philes 3.4 per cent., 9.5 per cent., and 4.33 per cent. respectively.

I may add that I find that in films stained with eosine for about one minute, and then in Delafield's haematoxylin for any time from five minutes to seven hours—the longer the better—the internal structure of the filaria is exceedingly well brought out.

After the above note was written, it occurred to me that eosinophilia might also be found in those affected with bilharzia haematobia.

I therefore examined the blood of a patient of mine on April 16th, 1902, who was, I knew, suffering from this disease, and I was not surprised to find that the eosinophile cells in the peripheral circulation were enormously increased. The examination was made at a time when he—an otherwise healthy athletic Englishman—was still engaged in his usual occupation, and was in his usual health.

His general blood condition was good, as he had for some time been taking iron as a tonic after a somewhat recent attack of influenza. The number of red blood corpuscles and the percentage of haemoglobin were practically normal, as was also the number of the leucocytes. The percentage of the leucocytes counted in films stained by eosine and haematoxylin, Jenner's and Leishman's stains respectively was as follows: Multinucleated leucocytes, 46 per cent.; lymphocytes, 27 per cent.; large uninucleated leucocytes, 7 per cent.; eosinophile cells, 20 per cent.

An increase in the number of eosinophile cells has been found in the blood of various forms of helminthiasis—for example, ankylostomiasis, infection with *ascaris lumbricoides*, *oxyuris vermicularis*, *taenia mediocanellata*, and especially in trichiniasis.

Dr. Gulland's observation, which I am able to confirm (*vide supra*), now includes filaria. My observation on the occurrence of eosinophilia in bilharzia haematobia is, as far as I can find, not mentioned in any of the literature relating to the subject.

I hope at some future date to give a detailed report of the blood in this interesting and rare condition.

CASE OF "INFECTIVE ENDOCARDITIS" TREATED WITH ANTISTREPTOCOCCUS SERUM.

By H. M. COOPER, M.B.LOND.,

Hampton-on-Thames;

WITH SOME REMARKS BY

CYRIL OGLE, M.B.Oxon., F.R.C.P.LOND.,

Assistant Physician to, and Lecturer on Therapeutics at, St. George's Hospital.

THE following case, although it had a fatal termination, is of interest on account of the results of a bacteriological examination of the blood and the effects of treatment:

History.—The patient, W. C. L., a man, aged 26, came under observation in the beginning of August, 1901. He gave a history of rheumatic fever four or five years ago, and said that for the last six months he had been feeling out of sorts; but the date of the onset of his present condition could not be fixed.

State on Examination.—He was markedly anaemic, wasted, and obviously very ill. His tongue was rather dry, and coated with a brown fur. No abnormality was detected in the lungs. His heart presented the usual signs associated with aortic regurgitation, an increase of size of the left ventricle, and a well-marked aortic diastolic murmur. In the mitral area there was a systolic murmur, heard also at the angle of the left scapula. The pulse was collapsing, the wave being of comparatively small volume. The liver and spleen were not enlarged. The urine was high coloured, and contained a little albumen.

Progress.—He was put to bed, and given stimulants freely, plenty of good food, and small doses of iron, arsenic, and strophanthus. A few days later the urine became porter-coloured, and there was evidently a considerable amount of renal bleeding, possibly due to infarction. He next had an attack of fairly copious haemoptysis, which lasted for three or four days. This was followed by an acute pain in one side of the head; he became heavy and stupid for a time, but without loss of consciousness, and with no evidence of aphasia or of motor paresis. He had also one or two attacks of diarrhoea. The temperature for the first three weeks was of a regular hectic type, rising to 101° or 102° in the evening and falling to 97° or 98° in the morning. No change took place in the aortic diastolic murmur, but the sounds at the apex varied in character: sometimes there was a suggestion of a presystolic in addition to the systolic murmur. No petechiae, and no clubbing, redness, or tenderness of finger-ends appeared, or any sign of joint inflammation. The pulse-rate was usually about 116 to 120 at night, and 104 to 110 per minute in the morning.

