security feelings are very strong and consequently if he has acquired the practice of thumb sucking at all it will invariably show itself during the sleep situation. As the child gets older then, the thumb sucking act is brought into operation by stimuli other than those which were originally responsible, and correction of the feeding defect - if it still exists - will not now cure the thumb sucking. As time goes on and the child's understanding increases, the primary need for feelings of comfort and security at all times gradually fades, but by then a further modification has taken place. The act of going to bed and thumb sucking have now become conditioned to one another and it is sufficient for the child merely to lie on his bed for the thumb sucking to start. Often too the conditioning process
continues still further. By own son had a bunny rug of which he was very fond and on being put to bed he would always demand his "bunny rug to suck his finger with". If he should pick up this rug during the day he would immediately put his finger into his mouth.

Mrs. B. describes how her son, Jerry (East Chatswood Kindergarten) could only suck his thumb whilst holding a piece of silk. This conditioning process started in his pram then his blankets were bound with satin. Even now at the age of 4 years, when thumb sucking has diminished considerably, if he feels silk he will put his thumb in his mouth.

Judith B. (Greenfield Kindergarten) now aged 3 years 6 months, has sucked her thumb from birth and now closely connects hand or thumb sucking with the sleep routine. She always puts her doll to bed with her hand to her mouth.

Susan B. (East. Mothercraft Soc'y., Fyshie), aged 1 year 5 mths, started thumb sucking then 7 weeks old. She now does so mostly when tired or going to sleep but she must always hold a piece of tape or ribbon with the other hand. For two nights running Mrs. B. withheld the tape from her cot and Susan was seriously upset and wouldn't go to sleep. Mrs. B. reports that Susan has only to pick up a piece of tape or ribbon and she will immediately put her thumb in her mouth, look drowsy and as often as not will lie down on a mat as if going to sleep.

It is clear then that if at this stage a mother should lie down beside her child at sleep time with the idea of providing feelings of comfort and security by her presence, this will be just as much a failure in preventing thumb sucking as it could be to look for a feeding defect. On the other hand both measures would probably have succeeded if they had been used at earlier appropriate stages. So further modification has taken place and at the present stage merely to feel tired, or to go to bed, or to feel a piece of ribbon, is itself a strong stimulus to the thumb sucking act.
Obviously the first step in handling the problem of thumb sucking is to prevent it ever occurring and the responsibility for this hardly rests with the dentist. With respect, it is suggested to the pediatricians that there is the need for a careful revision of the infant feeding technique so that the appearance of thumb sucking in the infant will be recognized as a symptom of some imbalance in the sucking-feeding routine and that steps will be taken at once to diagnose and correct it.

A few children turn to thumb sucking at weaning time after a normal nine or ten months breast feeding and this fact, too, points to the need for great care and skill in guiding the infant through, what is to him, something of an unusual. For him to start thumb sucking at that stage is to take a serious step backward. It is a reversion to an infantile practice and every effort should be made to find the cause and correct it. The sucking urge should not be left behind, and he should move forward, not backward. If the weaning period has passed without any signs of the infant turning to thumb sucking it is very probable that he will never do so, and therefore the importance of so ordering his existence that this troublesome practice never starts, can scarcely be overestimated. Even after weaning though, there is still the possibility of a reversion to this infantile practice, and careless handling on the part of his parents, or severe emotional distress can lead the infant to turn for security and comfort to that fantasy world which is called into being through the act of sucking, and the ever present thumb is the vehicle used. Once thumb sucking continues after the weaning period, and more particularly if it starts after that period, it can be an extremely troublesome practice to stop.

Andrew D., whose case discussion appears in Part II, is one who started thumb sucking after weaning. In response to a severe emotional upset he started the practice at 3½ years of age.
Janet A. too was another who started thumb sucking after
 evenings. She started by copying the habit from a play-
mate. This copying is often resorted to by an older child
when a new baby is born as a means of regaining some of the
attention which he feels he has lost. If the new baby starts
thumb sucking and the parents make a great fuss about it the
older child will often adopt the practice so that a fuss will
be made of him also. Such a child is Ann G., aged 7 years,
who had never sucked her thumb till she was 3½ years old, but
started to do so when she noticed the fuss which was made
about her baby sister’s thumb sucking.

Sometimes too, after the arrival of a new baby the thumb
sucking on the part of the older child is an attempt to regress
to an infantile state in which he was entirely dependent on
his parents and enjoyed their whole attention.

Once the practice is started it easily develops into a
habit because it is strongly reminiscent of the comfort,
security and pleasure experienced as an infant in the mother’s
arms. These same feelings are stirred again in fantasy and
once awakened, it is all too easy to turn again and again to
this fantasy world, especially in times of stress.

These instances to the contrary, the fact remains that
all evidence supports the contention that in the vast majority
of cases thumb and finger sucking starts in the first nine
months of life — the oral stage of existence— owing to some
lack of satisfaction of the sucking-feeding instinct. (See
Fig. 31).
Fig. 17. This photograph is reproduced from the Sydney 'Sun' of November 1st 1943, and shows a group of children watching the arrival of Santa Claus. Some aspects of this photo have already been discussed, but its importance here, lies in the perfect demonstration on the part of the girl in the centre, of a particularly harmful technique of thumb sucking. The thumb is taken into the mouth with the volar surface uppermost, and considerable upward and forward pressure is exerted on the palato and upper anterior teeth. The type of malocclusion which frequently results from the sucking technique is shown very clearly in Fig. 9.

A not unimportant feature too, is the way the forefinger is hooked over the nose, carrying with it the threat of further disfigurement.
3. **A CRITICAL REVIEW OF SOME POPULAR METHODS OF TREATMENT**

Included in the section of orthodontics in the Year Book of Dentistry 1941, is an article by Horrion Mitchell of the Mental Hygiene Institute of Montreal (53) in which she discusses the treatment of thumb sucking. She claims that thumb sucking is a normal activity in the infant and therefore it should never be directly interfered with, either by mechanical devices or by forcibly removing the hand from the mouth. Any show of disapproval or punishment is also condemned, and for the pre-school child, sharing, criticism, and ridicule must be avoided.

All of these negative approaches to the handling of the problem are to be condemned as calculated to produce serious mental disturbance. Methods of treatment advocated include:

1. **Promotion of child's wholesome socialization.**
2. **Play material suitable to the child's stage of development.**
3. **Opportunity and space for activity.**
4. **Regulation of child to be reduced to a minimum and as much freedom as possible permitted for him to live through the interests which are normal at any particular stage of growth.**
5. **Ensure a peaceful, happy home atmosphere.**

Mitchell claims that when thumb sucking is persistent in the later pre-school years, "it should be regarded as a symptom of difficulties in psychobiologic development that are amenable to constructive treatment through environmental modifications and parent education."

My objection, once again is directed against the claim that thumb sucking is a normal activity, particularly on the acceptance of this theory means inevitably that nothing whatever will be done to correct the practice until the "later pre-school years", because then, and only then, does Mitchell regard it as a symptom of an underlying disturbance. It should, of course,
be recognized as the symptom of a more or less serious mal-adjustment immediately it shows itself, and steps should be taken to diagnose and correct this mal-adjustment at once. To wait for 5 - 4 years before doing anything about it, is to increase out of all proportion the difficulties of diagnosis and treatment, to say nothing of the possible necessity of having to correct the resulting malocclusion.

Nevertheless, the article is a useful one, in that it directs the attention of dentists to the fact that important psychological processes are involved. Unfortunately, the Editor, George H. Moore, quite fails to understand their significance, for in a footnote, he says:

"Freedom is a good thing for children, but why should not parents enjoy it too? Articles like this by psychologists and pediatricians supply entertaining reading, but they bring heartaches to parents who take them seriously and then years later try in vain to find the money to pay for orthodontic services. Thumb sucking can be stopped in practically every instance without harm to the child but certainly with great saving of future money and expense to the parent."

This comment is typical of the dentist who is quite unable to appreciate the unity of mind and body. He can see a dental problem and there his interest ceases. Despite the overwhelming evidence of eminent psychologists that the act of thumb sucking has deep psychological significance and that the incorrect handling of it may cause serious disturbance of mental development, Moore is prepared to dismiss such warnings as unworthy of serious attention. His statement that thumb sucking can be stopped without hazard to the child, makes no reference to the methods by which he considers this can be done, nor is it supported by any scientific evidence of any sort.

Teuscher (67) advocates an appliance consisting of crowns fitted to the first temporary molars on either side with a bar
connecting them across the palate. The idea is that with
this in place the child finds it difficult to suck and thus
drops the habit. It is pointed out that lip sucking and biting,
frequently follows thumb sucking and in extreme cases of this,
the soldering of sharp spurs to the palatal box is advocated
to act as a deterrent. The article concludes with the
gratifying statement that "The short spurs on the lingual
wire should not be sharp enough to cut the lip" and "The
appliance is not placed to punish the child but to help him." !
The Editor, George Locke, condemns this barbaric treatment as
follows:-

"Very good if the patented 'Prevent a Habit!' fails.
This is a device of heavy wire made to fit the individual's
arch and intended to restrict elbow bending only the necessary
amount. If used constantly for several weeks, intra oral
devices are rarely needed."

It is well known how extremely irritating and fatiguing
it is to have anything sharp and jagged in one's mouth and
how impossible it is to keep one's tongue away from it, and
one wonders how either writer or editor could like to have
sharp spurs across their palates albeit "not sharp enough to
cut the lip". One wonders too, if they would be comforted
by the thought that they were not being "punished but helped".

Adamsen (48) completely sets aside the claims by
psychologists that obstructive methods of treatment are harmful
by saying:-

"General investigation of children as a whole, however,
does not bear out this claim if the problem is dealt with in
the correct way."

Just that is meant by "General Investigation of children
as a whole" is by no means clear and no further information
is given about it; nor is any evidence produced which would
make it possible to so easily set aside the psychologist's
objections. Such general statements without any authoritative backing or supporting evidence of any kind can only be regarded as quite unacceptable.

Adanson's method of treatment, which is completely opposed to accepted psychological principles, is the use of an arm splint which is presumably intended for use for a considerable time and which prevents any bending of the arm at the elbow. If an adult had to wear such a splint, there is no doubt that he would find the enforced limitation of movement extremely irritating and distressing, but at least he would be able to appreciate the reason for its use.

An infant, however, is quite unable to understand what has happened to him, and it requires but little imagination to estimate the terrible feeling of frustration, fear, and anger which such a device must arouse in him. He cannot use his hand to brush a fly from his face, he cannot scratch an itchy spot, in fact he is completely frustrated. There seems to be general unanimity of opinion amongst psychologists — and some of their opinions have been quoted — that the general pattern of an individual's life is decided in the first five years of his life. Within those early years the meaning which he gives to life is crystallized and no fundamental changes will take place subsequently. If then the infant finds the world to be a place in which he finds frustration and fear instead of the love and security which he needs so much, — he will grow up interpreting the world as a hostile place and he will react to it with feelings of hate and antisocial behaviour.

A tremendous responsibility therefore rests upon all those who are charged with the care of young children lest in their desire to help them in one direction, they cause irreparable harm in another.

In my opinion there are two sound reasons why splinting
of the arms as a means of correcting the thumb sucking habit should never be used under any circumstances. Firstly, such a practice violates accepted psychological principles and is capable of causing extremely harmful and lasting effects on the child’s personality; and secondly the evidence obtained from my investigation of over 2,000 children reported in and the 45 case histories Part II shows that such obstructive methods almost invariably fail to achieve their objective.

In the same journal as that in which Kenneth Adamson’s article appears is the description of a device for the prevention of thumb sucking by Joan Rattrey (28). This consists of an acryl moulding fitting over the thumb and fastened at the wrist with a man’s watch strap. It is open at the end leaving the tip of the thumb free so that most normal hand movements are unimpeded but the thumb cannot be bent back into the typical thumb sucking position.

This device is a vast improvement on the severe and harmful splinting advocated by Adamson but the improvement is in detail only and the underlying and undesirable principle of obstruction still remains. Miss Rattrey shows some appreciation of the psychological considerations involved when she says "The correct attitude of the parents towards its use, such that it is considered an advantage and not a restriction must be stressed. It must be attempted to keep the child completely unconscious of the habit and ignorant of the purpose of the appliance. For this reason the name 'Thumbguard' is suggested."

By own attempts at treatment along somewhat similar lines with Caroline P. and Caroline E. were completely unsuccessful (see Part 2.) and I firmly believe that it is quite impossible to do as is suggested and keep the child in ignorance of the purpose of the appliance. The mere appearance of it will at once excite interest and curiosity and some
explanation will be needed. Unless the child really has a sore thumb which needs protecting, then the true explanation must be given or lying resorted to and to deliberately lie to a child is such a thoroughly undesirable practice that it is not worth serious consideration. The desire to avoid implanting in the child’s mind any thought of obstruction or repression in connection with its thumb sucking is sound, but the avoidance must be real, and the subterfuges suggested are too transparent to stand any chance of success. The claim that the thumb-guard has been completely successful in two cases cannot be admitted without further information. If the correction of the thumb sucking has been achieved at the cost of mental disturbance on the child’s part or at the cost of developing an even more undesirable habit to take its place, then the cost has been too high, and what has seemed to be success when viewed from the purely dental angle becomes a failure when the total effect on the child’s personality is considered. Such a case was that of J. whose case is reported in Part 2. It may well be thought that the thumb-guard has a useful place in the treatment of thumb sucking if it is used strictly as an accessory and not as the principle means of treatment. Evidence will be produced later in this thesis that the only sound principle upon which correction of the thumb sucking habit can be based in the post weaning period is the re-direction of the energy behind the act into some other allied activity which is of a more desirable nature. Firstly emotional peace must be achieved, all forms of nagging and scolding discontinued and the new substitute activity must be carefully and patiently encouraged. Having observed these fundamental principles it is possible then that the use of the thumbguard might be helpful. It would then be used in the nature of a reminder in the same sense as the tight wrapping of a baby’s arms to discourage thumb sucking after the complete correction of the sucking-feeding routine.
The Thambyguard would then only be used with the full understanding and co-operation of the child and that would mean not before the age of 4 years.

No attempt seems to have been made by Teachers, Monroe Adson or Bettrey to discover the cause of thumb sucking or to base their treatment on some previously noted cause. They regard thumb sucking as a cause in itself - a cause of malocclusion, whereas it should more properly be regarded as the symptom of some underlying maladjustment. They and many other writers who advocate similar methods of treatment fail completely to recognise that the child they are seeking to treat is an individual with certain very definite rights of his own. He is not a machine which one is entitled to obstruct or push around in order to save worry or expense. His individual personality must be respected, and in no circumstances is it permissible for parent, doctor, dentist or teacher to impose his or her will on the child merely to serve his or her own interests or convenience. Nor must these remarks be construed as a plea for complete and absolute freedom for infants and children from all restraint and discipline. Such restraint is of course essential if the child is to receive a proper training which will result in him being happy and well adjusted to his surroundings, but it must be restraint exercised in a proper manner which recognises the child's individuality. As control there must be, then, as early as possible, every effort should be made to encourage self control and self discipline.

The child who still sucks his thumb through kindergarten years, or worse still through school years is, without any doubt, carrying over an infantile practice into a period of life when it should have been long since dropped. The practice has now become fixed into a habit which, in most instances is extremely difficult to break and even when environmental conditions have been corrected and are most favourable, and even
too when the child itself genuinely desires to drop the habit it is almost certain, particularly after the age of 3 that some specific technique will be necessary to assist him. Evidence of the uselessness of obstruction as a form of treatment is contained in Part II.

In recognizing that the habit should be broken, it would be wrong to assume that any means which might be available should be used, regardless of their effects in other directions. In a like manner it would be misleading to make the general statement that discipline and at times punishment, are necessary in the training of children in social behaviour. In the first instance one must be careful to plan and design the treatment in such a way as to eliminate or reduce to a minimum the chances of resulting mental disturbance and in the second, in considering discipline and punishment, one must recognize that only certain types of discipline and punishment, used under certain conditions and activated by the child's need for training in proper social and moral adjustment, are permissible.

Drummond and Drever (53) point out that actions governed by habits in adults have a low feeling tone and that to perform the acts without being aware of doing so. In children on the other hand a whole series of habits are found to be possessed of a high degree of feeling tone and in them the perpetrators take a very high degree of pleasure. It is probably because of the pleasure which accompanies performance of them which accounts for them becoming established as habits and they include such acts as masturbation, thumb, finger and lip sucking, nail biting, nose picking, bending the head and other forms of sense stimulation. Dr. John Thompson is quoted as saying:— "Some of them may indeed grow out of apparently automatic actions to begin with, but by the time that they are established as fixed habits they are not uncomplicated like the others, but are resorted to of set purpose because
of the great gratification which they afford to the child's feelings. They are certainly to be regarded as minor psychoses."

This survey of the writings of several well known psychologists and dentists on the subject of thumb sucking reveals the fact that in the past there have been many gaps in our knowledge of this problem. Psychologists appear to lack any real appreciation of the serious dental defects which can result from the habit, and both psychologists and dentists show a lack of understanding of the true nature of the act, why it occurs, and what should be the fundamental principles of treatment.

At the present time there is a far greater appreciation on the part of the laymen of the harmful effects to the teeth and jaws of the habit of thumb sucking than of the harmful psychological effects. Generally therefore the problem is viewed out of proper perspective and all too often wrong treatment is undertaken. The parents of a child who sucks his thumb will often obtain their first professional advice about the habit when they take the child to the dentist, because they are fearful of possible malformation of his jaws. This being so a serious responsibility rests on the dentist, and a great opportunity also, to see that the advice which he gives and the treatment which he prescribes, are based on sound scientific principles and designed to enable the patient to lead a fuller, healthier and happier life. If in his efforts to safeguard the formation of his patient's jaws the dentist upsets the smooth working of his mental processes, and particularly if he should do so in such a way as to permanently harm the child's psychological development, then whatever the result of the purely dental treatment, the end result, in terms of the patient's happiness and well being, have been harmful and retrograde. In order to avoid this the dentist must know
Because of its great importance in relation to the development of the jaws, the real purpose of this thesis is to reveal the true nature of the act of thumb sucking and to establish methods of prevention and treatment based on sound principles. The main emphasis, of course, should be on prevention, and this must be initiated long before the age at which the dentist normally first comes into contact with his young patients, and must therefore be the responsibility of pediatricians, nurses, kindergarteners and above all parents.

In the first place, it is necessary to assure those people who are looking for a quick, easy method of "curing the habit" that no such "cure" exists. Thumb sucking is not a disease to be cured, but a symptom of a maladjustment, the correction of which requires considerable patience, perseverance, skillful handling and self-discipline on the part of those whose responsibility it is to handle it. Two principles apply to this problem at any age. The first is that if the conditions which caused the onset of the act in the first instance can be diagnosed and corrected before it acquires the characteristics of a habit with a drive of its own, then I believe that it will very soon be dropped without any further action being taken.

If on the other hand the original cause is not soon diagnosed and corrected, and the act does become fixed as a habit, then the second principle applies which calls for a redirection of the stream of energy behind the act into some other more desirable form of activity. How this re-direction is to be achieved will vary at different ages. In the first six months when sucking either at the breast or the bottle is the only means by which the infant gets its food, it is very doubtful whether any efforts of re-direction are necessary.
Sucking is a perfectly normal instinctive activity at this age which will continue to express itself, in one way or another, till it is satisfied. If it should express itself in the form of thumb sucking, then it would indicate that it had not been completely satisfied during the feeding process and steps should be taken to diagnose and correct the faults which have developed. There is little doubt that if this can be done, the thumb sucking will cease in almost every case. The case of Robert S. (case history No. 1) is a case in point.

Dr. Young, the Superintendent of the Royal Hospital for Women, to whom I am indebted for carrying out certain investigations for me, has written as follows: "It is noted that thumb sucking occurs mainly in those children who experience difficulty in feeding, and it appears to be associated frequently with an inadequate amount of nourishment. Generally speaking, efforts are made to break the habit by placing gloves on the hands of the children, and this appears to be successful providing the child is fully fed". (Underlining is mine).

The use of mittens is really an obstructive measure which I believe it would be much better not to use and certainly their use could never be justified except when feeding and environmental conditions were perfectly satisfactory. As it would be very difficult to be always certain of this, I believe that other means of discouraging the thumb sucking should be used. Dr. Young's observation, is extremely valuable though, and indicates that it is easy to turn the infant's attention away from his thumb, provided the feeding routine is perfectly balanced. Instead of using mittens therefore, the same object would almost certainly be achieved by wrapping the baby in such a way that he experiences some difficulty in getting his hands to his mouth. The method has the great advantage over mittens, that if the baby urgently needs to get his hand free
to suck his thumb, he can do so, and furthermore, if this happens, then it is also evidence that there is probably a fault in the feeding routine which needs correction. Without such correction first, neither mittens nor wrapping will do the slightest good.

Sucking is an activity which is appropriate to the infant's first nine months of life and the appearance of substitute sucking in the form of thumb or finger sucking must be regarded as a disturbance or frustration, in some way or another, of the natural sucking-feeding instinct. Clinical evidence shows that one of the commonest ways in which the sucking-feeding instinct remains unsatisfied is when the mother has a very rapid and free flow of breast milk. The infant, under these conditions can often satisfy his hunger and nutritional requirements in a very short time, and with a minimum of sucking activity. The instinctive sucking act in the infant possesses a certain measure of intensity and if this instinctive demand is repeatedly denied full satisfaction, then, bearing in mind the way in which an instinct operates, some other means of obtaining satisfaction will be sought, and the thumb or finger provide the most convenient vehicle.

The aim should be always to keep the feeding routine in proper balance. Nutritional, sucking and emotional requirements all have a place in maintaining this balance and the frustration of any one will cause an imbalance which will, in a certain number of cases, result in substitute sucking. This is shown very clearly in the behaviour of calves described in Part 2. During the first six months of life the human infant is entirely dependent on the sucking act to obtain his food and consequently any appearance of thumb sucking should immediately suggest a disturbance of the feeding routine, and of the sucking act in particular. A too rapid and too free flow of milk from the breast or bottle is a very common cause
of thumb sucking because it leaves the instinct to suck unsatisfied (See Case Histories Part 2).

Although over-rapid feeding has long been recognised as undesirable and potentially harmful, its role as a possible cause of thumb sucking has not been adequately recognised, and consequently as long as the baby is healthy and putting on weight, despite this too rapid feeding routine, very little, if any effort is usually made at correction. Immediately a baby starts thumb sucking a too rapid and too easy flow of milk from breast or feeding bottle should be suspected, and if discovered, it should be corrected without delay.

