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A Trypanosome From Silver Catfish (*Schilbe intermedius*) in the Okavango Delta, Botswana

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Abstract

Of 48 freshwater fishes captured in the panhandle region of the Okavango Delta, Botswana, in 1999, only one, the silver catfish , was found to contain a blood parasite. When this trypanosome was compared with existing records of trypanosomes from the freshwater fishes of tropical and southern Africa it was found to most closely resemble *Trypanosoma mukasai.* Firm identification of the parasite requires collection of further material from the same source. As far as the authors are aware, this is the first record of a fish trypanosome from the Okavango Delta and the first report of such a parasite from silver catfish.

Introduction

Baker (1960), in his paper on the trypanosomes and dactylosomes of freshwater fish in East Africa, summarised the literature available on trypanosomes infecting freshwater fish of tropical and southern Africa. Baker (1960, 1961) concluded that of those trypanosomes described, there were probably only three valid species from African freshwater fish: *Trypanosoma toddi* Bouet, 1909, *Trypanosoma mukasai* Hoare, 1932, and *Trypanosoma tobeyi* Dias, 1952. Later, Paperna (1996) reported that a species resembling *Trypanosoma mugilicola* Becker and Overstreet, 1979, existed in the Mugilidae of the lagoons and rivers of southern Africa.

Recently, we were able to examine blood smears taken from several species of freshwater fishes captured in the Okavango Delta, Botswana. We report on a trypanosome discovered in one of these fishes.

Material and Methods

Fishes (n = 49) of 12 species in six families, were collected with gill nets stretched across deep lagoons in the panhandle region of the Okavango Delta in June and July, 1999. Fish captured by this method were maintained in tanks of aerated fresh water until examination, when they were anaesthetised with benzocaine. They were then measured and identified using Skelton (1996). Heart blood smears were taken, fixed in absolute methanol, stained with phosphate-buffered Giemsa (pH 6.8) and screened for blood parasites. Any parasite observed was measured with an eyepiece graticule and stage micrometer, according to the recommendations of Lom and Dykova (1992), and photographed with a Zeiss Axoskop 20 photomicroscope.

Results

The identity, number and length of fishes captured in gill nets are recorded in Table 1. They

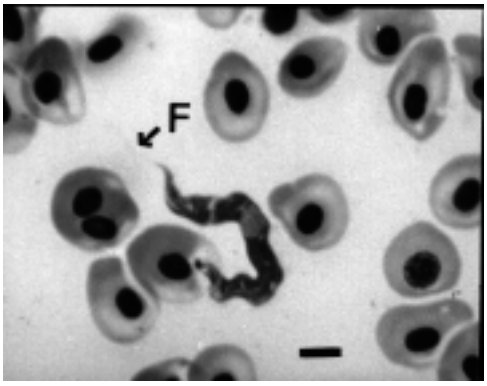

Figure 1. Giemsa stained blood film from *S. intermedius* with trypanosome. Note its pointed anterior with poorly stained free flagellum (F), nucleus within the deeply stained body, and blunt posterior with rounded kinetoplast. Bar scale = 5 µm

included: tigerfish *Hydrocynus vittatus* Castelnau, 1861 and silver robber *Micralestes acutidens* (Peters, 1852) (Characidae); banded tilapia *Tilapia sparrmanii* Smith, 1840, thinface largemouth *Serranochromis angusticeps* (Boulenger, 1907), purpleface largemouth *Serranochromis macrocephalus* (Boulenger, 1899), and nembwe *Serranochromis robustus* (Ghnther, 1864) (Cichlidae); African pike *Hepsetus odoe* (Bloch, 1794) (Hepsetidae); spotted squeaker *Synodontis nigromaculatus* Boulenger, 1905 and bubblebarb squeaker *Syndontis thamalakanensis* Fowler, 1935 (Mochokidae); western bottlenose *Mormyrus lacerda* Castelnau, 1861 and bulldog *Marcusenius macrolepidotus* (Peters, 1852) (Mormyridae); and silver catfish *Schilbe intermedius* Rhppell, 1832 (Schilbeidae).

Only one species of fish, the silver catfish (*Schilbe intermedius)*, captured in the Delta showed a blood parasite (Table 1) and this was a single specimen of a large trypanosome shown in Fig. 1. The measurements of this trypanosome are recorded in Table 2. In the Giemsa-stained blood film, the body of the trypanosome stained deep blue, though its free flagellum, arising from the pointed anterior end of the body, was poorly stained. The undulating membrane was difficult to discern

