Nematode Infection in Barbus Altianalis Boulinger 1900 (Pisces: Cyprinidae) in Lake Victoria River Systems

Oduor-Okelo, D.[1], J. G Wandera[2] and R.M. Katema[1]

[1]Department of Veterinary Anatomy and [2] Department of Veterinary Pathology & Microbiology
University of Nairobi, P.O. Box 30197, Nairobi, Kenya

Abstract

Extensive studies have been carried out on the ecology and taxonomy of the fish in lake Victoria and to date about thirteen families have been identified. Although parasitic infestations of these fish have been documented in the last thirty or so years, the pathology of these infestation ,a report on their impact on fish growth rates and mortality, the life cycle of the parasites in terms of intermediate and definitive hosts, are scanty. Microscopic examinations of the digestive tract of the teleost, *Barbus altianalis*, a stomachless riverine fish, revealed the presence of many nematode larvae encysted in the wall of the intestine, in the peritoneal cavity and even in the liver where they provoke inflammatory reactions characterized by centrally placed epitheliod cells surrounded by a double-layered capsule consisting of an inner layer of mononuclear cells and an outer layer of fibroblastic cells. Whereas the adult fish encountered in this study did not show any signs of poor-health, it is not known if heavy infestation can cause retardation of growth to maturity or cause juvenile mortalities in the natural habitat. However, with fish farming becoming an important economic undertaking in East Africa, serious thought must be given to fish pathology in general and fish parasitology in particular in this region. Equally important will be the study of the life cycle of the parasites and the intermediate hosts with the aim of improving the quantity and quality of fish in dams and fish-ponds.

Intoduction

Extensive studies have been carried out on the ecology and taxonomy of fish in the Lake Victoria and to date thirteen families have been identified (Aloys Achieng, Personal communication). Although parasitic infestations of these fish have been documented in the last thirty or so years (Fryer, 1961; Wabuke-Bunoti, 1980), the pathology of these infestations, their impact on fish growth rates and mortality, the life cycle of the parasites in terms of intermediate and definitive hosts, are scanty. This paper is a brief description of a nematode larval infection in *Barbus altianalis (Family: CYPRINIDAE)* which has hitherto not been reported.

Materials and Methods

Six *Barbus altianalis* were netted during a trawl-fishing at the estuaries of rivers Nzoia and Kuja in the Nyanza Gulf of Lake Victoria. The fish were weighed and the weights recorded; they were then opened up and the whole alimentary canal and the livers dissected out. The length of the alimentary tract was measured and recorded. Specimens from various parts of the tract and liver were fixed in 10% buffered formalin and processed for light microscopy.

Observation

Barbus altianalis is a stomachless fish. The average weight of the adult *B. altianalis* was 6.52 kg (range 5 to 8 Kg) while the length of the alimentary canal ranged between 90-130 cm. Microscopic examination of the intestinal wall revealed a number of encysted nematode larvae in the submucosa, tunica muscularis, mesentery, pancreas and body cavity. Some of the encysted larvae appeared to be in the process of degeneration. None of the encysted larvae appeared to provoke any inflammatory reaction but they caused pressure on adjacent tissues and significant thinning of the intestinal wall. In the liver larval cyst foci were observed in the parenchyma. The cysts stimulated definite inflammatory reactions characterized by centrally located epitheloid cells surrounded by mononuclear cells and an outer layer of fibroblastic cells that had walled off the parasite larvae. This outer layer also contained blood vessels. Many foci of necrosis or abscesses were also observed in the liver parenchyme and in the areas of the portal spaces.

Discussion

Barbus altianalis inhabits inshore waters and affluent rivers of Lake Victoria. It feeds on molluscs,