This, of course, if the responsibility of the pediatrician and not the dentist, but mention can be made of two methods usually adopted. The first is by means of a rubber nipple shield in which the aperture can be adjusted to control the flow, and the other is by varying the postures of mother and baby so that the baby is above the breast and has to suck the milk upwards. Control of a too rapid milk flow is most likely to meet with success in correcting thumb sucking within the first six months. After six months, difficulty may be experienced in getting the infant to take to the rubber teat of the nipple shield and caution must be exercised too, lest a too enthusiastic approach result in a sudden drying up of the mother's milk. At about six months the first teeth erupt, solids begin to appear in the diet, and the gradual transition begins from the stage of development in which the sucking act is appropriate, to the next stage of development in which the act of chewing is appropriate, and from this time onwards, if he is a thumb sucker, the principle method of treatment should be to provide increasing re-direction of energy away from sucking activities and towards chewing activities. One way in which this can be done is by gently removing the baby's hand from his mouth and immediately placing something attractive
and chewable in his hand, such as a rusk, a brightly coloured peg, teething ring, rattle etc. This must be done with great gentleness and friendliness in the nature of a game. Just to remove the hand from the mouth and nothing more, however gently it is done, is doomed to failure because it would be a purely obstructive act. On the other hand to remove the thumb which is being sucked and immediately replace it with a chewable object is to redirect the energy from one form of activity into another, from a sucking act to a chewing act, from a form of activity which is appropriate to a developmental stage which is gradually being left behind and towards an act which is appropriate to the next developmental stage. Great patience and perseverance is required to carry this out successfully.

Even within the first nine months the sucking-feeding instinct undergoes 'complication and modification' because several case histories record the fact that the baby has started thumb sucking within the first month or two and at 7-9 months is still thumb sucking but only when tired or going to sleep. This now has little, if anything, to do with any defect in the feeding routine which might have been the original cause of the thumb sucking, but the need now is for a sense of comfort and security, and substitute sucking promotes these feelings. Under these circumstances the correction of the original mal-adjustment, if still present, is necessary but it will be insufficient to bring about a cessation of the thumb sucking and re-direction away from sucking activity and into chewing activity is indicated.

Interesting supporting evidence that some form of substitute or artificial sucking does promote feelings which are similar to those experienced at the mother's breast is the behaviour of the calf feeding on the nipple feeding device described in Part 2. The calf feeding from its mother will instinctively butt the udder repeatedly with its head when it
in coming to end of its food and the calves being artificially fed by the nipple feeding device have been observed to do exactly the same thing.

It is sometimes claimed that the dummy provides a useful method of re-direction in the young infant and some consideration must be given to its use. The dummy has much against it, but so too has the thumb if sucked persistently, and it is often suggested that the dummy is the lesser of two evils because it has the great advantage of being an external thing to which access can be controlled and thus with careful handling the infant can be gradually weaned from it. However, all paediatricians are unanimous in their condemnation of the dummy.

Sir F. Truby King (43) roundly condemns its use. He says "Use of the dummy or the habit of persistent sucking of fingers etc., moulds the jaws, palate etc., in deformity and gives rise to defective irregular teeth, besides upsetting the digestion by introducing constant sucking and dribbling of saliva."

Dr. Margaret Harper (43) speaking of the dummy, says:—

"Continual sucking is an extremely bad habit which causes mouth breathing. It has a tendency to deform the growing jaws. It stimulates the flow of saliva and the juices of the stomach which should only be stimulated by taking food. Germs attach themselves to the rubber and may cause disease. A lack of self-control is also developed. Patient waiting is never practised. It has been said, with a certain measure of truth, that you are not a good mother if you cannot keep your baby happy and contented without a dummy."

Mary Truby King (44) says: "Never start the dummy habit for it is hard to break . . . . Think too, how the dummy is frequently dropped on the floor or street, picked up and re-placed in baby's mouth."

Honor Lane (31) says: "The worst of all things that can happen at weaning, is that the child should be given a comforter
or dummy. The comforter is the first soul destroyer, and more than any other single thing, in infancy is responsible for the faults of character and conduct in later life, for it keeps interest tied at the level of sensual gratification."

These authorities discuss the dummy without reference to the method of its use, the conditions under which it could be used, and, except Lane, without reference to the ages of the children to whom its use might be permitted. Lane, referring to the use of the dummy at weaning time, quite rightly condemns it. I can think of no circumstances under which the use of the dummy should ever be permitted after the child has been weaned from the breast and feeding bottle for it would then represent a serious regression. The other authorities are satisfied to make a general condemnation of the use of the dummy without making any detailed examination of conditions under which its use might be advisable. For instance, the dummy is condemned without any consideration being given to the infant's age, feeding conditions, whether breast-fed or bottle fed, its emotional circumstances, or general environmental conditions. The age of the infant, for instance, is very important, for measure which we might adopt and regard as desirable at 3 months, would be hopelessly wrong and very harmful if adopted a year later. Any action of the child must be considered against the background of its developmental stage. He should move naturally and easily, as he matures, from one stage to the next. From a psychological point of view, sucking is an infantile act. It is a natural and instinctive act to be indulged in until about 9 months. If it is indulged in after this time, whether the sucking is at a dummy, or a thumb, or anything else, then it is a carry-over from the previous stage of development. It is an infantile act which has become fixed, and this, of course, is very undesirable, for the child's mental growth.
But at three months, an objection such as Lane's, does not apply. The important point would be to keep it within the confines of its period, and at normal weaning time the infant must be weaned from all feeding-sucking activities and the energy so released, directed into more advanced activities. From the physical point of view, the question arises as to whether the use of the dummy does, in fact, cause malformation of the developing jaws. There is the risk of this. But the risk is very small if the dummy is used with the proper technique, with certain safeguards and only in the pre-weaning stage. In any event, it will only be used as an alternative to thumb sucking, and there can be no doubt that if the choice between an active force such as thumb, operating on the developing jaws, or a relatively passive force, such as a dummy, then the dummy is the lessor of the two evils.

When the dummy is used for any length of time in the post-weaning period, however, extensive malformation of jaw may result as reference to Figs. 3, 28 and 29 will show.
Fig. 28. C.R.L., now aged 43 years who used a dummy persistently till she was 4 years old.

Fig. 29. C.R.L.'s. extensive open bite caused by persistent and prolonged use of a dummy.
Perhaps the greatest objection to it though, lies in the possibility of its use without first making a careful diagnosis, and correcting every ascertainable fault associated with the feeding routine. Only after these measures have been taken, and the thumb sucking still continues, could the use of the dummy be even considered, for otherwise it would provide an all too easy way of keeping the infant quiet. It would mask an underlying maladjustment, but do nothing to correct it.

It will be seen then that the use of the dummy could only be approved in very rare cases, and even then only under the strictest supervision as to its method of use, and this preferably by having the infant admitted to a mothercraft training centre.

One must be careful not to fall into the fault of regarding the problem of the dummy only from the point of view of the dentist alone; or for that matter, from the sole point of view of the psychologist or paediatrician. Every factor must be taken into consideration and I confine myself here to making the plea for a thorough re-examination of the question of its use in certain special cases.

Close attention must be paid to satisfying the baby's widening sphere of interest as he grows older. For instance, suitable toys such as rattles, rings, coloured beads etc., should be provided with which he can practice movements with his hands and eyes as his sleeping hours decrease, and care must be taken to provide him with more companionship so that he will not be left alone for long periods of time in his room with nothing to do. It is then that he would tend to be thrown back upon himself and would find it easy to turn to thumb sucking, instead of having his attention directed outwardly. If the necessary precautions and careful planning are carried out, the infant's horizon will widen quite naturally and infantile acts will drop away as he grows older. Evidence of
the success of this means of deflecting the infant’s attention from his thumb sucking is provided in the comments contained in some of the questionnaires, details of which appear in Part II. The principle is similar to that involved in wrapping the very young baby up closely, so as to present some difficulty to its getting its hand to its mouth.

If there is an urgent need to suck, no close wrapping or attractive toys will deflect the infant’s attention from his thumb but if the feeding balance and general environment are satisfactory attention can easily be deflected from the thumb.

Susan Isaacs (21) speaks of this need for meeting his interest from his thumb during his waking hours by giving him more companionship in play and not leaving him lying awake and alone in his cot as much as one night with a child who had no interest in his thumb. He should be talked to more often, and have his fun shared in watching the trees, listening to his rattle, picking up his spoon or his blocks as he throws them down, and he should be helped in developing his interests in the outer world. This companionship directs his interests outwardly and deprives his thumb of its value as a source of pleasure. “Towards the end of the first year,” she says, “he begins to show a keener desire for active human companionship, the stimulus of voices and laughter and the pleasure of sharing pleasures. To deprive him of human society when he is ready for it, leaves him irritated, and it throws him back on the primitive pleasures of sucking his fingers and rocking his body, and baffles his first spontaneous movements towards social life.”

If now the baby’s feeding and general environment are well adjusted it is probable that his substitute sucking, as it might be called, will very soon be given up, or better still - never started, and the important point is that it will be given up before the act becomes set into a habit. The older
the infant becomes with the conditions giving rise to the thumb or finger sucking uncorrected, then the more studied, the more set and the more selective the act becomes, until by the age of two years, if still persisted in, he will almost certainly suck only one particular thumb or finger of one particular hand, and with one particular technique. By that time it has become a most difficult psychological problem.

It is obvious, therefore, that the primary aim should be to prevent the habit from developing, and to this end, if observations reveal that thumb or finger sucking is indulged in, then that should be the signal to examine immediately all feeding and other environmental conditions in order to discover, and correct the underlying maladjustment.

The handling of the problem in the young infant can be concluded by stressing the need for perfecting the weaning technique. The weaning of an infant is an important stage in its life, and particularly so if there is a tendency for an infantile habit to be carried over. The technique should be carefully planned on expert advice, and it should be carried through in such a way as to cause the minimum disturbance to physical and mental processes. If this is done, then existing actions should be dropped quite naturally, and included in these, is any tendency to finger or thumb sucking. If success is achieved at this stage, then it is probable that even if finger and thumb has been indulged in previously, little or no damage will result to developing jaws and teeth.

IMMEDIATE POST-WEANING PERIOD.

This is probably the most difficult time to handle the thumb sucker. There is no convenient instrument to use for his redirection; he is not yet old enough for explanations or reasoning, and consequently, we cannot look for any self-help from him. He should, by now, have dropped his sucking
impulses and their place should be taken by biting impulses. His tooth are starting to erupt and this does offer a most hopeful means of encouraging his natural transition from the one stage which is characterized by sucking activities, to the next stage which is characterized by biting activities. Every encouragement, therefore, should be given for the development of his chewing and biting tendencies. All Mothercraft books stress the need for introducing such things as rushes, toast crusts, and food requiring chewing, and these techniques should be carefully followed, not only in the interests of stimulating the healthy growth of jaws and teeth, but also because it directs attention and energy towards an act which is consistent with the present stage of development, and away from the previous, outgrown act of sucking. Suitable sterilized rubber rings can also be provided to stimulate chewing, and if the tendency is noticed for a continuation of sucking in the form of thumb or finger sucking, then there is need for an extra effort on the mother's part to check this tendency. Understanding the problem, she will, of course, keep completely calm and prevent, at all costs, undue attention being directed to the act either by herself, her husband, or relations and friends. Fuss or obstruction or tension at this time will surely be transmitted to the child. She should give him as much company during his waking periods as she can. She should provide him with suitable toys appropriate for his age and should try and ring the changes with these so as to maintain his interest, and leave him alone as little as possible when he might be awake with nothing to do. Also, as already described, she can remove his hand from the mouth if she is careful to do this with great gentleness, and in a calm and friendly manner, and if she is able to immediately place in his hands some suitable attractive toy or other article. She may have to do this very many times a day, but if she maintains her
patient and sympathetic attitude throughout, and uses the method of substitution as suggested; she will probably spend a decreasing amount of time at this task as days go by. This technique will have to be used with great discretion because feelings of fear, frustration and hate must be most carefully avoided.

The mother of Robin C. (whose case history appears on page 203) was advised to carry out this line of treatment. At the same time Dr. G. was warned that great patience would be required and that Robin's hand would probably have to be replaced perhaps 100 times per day at first.

Two weeks later Dr. G. reported a marked diminution in the finger sucking, but she laughingly remarked that instead of replacing Robin's hand 150 times a day, as I had warned her, it had been more like 500 times a day. However, all the members of her family had co-operated and every time Robin's hand went into her mouth somebody would very gently remove it and immediately place a rock or a toy or a peg in her hand. Dr. G. reported that Robin showed no resentment at this treatment and the fingers sucking gradually diminished. Also, on my advice, Dr. G. made an effort to give Robin much more company than she had previously done; she tried to leave her alone in her playroom as little as possible and invited some neighbouring children in to play with her.

After only two weeks of this patient treatment the sore on her first finger, which had been caused by her persistent sucking, had almost healed. Finger sucking was now taking place only when going to sleep instead of all day, as previously, her appetite was better, and her general condition and demeanour markedly improved.
The feeling of insecurity when meeting new people and facing new situations too, will often cause the infant to turn to the pseudo security provided by sucking its thumb. The mother can often help her infant over such periods by quite unobtrusively holding his hand or standing by him, and thus providing him with a real sense of security.

When the child goes to kindergarten at the age of two, to two and a half, he is very nearly of an age, and some actually are of an age, when they can be approached through reasoning. To quote Susan Isaacs (45) once again: "Children as young as these (2 to 4 years), do reason quite successfully when their interests are engaged." If now, the interest of these children can be engaged with reference to their thumb sucking habit, then in most cases they can understand if we try to substitute some other activity. Tiny children of two and a half to three, can be induced to behave very well while having teeth filled if it is borne in on their minds that it is in their own interests to do so. Admittedly, the cause and effect is not so sharp when we are dealing with thumb sucking, but with patient persistence, the average intelligent child will come to appreciate the desirability of himself stopping his thumb sucking habit.

This, then, is our approach to these kindergarten children; to induce in them a desire to stop sucking their
thumb sucking are at story time or other fantasy situations, when they are idle or bored, and then going to sleep. During the former two situations they could easily be encouraged to chew gum and they would probably welcome the chance. Their sleep period, however, presents a difficulty, for it would be unwise to let them have chewing gum at that time. It might be possible to overcome this by always giving them a slice of apple to eat when they lie down, or by having the child's mother or mother substitute sit by the cot, and perhaps hold a hand whilst he goes to sleep. The idea would be to provide that sense of security which the child might need and to provide it in reality instead of in fantasy which is all that thumb sucking does.

POST KINDERGARTEN PERIOD - SCHOOL CHILDREN.

If thumb sucking is still indulged in after five years of age, it has probably become firmly rooted in the child's make-up by faulty handling on the part of parents and friends. At this stage there is usually little difficulty in discussing the matter quite openly with the child himself. Once again though, great care must be taken to avoid any suggestion of censure or reproof. If he is taken carefully he will probably admit that he would like to give it up, and with the crystalization of his desire in this regard, a big step towards breaking the habit has been achieved. Once he realizes that one's desire is to help and encourage him to achieve something which he wants to do, he will usually co-operate very readily in any means suggested. Be can usually be easily informed and convinced of the need for breaking the habit and with the establishment of an atmosphere of friendliness and encouragement, there remains only the need for providing him with the means of re-directing what has now become an extremely deep-rooted and powerful urge. The initial favourable atmosphere
is all important, but it will not do on its own, for however much the child might want to conquer the habit, he should always be provided with some other more desirable form of activity into which his thumb sucking energies can be re-directed. If this is not done he will either forcibly repress his desire to suck his thumb with resulting mental disturbance later on, or he will give up his thumb sucking and regress still further to some such habit as nail biting.

Paul S., aged 7, (Case History No.6) was very proud of herself for having given up sucking her thumb, but immediately she did so, she started nail biting, which she had never done before.

The encouragement of the chewing gum habit seems to offer the most likely means of success. It provides that "incompatible tendency" of which McDougall speaks (33). Most children thoroughly enjoy chewing gum and within reason, the more they indulge in the habit, the more are they encouraging jaws and muscles to healthy development, and, at the same time, shutting out an undesirable habit. The child can be told why he is being encouraged to use chewing gum. He can be provided with the gum and told to use it whenever he feels the urge to revert to his thumb.

It will be seen then, that in the case of the older children the whole secret of success is in bringing out in the child himself the desire to break the habit; in building up his morale with kindliness and encouragement and with providing practical specific means for re-directing his energies.

PARENT CO-OPERATION.

Certain fundamental principles must be observed in the treatment of thumb sucking at any age, although, as we have already seen, there are specific lines of treatment applicable to different ages. It is of great importance that parents
should understand not only the nature of the act but also
the principles upon which methods of treatment are based.
Parent education is today receiving more and more attention
and the handling of the problem of thumb sucking is only one
of the many that parents must understand thoroughly so that
they can handle it intelligently and successfully. The old
idea that because people become parents, they automatically
become endowed with all the necessary knowledge to make them
good parents and to bring up their children to be well-
adjusted, happy, healthy citizens, is now thoroughly exploded.
To be a good parent demands careful study, thought and
training, and if this conscientious approach to parental
duties is lacking the result is reflected in the children.

Parent education then, is a sine qua non for the success-
ful guidance of the growing child so that he will be properly
adapted at the various stages of his development and so that
he will live through his experiences which are characteristic
of the various ages through which he passes. In this way he
will, as he leaves infancy behind, naturally outgrow infantile
habits and practices; and one of those of course will be the
infantile practice of sucking.

The mother of the child of nine who still persistently
sucks his thumb, cannot be excused because she says she has
to break him of the habit. She has probably done everything
done everything/wrong, and consequently the habit persists.
If she had been taught the true significance of thumb sucking,
had understood the nature of the act, and had known the
correct technique for handling it, then in all probability,
the practice would have been dropped many, many years before
and much physical damage would have been avoided as well as
much mental distress on the part of both the mother and the
child.

Another broad principle which should be recognised at
this stage is that the thumb sucking involves no moral issue.
There is no question of it involving either "sadness" or "goodness"; and consequently in holding it there could be no question of using anything which appears in the heart of punishment. It would be wrong too, to force an issue of obedience in connection with the act, such as ordering the child to refrain from pulling his thumb and expecting unquestioning compliance with such an order. This question of obedience is an important one, and Susan Isaacs (35) says of obedience that:

"As and when it is needed for the safety of the young, the call for obedience belongs to the biological responsibility of the parent. Moreover, it has its roots deep in the psychology of the human child. But it is not a need in itself. It is a condition—not a purpose. For we have the right to ask for it depends entirely upon what use we make of it. We can employ it purely to satisfy our need for power or dignity, or wisely to support the child himself against his own ignorance and confused desires. The issue turns not upon whether we shall ask children to obey, but specifically, upon what we shall ask them to do and what we shall prohibit." She regards obedience as an instrument of education, not an absolute value, and wherever possible a few minutes training is given beforehand, particularly in things desirable that the child is eagerly absorbed in something. This type of consideration is believed to be of great value in obtaining cheerful cooperation. She advocates that as far as possible the natural outcome of children's actions should be the means of conditioning their behaviour, and she avoids setting up confusion in the minds of children by avoiding, as much as possible the imperative form, and using the conditional instead. "Just," then falls into its place as representing a condition. For instance, the approach would be, "If you do X, Y will result." "If you want the string of your sailing-boat to hold fast, then you must tie it in one of a certain number of ways", and so on. This
form of approach is particularly applicable to children in handling young patients, and also to parents in coping with problems such as thumb-sucking. Every dentist will realise that to give a bare order to a young child to "sit still and open his mouth" will, in many cases, have little or no effect. But a friendly statement that "if you don't sit still and open your mouth, one of those sharp instruments might hurt your gums" is very quickly understood and acted upon. Or again, to sternly command the youngster to sit still so that you can finish his work, usually results in nothing but further opposition. On the other hand, using again the friendly tone and the suggestion that, "although I know it is not very pleasant, the quieter you can sit the sooner will it be finished and the sooner you can go out to play", puts a different complexion on the whole thing. The result of his good behaviour is then seen to be to his own advantage and his behaviour is conditioned in the way it is desired. The child then understands the path he has to follow and he will follow it with you willingly, instead of being forced blindly along a path bearing sign-posts, none of which he understands. Some of these inexplicable sign-posts could be such generalities as "naughty" or "horrid", "disgusting" and so on. Very young children cannot appreciate the meaning of such words, and as far as possible, they should not be used.

Susen Isaac quotes Dr. Ernest Jones (Psychoanalysis, 1923, Page 57) as saying— "The more a child's development comes about through its interests and affections, rather than through moral training, the less sharp are the unavoidable conflicts and their consequences." She herself, lays great stress on the need for patient understanding and sympathy on the part of the mother, and this patient friendliness is needed in the problem to have under consideration. She must know that if either she or her husband is harsh or
hasty in their approach, that this is one way to blind the
child to his infantile ways. She points out that the child
she goes in fear of scoldings or nagging, cannot go without
fear into the social life. He is thrown back upon himself
and upon his infantile ways of gaining love by his helplessness
or infantile habits. It is generally recognized that fear
of whippings and severe punishment will have these evil
effects, but it should be clearly realized also that fear
of nagging and harsh criticism may be just as harmful and
paralyzing to the sensitive child.

So much then, for the need for proper parent education
and proper parent behaviors.

At this juncture though, it might be as well to keep
the whole problem in proper perspective by reminding ourselves
that although thumb sucking is a serious problem and it can
cause serious damage to developing jaws and teeth, parents
should be careful not to over emphasize its importance, just
as they should be careful not to under-estimate it. To can
recall that Sillman (11) has produced evidence that in most
cases thumb sucking has not produced any appreciable deformity
up to the age of 3 years. The habit should be checked well
within that period of course, but at least there is no need
for us to be stampeded.

This then leads us to the final broad principle which
should be observed and that is that no obstruction or punish-
ment should be used in the handling of thumb sucking, but
patience, friendliness and careful re-direction of the urge.
PART II.
It has been shown that the act of suckling in the human infant, and probably in all mammal infants, is a strongly developed instinctive act. To study the nature of this instinctive act amongst human beings, presents considerable difficulty, because its manifestations are usually obscured to a certain extent by the behaviour of the infant's parents, and more particularly, the mother. A study of animals, whose natural characteristics approach fairly closely to that of man, affords a better opportunity of studying the nature of this particular instinct, because the whole process is on a simpler plane, and remains relatively unobscured by irrelevant actions. With animals too, it is possible to study different control groups whose environment can be controlled over specific periods. Extraneous influences can be excluded and consequently conclusions based on observed behaviour are much more accurate.

For the purpose of studying thumb sucking, cattle provide an excellent group for detailed study because the normal time for suckling their young approaches very closely the normal human period of nine to ten months. Cattle can be divided broadly into two groups, dairy cattle and beef cattle, and the techniques of rearing them provide a splendid opportunity for comparison. With dairy cattle, calves are weaned from their mothers usually within the first 48 hours. This weaning is done for economic reasons, because the mother cow's milk is required for sale, either as milk or butter. The calves of the beef cattle on the other hand, remain with their mothers and suckle naturally for about nine months. At the McGurvie Smith School, new born calves are fed for the first week after birth on full cow's milk which they drink from a
bucket. This is then supplemented with a properly balanced feed and at the end of nine to ten weeks, the calves are taken off the milk altogether. All calves are weighed each week and feeding is correlated to ensure a steady and satisfactory growth.

