Helminth Parasites of Malapterurus Electricus (Malapteruridae) from Lekki Lagoon, Lagos, Nigeria

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Abstract: A parasitologic investigation on the helminth parasites of *Malapterurus electricus* of Lekki lagoon was carried out. A total of one hundred specimens of the fish species were examined. The prevalence of infections was 37.0%. The male specimens (69) recorded a higher rate of infections (37.7%) than the female specimens (31) with a prevalence of (35.5%). The specimens of *Malapterurus electricus* were found to be infected with a *Proteocephalid cestode*, *Electrotaenia malapteruri*, a nematode, *Nilonema* species, and with an *acanthocephalan* parasite, *Tenuisentis niloticus*.The occurrence of the nematode and the acanthocephalan parasites is the first scientific report in the fish species. A total of seventy six (76) gastrointestinal helminths were recovered from the infected specimens. The overall worm burden was independent of sex and size of the fish species. [The Journal of American Science. 2007;3(3):5-10]. (ISSN: 1545-1003).

Keywords: Malapterurus electricus, Lekki lagoon, Helminth parasites, Tenuisentis niloticus

INTRODUCTION

Fishing is an important component of aquaculture in Nigeria. An appreciable proportion of the Nigerian population live close to creeks, rivers and lakes, and their main means of livelihood are fishing.

The genus *Malapterurus* is found throughout Western and Central tropical Africa and the Nile River. They occur in all the major freshwater systems in Africa. *Malapterurus electricus* is restricted to the Nile River and Lake chad (Moller, 1995).

There are currently three species of *Malapterurus* (Moller, 1995). *Malapterurus minjiriya* is known from the Niger River and Lake Kainji and M. microstoma is known from the Zaire River basin.

Skelton, (1993) reported that species in the genus *Malapterurus* are generally found among rocks or roots in turbid and black waters with low visibility and that they favour sluggish or standing water. Species in the genus *Malapterurus* have a general body form that has often been described as a bloated sausage. When they swim, their soft, puffy bodies give them the appearance of a rather rigid sausage propelled by somewhat ostraciform movements (Lissmann, 1958). *Malapterurus electricus* body is elongated and cyclindrical. The head is slightly depressed. The fish species eyes are small, the lips are thick and the snout is rounded with widely separated nostrils. *Malapterurus electricus* can reach up to 1220 mm in total length. (Skelton, 1993).

The most notable aspect of *Malapterurus* is its strong electrogenic ability. The electric organ, evolved from its pectoral muscle . The electric organ also surrounds the body over most of the length of the fish and is capable of discharging up to 350v (in a 500mm fish) (Keynes, 1957; Skelton, 1993; Sagua, 1987).

The electric catfish are nocturnal and spend most of the day hiding under shelter. *Malapterurus electricus* is most active for a period of 4 5 hours after sunset as this is the time when peak hunting and feeding occurs (Belbenoit *et al*., 1979).

Malapterurus electricus is a voracious piscivore (Sagua, 1979; Olatunde, 1984). The fish species hunt and stunned its prey using its paralysing electric organ discharge. It is an opportunistic feeder that will feed on the most readily available prey within its habitat. They are able to consume prey up to half their size (Sagua, 1979). There are no other known negative effects of *Malapterurus electricus* on humans aside from giving an unpleasant surprise to the fishermen who handles it.

Malapterurus electricus is eaten as food in parts of Africa. Moller 1995, reported that smoked electric catfish is a popular delicacy along the shores of Lake Kainji. The fish species is also occasionally encountered in the pet trade as an aquarium fish. The electric organs of *Malapterurus* have been used in studies of neuronal metabolism, axonal transport, and transmitter release (Volknandt and Zimmermann, 1986). The fish species is being particularly suited for this task because of their innervation by only one giant neuron (Janetcko *et al*., 1987; Moller, 1995; Volknandt, and Zimmermann, 1986).

The present study therefore investigates the parasitic helminth fauna of *Malapterurus electricus* from Lekki lagoon, Lagos, Nigeria, considering the conservation status and Economic importance for humans.

