On 2nd May the temperature was 104.2° morning and 102.2° evening. A few round and an occasional bigeminate form were found in the blood-smears.

On 3rd May the temperature was 101.2° morning and 103° evening. Blood-smears showed a similar condition to that found on 2nd May.

On 4th May the temperature was 102.4° morning and 102.2° evening. No piroplasms could be found in the blood-smears.

From the 5th to the 14th May the temperature fluctuated between 102° and 104.2° , but no piroplasms could be found in the blood-smears between the 5th and 12th May. On the 13th, however, a few round piroplasms were present, but after this they disappeared.

Experiment XVI.—Heifer 13.

On 23rd April 1910 this heifer received subcutaneously 100 cc. of the blood of Bull 214 (Experiment I.), and on the 30th April she was again inoculated with 20 cc. of the blood of Heifers 4 and 2 (Experiments IX. and XV.).

The temperature remained normal throughout the experiment, that is, from the 23rd April until the 14th May, except on 2nd May, when it rose to 103° in the evening. A few small round piroplasms were present in the blood-smears on the 3rd, 4th, and 5th May, but on none of the other days could parasites be found.

Experiment XVII.—Heifer 88.

On 30th April 1910 this heifer received subcutaneously 20 cc. of the blood of Heifers 4 and 2 (Experiments IX. and XV.). Observations were continued until 17th May, but no rise of temperature took place, and no parasites were found in the blood-smears.

DESCRIPTION OF FIGURES.

FIG. 1. Composite field showing piroplasma bigeminum in blood of an English cow on the eighth day after inoculation. Drawn with camera lucida, $\times 3400$. Each division of the scale is $\frac{1}{100}$ th mm., or 10μ .

FIG. 2. Composite field showing piroplasma divergens in blood of an English heifer (Heifer 3) on the eighth day after inoculation. Drawn under exactly the same conditions as Fig. 1. Each division of the scale is $\frac{1}{100}$ th mm., or 10μ .

FIGS. 3 to 8. Micro-photographs of blood showing different forms of the piroplasma divergens ($\times 2000$).

TRANSMISSION OF TRYPANOSOMIASIS IN NORTH-EASTERN RHODESIA.

By RUPERT L. L. HART, M.R.C.V.S., Government Veterinary Surgeon, Fort Jameson, Northern Rhodesia.

THIS short note is published principally because up to the present in this country it has been regarded almost as an axiom that tsetse fly (*Glossina morsitans*) is the only fly capable of transmitting trypanosomiasis in cattle.

Mr R. E. Montgomery, working with Dr A. Kinghorn in North-Western Rhodesia in 1907, advanced the view that stomoxys calitrans and lyperosia were also capable transmitters.¹ This opinion caused the closing of the Southern Rhodesia border to cattle from this territory for nearly two years, during which time experiments were made in Southern Rhodesia to transmit trypanosomiasis by stomoxys and lyperosia. I believe these experiments failed, and the border was again opened to cattle in this territory in June 1910.

On 1st April 1911 I received a letter from a settler (R. C.) enclosing a few small flies of the genus pangonia and blood-smears of a bullock which had died, with the following history.

For about a week the flies, which had not been seen before, were encountered in a swarm, like bees, and they bit the cattle, chiefly about the legs and bellies. I examined the smears after staining with Romanowsky (Leishman's modification), and found a few small trypanosomes in the proportion of one in six fields of a $\frac{1}{8}$ -inch lens.

I visited the farm in question at once, 50 miles away, and found many cattle showing trypanosomes in their blood, although none of them were yet showing clinical signs of disease.

Glossina morsitans exists within 20 miles of the farm, and I at first thought that the cattle had become infected by tsetse flies which might have followed a herd of game or elephants, which are very plentiful round there. R. C. assured me that no tsetse fly had been seen.

I decided to make a small experiment in a rough way to see if these pangonia were capable of transmitting trypanosomiasis, which was as follows.

I selected two bullocks showing trypanosomes in their blood and kept them at the farm. All the remainder of the cattle were taken 14 miles away and kraaled in a place apparently free from biting flies.

I next brought three old cows from Fort Jameson (50 miles away, in an area free from tsetse fly) and kraaled them with the two bullocks showing trypanosomes in their blood. These five were kept together constantly and fed close to the house to eliminate the chance of a stray tsetse fly coming along, which was improbable.

These cattle were placed in contact on 11th April 1911, and were immediately bitten by the pangonia and also by stomoxys nigra. I had to leave the farm to attend to my other duties, and returned there on 22nd April, and then examined the experimental cattle.