The Jersey herd at the McGuier Smith School provide an excellent opportunity for observations of behaviour. The feeding of two different groups of calves was observed and provided an interesting contrast. One group consisted of three calves aged three weeks, two of them were twins. These three were chained up out of reach of each other just before feeding. A bucket containing a measured ration of milk was given to each one and this was very quickly consumed. Immediately one calf had finished its milk it seized upon a finger of an attendant standing nearby and sucked it voraciously, and as a demonstration, two of the calves were then unchained. They immediately approached each other and seizing upon one another’s lips, sucked at them for several minutes. They had to be forcibly separated and chained up out of reach and even then they were screaming to get to each other. It is always necessary to leave them chained apart for one hour after giving them their milk in order to prevent this fierce substitute sucking. Dry feed is available to them immediately after their milk and at the end of an hour the calves can be released, as they will have temporarily forgotten their sucking urge by then. Experienced dairymen swear that this substitute sucking of mouth, ear or other parts of the body is universal amongst all bucket fed calves and it is in order to prevent them from harming each other that they are chained or hauled up for an hour after receiving their milk from a bucket.

The feeding of the other group of four calves provides a marked contrast. The cows on the farm are quite good
nullows but have dropped udders which makes them unsuitable for milking by machines. They have therefore been used for some time past as nurse cows for some of the new-born calves. This is a chance circumstance which provides a contrast to the normal dairy practice of nursing calves at birth. Instead of being bucket fed from birth, four calves are being fed naturally by these two cows, each cow feeding two calves at a time. The calves do not remain with the nursing cow all day but at feeding time the cows are given their own bins of food and the calves are allowed access to them. On this particular occasion it was noticed that the calves succumbed quite contentedly until the milk supply was nearly exhausted when a certain amount of jostling took place for access to the teats providing the last amounts of milk. One calf ceased sucking and helped itself to some of the cow's food from the bin, but very soon decided and lay down nearby and went to sleep. The other calf of this pair succumbed for some minutes longer than it too lay down. Those calves showed no further interest in one another. No chaining or separating was necessary and is never used and there was not the slightest tendency to suck one another. The two calves with the other nurse cow fed in a very similar manner but when finished they walked away together for 50 yards or so. One calf made some acutulatory attempts to suck its mate who showed no interest whatever in retalting. It very soon lay down and the first calf then ceased its sucking overtures, and it too lay down nearby and went to sleep. It was estimated that the sucking calves took about three times as long to obtain their milk as did the calves who got theirs from buckets. The contrast in demeanour between the bucket fed and the naturally fed calves after feeding, was most striking, for the former were lively and excited, whilst the sucking calves appeared quiet, contented and sleepy. It is claimed that the requirements of
nutrition are satisfied with both groups and that successive weekly weighing substantiates this.

These observations relating to bucket-fed and naturally fed calves are fully supported in a report of the results of some experiments carried out in U.S.A. C.D. Johnston (47) described an investigation which was started in a pure bred Guernsey herd of 200 milking cows in December 1933. About twenty cows are selected each year because of age, care foot, low production, sterility and udder trouble, for nurse cows. The cows and calves are kept in open sheds of different sizes and the pens, which are 15 to 25 feet long and 11 to 25 ft. wide, house two cows and three or four calves. Four day old calves are placed in the pens at any time of the year. When a new calf is put on a nurse-cow it is allowed 10 pounds of milk per day, and within two weeks many of the calves are eating some grain and hay. It is claimed that this system greatly reduces the mortality rate, and the calves are vigorous and well - grown when they are weaned at four months. He goes on to say "they show no desire to nurse each other's udders and tests when they are in the pens. It is interesting to learn that the owner has seen only one of these heifers nursing another heifer during the past three years in the pasture. During the grazing season it was common to find the heifers which had been well-fed, nursing themselves and other animals, thus necessitating special housing at the barn."

In the case of calves as with human infants, the need for nourishment stimulates the sucking instinct. The calves fed by the nurse-cow have their sucking-feeding instinct completely satisfied because not only are their nutritional requirements met, but their physical and emotional demands associated with the sucking act are not also.

The bucket fed calves have their nutritional requirements satisfied but the instinctive act of sucking which is so
strongly stimulated, first by hunger and then by the taking of food, is completely denied.

The satisfaction of the sucking-feeding instinct is a many sided process and the sucking act is an integral part of this process. If its satisfaction is denied, then a substitute will be found if at all possible.

There seems to be a close similarity in this after-feeding substitute sucking on the part of the calves to the after-feeding thumb sucking of some human infants. They might be getting enough food and be putting on weight normally, but if their milk is obtained too quickly or easily, either from the breast or feeding bottle, then the demand for a certain measure of sucking activity, deriving its energy from an inherent instinct, remains unsatisfied and the thumb turned to as a substitute. Undoubtedly there are other requirements to be met, particularly with the human infant, but the demand for nourishment and for the full exercise of the sucking act are two that are essential.

In another period observations were made of a group of six calves, all 4-7 months old and all having previously been fed by foster mothers. They had been weaned from the foster mothers within the previous month and were now given no milk but only dry food and natural grains. Although the natural sucking time is nine months these calves had been weaned from their foster mothers at four months; it is possible to do this with calves because they are at this stage no longer dependent upon liquid food but can, if necessary, be put on to a diet consisting entirely of dry food. This represents a further stage of development and if substitute sucking is persisted in, it is a carry-over of an instinctive practice. Several of these calves showed clear evidence of turning to the practice of substitute sucking; one bull calf was observed sucking the teats of a heifer cow in turn sucked the ear of another bull calf. Although this sucking was quieter and
lacked the voraciousness of the previously observed three weeks old bucket fed calves, it contrasted with the behaviour of the foster-fed Guernsey calves of similar age which were later observed at the Collingbar Experiment Farm and which showed, with two notable exceptions, no desire to resort to substitute sucking. One significant difference seems to be that the Jersey calves had never been allowed free access to their foster mothers at all times of the day. They were permitted access to them only twice a day, and as a calf running with its mother will usually feed about every four hours - very like the human infant - they probably lacked a full satisfaction of the sucking-feeding instinct. The Guernsey calves, however, were allowed to run with their foster mothers for six weeks and could feed at will. Then they were taken away from the foster mothers and put on to a ration of skim milk from buckets and dry feed twice a day there was no sign of substitute sucking. In one case there was at least a partial carry-over of an infantile practice into a higher stage of development whereas in the other case this practice had been left behind. Another difference was that the Jersey calves were given no milk after weaning from the foster mothers whilst the Guernseys were given skim milk twice a day in addition to dry feed and natural grass.

If too, as seems probable, these 4.5 months old calves had not, during their suckling period, turned to substitute sucking but were now doing so, then it would appear that there is a close parallel with the steady thumb or finger sucking often observed in the 4 to 5 months human infant, who, after 5 or 6 months at the breast has to be weaned and is put on to artificial feeding with insufficient attention being paid to the correct technique. The fierce substitute sucking of the two dairy calves also is very similar in nature to the vigorous hand or finger sucking so often observed in the young
human infant and it suggests very strongly a faulty feeding routine, resulting in an incompletely satisfied instinctive urge.

Geddes (52) has written up those earlier observations of mine from the dairyman’s point of view and has drawn attention to the behaviour of the two young calves which were seen to suck one another so furiously. Referring to my visit to the Doricvic Smith Farm, he says, “We have for some time made a habit of chaining up our calves after feeding them milk from a bucket... But on the occasion of the dentist’s visit we let the calves go free as soon as they had had their milk. Although they had been regularly chained before feeding, and had had little previous opportunity to suck each other, they immediately began to do so.”

This situation is somewhat similar to that of the young child whose mother told me that she had bandaged his elbows every night for six months in an effort to correct his thumb sucking. One night after this six months period, his bandage became loose and the thumb sucking was resumed immediately.

The situation is similar also to that reported later in which one of the calves at Lone Pine Farm had been bucket fed from birth, but lived alone in a paddock until four months old. Immediately it was placed with other calves, it started substitute sucking for the first time.

In neither case did physical restraint contribute anything to the correction of the practice and this is entirely consistent with the way in which an instinct operates. It will be recalled (p. 49) that an instinctive urge, once aroused, will either continue until satisfied, or will strive after satisfaction until the individual is exhausted, or it will cease to operate than a strongly incompatible tendency is aroused.

The sucking-feeding instinct is always strongly aroused
by the taking of food. Chaining the calves up therefore does nothing to alter the intensity of the urge and immediately the chains are removed after feeding, whether it is after a day, or a week, or a month, this instinctive urge must be satisfied and substitute sucking is immediately resorted to.

In the case of the child, the bandages operated in the same way as the chains on the calves. At the same time it must be remembered that one of the characteristics of instinct (Martin (28)) is that "If the instinctive act fails in one direction the organism attempts a variation of activity in its response." Thus the thumb sucking right cease as the result of bandaging but it would only be because the instinct was finding satisfaction in some other allied practice which is usually more desirable than the thumb sucking (c.f. Fox's Case 3 - Part II).

The use of mittens, sticking plaster, bitter aloes and such like restrictive measures are also doomed to failure. They are only other forms of obstruction and not only do not diminish the intensity of the instinctive urge, but actually increase it. Feared with obstruction the individual will strive all the harder for satisfaction and consequently mittens will be sucked or bitten through, gloves will be chewed through, aloes will be sucked off, and the thumb sucking will go on just the same.

It has been noted that beef cattle differ from dairy cattle in that their calves are allowed to remain with their dams for nine to ten months and they can therefore suckle naturally whenever they like. They even differ in two respects from those dairy calves at the Meadville Smith Farm which had been suckled by the two foster mothers, because the dairy calves were only allowed with the foster mothers twice a day at feeding time and they were suckled for only 2-3 months. One would expect therefore that amongst beef cattle, substitute sucking would be non-existent, and such is the case.
LISMORE, FAY - 1949.

By observations carried out at the McFarvie Smith School Farm of Animal Husbandry in January 1947, the observations recorded by Johnson (op. cit.) in U.S.A., theoretical considerations, and information obtained from experienced cattle men, all strongly suggested that frustration of a natural instinct lay at the bottom of the substitute sucking act and that this act corresponded exactly with the thumb and finger sucking so frequently observed in infants. In order to obtain further evidence of this, an approach was made to Mr. J. McGillivray, Chief, Division of Dairying, Department of Agriculture in N.S.W. He at once agreed to help and very soon arrangements were made for me to carry out a series of observations on the properties of Mr. P. J. Carey and Mr. J. Schubring of Wallangarra N.S.W., and at the Wallangbar Experiment Farm at Lismore, N.S.W.

Despite a temporary slackening of enthusiasm in the cause of research, owing to a cyclonic disturbance, the flight north was made on May 2, 1949, and the next day was spent at the experiment farm. This farm supports a splendid Guernsey herd (Fig. 22) and in the rearing of calves, foster mothers are largely used. The procedure is that whenever they are available, foster mothers are provided for all new born calves and these calves are allowed to run with the foster mothers and feed from them at will for a period of six weeks. At the end of six weeks the calves are taken from the foster mothers and put onto a bucket feed of 2 gallons of skim milk per day followed by a dry feed consisting of 4 parts oats, 2 parts bran, and one part of crushed wheat. They are provided with two feeds a day and this continues from their seventh week when they are taken from the foster mother, till the calves are nine months old, when artificial feeding is discontinued altogether.
If there are not enough foster mothers for all calves, then the normal dairy farm practice is followed for the remainder and they are put on to bucket feeding 48 hours after birth. A series of observations and photographs were made in Paddock "A", in which were 8 calves, aged 2-4 weeks, 5 foster mothers, 12 heifers in calf, and 5 backward cows. The 8 calves were all running with the foster mother cows and were fed by them exclusively. The pasture was ankle-deep kikuyu grass and all animals were in splendid condition, presenting a picture of complete contentment. The calves fed from one of the cows whilst we watched, and took 12 minutes steady sucking before they were satisfied and broke away. They scattered off together without making any attempt to suck one another and the accompanying series of photographs shows this very clearly (Fig.23). The calves were perfectly quiet and contented. One of these calves was a heifer and the other a bull calf, one having been born on 7 April and the other on 9 April 1949.

In Paddock "B" there were four calves by themselves (Fig.24). One, aged 8 weeks, had been reared on a foster mother for 7 weeks and for one week had been bucket fed. Another, aged 6 weeks, had been with a foster mother for one week and had been bucket fed for five weeks. The remaining two, aged 4 and 5 weeks respectively, had been bucket fed after the first 48 hours. These four calves were fed together from buckets and in each case their whole ration was consumed in three minutes. Immediately it was finished the two earliest bucket feeders sat upon one another sucking voraciously at each other's teats. They pursued one another from one side of the yard to the other occasionally getting into position where each could suck the other (Figs. 25-29). Their whole behaviour and demeanour was frisky and excited and contrasted strongly with the other calves who, when their ration was consumed, walked quietly away, one to one corner of the yard and one to
the other. The contrast too was most marked with the conduct of the two calves who had previously been observed feeding from the foster mother. Even allowing for his being slightly older, the calf reared for six weeks on a foster mother was much bigger and seemed in much better condition than the other three.

In Paddock "C" were 20 calves all of whom were born during the month of January 1949, and were therefore 2-4 months old when these observations were made. Eighteen of these calves were reared for six weeks on foster mothers and were then, according to the usual technique, put on to bucket feeding of skim milk and dry food. However, as there were not sufficient foster mothers, two calves of the twenty were bucket fed after the first 48 hours. They received mother's milk for the first week - whole milk from the herd for the next three weeks, and then over the next two weeks the change was gradually made to skim milk. The feeding behaviour of these twenty calves was of very great interest. They were mustered into a yard (Fig. 27) and five at a time were allowed into stalls at the head of which were placed the feeding buckets. In every case the milk ration was consumed in 1-1½ minutes and the calves then passed out into a yard separate from those waiting to come in (Fig. 28, 29). One of the two calves which had been bucket fed from birth received his food early and the other one was in the last five. When 15 had fed and passed out into the yard, they all stood round in a placid, quiet mood, and the only substitute sucking seen was a very desultory attempt at ear sucking by one calf for about 20 seconds. Then the last five had finished their milk and passed into the yard, the second of the two original bucket fed calves was seen to nudge his way busily and out of the herd until she found the other original bucket feeder. Immediately she found him she proceeded to suck very busily
at his penis (Fig. 30). She was nudged aside once by another calf and immediately went round the other side and started sucking again. Soon there was a trickle of urine from the sucked calf and this was sucked up.

I was informed that the procedure is always the same, the 13 calves reared on foster mothers for six weeks never suck one another, but the remaining two always do so. Dry feed was next put into troughs nearby and no further substitute sucking was observed (Fig. 41, 42). The two sucking calves seemed not to have the same excellent condition and bloom as the other calves, and from the dairymen's point of view it might well be that the elimination of this substitute sucking in calves would result in better developed animals. From the point of view of feeding behaviour, even a comparatively short period of natural sucking-feeding seems sufficient in the calf to satisfy the sucking-feeding instinct and once satisfied the calves progress easily to a more developed stage in which infantile practices are left behind. They don't resort to substitute sucking during their time with the foster mother and neither do they resort to it after they have graduated to the next stage in their development.

If, however, the sucking-feeding instinct never receives satisfaction, as with the two calves in Paddock "B" and the two older ones in Paddock "C", then substitute sucking is resorted to in an endeavour to satisfy the instinct. Of great importance too is the indication that the mere lapse of time alone will not cause the practice to stop. In Paddock "C" 13 calves who have had their sucking-feeding instinct satisfied have progressed easily to the next developmental stage, but the two calves who have never had this instinct satisfied, although of the same age and now being fed in exactly the same way and with similar rations, still cling to the infantile sucking practice.
The meaning of these observations as applied to human infant behaviour is of great importance. An instinctive demand requires satisfaction at its appropriate time and the individual - infant or calf - can then progress easily and naturally to its next stage of development. If, on the other hand, an instinctive demand is denied satisfaction at its appropriate time the source for satisfaction will persist and enter into later stages of development and it should have long since been outgrown. Thumbs and fingers sucking amongst infants and children in exactly this process in the great majority of cases.

The following day, Mr. Melrose, Dairy Officer of the Agriculture Department, and I proceeded some 50 miles to Ellengowan where arrangements had been made with Mr. J. J. Curley for observations of a number of Hereford cows and calves (Fig. 43). Great difficulty had been experienced previously in observing the habits of beef cattle owing to the fact that they are usually scattered over a very large area, but the splendid co-operation of Mr. Curley made it possible to make observations of a large number of cattle at his property, "Kilmorran".

His staff had rustled for my bundle a mob of 35 Hereford cows and their 35 calves, the ages of which ranged from one week to four months. The cows had been put into the yard and the calves into another nearby and they were not permitted to have access to one another for seven hours before the observations were made (Fig. 43). Four hours in the usual line which elapses between foods and consequently the calves were very hungry by the time we arrived and both cows and calves were extremely vocal on the subject. The calves showed no sign of sucking one another at this stage.

In order to observe the behaviour of a few cattle first, seven cows only were admitted to the cattle yard. Each calf
will feed only from its own mother and after some jostling round the seven mothers and calves got together (Fig. 43, 47, 48). Mr. McLaren and I both timed different groups and noted that the shortest feeding time was 10 minutes and the longest 16 minutes. Times taken of other pairs subsequently established 15½ minutes, as the average feeding time, and this corresponds very closely with the time taken by the Guernsey calves at the Experiment Farm.

After the first seven cows had finished feeding their calves they were matched closely but no substitute suckling of any sort was observed (Fig. 49). All cows and calves were then driven into a large neighbouring yard (Fig. 50). There was a great deal of milling round till mothers and offspring found one another and then feeding proceeded without further hindrance (Fig. 51). I was able to move about freely in the yard amongst the cattle and so too did Mr. McLaren and Mr. Carey, but not one instance of substitute sucking was observed. After feeding, many of the calves moved about together and the older ones cropped a bit of grass, but there was not the slightest suggestion of one calf attempting to suck another and their general demeanour was calm and contented (Fig. 51-53). All cattle were kept in the yard for 10 minutes after feeding had ceased and were then driven back to their grazing ground (Fig. 57).

Beef calves such as the Herefords normally run with their mothers for nine months and are then caimed. They are not bucket fed at any stage and their behaviour provides a dramatic contrast to the behaviour of dairy calves which are normally caimed within 48 hours of birth and reared on the bucket.

From Culmoran our party proceeded to Lone Pine Dairy Farm owned by Mr. J. Schubring, where we were able to watch the feeding of 40 Jersey calves aged from 8 weeks to 4 months.
The calves are fed twice a day and they line up six abreast at feeding stalls and drink skim milk from buckets (Fig. 58-30). No dry feed is given. Those aged 3-4 weeks took an average time of three minutes to consume their ration, whilst the longest time taken by the older calves, aged 5-4 months, was two minutes, and in two cases the ration was consumed in less than a minute.

Immediately after feeding the most furious ear, test, and flank sucking took place, and on more than one occasion calves were seen to interrupt feeding in order to fasten onto the ear of their neighbours (Fig. 61). It was interesting to note too that the substitute sucking continued in a most persistent manner for at least 15 minutes thereby closely approximating the time normally taken by a calf to take a feed from its mother or foster mother (Figs. 62-63).

There can be no doubt that the sucking instinct possesses a definite intensity which demands satisfaction and if it is denied in the normal manner, it will find satisfaction in a substitute way. One calf had an extremely interesting history. It was born on December 20, 1927, was bucket fed from birth, and its owner kept it in a paddock by itself until it was sold to the owner of Lone Pine Farm at the end of April 1928. It then became one of the mob of 40 other calves and immediately started substitute sucking for the first time. This behaviour presents a close parallel to that noted in young children than forcible scenes are used to prevent thumb sucking. In neither case is any progress made towards correcting the practice because the underlying cause, the unsatisfied instinct, remains, and immediately physical restraints are removed the effort to obtain satisfaction is made by scenes of the substitute sucking.

A factor which enters into the feeding of the calves at Lone Pine Farm, and, I believe, on most dairy farms, is that
the calves are fed on skim milk only, plus whatever natural
grasses they can get for themselves. Thus there appears to be
a degree of under-nourishment and consequently, compared with
the calves fed by their mothers or foster mothers, they are
not only deprived of the natural sucking act but are also
deprived of a certain amount of nutritional satisfaction as
well. This under-nourishment is probably a factor in the pro-
duction of substitute sucking, but it is not likely to be of
major importance unless the under-nourishment is extremely
severe. Observations at the McElvain Farm strongly indicate
that the frustration of the sucking act itself is all important,
for whereas a carefully balanced diet of whole milk and dry
feed meal is supplied, violent substitute sucking takes place
just the same amongst the bucket fed calves.

Similarly, at the Experiment Farm, the two original
bucket feeders in Paddock "C" were fed for one week after birth
on mother's milk, the following three weeks on whole milk
from the herd, and during the next two weeks the ration was
gradually changed to skim milk. It will be seen therefore
that from a purely nutritional point of view these two calves
were at no disadvantage as compared with the other 16, and
the only discernible difference in the feeding routine to
account for the substitute sucking was the frustration of the
sucking act. There is no doubt therefore, that the sucking
act is the core of the feeding instinct and that its frustra-
tion will always promote substitute action.

From these little observations it is apparent that there
is a fundamental reason for the marked difference in the
behaviour of calves under different circumstances. Of the 55
Hereford calves not one resorted to substitute sucking after
being fed by its mother, whereas the 40 Jersey calves all
sucked one another furiously after being fed. That the sig-
nificant difference does not lie in the fact that the Hereforus
are beef cattle and the Jerseys are dairy cattle is shown by the behaviour of the Guernsey calves raised by foster mothers at the Boilingbar Experiment Farm and the Jersey calves raised the same way at the McIvor Smith Animal Husbandry Farm. In the one case substitute sucking was entirely absent and in the other it was noticed for a few seconds only.

The essential difference lies in the fact that on the one hand the 65 Hereford calves run with their mothers, are fed by them and have their sucking-feeding instinct completely satisfied. Substitute sucking therefore never takes place. The same applies to the Guernseys observed at the Experiment Farm and the Jerseys at the McIvor Smith Farm, which were reared on foster mothers. The 40 Jersey calves observed at Lane Fine Farm on the other hand had been weaned from their mothers 34-48 hours after birth and thereafter fed from a bucket. The satisfaction of the sucking-feeding instinct had been completely denied and as this instinct is always strongly rooted in the taking of food, the fierce substitute sucking observed was the attempt on the part of the calves to satisfy this instinctive urge.

This behaviour amongst calves is exactly similar to thumb and finger sucking amongst infants. In both cases it is caused by failure to satisfy either wholly or in part a basic instinct. In the human infant, as has been pointed out, this sucking-feeding instinct is much more delicately balanced than in calves and it operates for a much longer time because the human infant is entirely dependent on the sucking act to obtain its nourishment for almost the first nine months of life. The calf can drink from a bucket from birth, and the calf can eat dry feed and grass from a very early age, and therefore, although the sucking-feeding instinct is very strong, it can be satisfied much more easily and over a much shorter period of time with the calf than can be done with the human infant.

This is demonstrated very clearly by the fact that the
six weeks period of nursing by foster mothers of the Guernsey calves was enough to satisfy the instinct. After that time they had outgrown it and could be fed from buckets and with dry feed without any substitute sucking taking place. The two calves of the same age who were bucket fed from birth and still persisted in their sucking activities after the others had outgrown it, seem to present a very close parallel to the human infant who turns to thumb sucking for substitute satisfaction during the oral stage, and never quite achieving it, persists, just as these calves were doing, long after the time when the normal sucking activity should have been outgrown.

