Doubtless by this time you have concluded that I have scolded quite enough, and that pessimism has no place in such a gathering as this. I plead guilty to the extent of only exercising the privilege with the hope of exciting discussion if you disagree, and no doubt you do, with some of my criticisms. We have much more reason to be satisfied than to find fault, and my comments, I assure you, have not been made in that spirit. State boards of health have no cause to be ashamed of their records, nor to feel that collectively or individually they have not justified their existence.

If we all thought alike there would be little progress; let us trust that our differences of opinion may always result in action for the common good. At the end of my chapter of lamentations, permit me to allude to a matter which is of vital interest to the continued usefulness of this conference as an effective health organization.

THE SECRETARY'S DUTIES.

No one who has been given the opportunity to observe can doubt that a board of health whose membership and executive organization are constantly shifting will fail to accomplish the most effective work in comparison with those boards whose membership continues practically undisturbed and whose secretary has a relative permanence of office.

This conference has been well served by competent and painstaking recording officers on whom has fallen the heaviest part of the burden in making it what it is. Our debt to the present active and efficient incumbent of the office is not to be lightly estimated. The man who has many things to do is the one who does things, and it is urged on the conference to make easier the labor by giving to the office some measure of permanency and adopting a definite and liberal policy with reference to assistants. The secretary should be empowered to employ all the aid he needs to issue the annual proceedings and early notices of the time and place of meeting of the conference, and if the present assessment on the several boards is not sufficient to defray the cost let it be increased. Service as good as we have been able to command is worth paying for, and we have no right to take too much of a secretary's time from his legitimate work as a state officer nor ask him to load himself down with the drudgery of purely clerical work; and, above all, we should not make it difficult or impossible to obtain the kind of service we need by withholding adequate support, and if any body would profit by having a permanent secretary this one would. I do not think we should ask a busy officer to do more than supervise and direct the work of the secretary's office.

In closing this address, permit me to express the pleasure I find in the privilege of greeting you as members of this conference. While we miss familiar faces and regret the changes which death and retirement have brought about, all of us who have been long in the work can cherish the memory of delightful comradeships and lasting friendships and turn to welcome heartily the newer members, confident that, whatever may be the changes in the personnel, the work will go on, that there will be no lessening of enthusiasm, and no loss of that courage which makes a fight half won.

The Fruits of Science.—"While we must be careful not to hamper pure science by demanding fruits from it at every step, we must nevertheless be careful that in the pursuit of knowledge as knowledge the fruits are not overlooked."—Dr. R. J. Rowlette in *Dublin Med. Journal*.

Original Articles

THE IMPORTANCE OF THE EARLY RECOGNITION AND TREATMENT OF RACHITIS.*

THOMAS S. SOUTHWORTH, M.D.

Attending Physician Nursery and Child's Hospital; New York City Children's Hospitals and Schools; Physician Out-Patient Department Babies' Hospital.
NEW YORK CITY.

The typical advanced case of rickets presenting marked bowing of the legs and other exaggerated deformities is easily recognized and could, in fact, scarcely be overlooked. That the malady can ever be allowed to reach this extreme stage, as so frequently happens, is but another instance of the strange parental blindness to forms of disease which progress so insidiously that the departure from the normal is not recognized. This perhaps arises from such constant familiarity with the infant's appearance that its peculiarities come in some way to be accepted as belonging naturally to the individual. In no other way can we account for the degree of bony deformity which takes place before the parents awaken to the necessity of seeking medical assistance, and even when such children are finally brought to the physician it is not, in a large proportion of the cases, because of the most obvious effects, but because of one of the more acute associated symptoms of the rachitic malnutrition. An excellent example of this appeared recently at the clinic in a Syrian child two years old with marked deformity of all the long bones and difficult respiration due to associated bronchitis. Noticing the interest taken by the staff in the child's extremities, the father rather impatiently insisted that these were of no importance, but that the only trouble lay in the difficult breathing.

