THE INTESTINAL PARASITE OF *CLARIAS GARIEPINUS* FOUND AT LOWER USMAN DAM, ABUJA.

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ABSTRACT: A total of 32 C*larias gariepinus* were randomly purchased at lower Usman Dam, Abuja. The fishes were examined parasitological for gastrointestinal parasites. Four species of helminthes parasites comprising of two Cestodes, one nematode and one acanthocephalan were isolated from the fishes. The Cestodes were *monobothrium sp* and *polyonchobothrium clariae*. The nematodes were *procamallanus laevionchus* and the acanthocephalan which is *Neoechinorhynchus rutili*. Majority of the parasites were found in the intestine. Infection was limited to fish ranging from 30-36 cm. Fish specimen that were lighter in weight were free from infection, but those found with high number of parasites weighed between 300g-350g.
[ALIYU. M. D. AND SOLOMON. J. R. **THE INTESTINAL PARASITE OF *CLARIAS GARIEPINUS* FOUND AT LOWER USMAN DAM, ABUJA.** Researcher 2012;4(9):38-44]. (ISSN: 1553-9865). http://www.sciencepub.net/researcher. 5

Keywords: C*larias gariepinus,* Cestodes and nematodes.

INTRODUCTION

Clarias gariepinus (Burchell, 1822) family Claridae is generally considered to be one of the most important tropical catfish species for aquaculture in West Africa (Clay 1979). *Clarias* specie inhabit calm fresh water ranging from lakes, streams, rivers, swamps to flood plains many of which are subject to seasonal drying. The most common habitats of the catfish are flood plains, swamps and pools. The catfish survive during the dry season due to the possession of accessory air breathing organ (Burton 1979a, Clay 1979). Since the last three decades, *Clarias gariepinus* has been considered to hold great promise for fish farming in Africa; the fish having a wide geographical spread a high growth rate, resistant to handling and stress and well appreciated in a wide number of African countries. The males and females of *Clarias gariepinus* are readily distinguishable. The males posses a distinct sexual papilla that is conspicuously located behind the anus. The sexual papillae are absent in the females. The fish is generally classified as omnivores or predators feeding mainly on aquatic insects, fish and higher plants debris as reported for catfish in the river ubangui, central African republic (Micha 1973). They also found to feed on terrestrial insect, mollusks and fruits. Burton (1979a) found that adult catfishes in lake sibaya(south Africa) fed mainly on fish or crustaceans while terrestrial and aquatic insects were the important diet of juvenile, and adult fishes inhabiting shallow areas. The catfish utilize various kinds of food resources available in their habitat.

WHAT ARE FISH PARASITES?

Fresh water fish can serve as definitive, intermediate or paratenic (transport) host in the life cycle of many species of protozoan, metazoan and crustaceans parasites. The parasite usually affects the marketability of commercially produced fish thus raising public health concerns especially in areas where raw or smoked fish is eaten (Hoffman and Bauer 1972; Paperna 1996). In fish farming or aquaculture, some parasites may be highly pathogenic and contribute to high fish mortalities and economic losses while in natural systems they may threaten the abundance and diversity of indigenous fish species. Africa host a great diversity of fresh water fish of which more than 3000 species have been identified (Skelton 2001). A recent check list recorded 568 species of helminth parasite and several larval forms infecting African fishes (Khalil and Polling 1997). The helminth parasite that infect vertebrates belongs to two phyla, the platyhelminths and the nemathelminths (round worm) (Robert & Janovy 2000). Flatworms of the class monogenea are ectoparasitic on the gills and skin of the host while the flukes (trematodes: digenea), the tapeworms (cestoda) and the nematodes infect the internal organs with their intermediate stages sometimes encysting in various host tissues (Robert & Janovy 2000). In general the endoparasitic helminthes have a heteroxenous life cycle i.e. one in which the parasite passes through at least one intermediate stage before develops into an adult. The latter stage in some cases usually develops in higher vertebrates that feed on the fish (e.g. piscivorous, birds, mammals, man), in which case the larval stage in fish exhibit morphological or physiological adaptation that will enable them survive in order to reach adult stage and propagate (Dawes 1946). The life cycle of most helminth parasite are so complex involving more than one intermediate host including fish that their study enables one to better understand the dynamics of aquatic system as a whole (Hoffman & Bauer 1971). Other aquatic animals such as planktonic copepods and mollusks play an important role in the development of parasitic helminth as intermediate host. Piscivorous birds in which some helminthes develop into adults stages are important in which they can disseminate parasite eggs over long distances making it difficult to control the spread of infections between water bodies in different catchments.

