A Clinical Lecture

ON A

CASE OF MULTIPLE DISEASE OF JOINTS IN A YOUNG CHILD.

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GENTLEMEN,—This afternoon we are going to discuss the case of this little boy whom you see before you, and I hope that he will prove to be of some interest. I have here the report about him made by Mr. Mollison; and he tells us that the boy is 5 years old, and that he has come into the hospital on account of swelling of many joints and enlarged lymphatic glands. The family history is unimportant. He is one of eight children. He is said to have had jaundice two and a half years ago following an attack of diarrhoea and vomiting. He walked at the age of 10 months. He had an attack like the present, the history tells us, three years ago. His mother says that then the ankles first enlarged, then the knees, and at that time the glands were also enlarged and painful. The present attack began at the end of March, 1904, and it was similar to the previous one. The swelling of the joints began this time in the ankles and knees, the affection of the knees preceding the ankles by a very short time. The joints swelled and became painful; and after the knees and ankles were involved the fingers were affected, and after this the neck became stiff; he cannot turn his head properly even now. Then other joints in the body, which I will show you presently, became enlarged and painful, as well as various glands. I think the best thing I can do next is to show you the boy, and then we will go over what are the possible causes of the condition in which you see him.

From any part of the theatre you will be able to see that many of the joints of his hands are enlarged. The interphalangeal joints of all the fingers of this hand are affected. The joints in the thumb are affected, and you can see that his wrist is swollen. On looking at his other hand you will perceive the same state of affairs, the interphalangeal joints being most enlarged. The wrist is considerably swollen. I will now show you the feet and the knees. The moment his stocking is pulled down you can see how very much enlarged the knee is, and he cannot bend it; the ankle, too, is considerably swollen, and the same is true of the knee and ankle of the other leg, and some of the toe joints in each foot are enlarged. Coming back to the upper extremity, you will notice that that elbow is very considerably enlarged, and so is its fellow. We are not sure whether the shoulders are diseased; we have not detected any affection of the jaw, and we do not think that the sterno-clavicular articulations or the articulation of the clavicle and the scapula are enlarged. You see that he cannot move his head freely, and the mother is certain that the neck has become stiff. Lastly, we believe, judging from the position he takes up in the bed, that the hips are affected, although we cannot tell that there is any enlargement of them. The other thing which was noticed about him when he came in was that he has enlargement of many of the lymphatic glands. In the neck here, if you feel him afterwards, you will notice some enlarged glands in both anterior triangles, especially the left. The glands in both axillae are strikingly enlarged, and they are quite discrete. You can slip them about and move them freely under your finger, and separate them one from the other. When he came in one epitrochlear gland was enlarged, but recently we have not been able to find that. It is easy to detect the enlargement of the glands in the groin, and also in Scarpa's triangle. The glands there have the same characteristics as in the other parts of the body—that is to say, they are considerably enlarged and discrete, and at times a little tender. Those are the only glands which appear to be affected, but you will see that they amount to a good many. Another point which on some days we can make out is that the spleen is two-fingerbreadths below the edge of the ribs. It is important to note that we found the boy's heart perfectly healthy.

We will now consider what might be the disease which would cause the state of joints which you see in our patient. I suppose every one of you would first of all say the boy may be suffering from osteo-arthritis. But before you say that you should consider precisely what you mean by it, because unless

you do, your employment of the word will be perfectly useless. I think everybody ought to mean by osteo-arthritis, a chronic disease of joints in which the synovial membrane, the bone and the cartilage are all affected. Clearly osteo-arthritis becomes a misnomer unless the bones are affected. You know what happens. It is a very common disease. Gradually the cartilage gets worn away, the bone underneath becomes eburnated, new bony growths take place at the side of the joint, there is a good deal of lipping, and finally the joints are more or less fixed and also there is bony grating detected when you move the joint. The first question you will ask yourselves is, does this disease, which is so commonly found in elderly women, occur in children? It undoubtedly does, but it is so rare that many of the largest textbooks omit mention of it altogether. And even Dr. Goodhart, with his very large experience, in the last edition of his book on children's diseases, only refers to having seen five cases, and in four of those five the joints were described as pulpy. In none of the children was a necropsy obtained, and the term "pulpy" rather suggests the possibility of some of these five cases having been tuberculous. At any rate, there was not a necropsy in a single one, so it is at all events possible that some of those five cases were not osteo-arthritis after all, and Dr. Goodhart's experience, I think, shows you how excessively rare osteo-arthritis must be in children. The best account I know of the disease as occurring in children is given by Dr. Donkin, and he does distinctly say in his book that he has seen osteo-arthritis in young children. He describes an insidious disease coming on in them, affecting, as it does in adults, the hands first, and other small joints, and then the larger joints. And Dr. Donkin mentions that there is a swelling and displacement of the bones, and grating and creaking and ankylosis and erosion of the cartilages, and bony outgrowths, and lipping of bones. So you see he alludes to all the features that we have said were essential to a definition of osteo-arthritis. But, as I have said, although it is described as occurring in children, you must remember it is so rare that many of the best textbooks do not even mention it. However, we thought we would see whether this child was an instance of such a very rare disease.