This apathy on the part of the parents with regard to the abnormality of rachitic deformities is only equaled by the failure of physicians to recognize not only definite early symptoms of rachitis, but also the importance, from the therapeutic standpoint, of the rachitic factor in very diverse manifestations. It is but repeating what every physician should know when it is stated that the malnutrition which affects the bony structures may affect almost equally, although not always so noticeably, the nervous, ligamentous, muscular and digestive systems. Indeed, symptoms referable to these latter may predominate in the picture. The claim has even been made that all bottle-fed children are, as a rule, to some degree rachitic. While this is by no means true of that comparatively small proportion of artificially fed infants whose food receives management of a highly intelligent order, nor of those who are endowed by Nature with exceptionally good digestive powers, it is true without question of many children who have not thrived on haphazard milk feeding or have been long subjected to a diet of condensed milk or patent infant foods.

To this list must also be added the not inconsiderable number of nursing infants who develop evidences of rachitis toward the end of a normal or prolonged period of lactation, whether from bad environment, racial predisposition, or from an increasing paucity of the more essential constituents of the breast milk. Such a racial predisposition is most commonly seen in New York among the negroes, and the Italians, Greeks, Syrians,

* Read in the Section on Diseases of Children of the American Medical Association, at the Fifty-eighth Annual Session, held at Atlantic City, June, 1907.

Armenians and other nationalities from southeastern Europe.

While the larger number of these cases occur among the poor, rickets is found in all classes. Yet, although the great prevalence of the condition is generally accepted academically, the actual recognition of rachitic manifestations in the patient, especially in the early or more atypical forms, unfortunately often fails or is neglected. This may be due in part to want of thoroughness in examining the entire body of the sick, or even fairly well, infant when presented for advice or treatment, but is also largely due to a faulty appreciation of the extremely varied symptoms of this vice of nutrition.

To the student or practitioner whose knowledge of rickets is derived from books or from the advanced cases presented in clinics, more especially by the orthopedic surgeon, the term suggests primarily a large square head, narrow chest, marked rosary, pot belly and bowed legs. He also may recall the enlarged epiphyses, delayed dentition, head sweating, open fontanel and lumbar kyphosis. When he meets with such a case which shows the majority of these earmarks he finds no difficulty in arriving at an immediate diagnosis. But if confronted with a case presenting but few of these classical symptoms, or one which instead of having reached its full development is still incipient, he may either hesitate to pronounce it rickets or be led by the prominence of some associated symptoms, such as obstinate constipation, chronic intestinal indigestion, convulsions or bronchitis, to overlook the underlying cause and so miss the opportunity of striking at the root of the real etiologic factor.

When the habit is once formed of rapidly but carefully inspecting and palpating the entire body of every young child presented for treatment, rachitic stigmata of varying degrees will be discovered much more frequently than is usually realized, and important indications for treatment will not be overlooked.

It is, as has been implied, a too common error to assume that because some of the usual symptoms are lacking the difficulty can not be rachitis. Rickets manifests itself under many guises and its early force may be expended chiefly on a few structures, although careful investigation will usually reveal confirmatory evidence in other directions. The epiphyses at the wrist may be unmistakably enlarged while the bones of the head are apparently normal. On the other hand, the head may show varying degrees of enlargement and squareness due to overgrowth of the frontal and parietal bosses with no recognizable involvement of the epiphyses. The weakness of the muscles of the back and of the ligaments of the spine resulting in the typical rounded kyphosis of the lower dorsal and lumbar region may be the condition which first attracts attention. Abdominal distension, favored by weakness of both striped and unstriped muscle fibers, may be extreme, moderate or completely absent. The same variability pertains to the bending of the long bones, irregularity of dentition and the rest of the commoner manifestations.

To this rule the thorax comes nearest to presenting an exception. Enlargement of the costo-chondral junctions, commonly known as beading of the ribs or the rachitic rosary, is probably the most constant sign of all, and even when not recognizable externally by palpation may, as so well pictured by Holt, be present on the inner surface of the thorax. In fact, the abnormal softness of the thoracic structure may be first strikingly

apparent from the sinking in of the chest walls during inspiration in some acute affection of the respiratory tract.

