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Haematoxenus SPECIES FROM UGANDAN BUFFALO *Syncerus caffer*[1]

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Abstract: Blood parasites, *Haematoxenus* and *Theileria,* were found to be common in African buffalo sampled in Queen Elizabeth Park, Uganda. These parasites are described and compared with similar forms from cattle.

INTRODUCTION

The genus *Haematoxenus* was first described from splenectomised cattle in Madagascar by Uilenberg.[5] This parasite, *Haematoxenus veliferus,* was associated with bovine red cells and was characterized by the presence of a delicate veil of unknown origin, attached laterally to a piroplasm - like parasite. Uilenberg also suggested that some piroplasm-like forms he found in cattle which did not possess a veil belonged to the same species. He concluded that although the classification must remain uncertain, these parasites morphologically most resembled the Theileridae. Since the original description, morphologically similar parasites have been reported from cattle in West Africa by Folkers and Kuil[4] and from East Africa by Buys *et al.*[3] and Oteng.[6] To date little is known about the biology or transmission of this protozoan. Both Uilenberg[5] and Oteng[6] managed to transmit the parasite by inoculation of infected blood into cattle, but were of the opinion that natural transmission was effected by ticks. Recently Uilenberg[7] reported *Haematoxenus* from 5 of 49 buffalo sampled in the Central African Republic.

This paper records the occurrence of *Haematoxenus* in African Cape buffalo *(Syncerus caffer)* from the Queen Elizabeth Park, Uganda. Some observations are made on the morphology and biology of this parasite.

MATERIALS AND METHODS

Thirty-one buffalo were immobilized with Etorphine* using a capture gun in the Queen Elizabeth Park during November 1970. Duplicate blood slides were prepared, fixed in methanol and stained with 10% Giemsa.

RESULTS

Twenty-nine buffalo showed *Theileria*-like parasites in their blood. The number of infected red cells (parasitaemia) varied between 0.012% and 5.5% but the majority of infected animals (22) had parasitaemias below 1%.

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Morphology of parasites

Two types of parasites were distinguished; veiled *Haematoxenus*-like parasites and non-veiled *Theileria*-like parasites. In four of the infected buffalo only non-veiled parasites were detected while 25 harboured both types. The proportion of veiled to non-veiled parasites varied considerably between individual buffalo but in every case non-veiled parasites were more common than veiled ones.

Morphologically the typical theilerial piroplasms varied between vacuolated forms under 1 μm in diameter, oval vacuolated forms up to 2.5 μm and rod-shaped forms with terminal chromatin and tailed cytoplasm up to 2 μm in length (Fig. 1). Except for the minute vacuolated forms these parasites were morphologically indistinguishable from *Theileria lawrenciei* of buffalo.[1]

The veiled parasites had a typical theilerial morphology except for the veil which appeared to arise laterally from the parasite's body (Fig. 2). The most common form of the veiled parasite consisted of a rod-shaped structure which varied from 1.2 to 2.0 μm in length. Typically these rods had terminal chromatin with a blue staining cytoplasmic tail. Without the occurrence of the veil these would have been indistinguishable from the typical theilerial parasites occurring in the buffalo. The veiled structure was usually rectangular although forms with terminal tapering were seen. The veil varied in length from 0.8 to 3.2 μm and the width of the veil was always slightly narrower than the length of the parasite's body. The body of the parasite was often situated in a peripheral position in the erythrocytes with the veil protruding up to 0.5 μm out of the erythrocytic surface. However, some parasites occupied a central position in the erythrocytes with the veil either falling short or protruding through the edge of the erythrocyte. Occasionally vacuolated *Theileria*-like parasites with veils were detected.

The colour of the veil, stained in Giemsa, varied from that of the erythrocytes to dark mauve. Often the edges of the veil appeared to be unstained and refractile. The veil had a definite structure, as free veiled parasites were detected. Possible stages of multiplication were detected in which two rod-shaped parasites were attached by a veil.