The first thing, therefore, which occurred to us on looking at these joints was to determine whether there was any bony enlargement. You see the knee is large, and shows up quite plainly even at a distance. On looking at the report which Mr. Mollison made when the child came in, we learn that some bony enlargement of the femur and tibia was described. And so large does the knee look that I must confess when I first examined it it seemed to me that these bones were enlarged. But my belief in that was shaken by having some prints of x-ray appearances taken, and these prints I will pass round, and you will see there is no evidence of any bony enlargement whatever round about the knee. Here are also x-ray photographs of the hands, and you will see there is no evidence of any bony enlargement in connexion with those enlarged joints. The very day on which these prints came back from the x-ray department Mr. Golding-Bird was in the ward, and we asked him to look at these joints, and he unhesitatingly gave the opinion that there was no bony enlargement at all. So the appearance of bony enlargement is deceptive, and I think we must accept Mr. Golding-Bird's opinion, which is confirmed by these photographs, that there is no enlargement of the bones. Now, the illness of this child began two or three years ago, and it would be unusual to have such a severe case of osteo-arthritis as this is, having lasted two or three years with no detectable bony outgrowths anywhere in any of the affected joints. Then I would point out to you another thing—that although there is a good deal of enlargement about the joints, in all of them it is such a symmetrical enlargement that it does not suggest bony outgrowths; it suggests more an enlargement of the soft tissues round the joints. And then again, another point is that we cannot detect, although the disease has lasted all this time, any locking on account of bony outgrowths, nor can we find any bony grating indicating that cartilage has become eburnated, so that clinical examination of these joints does not point to the fact that they are an ordinary instance of osteo-arthritis. Further, you must remember that the diagnosis of osteo-arthritis would fail to explain what is so strikingly shown—the enlargement of the glands which you can see in various parts of the body. And perhaps I ought to have told you earlier that when osteo-arthritis does affect young subjects it

is nearly always confined to children who have passed their second dentition, so it would be almost unknown to get it in so young a subject as this. I think you will therefore agree that we must put aside osteo-arthritis as a cause of this child's condition.