In two of them I failed to find any trypanosomes, but in the third (No. 3) I thought I detected one trypanosome, but was not certain, as I was at the time working with a microscope fitted only with $\frac{2}{3}$ -inch and $\frac{1}{8}$ -inch lenses, which are of course unsuited to serious work. (Anything ordered from Europe takes nearly a year to arrive here.) The experimental cattle showed no clinical symptoms then, but the two bullocks were visibly fly struck, with extreme pallor of visible mucous membranes, staring coat, running at the eyes, emaciation, and enlargement of the prescapular and precrural glands, and, although they continually lay down, they continued to eat ravenously.

My next visit to the farm was on 27th May 1911. I found trypanosomes to the average of two or three to a field in moist

¹ "Annals of Tropical Medicine and Parasitology," Vol. II., No. 2, June 1908.

blood in one of the cows (No. 1). I had this beast killed for the purpose of *post-mortem* examination, which was as follows.

The cow was in good condition and very fat, and there were no external lesions. On opening the abdomen there escaped about a quart of straw-coloured sticky fluid. All the organs appeared normal. The mesenteric glands were slightly enlarged, but normal in consistence. Microscopically they swarmed with trypanosomes. Examination of the spleen and liver for trypanosomes was negative. In the thorax all the organs were normal.

The flesh was of normal colour and consistence, and it was eaten, together with all the viscera, by my carriers with evident enjoyment.

Many of R. C.'s cattle which have died have been eaten by the natives on his farm, and no ill results have followed. The meat is merely dried over smoke fires and then consumed.

R. C. informed me that when he took off the skin of the first bullock which died he found exudates under the skin of the consistence of jelly, and straw-coloured.

Between my visits of 22nd April and 27th May the small species of pangonia gradually disappeared, and a large species of the same genus took its place.

Both species are well known to the natives, the small one being known as chipanga, and the large one as chiluma a ng'ombe, in the Chikunda dialect.

Native evidence is unreliable in these cases, and in this instance it is contradictory. Some say these flies kill cattle like tsetse, while others say they do not.

There were sixteen head of cattle which had trypanosomes in their blood at my first examination, and after six weeks they showed the clinical signs of fly struck. A curious feature about the first three or four which became infected was the fact that the hair at the end of the tail dropped out, and occasionally a small portion of the tail itself.

I was informed by a settler that he had noticed this symptom before, when he had got oxen fly struck on the way to Salisbury last year. Another marked feature appeared to be the colour of the animals attacked. In 80 per cent. of cases the colour of the affected animal was black or dark brown. I have noticed this also in other outbreaks of trypanosomiasis.

A few of the animals are recovering without treatment, including the two bullocks which I used as in-contact animals with the three experimental cows.

The two remaining cows, Nos. 2 and 3, both died of trypanosomiasis at the beginning of July.

It is unfortunate that more work could not be done, but this is work in which constant attendance is necessary, and that I was unable to give, as I am the only veterinary surgeon in a territory of 160,000 square miles.

Identity of the Trypanosome.—I am indebted to Dr Allan Kinghorn, of the Sleeping Sickness Department of North-Eastern Rhodesia, for a description of the trypanosome. I sent him two smears of gland juice, which were unfortunately broken in transit. He was, however, able to patch them up, but they stained badly. The measurements, which are approximate only, are as follows.

Trypanosomes measure 15·75 to 24·25 microns in length and 1·3 to 1·5 microns wide.

The nucleus measures from 2·25 to 3·0 microns in length, is placed about the centre of the trypanosome, and stains uniformly. The blepharoplast is fairly large, rounded or oval, and situated at or very close to the posterior extremity.

The undulating membrane is well defined, and there is a free flagellum measuring from 3·75 to 7·0 microns in length. The body protoplasm stains homogeneously, and does not show granules or vacuoles. Dr Kinghorn concludes: "Superficially the measurements of the trypanosome resemble those of trypanosome dimorphon or trypanosome pecaui, though the variations are not as wide as are commonly seen in these two species."

The flies have all disappeared again, but there will probably be a fresh invasion at the beginning of the rains of various biting flies, with which I hope to make some experiments, which will be recorded in a future note.

A NEW HÆMATOPINE OF THE SHEEP.

By FRANK W. GARNETT, M.R.C.V.S., Windermere.

MR H. A. REID, F.R.C.V.S., Government Bacteriologist at Wallaceville, New Zealand, forwarded me for identification some unmounted specimens of a parasite taken from the legs of sheep in Canterbury,

FIG. 1.

Haematopinus microcephalus ♂ ($\times 30$).

South Island. The only other recorded hæmatopine of the sheep (*haematopinus ovillus*), which is found on the head, was first recorded from New Zealand, and was named and described by Neumann in August 1907 (*Revue Vétérinaire*).

The parasites sent me are a new species of hæmatopine of the sheep. The accompanying photographs of *haematopinus ovillus* and the one now described will be readily differentiated, the magnification being the same in each. It has been noted that *haematopinus ovillus* resembles in general character *haematopinus vituli*; the new species somewhat resembles in configuration *haematopinus piliferus*.