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Gastrointestinal Helminth Parasites of the fish *Synodontis clarias* (Siluriformes: Mochokidae) from Lekki lagoon, Lagos, Nigeria

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Abstract: A total of 362 specimens of the fish *Synodontis clarias* were randomly selected and subjected to parasitological examination for helminth parasites. They were collected over a period of one year from Lekki lagoon, Lagos, Nigeria. The prevalence of gastrointestinal infection was 38.7%. The helminth worms found include two cestodes, *Proteocephalus* spp., *Wenyonia acuminata,* and a nematode species, *Raphidascaroides*. Male specimens (196) presented a higher rate of infection (37.8%) than female specimens (166) which showed a rate of 23.5%. The overall worm burden was high (678) and it was independent of fish sex and fish size. Rev. Biol. Trop. 56 (4): 2021-2026. Epub 2008 December 12.

Key words: *Synodontis clarias*, helminth, parasites, *Proteocephalus*, laguna Lekki, Lagos, Nigeria.

In Nigeria the demand for fish exceeds supply and the proportion of animal protein in the diet is generally low. Parasitic diseases of fish seem to be one of the major problems confronting fish culturists. The Squeaker or upside-down catfish *Synodontis clarias* (Linnaeus, 1758) is a benthopelagic, potamodromous fresh water fish that inhabits water with a pH range of 6.5-9.5 (Reids 2004). The fish has been reported to present dioecism with external fertilization (Breeder and Rosen 1966).

Olaosebikan and Raji (1998) recorded a maximum size of 36.0 cm standard length for male/unsexed of the fish species. The fish is generally classified as omnivore, feeding mainly on insect larvae, mollusks and detritus (Willoughby 1974). Its native range covers Chad, Niger (including the Benoue River), Senegal, Gambia and the Volta basins, and the Nile (Paugy and Roberts 1992).

S. clarias is also a non-guarding, substratum and open water egg scatterer, oviparous, and distinct pairing during breeding (Breeder and Rosen 1966). This fish species has been reported to occur in different ecosystems such as Benue river, (Paugy and Roberts 1992), in the zoogeographic realm of Ethiopia (Gosse 1986), in Kainji Lake (Willoughby 1974), in Lake Chad (Gosse 1986), in Niger, (Paugy *et al.* 1994), and in the Nile river, Senegal and Volta (Gosse 1986). The genus *Synodontis* belongs to the family Mochokidae and is the most common for commercial purposes (Reed *et al. 19*67). Twenty-one species of this genus have been reported in Nigerian inland waters and most of these have also been found within the Sudanean and Guinean zones (McConnell 1965, Reed *et al.* 1967).

This study was carried out in Lekki lagoon which serves as an important fishing zone to the inhabitants of Epe and Metropolitan Lagos at large.

MATERIALS AND METHODS

Study area: Lekki lagoon supports a major fishery in Nigeria. The lagoon is located in Lagos State, Nigeria (between 4°00' and

4°15' E; between 6º25' and 6°37' N). It has an extension of around 247 km^2 with a maximum depth of 64 m, the greater part 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 200 km. It is fed by the Oni river discharging into the North-eastern part, and by the rivers Oshun and Saga discharging into the North-western parts of the lagoon. Lekki lagoon experiences both dry and rainy seasons which are typical of the southern part of Nigeria.

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

The rich fish fauna of the lagoon includes *Heterotis niloticus*, *Gymnarchus niloticus, Clarias gariepinus, Malapierurus electricus, Synodontis clarias, Chysichthys nigrodigitatus, Parachanna obscura; Mormyrus rume, Calabaricus calamoichthys, Tilapia zilli, Tilapia galilae, Hemichromis fasciatus* and *Sarotherodon melanotheron* (Kusemiju 1981).

Collection and examination of specimens for parasites: From March 2003 to April 2004, a total of 362 randomly selected fresh specimens of *S. clarias* obtained from Lekki lagoon were purchased at Oluwo market, Epe, Lagos, Nigeria. The fresh specimens were immediately examined for gastrointestinal helminth parasites.