I think the next suggestion you should make to yourselves is, could this state of joints in any way be connected with rheumatic fever or the rheumatic state? You all know, because it is so continually drummed into you in the wards, that the rheumatic state in children is different from the rheumatic state in adults; that rheumatic fever—that is to say, a disease with sweating and pain flying about from joint to joint, with some swelling of the joints and fever—is very rarely seen in children. It has been described, I believe, in a child as young as $3\frac{1}{2}$ months, but it is quite exceptional. Rheumatic fever such as we see in adults, is very, very rarely seen in children. You further know that, even in adults, in whom rheumatic fever is common, it is in the highest degree exceptional to find any permanent damage left in the joint. You know if you go up to any examination, and are shown a case of chronic joint disease, and you suggest that it is a sequel of rheumatic fever as a first suggestion, it would tell against you, and I think rightly so, for such a condition is very rare. So that, inasmuch as striking rheumatic fever in children is very rare, and, further, as even in adults severe chronic disease of the joints following upon rheumatic affection of the joints is almost unknown, it would be in the highest degree exceptional to get a post-rheumatic fever chronic disease of the joints in a child. Nevertheless, this is an uncommon case which we have before us, and therefore we are bound to consider that possibility. Now, as this condition is so very rare, we ought, if it exists in this child, to find some evidence of the rheumatic state. But please remember I told you that the child's heart is perfectly healthy, he has never had chorea, does not suffer from any subcutaneous rheumatic nodules, has never had erythema, nor suffered from tonsillitis. In fact, he has not got a single one of the conditions which are grouped together under the head of rheumatic conditions. So that there is absolutely no evidence of a previous rheumatic state, and it is admitted that it would be very exceptional even if there were, for this chronic affection of the joints to follow. Therefore we must, for want of evidence, put that possibility out of court. I do not want to leave this subject without assuring you that, rare as it is, chronic disease of the joints after rheumatic fever does exist in children. Fortunately a child with the affection was under my care, and I can show you photographs of him. He was a child, aged 12, who came under me many years ago. He had been in the hospital at the age of 5 with chorea; at the age of 7 with pain and swelling in several joints, endocarditis and pyrexia, and at 8 with erythema, fresh endocarditis, pain and swelling in several joints, and the condition was relieved by salicylates—a perfectly typical rheumatic history. When he came in at the age of 12 there was much muscular atrophy, with fixation of all the joints of the four limbs, fixation in the position of flexion, and the movements of the neck and jaw were impaired. It is true that some of his lymphatic glands were enlarged, and it was suggested that the patient was an example of the disease of children associated with the name of Dr. Still. Against this view was the fact that the chronic inflammation of the scalp would explain the enlargement of the glands of the neck, and that they were the only ones strikingly enlarged. The patient died at the age of twenty at his home, and Dr. H. J. Starling, who was my house physician at the time, was good enough to go and make a *post-mortem* examination. The child was in the hospital at twelve years of age, so you see we kept an eye on him for eight years. Dr. Starling found that the boy had mitral disease, and that justified us in assuming that this severe condition of joints was a post-rheumatic state of affairs. You can see at a distance the great enlargement of the joints shown in the photograph of this boy. That is the only instance I have come across of that very rare affection—a chronic disease of the joints in children supervening upon rheumatic fever. Authors refer to it. Heubner refers to cases quite as severe as that just mentioned—one in particular in which the spinal column was affected: the neck was stiff, and the joints rigid, and most of the joints in the body were implicated, and in addition the child had a mitral murmur. And he describes other cases which he has seen in which the temporo-maxillary joint was affected and the small joints of the hands and feet were involved. But

you must never diagnose the condition unless you have some evidence of the possibility of a rheumatic strain in the patient.

I think I may now point out to you that it is an excellent rule in clinical medicine, whenever you have any disease at all out of the way, always to have the possibility of syphilis in your mind. You will in this way save yourself from many mistakes, and I think we should consider whether the condition you see in this child can be due to syphilis. Exceptional cases in which syphilis has been acquired by young children have been recorded, but such an event must be so rare that, as there is no evidence for it, we may put it out of court and come to the fact that if the disease is syphilitic the syphilis is congenital. That raises the question, What can congenital syphilis do to joints? Every one of you knows that one striking thing which it can do is to produce epiphysitis—a condition in which the epiphysis becomes very loose and the patient cannot move the affected limb; and for this reason such cases are frequently called cases of pseudo-paralysis, because, although there is no real paralysis of muscles, the condition of the joint, due to the separation of the epiphysis, leading to immobility of the limb, gives rise to the belief that the child is the subject of some paralysis. This is such a striking thing that you cannot overlook it; and any of you who have seen it in the out-patients department in little children can bear me out that there is nothing like it here; and, furthermore, the separation of the epiphysis which occurs in congenital syphilis is one of the earliest signs of congenital syphilis, and almost invariably occurs under the age of six months. This child is six years old, so his illness clearly does not fit in with that. A symmetrical synovitis is described as occurring in congenital syphilis. It is very rare, but it is worth bearing in mind, still it would not affect a number of joints like this, and it is a more acute affection. Some authors have described, apparently with justice, a third very unusual syphilitic affection of joints which occurs in rather older children from 5 to 12 years of age, an affection which is indistinguishable from osteo-arthritis. There is in this disease destruction of cartilage, lipping of bones, grating, and ultimate fibrosis. The objection to believing this case to be an example of this disorder is that we have looked at this boy and there is no evidence of his having had congenital syphilis, nor is there any grating, nor any bony outgrowth nor fibrous adhesion about the joints. So that the condition of these joints does not in any way conform to the suggestion that they may be the result of congenital syphilis, therefore that we may put aside congenital syphilis as a cause of this illness.