Diagnosis and Bacteriological Examination.—The condition was regarded as one of infective endocarditis, and search was made for a possible source of infection, but none was found, except it might be from two

carious teeth. No history of wound, otorrhoea, or gonorrhoea could be obtained. Although the patient rallied considerably in the earlier days of August, he subsequently became gradually weaker, and the question arose whether serum treatment would be of any avail, considering the obviously desperate condition of the patient. Dr. Cyril Ogle met me in consultation on September 5th. He agreed with my diagnosis, and was able to get a specimen of blood from the median basilic vein, which was at once mixed with sterilized bouillon and incubated not long afterwards. A pure culture of streptococci was found, and this was confirmed by Dr. H. Spitta, the Assistant Bacteriologist at St. George's Hospital.

Treatment.—Treatment by injections of antistreptococcus serum was at once begun (September 10th). Every other day 10 c.cm. were injected beneath the skin of the abdomen. The total amount used was 110 c.cm. in twenty-seven days. A solution (5 per cent.) of nuclein was also administered, in 1-drachm doses, by the mouth. The injections were always followed in a few minutes by a considerable quickening of the pulse and by feelings of faintness. On one occasion stimulants had to be freely given.

After-Progress.—The effect of the injections, after 30 or 40 c.cm. had been given, appeared to be most marked. The dry, cracked, brown tongue became moist and clean; the sordes disappeared from the teeth and fauces; the temperature on the day following the injection was considerably lower in the evening; food was well taken and a general improvement was manifest; the patient also said that he felt much better. The feebleness and rapidity of the pulse, however, remained a marked feature. Copious sweating often, but not always, followed the injections. No local inconvenience at all resulted from the injections. After the patient had had 100 c.cm. of serum the temperature became normal and remained so for seven clear days; the blood and all trace of albumen disappeared from the urine, but the pulse-rate did not diminish (120 to 130 per minute). Every effort was made to keep the heart stimulated, as it was thought that if the patient could rally from the past effects of the poison he might recover. Raw beef, parapeptone, plasmon and milk, strychnine and brandy were freely given and well taken. After the seventh day of normal temperature another evening rise took place, which was met by an injection of another 10 c.cm. of serum—for during the time the temperature had been normal the injections had not been given. The temperature again kept down for three days. The patient, however, was certainly weaker, and died quite suddenly on October 10th, after an illness of over two months. No necropsy was obtained.

Even although the result of the case was fatal, it seems worth recording for the following reasons: (1) That streptococci were definitely found in the blood, and that therefore the indication for treatment seemed clear; (2) that the serum undoubtedly did good, and certainly did no harm; (3) that if the treatment could have been begun in the earlier stages of the disease a good result might have been obtained.

Two series of serums were used. The second series seemed to have more effect than the first. This may be due to the fact that the second was more inimical to the particular kind of streptococcus in the blood, as I believe that Messrs. Burroughs and Wellcome, from whom the serum was obtained, prepare it from cultivations of mixed streptococci.

REMARKS BY DR. CYRIL OGLE.

Although with an unsuccessful result, I also think that this case worthy of being recorded, on account of the certain nature of the disease and of the organism associated with it. Dr. H. Spitta was so good as to make subcultures, and pure colonies of streptococci were obtained.

Many cases have been published of recovery under serum treatment from the gravest conditions of sepsis with living streptococci free in the blood stream; there are even a few where the same state of blood was most probably associated with valve implication, a condition which, one might say, would have been otherwise inevitably fatal, and one, no doubt, constituting a severe test of the value of the serum.

As regards the good effects in the present instance, Dr. Cooper is the more competent to speak, as he saw the patient once or twice daily; there certainly seems to have been an influence upon the temperature, and this, together with disappearance of discomfort, cleaning of the tongue, and increase of appetite, are fairly constantly observed in the accounts of this treatment by other observers.