MATERIALS AND METHODS

Study Area: Lekki lagoon supports a major fishery in Nigeria. The Lekki lagoon located in Lagos State Nigeria lies between longitudes $4^0$00' and $4^0$15' E and between latitudes $6^0$25' and $6^0$37' N, has a surface area of about 247 km^2 with a maximum depth of 6.4m. A large portion of the lagoon is shallow and less than 3.0m deep. The Lekki lagoon is part of an intricate system of waterways made up of lagoons and creeks that are found along the coast of South-Western Nigeria from the Dahomey border to the Niger Delta stretching over a distance of about 200km. It is fed by the River Oni discharging to the North-Eastern and the Rivers Oshun and Saga discharging into the North-Western parts of the lagoon.

The vegetation around the lagoon is characterized by shrub and raphia palms, *Raphia sudanica*, and oil palms *Elaeis guineensis*. Floating grass occur on the periphery of the lagoon while coconut palms *Cocos nucifera* are widespread in the surrounding villages.

The lagoon which experiences both dry and rainy seasons typical of the Southern part of Nigeria supports a major fishery in Nigeria. The rich fish fauna of the lagoon includes *Heterotis niloticus*, *Gymnarchus niloticus*, *Clarias gariepinus*, *Malapterurus electricus*, *Synodontis clarias*, *Chrysichthys nigrodigitatus*, Para*channa obscura*, *Mormyrus rume*, *Calabaricus calamoichthys*, *Tilapia zilli*, *Tilapia galilae*, *Hemichromis fasciatus* and *Sarotherodon melanotheron* (Kusemiju 1981). The map of Lekki lagoon is shown in Figure 1.

