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.

BY

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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

divided nuclei were always quite distinguishable by the characters given above from the ordinary polynuclear leucocyte; a coarse finger-like or amoeboid-looking lobulation was the commonest condition. Many of these large cells seemed very labile, and had been traumatized in the act of making the film. This was evidenced by the loss of the protoplasm of some, and by the spreading out of others into a delicate reticulated or vacuolated layer of basophilic matter very irregular in shape. A considerable number of these possessed protoplasm with a greater amount of basophilia than the nucleus, which was then discernible with difficulty as a clear, almost hyaline, mass embedded in or seemingly apposed to the darkly-stained protoplasm. No evidence of mitotic activity was observed in any of the leucocytes in this blood.

3. The second variety of mononuclear cell comprising 32 per cent. was smaller, and its nucleus took the basic stain much more deeply. It was sometimes round, sometimes reniform. In triacid preparations the so-called "perinuclear granules of Neisser," now regarded as artefacts, showed a peculiar predilection for these lymphocytic nuclei. The protoplasm was usually quite scanty, occasionally more abundant, and decidedly basophilic, so that when the bulk of the cell was larger than normal, and its nucleus a little less basophilic, a difficulty arose in the distinction of this from the larger variety of mononuclear cell.

4. Most cells were not specially stained for, and no undoubted specimen was seen in the Jenner preparation.

5. Glycogen in finely granular form was readily detected in many of the leucocytes.

This case agrees with the clinical pictures of acute leukaemia in its sudden onset, rapid course, moderate enlargement of lymph glands, enlargement of spleen, haemorrhages in skin and mucous membranes, and oral fetor. It agrees with the haemocytic picture of acute leukaemia in the following points: (1) Enormous preponderance of hyaline mononuclear cells, the larger variety preponderating as it is said by Ewing¹ and others to do in acute cases and in children; (2) rarity of polynuclear neutrophils, and, indeed, of all forms of granule cells; (3) presence of myelocytes in very small numbers; (4) rarity of both varieties of nucleated red corpuscles, as was first pointed out by A. Fraenkel.² We have no hesitation in diagnosing the case as acute leukaemia. A discussion of the significance of the blood changes in this interesting case, and of their relation to changes in the blood-forming organs, would, we consider, be lacking in objectivity unless accompanied by the results of autopsy, which we unfortunately have not at our disposal. We therefore abstain from entering on so difficult a task, merely referring to the recent papers of Glinski,⁴ Lustgarten,⁵ Januschiewicz,⁶ and Parkes Weber,⁷ as well as to Pappenheim's complete survey⁸ of the current theories as to the origin of the blood corpuscles.

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A CASE OF ACUTE LYMPHAEMIA.*

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A BOY, B. F., aged 9, was admitted to the Mater Hospital on October 1st, 1904, under the care of Dr. John Murphy. He had swellings on both sides of the neck, breathlessness, and bleeding from the nose.

Family History.—His father, a tailor, hurt his leg when 4 years old, and subsequently developed hip disease, for which amputation through the hip joint had to be performed. The mother, who was described as having been always very pale, died in February, 1903, about a fortnight after the birth of a child, from what cause I was unable to ascertain. Patient's elder sister, aged 10, was ill with pneumonia when patient was admitted to hospital, and her life was despaired of, but she recovered. His younger sister, aged 5, was described as suffering from swellings in the neck. I had her brought to the hospital and found her to be a ruddy, healthy child, with perfectly normal blood. In the upper cervical and suboccipital regions there were a few enlarged glands, which were obviously associated with irritation of the scalp, due to pediculi.

Personal History.—Six weeks before admission lumps were first noticed in the neck, armpits, and groins. For a week prior to admission he

had been suffering from epistaxis and bleeding from the gums. The swellings under the left arm were painful.

