Pontifrat Dispensary
Apl. 26, 1893

I certify that Dr. L. J.
Lancrook has held
the position of Resident
Medical officer to the
Pontifrat General Dispensary
& Accident Ward since
August, 1891.

Res. Wood
Secretary
Pontifrat Dispensary
Sir,

I wish to enter for the M.D. examination and enclose my matriculation form with the fee of £6.5.6 which I trust will be correct.

Yours truly,

L. H. Hammond
THE DISPENSARY,
PONTEFRACT.

April 21st 1893.

Dear Sir,

I beg to submit the enclosed thesis for the M. D. examination. I declare that the work has been done by myself.

Yours truly,

A. J. Hammer.
Thesis for M.D. Examination

by

Leslie James Larnrock

April 21st 1893

When as a medical student in Edinburgh, I was doing my dispensary work, I was much struck by the great prevalence of rickets among the children of the poorer classes, especially amongst those of them who living in a densely populated area, were to occupy houses which were packed so closely together that to obtain a sufficiency of light, fresh air, and proper ventilation is almost an impossibility. In order to study the disease clinically and find out what I could as to its causation, I obtained the position of House Surgeon to the Portobello Dispensary and Cottage Hospital, knowing that cases of the disease were very abundant in the town. To carry out these investigations, I have kept a list of all the children, between the ages of five
months & three years which have been admitted to the dispensary during my residence, together with the diseases from which they were suffering. Six hundred & seventy five children between these ages have been admitted & out of this total one hundred & sixty nine were suffering from Rickets, in a more or less severe form, giving an average of a little more than 25% of the whole number.

From notes & observations made on these patients I have compiled the following remarks on the Clinical Characteristics of the disease & its complications together with the remedies which I have found most useful in checking its progress & relieving the symptoms among during its course.

Rickets is a disease of children but the age at which the first symptoms make their appearance is very variable. Most of the children have come
under my notice when between the ages of six & twelve months either is undoubtedly the most common time for the disease to make itself apparent. Cases however are sometimes seen where the symptoms have appeared at an earlier or a later age than this.

It is however often possible in these late cases to obtain a history of illness corresponding to the beginning of Rickets, commencing about the time when the first teeth should be cut, the child though never being in a dangerous condition always remaining delicate. Moreover the disease itself is very often overlooked by the mother & it is not until some of the complications arise that she seeks medical advice & the signs are then found to be well advanced. In such cases it is difficult to say when the disease started.

There is no doubt however that in some cases the disease is not developed or at any rate the
symptoms have not been seen much till the child is well into its second year. The latest age to which I have seen it make its appearance is twenty-one months. The patient up till that time having appeared perfectly healthy and having cut its teeth at the usual time. The child started with an attack of diarrhea which, being very persistent, left it in an extremely weak emaciated condition after which it developed rickets in rather a severe form.

On the other hand I have had three cases under me which, at the fifth month, the leading symptoms were well developed showing to my mind that the disease had been some time in progress. These cases however are excepted so in order to get as clear an idea as possible on the subject I have made out the following table which gives as near as I could ascertain the age at which the disease started in
all my cases, in making out this list I have had to be guided in some instances by the history obtained from the mother but I think it is accurate enough for all practical purposes.

From the 6th to the 9th month 6 cases began

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<th>Month</th>
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Before the 6th month 3

From this it will be seen that the disease starts during the period of first dentition, the child's health at that time being somewhat lowered so that the circumstances leading to the development of rickets are able to act with more effect.

The symptoms of rickets may be said to be general & local, the latter being due to pathological changes taking place in the bones & leading to various deformities.