In a word then, both human infants and calves are possessed of a strong sucking-feeding instinct. If this instinct is fully satisfied, no substitute sucking will take place during the oral stage of existence, nor will this infantile practice be carried over into the next stage of development. If, however, this instinct is either partially or wholly unsatisfied, then substitute sucking is resorted to in the form of thumb or finger sucking in the infant, and ear, test or tail sucking amongst calves.
Fig. 30. This bucket fed calf sucks persistently at the ear of its mother in an endeavour to satisfy its sucking-feeding instinct. The action is an exact parallel to thumb sucking in the human infant.
Figs. 31-43 were photographs taken at Fallowbar Experiment Farm.

Fig. 31. Mr. G. Gillies, Manager of Fallowbar Experiment Farm, Mr. S. R. Ballard, Senior Dairy Officer, Lincoln, and Mr. T. Gough.

Fig. 32. A Guernsey cow and calf at the Experiment Farm.
Fig. 32. Two calves are first seen approaching their foster mother (A, B). In C, D, E, F, they are shown feeding. In G, they have just finished and H, I, J, K, L, M, show them strolling away together. Not at any time during the whole feeding process was any substitute sucking resorted to.
Fig. 24. Four calves in paddock "B" aged 4, 5, 6 and 8 weeks respectively. The one aged 8 weeks had been reared for the first seven weeks by a foster mother and one week by bucket feeding, the one aged 6 weeks had the first week with a foster mother and 5 weeks on the bucket, whilst the two youngest ones were bucket fed after the second day.

Figs. 25, 26. Immediately they have finished their feed the two youngest calves which have been bucket fed since two days old suck at one another's teats in a most voracious manner.
Fig. 37. Twenty calves, all born in Jan. 1949, and therefore aged 6 months when these photos were taken, waiting to be fed in Paddock "C". 13 of these calves were reared for the first six weeks by foster mothers. (This series, Fig. 37 to Fig. 42 inc.)

Figs. 33, 34. Calves which have finished their milk ration. No substitute sucking observed.
Fig. 40. All calves in Paddock "C" have now consumed their milk ration. The only two which have been bucket fed from birth are shown together, the one busily sucking the other. No other calves in this group show any interest in substitute sucking.

Figs. 41, 42. All are now given dry feed from troughs. No further substitute sucking was observed.
Fig. 49. Mr. P. J. Carey and Mr. G. McLean.

Fig. 50. Some of the 55 Hereford cows yarded before feeding.

Fig. 51. The calves yarded nearby awaiting feeding.
Fig. 42. Seven cows are admitted to the calves yard.

Fig. 43. One hungry calf finds its mother.

Fig. 44. Three more calves busily feeding.
Fig. 49. Feeding has just finished for these two. No substitute sucking observed.

Fig. 50. All cows and calves being driven into a nearby paddock.

Fig. 51. One calf in the picture is still feeding, all the others have finished.
Fig. 62. A well fed, contented calf. He's more interested in the camera than in his mates.

Fig. 63. A group of cows and calves after feeding. The author is to be seen balancing on the fence in the background.

Fig. 64. Another group of calves after feeding. They are all placid and contented and show no sign of substitute suckling.
Fig. 55. Another two calves after feeding. They are not in the least interested in one another.

Fig. 56. Cows and calves scattered through the paddock after feeding.

Fig. 57. The experiment finished, cows and calves are driven back to their pastures.
Fig. 63. Jersey calves waiting to be fed. In substitute sucking at this stage.

Fig. 52, 53. Feeding in progress.
Fig. 51. The calf fourth from the left finished its milk an instant before this photo was taken and it is already sucking hard at the ear of its neighbour.

Fig. 52. The calf at the rear was the first of this batch of six to finish its milk and it immediately started to suck the teats of another calf still feeding.

Fig. 53. A typical group after feeding, all sucking furiously at one another.
Figs. 64, 65, 66. This furious substitute sucking goes on for 15-20 minutes after feeding. A noticeable feature is the sense of extreme urgency which pervades the whole process.
Fig. 57. Still grouped together and jostling for position.

Fig. 58. The mob begins to spread out but still the sucking urge is not satisfied.
Fig. 23. Still at it!

Fig. 20. The observations completed, Dr. Schubring and the author admire a young bull calf.
In June 1948 a series of calf-feeding experiments was started at the McFarlane Smith Farm under the direction of Mr. H. J. Gaddes B.Sc., (Agr.), assisted by Mr. L. Stephens B.V.Sc., and Mr. J. C. Young, and I am permitted to say that as a result of my previous observations of calf sucking habits which have been described in this thesis, an artificial sucking device was introduced for feeding the calves. From the veterinarian's point of view it is believed that the elimination of the substitute sucking practice will result in better developed and healthier animals. Of interest in the experiments, however, lay in observing the effect of an artificial sucking-feeding device on the behaviour of the calves because of the close parallel with infant feeding and infant behaviour. After the first batch of seven calves had been at the Farm for 14 days, I spent two days there observing their behaviour and collaborating with Mr. Gaddes and Mr. Stephens in effecting improvements in the nipple feeding device.

This device is not new, for it had been tried out some years before and discarded as unsatisfactory. The reason for its falling into disuse appears to have been because of a failure to appreciate the need for establishing a proper balance in the feeding routine. This means that not only must the ration of milk be adequate and obtained by sucking at a nipple instead of drinking from a bucket, but also that the nipple-feeding device must be so adjusted that the sucking continues for a sufficient length of time to satisfy the instinctive demand behind the sucking act. If the sucking time is too short, the demands of instinct remain unsatisfied, and substitute sucking, although perhaps reduced, will nevertheless still occur. I was able to point out that an adequate sucking time was essential for the establishment of a proper feeding balance and I was confident too that once this balance
was established no substitute sucking of one calf by another could take place.

Seven calves were used in the experiment, three Australian Illawarra shorthorns, one Guernsey, two Ayrshires and one crossbred A.I.S. and Ayrshire. The youngest calf was 16 days old and the oldest 20 days, and they had all been at the farm for 14 days during the whole of which time they had been fed from the nipple feeding device. For the few days after being born till their transfer to the farm they had been fed by their mothers. The nipple feeding device consists of a long rubber tent with a small opening from which the milk may be sucked, whilst the other end has a thick rubber collar and wider opening into which is inserted a rubber tube (Fig. 72). The other end of this rubber tube is immersed in the bucket of milk. At one end of the feeding stalls is a panel with a hole bored to accommodate the nipple exactly, while the collar prevents it being tugged right through. The calf sucks at the nipple and draws the milk up from the bucket. The shelf for the buckets is placed on the opposite side of the feeding panel to the calves and is lower than the nipple so that the calf gets no assistance from gravity but has to suck against it.

An examination of the artificial nipples disclosed the fact that they had very open apertures and it was at once obvious to me that this enabled the calves to suck up their milk ration far too rapidly resulting in a very incomplete satisfaction of the sucking urge. It was my suggestion that the rate of consuming the milk ration be controlled so as to approximate as nearly as possible the time taken by a calf feeding from its mother. This was all the more important too because artificially fed calves are fed only twice a day whereas naturally fed calves feed 4 or 5 times a day. This suggestion was at once accepted and control of the consumption rate, and hence the sucking time, was attempted by means of
closed metal tubes bearing graduated jets which were inserted into the intake end of the rubber tubes.

For the two weeks previous to my visit the intake jets had not been used and under these conditions the full ration of whole milk (calculated at one-tenth of body weight of each calf) was consumed in five minutes at first, but this time soon decreased till only three minutes was being taken. The procedure had been to withdraw the nipple from the calves immediately the milk was finished. Substitute sucking of a constant decubital nature did take place and the calves were very lively and frisky. Then first used the jets on the metal intake tubes were varied from one to seven, each jet being one-sixteenth of an inch. At the 4 p.m. feed on the first day, six calves were fed in the stalls with the intake jets ranging from one hole to six, and the seventh calf which was recovering from an illness was fed separately. All calves had finished their ration in 6½ minutes but the variation in time was not very great because the calf on the two hole jet was finished first in five minutes, and the others finished in quick succession till the calf using one jet finished after 6½ minutes. All calves continued sucking vigorously at the nipples, but after three minutes of this dry sucking the nipples were withdrawn from the two calves which had fed from the one jet and the four jets respectively and they were driven out of the stalls. One wandered away, but the other was obviously unsatisfied and tried to go back into the stall. When blocked it walked round to the head of the stall and nudged at the veterinary officer who was standing there. The nipple had only just been taken out and this was detached from the intake pipe and offered to the calf. He immediately sucked it up and wandered round for a few minutes sucking hard at it like a dummy.

The remaining four calves were allowed to suck at the
nipples for another five minutes after the milk had been consumed and they were then driven out of the stalls. All wandered contentedly off together, and no substitute sucking of any kind was observed. The sick calf was then given its ration, which was half the usual amount, using the one hole jet. Its feeding time was 2½ minutes.

Although no substitute sucking of one calf by another was observed after this experiment, because the sucking urge had been satisfied, the continuation of sucking at the nipple after the milk has gone is considered undesirable from a purely physical point of view, because the calf is only sucking the air. The aim then is to so arrange the aperture of the jet, or better still, the aperture in the teat that the consumption of the ration will synchronise with the satisfaction of the sucking instinct. According to the observations of the Hereford cattle at Lismore and the Guernseys reared on foster mothers, this should take from 10-15 minutes.

For the 8 a.m. feed on the second morning, the intake jets were again altered so that every one had one jet of one-twenty-fourth of an inch. This time two calves finished their ration in five minutes, one took 5½ minutes, one took six minutes, two took seven minutes, and one (the sick calf) took eight minutes. The first six were all allowed to remain at the nipples after the milk was finished until they tired of it and backed out of the stalls of their own accord. One calf stayed one dry sucked for six minutes, and the others stayed for 12, 14½, 16, 18½ and 21 minutes respectively. The calves were still getting their milk ration rather too quickly, but the only sign of substitute sucking observed was when one calf sucked for a few seconds at the corner of a suck which was hanging over the fence. After leaving the feeding stall they all wandered off quietly together, without any attempt at sucking one another, and their general demeanour was very like
that of the contented mother or foster mother fed calves.

The seventh calf - the one which had been sick - was fed by
means of the nipple device and after taking eight minutes to
consume its milk, the nipple was immediately taken from it.
It mixed with the other calves but made no attempt to suck
any of them.

It seems very probable that if they are permitted to
do so the calves will continue dry sucking for a longer period
than is actually necessary to satisfy the sucking instinct
and the synchronisation of sucking and milk intake at a period
of 10-15 minutes would probably provide complete satisfaction.
The nipples could then be withdrawn and dry sucking prevented.
In exactly the same way in the feeding of human infants, the
aim should be to synchronise the necessary milk intake,
whether from breast or feeding bottle, with the satisfaction
of the sucking instinct.

Then a calf is feeding from its mother and is coming to
the end of its feed, it will be seen to hunt repeatedly at
the mother's udder with its head, in an endeavour, apparently,
to induce the flow of more milk. That the nipple feeding
device does, in all probability, promote similar feelings in
the calf, is supported by the fact that all calves at the
nipple feeding device were observed to hunt at the nipples
in exactly the same way.

If the principles underlying calf feeding are similar
to those of human infant feeding, and all the evidence suggests
that they are, then one would expect that the sucking-feeding
instinct of an infant he obtains his normal amount of milk
in very quick time would be unsatisfied, and that he would
turn to substitute sucking - in this case his thumb - in his
efforts to obtain satisfaction. This is exactly what happens.
There is a lack of synchronisation between nutritional intake
and sucking satisfaction just as there is with the calves,
resulting very often in the adoption of thumb sucking. How
many infants are affected in this way, and how many, if any, have their sucking instinct frustrated and yet do not turn to thumb sucking, is not known. It is certain, though, that of the known thumb-suckers a very high percentage of their mothers report an over rapid and over free milk supply resulting in the feeding time being markedly less than normal. All this corresponds exactly with the behaviour of calves.

At the 4 p.m. feed on the second day two new jets were used, which were finer still, whilst the other five tests were left without jets at all. The tests themselves have very open apertures, 1-8" in diameter, which allows the milk to run out quite freely if the bucket is raised above the level of the test. The five calves sucking tests without any jet control at the intake and took 3, 3½, 4, 7 and 8 minutes respectively to finish their milk, the sick calf being responsible for the 8 minute feed. Immediately they had finished their milk the tests were removed and the calves driven from the stalls. They made no attempt to suck one another, but they were obviously unsatisfied, because instead of tampering away and taking no further interest in the feeding process, as they had done in the morning, the three calves with the short feeding times hung round the stalls and tried to get back again, and then prevented from doing so, they tried to get round the head of the stalls to get at the buckets of milk belonging to those still feeding. It was not hunger which prompted this behaviour, because the ration was the same on each occasion. Their behaviour demonstrated afresh the need for satisfying the sucking urge as well as the nutritional need.

The two calves using the fine jets took 17 and 20 minutes respectively, and even then the latter calf had to have the jet changed for a larger one because it wasn't making any headway. Then those two calves had finished, the tests were immediately
removed and the calves wandered contentedly off.

The use of a controlling jet at the intake end of the tube is not the most satisfactory method of controlling the milk flow, because a partial vacuum is created in the nipple and the inlet tube. It seems therefore that the most desirable arrangement and one which would simulate nature most nearly would be to reduce the aperture in the tube itself to a point at which complete satisfaction was obtained. In this way the tube and test would remain full of milk as the calf continued to suck. The device would then be similar in operation and principle to the infant feeding bottle and both are capable of adjustment to the point where nutritional and sucking requirements can be met.

With the human mother the control of the too free supply of milk from the breast presents a more difficult problem and, as has been already pointed out, the nipple shield on which the test aperture can be regulated seems to provide the most certain means of achieving a proper balance.

The outstanding fact which emerges from these calf observations is that satisfaction of nutritional requirements alone is not sufficient to prevent fierce substitute sucking, but satisfaction of nutritional requirements synchronised with satisfaction of the sucking instinct, either at the mother, foster mother, or nipple feeding device, produces a balanced feeding situation which is not followed by any substitute sucking whatever. Allowing for the fact that the human infant develops much more slowly than the calf, and that his mental and emotional processes are much more delicately balanced, nevertheless, the evidence is very strong that the basic principle is exactly the same. If every aspect of the feeding situation is in perfect balance, no substitute sucking of thumb or finger will be resorted to, but if the feeding situation is not in perfect balance, then the greater the
imbalance - and frustration of the instinctive sucking set
is a major factor in producing an imbalance - the greater
is the likelihood of substitute thumb or finger sucking
occurring.
Fig. 71. The buckets of milk being prepared. Most of the calves are already in the stalls waiting to be fed.

Fig. 72. The artificial nipple and rubber inlet tube.

Fig. 73. Holotube with jet inserted into the intake end of rubber tube.
Fig. 74. Artificial nipple about to be inserted into hole at the head of the feeding stall.

Fig. 75. Feeding stalls with artificial nipples in place.

Fig. 76. Calves feeding from artificial nipples.
Fig. 77. This is the calf mentioned in the text whose sucking time was too short and she tried to suck Mr. Stephens' hand immediately after being driven from the stall.

Fig. 78. Photograph taken immediately after feeding. These calves are quite contented and show no inclination to suck one another.

Fig. 79. Feeding stalls and nipple feeding device in operation.
Figs. 80, 81. Two core photographs of behaviour immediately after feeding. No substitute sucking is taking place and the animals are taking no interest in one another. The sick calf can be seen being fed in the background.
Fig. 85, 86. These two calves were observed after feeding on a different part of the farm. They had not been fed from the nipple feeding device but had been bucket fed from birth and in striking contrast to the other calves were indulging in typical substitute sucking.

Note: It is hoped that the photographic shortcomings of this series will be excused as most of the snaps were taken in the rain.
The observations of the use of the nipple feeding device made in June 1943 were only of seven calves, another visit was made to the Eservie With Farm a month later, to observe the behaviour of 15 calves, 7 of which were those previously observed. The original seven calves were now in their seventh week and during the preceding week their milk ration had been cut down so that they were now receiving 1/2 pint of whole milk at each feed instead of 2 pint as previously. The object of this was to maintain a gradual reduction until they were weaned off milk feed altogether at nine weeks. Of the remaining 8 calves, 3 were in their second week, and 3 were in their fourth week. One of the younger calves had been isolated for the previous two days because of a mild bout of scour. It was being fed only half its usual ration of milk whilst sick, but it was intended to supply it with the normal full ration the following day.

Although it was recognized that adjustment of the aperture in the nipple was the best method of controlling the rate at which the milk was consumed, it had not yet been possible to have the necessary alterations made to the nipples and the metal jets were still being used at the intake end of the rubber tube, all containing two jets of 1-32".

Before the feeding of the 11 healthy calves started, it was decided to withdraw the nipples from 3 of the older calves immediately their milk ration was consumed but to allow the remaining 11 calves to continue sucking at the nipples for 2 minutes even though the milk might have been consumed in a shorter time. The first calf finished his ration in 2 minutes and then the nipple was at once removed he seemed very dissatisfied and tried to suck the fingers of the veterinary student who was leaning over the stall watching him. (Fig. 36).
As soon as the first three had finished they were all driven out of the stalls and their behaviour noted. No substitute sucking occurred although they loitered around the stalls for a short time (Fig. 84).

Of the remaining 11 calves, 10 had finished their ration well within nine minutes, but were allowed to remain, and at the end of nine minutes they were driven from the stalls. The remaining calf was one of the youngest and was a poor sucker. He remained to finish his ration in 23 minutes.

Soon after this batch had left the stalls, one of the older calves was observed to suck at the teats of another calf and to continue in this substitute sucking for 1½ minutes (Fig. 87). All the other calves seemed to be perfectly contented and showed no sign of substitute sucking (Fig. 86).

There seems little doubt that a certain duration of sucking time is an essential requirement in providing complete satisfaction during the feeding process, but it is interesting to note that the calf which indulged in the substitute sucking was one which had been left at the nipple for nine minutes. On the other hand it had had its ration cut down only a few days before from 2½ pints a feed to 1½ pints a feed. Possibly this cut was too drastic resulting in an imbalance in the feeding process, and thus giving rise to the substitute sucking. In any case the imbalance must have been only slight because the substitute sucking lasted only a short time.

The calf which had been sick was fed last and the nipple was taken from it immediately it had finished its milk in 3-4 minutes. As it had received only half ration and its sucking time had also been short, it was very far from satisfied and repeatedly tried to suck at the empty nipple, then tried to suck at the veterinary officer's hand, and when rebuffed he turned his attention to me whilst I was trying to take his photograph (Fig. 85).
These and previous observations show very clearly that it is quite possible to provide a perfectly balanced feeding routine using the artificial nipple feeding device, and that when this is done no substitute sucking takes place. Certain fundamental principles must be observed, but within the limits of these principles there is scope for considerable variation in individual behaviour.
Fig. 24. In the first snap of this series, "A", feeding has just started; three buckets have already been put out but the remainder of the calves are impatiently poking their heads under the feeding panel.

"B" and "C" show the behaviour of the calves immediately after leaving the feeding stalls. All had finished their milk and had been allowed nine minutes sucking time in all. There was no substitute sucking.

In "D", "E" and "F" the calves are seen contentedly away and once again no substitute sucking was observed.
Fig. 85. The calf in this series had been sick for two days and was being given only half the usual ration of milk. It was fed by means of the nipple feeding device although this was held in the hand instead of being used in the feeding stalls, "A".

Immediately the milk was consumed the nipple was withdrawn and of course this meant that not only did the calf obtain only half its usual ration, but that its sucking time was extremely short also. B, C, D, E and F show its subsequent behaviour. First, an attempt was made to suck the disconnected nipple; then a most determined effort was made to suck Mr. Young's fingers. The calf was obviously unsatisfied and was urgently trying to complete its satisfaction with substitute sucking.
Fig. 85.
Fig. 83. This calf finished its normal milk ration in 20 minutes, and the nipple was immediately withdrawn. It at once became extremely agitated, tried to get at the next calf’s bucket, and then one of the dairy officers bent over the stall to watch, it immediately sucked hard at her fingers.

The sucking time had obviously been too short to provide complete satisfaction and a substitute was being sought.

Fig. 87. This was the only other substitute sucking observed. These two calves had had their rations cut from 2 pints to 1½ pints per feed during the previous week. Although they had been permitted 5 minutes sucking time, this substitute sucking took place and lasted 1½ minutes.

Only the sick calf and the one shown in this and in Fig. 86 photograph/displayed any tendency towards substitute sucking and there seems little doubt that then the feeding routine is properly balanced substitute sucking does not occur.
Experiment carried out at the LaSalle 4th Farm from Dec. 26th:

If, as has been suggested, the satisfaction of the sucking-feeding instinct in the infant is dependent upon a properly balanced feeding routine, then a serious disturbance of this balance in one of a number of ways will result in a search for substitute satisfaction. There can be no doubt that frustration of the vitally important sucking act itself will cause this, and so too will lack of food, despite a sufficiency of sucking activity. In order to demonstrate this it was decided to establish a number of young calves on the nipple feeding device, provide them with a normal ration, and allow them to suck at the nipple for ten minutes or until they had finished whole milk, whichever period was the longer. This meant of course that if they should finish their ration in less than ten minutes they could be allowed to continue to suck the empty nipple till the full ten minutes had elapsed. Their behavior could be observed for several feeds under these conditions and then their milk ration could be cut by three quarters. They could receive the same quantity of fluid but instead of whole milk it could be changed to one quarter of whole milk and three quarters of water. The sucking time and all other conditions would remain constant. After three days of this reduced ration they could be returned to normal amounts of whole milk. Quick changes were decided upon so as to reduce to a minimum the possibility of habit formation.

The one week old calves, Nos. 650 and 650, arrived at the Farm on 17. 3.69, one being a Holstein and the other an Ayrshire. They were established on the nipple feeding device at once, and for the first week on the Farm were fed 2 and 1 plates of whole milk per feed. On 20. 3.69 six more calves arrived, Nos. 670-675, one being an Ayrshire and the remainder Holsteins. All took quite well to the nipple feeding device except No. 671 which
refused food for 2 days. Normal feeding took place on Sunday, August 25, Wednesday 28, and at the morning food on Thursday 29. The two older calves received 5 pints of whole milk per feed whilst the five younger ones received 3 pints. 10.675 started to feed on Thursday morning and received 5 pints. Ten minutes suckling time was allowed in each case but the actions were usually consummated in 3-8 minutes. During this period the only substitute suckling observed was by 575 after his first feed on Thursday morning, then he endeavoured to suck one of the other calves' ears. The substitute suckling of any kind was observed amongst any of the other seven calves and they all sucked perfectly contentedly and quietly while leaving the stalls. After the Wednesday afternoon feed I forced amongst them and deliberately tried to provoke substitute sucking by offering my fingers to several of them, but in each case it was refused.

