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NOTES ON CERTAIN ANIMAL PARASITES OF DOMESTIC STOCK IN SIERRA LEONE

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SERIOUS EPIDEMICS OF DISEASE AMONGST CATTLE IN SIERRA LEONE

From time to time heavy losses have been experienced by cattle owners in Sierra Leone owing to epidemics, during which large numbers of cattle die.

In December, 1914, we were requested by the Administration to investigate the nature of a serious epidemic which had broken out amongst cattle in the northern part of the country. The cattle in question had been brought down originally from French Senegal; they were practically all bullocks, owing to restrictions respecting the export of cows put into force by the French Administration.

We proceeded to Batkanu, the capital of the Karene district, but were informed on our arrival that the epidemic had ceased and that the animals were no longer dying. We found 90 cattle in the Government *Warri*, all of which appeared to be in a healthy condition. Most of the animals were in the Karene district during the epidemic, and had remained apparently uninfected; a few, however, had been ill, and seemed to have recovered. Whether

these animals had really suffered from the infection which had resulted in the death of large numbers of others is uncertain, but Dr. Clearkin, the medical officer in charge of the district, was of the opinion that this was the case. We were informed that the epidemics occurred towards the end of the rainy season, and that they coincided with the appearance of large numbers of a fly (*Stomoxys nigra*), which was held responsible. This hypothesis is in accordance with the history given by the natives; those questioned by us stated that the disease appeared every five or six years, during the rainy season, and that it was due to the bites of the fly (*Stomoxys*). It was believed that the infection was contracted by the animals whilst being brought down from French country, where cattle breeding is carried on extensively.

The course of the disease was rapid, the symptoms being fever, staring coat, emaciation, and death in a month or six weeks.

Fresh and stained preparations of blood of each of the 90 cattle in the Warri were examined, and rats were inoculated with blood from every tenth animal. As a result of this examination four cattle were found to be infected with trypanosomes; two with *T. vivax*, one with *T. congolense* and one with *T. gambiense*. In two of the animals *Piroplasma bigeminum* was found, and in about 30 per cent. a parasite belonging to the genus *Theileria*. Two healthy oxen were inoculated with blood from each of the animals suffering from infection with *T. vivax*. The animals inoculated from the first ox remained healthy, and trypanosomes were never seen in their blood; those inoculated from the second, which also harboured *Piroplasma bigeminum* in its blood, became infected both with *T. vivax* and with *Piroplasma bigeminum*, but exhibited no signs of disease, and were alive and in good condition when we left the colony three months later.

In view of the fact that we did not see these animals until the epidemic had ceased, it was impossible for us to make any post-mortem examination, and there was no material at our disposal upon which a definite conclusion could be reached as to the cause of the great mortality which had occurred. Although the examination of blood proved that the cattle were infected with several protozoa, any one of which is potentially the cause of epidemics fatal to cattle, it would not be possible to make any definite statement on the

subject until observations can be made on the spot during the time when the epidemic is running its course, so that animals can be examined systematically, the clinical course of the disease watched and material obtained immediately after death. We cannot emphasise too much the importance of properly directed and sustained work in the investigation of problems of such economic importance; it is only by this means that the true nature of these ever-recurring epidemics will be elucidated.

TRYPANOSOMIASIS

During our visit to Sierra Leone we had the opportunity of examining a considerable number of domestic stock, both in the Colony and in the Protectorate. In all, 143 cattle were examined, and trypanosomes were found in nineteen. The proportion of infected cattle must, without doubt, be very much greater than this, as in the majority of cases an examination of a single fresh preparation of the blood was all that could be undertaken. These cattle, which were brought to Freetown for slaughter, appeared to be the most heavily infected; trypanosomes were discovered in the blood of fourteen out of thirty-four animals immediately after they had been killed at the Military slaughter-house. A probable explanation of this is that so soon as animals begin to lose condition they are taken by the natives to be sold in the Freetown market. In the nineteen infected animals *T. congolense* was found eleven times, *T. vivax* twice, a double infection of *T. congolense* and *T. vivax* five times, and *T. gambiense* once.

The blood of ten dogs was examined, but in no cases were trypanosomes found. One of the animals was, however, proved to be infected with *T. congolense* by inoculation of rats. No instance of infection with trypanosomes was found in the seven goats and seven sheep examined.

In connection with the information derived from examination of domestic stock it is of interest to refer to observations on the amount of trypanosome infection obtaining in *G. palpalis*.