I do not think that in such a chronic case as this acute or subacute pyaemia need worry you much. I only mention it because whenever you are seeing anybody with joint disease let such a possibility pass through your mind, and you will prevent fatal mistakes in the more acute cases. It is no uncommon thing—as I am often pointing out to you in the wards—for cases to be believed to be examples of rheumatic fever when in reality they are pyaemic, and for the mistake not to be discovered until too late and the patient dies, when, had the mistake been recognized earlier, the source of the pyaemia might have been dealt with and the patient might have recovered. Although it hardly bears on our present case, this is such a serious mistake that I feel you will excuse me if I tell you of one or two cases we have had in the wards.

There was a man I remember who was transferred from the surgical wards because he was thought to have rheumatic fever. We found that he had pneumonia, which is a rare complication of rheumatic fever, so that made us examine him very carefully, and we found that he had a prostatic abscess. We thus learnt that his trouble was pyaemic, but too late. The abscess was opened, but he died of pyaemia. A man was admitted under me with supposed rheumatic fever, but really he had pyaemia from a sore on the heel. I recall another case which was thought to be rheumatic, but it was pyaemia originating in suppurative ear disease. And with all these three cases I am sorry to say the diagnosis of pyaemia was confirmed by *post-mortem* examination. Remember, too, that the mistake is not infrequently made between rheumatic fever and the acute epiphysitis that young children often get, which is a pyaemic condition. However, I only mention these things because they are so important, but they cannot bear on a chronic case like this.

It has, of late years, been said that some cases of chronic joint disease, vaguely spoken of as rheumatic, are really in-

stances of chronic infective arthritis. I think that is so, but I also think that the number of such cases is exaggerated. Some time ago a woman suffering from chronic osteo-arthritis was in the hospital; it was suggested that really she had chronic infective arthritis, and consequently, as they were much diseased, all her teeth were cleared out and several suppurative foci removed. I wrote to her a year after she left the hospital, and I found that her chronic rheumatic condition had persisted. So you must not assume because there is a focus of chronic suppuration that every case of chronic joint disease associated with chronic suppuration is an example of chronic pyaemia. A few are, but the majority are not. Here is one which, for instance, I think is. An old lady who had pyuria was said also to have chronic articular rheumatism. On going into the case I found that the joints had only been affected since the pyuria began. The shoulders, ankles, and right knee were implicated, the shoulders being nearly fixed; there was grating in the right ankle, the knees were swollen and tender; there was no affection of the hands and feet, which are so commonly diseased in chronic articular rheumatism. I think that was an instance of chronic infection of joints following upon pyuria. These observations are not relevant to the case of this boy, for he has no source which could infect him with chronic pyaemia.

I am always telling you that gonorrhoeal arthritis is a malady which is frequently overlooked in adults. That hardly applies here. It is true that at this age infection by gonorrhoea has been known, but such a case would be a curiosity. But please never forget, when examining adults with chronic disease of joints, to think of the possibility of its being gonorrhoeal. I never knew gout affect a child of this age, and we can put that aside. Haemophilia is a disease which you should never forget when thinking of joint disease, because if you fail to do so the results may be so disastrous; the joint may be opened and the patient bleed to death. But haemophilia never affects thirty or forty joints, as is the case here. I have known a case of cerebro-spinal meningitis give rise to difficulty, but that is an acute state of affairs. It is ushered in, it is true, by pain in the joints and stiffness in the back of the neck; but, as I have said, it is an acute condition and not chronic, so we can put that aside.