Weights, standard lengths and total lengths of the specimens were recorded. Fishes were dissected, the alimentary canals were removed, cut into parts and put into physiological saline for parasites recovery. The intestines were further carefully slit open longitudinally to aid the emergence of gastrointestinal helminth parasites. The recognition of the worms was enhanced by the wriggling movements when they were emerging.

Processing of parasites: The collected helminth parasites were fixed in 70% alcohol, counted and recorded, whole mounted histological preparations of them, stained with Haematoxylin and eosing, were prepared. Identification of the specimens to species level was undertaken and confirmed at the British Museum (Natural History), in the United Kingdom.

RESULTS

Three hundred and sixty two specimens of *S. clarias* were examined for parasitic helminth fauna. All helminthic infections observed and recorded were restricted to the intestine. One hundred and forty specimens were found to be infected (38.2%).

Table 1 shows the presence of gastrointestinal helminth infections in relation to sex of *S. clarias* in Lekki lagoon, Lagos, Nigeria. A total of 196 male specimens were examined and 97 were infected with helminth parasites, which shows an infection of 37.8% of the total sample. A total of 166 female specimens were examined and 43 were infected with helminth parasites, which shows an infection of 23.5% of the total sample.

TABLE 1

Prevalence of gastrointestinal helminth parasites in relation to sex of Synodontis clarias *in Lekki Lagoon, Lagos, Nigeria*

Parameters	Male	Female	Combined
Number examined	196	166	362
Number infected	97	43	140
Percentage of infection	37.8	23.5	31.2

Chi square=3.841

Two kinds of helminth parasites collected included cestodes as *Proteocephalus* species (Weinland, 1858) (Proteocephalidae), *Wenyonia acuminata* (Woodland, 1923) (Caryophyllaeiidae), and a nematode *Raphidascaroides* species (Yamaguti, 1941) (Heterocheilidae). Neither acanthocephalan nor trematode infections were recorded in the examined specimens. Mixed infections with more than ten worms were observed. A total of 678 helminth worms was collected from the examined fish specimens.

Table 2 shows intestinal helminth infections in relation to size of *S. clarias*. The group with a length between 10-15 cm showed 42.1% of infection, the group with a length between 16-20 cm showed 36.6% of infection, the group with a length between 21-25 cm showed 48.1% of infection, and the group with a length between 26-30 cm showed 50% of infection. The weight of the specimens examined ranged between 29.0 and 174.10 g. There was no relationship between sex and size in relation to gastrointestinal helminth infections in *S. clarias*. See the scatter diagram of male, female and combined sexes of *S. clarias* (Figs 1-3).

DISCUSSION

According to the host-parasite checklist of Khalil and Polling (1997) none of the collected parasites described above have been recorded

TABLE 2
Prevalence of gastrointestinal helminth parasites in relation to length group of Synodontis clarias *in Lekki Lagoon, Lagos, Nigeria*

Parameters	10-15 cm	16-20 cm	21-25 cm	26-30 cm	Total
Number examined	19	287	52	41	362
Number infected	8	105	25	2	140
Percentage of infection	42.1	36.6	48.1	50	38.7

Chi square=7.815

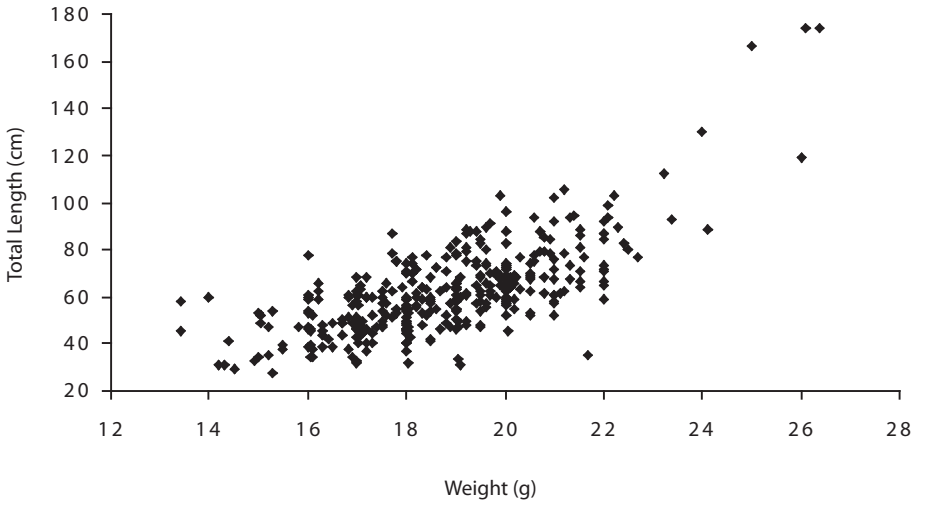

Fig. 1. Correlationship between total length and weight of *Synodontis clarias* (combined sexes).

