THE TREMATODE *Clinostomum complanatum* (PLATYHELMINTHES: DIGENEA) IDENTIFIED AT THE PERCH FROM THE SMALL RESERVOIRS ALONG THE PREAJBA RIVER

GOGA Ionelia Claudia, CODREANU-BĂLCESCU Doina

Abstract. The digenetic trematode *Clinostomum complanatum* (RUDOLPHI, 1819) was identified at perch (*Perca fluviatilis* LINNAEUS, 1758), after sampling ichthyologic material from the reservoirs located along the Preajba Valley during 2010.

Keywords: Preajba, digenean, *Clinostomum complanatum*, *Perca fluviatilis*, metacercaria.

Rezumat. Trematodul *Clinostomum complanatum* (Platyhelminthes: Digenea) identificat la biban în lacurile mici de baraj de pe cursul râului Preajba. Trematodul digeneu *Clinostomum complanatum* (RUDOLPHI, 1819) a fost identificat la biban (*Perca fluviatilis* LINNAEUS, 1758), în probe de material ihtiologic, colectate pe parcursul anului 2010, în lacurile mici de baraj de pe cursul râului Preajba.

Cuvinte cheie: Preajba, digeneu, *Clinostomum complanatum*, *Perca fluviatilis*, metacercar.

INTRODUCTION

Family Clinostomatidae (Ord. Strigeatida) has a widespread distribution, in the area where mean temperature is about 10^{o}C (GRABDA-KAZUBSKA, 1974).

Clinostomum complanatum is a digenetic trematode which usually infects fish-eating water birds (final hosts). The cercariae of *C. complanatum* have been recorded from some freshwater snail species belonging to the genera *Lymnaea*, *Radix*, *Heliosoma* etc., as first intermediate host. *Clinostomum complanatum* metacercariae (yellow grubs) were recorded from more than 25 freshwater fish species (second intermediate host) and adult stage of parasite (fluke) has been reported from more than 7 species of ichthyophagous birds (herons, egrets etc.) (MALEK & MOBEDI, 2001). VULPE (2007) considers that the parasite can be found at all fish species. *C. complanatum* metacercariae infest the skin, muscle, fins, head and viscera, causing pathologies and changes in the host behaviour, with consequent economic losses in fish farms (VIANA et al., 2005); for example, in USA and Brazil, clinostomosis cause significant problems for Siluriformes.

The presence of metacercariae in the muscle of fish makes them unsuitable for human consumption. If a human accidentally consumes raw or semi cooked infected fish, the fluke attaches to the mucus membrane of the larynx or oesophagus causing a clinical syndrome (haloing); the parasite can migrate to the trachea. Many cases in men have been reported since 1938 in Japan and Korea (CHAN–WONG PARK, 2009) and other countries. In recent years, in pisciculture communities from the hydrographical basin PreajbaValley (Dolj County) there were performed sporadic samplings the purpose of which was to obtain the ichthyologic material necessary for further parasitological studies (GOGA, 2009, 2009a; GOGA, 2010). We identified 12 fish species belonging to two orders and four families.

Here we describe an infection with metacercariae of *Clinostomum complanatum* (yellow grubs) in *Perca fluviatilis*. The present study aimed also to establish correlations between the parasitized fish life environment and the incidence of this parasitosis.

MATERIAL AND METHODS

During the year 2010, there were made some field trips in the area of the reservoirs located along the Preajba River, a small tributary of the Jiu River. The sampled fish material has been examined ichthyo-pathologically, namely clinical and parasitological examination in the Laboratory of Parasitology, Dolj Sanitary Veterinary Directorate. Strictly referring to the parasitological exam, we may state it was performed for the identification of the ecto and endoparasites.

The parasites were found at a single species, respectively the perch. On macroscopic examination of the fish specimens were seen fixing cysts places. The parasitized fish are easily identifiable due to the presence of white-yellowish, ovoid cysts with metacercariae enrolled inside, in the musculature and gill lamellae (Figs. 1; 3).

With two dissection needles the metacercariae were extracted from the cysts and afterwards they were passed to a Petri dish with water living metacercaria was placed in a drop of water on the slide, being examined by transparency at a stereomicroscope (Fig. 4) and the mounting of the parasite in a fresh preparation (a small drop of water containing a specimen between slide and cover glass) allowed its examination at the optical microscope (Figs. 5; 6a, b) (10x X 20x).