For the afternoon feed on Thursday August 29, the regime for all eight calves was changed from whole milk, to one quarter of whole milk and three quarters of water. The quantity of fluid given remained the same, namely 5 pints for the two older calves and 3 pints for the six younger calves. The full ten minutes suckling time was allowed as in previous feeds and throughout the experiment jets were used to synchronise as nearly as possible the consumption of the fluid with the actual suckling time. This drastically reduced ration was continued on Friday, Saturday and Sunday. By Saturday afternoon the calves were hanging round the stalls and following long before feeding time and even before feeding those instances of substitute sucking were observed. One calf sucked at a rush hugging over the fence, another sucked at the ear of a mate for a few seconds, whilst 10.675 sucked for more than a minute at the teats of an older heifer.

At this particular feed all had finished their milk and water mixture at the end of six minutes, but all continued sucking vigorously at the nipples till the full ten minutes had
clapped, then they were driven from the stalls. Nos. 573 and 578 indulged in some obligatory sucking of one another for several minutes, No. 573 pursued the latter persistently for ten minutes, sucking at his teats and at his teats when he could get near them; No. 578 sucked persistently at the teats of an older heifer for 15 minutes, and No. 353 pestered me around the yard trying to suck at my hands or pants whilst I was trying to take some photographs. The whole atmosphere was in marked contrast to that which prevailed whilst the full ration was being given.

At the morning feed on Sunday, Aug. 19, the same ordered ration was given and the same ten minute sucking time allowed. All eight calves finished their ration within six minutes and continued at the nipple till ten minutes had elapsed. On being driven from the stalls No. 353 immediately pursued his mother, just as he had done at the previous feed, making determined efforts all the time to suck at his teats or his teats; Nos. 573 sucked persistently for several minutes at the teats of another calf, Nos. 573 engaged in some obligatory sucking, Nos. 573 sucked for some minutes at mother's ear, and No. 468 again sucked very persistently for about ten minutes at the teats of an older heifer's calf.

It seems clear that hunger of itself will produce substitute sucking although the practice does not seem to possess anything like the same degree of urgency, voraciousness or persistence which is in evidence when the calves have had their sucking activities frustrated by feeding them from a bucket. The important fact remains however, that severe disturbance of nutrition at the stage of the individual's development when food is normally obtained by means of sucking will result in an imbalance of the feeding session, thereby preventing satisfaction of the feeding-feeding instinct and causing the individual to turn to substitute sucking in an endeavour to find satisfaction.

The indications are very strong that this urge urge applies equally to human infants as well as to calves.
Fig. 27a. This series is typical of the behaviour of the calves whilst they were fed normal portions of whole milk associated with adequate sucking time.

None of the seven calves which were established on the nipple feeding device during this part of the experiment showed any sign of substitute sucking.
Fig. 37b. These photographs were taken after the calves had been fed for 28 days on rations consisting of one quarter of the normal amount of milk and three quarters water. The sucking time remained constant at ten minutes.

There were many instances of substitute sucking, although the process was not marked by any great degree of urgency.
Mr. B.M.  "A" and "B" in this contest show No.300
pursuing Mr. Young. In "A" he is dressing hand at
his fingers and in "B" then the hands are held out
of reach he is sucking at the leg of his trousers.

"A" and "B" are further instances of substitute
sucking observed at this time.
CASE DISCUSSIONS

Case 1. Robert S.

A case history which demonstrates the effect of correcting the feeding situation is that of Robert S., who was born on the 22/3/33, with a birth-weight of 6 lb. 6 oz. He was admitted to one of the Frensham centres on the 17th May, 1933, his weight then being 3 lbs. 11 ozs. Previous to admission, his feeding had been very faulty. He had been on a weak condensed milk mixture and had been obtaining much fluid, but very inadequate nourishment. He was extremely dehydrated, very distressed and kept tearing at his hair and screaming continuously. His feeding was gradually adjusted and improved, but it took some time before his general condition showed improvement. By August, however, his condition was excellent, he was putting on weight consistently and he was discharged on the 16th August, his weight then being 13 lbs. 3 ozs. During the whole time of his stay at the centre, he sucked his thumb persistently and continuously, and although he showed marked progress in other ways, and on discharge was a happy, healthy, contented baby, he was still sucking his thumb as persistently as ever. He returned to the country and a letter from the Clinic Sister near his home, written two months after discharge, reported that his condition was still perfectly satisfactory, progress was being maintained, and the thumb sucking had almost ceased. No re-direction had been necessary, only correction of the feeding process and careful maintenance of sound method.

Case 2. Judith G.

Judith G. was born on 25th June, 1933, and was breast fed from birth. She made quite satisfactory progress till
about 2 months, when she started sucking voraciously on her
first and second fingers. No method of correction of treat-
ment was attempted, but at 4 months, she started to lose
weight and Mrs. C. was advised by the Baby Clinic Sister that
her milk was deficient in nourishment. Breast feeding was
then complemented with cow's milk and KaroMilk and the baby
very soon picked up and started putting on weight again.
By 6 months the feeding difficulty had been entirely correct-
ed, baby was progressing normally and - very significantly -
the finger sucking which previously had been carried on so
ferociously, now ceased altogether. Breast feeding complemented
with KaroMilk and cow's milk continued till 3 months when the
process of finally weaning from the breast was commenced.
At this time too, Judith got her first two teeth. Feeding
at the breast was cut down to five minutes at each feed, the
balance being supplied per bottle, and vegetables were given
at the 5 o'clock feed. By 7 months weaning from the breast
was complete and cow's milk and KaroMilk was given per bottle
at each feed with the addition of vegetables at 3 o'clock
and porridge at 6 o'clock.
At 3 months, owing to what appears to have been a mis-
understanding between Mrs. C. and the Clinic, the 10 o'clock
feed was abruptly discontinued as the first step in weaning
her from the bottle. Judith at once became upset at the 10
o'clock feeding time, cried, had difficulty in getting off to
cleep, and within three days she had started sucking fiendishly
at her thumb.

It appeared to me, on discussing the situation with
Mrs. C., that the abrupt termination of the 10 p.m. feed must
surely have been a mistake, and furthermore, that in all
probability this step had been taken too early. All the cir-
cumstances were accordingly brought before the clinic sister's
notice, who agreed at once that some mistake or misunderstand-
ing had occurred. The 10 p.m. food was immediately resumed
in full measure but Mrs. C. was instructed to start the
weaning process again after 2 or 3 nights and to gradually
reduce the amount of milk given, by 1 oz., each night until
the food was finally suspended at 9 months.

Immediately the food was resumed, Judith stopped sucking
her thumb and her restlessness disappeared also. Of equal
importance too is the fact that then, at the end of the
gradual process, the 10 p.m. food was finally discontinued,
no thumb sucking resulted. At the time of writing Judith
was 13 months old and had never re-commenced thumb sucking.

The delicate balance which must be maintained in the
sucking-feeding routine of the human infant is thus exampli-
fied very clearly in Judith's case. When she started sucking
her fingers at the age of three months, she was getting all
the physical exertion she needed from her sucking, but the
nourishment which she was obtaining was deficient, and there
can be little doubt that in order to satisfy her infant's
sucking-feeding instinct something more than mere physical
exertion is required. There are several requirements
necessary and these must all be met in the right way and at
the right time. The handling of this delicately balanced
process of which the sucking act is the core, requires the
closest attention to detail, for the neglect of one require-
ment can, and often does, result in the whole instinctive
drive, being unsatisfied and as a result the infant turns to
the substitute sucking of its thumb in its attempt to find
complete satisfaction.

When Judith's feeding was disturbed at 2 months because
of her mother's milk providing insufficient nourishment, the
natural reaction was for Judith to seek more food. As the
instinctive act of sucking is the only means by which the
need for food and nourishment can be satisfied in an infant,
then the mother's milk became inadequate the sucking act was
stimulated to greater activity and the substitute sucking of her own fingers was resorted to in an effort to satisfy the sucking feeding instinct.

In exactly the same way when the 10 o'clock feed was abruptly suspended, the baby was hungry and then a baby is hungry, its instinctive response is to suck, for it is only by means of this act that hunger can be assuaged. If now it is denied access to the breast or the feeding-bottle, the instinctive urge to suck will nevertheless remain and the thumb is the most convenient substitute available.

If in Judith's case, the feeding routine had not been examined and corrected immediately the thumb sucking commenced, it can easily be seen how the act would continue night after night, until it developed into a habit. It can be seen too, how the denial of natural satisfaction for the sucking instinct turns a baby's attention in upon itself. It is able to derive a certain measure of satisfaction by sucking its own thumb, but as no nourishment is gained from it, the satisfaction is not a real one but is only a fantasy.

Case 3, Caroline P. and Caroline F.

Two other case histories at this stage will serve to demonstrate how extremely important it is to use the utmost care and understanding in any efforts which are designed to break the thumb sucking habit.

There are several thumb suckers at the Lady Gowrie Child Centre in Sydney and examination disclosed the fact that a number of these had callus on the thumbs or fingers which they were in the habit of sucking. It was thought that perhaps the child's attention could be directed to her affected finger and an explanation made that it was intended to try and cure it by covering it with adhesive plaster. In
this way all mention of sucking could be avoided, but at the same time, the plaster would prove too unpleasant to suck, and the habit would be at least weakened.

The history of Carolyn P. is as follows:

Aged 2 years, 4 months,

7. 3.43 Carolyn had sticking plaster put on her thumb, and she went around telling the other children that she had a sore. Only once did she go to put it in her mouth and that was in bed, but she soon removed it and instead held her hands over her ears.

8. 3.43 Carolyn took no notice of sticking plaster but put thumb in mouth, especially when upset, and also on her bed. Went to sleep with thumb in mouth.

9. 3.43 Carolyn no better, sucked sticking plaster and all, refused to remove thumb while eating.

14.3.46 Right back to them first observations were made. Worse than on previous days - did not remove thumb the entire afternoon, cried as well.

Obviously the approach has been a failure with Carolyn P., despite the hopeful start. With a child who is prepared to suck plaster and all, there is the considerable disadvantage which was soon apparent that the plaster becomes soaked with saliva and very soon becomes filthy and its introduction into the mouth in this condition is a menace to health.

The history of Carolyn L. is as follows:

Aged 2 years 3 months.

Carolyn had no callus on her thumb, but nevertheless some plaster was put on her thumb. No doubt this was a tack approach, because there seems little doubt that she appreciated the reason for it at once. Detailed observations were:

7. 3.43 Carolyn cried when plaster was put on her thumb and soon took it off. To avoid further distress,
teacher told her she could keep it off, providing she did not put her thumb in her mouth. She did not do so and went to sleep without resorting to sucking.

9. 3.23 Did not suck her thumb on her bed, was told by teacher that if she did, the sticking plaster would be put on again.

9. 3.23 Did not sleep, played with her hands, but did not put thumb in her mouth.

Note: The Director reports that although Carolyn refrained from sucking her thumb whilst at the Kindergarten, she had seen her each day put her thumb in her mouth immediately she left to go home.

14. 3.23 Refused to go to sleep.

15. 3.23 Cried when put to bed. Teacher went over and asked what was wrong. Carolyn would not speak so teacher told her to suck her thumb, and she immediately put it into her mouth and stopped crying and soon fell asleep. It is felt that the change was too much for her because this morning for the first time in weeks, Carolyn cried when she left her mother and rather than have her dislike coming to the Centre, it was decided to allow her to suck her thumb, as it seems to make her feel more secure in these surroundings.

It was my intention in suggesting the adhesive plaster treatment to carefully avoid connecting it in any way with the thumb sucking so that not only would no issue develop, but also that there would be no atmosphere of tension or discipline about it. The technique was not followed out at any stage with Carolyn W. In fact the situation was completely reversed when the teacher told Carolyn on the first day of the experiment that she could leave the plaster off her thumb provided
she did not suck. Thus, instead of the plaster being a means for curing an affected finger it immediately became an instrument with which to enforce discipline, and the whole spotlight of attention was at once focused on the thumb sucking. Although this was the very situation I had hoped to avoid, it did serve a useful purpose by demonstrating the effect on this child — and I believe it is typical — of attempting forcibly to put an end to this deeply ingrained habit. The force in this case, albeit used ever so gently, was the threat to replace the plaster on the thumb, and the result was a not inconsiderable emotional disturbance without at any stage there being any prospect of success, because even though she refrained from sucking at the Centre, she did so immediately on leaving.

The case histories of Carol C. (aged 9 years, Case 4) and Carolyn W., (aged 2 years), show clearly that efforts to impose on them from without obstructive conditions which will prevent from sucking, not only failed in their objects, but they also caused needless emotional upsets which in the case of Carol C. have almost certainly left a permanent impression on her character.

Case 4. Carol C.

Carol C., aged 9 years at the time I examined her. The teeth were in bad position with the upper centrals pulled well forward and the lower incisors forced back by the action of the thumb. She sucks her right thumb only, with the volar surface uppermost and the fingers clenched, and whilst at home the sucking action is an extremely vigorous one and is almost unceasing. She will even suck between courses at meal time and whilst asleep, and if an attempt is made to remove her hand from her mouth whilst asleep, considerable force must be used.
At birth Carol weighed only 3 lbs. was first fed with an eye dropper and then breast fed. The mother suffered from kidney trouble during pregnancy and in the light of all the circumstances the saving of the baby's life was regarded as a great triumph and she was greatly flused over and made much of in consequence. She is an only child and for her first five years her care was shared by her mother and a permanent nurse.

The mother says that thumb sucking commenced at birth and has continued without any lessening over since. In an endeavour to break the habit the nurse strapped the arms to her sides but the procedure was a complete failure. Immediately the strapping was removed the sucking re-commenced.

Mr. C. now says that everything she can think of has been tried in her efforts to break the habit but all to no avail. She has put mustard, castor oil, pimple dye and aloe on her thumb at different times, but Carol mostly says she likes them and goes right ahead with the sucking. Sinker stools have been fastened on the thumb with elasto-plast, but these are bitten through till the thumb is bare.

When her arms were strapped to her sides she bit chunks out of the blanket and chewed them and when the sheet was turned well down over the blanket the sheet was bitten through and the blanket again attached. When the arms strapping ceased the thumb sucking re-commenced. The mother admits that she is over anxious and at her wits end and that she beggars the child ceaselessly to try and stop the habit. Carol spends most week-ends with her grandmother who also bothers her about the habit.

Carol is very temperamental and gets very excited, an instance of this being the fact that she frequently gets so worked up over the weekly school sports day that she returns home with a headache and a rise in temperature.
At 3 years splinting of the right elbow was tried. The splint was applied every day for three weeks immediately she returned from school but the result was a complete nervous upset for both mother and child. Carol couldn't sleep or eat properly and became extremely irritable and at the end of three weeks they were both so tired that the treatment was dropped and of course the thumb sucking re-emerged.

The whole situation seems to have assumed the proportions of a major issue with resultant nervous tension all round from which there seems little hope of escape.

I interviewed Carol alone and she seemed a very pleasant bright girl. She said she really wanted to stop her thumb sucking because she knew the harm which she was doing to her teeth but she just could not manage it.

For a child of 9 years to suck her thumb as fiercely and as persistently as Carol does, a situation is revealed in which very considerable dental and psychological damage has already been done and there is every probability of still further harm resulting without any prospect of the habit being dropped. It is quite certain too that no orthodontic treatment can be attempted until the thumb sucking ceases.

No doubt there are several reasons why in some children the act persists, but one of these reasons is most certainly the misguided interference of well meaning parents and others in their anxiety to break the habit. Very many children make their first visit to the dentist at about three years of age and the dentist should be equipped to give sound advice as to the correct method of handling the situation if at that time thumb sucking is still indulged in.

No proper diagnosis, advice or treatment appears to have been given to Carol at an early age and as a result a mistaken approach to the problem has been persisted in for
several years. The only results have been progressive
dental and psychological damage with the habit now firmly
fixed than ever. It is surely quite wrong for dentists on
the one hand to ignore this problem until obvious malforma-
tion of the jaw results and then to resort to all manner
of regressive methods to solve it, just as on the other hand
it is equally wrong for them to over emphasize the importance
of the purely dental aspects of thumb sucking in very young
infants and by frightening parents with the alleged dire
results, create a situation of tension about the child which
will almost certainly result in the very thing they are seeking
to avoid, namely a continuance of the habit.

What is needed is for the dentist to be possessed of
some sound scientific knowledge of child psychology, so that
when his young patients present to him with a history of
thumb sucking, it will be possible for him to assess the
cause with some degree of accuracy and to advise the parents
accordingly.

Carol's case history shows that she is the only child
of an over anxious mother and over-cautious on the part of
the mother can have disastrous effects on the child.

Zoe Benjamin (5) says:-- "The over anxious mother by
her attitude alone causes irritability in the child; her
nervous tension is conveyed to him and he too becomes nervous,
irritable and resistant. Serenity and calm which are funda-
mental to happy child guidance should be cultivated because
the assurance and poise which it gives the mother helps her
to rise above many of the difficulties the child presents.
It also has this advantage that when the child realizes he
has little or no power to arouse her irritation or anger the
desire to do so dies away. Her serenity, therefore, gradually
brings a greater peace to the child. There are many families
in which the mother's attempt to control her own irritability and over anxiety has changed a disturbed and quarrelsome household into a harmonious and co-operative one. If the child is to develop normally he must live in a harmonious atmosphere, he must feel secure in the love and understanding of his parents. In such an atmosphere the possibility of the formation of bad habits is greatly minimised because the child will be happy. The child who is unhappy cannot be good."

From the time she was a tiny, premature, 3 lb., baby, Carol seems to have been surrounded by over anxiety and tension on the part of her mother. At least two causes for the demonstrations of anxiety are known, the first being over the possibility of her survival and the second over her thumb sucking. This persistent tension is very probably the cause of her extreme nervous excitability. As regards thumb sucking Mrs. C. says that she has "tried everything", including persistent nagging which is still going on. As far as this is concerned it is obvious that the more she nag the more Carol feels the need for security, comfort and solace, and the quicker and the easier those available is the provided by sucking her thumb. She represents to the comfort and security which she can obtain from her own body, and the more she sucks her thumb the more upset her mother becomes and so the vicious circle goes on.

An important point to remember too is that the nurse in her efforts to break the habit used to bind her arms to her sides. During infancy the nurse would be viewed in much the same light as her mother, and any strong feelings called forth by the nurse's actions might very well have become fixed and come to represent Carol's attitude, not only to her parents as well, but also to teachers and all in authority over her. Watson (3) it will be remembered, showed that the so-called hampering of an infant's movements called forth instinctive rage and temper and the nurse's misguided efforts must surely
have done this for Carol and have planted within her the
seeds of a lasting resentment. The child's method of obtaining
relief from the tension engendered was to suck its thumb
immediately the restraint was removed! It is more than like-
ly too that the act is used, unconsciously, no doubt, as a
means of getting revenge on her mother for the many scoldings,
frustrations and indignities which she has forced upon her.
For a parent to show obvious distress at the sight of any
act on the part of the child is simply to place in the child's
hands a weapon which will most certainly be used in retaliation
as the need arises.

No effort seems to have been made to build up Carol's own
desire to drop the habit, to strengthen her by means of en-
couragement and co-operation, and to devise means whereby she
could help herself, and yet there is not the slightest doubt
that only through re-directing her energies into a more
desirable activity and the building up of her own morale, is
there any chance of the habit being dropped. Mrs. C. relates
that her present approach is that whenever she sees Carol
with her thumb in her mouth, she says "Thumb," at which Carol
is expected to take her thumb out of her mouth. In other
words a command is given and obedience is expected, despite
the fact that Susan Isaacs (71) says that "there are those
casts of behaviour which are of neurotic origin - nail biting
(thumb sucking), stammering, sleeplessness - not one of these
should be treated as a question of obedience."

Case 5. JENET L.

Jenot L., aged twelve, still sucks her thumb fairly
regularly, and her two upper centrals are considerably
shortened as a result. I pointed this out to her and at the
same time told her that I felt sure that in her own heart she
wanted to give up her thumb sucking. My friendly approach
immediately brought forth a shy admission that this was so.
The next step was to assure her of every possible help, but at the same time it was made clear that she, herself, would have to overcome the habit and no one else could do it for her. She was immediately made to feel, though, that the problem was well within her capabilities by having explained to her the methods by which she could handle it. She was given chewing gum and I encouraged her to ask her mother for an apple when going to bed. I asked her then also she usually sucked her thumb, and when she said at the pictures, she was told that that would be easy to overcome - all that was necessary was to sit next to her mother on the left-hand side (she sucked her right thumb) and during the pictures to either chew gum, or else, hold her mother’s hand till the show was over. She was most interested and promised to try and carry these instructions out. A complicating factor had been her father’s attitude, for he had been incorrectly reprimanding her whenever he saw her with her thumb in her mouth. It was suggested to Mrs. L. that a few tactful words might restrict the father’s activities, and I explained the instructions which had been given to Janet.

Subsequent reports from the mother were that without any prompting, Janet had asked for an apple going to bed and had welcomed the use of chewing gum. She had twice been to the pictures and on the first occasion, without any prompting, had sat on her mother’s left as suggested. Early in the show she had put hand to mouth and then, without any prompting, had suddenly taken it away and slipped her arm through her mother’s, leaving it there for the rest of the show. On the next occasion, the hand had again unvelled to the mouth and at this time her mother had offered her some chewing gum. This was readily accepted and chewed for the rest of the show without any further thumb sucking.

The struggle still goes on, but all the signs are that Janet herself is winning the battle. There is no tension
surrounding it; no doubts; no hard words. It is safe to
say that she will not only conquer her thumb sucking, but
having done so, her character will have grown in stature at
the same time.

It should be noted that the important features are
embodied in the suggested corrective routine, both of which,
at Janet's age, are essential for success. Firstly, her
interest and active co-operation were aroused, and, secondly,
alternative activities were provided, into which the energy
behind the thumb sucking could be re-directed.

Case 8.

Case History of Female S. aged 7 years.

Pam S. was first seen at the age of 6 years. Her mother
reported that she had always sucked the first two fingers of
the left hand and there was considerable displacement of the
left central and lateral as a result. She was referred to
an orthodontist who advised light bandaging of the left elbow.
He went to some trouble to explain to Pam the reason for this
and he made a deep impression on her mind by showing her
models depicting the results of thumb sucking. He also gave
her a mirror and demonstrated to her the harm which she was
cauing to her own teeth and jaws and he strongly impressed
on her the necessity for breaking off the habit.

The bandaging of the left elbow was started at once with Pam's full co-operation. In fact on
more than one occasion when her mother had forgotten, Pam
reminded her to apply the bandage. At the end of two or three
weeks she (Pam) said that she thought she could manage without
the bandage and it was accordingly discontinued. The finger
sucking ceased and it has not occurred again since that time,
nearly a year ago. With the cessation of the finger sucking
too, the displaced teeth have very nearly come down into
normal position and from the orthodontists and the dentist's
point of view it would appear that the treatment has been eminently successful. If the dentist is concerned only with teeth and he looks no further he will always be well satisfied with a result such as this. If, however, he has a broad outlook and is fully poised with the essential unity of health, he will look further, and in the case of Pam S. he could have discovered that immediately the finger sucking ceased nail and finger biting commenced. This habit has persisted ever since and all efforts to break it have failed. Taking an over all view therefore, there is room for very serious doubt as to whether Pam has been rendered a service or a disservice in the methods which have been used to correct her fingersucking.

