

## A New Blood Parasite of the Fowl.\*

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WHILE in the United States of America in 1935, the author examined several blood smears of fowls showing anaemia due to different causes. In smears of two fowls taken in New York City the parasites were found. As far as was known the fowls were raised not far from the city. Later similar bodies were encountered in a fowl blood smear received from Philadelphia. During the year following his return to South Africa the writer found on three occasions in fowl blood smears an organism morphologically indistinguishable from that seen in America.

### DESCRIPTION OF THE PARASITE.

It is an intraerythrocytic organism seen so far only in the blood of the fowl. Usually almost round, it varies in diameter from  $0.5\mu$  to  $1.5\mu$ , the average diameter being  $1.0\mu$ . Those that are oval may be  $1.5\mu \times 0.7\mu$ .

The centre of the parasite is usually clear. The chromatin may extend right round the periphery; often, however, it is most prominent round only one half of the circumference. The chromatin is sometimes seen lumped at two or three points on the periphery. When the organism is distinctly oval, the chromatin is often aggregated at the extremities to give a bipolar appearance. Pairs of parasites are not rarely found, suggesting that division is by binary fission. Figures 8, 9 and 10 illustrate this point. Our knowledge of the mode of multiplication is still most fragmentary. No pigment has been seen.

It is very unusual to find two well separated parasites in one cell and, so far, three or more have not been observed in a single cell. In nearly all cases only one parasite occupies a cell, and it is usually situated midway between the nucleus and the edge of the cell.

Parasites have rarely been seen in normoblasts. Giemsa's stain has been the only one so far employed.

\* The organism was discovered while the author was studying as a Commonwealth Fund Service Fellow in Dr. E. V. Cowdry's laboratory in Washington University, St. Louis, Mo.

Thanks are due to Dr. Cowdry for his unfailing interest and kindness.

The heaviest infection revealed only about 7 per cent. of the red cells containing parasites. Lung smears, and sometimes heart blood smears, show more organisms than smears of the peripheral blood.

Though apparently associated with some degree of anaemia the effect of the parasite on the host is uncertain. But anyone conversant with the ravages of Aegyptianellosis in nature, and its remarkable harmlessness in the laboratory, will hesitate to declare any new parasite pathogenic or otherwise, without first amassing considerable experience of its potentialities.

#### THE OCCURRENCE OF A SIMILAR PARASITE IN SOUTH AFRICA.

1. In February, 1936, two dead and two live White Leghorn pullets, four months old, were received from the Johannesburg district of the Transvaal. The owner stated he had lost many fowls with similar symptoms.

*Clinical Examination.*—The birds were mopy and stood about, occasionally drinking water. They were pale and very emaciated and had no appetite.

*Post-mortem Examination.*—All were markedly emaciated. The crops contained a little slime. In one case a few oocysts of *Eimeria* (species not determined) were detected, but there were no lesions to warrant a diagnosis of coccidiosis. Heart blood cultures on agar and in bouillon were negative. In all cases the gall-bladder was distended to a most unusual degree with dark green viscid bile.

Only in one case did a blood smear show anaemic changes and they were very slight; this heart blood smear, however, revealed a few parasites scattered more or less in groups. The peripheral blood of the same fowl appeared to be free of parasites.

Eight days later six more sick pullets were received from the same farm. All were thin and mopy and were killed for examination. In all cases round worms and tapeworms were found to be frequent. There was, as before, no tumor splenis. All the gall-bladders were very distended with dark green viscid bile. Blood smears of all pullets showed slight anaemic changes, and three birds had parasites, especially in lung smears, but the parasites were rare.

The cause of the mortality could not be established with certainty. One naturally was inclined to attribute the deaths to helminthiasis, but the condition of the gall-bladders was remarkable, and this fact alone suggested that the parasites may have had something to do with the losses. Another disease characterised by extreme emaciation and dejection, and associated with the presence usually of very few parasites, is leucocytozoosis of the fowl. This fact should make one chary about overlooking the harm that the new parasite may be capable of producing.

2. In September, 1936, three South African Australorp chickens, two weeks old, were sent for examination from the Standerton district of the Transvaal. They were dead and partially decomposed.

Death was due to *Salmonella pullorum*. In one case a lung smear showed slight anaemia and a 5 per cent infection of the red cells with the parasite.

This is of interest, indicating the incubation period may be less than 14 days.

3. In September, 1936, fifteen dead White Leghorn chicks, one month old, were received from the Leslie district of the Transvaal. In each case the liver was enlarged and yellowish, the spleen was enlarged and dark red, the kidneys were slightly enlarged and of an ochre colour, and there was intestinal catarrh. The lesions were thus typical of fowl typhoid in the chick, and the diagnosis was confirmed in each case by the isolation of *Salmonella gallinarum* from the heart blood. Two heart blood smears showed fairly marked anaemia and the intracorpuseular parasites.

Obviously the deaths were due primarily, if not entirely, to fowl typhoid. The rôle of the protozoon could not be assessed.

#### DISCUSSION.

Are there sufficient grounds for considering this a new parasite? It is scarcely necessary to prove it is not *Plasmodium gallinaceum* or a Leucocytozoon. Some may suggest it is part of the life cycle of a spirochaete, but now that it is clear that the intracorpuseular bodies, described by Balfour and others in association with avian spirochaetes, are *Aegyptianella pullorum*, the suggestion loses its attraction. There is no satisfactory evidence that an avian spirochaete ever enters an erythrocyte or multiplies other than by transverse binary fission. Then again there is not likely to be an Argas infestation in New York State, and the spirochaete is transmitted by species of this genus. (An unconfirmed report of Zuelzer states that mosquitoes may transmit spirochaetes to fowls, but the epizootological evidence in most countries, including South Africa, is against this being of any importance.)