Four hundred wild *Glossina palpalis* caught on the Cape Lighthouse Peninsula were dissected and examined; trypanosomes were found in twenty-one of them.

TABLE I.—Showing the manner in which trypanosomes were recognised in infected domestic stock

No.	Animal	Trypanosomes found in peripheral blood	Animals inoculated	Result of inoculation	Diagnosis
1	Ox 11 ...	<i>T. congolense</i>	...	...	<i>T. congolense</i>
2	Ox 23 ...	<i>T. vivax</i>	Ox I Ox II Rat 15a Rat 15b Rat 15c	Negative Negative Negative Negative Negative	<i>T. vivax</i>
3	Ox 88 ...	<i>T. congolense</i>	Rat 21	<i>T. congolense</i>	<i>T. congolense</i>
4	Ox 89 ...	<i>T. vivax</i>	Ox III Ox IV Rat 16a Rat 16b Rat 16c	<i>T. vivax</i> <i>T. vivax</i> Negative Negative Negative	<i>T. vivax</i>
5	Ox 100 ...	Negative	Rat 24	<i>T. gambiense</i>	<i>T. gambiense</i>
6	Ox 108 ...	<i>T. congolense</i>	...	...	<i>T. congolense</i>
7	Ox 111 ...	<i>T. congolense</i>	...	...	<i>T. congolense</i>
8	Ox 112 ...	<i>T. congolense</i>	...	...	<i>T. congolense</i>
9	Ox 120 ...	<i>T. congolense</i>	...	...	<i>T. congolense</i>
10	Ox 121 ...	<i>T. congolense</i>	...	...	<i>T. congolense</i>
11	Ox 137 ...	<i>T. congolense</i> <i>T. vivax</i>	Rat 11a Rat 11b	Negative Negative	<i>T. congolense</i> <i>T. vivax</i>
12	Ox 140 ...	<i>T. congolense</i>	Rat 12a Rat 12b	<i>T. congolense</i> <i>T. congolense</i>	<i>T. congolense</i>
13	Ox 141 ...	<i>T. congolense</i>	Rat 13a	Negative	<i>T. congolense</i>
14	Ox 142 ...	<i>T. congolense</i>	Rat 13b	Negative	<i>T. congolense</i>
15	Ox 143 ...	<i>T. congolense</i>	...	...	<i>T. congolense</i>
16	Ox 144 ...	<i>T. congolense</i> <i>T. vivax</i>			<i>T. congolense</i> <i>T. vivax</i>
17	Ox 145 ...	<i>T. congolense</i> <i>T. vivax</i>			<i>T. congolense</i> <i>T. vivax</i>
18	Ox 146 ...	<i>T. congolense</i> <i>T. vivax</i>			<i>T. congolense</i> <i>T. vivax</i>
19	Ox 147 ...	<i>T. congolense</i> <i>T. vivax</i>			<i>T. congolense</i> <i>T. vivax</i>
20	Dog 155 ...	Negative	Rat 30a Rat 30b	<i>T. congolense</i> <i>T. congolense</i>	<i>T. congolense</i>

TABLE 2.—Giving results of dissection of wild *Glossina palpalis* found to be infected with trypanosomes

No. of fly	Salivary glands	Proboscis	Intestine	Result of inoculation
1	o	o	+++	2 rats, negative
2	o	++	o	
3	o	++	++	1 rat, gut and proboscis contents, negative
4	o	+++	o	
5	o	++	o	
6	o	++	o	
7	o	+++	o	
8	o	+	o	
9	o	+++	+++	{ 1 rat, gut contents, negative 1 rat, proboscis contents, died on 6th day
10	o	+	o	
11	o	+++	o	
12	o	+++	o	
13	o	+	o	
14	o	++	o	
15	o	o	+	
16	o	+++	+++	{ 1 rat, gut contents, died on 6th day 1 rat, proboscis contents, died on 6th day
17	o	+	o	
18	o	+	o	
19	o	+	o	
20	o	++	+++	{ 1 rat, gut contents, negative 1 rat, proboscis contents, negative
21	o	+	o	

+ Signifies trypanosomes scanty.

++ Signifies trypanosomes numerous.

+++ Signifies trypanosomes swarming.

