

Infection and the histopathological damage caused by Yellow Grub (*Clinostomum complanatum*) in guppies (*Poecilia reticulata*)

B.G.D. Sumuduni¹, D.H.N. Munasinghe^{1*} and W.P.R. Chandrarathna²

¹Department of Zoology, Faculty of Science, University of Ruhuna, Matara, Sri Lanka.

²Ornamental Fish Breeding and Training Center, National Aquaculture Development Authority, Rambadagalle, Kurunegala, Sri Lanka.

Abstract

Guppy (*Poecilia reticulata*) is one of the highly demanded species in the export market. The infection of Yellow grub (*Clinostomum complanatum*) and the histopathological effects caused on guppies were investigated. Samples were collected from fish rearing ponds at the Department of Zoology, University of Ruhuna, Matara, Sri Lanka. The sample consisted of 30 individuals and the prevalence of the parasite was estimated and the number of cysts on each infected fish was counted. Infected fishes were treated with Naguvon and KMnO₄ and kept for three months to determine the possibility of controlling the parasite. Metacercaria larval stage and histopathological damages caused by the parasite were examined. Snails belonging to *Helisoma* sp. were collected from the pond and kept under sunlight to observe the shedding of cercaria larvae. Daily observations were carried out to record the bird species that visit the ponds to determine the definitive host.

Prevalence of the parasite was 20% and among them 66.67% were females. One to five numbers of embedded metacercarial cysts were observed on each fish either in muscles, caudal and pectoral fins, around eye region or inside surface of the operculum. The elongated oval shaped metacercaria possessed small oral and a ventral sucker and vitellaria present in the body. With the time parasites developed inside the cysts and severe histopathological damages were caused shifting internal organs aside. The infection of parasite cause considerable impact on the behavior, appearance as well as economical and ornamental values of the fish. The fork tailed cercaria larvae released by snails were observed. Common heron was determined as the definitive host. Naguvon and KMnO₄ treatments were not capable to control the parasite. With the support of the reported information in the current study, future research could be directed towards the investigation of proper treatment methods to control the damage caused by the parasite.

Key words: *Clinostomum complanatum*, yellow grub, guppy, *Poecilia reticulata*, histopathology

*Corresponding author: dhnm@zoo.ruh.ac.lk, donamunasinghe@gmail.com

Introduction

Guppy (*Poecilia reticulata*) gained considerable attention in the Sri Lankan freshwater ornamental fish industry. The present study investigated the infection and damage caused by infection of internal plathelminth trematode parasite, yellow grub (*Clinostomum complanatum*) on guppy fish. The yellow grub *C. complanatum* is a common parasite mainly in North American countries (Olsen 1962). The metacercarial stage of the yellow grubs embedded intramuscularly (in the muscle) or subcutaneously (under the skin) in fish and it has been reported from many fish species (Hoffman, 1999) such as yellow perch, bass, and sunfish (Olsen, 1962) and also in amphibians (McAllister, 1990). The parasite cysts are highly visible

to the naked eye and consumers do not readily accept the infected fish due to their unsightly appearance (Hoffman, 1999). It has been reported that larvae of yellow grub could be survived for four years inside the cysts of fish (Elliot and Russert, 1949).

The records on damage of *C. complanatum* have not been documented in Sri Lanka so far. The heavy infection of the parasite cause slow moving of the fish and considerable impact on their growth. Even slight infection of the parasite form embedded cysts in the body which damage the appearance of the fish and reject them causing economic loss.

Materials and methods

Wild guppies (n = 30) were collected from the earthen ponds of the Department of Zoology, University of Ruhuna, Matara. Fish were observed for the external symptoms of the yellow grub infection. Infected males and females were counted and prevalence of the parasite was calculated using the following formula, Prevalence = (Infected fishes / Total fishes examined) X 100.

Different sizes of metacercarial cysts were pierced by a needle to release metacercaria from the cysts. They were kept in saline for 24 hours and stained with Borax carmine to investigate the morphological structure. Infected guppies were fixed in Bouin's fluid and tissues were prepared for histopathological examinations and damage caused by parasite was observed. The first intermediate host, snails belonging to *Helisoma* sp. were collected and kept under sunlight for shedding of cercaria larvae. Daily observations were carried out to record the visiting bird species to the pond that act as the definitive host visit to ponds. Twenty infected fishes and non infected fishes were separately kept in 1ppm Neguvon bath for 24 hours and then 2.5ppm KMnO₄ and the cysts were examined. Then metacercarial cysts of 20 fishes were removed and they were exposed to 1ppm Neguvon bath for 24 hours and then 2.5ppm KMnO₄.