Carpano has described a Grahamella infection of the fowl, but this claim also lacks confirmation and, in any case, his description of the organism indicates clearly it is nothing like the parasite under discussion.

In the differential diagnosis the parasite of outstanding importance is *Aegyptianella pullorum*, with which we are fortunately well acquainted. *Aegyptianella* is generally two to four times the size of the newly found organism, and two or more are commonly found in a single erythrocyte. In fowl blood, schizonts are seen fairly frequently and the merozoites can be distinguished easily. Though a merozoite is often the same size as the new organism, it tends to be elongate, and to occur in numbers of up to ten to twenty in the red cells. *Aegyptianella* has been proved to be carried by *Argas persicus* and, as already mentioned, the genus Argas is of no consequence in the State of New York.

All facts considered, it seems highly probable that the parasite described here should be regarded as a new fowl haematozoon, of possibly low virulence. No name is suggested as only meagre information is available regarding multiplication, mode of transmission, pathogenicity, etc.

Though smaller, the organism bears some resemblance to the parasite *Sauroplasma thomasi* n.gen.n.sp. described by du Toit (1937) in the erythrocytes of the lizard, *Zonurus giganteus*, Smith.

#### SUMMARY.

An apparently new blood parasite of the fowl, found in New York and Philadelphia, has been described. A very similar, if not identical, organism occurs also in South Africa. The indications are that the parasite is not highly pathogenic.

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DESCRIPTION OF PHOTOMICROGRAPHS.

These were prepared by Mr. T. Meyer in his usual careful manner.

All photographs are of fowl blood stained with Giemsa.



Fig. 1.



Fig. 2.



Fig. 3.

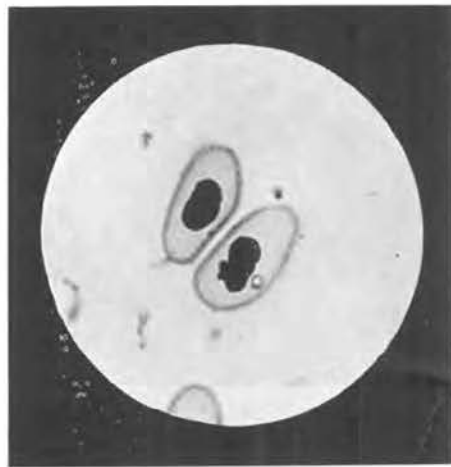


Fig. 4.

Fig. 1.—1,400  $\times$ . The largest parasite so far seen.

Fig. 2.—1,400  $\times$ . A parasite of average size.

Fig. 3.—1,400  $\times$ . Two parasites.

Fig. 4.—1,250  $\times$ . A parasite of average size.

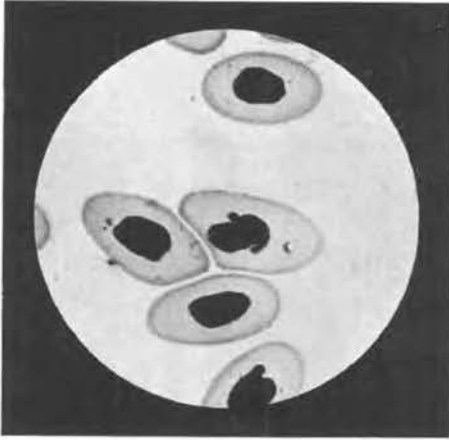


Fig. 5.



Fig. 6.



Fig. 7.

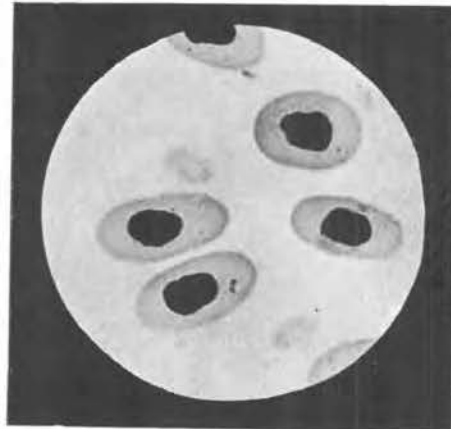


Fig. 8.

Fig. 5.—1,400  $\times$ . A parasite of average size.

Fig. 6.—1,250  $\times$ . A bipolar form.

Fig. 7.—1,250  $\times$ . A smaller form and a larger form (out of focus).

Fig. 8.—1,400  $\times$ . A parasite apparently dividing.



Fig. 9.—1,250  $\times$ . Two adjacent organisms, possibly the result of binary fission.

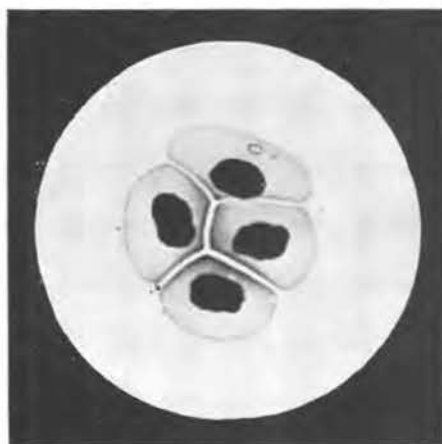


Fig. 10.—1,400  $\times$ . Two adjacent organisms, possibly the result of binary fission.