Protozoan Parasites of Two Freshwater Fish Species (*Oreochromis niloticus* and *Clarias gariepienus*) in Khartoum State (Sudan).

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Summary

Two random groups, each of thirty individuals of the freshwater fishes *Oreochromis niloticus* (Bulti) and *Clarias gariepienus* (Garmout) were collected from aquacultures and *Jebel Awlia* reservoir, Khartroum State. Fishes were examined in the laboratory for the presence of protozoan parasites in their blood and visceral organs.

Trypanosoma, *Myxobolus* and *Haemogregarines* spp. were diagnosed in the blood, livers, kidneys and ovaries of *Clarias gariepienus* from Jebel Aulia reservoir. *Cryptobia* and *Myxobolus* spp. were the only protozoons found in the livers, kidneys and ovaries of *Oreochromis niloticus* obtained from aquacultures. These findings are compared with earlier results reported in the Sudan and the importance of fishes as a source of highly quality proteins is highlighted.

Key words: *Oreochromis niloticus, Clarias gariepienus*, protozoan parasites, fish farms, Khartoum State, Sudan.

Introduction

In the year 1996, the world annual catch of fish protein reached 116 million tons whereas the world production of aquaculture mounted to 16 millions of tons, most came from the developing countries (FAO, 1996).

Fishes are hosts for many protozoan parasites. Some of the parasites cause disease affecting fish health and reproduction, making them fall easy prey to predators. In fish farming, parasites may lead to epidemics and mortalities resulting in economic losses (Khalil and Polling, 1997). Changes in blood characteristics of *Oreochromis niloticus* and *Clarias gariepienus* caused by stress due to the exposure to environmental pollutants, diseases or attack by pathogens have been studied by several authors (Paperna, 1996; Onusiriuka and Ufodike, 2000; Ezri, 2001; Gabriel *et al,* 2001; Adam, 2004 ., Adam and Agab, 2008). Issues discussed by the above mentioned authors have been effectively employed in monitoring the responses of the fish to the stressors and evaluating its health status under such adverse conditions.

Little work on the incidences of trypanosoma in Sudan-freshwater fishes has been done. Neave (1906) reported presence of trypanosomes in the blood of *Synodontis shall, Bagarus bayad* and *Mugil* species in the Sudan. Trypanosomes were detected in the blood of some River Nile fishes; the protozoan is found in *Mugil* species, *B. bayad, S. shall, Chryichthys auralus*, *Tilapia* sp. and *Polyptetrus* sp. (Wengon, 1908). Four protozoan parasites were reported in the Sudan by Al Wasila (1976) infect *Oreochromis niloticus* fish; of them, *Trypanosoma mukasi* (Hoare, 1932). *T. alhusaini* and *Myxobolus* sp. are the protozoa that live at the expense of four freshwater fishes, *Polypterus sengalus, Clarias lazera, S. shall* and *serrtatus* (Idris, 1986). The survey conducted by Shammat (1989) to detect the protozoa that infect *Oreochromis niloticus* which was collected from the White Nile and Aquaculture farms in Khartoum State, revealed the presence of *Trypanosoma mukasi* and two other species of trypanosomes. *Myxobolus agolus* (Lansberg, 1985) was reported for the first time from *Oreochromis niloticus* in the Sudan by Shammat (1989).

Trypanosomes have been reported in Africa by many researchers (Wengon, 1908; Hoare, 1932; Dias, 1952 ; Baker, 1960 ; 1961). Some fish infecting species are apparently distributed as widely as their hosts e.g *Clarias- gariepienus* and *C. lazera.* Leeches, as well as trypanosomes frequently infect *Clarias gariepienus* in Palastine (Paperna, 1996). Natural infection with trypanosomes may be very common where their leech vectors are abundant. In Lake Victoria, 54% of *Oreochromis* sp were found with variable degree of infection with trypanosomes and 50% of *O. esculenta* were found infected, and 20% of *O. niloticus* were found infected in Lake George (Baker, 1960 ; 1961).