Up to this point you may say this is a very unsatisfactory discussion, because we have learnt so many things that the case cannot be. But I hope we have now reached a stage at which I may point out that it conforms admirably to an account of a joint disease which was given by Dr. Still, and in order that there should be no doubt about the matter I brought down the very words of his own account. He says: "The disease may be defined as a chronic progressive enlargement of joints associated with a general enlargement of the glands and spleen." You see that fits the case of our boy. "The onset is insidious," as in this child, "and it almost always occurs before the second dentition"; this began at the age of 3. "The child complains of stiffness in the joints which slowly become enlarged, and subsequently other joints become affected." That obviously fits this case. "I wish to lay some stress on the character of the enlargement of the joints. It reels and looks more like a general thickening of tissues found the joint than a bony enlargement, and is correspondingly smooth and fusiform, with none of the bony irregularity of the osteo-arthritis." You see our case exactly conforms to that description. "The absence of osteal growth and anything like bony lippling, even after years have elapsed since the onset, is very striking. There is never any bony grating, although creaking of tendon or cartilage is frequently present. The absence of pain is very striking, and limitation of movement—chiefly of extension—is almost always present." You see there is in our patient an inability to extend the joints, there has been no pain since the first onset, and there is no bony grating. "The child may be completely bedridden, owing to the affection of the joints." In Still's case the earliest joints affected were the knees, and that was so in our case. "Subsequently the wrists, the cervical spine, the ankles, the ribs, and the fingers. The affection is symmetrical." That is another striking thing about it. You can see in this boy's two hands how symmetrical the change is. "There is no tendency to suppuration or ankylosis." You can examine his limbs afterwards for yourselves to see the truth of this. "The muscles which move the joints show early chronic wasting." Look at the wasting here and round the femurs and you will agree that the wasting is extreme. "Perhaps one of the most distinctive features is the enlargement of lymphatic glands. The enlargement is general, but

affects primarily and chiefly those related to the joint affected. The glands are separate, rather hard than soft, and not tender, and show no tendency to break down." If you will examine the glands in the axilla and other parts afterwards you will find that in every point they conform to the description given here. These enlarged glands have been present for many months, but they have not broken down. "More often they do not become larger than a hazel nut. The glands most affected are the supratrochlear—those along the brachial artery, those in the axilla, those in Scarpa's triangle, those deep in the iliac fossa, those in the deep angle of the neck." All those are affected in this case except the iliac glands. Still mentions enlargement of the spleen, which we have seen exist in this patient; and then he goes on to emphasize again the character of the enlargement of the joints. He says: "There is marked thickening of the capsule and connective tissue just outside it; there is also thickening and vascularization of the synovial membranes"; and if you will examine this patient you will see that you can detect thickened synovial membrane between the tibia and the femur, "and in many of these joints the uniformity of enlargement suggests a general thickening of the synovial membrane." He is speaking next of the *post-mortem* appearances as confirming the suggestion that the disease is not osteo-arthritis. He says the cartilage may be perfectly normal. "A case in which the disorder had lasted three years showed pitting of the surface of the cartilage from pressure, very marked processes of synovial membrane fitting into the pits, no fibrillation, no osteophytic change, no exposure or eburnation of bone." It is, you see, a synovial and not a bone or cartilage disease. "The enlarged glands appear normal on section"; and I think that that completes the description of the disease. So you will agree with me, I am sure, that this child conforms very accurately to that description.

Now, that description was given in 1896, and the only important work in connexion with the disease which has been done since, as far as I know, is that bearing on the suggestion which has been put forward that this disease is really a form of chronic tuberculosis. The suggestion was originally made that many cases of chronic osteo-arthritis are really chronic forms of tubercle; and I have here a paper in which the attempt was made to solve that question by Dr. Edsell and Dr. Lavenson. It is a paper which was published in the *American Journal of Medical Sciences*. The way they set out to investigate the question was to give the patients injections of tuberculin to see whether they reacted. The experiment, of course, is not conclusive, because the patient may react, having tubercle elsewhere, and yet the joint disease may not necessarily be tuberculous; but it is a striking thing that of a number of cases here recorded of osteo-arthritis so-called, in some enlarged glands were present, and in some they were not, and almost without exception it was the people with no enlarged glands who failed to react to tuberculin injections, and it was the people with enlarged glands that did react to tuberculin.