As regards the general symptoms the child, as a rule, has, early
on in the disease a party anaemic 
look, its face appears pinched up. 
as if the disease has lasted any 
length of time the body is 
emaciated & the muscles are 
soft & flabby while if it is 
at all a severe one the child 
will not be able to walk or un 
stand though it may have 
walked perfectly well before the 
process set in.
It is generally very fretful & 
peeved crying when moved 
especially if its limbs are 
interfered with & at night 
it is extremely restless tearing 
off the clothes & lying uncer 
tered while its head which 
is often burrowed down into 
the pillow becomes bathed 
with perspiration. This 
sweating of the head is a 
very constant symptom & 
is often very profuse the 
pillows being wet through 
while in some cases the 
neck & upper part of the 
body may also be affected, 
when auditory & eczema are 
often also seen in these regions.
The whole body is tender but this is more especially marked in the arms & legs which if pressed constantly cause the child to cry out. This will also account for the dislike the child has for being handled. In some instances the muscles especially those of the abdomen are equally sensitive.

Sometimes, however, these general symptoms are not at all well marked & they are liable to great many variations. Sometimes the child instead of having a thin, drawn face may appear well nourished & its cheeks may have quite a rosy colour; & instead of being restless it may lie quite still staring up at the ceiling, & taking no notice at all of anything going on around it. Again instead of the muscles of the body being wasted you may find an abnormal amount of fat present.

In the large majority of instances however there are sufficient general symptoms present wit
which is to diagnose the case with almost absolute certainty, is this in important because they often occur before the changes in the bones are at all marked & would be liable to be over looked. & it is at this early stage that the disease cannot easily checked & measures which later on when the deformities have taken place, would be useless, often act with great success.

Although almost all of the systems become more or less affected in rickets, the chief pathological changes occur, as I have before stated, in the bones. & it is as a result of these changes together with the general debilitating effects of the disease that the other systems become influenced. It is therefore more convenient to describe the signs which are met with in the bones all together though none of the characteristics which will
be mentioned should, perhaps, strictly speaking, belong to other systems.
In looking at the child you are at once struck by the apparent large ness of the head. It is doubtful whether the head is really enlarged or not, but the smallness of the face & body make it appear to be so. The shape is also altered, the forehead is broad, square & projects prominently when viewed from the side. The parietal bones are also markedly prominent, while the whole head is flattened & compressed from above downwards. The sagittal, lambdoidal & coronal sutures remain open long after they should have closed & the edges of the bones bordering them are soft & readily yielding to pressure & at the same time they are thickened so that a groove is formed with a ridge on either side which can be felt running between the two parietal & the parietal &
frONTAL bones respectively. Sometimes, but very occasionally, the same thing occurs in the frontal nature the groove then extending down the front of the forehead. This was to be seen in the case of two of my patients in whom the head symptoms were very marked.

The anterior fontanelle which one expects to find occupied by the eighteenth month remains with few exceptions, more or less widely open in healthy children till the second or third year, sometimes even as late as the fourth, while the posterior fontanelle also often remains membranous for an abnormal length of time.

If the skull be grasped with both hands & the forefinger be pressed firmly over the surface of the bones around the Posterior fontanelle small conical spots may be felt which yield to the pressure, & may be indented making a kind of crackling noise which somewhat resembles the cracking
of an eggshell except that it is not quite so loud. The place
where I have found these spots most often have been on the
parietal bones, at their post- 
erior inferior angular, also occasionally on the occipital.

The bones of the face are small & ill-developed, giving it that
thin pirited appearance before mentioned, in marked contrast to the rizes of the
head. The jaws, especially the lower one, are sometimes alterned in shape the space between
the two sides being narrowed posteriorly whilst the lower
margin become turned out
wards & the alveolar surface
inwards. This interface with
the portion of the teeth will
be again referred to when the
latter are being considered.

In a few cases the head
symptoms are not at all mark-
ed, the skull does not appear
to be increased in rize &
the sutures & fontanelles be-
come closed at the usual time.
As regards the actual increase
in rise of the head in rickets, it is extremely difficult to give a decided opinion but on taking the average circumference in twenty healthy children & a similar number in which rickets was present I found the latter to be the greater by half an inch.