Data on piscine haemogregariens and dactylosomes are rare in Africa (Hoare, 1932; Baker 1960). Dactylosomes in cichlids are related to haemogregariens, which show affinities with mammals on piroplasms (Bathra and Desser, 1989). The only pathological significant infections are caused by the haemogregariens that induce proliferation lesions they are reported only from culture marine fishes. Paperna (1979), reported that, lesions may comprise encapsulated aggregates of merothoites.

A Preliminary survey was proposed, in this study, to identify the important blood protozoa present in the circulatory system and some internal organs of two freshwater fishes: Bulti (*Oreochromis niloticus*) and Garmout (*Clarias gariepienus*) which are usually raised in aquaculture farms in Khartoum State (Sudan).

Materials and Methods

Samples Collection: Thirty fish samples of *Oreochromis niloticus* were collected in two groups; 20 samples were collected by two fishermen using gillnets and cast net from the Aquaculture Experimental Farm of

the College of Veterinary Medicine and Animal Production, University of Sudan–Khartoum North. Ten samples were caught in Al Shajara Fisheries Research Station (south of Khartoum).

From Jebel Awlia Reservoir, 30 fish samples of *Clarias gariepienus* were also collected for blood protozoan investigation.

After collection, the length for each sample was measured in cm, using a ruler. Blood samples were collected from the caudal vein; films were thereafter made by placing a drop of blood on clean slide, spread on and left to dry. After proper dissection of all the caught samples, impression smears were prepared from liver, ovaries and kidneys and left to dry.

Laboratory Investigation: Blood and impression smears were fixed and stained with fresh Giemsa stain; they were examined at x100 magnification under light microscope.

Results

Fishes were examined in the laboratory for the presence of protozoan parasites in the blood and other organs. Blood protozoa detected in the blood, kidneys, ovaries and liver of *Oreochromis niloticus* and *Clarias geriepienus* are shown in Table 1. Identification of the protozoan parasite was made at the generic level.

Table 1. Protozoans detected in the infected blood and organs of *Oreochromis niloticus* and *Clarias gariepienus*.

Fish species	Infected blood/organs	Detected protozoan
Oreochromis niloticus	Livers. Kidneys and ovaries	*Myxobolus* sp.
	Livers	*Cryptobia* sp.
Clarias gariepienus	Blood and livers	*Trypanosoma* sp.
	Livers, kidneys and ovaries	*Myxobolus* sp.
	Blood	*Haemogregarine* sp.

Examination of the blood films and impression smears of liver, ovaries and kidneys of *Oreochromis niloticus* collected from Al Shajara-Fisheries Research Station revealed the absence of blood protozoa. A number of six fishes that measured 12.9, 13.5, 14, 15.5, 16 and 19 cm. length were found free from blood protozoons in all the investigated organs. Examination of 4 fish samples revealed the presence of *Myxobolus* sp. and *Cryptobia* sp. in the investigated organs (Table 2).

The *Oreochromis niloticus* group collected from the Aquaculture Experimental Farm revealed the absence of blood protozoa from all the blood films examined. Three fish samples that measured 12.7, 13.4 and 14 cm. in length were found free from blood protozoa. *Myxobolus* sp and *Cryptobia* sp. were detected in the impression smears of livers, ovaries and kidneys of 17 fish samples (Table 2).

Table 2. *Cryptobia* sp. infects the ovaries of *O. niloticus*. Baker (1960 ;1961) reported the prevalence of *Cryptobia* sp. in *O. niloticus*. as 54% in Lake Victoria and 20% in the Lake George.