It would have been of interest to have determined, by a second examination of the blood, whether the streptococci had disappeared when the temperature had been standing at a normal level for some days, as one is inclined to attribute the rather sudden death of the patient to exhaustion of the heart from free aortic regurgitation, combined with prolonged fever and poisoning.

Although the patient was extremely ill and very sensitive when the blood was taken for examination, the process did not apparently cause much more discomfort than an ordinary hypodermic injection.

Messrs, Burroughs and Wellcome inform me that the two lots of serum which we used were from different sources, but that both were prepared by aid of six different strains of streptococci from human subjects.

CASE OF FATAL ANAEMIA PRESENTING SOME UNUSUAL BLOOD CHANGES.

BY

O. K. WILLIAMSON and E. W. MARTIN,

M.A., M.B.Cantab., M.R.C.P.Lond.,
Physician to Out-patients (late
Pathologist) City of London Hos-
pital for Diseases of the Chest,
Victoria Park.

M.B.Edin., Resident Medical
Officer, City of London Hos-
pital for Diseases of the
Chest, Victoria Park.

G. E. C., male, aged 43, an insurance agent, was admitted to the Hospital for Diseases of the Chest, Victoria Park, under the care of Dr. Heron, on November 27th, 1900, complaining of weakness and shortness of breath.

History.—The symptoms had started insidiously during the hot weather of August, 1900, when he complained of fatigue and also of occasional giddiness when out walking, causing him to fall once. There was headache and shortness of breath, the latter specially marked on exertion. From the middle of October till the middle of November he had been able to do a little work, although his weakness and fatigue were gradually increasing, and he noticed that his hands and feet were slightly swollen. There had been a little cough for the last two months. Throughout the course of the illness he had at no time complained of vomiting, diarrhoea, melaena, haematuria or epistaxis. There was no history of any former illnesses. His father died of "fever," his mother of typhoid fever, the remainder of his family being healthy.

State on Examination.—The patient was found to be a well-nourished man, very pale, there being a slight suggestion of lemon colour about the nose, his mucous membranes also being extremely pale. He was obviously ill, lay flat in bed, being neither cyanosed nor in pain. There was some oedema of both feet and of the left leg, and slight puffiness about the eyes. There were no haemorrhages anywhere, and the gums, beyond being anaemic, were normal. The temperature was 99°. He had some cough, worse at night, but no expectoration. The lungs showed no abnormal physical signs. There was a short systolic murmur, heard at all the cardiac areas following the first sound, and not conducted into the axilla. Pulse 94. The tongue was furred, the appetite fairly good, the bowels regular. The abdomen was slightly distended, the liver and spleen not palpable. The urine was acid, specific gravity 1014, and contained neither albumen nor sugar.

Progress.—Patient's condition became steadily worse. On December 11th he was delirious, passing his urine and his faeces under him. He resented movement; took liquid nourishment well. There was percussion dullness over the right lung posteriorly, with some increase of vocal resonance. The knee-jerks were brisk. On December 12th, by ophthalmoscopic examination, haemorrhages were seen upon the fundus of the left eye. For the first week after admission the temperature was raised, varying between 99° and 102.2°, with frequent remissions of 1° or 2°. For the last four days of life it assumed the intermittent type, varying between 99° and 103.4°. Patient died on December 12th.

Blood Examination.—On December 8th the blood was distinctly pale in colour. On examination of a film stained with the triacid stain there was seen to be marked poikilocytosis, many of the corpuscles being larger than normal, but some much smaller. The colouring matter appeared not to be diminished. Many nucleated corpuscles were seen, by far the greater number of which were normoblasts, with, however, a few of the unnamed variety, and also one or two cells which were probably megalo-blasts. There appeared to be less tendency than normally to form rouleaux. The white corpuscles were obviously markedly increased in number, and consisted almost wholly of lymphocytes, these showing all varieties of size, from that of small lymphocytes up to that of large mono-nuclear cells (large lymphocytes), so that it would have been impossible to separately classify these two varieties. The lymphocytes, moreover, were more faintly stained than normally. There were very few polymorphonuclear neutrophils, and in all the films examined only one or two myelocytes were seen. On December 11th the poikilocytosis was seen to be more marked; one microblast was seen, and many normo-blasts, the appearances otherwise being similar to those on December 8th. The red and white counts were made from liquid films, the differential counts from films stained by the triacid stain.