Some of the most characteristic & at the same time most important changes in the disease are to be found in the bones of the thorax.
The clavicles are of course prominent being much more sharply curved than normally whilst in some cases they become even bent at an angle so that the shoulders are carried backwards by pushing the fingers over the ribs two nodular swellings separated by a groove can as a rule be felt at the point where the bony portions meet the costal cartilages. These swellings are known as the "Ricketty knobs" or they are sometimes spoken of as the "Rending of the ribs"
Thus as the costal cartilages are of different lengths we have formed along each side of the thorax a row of nodular elevations extending downward & outwards. This is important & must be very carefully looked for whenever there is a suspicion that Rickets is present for it is sometimes the first & only sign to be found in a Ricketty child.

In some cases however they are much more difficult to find than in others, thus depending in a great measure on the amount of putriment for where the child's body is much emaciated they can not only be easily felt but sometimes even seen.

Accompanying these changes the whole form of the chest often undergoes a considerable amount of alteration in shape but here again the extent of the deformities vary & depend in a great measure not only on the severity of the attack of rickets but also on the amount
of bronchial obstruction & its attendant symptoms which has been present.
The antero-posterior diameter of the chest is lengthened while the lateral measurement
are diminished. Thus forming a somewhat pigeon-shaped breast but it differs
somewhat from the true form of this variety of deformed chest in that there is
more lateral retraction & the anterior surface is broader & flatter instead of being feel shaped. The
Two are however generally spoken of as the same. In
this way the cubic space within the thoracic cavity
may be greatly diminished & the changes are brought
about in the following manner. The ribs, like all the
other bones in the body, being softer than normal
yield more readily under pressure & hence when the
breathing is at all obstructed consequent upon bronchial
or laryngeal troubles so that greater efforts are required to draw the air into the lungs. The sides of the chest wall become drawn inwards by the contractions of the diaphragm aided no doubt by the atmospheric pressure without being greater than that within. Further these changes instead of being transitory as would be the case in an otherwise healthy child suffering from bronchitis, remain permanent the elasticity of the ribs appearing to be lost. The ribs most affected in this way are the second to the eighth inclusive, the three portions of these between the angles of the costal cartilages become bent inwards towards the thoracic cavity so that a broad groove is formed on either side of the sternum. The result being that the latter is pushed further forwards becomes very prominent.
the lower ribs, on the other hand, which overlie the solid organs, are often bent outwards forming the upper boundary of the abdomen; as this is an a rule desultory, it along with the projecting sternum causes the diminution in the lateral diameters of the chest above mentioned to be all the more marked.

The increased curve of the clavicles also helps to increase the deformity by carrying the shoulders further back. In some cases the changes in the ribs are more marked on one side than the other in which case the chest becomes asymmetrical. Another abnormality, which is sometimes seen, is for the upper border of the rib to occupy the position which should be held by the external surface, it having become twisted on its own axis.
The changes in the bones of the upper & lower extremities take place, as elsewhere, at the growing portions of the bone. The lower ends of the radius & ulna - particularly the former - are much enlarged both in breadth & thickness forming an ovoid prominence which, in extreme cases where there has been much wasting, appears to be separated from the hand by a groove, while the hand itself being as a rule small makes the enlargement of the wrist still more noticeable.

The upper portions of these bones, or rather their diaphyses, are often curved so that the concavity looks towards the flexor surface while in the humerus the most common distortion is a bending with the concavity forwards at the junction of the upper & middle thirds of the bone. The enlargement of the epiphyses about the elbow
is usually not so well marked as at the wrist though it does take place the lower end of the humerus being the most affected of the bones forming the joint.

In the lower extremity the changes are even more pronounced than in the upper. The lower end of the femur & the upper end of the tibia become greatly increased in size forming two prominences separated by a furrow & hence these patients are commonly thought by the poorer classes to be double jointed. Both the epiphyses of the tibia & fibula are enlarged at the ankle, the changes here resembling those at the wrist.