Even if one has never had the opportunity to study at autopsy the effects of this condition on the underlying lung, one need only spend a few minutes watching this collapse of the anterolateral areas of the thorax where expansion should take place to realize what a serious handicap this is to the infant. It enhances primarily the danger of pulmonary involvement. It increases necessarily the dyspnea and frequency of respiration in the efforts properly to oxygenate the blood. It multiplies the labor and fatigue, adding to the possibilities of exhaustion of the muscles of respiration and of the respiratory center. It results in poor expansion, if not actual atelectasis or consolidation of anterior portions of the pulmonary tissues, which should take on vicariously the work of aerating the blood during any temporary involvement of the posterior and more dependent portions. What wonder that with this crippling of one of the most vital mechanisms the rachitic child succumbs when a normal child would have survived.

Prominent as may be the enlargement of the head and the bending of the long bones, such incidence of the disease does not begin to have the importance or to be fraught with the danger to life which results from the instability of the nervous system with its proneness to convulsions, nor from the soft and flexible thorax which increases many fold the danger from an intercurrent bronchopneumonia. It can not be too strongly restated that the real menace of rickets, both during infancy and more remotely in the later life of the individual, lies in its more subtle effects on the organism. In addition to convulsions and pneumonia already mentioned, there are dangers from laryngismus, stridor and chronic intestinal indigestion, while the greater liability of the contracted chest to tuberculous disease in later life, and the danger to the parturient mother and her infant from rachitic deformities of the pelvis, are matters of general observation. No more potent arguments could be advanced for the prophylaxis, early recognition and treatment of this condition.

In some instances I have succeeded in so impressing colored mothers of severely rachitic children with their responsibility for the degree of the deformity that they have brought their later infants or those of their neighbors to the dispensary during the first few months after birth. With supervision of their care and feeding these children have escaped the difficulty. But such prophylaxis is rarely possible and our efforts must be chiefly directed to the early recognition of rachitic tendencies.

While not claiming that the individual symptoms of head sweating, restlessness, constipation, beading of the ribs and baldness of the occiput, caused by constant movement of the head on the pillow, when occurring singly invariably indicate the rachitic type of malnutrition, they are symptoms which should be carefully observed and considered and, if appearing together, should put us on our guard and make preventive treatment advisable. If to these be added one or more of the other classical evidences, our duty becomes imperative. If the patient is the subject of laryngismus, tetany, head-nodding or craniotabes, even if rachitic signs are doubtful or apparently wanting, antirachitic measures offer the most probable line of successful treatment. This is also true of convulsions, unless some other exciting cause is clearly present.

Rachitis may undoubtedly begin before the fifth

month, just how much earlier is a mooted point. Thereafter it is recognizable with increasing frequency during the latter half of the first year and may be most marked during the second year. Its distinctive features very often appear rather early when there has been a considerable period of general malnutrition, and I consider it one of the distinct advances of recent years that the different types and phases of malnutrition are now regarded less as diseases *per se* and more as the avoidable results of vicious or unintelligent methods of feeding.

Despite the different conditions which may lead to the development of rachitis and the comparatively long period during which it may first reveal itself, there must be a time when the process is incipient, and it should be our aim to detect it promptly and to begin treatment at this stage before it has advanced to the point of becoming a serious present or future menace to health or life. I have laid considerable stress on prophylaxis because even in nursing infants, having what I have called a racial predisposition, much may be accomplished in this direction by better hygienic conditions for mother and child, but more especially by attention to the mother's diet, the employment of remedial measures which will be mentioned later, and by checking the tendency to undue prolongation of the period of lactation. In these cases we must also supplement the deficient proteids of the breast milk at an earlier period than usual by giving the proteids of cow's milk, egg albumin and beef juice.

The influence of condensed milk in the causation of rickets and that of such infant foods as are not designed to be administered with a proper proportion of fresh cow's milk is so well recognized that in this connection it is only necessary to insist that their use, if they are used at all, should be limited to certain periods of emergency and thereafter promptly replaced by cow's milk.

Efficient prophylaxis in the bottle-fed is by no means a simple matter, owing to the difficulty experienced at times in securing the digestion and absorption of cow's milk, and especially of the necessary amounts of its proteid, casein. This difficulty fortunately is overcome readily by many children under proper management, and the number with whom it becomes a serious matter decreases to a certain point in proportion to the experience of the physician. In the earlier months, therefore, prophylaxis and treatment are practically the same as that of malnutrition in general.