Honor Lane (25) says:— "If this (thumb sucking) then is vigorously suppressed by the parent, the child will show that he accepts her attitude by one of these perfect symbolisms of which the unconscious mind is master and will fall back on nail biting instead, for the teeth in biological history stand for the animal's aggression and attack; and the nails for the animal's claws; the child's act is thus a picture of his mental attitude; it is an affair of 'tooth and claw', an inner conflict between the angry, disappointed, pleasure loving animal in the baby himself and the idea which is being imposed on him of pleasure rejected. Nail biting is thus a step further backwards in regression than thumb sucking and expresses an imposed end to that extent accepted disapproval of the pleasure first substituted."

If one accepts Honor Lane's assertion that thumb sucking which gives place to nail biting in circumstances similar to those which he describes, is a further step backwards in regression, then one is left with the uncomfortable knowledge that the improvement in Pam's teeth and jaws have been gained at the expense of her mental and social development.
Pan is the eldest of three children, all of whom have been breast fed for the full normal period of 0-10 months. She is a nervous, excitable, highly strung child whilst Pat, the second child, is quite the opposite, being of a thoroughly calm and placid disposition. Mrs. S. describes how, as so often happens with a first baby, she was over anxious not to spoil her, and in the light of her present experience she recognises that she and her husband were too strict with her. Pan's finger sucking dates from the time she was a fortnight old when she and her mother returned from hospital. Mrs. S. recalls how, on returning home the first day, and putting the baby down, she started to cry. In her determination not to give in to her, as it was not feeding time, Mrs. S. allowed her to cry for an hour or more without going near her. She realises now, that the journey home was probably the only occasion during Pan's existence that she had been nursed for any length of time without being fed, and then she was put down she felt frustrated, and her cry was one of distress. Her expectation of being fed had stimulated her sucking instinct which was then completely unsatisfied. The ignoring of her call for help would then only serve to increase her sense of frustration and fear of what appeared to be a withdrawal of love and security. It is in such circumstances that a baby will find a substitute sense of security and satisfaction in sucking its own thumb and Mrs. S. thinks that Pan's finger sucking probably started with this incident. It is probable too that the continuation of excessive strictness resulted in continued imperfect harmony between mother and child. If the baby's need for feelings of love and security is closely bound up with the sucking-feeding instinct and if the instinct is insufficiently satisfied, then the need for a substitute would remain and the finger sucking would continue. It can easily be seen now how the introduction of
restrictive methods such as splints, mittens, etc., will only increase the child's sense of frustration and maladjustment and will cause it to turn more determinately than ever, to the fantasy satisfaction which it can achieve by sucking its thumb or fingers, because here is that 'obstruction of instinctive striving accompanied by a painful feeling' of which Kellogg (89) speaks.

Every (?) claims that if the thumb sucking tendency is not met with nagging and scolding, then either this tendency will be reinforced with increased habit formation, or, what is infinitely worse, it will be subconsciously repressed with all the resultant possibilities of adult emotional and physical illness. He speaks of one mother who came to recognise thumb sucking as the signal of a need and who answered this signal by searching for and supplying the lacking love and security instead of being angry, disgusted and frightened.

In the case of Pan 8, the consequences to herself of thumb sucking were dramatically impressed upon her by means of models of malformed jaws, and demonstrations upon herself by means of the mirror, and as a result she was induced to try very hard to give up the practice. Evidence of the deep impression made was seen in the fact, reported by her mother, that Pan repeatedly spoke of it and commented on other children with irregular teeth, linking it at the same time with thumb sucking.

So far, the treatment was sound because it built up in her mind the desire to overcome the thumb sucking habit herself, but the treatment goes wrong with the means which were suggested for realising her desire. If, having built up the desire, some activity had been suggested, into which the energy behind the thumb sucking act could have been diverted, then there is little doubt that success would have been ac-
-photo. Instead of this though, then Pam's desire to break the habit had been built up, the method suggested was not a re-direction but an obstruction of energy.

That the obstruction was agreed to and was in fact almost self-imposed in no way reduces its undesirability. The method used to attempt to break the habit was by the use of physical obstruction, in the form of the bandaging of her elbows. Every (7) claims that one of two things will happen if the urge behind a deeply rooted action like thumb sucking is forcibly obstructed, either mentally or physically; firstly, that the habit will continue despite the obstruction or, secondly, that it will be subconsciously repressed. There is a third alternative, however, and that is that the habit will be replaced, if undirected, by another habit more undesirable than the first. This is the "further regression" described by Honer Lane (32) and it is exactly what happened in Pam's case, for no sooner had her finger sucking been given up, than she started nail biting.

It demonstrates very clearly too, the underlying process explained by Flugel (35) (3-41), when he speaks of primitive desires continuing to express themselves until satisfied, and how in the course of the process of seeking satisfaction, they undergo "complication and modification" at both ends. "They come to be aroused" he says, "by objects other than those by which they are innately set in motion . . . and they express themselves in behaviour different from that which is innately determined."

Pam's thumb sucking had for a long time been prompted by objects other than those by which it had been innately set in motion, and now that she had turned to nail biting, the original sucking instinct was expressing itself in "behaviour different from that which was innately determined."

The treatment then, has been incorrect because it has
failed to observe the fundamental principle of recognising the store of energy behind any habit or behaviour trend, either good or bad, and of correcting a bad habit by means of diverting the energy behind it into a more desirable activity. It may be that the new activity which it is proposed to promote, has itself some undesirable features, but once it has supplanted the old one, it in its turn can be supplanted by diverting the energy behind it, into yet another activity which is allied to it, but which is once again of a more desirable nature. In this way repressions and regressions are avoided and the movement is always forward in the direction of healthy physical and mental growth, and development.

In doubt those who are looking for a quick and easy "cure" for thumb sucking will be disappointed at this seemingly slow and cumbersome procedure, but thumb sucking is not a disease but the symptom of an underlying maladjustment and the correction of such disturbances cannot be achieved overnight. Anderson, it will be remembered (37), says:— "Early behaviour seems to possess some degree of fluidity, diffuseness, and lack of organisation in contrast with its later fixity, precision and organisation . . . . With increasing age the process of diverting the organism so to speak, becomes more and more difficult since each new activity or skill has to compete with others already established. The early acquired skill or activity not only gains by virtue of its priority but also by virtue of its capacity to block other acquisitions."

Thus the longer the thumb sucking set continues the more difficult becomes its correction.
Case 7. Andrew D.

Andrew D., now aged 5, was born a few months after his father departed overseas with the Army. After being a prisoner of war for 3 years, the father returned to work for the first time, his son, aged 4. He is a well-developed, sturdy youngster who was breast fed for about 3 months and had never at any time sucked his thumb. The father failed at first to understand his son, and no doubt, too, he was suffering the nervous effects of his long captivity. He found it difficult to tolerate the inevitable noise, bustle and upheaval in the home where there is a young child. It seems the father made excessive demands for good behaviour and discipline from his infant son, and the boy on his part could not understand this intruder who had suddenly appeared in the home. He was jealous of his mother's attentions and showed signs of considerable emotional strain. To cap it all, shortly after the father's return, both mother and father went away for a holiday, leaving the boy in the care of his grandmother. This seemed to be convincing evidence that his mother's affection and protection had been withdrawn from him, and it was at this time that the boy started thumb sucking. His urgent need was for love and security, both of which he appeared to have lost, and so he turned to himself and to the sucking act, which was so strongly associated with the feelings of love and security, which he had previously enjoyed to the full, when he was an infant in his mother's arms. He reverted to an infantile practice, because by sucking his thumb he was able to escape from a cruel reality into a comfortable world of fantasy.

About twelve months after his father's return home, a baby sister was born and this event, as so often happens, brought with it problems of jealousy and the need for careful readjustment. The mother has taken great care to try and
facilitate the readjustment, but this further disturbance is undoubtedly a big factor in keeping the thumb sucking habit alive. At 5 years of age, this practice is one that is most difficult to break, and it will require considerable skill and understanding on the part of both parents, before the boy will be able to throw it off.
The questionnaire investigation and behaviour observations.

Many of the conclusions already arrived at in this thesis need the support of practical evidence as to the behaviour of infants and young children, and by carrying out an investigation of a large number of children of different ages, and from widely different localities, it was hoped, not only to obtain this practical evidence, but also to supply the answers to many aspects of the thumb sucking problem which were not previously understood. For instance it was hoped to throw some light on such matters as the influence of sex, age, methods of treatment, natural feeding as against artificial feeding, the effects of faulty feeding, and the situations in which thumb sucking is usually indulged in.

It was evident that actual observations by any one person into these matters could be an impossibility, and yet it was essential for the success of the investigation that it be carefully planned on standardised lines, and that it be carried out by trained observers, all of whom should have a perfectly clear conception of the end in view and the methods to be adopted to achieve it. An approach was made in the first instance to Dr. F. W. Clements, Director of the Institute of Anatomy, Canberra, under whose general direction the Lady Gowrie Child Centres in each of the capital cities operate. Dr. Clements was kind enough to arrange for all these Child Centres to co-operate, and subsequently a trip was made to Canberra to discuss with him details of the proposed investigation. Still working towards the point where the investigation could be particularised into a definite form, a number of general observations were carried out at the Sydney Lady Gowrie Child Centre with the kind co-operation of the Director, Miss Terrey, and the members of her staff.

The L.G.C. Centres were established in 1933 and their
objects are summarised by Tumpton and Heinig (50) as follows:

"The testing and demonstrating of methods for the care and instruction of the young child.

The study of problems of physical growth, nutrition and development.

The study of laboratory problems indicated as calling for study."

It will be seen therefore that they were specially designed and equipped to assist in the investigation of behaviour problems such as thumb sucking. I was very soon impressed with the detailed observations and histories which are made of every child, not only during every phase of his kindergarten life, but also in his home life as well through the close liaison which is maintained with the mothers, and through visits which are made to the children's homes. The persistent thumb suckers in the Centre were soon pointed out to me and on subsequent visits I was able to examine the mouths of each of these children and to proceed with a study of their behaviour during the various activities which they go through at the kindergarten. As one of the functions of these kindergartens is to act as demonstration centres, such rooms used by the children is provided with an observation booth from which they can be closely observed without the observers themselves being seen by the children. They are perfectly natural in their behaviour then their teachers only are present, but the presence of outsiders would immediately tend to destroy this atmosphere and negative the value of any observations made. Of course the teachers are themselves observing and recording behaviour the whole time, and it soon became evident that their observations in my particular problem would be of far greater value than any which I might be able to make myself. To convince myself of this, however, I did spend several days in the observation booths, and on two occasions, at the end
of the morning, had dinner in the dining room with the three-year-olds. On one of these occasions I found myself dining next to Albert C., who was a persistent sucker of first and second fingers. After a few curious glances, my presence was soon accepted and Albert chatted away quite brightly through the meal. I had been told that he was one of the most persistent of the finger suckers and this was soon apparent, for whenever there was a lull, either in his outing or his conversation, steady sucking of first and second fingers would take place.

The thumb sucking episodes at story-time mentioned previously were seen from the observation booth, then I could see the children but they could not see me.

After several visits to the Centre and after several discussions with Miss Terry, the general plan of approach began to take shape. Observations would have to be carried out on many more children than were available at one kindergarten if the results were to be of value and a conference with Miss Lynch, Principal of the Kindergarten Teachers Training College, resulted in a splendid offer of co-operation from the Kindergarten Union. The machinery of the investigation it seemed could best be carried out by means of a questionnaire, which would embody the points on which information was required. This would make possible the necessary standardisation, and could also lend itself for use with the younger age groups from birth to two years. I became convinced of the necessity of starting the investigation from birth when I discovered the fact that every thumb sucker at the Lady Gerrie Child Centre was already confirmed in the habit when he or she first attended. As the practice was already well established, research into treatment might be undertaken, but research into causes would have to be undertaken at a very much earlier age. In framing the questionnaire care was taken to make it on
simple as possible, but at the same time to leave room for individual comments and suggestions. The aim throughout was to try to discover any factors which might contribute to, or cause the practice of, thumb sucking, and the questionnaire form was so designed that it could be used both for very young babies as well as for older children.

Eventually, two forms were decided upon, Form B and Form C, copies of which are shown on pages 227 and 207.

In order to obtain observations from birth onwards, co-operation was sought and obtained from several institutions and personal interviews followed with the Superintendents of the Royal and Crown Street Women's Hospitals, Dr. Margaret Harper, the Patrons of Kerikeri—Sydney Plunket Mothercraft Centre, Trenzillic Mothercraft Training Schools at Willoughby and Petersham, Carpenter House, Scarba House, the Secretary of Dalke Children's Home and the Sisters in charge of Australian Mothercraft Society's Clinics, Elizabeth Street, Bondi Junction and Pymble.

In each case the object of the questionnaire was fully explained and for the purpose of standardising the results the exact meaning of various terms was agreed upon. Then in order to complete this process of standardising the whole approach to the investigation, I attended a general meeting of representatives from all Kindergartens held at the Frances Nation Kindergarten and was afforded the opportunity of addressing the meeting and explaining the questionnaire in detail. Subsequently results were obtained from 2,356 of Form C and 158 of Form B.

FORM C.

Form C is considered first as being the more general of the two, and the total results of this investigation are shown in Fig. 28. 29 different institutions filled in Form for the children under their control. Some were maternity
hospitals handling new-born infants, some were Baby Health Centres caring for children up to about 12 months; some were mothercraft training centres; some were children's homes, and others were kindergartens caring for children from 2 to 5 years of age. It may be fairly claimed, therefore, that a very broad field is covered and that the results obtained are as near to a typical cross-section of the whole community as it would be possible to obtain. The aim being to try to discover any factors contributing to or causing the act of thumb sucking, the first and most obvious one to be considered was the influence of sex. Fig. 89 gives these figures and shows that neither sex has a preponderance of thumb suckers. Of all children observed 53.31% were males and 46.69% were females, and of the 558 thumb suckers 49.52% were males, as against 51.08% females. The figures are so close that it is safe to say that sex, as a contributing factor, is non-existent.

The question of age is extremely important, for these answers should throw some light on such matters as to when the habit starts, how long it lasts, and whether any particular age is more vulnerable than another. Reference to Fig. 90 shows that the percentage of thumb suckers amongst all children observed was 28.29 and the highest average age at any institution was 4 years and 3 months. Comparing these figures with those for the 643 children aged 6 months or less, it is found that the percentage of thumb suckers amongst these younger children is 33.57%. The indication is very strong that the practice of thumb sucking almost invariably starts within the first nine months of life, and that once having started, it continued with little, if any, change, at least until the end of the pre-school years. There will, of course, be a few individual variations with a few children giving up the habit, and also with a few starting it late, but in the main, there seems little doubt that the practice
starts in early infancy and continues unchecked for several years. However, this question as to the age at which thumb sucking usually starts is far too important to be left in any doubt, because it is fundamental to the planning of measures to be adopted for prevention and early correction. If it is true that in the majority of cases thumb sucking starts in infancy, then measures to be used must be appropriate to this stage of development. In an attempt then to establish beyond reasonable doubt the usual commencement age, a further survey was carried out in twelve kindergartens and at the Dental Hospital. Information was obtained from the mothers of all children who were known thumb suckers and who were then attending these institutions (March-June 1942) and results are shown in Fig. 01. They provide striking confirmation for the information obtained from the questionnaire. The results show too that 93.32% of the children were persistent thumb suckers, and the had an average age of 4 years first nine months and 1 month, started the practice within these 78.13% of them started within the first three months of life. As the survey included more than 100 children distributed in widely different areas, and as it confines in more detail the general deductions made earlier, the evidence is very strong that in the vast majority of cases, the practice of thumb sucking has its origin in early infancy.

Obviously then if the practice is to be brought under control, with emphasis upon prevention, attention must be focused almost exclusively on infancy. The underlying causes must be sought primarily in early infancy, and measures for prevention and control must be devised which are based upon a knowledge of such causes. Once again it is clear the responsibility for this rests with the pediatrician and the Baby Health Centres, for by the time the dentist normally comes in contact with the persistent thumb sucker, he is
already addicted to the practice and patient treatment based on sound psychological principles is then called for.

That ..3.0% of all children are persistent thumb suckers carries very serious implications of great dental deformity, to say nothing of psychological damage. Just what percentage of older Australian children are thumb suckers is not known, but it will be remembered that Johnson (11) claimed that 10% of American children indulged in the habit for 10 years or longer. As his figures for younger children, 14.2%, correspond almost exactly with those I have obtained, it is not improbable that the 10% that he mentions for older children, applies to Australians as well.

Fig. 32 shows the institutions at which observations of the children, aged six months or less, were made.

PRELIMINARY

Questions 7 and 8 were included in an endeavour to ascertain that means of treatment were being used, and with that measure of success they were meeting. If the answer to Question 7 was in the affirmative, then the answers to Question 8 became important, and particularly if the methods of treatment used, were described. Fig. 33 is a dissection of all answers to Question 8, both affirmative and negative. The extraordinary fact is revealed that of the 245 efforts at controlling the habit, 271, or 77.28%, of the total were complete failures. A closer investigation was then made in order to discover and classify the exact methods of treatment which had been used and the results of this classification are shown in Fig. 34. The methods of treatment recorded were examined and classified under six
headings. They were:

1. Purely obstructing. Under this heading were classified such methods as splinting the elbows, applying sticking plaster or evil-tasting substances to the thumbs or fingers, tying the hands to the sides, the use of gloves or mitts, or similar devices for physical restraint. Hugging and scolding were classified under this heading also, for there is no doubt that they are just as obstructive and negative in their effects as the more obvious physical means of obstructions.

2. Some obstruction, plus feeding correction. It is the custom in many mothercraft centres to wrap the baby's arms and hands closely in its shawl, and at the same time, of course, every effort is made to bring the feeding routine to a state of perfection. Babies who have been treated in this way have not been included in Classification 1, because, although they have been subjected to some form of obstruction, the way is deliberately left open for them to get their hands free if the need is very great. At the same time, too, the correction of the feeding routine is the really important factor.

3. Correction of feeding routine. This section applies entirely to infant feeding, and the recordings under this heading refer to a correction of feeding as the only method of treatment.

4. Re-direction to some other activity. Under this heading are included efforts at treatment designed to re-direct the energy behind the thumb sucking cut into some other closely allied activity which is of a more desirable nature.

5. Use of the dummy. This is really a special form of re-direction, but seems to be of sufficient importance to warrant special classification.
The Promotion of self-interest. Under this heading fall those types of treatment which contrive to coincide with the child's self-interest. It corresponds to the technique advocated by Susan Isaacs (20) whereby the child is allowed, as far as possible, to experience the result of its own actions. If its own actions are harmful to itself, and the child is able to realise this, then it is this situation which is included under this heading.

Unfortunately a large number of forms, 113, gave no indication of methods of treatment. Of those which did, however, 123 were classified under Section I as being purely obstructive in character and of this number 123 were complete failures. There are very many comments reporting the use of such methods as bitter oint on the fingers, bandaging elbows, sticking plaster and mittens. Two typical comments relating to obstruction are included, and they are as follows:-

"Only sucked fingers when going to sleep. Habit persisted until a few months ago when she saw doctor putting mercurochrome on baby brother's arm prior to injection. Yvonne was threatened with the same treatment on her fingers. Mother says she often starts to put her fingers in her mouth, then stops herself. She has been much more irritable since habit given up." This method of approach must definitely be regarded as a form of obstruction, and the result, as far as the child is concerned, is some measure of repression. The irritability reported is clear evidence of the mental distress which has been caused.

The other comment is as follows: - "Leslie sucked two fingers when put down to sleep; mother tried gloves, but Leslie screamed so much the gloves were discontinued and baby allowed to continue the bad habit."

There was the usual failure in this case to discover the child's need and she was therefore obtaining a substitute
sense of security and comfort from her thumb sucking. How
great her need was for this substitute is shown clearly by
her deep distress when she was physically frustrated by the
gloves.

The 11 cases of feeding correction were successful in
every case and 13 out of 25 efforts at re-direction were also
successful. Section 6 also records 7 successes and no
failures and a typical comment under this heading is as
follows:—

"Developed a callus on thumb which became infected at
12 months - was bandaged for 48 hours with iethyl peol and
never sucked his thumb again."

Treatment under these three headings, Nos. 3, 4 and 6
are based on sound scientific principles whereas treatment
of a purely obstructive nature as recorded in Section I is
quite devoid of scientific foundation. It is quite apparent
that up till now obstructive methods have been relied on
almost entirely for the control and treatment of thumb sucking
and it is equally apparent that such methods will in the
future have to be completely discarded and an entirely new
approach brought to this problem. This new approach will
have to be positive and helpful and not negative and
restrictive.

Methods of feeding. It was felt that if the feeding
routine was a contributing factor in producing the onset of
thumb sucking then the method or technique of feeding during
infancy would be important. It seemed at first glance that
the artificially fed babies would provide most of the thumb
suckers, whilst the breast fed babies would be more or less
immune. Question 9 was designed to investigate the accuracy
of this assumption and Figs. 25 and 26 give the results
obtained. Of the thumb suckers there were 547 answers to
this question and these indicated that 41.7% were wholly
breast fed, 24.32% partially breast fed and partially artificially fed, and 50.55% were entirely bottle fed. On the other hand, of the non-thumb suckers, 50.03% were entirely breast fed, 21.51% were partially breast fed and partially artificially fed and 27.51% were entirely bottle fed. The difference between thumb suckers and non-thumb suckers is not very great. There are many breast fed babies who suck their thumbs, just as there are many who do not, and by the same token there are many thumb suckers and non-thumb suckers amongst the artificially fed babies. The explanation as has been mentioned earlier is that many babies whose feeding at the breast is unsatisfactory are helped to obtain complete feeding satisfaction by the breast feeding being supplemented or, in certain cases, by a complete change from breast feeding to artificial feeding. When this is carefully done and full satisfaction obtained, the use of artificial feeding is actually a means of preventing thumb sucking. If the artificial feeding is not handled with great care, though, some measure of satisfaction will still be lacking despite an otherwise general improvement, and then the thumb sucking will probably continue. The figures in this section undoubtedly indicate that there is a greater chance of a failure to completely satisfy the sucking-feeding-instinct when artificial feeding has to be resorted to, but the mere fact that a baby is entirely breast fed by no means eliminates the possibility of failure. Subtle disturbances in either method can cause this.

Disturbances to the feeding routine. Still believing that the theoretical survey pointed strongly to the feeding routine as the basis of the development of the habit, question 10 was included to ascertain whether there was any connection between serious feeding disturbances and the development of the thumb sucking habit. The total figures, however, give a very indefinite picture. It is now realized that the many
subtle disturbances of the feeding routine which can be profoundly upsetting to the young infant may yet fail to attract enough notice to prompt the seeking of medical advice. Evidence of the effect of feeding, however, is very well shown in Fig. 97. In this table the figures obtained from the Tresillian Mothercraft Training Schools at Petersham and Milloughby, together with those from the Karitane Training College at Wellington are compared with those from the Carpenter Mothercraft Home. Babies are admitted to Tresillian and Karitane specifically on account of feeding disturbances. They are either admitted on their own, or with their mothers, for a correction of their feeding, and the establishment of a sound routine. Carpenter Mothercraft Home, on the other hand, is designed to serve a different purpose. It is purely a convalescent home for mothers and babies generally immediately after their discharge from hospital. The babies are all normal healthy infants. Conditions at Carpenter Home are quiet and restful for both mother and baby, and a comparison of the figures for these infants as opposed to those from the Tresillian and Karitane Centres is extremely significant. Of the 108 from Carpenter only 4 or 3.7% were thumb suckers, whereas of the 153 returns from Tresillian and Karitane 53 or 37.8% were thumb suckers.