Kidneys and ovaries	0	0	3	11, 13.2 and 14.2
Livers	2	15 and 17	4	11.2, 11.6, 13.4 and 14
Kidneys	0	0	2	11.6 and 12.5
Ovary	1	14.2	0	0

Investigation on *Clarias gariepienus* group (60 fish samples), collected from *Jebel Awlia* Reservior showed the absence of protozoan parasites in the blood films and smears of kidneys, ovaries and livers of eight fish samples of 23.4, 29, 30.3, 30.5, 31.3, 36, 38.3 and 45 cm. in length *Trypanosoma* sp., *Myxobolus* sp., and *Haemogregarien* sp. were detected in the blood, liver, ovaries and kidneys of 22 *Clarias gariepienus* collected from Jebel Awlia Reservior (Table 3).

Table 3. Details of *Clarias gariepienus* carrying blood protozoans (*Trypanosoma* sp. *Myxobolus* sp. and *Haemogregarine* sp.)

Protozoans carrier Blood/ organs	No. of fish samples	Lengths (cm.)
Blood, ovaries and livers	2	15 and 28.5
Livers and kidneys	2	29.1 and 41.3
Blood and ovaries	2	23.8 and 30.8
Liver and blood	1	26
Ovaries	2	32.5 and 33.5
Kidneys	5	25.7, 29.1, 30, 33.7 and 42
Livers	6	25.8, 27.4, 29, 30.7, 32.5 and 36.5

Discussion

Trypanosoma sp. were found in the blood and livers of *Clarias gariepienus* and absent in the specimens of *O. niloticus*. This result agrees with the findings of Wengon (1908), Hoare (1932), Dias (1952) and Baker (1960;1961), who reported the occurrence of *Trypanosoma* sp. in *C. lazera* in all major River of Africa and in the East Africa, but not in *O. niloticus*. Al Wasila (1976) reported the presence of four protozoan parasites of *O. niloticus* including *Trypanosoma muskasi. Trypanosoma alhusaini* was reported by Idris (1986) in the blood of *C. lazera*.

In marine fishes, *Trypanosoma carassii* is a pathogen of juvenile common carp, *Cyprinus carpio carpio*, found Latvia ponds (east of the Baltic Sea). The leeches, *Piscicola geometra* and *Hemiclpsis marginata* acted as vectors according to Kirjusna and Vismanis (2007). The authors also reported the leeches, *Pisicola geometra* and *Hemiclpsis marginata*, as vectors of *Trypanosoma granulosum* which found in the blood of eels and *Anguilla anguilla* fish in the Lake Usmas (the Baltic Sea).

Hoare (1932) and Baker (1960) claimed that, data on piscine haemogregarines and dactylosome in Africa are scare in cichlids. In South Africa, Bertha and Desser (1989) reported the presence of *Dactylosoma hannesi* and *Haemogregarine* sp. in grey mullet. The latter authors reported these parasites as host-specific to grey mullet fish only. In this study *Haemogregarine* sp. is found in the blood of *C. gariepienus* caught in *Jebel Awlia* Fish Reservior.

Myxobolus sp. is found in both types of fishes of this study. Livers, kidneys and ovaries were the infected organs. Ovarian infection with *Myxobolus* sp. in female cichlids from Lake Victoria was reported by Paperna and Thurston (1968). The infection was also found as focal points in the intestinal tissues. Infection by *Myxobolus* sp. is best known in cichlid fishes and can also spread from cichlidae fishes to fishes of other families (Paperna, 1973). Parasitological studies were done by Shammat (1989) on *O. niloticus* collected from White Nile and fish farms around Khartoum State, revealed *Myxobolus* sp. is one of the protozoa that infect this fish species.

In marine fishes, according to Kirjusina and Vismansis (2007), *Myxobolus- bramae* and *M. cycloids*, were detected in the kidneys and urinary bladders of *Abramis brama* and *Sardinius erythrophthalmus* fishes, respectively. *Myxobolus carassi* was detected in the livers of *Carassius carassius* fishes and *M. exiguss* (Thelohan, 1895) was detected in the gills and kidneys of *Abramis brama* fishes.

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