If the child be allowed to walk about while suffering from the disease the bones of the thighs & hips are apt to become bent & the distortion thus caused may last throughout out life. It is this way that the conditions known as 'knob
the latter is the more common
the femur in this case being
curved forwards & outwards,
the curve being continued
into the tibia & fibula in such
a way that a kind of semi-
circle is formed the knee
being wide apart while the
ankles meet
in knock knee the change is
more in the internal condyle
which is much more increased
in size than the external
the result being that the
knee is bent inwards towards
the middle line forming the
apex of a triangle the sides
of which are the thigh & leg.
In some cases the internal
condyle though lower than
the external does not appear
to be larger than it, in
which case the deformity
appears to be due to the
lower end of the femur
being curved inwards. In
both of these deformities each
side may be affected alike but
it is more common to find
one worse than the other. In addition to the curve taken by the tibia & fibula given above, they may be bent outwards or forwards, the ankle being widely separated or their lower ends may be bent forwards. The only case I have seen in which the bones were curved outwards was a child twenty months old who had never walked but was always crawling about the floor & here also the bones of the fore arm & upper arm were markedly bent more so than in any other child I have observed. This was no doubt due to supporting the weight of the body whilst the legs on the other hand were pushed out behind quite as in swimming so that more pressure was exerted on the outside of the foot. The family to which this child belongs are all sickly save the mother & all have deformities about the legs. The father, eldest
son a daughter are bow-legged
the latter markedly so; the
second native knock knees
whilst the youngest alive is
the case recorded above. Two
children have died one ten
months & the other fifteen mon-
ths old. The deaths occurred be-
fore I came here but they are
entered on the books as due
to convulsions following on
Rickets.
I mentioned under the gen-
eral symptoms the tenderness
of the bones which is often
manifest. This, though some-
times present along the whole
length of the bone, is as a rule
much more marked at the
epiphysial ends where the
enlargements have taken place
& in my experience the greater
the enlargement the more tender
has the part been. It varies
greatly however in degree, some
children crying immediately
they are touched while others
can stand a considerable am-
ount of pressure.
I have attended six cases
of fractures occurring in rickety children, in four of them the bones of the forearm were broken— all being green stick fractures—and in the other two the clavicle. They all came with a history of having fallen down on the affected part but as I saw none of them happen I do not consider that I am in a position to give an opinion as to whether the injury would have been sufficient to have caused a fracture in a healthy child or whether rickety children are more liable to fracture their bones than others. In writing much more callous seemed to be thrown out than is the case under ordinary circumstances.

The deformities of the arms and legs are proportionate to the amount of strain put on them during the disease for if the child be kept as much as possible on its back, the legs, except for the swellings at the joints, remain normal in shape.
In the spineal column, the dorsal vertebrea are often curved with the concavity backwards, the kyphosis thus produced being compensated for by lordosis in the cervical and lumbar regions. This is most marked in cases where the child has been set up in a chair for long periods at a time.

The curvature in rickets differs from that which occurs in tubercular disease of the spine by the curve being longer, not so abrupt but disappearing when the child is laid on its face & traction is applied to the spine above & below. Moreover it does not last for any length of time disappearing as soon as the child requires its strength, so that it seems to be due more to weakness in the muscles & ligaments of the back rather than to any pathological changes taking place in the vertebrea themselves.
In the pelvis various changes occur as seen from dry specimen but I have only had the opportunity of examining one woman whose case was as follows. She was twenty years of age, of medium height & appeared if anything to be broader across the hips than the average. There was no bending of the bones to be seen but she informed me that as a child she had had to wear iron to straighten her legs. She had been confined six weeks previously the child having had to be destroyed a month and a half after she had suffered a great deal from pain in the pelvic region on examining her for vaginismus the lower part of the pelvis was as capacious as usual but the promontory of the Sacrum was low down being easily reached by the finger while it projected forwards towards the pubis. The distance from the promontory to the lower
border of the pubic arch was 3½ inches which would give a conjugate diameter of only 2½ inches, a space much too small to allow an ordinary head to pass.