The sharp tooth catfish *Clarias gariepinus* (Burchell, 1822) is a widely distributed food fish in Africa (Satriel and Burton, 1984; skelton 2001). It is a hardly omnivorous species tolerant to low oxygen concentration due to its efficient air breathing organ (pseudobranch). The catfish has a great potential as a protein and energy source in human nutrition and its lipids are a good source for polysaturated fatty acid which have a well defined nutritional role (Hoffman & Prinsloo 1996).

LITERATURE REVIEW

Fish helminthology is not as widely-studied as other aspects of aquatic parasitology and fish biology. This is probably because helminths mainly infect the internal organs, predominantly the gastrointestinal tract, which does not comprise the edible portion of the fish. Although fishermen and anglers regularly encounter encysted "grubs" (metacercariae) in the skin and muscles of fish (B.Marshall), they regard them just as a nuisance, notwithstandind the biological and economic impact they may have on the fish species.

The major drive for scientific research is now oriented towards applied topics, where science is expected to come up with solutions to environmental problems caused by technological advances in industry. Fundamental sciences such as taxonomy are therefore being neglected, especially in developing countries where resources for advanced methods (e.g. molecular systematic) are not available. This is reflected in the field of fish helminthology where only a few workers are known and there is a dearth of expertise on the subject. This aim of this study was to identify and classify the helminth parasites of the sharptooth catfish, *Clarias gariepinus.*

TYPES OF PARASITES

Some of the internal parasites of Clarias gariepinus include cestode Species, nematode species and the trematode species. Some include the following.

CLASS: Cestoda
ORDER: Pseudophyllidea
FAMILY: Ptychobothriidae Luhe, 1902
GENUS: Polyonchobothrium Diesing, 1854

Polyonchobothrium clarias (Woodland, 1925)

Scolex rectangular with a flat to slightly raised apex (rostellum) armed with a crown of 26-30hooks. Apex divided into two semicircles each bearing 13-15 hooks. Hooks at the end of each semicircle smaller than the others.

Two longitudinally elongated bothria in line with the gaps between the crowns of hooks. Immature proglottids of strobila not completely segmented. Some mature segments apparently fused. Testes mendullary; uterus anterior to ovary, highly folded and occupying the greater portion of gravid proglottids. Vitellaria cortical. Eggs unoperculate and embryonated. Attached to stomach and anterior intestinal mucosa.

Polyonchobothirum clarias is widely distributed in siluroid fishes from African freshwater sources, having been recorded from Nigeria in the North African catfish *Clarias lazera* (C. gariepinus) (Cuvier and Valenciennes, 1840; Aderounmu and Adeniyi 1972). It was also reported in the Bagrid catfish *Chrysichthys* thonneri (Steindachner, 1912 from Gabon; Khalil 1973), in the mudfish Clarias anguillaris (Linnaeus, 1758) and Heterobranchus bidorsalis (Goeffroy Saint-Hilaire, 1809 from Senegal; Khalil 1973), and in C. gariepinus in seven dams in the Lebowa region, South Africa. In Zimbabwe, (Chishawa 1991) and (Douellou 1992) found it in the intestine of the brown squeaker, *Synodontis zambezenis* (Peters, 1852) and C. gariepinus from lake Kariba, although they mistook it for a larval cestode. Larvae of Polyonchobothrium are only found in the copepod intermediate host (Zhongzhang 1982). The low intensity of *P. clarias* in hosts is assumed to inflict minimal damage on the host tissue (Paperna 1996), whereas high parasitic loads in the gall bladder have been shown to cause granulomatous nodules and fibrosis (Wabuke-Bunoti 1980). Mashego (1977) recorded intensities of up to 200 in *C. gariepinus* from Nigeria causing nodules at the point of attachment, while Barson and Avenant-Oldewage (unpublished data) recorded more than 100 individuals infecting one specimen of *C. gariepinus* in the Vaal Dam. The fact that the tapeworms physically resisted detachment from the gut mucosa suggests that the suction created by the bothria and the clasp of the apical hooks would cause severe pathological effects in heavy infection.

CLASS: Cestoda
ORDER: Proteocephalidea
FAMILY: Proteocephalidae La Rue, 1911
Genus: Proteocephalus Weinland, 1858

Proteocephalus glanduliger (Janicki, 1928)

Fuhrmann, 1933 Scolex unarmed, with four cup-shaped arranged symmetrically around a protrusible rostellum; neck region not differentiated into well-formed proglottids. Glandular organ present in one specimen but not apparent in the other , approximately similar in size to suckers. Anterior proglottids broader than long, posterior longer than broad. Genital pores lateral and irregularly alternating. Testes and vitellaria medullary as shown in transverse sections. Despite the abundance and diversity of proteocephalid cestodes in Afican Freshwater fish (Khalil & polling 1997), several species, *Proteocephalus Glanduliger* have been recorded in Africa from *C. gariepinus* (Mashego 1977, 2001; van As and Basson 1984; Saayman et al. 1991).