After the fifth or sixth month, however, when the rachitic element tends to reveal itself more distinctly, certain measures become of definite value. It is a mooted point whether general tenderness of the body belongs to the symptomatology of rickets or denotes a tendency to scorbutus, but fresh orange juice, which has such a signal effect on scorbutus, has also a beneficial influence on the rachitic infant. At this period or even earlier we may also begin the administration of pure cod liver oil, at first in small quantities and increased with tolerance to half a dram or more three times a day. If not well borne, and especially in warm weather, pure olive oil has considerable value as a substitute. More than usual attention should be given to securing the ingestion and digestion of an adequate quantity of proteid, and usually by the seventh month, if need be, and assuredly in the later months of the year, this may be assisted by administration once daily of beef juice or the white of one egg, the latter incorporated with the contents of one of the bottles.

In undertaking the treatment of older children who have entered on their second year scraped rare meat pulp may be given at once and soft boiled eggs are of important assistance in making up for previous proteid deficiencies in the diet.

The management of the starch-containing foods in these older patients requires especial care, but also an intelligent differentiation of conditions. That advanced rachitic cases often show starchy indigestion is notorious. This is, indeed, truer in proportion to the degree to which the starches have been undercooked or given in excessive quantities to the exclusion of animal proteids. The more marked cases are those children with distended abdomens and foul undigested stools whose condition has been aggravated by insufficiently cooked cereals, potato or an excess of bread in their diet. Oatmeal and potato are better interdicted entirely in such cases, and other starchy foods if given should be limited to a small amount of thoroughly cooked and strained cereal of some other kind, or to zwiebach, or stale bread dried to a crisp in the oven. Total exclusion of starchy food is by no means always necessary. Cereal additions to milk make available a considerable amount of vegetable proteid and mineral matter which are craved and promptly assimilated by the underfed organism of certain rachitics. There surely is no contraindication to the judicious use of suitably prepared starchy food when any considerable degree of intestinal indigestion and distension is lacking.

Of the more distinctly medicinal measures the use of cod liver oil has already been alluded to. Its use for long periods is certainly of great value. When an adequate amount of fat is lacking in the food, as in feeding with condensed milk, it may, within limits, act both as a prophylactic and curative measure. It is also valuable under other conditions in the subacute bronchitis to which rachitic patients are so liable. It is also the best of all mediums for the administration of phosphorus.

Recently in re-entering on my yearly term of service in one of the children's hospitals my attention was directed to an evidently rachitic youngster who was in bed because he was unable to walk. Enquiry elicited the information that he was an Italian aged 28½ months. When admitted to the hospital four and a half months previously he had seven upper and six lower teeth, but despite treatment with tonics, phosphates and good diet, he had shown no inclination to walk and had cut no other teeth. My suggestion that phosphorus be given him elicited the perfectly frank statement from the house physician that he supposed that the phosphorus treatment of rachitis had been long since "exploded" and discarded. Receiving, however, 1/200 grain of phosphorus in 30 minims of cod liver oil thrice daily, the child stood on his feet in less than two weeks, walked with assistance in twenty-one days, and just one month from the beginning of treatment walked alone and was cutting three additional teeth. These prompt results, which I had confidently expected, made a convert of the house physician. The opinion voiced by him at first, and which has been gaining ground in recent years owing to the position taken by some of the foremost writers on pediatrics, seems to me an unfortunate one and detrimental to the best interests of many rachitic children, inasmuch as I find phosphorus to be the agent which can be relied on to cut short most promptly the acuter symptoms of the rachitic process.

It is certainly important that no single remedy should

be emphasized so strongly as to lead the practitioner to the belief that with its use he may neglect the all-important dietetic and hygienic measures of treatment. Rachitis, indeed, tends to spontaneous recovery on the proper assimilation of a broader general diet, and special attention should always be given to the introduction of such articles as shall compensate for the previously insufficient proteid, but phosphorus is, at certain junctures, almost a specific. As seems most rational, it is particularly useful in rachitic instability of the nervous system—in tetany, laryngismus stridulus, head-nodding and the tendency to convulsions.

On children with a fairly developed musculature, but who have passed the usual age without walking or who, having begun to walk, have ceased to do so owing to a further advance of the malady, the effect of phosphorus is relatively brilliant. Such immediate results can not, of course, be expected when the musculature is not sufficient to support the body, but even here the effect may be seen in greater activity. On delayed dentition it has also naturally a less certain, but frequently favorable, influence.

