Helminth Bioload of *Chrysichthys nigrodigitatus* (Lacepede 1802) from Lekki Lagoon Lagos, Nigeria

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Abstract

Two hundred and sixty randomly selected specimens of a common fish, *Chrysichthys nigrodigitatus* (Lacepede 1802) collected over a period of one year from Lekki Lagoon, Lagos were subjected to parasitological examinations. The prevalence of helminth infections was 12.7%. Thirty three (33) of the fish specimens examined were infected with gastrointestinal helminth parasites. A total of seventy eight (78) parasite specimens were recovered from the fish specimens examined. The males (205) recorded a lower rate of infection (10.7%) than the females (55) which had a prevalence of 20%. Helminth parasites recovered include a cestode, *Proteocephalus* sp, an aspidogastrid trematode, *Aspidogastrea africanus*, and a nematode *Paracamallanus cyathopharynx*. Worm burden and intensity were low and independent of sex and age of fish. No seasonal variation in parasite intensity was observed.

Key Words: bioload, helminths, Lekki Lagoon.

Introduction

Chrysichthys nigrodigitatus (Lacepede 1802) is a common silver coloured African catfish occurring in Nigeria and several West African countries. It is a highly valuable fish species amongst the indigenous African populations. Considerations for the culture of the fish have resulted in several biological studies on the growth and fecundity of the fish species.

The emanating need to culture fishes for protein consumption for the teeming rapidly growing populations in the developing countries have made it necessary to intensify studies on the parasite fauna of the African freshwater fishes.

Although listed as a generalized predator, *Chrysichthys nigrodigitatus* is generally omnivorous being adopted for aquaculture. Environmental degradation, including oil spillages, pollution and destruction of mangrove swamps have had considerable impacts on the breeding and nursery coastal habitat of the fish, particularly in Nigeria (Anyanwu, 1991; Ekanem, 1996). *Chysishthys nigrodigitatus* is being adopted for aquaculture in the country.

Mohmoudim Rashid (1996) observed the presence of parasites due to food and feeding of two *Chrysichthys* species; *C. aurantus* and *C. nigrodigitatus*. The parasite checklist of Khalil and Polling (1997) documented a sparse parasite fauna for *Chrysichthys nigrodigitatus*, recording the occurrence of *Protoancylodiscoides chrysichthyes*.

Parasite documentation on *Chrysichthys* species includes *Wenyonia minuta*, Woodland (1923), Family Caryophyllaeidea in Sudan in *Chrysichthys auratus*; a cestode, *Proteocephalus beauchampi* Fuhrmann and Baer, 1925 (Family Protocephallidae La Rue, 1911) in Lake Tanganyika; *Acanthostomum spiniceps* Dolfus, 1932 (Family Acanthostomatidae Poche, 1926) in Mali in *C. fuscatus* and metacercaria of *Clinostomum chrysichthys*, Dubois, 1930 (Family Clinostomatidae Luhe, 1901).

Manter and Pritchard (1969) in Ghana and Gabon and Obiekeizie, Moller and Anders (1988) in Nigeria reported the aspidogastrid trematode, *Aspidogastrea africanus* in *Chrysichthys nigrodigitatus*.

The present study investigates the helminth fauna of wild *Chrysichthys nigrodigitatus* collected from the Lekki lagoon, Lagos, Nigeria being the first study on helminth parasites of *Chrysichthys nigrodigitatus* in the lagoon.

Materials and Methods

Study Area

Lekki lagoon supports the major fishery in Nigeria. The lagoon located in Lagos State, Nigeria lies between longitude 4º00' and 4º15' E and between latitudes 6º25' and 6º37' N, has a surface area of about 247 km^2 with a maximum depth of 6.4 km.

A large portion of the lagoon is shallow and less than 3.0 m 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 fauna of the lagoon according to Kusemiju (1981) includes *Heterotis niloticus* (Ehrenberg, 1929), *Gymnarchus niloticus* (Curvier, 1829), *Clarias gariepinus* (Burchell, 1822), *Malapterurus electricus* (Forskal, 1775), *Synodontis clarias* (Linnaeus, 1762), *Chrysichthys nigrodigitatus* (Lacepede, 1802), *Parachanna obscura* (Gunther, 1861), *Mormyrus rume* (Boulenger, 1898), *Calabarius calamoichthys* (Smith, 1865), *Tilapia zilli* (Gervais, 1848) *Tilapia gallinaea* (Artedi, 1757) *Hemichromis fasciatus* (Peters, 1857) and *Sarotherodon melanotheron* (Ruppel, 1852). Figure 1 shows the map of Lekki Lagoon, Lagos, Nigeria.

Collection and Examination of fish Specimens for Parasites

A total of 260 randomly selected fresh specimens of *Chrysichthys nigrodigitatus* were purchased at Oluwo market, Epe, Lagos, Nigeria over a period of one year. The weights, standard length and total lengths of the fishes were recorded. The weights were taken with the aid of standard top loading Denward balance while the lengths of the fishes were taken with the metre rule. The fishes were immediately subjected to parasitological examinations.