Date.	Red Cells.	Haemo- globin.	White Cells.	Differential Counts of White Cells		
				Lymph- ocytes.	Poly- morpho- nuclear Neutro- philes.	Myelo- cytes.
Dec. 1st ...	Per cm. 900,000	20%	Per cm. Increased	—	—	—
Dec. 8th...	480,000	12%	34,000	99.27%	0.55%	0.18%
Dec. 11th...	400,000	12%	45,000	99.06%	0.36%	0.37%
Dec. 12th...	300,000	—	38,000	99.62%	0.37%	None

Thus it will be seen that on December 8th the ratio of red to white cells was 14 to 1; on December 11th was $\frac{8}{3}$ to 1; and on December 12th was just under 8 to 1.

Necropsy.—The visceral pericardium showed many petechiae. The right pleural cavity contained 3 xv of clear fluid, and the lower part of the pleura showed signs of recent inflammation; the upper part was thickened, and there were some fibrous adhesions. The left pleural cavity contained 3 x of clear fluid, but the pleura was not inflamed. At the apex of the upper lobe of the right lung there was a small calcified tuberculous mass, and there was some fibrosis throughout this lobe; both the middle and upper lobes showed pneumonic consolidation. The left lung showed a small caseous and calcareous mass with some surrounding fibrosis near the apex of the upper lobe, and there was a similar mass in the lower lobe, with a small area of pneumonic consolidation at the base. The heart was large and fatty, the endocardium of the left ventricle showing "tabby cat" striation. The liver was not enlarged, but was fatty, microscopically showing advanced fatty degeneration with many lymphocytes between the liver cells. On treating a section with ferro-cyanide of potassium, no trace of iron could be detected. The spleen weighed 12 oz., and was large and firm. The kidneys were fatty. There was an old tuberculous ulcer on the caecal side of the ileo-caecal valve. One mesenteric gland and one of the thoracic glands were enlarged to a slight degree, but on microscopical examination showed no changes. There was nothing else abnormal in the glandular system. The bone marrow showed no departure from the normal. The muscles were dark red. The thymus gland was not enlarged.

From a film stained with eosin and methylene blue $\times 500$.

The case presents some very interesting features. The blood picture as regards the red blood corpuscles is practically that of pernicious anaemia, the diminution in the number of red cells being unusually great even for this disease, being less than one-tenth of the normal number, there being marked poikilocytosis and numerous nucleated cells, the colouring matter, moreover, being diminished only in proportion to the diminution in number of the red blood corpuscles. On the other hand, the white corpuscles exhibited typically the condition found in lymphatic leukaemia, their number being about four or five times the normal, and consisting of over 99 per cent. of lymphocytes, instead of the normal number of about 30, the neutrophils being diminished to about $\frac{1}{3}$ per cent., the normal number being about 70 per cent., and this although the patient was suffering from lobar pneumonia.

The extreme degree of the anaemia, together with the large number of nucleated red corpuscles, would seem to show that the process was an acute one, but the absence of any haemorrhages on the skin or sponginess of the gums, would apparently forbid the case being classified with those described as acute leukaemia. Westphal describes a case in which the blood picture was that of pernicious anaemia, the red cells being diminished to 816,000 per centimetre, and in which there was a leucocytosis amounting to 24,000; the greater number of these consisting of lymphocytes. This case, however, showed many haemorrhages on the skin and mucous membranes, and ran its course to a fatal