But that is not really the matter which concerns us this afternoon. Our concern is as to whether the disease in this little boy, which is exactly like the disease described by Dr. Still, can possibly be a form of chronic tuberculosis. One of the cases of Dr. Edsell and Dr. Lavenson was an example of this disease, and very briefly I will give you the points about it. The patient was a little boy who was 11 years of age when he was admitted into a hospital, and he had trouble in all the joints, much as our patient here has, and his axillary glands, and also his epitrochlear and inguinal glands were enlarged, and the splenic dullness was increased. He was sent out of the hospital and came to a home for incurables two years later. The glandular enlargement was much more striking; many of the glands were affected and many of the joints were involved. It would be tedious to read to you the full description of the condition of each joint, but the point of the case is that he was given tuberculin injections, and the result was that after injecting 3 mg. the temperature rose, the boy felt miserable, and his joints, which had been free from pain for many months, became painful again, and he begged that the massage be omitted. Tuberculin was given again, and again the temperature rose and the joints became painful. Several of the enlarged glands were removed, and they did not appear to the naked eye to be tuberculous. Sections were examined for tubercle bacilli, but none were found. Inoculations were made from an emulsion of several of the largest glands, and the emulsion contained organisms having the perfectly typical appearance

of tubercle bacilli, but the authors say they were surprised to find that the inoculation of this material into guinea-pigs was entirely negative. So their case does not prove anything, but at the same time it is suggestive of the possibility that these children affected with multiple chronic affections of the joints and enlarged glands and a large spleen may be suffering from a chronic form of tuberculosis.

There are only two other points that the case raises to which I should like to direct your attention. The first is the extreme degree of arthritic atrophy. I would like to point out to you, what you are often forgetting, that that atrophy has nothing whatever to do with the disuse of the joints; it is much too extreme for that. It has, in some obscure way, a nervous origin. The growth of muscle and the activity of the joints are co-ordinated probably in the spinal cord, so that if the joints become useless the muscles rapidly waste. Wasting of muscles following arthritis does not occur in animals if the posterior roots of the cord are cut.

And the last point, which we have not time to go into thoroughly now, is to remind you that I have throughout the lecture used the word "osteo-arthritis" as distinct from rheumatoid arthritis, because I am constantly showing you in the words that the diseases lumped together as one under the names arthritis deformans, osteo-arthritis, chronic rheumatoid arthritis, chronic rheumatic arthritis, comprehend several diseases—at least three—namely, an acute, or a subacute disease if you like, of which we have had many instances in the hospital, one of which has only recently gone out from Mary Ward, in which the bones are not affected. It is a disease solely of synovial membranes, and is accompanied by slight pyrexia; the name rheumatoid arthritis should be kept for it. Secondly, there is osteo-arthritis, which is a disease in which there are bony outgrowths, and the cartilages become worn away. And finally there is the arthritis of old people, usually confined to a single joint.

ON A CASE OF ACUTE LYMPHAEMIA IN A CHILD.

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In view of the great theoretical interest attaching to leukaemic blood conditions, especially those of acute nature, we think the following case worth recording. Unfortunately it was only a few days under observation and the only blood count done was made on the day the patient was removed from the hospital by the parents. Its condition at this time was almost moribund, and we have since learned that the child died on the day following removal from hospital. An autopsy would have been of great value in determining the marrow changes, etc., yet even in its absence the nature of the case seems to us to be fairly clear.

Clinical History.

Female child, aged 3, admitted on August 1st, 1904, to the Children's Hospital, Temple Street, Dublin. The history given by her mother was: Healthy until January, 1904, when she contracted whooping-cough, since which she had not been strong. In June, 1904, she was ill, and the doctor in attendance said her kidneys were affected. Three weeks before admission she got a fall on her left side and from this the mother seemed to date the onset of the present attack.

Condition on Admission.

The child was well nourished, the skin of a characteristic tawny tint. A few spots of subcutaneous haemorrhage were present in the ilio-sacral region, and during the few days she was under observation these increased very much in size and number, though confined to the same area. The left thigh was flexed, and movement caused great pain; this was attributed to the fall, but no injury was present to account for it.

Pressure over lower third of both tibiae showed great tenderness, slight tenderness on pressing sternum.

None of the skeletal changes of rickets were present. The child was fairly bright at times, but seemed to lapse occasionally into a stuporose condition, lying with mouth open, eyes half closed, and indifferent to slight stimuli.

Temperature varied from 100° to 102° F.; pulse on day of admission was 100, but showed tendency to increased rate (160 on day of removal from hospital). This, with other symptoms, would perhaps indicate the progressive nature of the case, a similar progressive change being observed in films of blood taken at an interval of two days.

Epistaxis and melaena were present, the former practically constant,

as was the latter on relief of the obstinate constipation which had persisted during the course of the illness. There was no swelling or bleeding of gums, but there was a very disagreeable fetor from the mouth.