Reasonably prompt in its action on the nervous system and in restoring the use of the limbs, its effects on the osseous system are necessarily slower and less readily detected. Bone deformities, though checked, remain or are but slowly affected in part. To this latter fact more than to any thing else I believe the skepticism concerning the efficiency of phosphorus to be due, for the rapidity of its action on different tissues and structures can not inevitably be the same and it is also difficult to differentiate its effects from those of other measures used coincidentally. My use of phosphorus with small quantities of cod liver oil opens, I am aware, an avenue for discussion, but the results in equally suitable cases have not been so prompt with cod liver oil alone. Out of several hundred cases in which I have used the combination of phosphorus and cod liver oil I can recall but two in which I suspected that it was not well borne. It is suitable for administration during the moderate or cold months of the year, but during the hot summer months or during an intercurrent attack of diarrhea its use, following the customary rule for all cod liver oil preparations, is suspended and the phosphates of iron and calcium are substituted.

Children with evident rachitis who are not under any antirachitic treatment may be found in most children's hospitals. I have been surprised to find how often rachitic evidences are passed over by hospital internes and also how frequently, when recognized, they receive no special treatment. This leads me to feel that their medical instruction concerning rickets has been such as to make them look on it as a condition by itself, with a well-developed symptom-complex which requires treatment only in its severer forms, but is negligible when its manifestations are but moderate, or when they are overshadowed by some more acute affection. This attitude of the hospital interne is probably fairly representative of recent graduates in general.

Much more attention than formerly is now given to the maintenance of well-balanced nutrition in the subjects of artificial feeding, with the purpose of avoiding the incidental starvation of particular structures, and, conversely, when such deficiencies are discovered measures are at once adopted for their correction. Of these the rachitic tendency is one of the commonest and its correction the most important on account of its possible dangers.

I would urge the necessity of an earlier recognition of rachitis, call attention again to the dangers with which it menaces the child and to the immediate importance of instituting special dietetic measures, and ask for a further consideration of the special value of phosphorus in cutting short the active and progressive stage of the disease.

DISCUSSION.

DR. A. W. FAIRBANKS, Boston, asked Dr. Southworth to what he attributes the inability of these children to walk; whether to muscular weakness, ligamentary relaxation, or to bone weakness. And, whether he considers that organic phosphorus has any advantage over the inorganic form in the treatment of these children.

DR. J. C. COOK, Chicago, believed that in the present state of knowledge of rickets, and in the frequency with which it occurs, physicians are liable to neglect other defects and find themselves in the state they were in 10 or 15 years ago with the teething children; in other words, dub every child rachitic that fails to walk, talk or produce teeth at the proper age. Dr. Southworth, he said, stated that rickets at five months was the earliest period at which the disease occurs. Dr. Cook has seen two children born, or has seen them within a few hours after birth, with well-marked rachitic rosary and laryngismus stridulus. He protested that so many of the spinal paralysis cases are liable to be neglected in the rachitic diagnosis, satisfying oneself that rickets exists, and that nothing else probably does. As stated by the author, the cause of rickets is ordinarily the food supply. Dr. Cook's experience has been that the food supply, while it may predominate, is not the sole cause. At a clinic attended by many colored and Italian children, he has seen many cases of rachitis, and from observation he is inclined to the belief that it is much more frequently a matter of hygiene than has been thought. Namely, a nursing baby, with the milk apparently normal as to laboratory findings, will frequently be found rachitic. It is not the artificially fed children only. The treatment of these children is getting them out of doors, and giving them orange juice. He claimed that if Dr. Southworth, instead of giving the children cod liver oil in the summer time, would put them out of doors, he will get quite as good or better results.

DR. J. L. MORSE, Boston, Mass., agreed with Dr. Southworth as to the frequency of rickets. Some years ago he studied nearly 400 consecutive babies in the out-patient department at the Infants' Hospital in Boston, and found bony signs of rickets in 80 per cent. Rickets, he said, is not as common as this in private practice, but he believes that 50 per cent. of the babies seen in private practice show bony signs of rickets. The only pathognomonic signs of rickets, in his opinion, are the skeletal. While there are other signs of rickets, one can not be sure that they are due to rickets, and not to something else, unless the bony signs are present also.