RESULTS AND DISCUSSIONS

In the sampled material, there were identified parasites only at 10 perch (*Perca fluviatilis* LINNAEUS, 1758) specimens (7♂ and 3♀), with a weight varying between 91 and 422 g. Each specimen wore at least six cysts.

The digenean *Clinostomum complanatum* (RUDOLPHI, 1819) was determined. The metacercariae enrolled inside ellipsoidal white-yellowish cysts (yellow grubs), of about 2 mm in length, were located in the upper angle and inner face of the operculum (Fig. 1), gill arches (Fig. 2) and lamellae (Fig. 3) respectively. This fact illustrates the parasite preference for well vascularized areas, with intense activity. At *Rhamdia quelen* (Siluriformes) VIANNA et al (2005) found the largest density of *C. complanatum* metacercariae in the oro-branchial cavity, sub-opercular tissue. Likewise, metacercariae of *Clinostomum marginatum* parasitizing *Loricariichthys platymetopon* were found encysted in the base of the fins, muscle, inner wall of the operculum, lips, gill arches, palate, bone plaques and eyes, forming small white-yellowish nodules (EIRAS et al., 1999).

GRABDA-KAZUBSKA (1974) recorded also the occurrence of *Clinostomum complanatum* metacercaria at *Perca fluviatilis* in Poland and the possibility of its acclimatisation in artificial heated lakes.

The representatives of the class Digenea need at least two hosts during their life cycle: an intermediate host (snails, shells) and a final host (piscivorous birds, raptor fish or mammals). In the small reservoirs placed along the Preajba Valley, there were found numerous gastropods belonging to the genera *Planorbis*, *Physa*, *Viviparus*, *Radix, Stagnicola, Fagotia* (CIOBOIU, 1998-2000; CIOBOIU & BREZEANU, 2000), as well as ichthyophagous birds (Fig. 7). Thus, the area ecosystem offers optimum conditions for the development of *Clinostomum complanatum*. The absence of the parasite at the other fish species from the same habitat, except *Perca fluviatilis*, could be explained by a greater receptivity towards this parasite in the case of the perch, a raptor species.

The digenean *Clinostomum* use raptor fish as the second intermediate host and the furcocercous cercariae penetrate their body after leaving gastropods or bivalves (the first intermediate host). Inside the second intermediate host the cercariae fork-tailed lose their tail, encyst and develop into metacercariae. From the pathology viewpoint, calm fish infested with metacercariae could be ingested by raptor fish species, in the present situation the perch, and trematodosis occurs at cutaneous level, gills, and musculature or can affect the internal organs (ROMAN, 1955). The metacercaria is usually encysted in a cyst of host and parasite origin, or encapsulated in a layer of tissue derived from the host only. The metacercariae are infective for the final (definitive) host; they excyst in the definitive host's gut becoming adult digeneans (flukes), with a length of 3-8 mm (Fig. 7).

For the determination of this digenetic trematode, we took into account the parasitized area on the fish body, as well as the taxonomic characters: the dimension and shape of the suckers; the position of the ventral sucker (Fig. 5) in relation to the position of the oral sucker; the morphology of the digestive tube (Figs. 6a, b) (MUNTEANU & BOGATU, 2008). The metacercaria resembles quite much to the fluke both as colour and shape. They have a yellowish colour and are relatively large (4-6 mm). The ventral sucker is very sizable, cecums are long, extending to the front of the oral sucker.

In natural water bodies, it is impossible to prevent parasite fauna. In order to limit as much as possible the infestation of fish populations, the literature in the field recommends certain prophylactic measures: limiting the number of molluscs within fisheries through periodical drainages, preventing the development of excessive vegetation in case basins get clogged, preventing the penetration of wild fish species that might carry parasites inside piscicultural basins.

Figure 1. Encysted metacercaria located in the upper angle, inner face of the operculum (stereomicroscope, by transparency). (Photo: Claudia Goga).
Figura 1. Metacercar închistat în unghiul superior, fața internă a operculului (stereomicroscop, prin transparență).