smaller fishes, aquatic vegetation and arthropods. Although this feeding regimen exposes Barbs to helminthic parasitic infestation, information on the histopathological effects of parasitism has not received much attention from parasitologists. Poynter (1966), reporting on the tissue reactions to nematode parasites, does not include examples of nematodes in fish. There are four common genera of round worms that parasitise fishes in the great lakes of Africa: namely *Contracaecum, Procamallanus, Eustrongylides and Rhabdochona* (Fryer and Iles, 1972: Whitfield and Heeg, 1977: Malvestuto and Ogambo-Ongoma, 1978). *Contracaecum spp.* are not species specific and both marine and fresh water fishes are infected (Whitfield and Heeg, 1977). Mashego (1989) and Boomker (1994) have reported the presence of *Contracaecum* larval stages embedded in the mesentery, adipose tissue, liver lobes and body cavity of various *Barbus spp.* in South Africa. Although the identity of the nematode in this study was not determined it is speculated that it might well be one of the species of the genus *Contracaecum*. An interesting aspect of the encapsulated larvae in the intestine, pancreas and mesentery of *B. altianalis* was the apparent absence of an appreciable inflammatory reaction. In a previous study, Watson and Dick (1980) also found encysted larvae of *Raphidascaris* in the intestine. Mesentery and visceral organs in young white fish and cisco but they did not report any inflammatory reactions. This contrasts with the findings of Janiszewski (1949) in which the un-encapsulated larval stages of *Cucullanus minutus* induced pathological changes in the submucosal connective tissue. In the liver the larval cysts provoked inflammatory reactions characterized by centrally placed epitheloid cells surrounded by a capsule consisting of an inner layer of mononuclear cells and an outer layer of fibroblastic cells and blood vessels. These can cause mechanical damage due to pressure. A similar capsular structure has been described for the *Anisakis sp.* larvae (Mikhaylova *et al.*, 1964). It has also been suggested that encapsulated nematode larvae secrete toxins which, together with mechanical damage, cause further liver degeneration (Bazikalova, 1932). Such debilitating infections can render the fish more susceptible to stress and secondary infections.

References

Bazikalova A., 1932. *Data on the parasitology of Murman fishes: Rabot na Murmane, Snabtechnizdat, Moscow and Leningrad. pp. 136-153.*

Boomker, J., 1994a. *Parasites of South African fresh water fish VI. Nematode parasites of some fish species in the Kruger National part Onderstepoort Journal of Veterinary Research, 61, 35-43.*

Fryer, G., 1961. *The parasitic Copepoda and Branchiura of fishes of Lake Victoria and Victoria Nile. Proceedings of Zoological Society, London, 137, 41-60.*

Fryer, G. and T.D. Iles, 1972. *Predators and parasites. In: The cichlid fishes of the great lakes of Africa: Their biology and Evolution Chapter 9, Liver and Boyd, Publishers, Edinburgh. pp. 231-260.*

JANISZEWSKA, J., 1949. *Some fish nematodes from Adriatic Sea. Zoologica Poloniae, 5, 73-159.*

Malvestuto, S.P. and A. Ogamgo-Ongoma, 1978. *Observations on the infection of Tilapia leucosticta (Pisces: Cichlidae) with Contracaecum (Nematoda: Heterocheilidae) in Lake Naivasha, Kenya. Journal of Parasitology, 64, 383-384.*

Mashego, S.N. 1989. *Nematode parasites of Barbus species in Lebowa and Venda, South Africa. South African Journal of Wildlife Research, 19, 35-37.*

Mikhaylova, I.G., E.V. Prazdnikov, and T.O. Prusevich, 1964. *Morphological changes in the fish tissue around the larvae of some parasitic worms. Morsk. Biol. Inst. Akad. Nauk SSR, 5, 251-264.*

Poynter, D., 1966. *Some tissue reactions to the nematode parasites of animals. Advances in Parasitology, 4, 251-264.*

Thurston, J.P., 1965. *The pathogenicity of fish parasites in Uganda. Proceedings of East African Academy, 3, 45-51.*

Wabuke-Bunoti, M.A.N., 1980. *The prevalence and pathology of the cestode Polyonchobothrium clarias (Woodland, 1925) in teleost, Clarias mossambicus (Peters). Journal of Fish Diseases, 3, 223-230.*

Waston, R.A. and T.A. Dick, 1980. *Metazoan parasites of pike, Esox lucius Linnaeus, from Southern Indian Lake, Manitoba, Canada. Journal of Fish Biology, 17, 255-261.*

Whitfield, A.K. and J. Heeg, 1977. *On the life cycles of the cestode Ptychobothrium belones and nematodes of the genus Contracaecum from Lake St. Lucia, Zululand. South African Journal of Science, 73, 121-122.*