Dr. Morse believed that Dr. Southworth was claiming too much when he said that indigestion and many nervous symptoms are due to rickets. In many cases they undoubtedly are due to rickets, but in other cases they certainly are not. It is far more likely, he said, that indigestion is one cause of rickets, than that rickets is the cause of indigestion. Head nodding, convulsions and so on, merely show an irritable nervous system, which may or may not be due to rickets. Dr. Morse agreed with Dr. Southworth that in all probability unhygienic surroundings have almost as much to do with the etiology of rickets as has improper food. Rickets, in his experience, is more likely to occur in those taking a food low in fat and containing an excess of carbohydrates. This is one of the diseases in which, in his opinion, the much-abused proteids are not at fault.

He disagreed entirely, however, as to the presence of tenderness of rickets. Dr. Southworth said that he has seen the tenderness of rickets cured by orange juice. Dr. Morse believes that the tenderness was not due to rickets but to a complicating scurvy so mild that no other signs were present. Dr. Southworth also spoke of adding the white of one egg to the food in order to increase the amount of proteid. The white of one egg, however, is equal to but 12 calories. This amount

is contained in one tablespoonful of cow's milk. As to treatment, Dr. Morse agreed with Dr. Cook that the best thing is to put the patients out of doors. Next to that it is necessary to feed them properly. The food to be given is that best fitted for the individual infant, with possibly an excess of fat. He has given children phosphorus until he has feared that they would light if rubbed too hard, without having seen the slightest benefit. He thinks it is the other things which are done, and not the phosphorus, which makes them gain.

Dr. I. A. ABT, Chicago, thought that the teaching promulgated for many years that rickets is due to an excess of fats, has created a wrong impression as to the etiology. While rickets may, under some circumstances, be due to an excess of fat, his own conception from cases he has seen, is that it is due to a general toxemia, a chemical poisoning, produced by faulty metabolism. Perhaps, he said, the food ingested produces toxic products, which when in excess cause various bone symptoms, perhaps at times bone tenderness. Babies have pain; they are restless; cry; do not sleep, and Dr. Abt believes that this is frequently due to pain and bone tenderness. He believes also that rickets may be congenital. He has seen and read in the literature, of cases where children were born with cranial tabes, and where from the first day of life rickets became manifest. In a large number of these cases cranial tabes was definitely established, so that in certain families rickets is congenital. For instance, he thought that a study of Italian children would usually reveal congenital rickets. As to treatment, he agreed with Dr. Southworth, though he believes one mistake made is that physicians do not begin sufficiently early to feed something more than milk. Many of these children with rachitic tendencies may be given, at 7 or 8 or 9 months of age, animal broth, broths with vegetables boiled in, well salted. Dr. Abt believes that beef broth prepared in this way is antirachitic.

Dr. C. G. KERLEY, New York City, believes that rickets is a nutritional disorder due to defective feeding or defective assimilation. If it were an infection, it would be peculiar that just as soon as these children are fed properly and placed under proper hygienic conditions, they improve rapidly. Being then a nutritional disorder, the line of treatment is suggested by the nature of the disease. A high proteid diet, he said, answers best in those cases. In those under 1 year of age good cow's milk and oatmeal gruel have served him well. After the first year, milk, meat, eggs and gruels made from dried legumes have been entirely satisfactory. Of course, these substances need not form the diet exclusively, but they should form a large part of it. As to the value of cod liver oil, Dr. Kerley agreed with Dr. Southworth. The beneficial effects following the use of phosphorus he is inclined to doubt. Early in his professional life, he used it a great deal. One of his assistants, several years ago, suggested that they treat every other rachitic case with phosphorus. Careful observation of these patients, by weighing and measuring, showed that those which did not get phosphorus did as well as those which received it. The tenderness of rickets and the absence of typical signs, he looks on as incipient scurvy. Often times when these cases are given orange juice, they improve at once.

Dr. E. W. GOODENOUGH, Waterbury, Conn., said that inasmuch as there may exist causes of faulty nutrition in the uterus as well as after birth, there is no reason why there may not be rachitis at birth. As far as his experience goes, rachitis does not show itself until children are old enough to have indigestion and, as a result, faulty metabolism. A large number of children who are breast fed are fed by people who are not clean. Every time the baby cries, the mother gives the child the breast; fed frequently when well, if sick these children are fed more often, thus increasing their indigestion and giving them every opportunity to have autointoxication and resultant faulty metabolism.