The changes in the form of the pelvis are of course of most interest to the obstetrician, and I have recorded this case quite to show that abnormalities do occur here as in all the other bones of the body.

By far the most important pathological changes in the alimentary system take place in the teeth and there form a most interesting study.

Almost always the development of the teeth is delayed and is not at all an uncommon thing for a rickety child not to cut its first tooth till it is well into its second year. In other cases the first few teeth make their appearance at the proper time and then there is a long...
interval before any more are seen, the dentine then not having developed till after the first were through. When the teeth do begin to come they do so at irregular intervals & are usually imperfectly developed being very soft & becoming discoloured soon after appearing above the gums so that very often they decay away right down to the gum before they are a year old. As a rule these changes take place equally in the upper & lower teeth but in other cases one jaw is more affected—generally the upper—these decaying away while those in the lower jaw remain moderately sound. It is also not uncommon to find the two lower central incisors cut at the usual time & for no teeth to appear in the upper jaw for some months afterwards. In some cases I had under me the central incisor appeared
one after the other between the eighth and ninth months, I saw perfectly black as they were cut crumbling away almost immediately after, in fact, they never got to reach much above the level of the gum.

Again in some few instances, I have seen denition go on normally & the teeth remain good but here the disease was not severe & the other symptoms were proportionately slight.

Often the teeth are not differently in the jaw. The crown, especially of the molars but sometimes the incisors also, tend rather to point upwards, while the incisors instead of forming a curve run in a straight line on either side.

The molars also form a starting line so that the two meeting form an obtuse angle. Thus instead of having an arched curve, the jaw assumes a polygonal form.

These differences apply especially to the lower jaw, the upper being very little affected except
that sometimes one side appears to be more developed than the other.

The appetite is as a rule very poor, often in fact this is the first symptom noticed; but in other cases the child will eat anything it is given, and in some of these cases that you get the fat developed normally about the body, & sometimes even excessively. A curious feature of the disease is the great desire for drinking, especially of water. Any other liquid may be offered, but none seems to be able to appease the great thirst in anything like the same way that water does.

In examining the abdomen, it is commonly found to be globular in shape, distended with gas (in marked contrast to the diminutive thorax) & more or less resistant to pressure while on percussion a tympanitic note is obtained all over it.
The liver & spleen are pushed downwards by the contracted thorax so that the former can as a rule be distinctly felt below the ribs. But I have never been able to make out that the area of the liver, though altered, was enlarged except in cases where the disease was complicated with something else as for instance in syphilis, where no doubt some enlargement does take place. The only other important condition met with in this system is diarrhoea & this is usually considered as a complication of the disease & will be treated later on.

Having described the peculiarities of the chest as regards its shape under a previous heading, the remaining features of the disease to be met with in the Respiratory system may be dismissed in a very few words. The breathing, when the chest
is at all deformed is quicker & shallower than normal & at each inspiration the flattened side of the thorax becomes drawn inwards still further, whilst the epigastric region is also drawn in by the action of the diaphragm. Along the borders of the sternum the percussion note is sometimes hyper-sonorous and the anterior margin of the lung to be emphysematous. On the other hand there is sometimes some impairment of the note on one side of the back the cause of which seems to be obscure as with the stethoscope no signs of consolidation are to be made out.

The character of the breath sounds varies according to the degree with which the disease has been complicated with bronchitis. In some cases however where there has been no bronchitis the breathing is much quicker than normal.
In the circulatory system the cardiac dullness sometimes extends further outwards on the left side than it does in the normal condition while the impulse heat may be felt both below and external to its usual position. These conditions are however only to be found when the deformity of the chest is extreme so that they would appear to be due, more to displacement of the heart by the pressure of the ribs, together with some collapse of the lungs, rather than to hypertrophy of the organ.

In the nervous system there are very few changes to be noticed. The large veins of the head together with the other changes in the bone which I have mentioned is often looked upon by the parents as friends to be due to "water in the head" but that it is not so is proved by the power the patient has to hold his
head erect. Moreover the mental faculties are very often, instead of being impaired, more than usually developed though some 
rickety children are very late in beginning to talk.
The headache is as a rule increased & both nerves & muscles are 
more irritable than normal.