The collections were undertaken monthly for a period of one year, October 2003-September, 2004. The abdominal cavity of each fish was then cut open and the gastrointestinal part was removed and cut into parts. The gastrointestinal parts were separated from the other visceral organs and placed in Petri dishes containing physiological saline. The intestines were further carefully slit open to aid the emergence of the parasitic helminthes. The emergence of any worm was easily noticed by its wriggling movement in the saline solution.

Processing of Recovered Parasites

The recovered helminth parasites from different sites were fixed in 70% alcohol, counted and

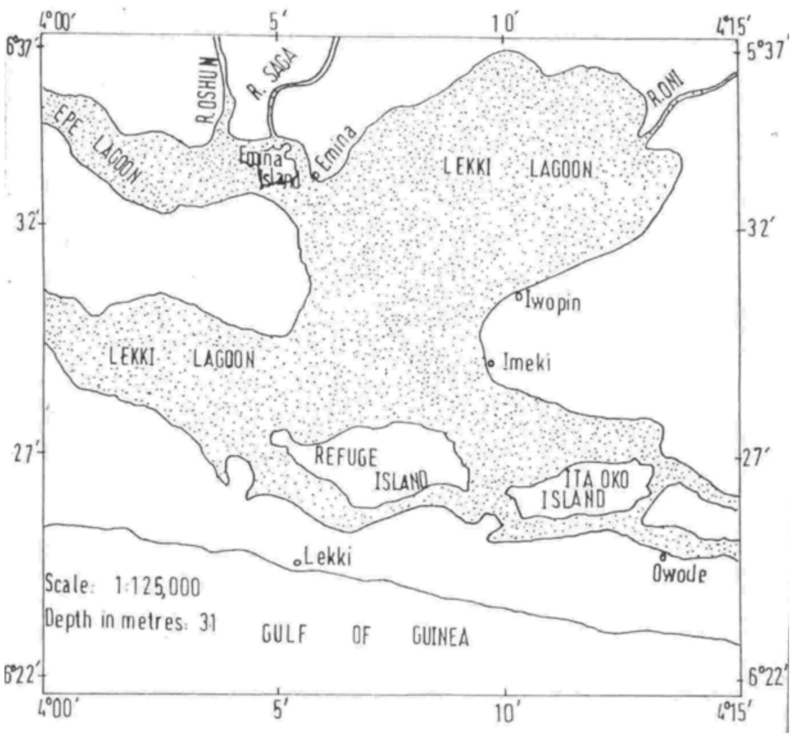

Figure 1. Map of Lekki Lagoon.

recorded. Whole mount histological preparations of the worms were undertaken. The platyhelminthes were stained with Haematoxylin and eosin or Borax carmine, while the nematode was examined after clearing in xylene. Identification to species level of the worms was undertaken by experts at the Parasitic Worm Unit, British Museum (Natural History), United Kingdom.

Results

Two hundred and sixty fish specimens were subjected to parasitological investigations. The overall prevalence of intestinal helminthes infections was 12.7%. A total of thirty three of the fish specimens were found to be infected.

Table 1 shows the prevalence of intestinal helminth infections in relation to sex of *Chrysichthys nigrodigitatus*. A total of two hundred and five (205) male of the specimens were examined and twenty two (22) were infected (10.7%). On the other hand, fifty five female of the specimens were examined and eleven (11) were infected (20%). Single and mixed infections were observed. A maximum of nine helminth parasites were recovered from a number of infected fish specimens. The mean parasite infection is 2.36.

The fish specimens examined tend to be infected with a cestode, *Proteocephalis* sp. (Proteocephalidae), a trematode, *Aspidogastrea africanus* (Aspidogastridae) and a nematode, *Paracamallanus cyathopharynx* (Camallanidae).

The Chi square calculated was less than the tabulated one. This implies that there is no difference between sex and infection in the specimens examined.

Table 2 illustrates size related variations in the infection prevalence in *Chrysichthys nigrodigitatus*. The length groups 10 – 15 cm and 16 – 20 cm had significantly higher prevalences than the other length group. The prevalence of parasitic infection had its minimum in the length group 21–25 cm and the length group 26–30 cm recorded zero prevalence of infection.

The Chi square calculated is less than the Chi square tabulated, therefore there is no relationship between size and infection in *Chrysichthys nigrodigitatus (*Chi square =7.815).

A total of 78 parasite specimens were recovered from the intestine of the fish. The maximum weight recorded in the specimens was 146.31 g. The parasitic helminth infection was recorded in the different weight groups. The results conspicuously depicts that smaller specimens were more susceptible to parasitic infections than the bigger ones.

The cestodes, *Proteocephalus* specimens recovered from the intestine of

Chrysichthys nigrodigitatus had a length range of 10.2 mm – 34 mm. A total of 117 proglottids were observed in the longest tapeworm. Bivalves were predominant in the intestine of these fish specimens.