Dr. L. T. ROYSTER, Norfolk, Va., about ten years ago was interne in the New York Infant Asylum, when he observed almost exclusively white cases of rickets. At present he sees only negroes. Every case that he saw in New York came in from very poor surroundings. It was a well-recognized fact that those children could not get well at the Sixty-first street branch, and they were sent to Mount Vernon, where they got

fresh air. As to the negro in the South, those children are frequently not weaned until 15 months old and eat ham and cabbage, or anything they desire. Dr. Royster has seen many cases of rickets in children breast fed by healthy mothers, and he sees many children fed on ham and cabbage at 6 months who have no rickets. But, he said, back of it all there unquestionably is the standpoint of hygiene, and the nutrition of the mother. It is an inheritance of unhygienic surroundings. Since the negro has been a free being he has not taken care of himself or his offspring. Any child that has a fever must be shut up in a room with a temperature higher than the child's temperature. It is a sin to open the windows and let in a little air. As to the matter of inheritance, the inheritance of superstition is paramount, and until that can be eradicated from the human mind, rickets will not be cured. A combination of cod liver oil and fresh air in his practice works wonders.

Dr. R. B. GILBERT, Louisville, Ky., believed that rickets is essentially a disease in which there is a deficiency of lime salts out of which the child gets bone and teeth. An early symptom is sweating and profuse urination. It ought to be recognized early. A mother who indulges freely in acid food, and who has the attendant fermentation in her stomach, gives her child milk that is acid, and the infant will soon become rachitic. Acid fermentation in the stomach of a bottle-fed baby is the same thing. As to the hereditary theory, Dr. Gilbert believes that there can be nothing in it. He has knowledge of two or three adults who had rickets in their childhood and were hunchbacks, and who have children who are normal. It means better hygiene, better assimilation of food, plus a better supply of lime salts to the bone. Heredity, he said, can be explained simply by a continuation of bad hygienic surroundings from one generation to the other. In his clinic there is a majority of the colored element and there is much rickets among them. He does not believe in the treatment by phosphorus in minute doses. He has tried it without any effect. As for orange juice, that is beneficial only in cases of scorbutus.

Dr. G. H. CATTERMOLE, Boulder, Colo., said that in Colorado the cases of rickets improve when the diet is sufficient and of a suitable kind. The patients usually seen are the children of Italian miners, but they are also found among the well-to-do. So far as he has had an opportunity to observe, frequent pregnancies are a predisposing factor.

Dr. T. S. SOUTHWORTH, New York City, answering Dr. Fairbanks' question, why these children did not walk, said he did not know. The rachitic process influences various structures in the body, not the bones alone, but the ligaments and muscles as well. As to the use of organic and inorganic preparations of phosphorus, he thinks that the use of phosphorus contained in the official oil of phosphorus is better than the use of it in chemical combination. It will, he said, cut short the acute symptoms of rickets more rapidly than other measures alone. He suggested that if some of those who have not had success with phosphorus, will give it careful use with that end in view, they will get a more favorable impression. He has seen rickets at three months. Of course, he said, the congenital cases have been recognized.

Hygienic measures he did not emphasize so much, because we all recognize that change of hygiene is often necessary. Dr. Morse, he said, misunderstood him if he thinks that he (Southworth) considers chronic indigestion to be a pathognomonic indication of rickets, without any other signs. He simply referred to the chronic indigestion which is so common an accompaniment, and part of the picture of advanced rickets. As to the tenderness of rickets, whether it is of scorbutic origin, that also is a mooted point. Certainly there are rachitic children who cry when approached and who show tenderness, but do not show any scorbutic stigmata when examined. Whether they would, if neglected for a longer time, show evidences of scorbutus, he did not know, but he doubted it. Dr. Southworth believes that the white of an egg daily in the food is useful. By stating the value of a food in calories not all is said. There must be assimilation of a sufficient amount of lime salts. Of course, there is almost too much lime in cow's milk, but the difficulty is to get that lime assimilated properly.