The urine varies in different cases & there is nothing to 
be found in it as far as I 
can ascertain which is char-
acteristic of the disease. 
In thirty rachitic patients 
whose urine I examined 
quantitatively for phosphates 
I found that the lowest am-
ount secreted in the 24 hours 
was 1.16 grammes while the 
highest amount was 4.45 
grain, the average of the 
three cases being 2.9 grammes. 
Each patient's urine was 
examined six times at 
intervals of from a week to 
ten days & the amount was 
found to vary considerably 
in them all. For example
the one mentioned above as having excreted 4.55 grammes in the 24 hour was on one occasion found to have only passed 2.76 & on another 3.19 grammes.

The lymphatic glands in the neck & groin are very often increased in size & to a less extent those in the axilla & throat are also. The spleen is, in cases where there is much contraction of the thorax, sometimes pushed lower down & inwards towards the centre. The upper border of the splenic dullness in one case of mine corresponded with the lower border of the tenth rib & the dullness extended downwards to half an inch below the lower border of the twelfth rib & outwards to the anterior axillary line. The blood appears in some cases to be little changed, while in others there is a slight increase in the white blood corpuscles & a diminution
in the amount of rest, there is however nothing constant to be found in the blood.

Having given the principal symptoms it is now necessary to mention briefly the complications which which are liable to occur during the course of the disease — though the following conditions are not characteristic of rickets they are no doubt due in a great measure to or at any rate aggravated by its presence in the system. Ricketsy children are very subject to chest troubles, particularly Bronchitis & Broncho-pneumonia. Attacks of these complaints from which an ordinary child would soon recover if when met with in conjunction with rickets exceedingly troublesome & dangerous, but can this be wondered at when one considers the deformed chest so often present & even if it has not gone on to actual deformity the softened ribs have lost their original elasticity &
the breathing is thus interfered with.

Croup is another disease which rachitic subjects are very prone to be attacked by—a regularly enough the only cases of it—eleven in all—which I have attacked. The patients have all been under me before being treated for rickets.

Raspberry or Stridulus is another complication which I have seen present.

The digestive system sometimes recovers derangement altogether, but as a rule, sooner or later the appetite becomes lost or even what food is taken is often vomited against immediately. Along with this you generally get attacks of diarrhoea the stools being slimy, green in colour, very offensive so that the parents tell you they are sure the child has consumption of the bowels, a mistake which I believe is very often to be attributed to chronicists who often see the child first and give this as a kind of general
diagnosis.
The diarrhoea can be easily understood when the causation of the disease is considered for an unclean diet is undoubtedly one of the commonest causes.

Simple tonsilitis or throat are also met with but do not differ from that seen in other children.

Another symptom which complicates the disease is the convulsions, convulsions being very common, often most with the little patient just coming out of one fit to be seized by another. In this way I have seen a child pass the whole night keeping on in fact till it died of sheer exhaustion.

The skin eruptions which are most commonly met with in the disease are Erythema and amnion being due no doubt to the profuse perspiration which is so common.

I have also seen nervousness on two occasions the peculiar
feature of which was the extravasation of blood along the subcutaneous surface of the ribs & the marked tenderness on pressure of this bone.

I have now described all the signs & symptoms which I have observed in cases of Rickets but it must be thoroughly understood that the clinical history of the disease does not, in every case, present by any means all these characteristics & in really well marked cases some of the leading features may be absent.

The signs most frequently present & upon which most reliance can be placed are the tenderness of the ribs & the enlargement of the sides of the long bones while the cranial symptoms also are as a rule present.

As regards the duration of the disease my patients have not been under me long enough...
to enable me to say anything very decisive as to the exact length of time rickets remain in the system or its symptoms or consequences continue to manifest themselves. One thing, however, is certain and that is, that the sooner the disease is recognized, the more amenable it is to treatment and the sooner does it take its departure.