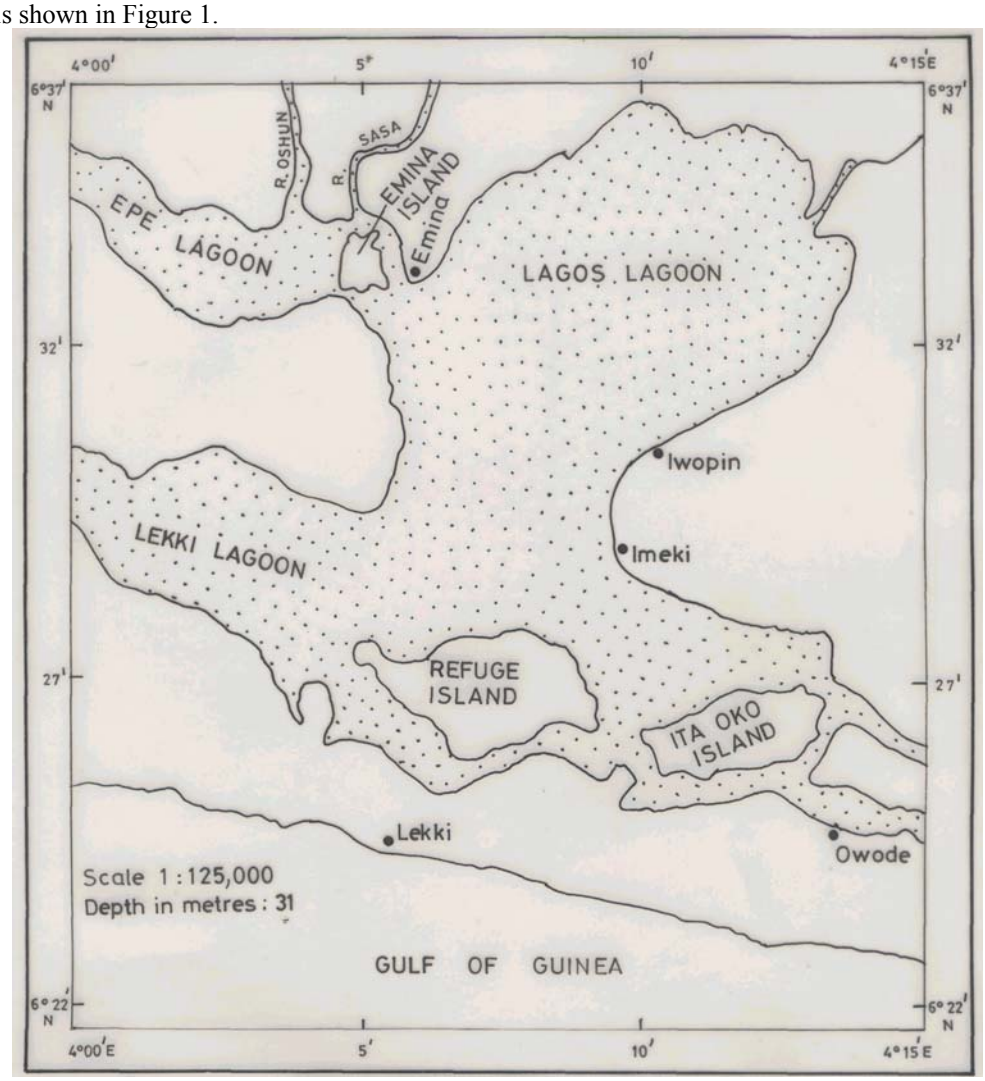

Figure 1. Map of Lekki Lagoon

Collection and Examination of Specimens for Parasities

From early, 2003 to late, 2004, One hundred randomly selected fresh specimens of *Malapterurus electricus* recovered from Lekki lagoon were purchased at Oluwo Market at Epe, Lagos, Nigeria. They were thereafter examined for parasites. The weights, standard lengths and total lengths of the fishes were recorded. The fishes were dissected and the alimentary canals were removed and cut into parts in physiological saline for parasite recovery. The intestines were further carefully slit open to aid the emergence of parasites. The recognition of the worms was enhanced by the wriggling movements on emergence.

Processing of Parasites Recovered

The recovered helminth parasites were fixed in 70% alcohol, counted and recorded. Whole mount histological preparations of worms stained with Haematoxylin and eosin were prepared. Identification of specimens to species level was undertaken and confirmed at the British Museum (Natural History), United Kingdom.

RESULTS

A total of one hundred specimens of *Malapterurus electricus* were subjected to parasitologic investigations. The prevalence of gastrointestinal helminthes infections was 37% which implies that a total of Thirty-seven of the specimens were found to be infected.

A total of Seventy-six (76) helminth parasites were recovered from the Thirty-seven infected specimens of *Malapterurus electricus This implies that the intensity of infections was low*.

Table 1 shows the prevalence of intestinal helminth infections in relation to sex of the fish species. A total of Sixity-nine (69) male specimens of *Malapterurus electricus* were examined and Twenty-six (26) were infected with gastrointestinal helminth parasites (37.7%). On the other hand, Thirty-one (31) female specimens of the fish species were examined and Eleven (11) were found to be infected with gastrointestinal helminth parasites (35.5%).

Single and mixed infections with a minimum of one helminth and a maximum of eight helminth parasites were recovered from the specimens of *Malapterurus electricus.*

Table 1. The prevalence of gastrointestinal helminth infections in relation to sex of *Malapterurus electricus*

	Male	Female	Combined sex
Number Examined	69	31	100
Number Infected	26	11	37.0
Percentage of Infection	37.7	35.5	37.0

Chisquare = 3.841

There was no significant relationship in the male and female of *Malapterurus electricus* in relation to parasitic infections.

The specimens of *Malapterurus electricus* were found to be infected with a proteocephalid cestode, *Electrotaenia malapteruri*, (Fritsch, 1886) a *Nematode*, *Nilonema* species (female) and with an unusual acanthocephalan parasite, *Tenuisentis niloticus. The infection of the nematode and the acanthocephalan parasites profess the fist scientic report in Malapterurus electricus*

Table 2 illustrates size related variations in the infection of *Malapterurus electricus*. The length groups 10 – 15cm (55) had a prevalence of49.1% which implies that Twenty-seven (27) of the specimens in this length group were infected with gastrointestinal helminth parasites. This length group recorded significantly the highest prevalence of infection. The length group 16 – 20cm (42) had a prevalence of 23.8%. A total of ten (10) specimens were found to be infected with helminth parasites. The length group 21 – 25cm recorded zero prevalence of infection. The chisquare calculated for the length groups was higher than the tabulated ones.

This implies that there is a significant relationship between size and gastrointestinal infection.