The histology of the worm resembles the description of *P. glanduliger* by (Mashego 2001) in *C. gariepinus*: In African fish species other than the Clariidae, many proteocephalid species have been described from the sudan (Khalil 1963, 1973; Jones 1980), the Democratic Republic of Congo, Egypt, Liberia and Senegal (Khalil 1973; Khalil and Polling 1997).

CLASS: Nematoda
ORDER: Spirurida
FAMILY: Camallanidae
GENUS: *Procamallanus Baylis*

Procamallanus laevionchus

Most features as described by (Moravec 1975). Ovary reaches oesophagus. Uterus occupies most space in body cavity; filled with motile first-stage larvae and eggs at various stage of development. Vagina muscular, narrow and directed backwards from genital opening. Tail terminates with three processes, one large, dorsal and two small and equal, subventral. Females posterior end has lateral sunken papilla-like structure and shows apparent segmentation, and this observation has not been made before.

Procamallanus is a widely occurring parasite of clariid catfish Africa, having been recorded in South Africa by Mashego (1977; Lebowa), Mashego and Saayman (1981; Lebowa), Boomker (1982, 1994b; Hartbeespoort Dam) and Saayman et al. (1991; Middle Letabam. Moravec (1975) experimentally determined the life cycle of *P. laevionchus* in *Clarias lazera* from the River Nile in Egypt. The nematode therefore is distributed widely across the continent, having also been recorded from the Democratic Republic of Congo, Ghana, Senegal, Sudan and Uganda (Khalil and Polling 1997).

CLASS: Nematoda
ORDER: Ascaridida
FAMILY: Anisakidae
GENUS: Contracaecum Raillet and Henry 1915

Contracaecum spp. Larvae

Third-stage larvae (L3) with two blind caeca branching off from intestinal canal at the boundary between oesophagus and midgut. Ventricular appendix shorter and pointing posteriorly; intestinal caecum longer and pointing anteriorly. Tail curved with terminal spine. Reproductive system not developed. *Contracaecum* sp. Larvae have been recorded from catfish and other species from South Africa, viz. *C. gariepinus* (Mashego 1977; Mashego & Saayman 1981; Boomker 1982, Saayman et al. 1991), They have also been recorded in *C. gariepinus* from the hypersaline coastal lake. It is a cosmopolitan parasite of fish-eating birds and mammals (Anderson 1992) and can reach alarming intensities without affecting host condition (Mashego & Saayman 1981; Boomker 1982), an adaptation that probably ensures that the larvae survive to reach the final host without killing the intermediate host.

CLASS: Trematoda
ORDER: Digenea
FAMILY: Diplostomidae Poirier, 1886
GENUS: Ornithodiplostomum Dubois, 1936

Ornithodiplostomum sp. metacercariae,

Metacercariae encysted in tough white cysts secreted by host in the dorsolateral muscles; thin transparent wall secreted by parasite into which it is coiled, thus difficult to identify. Few successfully excysted metacercariae belong to the Diplostomidae and closely resemble Ornithodiplostomum sp. Body indistinctly bipartite with no pseudosuckers, but with a large circular holdfast organ (tribocytic organ). Developing, immature testes apparent. Sub terminal examinable genital apparatus (copulatory bursa) also distinct from photomicrograph. The location of the cysts (deep in the muscle tissue), their whitish colour and large size would suggest that the trematode is a clinostome (Family: Clinostomidae) (Mashego 1977; Paperna 1996). However, Clinostomum species metacercariae have only been recorded from non-siluroid fishes in Africa, especially cichlids (Britz 1985; Mashego 1982; Douellou & Erlwanger 1993; Khalil & polling 1997). Euclinostomum sp., however, infects Clarias species (Mashego 1977; Prudhoe & Hussey 1977; Mashego & Saayman 1989; Khalil & Polling 1997) but looks morphologically different from the specimens obtained during the present study. Furthermore, clinostomid worms do not have a holdfast (tribocytic) organ that characterizes the Diplostomidae.

MATERIALS AND METHODS

METHOD

The fishes were randomly bought at lower Usman dam, Abuja. Specimen were collected and transported where they were examined for helminth parasite.

Laboratory method:

In the laboratory, the fishes were sorted out. The standard and total lengths were measured to the nearest tenth of a centimeter using a half meter rule mounted on a dissecting board. The weight of each fish was measured to the nearest 0.1g.

Collection and examination of specimens for parasites

A total of thirty two *clarias gariepinus* were randomly obtained from Lower Usman dam, Abuja. Nigeria. The fishes were bought. The fresh specimens were immediately examined for helminth parasites. The weights were taken with the aid of the scale kilogram weighing balance while the standard and total length of the fishes were measured using a meter rule. 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 split open longitudinally to aid the emergence of the gastrointestinal helminth parasites. The worms were recognized by their wriggling movement on emergence. The infected guts were removed. The recovered helminth parasites were fixed in 70% alcohol. They were counted and recorded.