The lymphatic glands in posterior triangle of neck, axillae, and groins were moderately enlarged and soft. The abdomen was prominent; spleen was palpable, extending 2½ in. below margin of ribs; the edge was observed to be distinctly sharp. The liver was apparently not enlarged. Slight ascites was present. Neither the lungs nor the heart showed anything of interest. Urine was pale in colour, specific gravity 1020, free from albumen, but containing a large quantity of indican.

An interesting fact was the passage of a worm (ascaris) on the morning patient left hospital.

Blood Count.

The following is the result of the blood count made on August 6th: Reds, 1,540,000; whites (counted on the same preparation as the reds), 131,000. With the pipette giving a dilution of 1 in 10 and the leucocyte counting fluid the figure was 136,400.

Films were prepared on slides, fixed by immersion for one hour in equal parts of alcohol and ether, and stained by three standard methods, namely, Ehrlich's haematoxylin and eosin, Jenner's compound of methylene blue and eosin, and Ehrlich's triacid.

Between 500 and 600 leucocytes were differentially counted on a film stained by each of the three mixtures, making a total of about 1,700, and the results now given are based on an average struck between the percentages given by each method. They are as follows:

	Per cent.
Large hyaline mononuclears	65.0
Smaller hyaline mononuclears (lymphocytes)	32.0
Polynuclear neutrophils	1.3
Polynuclear eosinophiles	0.5
Neutrophile myelocytes	0.6
Eosinophile myelocytes	0.6

100.0

The red corpuscles were for the most part large. (Several which were measured gave results between 8 and 9 μ .) They appeared to contain an average amount of haemoglobin, judging from the depth of their tint with eosin. (The haemoglobin was not estimated.) Despite the severe anaemia nucleated reds were remarkably few. Not a single megaloblast was seen, and only two ordinary normoblasts. Two other nucleated reds of very remarkable aspect were seen. Their protoplasm was more deeply stained with eosin (in the Jenner preparation) than that of their neighbours, whilst their size was somewhat smaller (7.2 μ). Their nucleus was not so deeply stained as that of the ordinary normoblasts, and was surrounded by a wide, colourless zone, as though contained in a vacuole. In the cell that was measured this vacuole was 4.8 μ in diameter, and the contained nucleus 3 μ . One of us who has had the opportunity of closely studying the blood of many leukaemic cases, does not recollect to have ever seen anything resembling these two objects. In counting 1,700 leucocytes these four were the only nucleated red cells encountered. Granular degeneration and basophilia of the reds were not seen, though closely looked for.

In connexion with the leucocytes we would lay stress on the following points of interest:

1. The Extreme Rarity of Ordinary Polynuclear Neutrophiles.

In the haematoxylin-eosin preparation many cells with polymorphous and diversely-lobed nuclei could be seen which might have readily passed as such on superficial inspection. Careful examination showed, however, that the nuclei of these cells were distinctly paler, and their reticulum less distinct than those of true polynuclear neutrophils. They were also somewhat larger, and their nuclei more bluntly and usually less deeply lobed. Comparison with the two other staining methods showed that these apparently polynuclear cells were devoid of neutrophilic granulations. In a very few of these a very fine basophilic granulation was seen.

2. The Character of the Mononuclear Cells which Made up 97 per cent. of the Leucocytes.

The great majority of these were large (up to 22 or 23 μ) perfectly hyaline cells with faintly staining nucleus and more or less basophile protoplasm. Neutrophilic granules were present in a very small proportion, and even amongst these, few possessed them in such numbers as are met with in the ordinary myelocytes of myelogenous leukaemia. The fine acidophile granules which were occasionally present were dotted over the cell at wide intervals.

In about the same number (0.6 per cent. of all leucocytes) there were present coarse acidophile granulations. Even these were not so closely packed as in the typical eosinophile myelocytes of myelaemia. The large mononuclear cells in this blood belonged to all the varieties recently defined by Pappenheim¹—namely, the large lymphocytes, large mononuclear (*sensu stricto*), and transitional forms. Their nucleus presented every grade of lobulation, from a scarcely visible hilus or infolding, to two, and occasionally three, completely separate masses of nuclear substance. These cells with