Sister Convey of the Australian Mothercraft Society Clinic, Bondi Junction, after completing 155 questionnaire forms, made some very useful comment about what she believed to be the causes of the thumb sucking habit. She believed that the feeding situation was the basis of much of the trouble, the food being either insufficient in quantity or of a wrong type. She had often noted that after an addition to, or a change in, the diet, the thumb sucking ceased. She noticed too that in many cases the thumb sucking took place after meals, and attributed this to the baby obtaining
his food too quickly either from the breast, or from the bottle. These comments are of great value, particularly as they coincide with many of the individual histories supplied on the questionnaire form. For instance, the mother of Boyd F., aged 2 years 9 months, says, "I have three children all thumb or finger suckers, and I firmly believe that the habit, in their case at least, was caused by the fact that they received their milk too quickly - a full meal in five minutes."

Of Stuart B., aged 9 months, the report says, "At about two weeks he started sucking fists and fingers. Is overfed rather than underfed, but suffers a good deal from wind which may be the reason for the fist sucking."

Of Susan O'B., aged one week, "Baby only sucked thumb after taking bottle."

Of Kerith F., aged two weeks, "Admitted to the Karitano Mothercraft Centre to be established on a good feeding basis. Obtaining feedings too quickly than at breast - over quota - but only sucking 3 minutes on one side. Has settled after regulating, and if well wrapped up unable to get at fingers."

In the case of this child and many others like her, there is little doubt that tight wrapping without first correcting the feeding routine would achieve nothing in the way of controlling thumb sucking. Once the feeding has been corrected, however, the tight wrapping is merely a discouragement, and is a useful adjunct.

Comment on Beverley L., aged three weeks, says, "Baby normal delivery but very sleepy at breast from birth and not sucking strongly. Admitted to be adjusted on a satisfactory feeding basis. Later much improved and able to suck at breast. Still inclined to suck fingers before feeding if she could reach them, but alright if well wrapped up."

Of Kerrie J., aged one month, "Baby instrumental delivery,
very lethargic and jaundiced, not sucking strongly, and vomiting. Tube fed for several days after delivery. Mother expressing four hourly and milk supply increased to full quota. Baby bottle-fed with expressed milk then put back to the breast at three weeks. Condition improved, baby sucking well and obtaining full quota. Jaundice cleared and only inclined to cry and suck fingers occasionally."

During one of my visits to an orphanage in Sydney I had an opportunity to observe the feeding techniques of six babies under six months. They were all in their cots with pillows arranged next to their heads and their feeding bottles were propped up on pillows. The babies were then allowed to feed themselves.

I believe that it is generally accepted amongst pediatricians that if a departure must be made from the natural breast feeding procedure that departure must be kept to a minimum, and if the need is for complete artificial feeding, then every aspect of the feeding routine should be so planned that as nearly as possible complete nutritional and emotional satisfaction should be assured. It did seem to me that these babies were being deprived of an important emotional satisfaction through not being nursed at feeding time and this factor might well contribute to an insufficient satisfaction of the sucking-feeding instinct resulting in turn in the search for a substitute satisfaction in the form of thumb sucking.

General comments on the effects of maladjusted feeding are as follows:—

Helen M.C., aged 11 months, "Commenced finger sucking at 6 months then breast supply started to fail."

Robert J., aged 9 months, "Only a finger sucker whilst feeding not quite satisfactory. As soon as feeding increased and gains were satisfactory, the finger sucking ceased."
Lincette B., aged 2 months, "On admission to Tresillian North baby was fed on modified cow's milk. She was underweight and very unsettled. When discharged, baby was fully breast fed, weight satisfactory and finger sucking much less marked."

The extreme importance of the weaning process has already been remarked upon, and there can be little doubt that there is need for a very careful technique in which the closest attention is paid to every detail. The case history of Judith C. exemplifies this very clearly, and the following three comments are also quoted in support:

"Still sucks thumb persistently. Was difficult to wean, is now very jealous of baby sister and has sucked thumb more persistently since she arrived."

Incidentally this comment brings out another factor which frequently operates to keep the thumb sucking habit alive. The older child often feels that with the arrival of the new baby he has lost some of the attention which he enjoyed previously. He therefore feels less secure in his parents' affections and resorts to thumb sucking in an effort to regain attention.

Other comments were:

"Did not suck fingers very much until after weaning."

"Did not suck thumb at all until weaned. Various remedies tried without success."

If we consider all these results in conjunction with the effects of frustration of the feeding instinct noted amongst calves, and remembering too the opinion expressed by the superintendent of the Royal Hospital for Women, the evidence becomes altogether conclusive that a disturbance in one way or another of the sucking-feeding instinct is by far the commonest cause and probably the only cause of thumb and finger sucking amongst infants under 12 months of age."
It should be recognised though that not every child will act similarly given similar conditions. Some infants with feeding disturbances might not suck their thumbs or fingers at all. They might find substitute satisfaction in some other way or they might exhaust themselves sucking such a substitute and not finding it. That is claimed though is that when thumb sucking does occur in infants it is evidence that the sucking-feeding instinct is being incompletely satisfied.

The relatively few children who turn to thumb sucking after the normal weaning time do so for different reasons, and the principal of these is the search for security. It is an attempt to regress to an infantile state and will usually be caused by some severe emotional upset.
QUESTIONNAIRE

N.B.—Please select any children at random—not necessarily thumb suckers—and fill in a separate form for each child.

Where squares appear, indicate answers with a cross.

1. Name of hospital or institution

2. Baby's name

3. Sex
   Male □
   Female □

4. Date of birth

5. Date of filling in this form

6. Does child suck finger or thumb persistently—that is, at some time or other during every day?
   Yes □
   No □

7. If child has been a thumb or finger sucker, have any efforts been made to break the habit?
   Yes □
   No □

8. Were the efforts used to break the habit successful?
   Yes □
   No □

9. How is, or was, child fed as a baby?
   Wholly breast □
   Breast supplemented with bottle □
   Wholly bottle □

10. Is, or was, feeding as a baby sufficiently difficult to require medical advice, admission to hospital or special treatment?
    Yes □
    No □

11. Please add any further comments referring specially to thumb or finger sucking which you think might be helpful—e.g., methods used to break the habit, etc.:—

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

This return should be based on an observation covering at least seven consecutive days.
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**Note:** Totals do not quite check in every case because many forms were incompletely filled in.
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**FIGURE 89.**

**S E X**

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<tr>
<td>Total number of females</td>
<td>1038</td>
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<tr>
<td>Percentage of females</td>
<td>43.00%</td>
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<td>Total male thumb suckers</td>
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<td>Percentage of male thumb suckers</td>
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<tr>
<td>Total female thumb suckers</td>
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<td>Percentage of female thumb suckers</td>
<td>51.98%</td>
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</table>
FIGURE 80.

AGE

Total number of children: 2593
Total number of persistent thumb suckers: 553
Highest average age at any school or
  Institution: 4.72
Percentage of thumb suckers of all
  children: 23.03%

Total number of children aged
  six months or less: 649
Number of thumb suckers aged
  six months or less: 153
Percentage of thumb suckers aged
  six months or less: 23.57%
| Patient | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| Age     | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 | 210 | 220 | 230 | 240 | 250 | 260 | 270 | 280 | 290 |
| Gender  | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F |
| Height  | 160 | 170 | 180 | 190 | 200 | 210 | 220 | 230 | 240 | 250 | 260 | 270 | 280 | 290 | 300 | 310 | 320 | 330 | 340 | 350 | 360 | 370 | 380 | 390 | 400 | 410 |
| Weight  | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 | 210 | 220 | 230 | 240 | 250 | 260 | 270 | 280 | 290 | 300 | 310 |

**Instructions:**
- 0-2: Home care and observation only
- 0-2: Home care and observation only
- 0-2: Home care and observation only
- 0-2: Home care and observation only
- 0-2: Home care and observation only

**Late Effects:**
- Home care and observation only
- Home care and observation only
- Home care and observation only
- Home care and observation only
- Home care and observation only

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### FIGURE 22

**Children aged six months or less**

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Number of recorded efforts at treatment
(Total of all answers to Question 6.) 845

Number of successful results 73

Successful results expressed as percentage of total 28.02%

Number of unsuccessful results 230

Unsuccessful results expressed as percentage of total 71.98%
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<th>Correction of feeding routine</th>
<th>Re-direction to some other activity</th>
<th>Use of dummy</th>
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| TOTALS | Yes 76 No 269 | 10 | 129 | 8 | 1 | 11 | 19 | 7 | 4 | 2 | 7 | 123 |

Note: In certain cases figures do not cross check, because comments sometimes indicate answers in addition to those contained in question 3.
### METHODS OF FEEDING

#### FIGURE 35. Thumb Feeders

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<td>3. Total of those entirely bottle-fed</td>
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#### FIGURE 36. Non-Thumb Suckers

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### FIGURE 27

Comparison of Normal and Disturbed Feeding

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</table>
METHOD OF PREDICTION

These forms were used in an investigation by kindergarten teachers to ascertain the situations in which kindergarten children indulged in the thumb sucking habit. The results obtained from twenty five kindergartens are shown in Fig. 03. The total number of days on which observations were made was 360, and this figure also represents the maximum which could be recorded in any one situation. It will be seen at a glance that at kindergarten age the sleep situation is by far the commonest in which the habit is indulged in, and the going-to-sleep period is almost invariably used by the persistent thumb sucker. Periods of boredom show the next highest recordings after the going-to-sleep and sleep periods, and after that, story-time showed a high recording. These situations were a long way ahead of all others for which observations were carried out. The pleasurable feeling of comfort, protection and security when tucked up in bed, is strongly reminiscent of the comfort, protection and security experienced as an infant in his mother's arms, and the process of modification previously dealt with explains how the sleep situation becomes the commonest thumb sucking occurs. It has been shown previously that when thumb-sucking persists after the normal coming time, it is the continuance of an infantile practice. It promotes fantasy feelings of comfort, protection and security, and thus the fantasy situation of story-time gives rise to the accompanying habit of thumb-sucking, just as the fantasy situation in connection with the arrival of Santa Claus did. When the child is bored or unoccupied it finds solace by retreating into its fantasy world.

It is noteworthy that at this age the feeding situation has become relatively unimportant. The process has undergone
considerable modification and the original cause which was associated with the infant feeding routine, has now been lost sight of. When the child has reached kindergarten age and is still thumb-sucking, it is of great importance that the practice be cured at the earliest possible moment. If this can be done before the permanent teeth erupt, and if the amount of deformity is not too great, or secondary habits of lips and tongue are absent, there is a strong chance that the permanent teeth in erupting will make the necessary correction to any slight malocclusion. The results of the D form investigation points strongly to the means by which control can be achieved. Means must be found for removing the necessity for the child to seek security and comfort from its thumb-sucking phantasy. There are very many comments to show that children will retire into themselves when faced with a situation which seems beyond them. Many children are shy and embarrassed when confronted with strangers. They don't know how to act, the situation is a bit beyond them and they seek the unreal sense of security which they can derive from thumb-sucking. It would seem that the great need is to protect these children from situations which are beyond them, but at the same time to train them gradually to stand on their own feet. The sleep situation will probably be the last in which the thumb-sucking will be indulged in, and patient and careful handling will help the habit to disappear. If the mother or mother-substitute could sit by the child's cot at sleep time perhaps hold his hand, or provide some physical contact and nothing more; if the atmosphere were quite friendly and quiet, and if this routine were patiently observed for some weeks on end, I believe that the sense of security and comfort derived from the mother's presence would be a real one and could gradually replace the unreal one promoted by the thumb sucking. Very many of the kindergarten's comments indicate considerable improvement in
dropping the thumb-sucking habit after the child’s attendance at kindergarten. I believe that in many cases this is due to the child being subjected to very faulty handling at home, and the improved handling at kindergarten has brought about improved behaviour. This is shown very clearly in the duplicate B Forms submitted for Florence E. of Phoenix Kindergarten. In eight days of observations at the kindergarten Florence was observed thumb-sucking on only five occasions, whilst in a similar period at home her thumb-sucking was almost continuous, and the number of separate recordings made for the equivalent period was sixty-three. Other comments reflecting the effects of home environment as against that at kindergarten are as follows:

Paul F., aged 3 years 3 months - "Paul never sucks his thumb or fingers at kindergarten, but his mother says he always has his thumb in his mouth at home."

Margaret P., aged 5 years and one month - "Child even now persistently sucks her thumb then going to sleep although she used to do so any time in the day. She became less inclined to do so during the day since she started at kindergarten."

Robert B., aged 4 years 1 month - "Only sucks his thumb when going to sleep at night. Since coming to kindergarten he no longer sucks his thumb during the day."

There are many other comments in a similar strain to these, all of which suggest faulty psychological handling at home as the factor tending to keep the habit alive.

Very many comments have been made describing necessary manoeuvres made with the other hand during thumb sucking. Some typical ones are as follows:

"Child now sucks thumb persistently while sleeping and before overtaken with sleep - roofs tip of nose rhythmically with the index finger of the same hand and wiggles hair with the other hand."
"Martin sucks his thumb only when he has a blanket, i.e., only at night when going to sleep. His thumb sucking seems associated only with a special small blanket 'his baby blanket'."

"Rayna has a habit of holding a woolen blanket close to her mouth whilst sucking thumb, and at the same time working her fingers until she rolls a small ball of wool off the blanket, which she puts in her mouth and swallows. Then we won't give her a blanket at night, it is nothing to see her kneeling down beside baby's cot and using baby's blanket through the railings. To have her on an iron tonic to see if this will supplement any deficiency." (Mother's description).

"Child sucked thumb from an early age when tired, and then put to bed. The notion would always take place when child came in contact with any woolen or soft material such as singlet, fur, blanket etc."

No attempt has been made to investigate the meaning of these accessory movements as they seem to have little direct bearing from a dental point of view. They are very common, however, and attention is drawn to them here and to the need for further research in order that they may be fully understood."
FORTY-FIVE CASE HISTORY.

Theoretical considerations, the questionnaire investigation, and previous case discussions have all suggested very strongly that in an imbalance of the feeding routine, or more particularly, in an imbalance of the sucking-feeding instinct is to be found the original cause of most children starting the practice of thumb sucking. In order to investigate this more closely and to obtain detailed first-hand information, I spent some time over a period of 3-4 months personally attending a number of clinics, interviewing mothers of thumb-suckers and collecting their histories. The effort was made to standardise the information as much as possible and to this end the questionnaire form was used as a basis and in addition the following information relating to the feeding routine was sought:

(a) Weight increases, digestion, general condition
(b) Rate of feeding.
(c) Times of feeding.
(d) Atmosphere at feeding time.
(e) General.

Some of the mothers have been interviewed several times and the histories obtained have been summarized, and certain facts condensed into tabular form (Fig. 99). The clinics at which this work has been carried out are the King George V. Post Natal Clinic, Australian Mothercraft Society's Clinics at Elizabeth Street and Pymble, Trevanion North, Mothercraft Training School and the Dental Clinic of the United Dental Hospital. Further histories were obtained from my own practice.

Taken on their own these histories would have to be treated with reserve because the numbers are limited - they are compiled almost entirely from information supplied by the mothers, and for obvious reasons it was quite impossible
to establish control groups as was done with the calves.
If, however, the results of these histories are considered
in conjunction with the results of the questionnaire, and
also in conjunction with the observations of self-behaviour,
the whole does provide very strong evidence that the origin
of thumb sucking is nearly always found in a disturbance of
the infant feeding routine. Furthermore the evidence is very
strong that of the various ways in which this disturbance can
come about, probably the commonest is the over rapid feeding
of the infant at the breast, resulting in a lack of satis-
faction of the instinctive sucking act.

Levy (62) has previously drawn attention to the close
connection between an over rapid flow of breast milk and the
onset of thumb sucking, and he gives 11 case histories of
thumb suckers in which the factor common to all was the rapid
flow of breast milk. Of 23 other cases of thumb sucking he
says, "24 are traceable to some feeding difficulty; primarily
the sucking phase of the feeding act."

These observations coincide with my own, but Levy no-
where mentions the role of instinct, and indeed its signifi-
cance seems not to have been appreciated by him, whereas,
of course, in my view it is of fundamental importance for an
understanding of the whole phenomenon of thumb sucking.

Of my 45 histories 31 report one or more discernible
defects in the feeding routine. In Fig. 39 over rapid feeding
is included under the general heading "discernible feeding
disturbances", but in view of its importance it has also been
separated under a special heading of its own. Of the 45
histories 33 report this defect. It was noticeable during
my investigations that if the baby's physical condition was
satisfactory, despite the over rapid feeding — and in many
cases this was so — then little if any notice was taken of
this defect, either by the mothers or nurses. If, however,
it is accepted as being one of the major factors causing an imbalance in the feeding routine and in turn giving rise to the practice of thumb sucking, then very close attention will have to be given to it in the future.

Although it has no direct bearing on the problem of thumb sucking it is interesting to note the number of cases in which a copious supply of breast milk was followed at 4-3 months by a drying up of the supply necessitating complementing or weaning.

The recorded results of attempts to control thumb sucking by various methods of obstruction are of very great importance because in all the cases where these methods have been tried the result has been complete failure. This coincides entirely with the previous results shown in Fig.8d and provides striking confirmation of the correctness of the theoretical approach to the problem as set out in Part I.
<table>
<thead>
<tr>
<th>Description</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entirely breast fed for at least six months or up to the age of taking history</td>
<td>26</td>
</tr>
<tr>
<td>Partial or complete artificial feeding resorted to within one month of birth</td>
<td>8</td>
</tr>
<tr>
<td>Partial or complete artificial feeding resorted to within six months after birth</td>
<td>12</td>
</tr>
<tr>
<td>Number of histories recording discernible feeding disturbances within the first nine months</td>
<td>41</td>
</tr>
<tr>
<td>Number of histories recording over rapid feeding from the breast and (or) excessive milk supply</td>
<td>33</td>
</tr>
<tr>
<td>Number of histories recording over rapid breast feeding coupled with need for supplement or weaning at six months or earlier</td>
<td>10</td>
</tr>
<tr>
<td>Successful attempts to correct thumb sucking using obstructive means - mittens, alcoh., etc.</td>
<td>NIL</td>
</tr>
<tr>
<td>Unsuccessful attempts to correct thumb sucking using obstructive means - mittens, alcoh., etc.</td>
<td>14</td>
</tr>
<tr>
<td>Successful use of dummy to correct thumb sucking</td>
<td>NIL</td>
</tr>
<tr>
<td>Unsuccessful use of dummy to correct thumb sucking</td>
<td>5</td>
</tr>
<tr>
<td>No attempts at correction made</td>
<td>28</td>
</tr>
</tbody>
</table>
UNITED DENTAL HOSPITAL

History taken 21-6-48. Aged 3 years 1 month.
Breast fed till 8 months and Mrs. G. states that
the usual four hour periods between feeds was never
observed. Baby was fed whenever Mrs. G. felt she
needed it. Heather was given a dummy at six months
and is still using it. Despite the dummy, thumb
sucking which started when 10 days old, is still
indulged in.

There is typical malformation of the jaws and mal-
position of the anterior teeth. (See Figs. 21-24 inc.)

Josephine Hol.

History taken 20-6-48, aged 6 years, 5 months.
Breast fed for first five weeks only. For the
first three weeks after return from hospital baby
was continually screaming and upset and unsatisfied.
Mother and baby were admitted to Carpenter House
in order to test feeding technique and to establish
a proper routine. Tests revealed that the mother's
milk supply was very deficient and baby was very
much underfed as a result. Thumb sucking started
within the first three weeks of life and continued
till five years of age. Breast feeding was com-
plicated whilst at Carpenter House and baby was
then satisfied and continued to show satisfactory
progress. At 32 months baby was weaned and bottle
feeding resorted to. When three months old various
obstructive methods were tried — aliases, mittens,
finger stalls etc. At the end of one week's
determined efforts the baby was so seriously upset
that all were discarded. A dummy also tried but
this was refused.

At the age of five years Josephine hurt her left
arm. This required bandaging for some weeks and the arm had to be carried in a sling. As it was her left thumb which she used to suck and it was now impossible for her to do so, she was very upset for several days and feeding and sleep situations were seriously disturbed. No attempt was made to suck the other thumb and eventually when the bandages were removed thumb sucking was not resumed.

Malcolm McI.

History taken 20.6.48, aged 1 year. Breast fed for only one month. Some tendency to thumb sucking observed in first few weeks - dummy given and used for three weeks only and refused. Malcolm is Josephine's brother and after her previous experience Mrs. McI. says that she paid close attention to his feeding from birth. He was complemented even during the first month at the breast and satisfactory progress has been maintained throughout. Early tendency towards thumb sucking soon disappeared and the practice has never shown itself since.

Ronald C.

History taken 7.7.48, aged 7 years. Breast fed. Mrs. C. reports that she had a very copious milk flow which made it necessary for her to express before every meal up to the age of 5½ months. Baby obtained meals very quickly, but weight increases were always well maintained. Thumb sucking started at five months and is still very much in evidence. The usual obstructive methods were tried, aloe, finger stalls, etc, but with the usual lack of success.

Valerie Ch.

History taken 7.7.48, aged 8 years. Breast fed till 8½ months. Thumb sucking started at about 4 months but Mrs C. rather hazy about details of
infant feeding. She says that Valerie’s weight increases were well maintained and that feeding times were normal. Husband’s family all very nervous and highly strung. Bandaging and aloes tried without success.

History taken 7. 7.48. Aged 6 years. Breast fed. Mrs. C. reports having had a very copious and quick flow of milk resulting in baby obtaining feeds very rapidly, seldom taking more than 10 minutes at each feed. Mother had considerable difficulty in drying off her milk at weaning time. Thumb sucking started between six and nine months of age and has continued ever since. Aloes, mustard and bandages were all tried without avail and then at the age of 4-4½ years the arm was bandaged firmly to the boy’s side when he went to bed at night. This too was quite useless because he would struggle and contort himself until eventually he could get hand to mouth. No discomfort seemed too great as long as the thumb could be sucked. When these measures proved complete failures metal thumb guards were constructed consisting of stout metal cylinders inside which were cloth finger stalls and tapes for tying round the wrist. These thumb guards were tied on every night for twelve months and Norman would frequently suck guard end all. At the end of 12 months the use of the thumb guards was discontinued in the hope that the habit had been broken but the thumb sucking was immediately resumed. (See Figs. 100 - 103 inc.)
Fig. 100. Norman C., whose case history appears on page 229.

Fig. 101. Norman C. demonstrates the heavy metal thumb guards which had been used over the previous twelve months in an attempt to break him of the thumb sucking habit. His facial expression is certainly not that of a happy, well adjusted child.
**Fig. 102.** Norman C. frequently thumb sucks despite the cumbersome thumb guard.