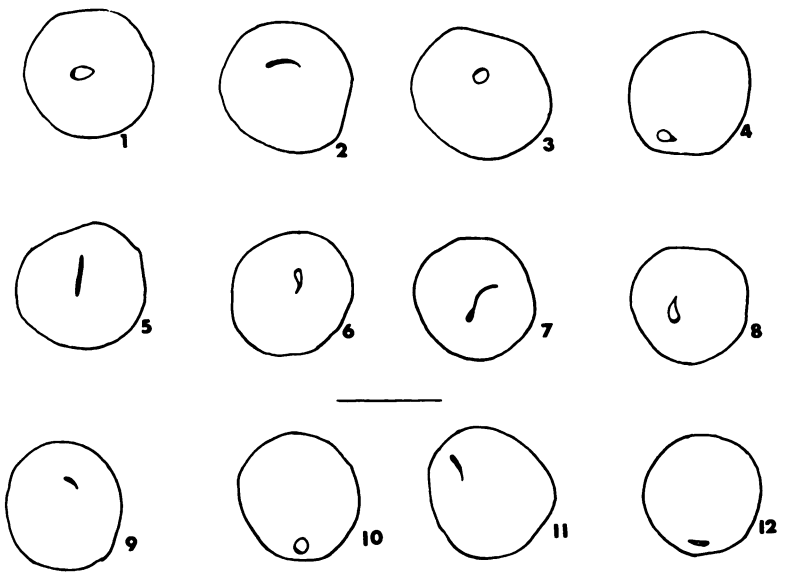

FIGURE 1. **Theileria** species from Ugandan buffalo.

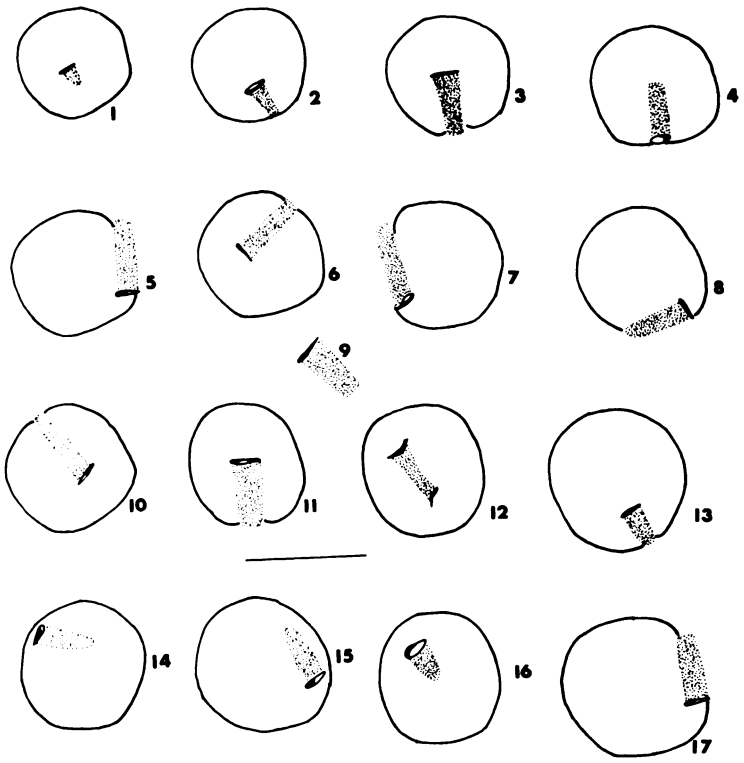

FIGURE 2. **Haematoxenus** species from Ugandan buffalo. Note "Dividing" form (12) and "free" form (9).