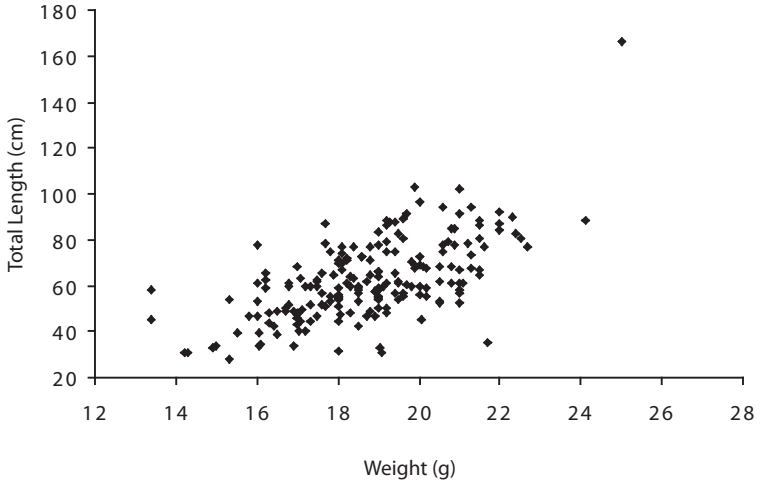

Fig. 2. Correlationship between total length and weight of *Synodontis clarias* (male).

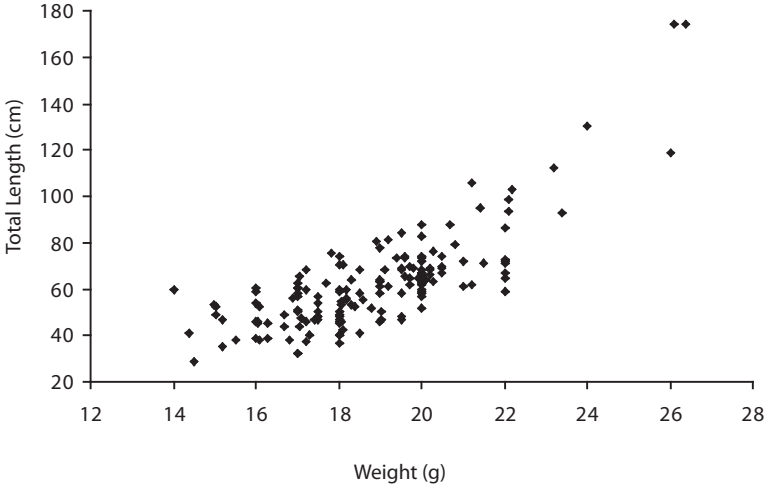

Fig. 3. Correlationship between total length and weight of *Synodontis clarias* (female).

for *S. clarias*. Therefore, this study is the first scientific record of these helminth parasites in *Synodontis clarias*. The parasite *W. acuminata* has only been documented to infect *S. membranaceus* in Sudan.

Akinsanya and Otubanjo (2006) also found *W. acuminata* from *Clarias gariepinus* collected from Lekki lagoon. The prevalence of *W. acuminata* in different fish species could be an indication that there is no strict host specificity by this parasite. Other species of *Wenyonia* however have been found in some *Synodontis* species: *W. longicauda* (Woodland, 1937) occurred in *Synodontis gambiensis, Wenyonia minuta* (Woodland, 1923) in *Chrysichthys auratus*, and *Wenyonia virilis* (Woodland, 1923) in *Svnodontis batensoda, Synodontis schall* and *Synodontis clarias* (Khalil and Polling, 1997). *Wenyonia* species has therefore been known to infect members of the family Mochokidae.