It will be seen from Table 2 that of the twenty-one flies found to contain trypanosomes, the proboscis alone was involved in fifteen, the gut alone in two, whilst there was a heavy infection of both gut and proboscis in four. No instance of invasion of the salivary glands was encountered. Assuming that these parasites were trypanosomes pathogenic to man and domestic stock, the result of previous work allows us to conclude that fifteen of the above flies were infected with *T. vivax*, four with *T. congolense*, and the remaining two with a trypanosome belonging either to the Congolense or the Gambiense group; which, we are unable to decide owing to the fact that the cycle of development of the trypanosome in the fly was incomplete. Inoculations into rats were made, with negative results in each case, from five of the flies found to be infected. Unfortunately in two instances (Flies 9 and 16) the rats which had received the contents of the proboscis died six days after inoculation, but in two other cases (Flies 3 and 20) the rats lived long enough to have become infected. The fact that these animals did not become infected does not prove that the trypanosome found in the flies was not *T. congolense*, as it has now been established that it is always easy to infect rats with this trypanosome. A similar failure of *T. congolense* to establish itself in these animals is seen in the case of three rats inoculated respectively from Oxen 137, 141 and 142 (see Table I), which were found on direct examination of the blood to be suffering from an infection with *T. congolense*. Previously the trypanosome in question would have been designated *T. nanum*, but recent work shows that the difference between the latter parasite and *T. congolense* is only an apparent one.

A small number (95) of wild *G. palpalis* was fed on rats; no infection resulted.

BABESIASIS AND THEILERIASIS

Whilst examining blood films of cattle, species belonging to the genera *Babesia* and *Theileria* were seen. In about 5 per cent. of the animals examined a few large double pear-shaped bodies and an occasional large amoeboid form were encountered in the red cells. This parasite was undoubtedly *Piroplasma bigeminum*.

The other parasite occurred much more frequently, being found in between 20 and 30 per cent. of the animals examined. Small rod- and ring-shaped bodies showing distinct cytoplasm and chromatin were seen in the red cells. In some animals 1 or 2 per cent. of the cells were invaded, whilst in others only an occasional parasite was found. These bodies seem to be identical with those discovered by Macfie (1914) in cattle in Nigeria. They did not appear to produce any symptoms of disease. Most of the animals in which they were found were in perfect health; a few were emaciated, but in these trypanosomes were also found.

Owing to the fact that so large a proportion of cattle were discovered to harbour these bodies in their blood—usually they were present in very small numbers only—we did not consider that inoculation experiments into local cattle would afford any evidence as to the inoculability or otherwise of the parasite. No 'blue bodies' of Koch were found in the blood, or in smears made from the kidneys, liver, spleen, lungs, or bone marrow of six infected oxen. Theiler (1907) describes *Theileria parva* and *Theileria mutans* as being very similar in appearance. He differentiates between them on the following grounds. *Th. parva* is very virulent, is non-inoculable, and is characterised by the presence of the 'blue bodies' of Koch; whereas *Th. mutans* is non-virulent, is inoculable, and the 'blue bodies' of Koch are not found. There is little reason to doubt, therefore, that the parasite in question is *Theileria mutans*.

All the ticks which could be found were collected from each of the ninety cattle examined in the Warri at Batkanu; the animals were thrown and carefully searched. The only species encountered were *Boophilus australis* (126 adults, and 395 nymphs) and *Amblyomma variegatum* (4 adults, and 28 nymphs). We are indebted to Professor G. H. F. Nuttall for kindly determining them.

CONCLUSIONS

1. Cattle are not bred to any extent in the Colony of Sierra Leone or in most parts of the Protectorate. Bullocks are, however, imported from French Senegal in considerable numbers, and gradually find their way down to Freetown for slaughter.

2. Serious outbreaks of disease in the form of epidemics occur amongst the cattle of Sierra Leone.

3. These epidemics have been attributed to various causes, but their real nature is still obscure.

4. Trypanosomiasis of cattle is common. Of the thirty-four animals examined at the slaughter-house in Freetown, fourteen (41 per cent.) were found to be infected. As only a single blood film was examined, the real percentage of infections is certainly much higher.

5. *T. congolense* and *T. vivax* are the parasites most commonly found. *T. gambiense* was met with once.

6. About 5 per cent. of the animals examined were found to be infected with *Piroplasma bigeminum*.

7. *Theileria mutans* was encountered in between 20 and 30 per cent. of the cattle examined.

REFERENCES

- MACFIE, J. W. SCOTT (1914). Notes on some Blood Parasites collected in Nigeria. *Annals Trop. Med. and Parasitol.*, VIII, pp. 439-468.
- THEILER, A. (1905-6). Report of the Government Veterinary Bacteriologist. Transvaal Department of Agriculture, Pretoria.
- (1906-7). Report of the Government Veterinary Bacteriologist. Transvaal Department of Agriculture, Pretoria.