Table 2. Intestinal helminth infection in relation to the size of *Malapterurus electricus*

Body	10 – 15cm	16 – 20cm	21 – 25cm	Total
Number Examined	55	42	3	100
Number Infected	27	10	0	37
Prevalence of Infection	49.1	23.8	0	37

Chisquare = 5.991

A total of Seventy-six (76) helminth parasites were recovered from the Thirty-seven (37) infected specimens of *Malapterurus electricus*. The minimum standard length recorded was 8.00cm while the maximum standard length (SL) recorded was 18.50cm. This standard length was recorded from female specimens of the fish species. The minimum weight recorded was 15.35g while the maximum was 162.20g.

The results of the gastrointestinal helminth infections show that smaller specimens are more liable to parasitic infections in *Malaptrurus electricus*.

DISCUSSION

The gastrointestinal helminth parasites of *Malapterurus electricus* in Lekki lagoon, Lagos, Nigeria were investigated. The prevalence of infections was 37.0%. The gastrointestinal helminth parasites recovered from the present study are *proteocephalid cestode*; *Electrotaenia Malapteruri* (Fritsch, 1886), *Nilonema gymnarchi* (Khalil, 1960) and an unusual acanthocephala parasite, *Tenuisentis niloticus* (Meyer, 1932).

According to the host parasite checklist of Khalil and polling (1997). It is only *Electrotaenia malapteruri* that has been documented in *Malapterurus electricus*. The present study therefore profess the first scientific report of *Nilonema gymnarchi* and *Tenuisentis niloticus* in *Malapterurus electricus*

The host parasite checklist of Khalil and polling 1997 documented. *Electrotaenia malapteruri*, in *Malapterurus electricus* (Woodland 1925, Khalil, 1963, 1969) in Sudan.

Alain de Chambrier *et al*., (2004) redescribed the *Proteocephalidean cestode Electrotaenia malapteruri* on the basis of freshly collected material from the River Nile in Egypt. The validity of the cestode is confirmed. Unique characters of the genus were also observed in details. The parasite was also reported to be specific to *Malapterurus electricus*. The occurrence of *Nilonema gymnarchi* in *Malapterurus electricus* is a confirmation of the fact that the fish species is an opportunistic feeder that will feed on the most readily available prey within its habitat: Sagua (1979) reported that they are able to consume prey up to half their size.

The nematode normally occurs in body cavities or penetrate subcutaneous tissues. The males are short-lived and the ovoviviparous females extrude their posterior end through the skin to release larvae into the water. Fish become infected by ingesting infected copepods (Molnar, 1966; Paperna and Zwerner, 1976).

Akinsanya *et al*., 2007 in a comparative study on the parasitic helminth fauna of *Gymnarclius niloticus* and *Heterotis niloticus* recovered *Nilonema gymnarchi* in the intestine of *Gymnarchus niloticus* and *Raphidascaroides* species in the stomach. The host specificity of nematodes is variable. Among the Camallanidae, Procamallanus laevionchus has been reported from fish hosts of six different families.

The occurrence of *Tenuisentis niloticus* in the fish species is also a confirmation of the feeding habits of *Malapterurus electricus*. All acanthocephalans develop via one or more intermediate hosts. The first intermediate hosts are amphipods, isopods, copepods or ostracods. Fish can also serve as intermediate hosts interest to note that host specificity of acanthocephalans is variable. Khalil (1971) reported that *Paragorgorhynchus albertianum* is indiscriminate in its choice of hosts.

The host-parasite checklist of Khalil and Polling (1997) also recorded *Phyllodistomum spatulaeforme, Corallobothrium solidum, Capillaria fritschi, Dujardinascaris malapteruri, Distichodus niloticus, Amplicaecum larva,* and *Contracaecum* species in *Malapterurus electricus*. The gastrointestinal helminths

were recovered from fishes in all weight categories. Variations in the infections of the different length categories were also recorded.

The prevalence of parasitic infections correlates with fish length which also inturn corresponds to fish age as reported by Lagler *et al*. (1979). The length group 1 – 25cm recorded zero prevalence of infection. This may be attributed to the possible random selection of the specimens and the probable high level of immunity in larger sized fish specimens. The length groups 10 – 15cm and 16 – 20cm recorded the highest prevalence of infections. This may be attributable to the random selection and the low level of immunity in the smaller sized fish.

Further studies are still required to establish the various invertebrate hosts of the helminth parasites of Lekki lagoon and also to determine the genetic diversity in the gastrointestinal parasites.

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