Species of the genera *Proteocephalus* have also been documented in some *Synodontis* species, for instance *Proteocephalus beauchampi* occurred in *Synodontis schall,* and *Proteocephalus synodontis* in *Synodontis batensoda* and in *S. schall.*

Nematode species of the genera *Raphidascaroides* have not been documented to infect any species of *Synodontis*. Akinsanya *et al.* (2007), in a comparative study of the parasitic helminth fauna of two fish species, collected species of the nematode genus *Raphidascaroides* from the stomach of *Gymnarchus niloticus* collected from Lekki lagoon, Lagos, Nigeria.

The high worm burden in the intestine of the fish may be due to its omnivore nature. Khalil (1971), Van As and Basson (1984), reported that a variety of adult stage tapeworms occur in native African fish especially the Caryophyllaeidae as well as one amphilinid representative, the segmented pseudophyllideans, and Proteocephalidae. These findings coincide with the present study which also isolated Caryophyllaeid and Proteocephalid cestodes from *S. clarias.*

Scholtz (1991) reported that the first intermediate host of Caryophyllaeid cestodes are the oligochaete worms Tubifex and allied gender. They emphasized that eggs contained within, or released from evacuated dead worms, are ingested and hatched within the digestive tract of the tubificid worm. The definitive host therefore becomes infected when consuming infected Oligochaetes. However, Hoffman (1967) reported that the first intermediate hosts of segmented tapeworms like Pseudophyllideans and Proteocephalids are copepods. He reported that a second larval stage of Pleurocercoids, develops in fish species that are not compatible as definitive hosts in *Proteocephalus*.

The high prevalence of gastrointestinal helminthic infections may then be attributable to the omnivorous feeding habits of the fish species.

Banhawy e*t al.* (1975) also collected *W. virilis* from the intestine of *S. schall.* These authors observed degenerative changes in gut wall, liver and pancreas.

The prevalence of the nematode species of the genera *Raphidascaroides* is the first scientific reports in *Synodontis clarias* of Lekki lagoon. Rajyalakshmi (1995) also collected a new species of this nematode genera from the intestine of hammer-headed shark, *Sphyrna zygaena* (Linnaeus) in Sisakhapatnam, and this new species did not coincide with the description of already known species.

Moravec (1975) found that the larvae of *Procamallanus laevionchus,* anisakids (Heterocheilhdae) *Dujar dinascaris*, and of *Raphidascaroides*, when ingested by wrong piscine hosts, often survive as waiting stages (fourth stage larvae) in the gut or other tissues for a variable period of time and continue their development into the adult stage, if their carrier host (paratenic) is predated by a compatible host. Petter *et al*. (1989) has also demonstrated this in species of *Anguillicola.*

The gastrointestinal helminth infections of different length categories were also recorded. The length group 10-15 cm recorded an prevalence of 42.1% while the length group 16-20 cm recorded the lowest prevalence of 36.6%. This may be due to random selection of the specimens and to probable high level of immunity built up in the fish specimens. The other length groups, 21-25 and 26-30 cm, recorded an prevalence of 48.1 and 50%, respectively. The highest rate of infection recorded in the male specimens (37.8%) could also be attributable to the random selection of the specimens from Lekki lagoon. Further study is still required to carry out the genomic characterization of the gastrointestinal helminths and also to investigate the different intermediate hosts of the helminth parasites.

RESUMEN

Se muestrearon aleatoriamente un total de 362 especímenes de *Synodontis clarias*, los cuales fueron sometidos a análisis parasitológicos. Los especimenes fueron recolectados durante un período de un año del lago Lekki, Nigeria. La existencia de infecciones gastrointestinales fue de un 38.7% del total de especímenes examinados, lo cual representó 114 especímenes infectados con parásitos helmintos. Los gusanos helmintos encontrados incluyen dos céstodos,

especies de *Proteocephalus*, *Wenyonia acuminata,* y una especie de nemátodo, *Raphidascaroides* sp. Los especímenes machos (196) presentaron una tasa de infección mayor (37.8%) que la presentada por hembras (23.5%). La cantidad total de gusanos parásitos fue alta (678) y fue independiente del sexo y la talla del pez.

Key words: *Synodontis clarias*, helmintos, parásitos, *Proteocephalus*, laguna Lekki, Lagos, Nigeria.

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