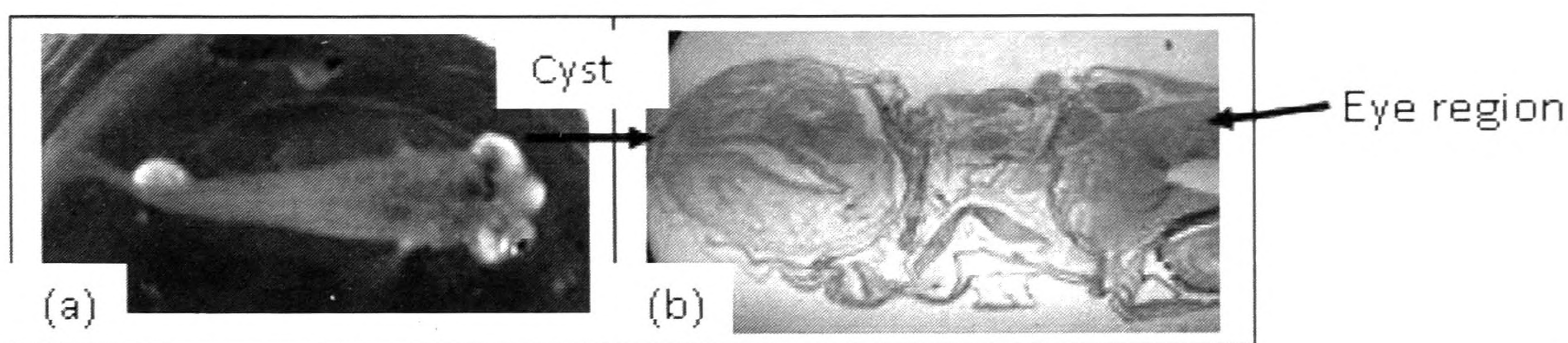


Fig.1: (a) Cyst on the eye region (b) Shifted eye region due to the cyst of parasite

Results and Discussion

Yellow grub cysts were observed on the musculature, on caudal and pectoral fins, around eye region and on inner surface of the operculum, which appeared as yellow coloured, slightly oval spot, about 3 to 6 mm long. The prevalence of the parasite was 20 % and among them 66.67 % were females. Fishes were infected with 1-5 number of metacercarial cysts. Different stages of metacercaria were found. Considerable impact on the internal organs, behavior and appearance

of the fish were observed. After stained with Borax carmine, it was noticed that metacercaria has an elongated oval shaped body. A small oral sucker and a ventral sucker were present close to the anterior side of the body and the vitellaria were present in the body. The observations are consistent with reports presented by Salim and Ali (2010). The treatment, Neguvon and KMnO₄ applied on fish were not responded to metacercaria cyst as metacercaria makes comparatively deep wounds in the body when encysting. Fork tailed cercaria was found in the snails which act as the first intermediate host and the common heron was observed as the definitive host where the adult parasites feed and reproduce. Studies are important to control the damage caused by the parasite.

References

Hoffman, G.L. 1999. Parasites of North American freshwater fishes. 2nd edition. Comstock Publishing Associates, Ithaca and London.

Olsen, O.W. 1962. Animal parasites. Burgess Publishing Company. Minneapolis.

Elliot A.M. and Russert L.R. 1949. Some condition characteristics of a yellow perch population heavily parasitized by *Clinostomum marginatum*. *Journal of Parasitology* **35(2)**: 183-190.

McAllister C.T. 1990. Metacercaria of *Clinostomum complanatum* (Rudolphi, 1814) (Trematoda: Digenea) in a Texas Salamander, *Euryceaneotenes* (Amphibia: Caudata), with Comments on *C. marginatum* (Rudolphi, 1819). *Journal of the Helminthological Society of Washington* **57(1)**: 69-71.

Al-Salim N.K. and Ali A.H. 2010. First record of three species of trematodes of the genus *Clinostomum* Leidy, 1856 (Digenea: Clinostomidae) parasitic in piscivorous birds from East Al-Hammar Marsh, *South of Iraq Marsh Bulletin*. **5(1)**: 27-42.