**Fig. 103.** The bite is somewhat open as a result of the thumb sucking but the malocclusion is not severe.
History taken 22. 6.48, age 7 months.
A thumb sucker from birth - very difficult to
induce him to take to the breast and breast feeding
unsatisfactory until at 4½ months milk supply
failed and baby bottle fed since then. Whole
feeding situation then improved, feeds vigorously
from bottle, steady increases in weight maintained
and thumb sucking much less in evidence. Has six
teeth, average feeding time at bottle - 15 minutes.

Kev H.

History taken 19. 5.48. Age 8 weeks. Breast fed.
Mother's milk supply is very free and baby obtains
nourishment very quickly. Mrs. H. says average
feeding time in hospital was only 2-3 minutes and
now is only 7 minutes. One side only is taken as
baby refuses the other.
Atmosphere at feeding time is far from good as Mr.
and Mrs. H. live in one room, there are eight
people in the house and there is constant noise
and distraction.

Francis R.

History taken 2. 6.48. Age 3 months 1 week.
Started thumb sucking at 11 weeks and most noticeably
immediately after meals. Mrs. R. reports having
complemented breast supply from two weeks. Baby
has been receiving 20 minutes at the breast and
then the bottle - often cries after feeds and seems
distressed - often vomits after feed also. Sister
reports that Mrs. R. insisted on giving a complement
immediately after leaving hospital although strongly
advised not to. Gain in weight at 1. 4.48 was
15 ozs, for two weeks and breast supply satisfactory
but mother still insisted on giving complement. Subsequent gains have been erratic too, probably due to consistent over-feeding. Mother's milk now diminishing and baby showing a preference for the bottle as he can obtain his milk more easily by that route. Thumb sucking probably due to faulty feeding routine from the beginning - unnecessary and undesirable complementing.

Hands were bound to stop thumb sucking, without success.

History taken 12. 5.49. Age 5 months. Breast fed. Weight increases of 3-9 ozs. per week maintained for first three months. For some undiscovered reason over the next six weeks gains averaged only 1-1½ ozs. per week. Thumb sucking started at 4 months. Feeding has always been very rapid with an average time of only 5 minutes. Test feed at three months resulted in 7½ ozs. in five minutes. Mrs. M. reports that she always wears a napkin over her breasts to absorb the milk which flows spontaneously. Baby hardly has to suck at all to obtain its milk.

History taken 12. 5.49. Aged 3 days. Breast fed. Three older children in the family, and all are persistent thumb suckers. Stephanie is now starting to suck her thumb also. The older children all started the practice before they were three months old. Mrs. C. reports that all were able to feed very quickly owing to a very free milk supply. Stephanie is now taking only 10-12 minutes, and she has to be set up every now and then to stop her from choking.
Jennifer S. History taken 2. 6. 48. Aged six months. Breast fed. Started sucking second and third finger of left hand at about five months. Mrs. S. has always had a very free flow of milk and she also reports that she lives in the same house as three aunts who are the cause of constant distractions during feeding time.

Allen L. History taken 12. 5. 48. Aged 3 months. Breast fed for six weeks and then entirely bottle fed. A five weeks premature baby, progress good, only started thumb sucking at 4-5 months. Feeding situation seems very difficult, Mr. and Mrs. L. living with parents and Mrs. L. is subject to constant interruption and distraction at feeding time. Sister Tyler reports that Mrs. L. repeatedly misunderstands feeding instructions. Aloe and gloves used without success.

Henry N. History taken 28. 5. 48. Age 3½ months. Breast fed. Henry sucked his thumb from birth till about three months when he changed to the first and second fingers, which he has sucked very persistently ever since. He has been breast fed throughout and weaning process is now about to start. Mrs. N. reports that her milk supply has always been very copious and free flowing so that she found it necessary, for the first six months, to use padding inside her dress or night gown to absorb the excess. 14-15 minutes has been the average feeding time. Weight increases have been well maintained and baby is a splendid physical specimen.

Vicki C. History taken 28. 5. 48. Age 8 months. Breast fed. Thumb sucking started at 6½ weeks. At 2½ weeks
Vicki C. (Contd.)
she had a test feed and took six minutes one breast
and three minutes on the other for a gain of 5 ozs.
Vicki has always been able to feed very quickly
and never at any stage taken as long as 20 minutes.
Average time taken has always been between 12-15
minutes. Mrs. C. reports milk flow always very
free and would often flow spontaneously.

John W.
History taken 2. 6.48. Age 2½ months.
Baby has been wholly bottle fed from five weeks
owing to mother’s milk being insufficient. Thumb
sucking has only started since bottle feeding began,
and is most noticeable immediately after feed.
Now gaining well 6-8 ozs per week. Has been
given iron tonic for last three weeks owing to low
blood count of 59%.

Georgina I.
History taken 28. 4.48. Age 12 months. Breast
fed till 11 months. Weaning now complete.
Started wrist sucking at 5-4 months and when I first
saw her she had a very nasty infected wrist as a
result of the sucking. Feeding routine was often
disturbed by older brother, and Mrs. I. was always
very upset by these distractions. After first
visit wrist was bandaged over a dressing of peni-
cillin ointment. Mittens were tried early without
success.

Anthony B.
History taken 30. 6.48. Age 7 months. Breast fed.
Has sucked his thumb since two months old. For
the first six weeks it was very difficult to get
him established at the breast, but once started,
feeding was very rapid and has remained so ever
since, 5-10 minutes being the usual time taken.
Anthony B.
(Contd.)
Sucks thumb mostly when tired and when going to bed. Has no teeth yet.

William O.
History taken 7. 7.48. Aged 7 months. Breast fed for only one month at the end of which time Mrs. O. developed badly cracked nipples. When an abscess started, baby was weaned. Thumb sucking started at about four months and is mostly observed during the day, scarcely ever when going to sleep. Is a very hungry baby and consumes his food with considerable gusto.
TRESILLIAN NORTH MOTHERCRAFT TRAINING SCHOOL.

Philip McC.  
History taken 30, 6, 48. Aged 5 months. Artificially fed. Mother died during childbirth and baby was very difficult to get established onto artificial feeding. He always appeared hungry and unsatisfied and for some time he failed to put on weight. He is now gaining well and is much more satisfied, but is still sucking two fingers. This practice started within the first month.

Lloyd W.  
History taken 30, 6, 48. Aged 5 months. Artificially fed. Started to suck his thumb before a fortnight old, and has done so ever since. Has failed to put on weight recently and has been vomiting frequently and was very unhappy on admission to Training School. Condition now much improved, but thumb sucking still indulged in.

Gregory McC.  
History taken 30, 6, 48. Aged 3 months. Breast fed for three weeks, then artificially fed. Has vomited since birth and vomiting getting worse. Cries day and night. He sucks four fingers consistently.

Robyn C.  
History taken 30, 6, 48. Aged 11 months. Breast fed for seven months, rather a quick flow and baby never really interested in her food. Feeding still difficult. Thumb sucking started at a very early age and still in evidence.

Timothy McC.  
History taken 30, 6, 48. Aged four months. Breast fed. Has been a thumb sucker from birth. Milk flow has always been very free and baby has obtained feeds very quickly. This has now been controlled somewhat but thumb sucking continues.
History taken 2.7.48. Aged 4 years. Breast fed for only two weeks, complemented until two months and thence entirely bottle fed. Baby weighed 9 lbs., after a cesarian birth. It was discovered two weeks after birth that baby was being very considerably underfed and when Mrs. L. and baby went home at the end of a month baby's weight was only 6 lbs., 3 ozs. Breast feeding plus a supplement was persevered with until two months then milk supply became very deficient and the change to full bottle feeding was made. There was considerable difficulty in establishing a satisfactory routine and at this time Mrs. L. attended the clinic for three days a week for two weeks. She reports that it was thought that the difficulty was due largely to previous starvation. Once established on the bottle however, the weight started to increase and continued satisfactorily till at eleven months he was over normal weight. Mrs. L. describes him as "a greedy baby and a quick feeder".

Teeth sucking started in hospital and the skin of two fingers was sucked raw at one month. He sucked his fingers continually as an infant despite the use of all the usual methods of obstruction such as mittens, finger stalls etc.
David B.
History taken 29, 6.49. Aged 2 months. Breast fed. Large feedings obtained very quickly. Baby sucks thumb or back of hand and has done so from birth.

Julie JIC.
History taken 21, 6.49. Aged 9 months. Artificially fed from birth. Baby screamed and fought against food for first six weeks. She then spent a month at Tresillian North to establish the feeding routine and progress has been well maintained since. Started thumb sucking at birth and still does it particularly when going to sleep. Mother regards the thumb sucking as quite normal behaviour.

Stacyenia E.
History taken 25, 6.49. Aged 13 months. Breast fed for three months, supplemented till six months and then artificially fed. Started thumb sucking within the first month. Breast feeding was always very rapid 10-15 minutes being the usual feeding time. Supplement was given at three months owing to milk supply becoming inadequate. Thumb sucking was very marked whilst baby fed exclusively at the breast but when supplemented Mrs. E. acted on my advice and so adjusted the teat that the feeding time was allowed down to a full 20-25 minutes. In addition baby was kept well wrapped when put down to sleep. Thumb sucking very soon ceased and has not been resumed.

Tony E.
History taken 25, 6.49. Aged 4 years. Breast fed till normal weaning time but feeding time always very quick owing to very free milk flow. Thumb sucking started before baby a month old and practice still persists.
David D.

History taken 23. 6.43. Aged 3 months. Breast fed for nine weeks and then bottle fed. Whilst in hospital and for first few weeks after return home milk supply was very free necessitating the use of puddling to absorb the excess. Feeding times were never more than 15 minutes and little or no effort required on the part of the baby. Two and a half weeks after return from hospital the family were threatened with an ejection order. Mrs. D. was very upset and baby too became disturbed and feeding became difficult. Baby would scream continuously after feeds. At seven weeks he was underweight and a test feed revealed that the breast supply was now very deficient. Then going to sleep a dummy was given for the first five months, but at this time the dummy was rejected and thumb sucking started. Once the bottle feeding routine was established satisfactory weight gains have been maintained.

Hervidee C.

History taken 18. 6.43. Aged 7½ weeks. Breast fed for 5½ weeks, complemented for another week and then weaned at 6½ weeks. Baby seemed hungry until weaned and was not gaining well, but in the last week has gained 1 lb. 1 oz. and thumb sucking seems less in evidence. The thumb sucking started in hospital - takes about 30 minutes at bottle and was previously taking 50 minutes at the breast.

Robert J.

History taken 3. 6.43. Aged 11 weeks. Breast fed up to the present, but compliment now being started. Thumb sucking started after being home from hospital for one week. Mrs. J. was giving three hourly feeds instead of four hourly. Baby became upset with
wind and indigestion. Thumb sucking started at this
time and has always been most noticeable immediately
after feeds. Clinic advised Mrs. J. of mistake in
feeding routine and four hourly feeds were instituted.
Indigestion improved but thumb sucking continued.
History at Clinic records an over rapid flow of
breast milk and, at first, an over supply. Recorded
feeding times varied between 15-17 minutes - never
as long as 20 minutes. Now (38, 5.43) mother's milk
is insufficient and complement has so far been
rejected. Baby is experiencing a gastric upset and
has lost 3 lbs. in the last week.

History taken 38, 3.43. Aged 7 months. Breast fed
till six months. Edwin started sucking his thumb
then four days old and has done so ever since. His
Clinic history shows consistent recordings of 15
minutes or less for each feed. Breast supply
started to fail at 20 weeks when a complement was
offered but this was refused. Breast supply
recovered under treatment and continued till the
supply finally failed at six months. The bottle is
now taken quite readily and Mrs. R. says that she
believes that the thumb sucking has decreased since
bottle feeding routine has been established. Kittens
were used to stop thumb sucking but given up as
useless.

History taken 38, 5.43. Aged 8½ months. Breast fed
throughout and Mrs. G. reports that feeding has
always been satisfactory with weight increases well
maintained. Thumb sucking started then very young,
but this has decreased and now takes place only
when tired or when going to sleep. Efforts were made at first to prevent the practice by pulling the hand from the mouth but this had to be abandoned because baby would scream and refuse to go to sleep.

History taken 33. 5.49. Aged 5 months. Artificially fed throughout. Thumb sucking started at three months and gloves were used to try and stop it but without success. Baby upset in last month and has had some vomiting bouts. Weight increases have dropped also averaging only 3 ccc. per week for the last three weeks. By 33. 6.49 Graham was much better and normal weight increases resumed. Fruits and vegetables have been given during the last week. Lower controls have just erupted. Thumb sucking has almost ceased.

History taken 33. 5.49. Aged 4½ months. Breast fed till 3 months and then complemented, but now at 4½ months baby is to be weaned owing to failure of mother's milk supply. Thumb sucking started when baby was two weeks old and mother relates that soon after their return from hospital Julia would often cry for two hours after the 10 a.m. food with indigestion. Mother's milk supply was always very free flowing and baby never took as long as 20 minutes over a feed. At 6½ weeks she was getting too much food too quickly and the Clinic advised cutting down the feeding times to 10 minutes on one breast and 5 minutes on the other at the 8 a.m. and 10 a.m. feeds. Bottles were tried in an effort to stop the thumb sucking but they were a failure.

History taken 7. 7.49. Aged 5 months. Breast fed till two months old, then given a complement till 4½ months old and then weaned from the breast altogether.
Thumb sucking started at one month. At this time baby suffered considerably from indigestion and his feeding times were reduced because he was getting too much milk too quickly. Breast flow was very free and feeding times ranged from 11 minutes at the 8 a.m. feed to 17 minutes at the 10 p.m. feed.

Attempts were tried to stop the thumb sucking but were given up as useless. Dummy tried but refused.

At five months baby suffered another gastric upset and lost weight for three weeks, but is now much better, and in the last week has put on 3 ozs. In taking 15 minutes to consume 3 ozs. of milk from the bottle. Has one tooth through.

History taken 7.7.43. Aged 3 years. Sister of Michael II. Started thumb sucking at about 4 months. Breast fed for four months and then weaned. During breast feeding milk supply was always very copious and free and towel had to be used round breasts at night to absorb the excess flow. Unlike Michael, progress has been good throughout with no digestive upsets.

History taken 7.7.43. Aged 11 months. Breast fed till six months, then supplemented till nine months and then weaned. Weight increases well maintained throughout but milk supply very free and baby always obtained his food very quickly, usually only 3 minutes at each breast. Now has 3 teeth.

Gloves and mittens were used in an endeavour to stop thumb sucking, but baby became very distressed and the attempt was given up as useless.
History taken 7, 7/49. Aged 3 months. Breast fed. Cesarean birth. Mother and baby spent two weeks at Carpenter House after discharge from hospital. Great difficulty was experienced in establishing baby on a satisfactory feeding routine and for some time she refused to feed at all from the right breast. Thumb sucking started at about this time. When at last feeding routine was established milk supply was extremely free and copious. After discharge from Carpenter House till six months of age baby was given only five minutes at each breast at each feed. Efforts were made to slow the feeding process by alterations in the posture of mother and baby and various types of nipple shields were also tried but without appreciable effect.

Mother had to use a towel at night to absorb the excess flow of milk.

For the last six months, baby's progress has been very satisfactory. She now has four teeth.
History taken 18. 6.28. Aged 1 year 5 months. Breast fed till weaned at 10 months. Started thumb sucking at seven weeks old. For three weeks after birth baby refused to take to the breast and mother had to express for every meal. Mrs. B. says that she used to get very upset. At the end of three weeks breast milk supply from the breast was always very free and quick necessitating Mrs. B. using a towel round the breasts at night to absorb the flow which would take place during the night. Mrs. B. was advised by the Clinic to express before each feed in an attempt to slow down the feeding time and to help baby to cope with the copious flow. Even after expressing, feeding time was always less than 10 minutes at each breast — usually 8 minutes and 6 minutes. At no time did baby take as long as 20 minutes at the breast. She was always very easily distracted and once distracted was hard to get back to her feed.

Susan now sucks her thumb only when tired or going to sleep and she must always hold a piece of ribbon or tape at the same time. If she cannot hold the tape in one hand and suck the thumb of the other she finds it very hard to get off to sleep and continues to search round the cot for something to hold. Mrs. B. now ties a piece of tape to the end of the cot and Susan holds this with one hand, sucks the thumb of the other hand and goes off to sleep. If she wakes in the night the same performance takes place till she goes off again.

Susan has now become so conditioned to tape
and ribbon that she has only to pick up a piece
during the day and she will immediately put her thumb
in her mouth and will more often than not lie down on
the floor as if going to sleep.

History taken 31, 4.49. Aged 6½ months. Breast fed
till 5 months. Started thumb sucking then three
weeks old. Baby's progress was well maintained till
3 months, but weight increases then fell below normal
and at five months a supplement was given and at six
months weaning was decided upon because of the failure
of breast supply. The weaning process is now in
progress.

History taken 17, 5.48. Aged 11 months. Breast
fed till six months and then weaned. Thumb sucking
started within the first two weeks, and got steadily
worse. Baby took food well till three months old,
and then started to fight against it. She has been
difficult to feed ever since. Mrs. G. reports that
flow of breast milk was always very rapid and one
test feed revealed that the normal ration was supplied
in five minutes.

Living conditions have also been very difficult
for this family, and for three months from the time
the baby was three months old, they lived in a one-
room flat where they were subjected to constant noise
and distraction. Mrs. G. says that she became very
upset and disturbed herself at this time.

History taken 31, 4.49. Aged six months. Breast fed.
Thumb sucking started when baby one month old. Mrs. H.
says that feeding has always been very quick owing to
free and copious milk supply - usual feeding time
Beverly H.  
About 10 minutes. Milk supply is now drying up and weaning was started on 13. 4.49. For the first four or five days it was difficult to get the baby to take the bottle, but she is now taking it quite well although she is feeding from it very slowly, taking as a rule 20-40 minutes. Since the weaning process commenced, thumb sucking has ceased.

Phyllis H.  
History taken 21. 4.49. Aged 4 months. Breast fed. Thumb sucking started when six weeks old and is always observed immediately after feeds. Mrs. H. states that once feeding starts milk will flow from the breast of its own accord, the baby not having to suck at all. Flow is always very free, and an embarrassment to the baby, and he has suffered several digestive upsets.
PART III.
CONCLUSIONS

1. Evidence from dental literature establishes the fact that the practice of thumb sucking in infants and children can, and very frequently does, cause extensive dental deformity. Not only is it potentially the direct cause of certain severe types of malocclusion, but it can also act as a contributing cause by giving rise to harmful secondary habits such as abnormal lip, cheek and tongue action.

2. Malocclusion not only interferes very considerably with the normal function of mastication, but the irregularity of the teeth also renders satisfactory oral hygiene extremely difficult and could predispose to a high caries incidence. Lack of normal functional stimulation could also adversely affect the gingival tissues.

3. Considerable attention has been paid to thumb sucking by child psychologists, but a survey of literature on the subject points to a lack of understanding of the actual nature of the act, why it occurs, and how it should be controlled.

4. By questionnaire investigation disclosed the following facts:
   Of 2323 children observed 698 or 23.63% were persistent thumb suckers.
   Of 549 children aged six months or less, 153 or 27.97% were persistent thumb suckers.
   Of 247 recorded attempts at treatment only 73 or 29.62% were successful.
   All forms described methods of treatment. 164 consisted of some form of obstruction and of those 154 attempts 124 were complete failures.
Of all children recorded as thumb suckers, 44.79% were wholly breast fed and 55.21% were partly or wholly artificially fed. Of children recorded as non thumb suckers 50.88% were wholly breast fed and 49.02% were partly or wholly artificially fed.

5. Most of the methods of controlling the habit advocated by dentists are open to the severest criticism as likely to result in serious psychological harm and at the same time standing little or no chance of success in checking the habit. Statistical evidence is produced to support these claims.

6. The act of sucking in infancy is an instinctive act by means of which the intake of food is ensured. I have therefore called this act the sucking-feeding instinct.

7. Martin (22) says "If the instinctive act fails in one direction, the organism attempts a variation of activity in its response". If there is a failure to satisfy the sucking-feeding instinct either at the breast or with the feeding bottle, the infant will attempt a variation by sucking something else and that will almost invariably be the conveniently placed thumb.

8. Thumb sucking then nearly always starts because of incomplete satisfaction of the sucking-feeding instinct, and in over 90% of cases has its origin within the first nine months of life.

9. Strong support for this explanation of thumb sucking is provided by the behaviour of bucket fed calves as distinct from calves fed by their dams, by nurse cows, or by the nipple feeding devices. Bucket fed calves invariably indulge in substitute sucking of each other, whereas naturally fed calves never do so, nor do those which
have been established in a satisfactory routine at the
nipple feeding device.

10. Further support is seen in the fact that a high percent-
age (37.9%) of the babies admitted to Transilvian and
Rachitic Mothercraft Training Schools because of feeding
difficulties are thumb suckers whilst of the normal
healthy babies admitted to Carpenter Convalescent Home
the percentage is extremely small (3.3%).
The 48 Case Histories obtained from various Child Clinics
provide further support for this contention.

11. Correction of thumb sucking as soon as it appears is of
great importance, because it will not then develop the
characteristics of a habit. Careful correction of every
detail of the feeding routine should be carried out at
once and particular attention should be paid to regulating
the flow of milk from breast or feeding bottle, so as to
ensure adequate sucking as well as nutritional and
emotional satisfaction.

By statistics disclose the fact that 23.5% of all
children aged six months or less are thumb suckers, and
this indicates the need for further careful research into
the whole technique of infat feeding. Often the most
sensible disturbance of the feeding routine will cause in-
complete satisfaction of the sucking-feeding instinct
and will result in thumb sucking.

12. Weaning is recognised as an extremely important phase
through which the infant must pass. Great care must be
exercised to ensure that every detail of weaning
technique is perfected.
13. Failure to guide the infant successfully through this transition stage will often result in some purely infantile practice such as thumb sucking, which should have been left behind, being carried over into the next stage of development.

14. Thumb sucking occasionally starts in the post weaning period. Usually it is then an attempt to regress to the infantile state in search of security because of emotional disturbance.

15. Sucking feeding in the mother’s arms is strongly associated with feelings of security, comfort and protection. Thumb sucking promotes similar feelings but they are not real and the situation becomes a fantasy. Thumb sucking thus promotes a fantasy situation into which the child can retreat from realities.

16. Treatment of thumb sucking in the past has consisted almost entirely of using different forms of obstruction. Such methods are contrary to accepted psychological principles, seldom meet with any success and cause considerable psychological disturbance. Evidence is produced of the complete failure of obstructive methods of treatment.

17. Proper treatment in the pre-weaning period is to correct the feeding routine, and to assist in an easy transition from sucking activity to chewing activity. After weaning, the correct principle of treatment is the re-direction of the energy behind the habit into some other allied activity which is of a more desirable nature.

18. Thumb sucking involves no moral issues.

20. Thumb sucking is fundamentally a psychological problem which frequently gives rise to serious physical defects. Action towards prevention and control of these defects must first of all recognize and conform to established psychological principles.
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