DISCUSSION

The present report is the first record of *Haematoxenus* from wild animals in East Africa. It is likely that this parasite is maintained within buffalo populations since some of the buffalo sampled in Queen Elizabeth Park have not had cattle contact for many years. Brocklesby and Vidler[4] and ourselves have failed to detect *Haematoxenus* in large numbers of buffalo examined in other areas of East Africa. Therefore the distribution of *Haematoxenus* in buffalo populations may be restricted.

Haematoxenus from buffalo was morphologically indistinguishable from the cattle species *(Haematoxenus veliferus)* from Madagascar or Kenya. Fig. 3 shows the cattle parasite obtained from a pregnant cow from Athi River, Kenya. Whether or not the parasites are the same species will have to wait until transmission attempts are made between buffalo and cattle. It has been impossible to determine whether typical theilerial parasites detected in the majority of buffalo represented a part of the development of *Haematoxenus* or whether they were a separate species.

Tail-like appendages attached to *Anaplasma* marginal bodies have been described by a number of workers using special stains or techniques. These findings have been reviewed by Ristic,[7] and the name *Paranaplasma caudata* has been proposed for one of these strains.[5] It seems unlikely, however, that *Haematoxenus* is related to *Anaplasma,* particularly

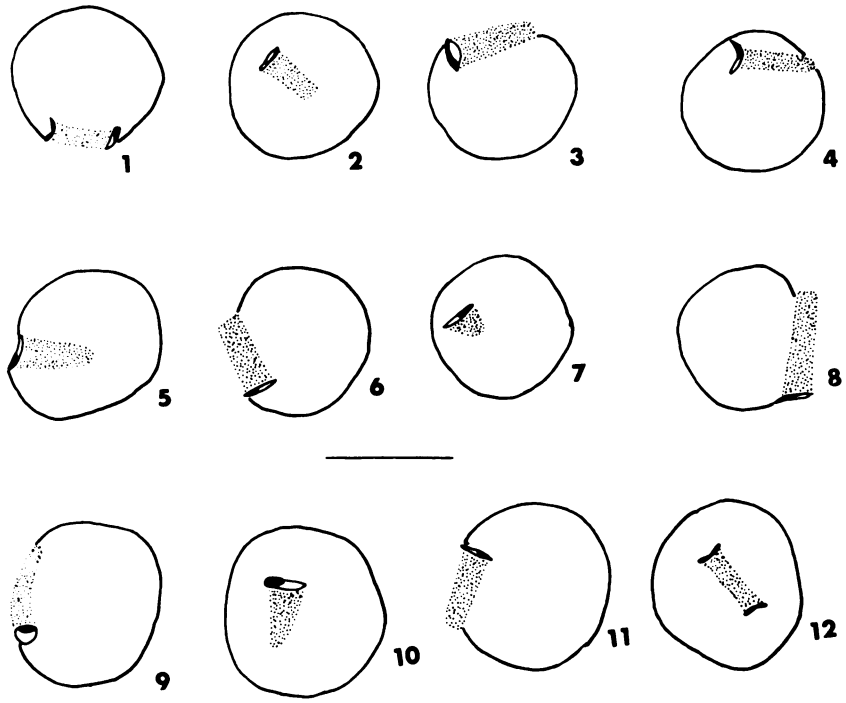

FIGURE 3. **Haematoxenus veliferus** from a pregnant cow obtained from Athi River, Kenya. Note "dividing" form (1). (Scale on all drawings equals 5μm)

as cytoplasm staining by Giemsa has not been recorded for *Anaplasma*, and the veils of *Haematoxenus* bear only superficial resemblance to the tails of *Paranaplasma*.

Haematoxenus of buffalo resembled *Theileria* very closely except for the occurrence of the veil. The nature of the veil has yet to be established.

There was no evidence that this parasite was pathogenic to buffalo and the parasitaemias of *Haematoxenus* were below that which could be considered pathogenic in theilerial infections. *Haematoxenus* infections in buffalo are unlikely to be an important source of cattle pathogens since Uilenberg found *Haematoxenus veliferus* was non-pathogenic to cattle.

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