My experience leads me to believe that in most cases, after lasting for eighteen months or two years, the enlarged ends of the bones become less prominent and the other symptoms at the same time begin to disappear. The child becomes able to stand by itself and then to walk. The teeth begin to make their appearance, and the rickets, a fortunate phase, becomes ossified. The whole appearance then becomes more suggestive of health and the attacks of bronchitis and diarrhea which were before so frequent gradually cease to appear at all.
Whether the deformities disappear or not will depend in a great measure on the extent to which they were present. If the legs have been marked by twisted, the patient may be dwarfed for life though even the conditions known as "bowlegs" & "knock-knee" often become much modified along with the general improvement which takes place.

The effects of the disease on the thorax & pelvis also leave lasting results so that even after puberty, a cure may be diagnosed as having passed through a sickly infancy. On the other hand if the child be properly attended to when the joint signs manifest themselves an improvement often takes place immediately & within six months all the symptoms have disappeared leaving the child little if any worse from its effect. All sorts of variations from the general rule like this are to be met with some
infants rearing for several years without the slightest improvement. For instance, a case came under my notice in which Rickets had been present for over two years, it continued in the same state for another eighteen months, and then died in consequence. 

It thus seems probable that while the ordinary duration of the disease is about eighteen months, this period becomes modified according to the treatment a cure which the child receives.

The diagnosis of rickets is, as a rule easy, but it is generally only when the disease is first commencing that a mistake is liable to be made; even then, there is as a rule sufficient evidence to guide one as to what the disease is. The point to be borne in mind is that Rickets children are very prone to
attacks of bronchitis Deinhoevee is that in all cases presenting these symptoms the first thing to be found out is whether rickets is the cause of them. This is more important because as I have said before many patients are first brought under the medical man's notice on account of the complications, the signs of rickets not having been recognised so that if they are now still further overlooked as much more valuable time is wasted before the proper course of treatment is commenced.

As regards the prognosis, rickets is not of itself a fatal disease the majority of cases ending in complete recovery, but it is the complications which are most to be feared in this respect. I have had seventeen deaths in which the primary cause was rickets, in ten of these bronchitis was the secondary
cause, in nine convulsions, while in the remaining one an attack of crops proved fatal. There is no disease in which the progress is more dependent upon the care with which the child is attended to the physicians instructions are carried out than rickets.

Causes: As the disease is so much more prevalent among the children of the lower class, it follows that there must be something in their style of living which causes or at any rate predisposes to the disease. In Pontefract (the town from which the cases occurred from which these notes were taken) most of the working classes live in narrow yards, the houses being built on either side with in some cases so little space left for a passage between them that it is impossible to hold an umbrella open as you walk along. Their houses have no back door so that all
the light & ventilation which reaches them has to come from the passage & consequently on coming in from the fresh air one is almost stifled on entering one of their rooms. A very great proportion of the children which I have attended in these yards have suffered from rickets. There are however some working-class houses which are properly ventilated & in these rickets is comparatively rarely seen. Therefore I think that want of proper ventilation & light may be put down as one of the principal causes of the disease.