Fish species	No.	Mean length ± SD (range) in mm	Prevalence (%)
Hydrocynus vittatus	6	448.8 ± 75.2 (305 - 540)	0/6 (0)
Micralestes acutidens	10	57.1 ± 3.3 (53 - 63)	0/10 (0)
Tilapia sparrmanii	2	137.5 ± 2.5 (135-140)	0/2 (0)
Serranochromis angusticeps	1	220	0/1 (0)
Serranochromis macrocephalus	1	230	0/1 (0)
Serranochromis robustus	3	305 ± 25 (280-330)	0/3 (0)
Hepsetus odoe	1	265	0/1 (0)
Synodontis nigromaculatus	3	204 ± 30.4 (180-247)	0/3 (0)
Syndontis thamalakanensis	1	190	0/1(0)
Mormyrus lacerda	1	385	0/1 (0)
Marcusenius macrolepidotus	8	188.6 ± 18.5 (170 - 227)	0/8 (0)
Schilbe intermedius	12	213.3 ± 46.2 (80 - 270)	1/12 (8.3)
Total	49		1/49 (2.0)

Table 1. Identity, number and length (mm) of fishes captured in the Okavango Delta, and prevalence of blood parasites in these fishes.

Measurement	length (μm)
midnucleus to anterior	14.1
midnucleus to posterior	21.3
midnucleus to kinetoplast	20.1
posterior to kinetoplast	1.2
nucleus length	4.1
body width	4.0
length of free flagellum	9.2
total body length	35.4
overall length including free flagellum	44.6

Table 2. Measurements of *Trypanosoma sp.* from *S. intermedius*

along some regions of its length, because of its close proximity to the intensely stained body of the trypanosome. The kinetoplast was prominent and rounded, lying close to the blunt posterior end of the body. The nucleus, which was rounded, stained pink with Giemsa and lay closer to the anterior end of the trypanosome than its posterior extremity (Table 2).

Discussion

Hoare (1932) described *T.mukasai* from *Haplochromis serranus, Haplochromis cinereus and Haplochromis humilior* (Cichlidae) collected from Victoria Nyanza, Uganda. Subsequently, Baker (1960) measured 17 specimens of Hoare's trypanosome and he noted that the larger specimens his own trypanosomes from *Tilapia* and other genera of fishes (*Labeo, Bagrus, Mormyrus* and *Astatoreochromis*) in Lake Victoria and Lake George, East Africa, closely resembled *T.mukasai,* except in flagellar length. Baker (1960) concluded that his large trypanosomes were also *T.mukasai* and that the smaller trypanosomes, which he found in the same fishes, were different forms of the same species.

Although we have only one specimen of our material to compare with others, the general morphology of our trypanosome, its total body length (35.4 μm), distance from the posterior to kinetoplast (1.2 μm), nucleus length (4.1 μm), body width (4.0 μm) and free flagellum length (9.2 μm) are all similar to those of *T. mukasai* quoted by Baker (1960). Futhermore, the nucleus of our trypanosome, even allowing for measurement from the centre of the nucleus, rather than its anterior edge (as in Baker's measurements), lies nearer to the anterior end, as in many examples of Baker's material.

Baker (1960) considered that *T.mukasai* did not differ greatly from Bouet's (1909) *T.toddi*, except in having a shorter free flagellum and a nucleus slightly, on average, in front of the mid-point of the body. Since our trypanosome has a flagellar length about equal to that of *T. mukasai* and a nucleus which is positioned fairly well forward, it resembles *T. mukasai* more than *T. toddi.*

Trypanosoma toddi and Dias' (1952) *T. tobeyi* appear to differ only in nuclear position (see Baker, 1960), the nucleus lying more anterior in *T.tobeyi*. Baker (1960) considered that *T. tobeyi* might eventually prove to be a synonym of the *T. mukasai.*

The only other trypanosome named from Africa is one resembling *T. mugilicola* (see Paperna, 1996). However, one feature of this trypanosome is striking. The nucleus of *T. mugilicola* is only about 6.6μm from the anterior end of the body (Becker and Overstreet,

1979). This characteristic immediately separates *T. mugilicola* from *T. mukasai* because in most specimens of the latter the nucleus is roughly twice this distance from the anterior end. Eiras *et al.* (1995), as a result of their studies in Brazil, suggested that *T. mugilicola* might be synonomous with *Trypanosoma froesi* Lima, 1976.

The identity of our trypanosome from the Okavango Delta is difficult to place, since it is based on one specimen. In the absence of adequate material, we consider that it most closely resembles *T. mukasai*, but we will review this opinion should further specimens be located. As far as we are aware, this is the first record of a fish trypanosome from the Okavango Delta region of Botswana and the first report of such a parasite from the silver catfish, *Schilbe intermedius*.

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Author's Footnote

Trypanosoma mukasai has been reported recently from African *Tilapia nilotica* and *Clarias lazera*, but not from the Okavango (Negm-Eldin M. M & Davies, R.W (1999). Simultaneous transmission of *Trypanosoma mukasai, Babesiosoma mariae* and *Cyrilia nili* to fish by the leech *Batracobdelloides tricarinata*. Deutsche Tieräztl. Wochenschr. 106, 526-527.)

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