Condition on Admission.—A good-looking, well-nourished, fair-haired boy, the lower part of whose face presented a peculiar square outline owing to the large glandular swellings beneath the jaw on each side. The face and mucous membranes were very pale. The tonsils were enlarged, and post-nasal adenoids evidently present and large. Tongue dry, and coated at the side; lips cracked on the inside. The skin of the abdomen and legs is mottled with dozens of small petechiae, which are said to have appeared before the glands began to swell. Masses of enlarged glands are seen and felt at the sides and back of the neck, in the submaxillary region, in both axillae and groins. The glands are moderately hard, discrete, and freely movable. One gland in the left axilla is both painful and tender, and the glands in the right are somewhat tender. Pressure over the other glands causes no pain; no glands palpable in the antecubital or popliteal fossa. The spleen is decidedly enlarged, its edge being felt about midway between the lower border of the ribs and the umbilicus. Temperature on admission 99° (100° the same evening), pulse 120, respirations 26. The patient was very dull and apathetic. The urine deposited an abundant sediment of uric acid crystals, and contained a distinct trace of albumen.

BLOOD EXAMINATION.

At the first glance the case might have been taken for Hodgkin's disease, but the fresh blood preparation at once settled the diagnosis. On the day after admission the blood count was R. 1,898,000, W. 212,000, the proportion being as 8.9 to 1. The stained preparation showed hardly any other form of leucocyte save lymphocytes—large, faintly staining, and evidently degenerating forms being very numerous. The diagnosis was therefore lymphatic leukaemia, and in view of the rapid development of the symptoms, temperature, haemorrhages, and general condition, the case had to be classed as an acute form of the disease. The haemoglobin was about 40 per cent., specific gravity 1.0435 (Roy-Hammerschlag). The fresh blood showed much fine molecular matter floating in the plasma, and displaying remarkably active motility, probably Brownian.

The first differential leucocyte count was made on a triacid preparation three days after admission, and showed that no less than 98 per cent. of all leucocytes were mononuclear. Polymorphs were only 0.5, transitionals 1.1 per cent., whilst out of several hundred cells examined, only a couple of doubtful myelocytes were detected.

Characters of the Mononuclears.—Somewhat less than half of them (42 per cent.) were of medium size, about as big as a red corpuscle or a shade larger. Their nucleus was strongly basophile, often delicately incurved or reniform, and sometimes double, with the apposed sides of the nuclei flattened as though direct division had recently occurred. The protoplasm of these lymphocytes was scanty and hyaline. It was often more basophile than the nucleus, and in Jenner and triacid preparations there was little distinction. A certain number (about 0.6 per cent.) had the same sort of nucleus, but a much larger amount of protoplasm. These might be described as large mononuclears. The other kind of lymphocyte was present in larger numbers (56 per cent.). It was larger, more faintly stained, and so easily broken down that most of them looked like mere irregular bluish expansions, about twice as big as a red disc, and scarcely showing any difference between nucleus and protoplasm. Their margins were often fringed with irregular protuberances. Subsequent observation showed that there was no fundamental difference between these two classes of mononuclear leucocyte, their relative proportions seeming to vary with the amount of pressure used in making the film. The large faint variety I consider to consist of the more labile, degenerating, or necrotic individuals.

A very few large mononuclears appeared to contain very fine granulations of acidophile character—possibly myelocytes. In others there were basophilic granules of various sizes. Polymorphs were remarkably few and hard to find, whilst eosinophiles and typical mast-cells were absent altogether. The red corpuscles were also labile, readily deformed, apt to run together in clumps, and did not stain well, being evidently poor in haemoglobin. With few exceptions, they did not display any basophilic tendency. Nucleated forms were, considering the profound anaemia, surprisingly uncommon, and all that I came across were of normoblastic character.

Progress of the Case.—On October 6th a bluish patch of ecchymosis, 2½ in. by 3½ in. in diameter, appeared in front of the left elbow round the vein from which blood had been taken for bacteriological examination. Another large ecchymosis appeared spontaneously over Poupart's ligament, on the same side. The temperature fluctuated between 99° and 101°, the pulse was between 130 and 140, respirations about 24.

* Being portion of a paper read at the Pathological Section of the Royal Academy of Medicine in Ireland.