Identification of parasites

All the recovered gastrointestinal helminth parasites were sorted out into their various groups (cestodes, trematodes, nematodes and acanthocephalan). The parasites were preserved and fixed in 70% alcohol.

RESULT

32 specimens of *C. grienpinus*, ranging in weight from 250-300gm and total length of 30-36cm were examines for helminth parasites in the intestine. Of this number, 18 (59.38%) were found to be infected by helminth parasites.

A study of the results revealed a total of 4 classes of parasitic helminthes were found. These classes are the Cestodes, nematodes and trematodes as shown in Table 1 below.

TABLE 1. The prevalence (%) of the intestinal parasites in relation to the sex of the fish.

	MALES	**FEMALES**	**COMBINED**
NUMBER OF FISHES EXAMINED	20	12	32
NUMBER OF INFECTED	13	5	18
PREVALENCE (%)	65	41.67	59.38%

TABLE 2. The prevalence (%) of the intestinal parasite in relation to standard length of *Clarias* specie

BODY	**25-30CM**	**30-35CM**	**36-40**	**TOTAL**
NUMBER EXAMINED	9	13	10	32
NUMBER INFECTED	4	7	7	18
PREVALENCE OF INFECTION(%)	44.4	53.84	70	18

TABLE 3. The prevalence (%) of the intestinal infection of clarias species in relation to their body weight.

Body weight (g)	Number fishes examined (%)	Number of infected fishes(%)	Total number of parasite.(%)
200-250(g)	2 (6.25)	1(3.125)	1
250-300(g)	11	6(18.75)	6
300-350(g)	19	11(34.375)	11
350-400(g)	0	0	
TOTAL	32	18(56.25)	18

DISCUSSION AND CONCLUSION

The result of this investigation revealed the occurrence of 4 helminths parasitizing *C. garienpinus*. These are the nematode, *Procamallanus sp*., cestodes, *Polyonchobothrium sp*. and *monobothrium sp*. and acanthcephala which is *Neoechinorhynchus rutili*. The high infection rate recorded in this investigation indicates that helminthes are a Ukoli (1987); Ndifon and Jimeta (1990; Auta *et al* (2000) had subscribed to this observation.

The commonest infection of the fish was caused by a nematode. According to Bakare and Imevbore (1970), *Claris sp*. are bottom dwellers/feeders, they feed on what is most available and close to them such as detritus, water invertebrates like arthropods, mollusks and mud. Among these invertebrates, there may be intermediate hosts of various parasites which may develop into adults in the gut of fish after consumption especially if it is by a proper definite host (birds, such as gray heron). Judging by the number and type of nematodes parasite found in the fish, it seems that the intermediate host [*Mesocyclops* (a copepod)] in case of *Procamallanus sp*. are common in the environment. Royce (1972) concluded that the presence of nematodes in fish lead to decline in population in their natural environment although, this study did not investigate this assertion. The distribution of helminth parasites in the gut of *C. garienpinus* showed that the majority of the parasites occurred in the intestine. Similar finding were reported by Khalil (1969); Ugwuzor (1987); Ndifon *et al* (1990); Oniye (1999); Auta *et al* (2000) and Emere (2000). This could be due to the conducive nutritional advantage presented by the host's intestine to the parasites. Onwuliri et al (1989) observed that helminthes sometimes differ in their nutritional and respiratory requirements. In this study, Cestodes were mostly found in the gallbladder. This observation is similar to the observation of Paperna (1980). The sex ratio found in this study indicated that more males than females occurred in the samples fish population similarly a higher number of helminth parasites were found in males than the females. There was a significant difference in the prevalence of infection between the males and the females. According to Emere (2000) and onwuliri and Mbgemena (1987) differences in infection between the two sexes could be due to differential feeding either by quantity or quality of food eaten and as a result of different degrees of resistance to infection. This observation could also be due to the fact that there were simply more males available for infestation. Infections in the juveniles fish was low compared to adults. This suggest that food/diet is probably responsible for the burden in parasite species as reported by Dogiel et al (1958); Oniye (2000) and Emere (2000). The high infection observed in bigger fish in this study may be due to the fact that larger fish provides greater surface for infection than smaller fish as reported by Bishop and Margolis (1955). Roberts (1978) showed that the number of parasites increases with the fish length and suggested that the increase in parasitization could be to parasitic larvae accumulating from year to year as the fish grows older. The present investigation shows evidence of parasitic helminth infection of C. garienpinus. The presence of these parasites might elicit some pathological effects on the fishes by retarding their growth, causing tissue disruption and even death. However, it might be assumed that parasitic infection of fish does reduce their productivity, as shown by several studies (Onwuliri et al 1989 and Anosike et al 1992).

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9/3/2012