Uncleanliness is another of the leading causes, some children when first seen being simply caked with dirt so that all the pores of the skin must be filled up. By far the largest proportion of the cases of rickets occur in children who have been brought up on the bottle so that instead of getting the mother's milk they have had
some other substitute. Very often this is preserved milk or
This is I think particularly liable to start rickets the chil-
dren thus fed being almost always soft and plabby. In other
instances you see children from the very first being fed on oat-
meal, arrowroot, tanks or bis-
cuits & as a consequence having frequent attacks of diarrhoea.
Too little care is also taken with regard to the cleanliness
of the bottle in fact in many
cases this is not thought of at all.
When rickets does occur in children who have been suck-
led by the mother the milk is usually thin & watery
though sometimes no cause of this kind can be found.
Again the disease is sometimes seen in those children in whom
the process of weaning has been deferred till long past
the usual time. Here the child
does not get strong enough
food instead of it being too
strong for its digestive powers
as in the preceding case. It is very difficult to say whether there is a hereditary tendency to rickets or not for as the effects are not always lasting you have to depend on the history & this can very rarely be found out with any degree of certainty. I have seen cases in which with arickety father or mother almost all the children also had rickets. The mother's health during pregnancy & lactation has I think something to do with the causation for very often you find a weak, anemic woman who a child which develops the disease but certainly these cases are often brought up on the bottle that may account for it. The same thing is met with in cases where the mother in suffering from anemia or other debilitating diseases. One thing at any rate is certain, namely, that in a large family the first children often grow up quite healthy while the later ones become attacked.
by rickets, but on the other hand if the first child has rickets the other almost always have it also & this seems to me to be due to the weakening effects of too prolonged child bearing on the mother's system.

Treatment.

The first thing to be done in the treatment of a case of rickets is to remove as far as possible the existing cause, thus if the sanitary condition of the house is at fault it should be remedied & the feeding & cleanliness of the child must be seen to. With well-to-do people these points should be able to be carried out without much difficulty, but with the poor it is altogether different & here the difficulty lies for it is with them that we have chiefly to deal. A great amount of good can however always be done in this direction if the mother is only willing to follow instructions.
The room in which the child sleeps should be kept perfectly clean and as the ventilation is usually very bad both the window & door should be kept open during the day as to make it as fresh as possible for the night & if it can be managed no one but the father & mother should sleep in the same room with it. During the day & provided there is no bronchitis or other complication present it should be taken out in the fresh air as much as possible but care must be taken to have it well clothed to prevent its catching cold. Every night & morning a bath should be given & the child's clothes must be frequently changed. If the diet has been at fault one suitable to the patient's age must be substituted; then if it be over a year old & be still awkward it should be weaned at once & given cow's milk, eggs & a little minced meat. If a feeding bottle is being
used it should be kept scrupulously clean & the food should be prepared in small quantities at a time. Two bottles should always be kept, the one not in use being filled with a solution of boracic acid.

In order to prevent as much as possible the occurrence of deformities the child should be kept lying down & all attempts at walking prevented till the bones become firm.

Having attended to these general conditions the remedies which I have found to have most influence over the disease are Parrish's syrup & cod-liver oil, half a teaspoonful of each three times a day. In some cases the latter is not borne well by the stomach & the dose has either to be diminished or stopped altogether. If the child be well nourished it may not be required & then bismuth ferris or zinc ferris perchlor are very useful. The chief objection to them being that they have a tendency...
to set up diarrhoea in which case lactate of iron in 5 grain doses three times a day may be substituted.

With these remedies I as a rule order tullerini's food which I have found to be by far the most useful of artificial foods. In other cases raw meat juice & Caffarin Liqueur Carmin are also of great service.

If here there is much emaciation & other measures have failed rubbing the whole body over with olive oil night & morning often acts in a very beneficial way. A cold douche to the head & back are also often of much use.

If any diarrhoea be present a small dose of Carpenter oil should first be given & after this has acted I have found in Epsom salt & a high Perchlorurit, taken every hour, act better than anything else, but should this fail then Bismuth or Chalk should be tried.

For restless new Bromide of
Potassium or Chloral are useful but after the diet & living have become properly regulated this generally ceases of itself.

When the perspiration of the head & neck becomes excessive it can usually be stopped by sponging the face with dilute tartr-oxy-hydrochloric acid & I much prefer this to giving Belladonna internally which has the same effect.

Bronchitis & other chest complaints must be treated on the ordinary principles except that I think that poulticing should only be resorted to where absolutely necessary as in most cases covering the chest with a thick layer of cotton wool is just as beneficial & is not followed by the depression which sometimes seems to be caused by the poultices.

When deformities of the limbs have occurred they may when slight be reduced by rest & pressure, but in other cases where they are
more marked, a surgical operation may be necessary.

R. F. Harrroch.