Discussion

Chrysichthys nigrodigitatus, a bagrid, catfish from Lekki lagoon, Lagos, Nigeria, were subjected to parasitological examinations. A total of seventy eight specimens parasites were all recovered from the intestines of the fish. This is attributable to the fact that helminth parasites depends on the presence of absorbable food materials in the lumen of the gut.

Chubb (1982) however suggested that an antibody complement system secreted into the intestine probably in the mucus prevents the establishment of parasites.

The availability of certain classes of nutrient and their different site of digestion and absorption will play a definite role in determining the parasite kind and their distribution in the intestine.

Two hundred and sixty specimens of the catfish were examined. The prevalence of gastrointestinal

Table 1. The Prevalence (%) of intestinal helminth infections in relation to the sex of *Chrysichthys nigrodigitatus*

	Male	Female	Combined
Number Examined	205	55	260
Number Infected	22	11	33
Prevalence (%)of Infection	10.7	20	12.7

Chi- Square = 3.841

Table 2. Intestinal helminth infection prevalence (%) in relation to the size of *Chrysichthys nigrodigitatus*

	Body Length (cm)				Total
	10 – 15 cm	16 – 20 cm	21 – 25 cm	26 – 30 cm	
Number Examined	31	101	123	5	260
Number Infected	5	16	12	0	33
Prevalence(%) of Infection	16.1	15.8	9.8	0	12.7

Chi-Square=7.815

helminth infections was 12.7%. The parasitic helminth recorvered from this present study include a cestode species, *Proteocephalus sp.*, an aspidogastrid trematode, *Aspidogaster africanus* and a nematode *Paracemallanus cyathopharynx.*

This present study is the first record of *Paracamallanus cyathopharynx* in *Chrysichthys nigrodigitatus*. The host parasite checklist of Khalil and Polling (1997) recorded P*aracamallanus cyathopharynx* in a *Clarias* sp and *Heterobranchus longifilis*.

Khalil (1969); Moravec (1974; 1975) and Boomker (1982) confirm that *P. cyathopharynx* is parasitic on *Clarias.*

Cammallanidae, Cucullanidae, Philometridae and Anguillicolidae are known to use copepods as their first intermediate hosts. Moravec (1974a; 1975b) studied the life cycle of P*aracammalanus cyathopharynx* in Egypt and obtained a development of the first three larval stages in *Mesocyclops leuckarti*.

Akinsanya and Otubanjo (2006) also recovered *P. cyathopharynx* from the intestines of *Clarias gariepinus* obtained from Lekki lagoon, Lagos, Nigeria.

The occurrence, therefore, of *P. cyathopharynx* in more than one fish host is suggestive of the fact that there is no strict host specificity.

In Sudan, Saound, El-Naffar and Abdel-Hamid (1974) designated *Aspidogaster africanus*, Baer, 1827 as a new species from the cyprinid fish *Barbus bynni* (Forskaal) caught from the white Nile at Jebel Ap-Awlyia using the detail morphological features such as the position of the ovary in relation to the testes.

In *A. africanus*, the single testis lying in the posterior third of the body and the smaller ovary lie lateral and are slightly anterior to the testis. This present study affirms the occurrence of *A. africanus* in a wider spectrum of fishes other than *Barbus* as documented by Khalil and Polling (1997).

Aspidogastea limacoides reported by Baer (1959) from *Barbus* species in Zaire is considered to be *A. africanus* according to Saoud *et al*., (1974), based on Baer's drawings in which the position of the ovary is distinctly different from that described for *A..limacoides* but fairly similar to that of *A. africanus*.

This present study recovered a P*roteocephalus* species from the intestine of *Chrysichthys nigrodigitatus*. This is in conformity to the work done by Kennedy and Hine (1969) on the abundance and prevalence of *Proteoceophalus torulosus* in *Leuciscus* sp.over two years in Britain. They observed that the tapeworm is present only from November or December through to June and July and becomes gravid in April. The present study obtained some tapeworms in January 2004, which affirms the seasonality recorded by Kennedy and Hine (1969).

Lien and Borgstrom (1973) also investigated a seasonal cycle of intensity of infection for a species of *Proteocephalus* in *Salmo trutta* from a lake in South Norway and found out that the incidence of infection remained fairly stable. They also observed that the incidence of infection decreased to almost nil in August – September due to increases in water temperature. The occurrence of *P. cyathopharynx*, *Aspidogastea africanus* and *Proteocephalus* species in other fish hosts is also indicative of similar diets, feeding habits and patterns among the freshwater fishes.

The low prevalence of 12.7% infection in this present study can be attributable to the frequency of exposure to infection in Lekki lagoon. The length groups 10 – 15 cm and 16 – 20 cm had the highest prevalence of infections. This may be attributable to the low level of immunity in the smaller sized fish. The length groups 26 – 30 cm recorded zero prevalence as a result of possible random selection of the specimens and the probable high level of immunity in larger sized fish specimens.

Further studies are still required to establish the changes in the environment, whether natural or man-made and to proffer probable biological control of the parasites in Lekki Lagoon.

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