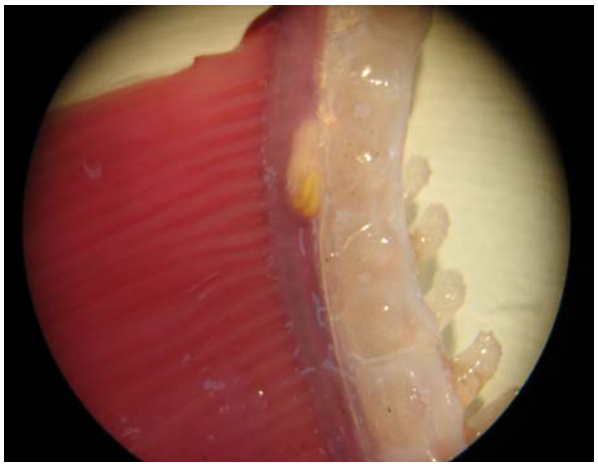

Figure 2. Metacercaria settled in the gill arch (stereomicroscope, by transparency. (Photo: Claudia Goga).
Figura 2. Metacercarul fixat în arcul branhial (stereomicroscop, prin transparență).

CONCLUSIONS

The ichthyocenoses from the Preajba hydrographical basin are made up of 12 species belonging to two orders and four families; ten of the species are autochthonous and two are acclimatized allochthonous species (top mouth gudgeon and pumpkinseed)**.**

The low incidence of clinostomosis may be induced by the reduced number of ichthyophagous birds. The representatives of the class Digenea need at least two hosts in their development: an intermediate host and a final host (raptor fish, ichthyophagous birds, mammals).

The sampled fish did not register clinical manifestations.

The control of the disease in these piscicultural reservoirs should rely on preventing the penetration of gastropods or of water infected with furcocercous cercariae, taking into account that the water level regulation is made in the underground, from one reservoir to another, as well as on avoiding the development of optimum conditions for ichthyophagous birds. People should not eat raw or undercooked fish.

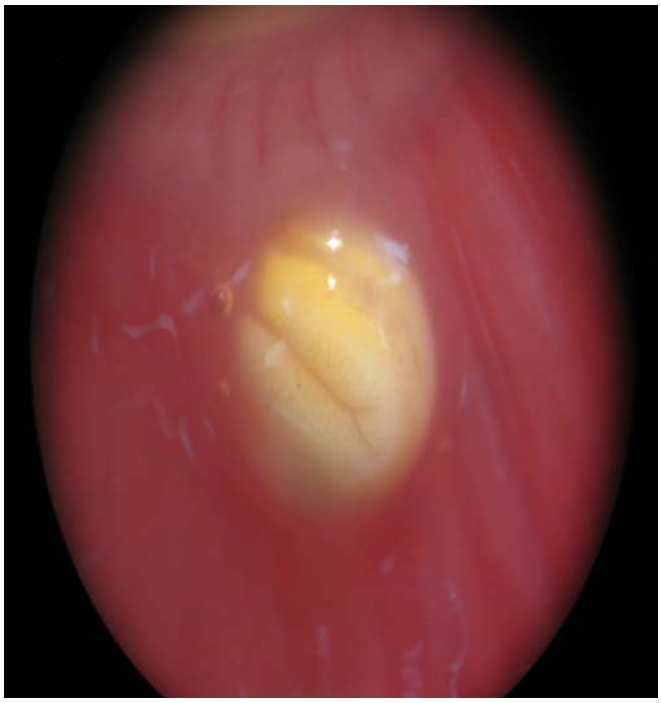

Figure 3. Metacercaria encysted between gill lamellae (stereomicroscope, by transparency). (Photo: Claudia Goga).
Figura 3. Metacercarul închistat între lamelele branhiale (stereomicroscop, prin transparență).

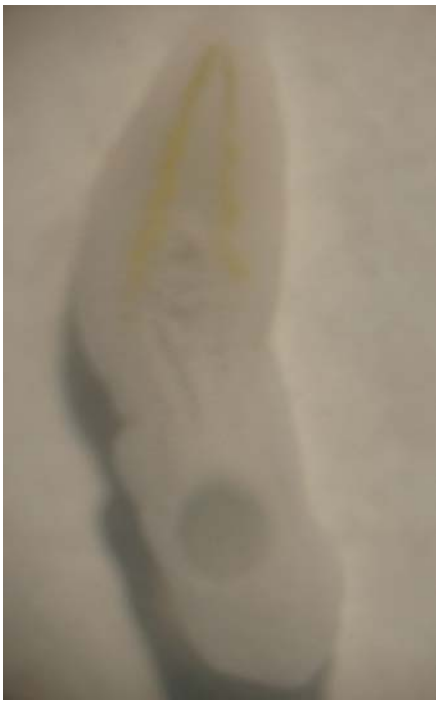

Figure 4. Metacercaria extracted from the cysts (stereomicroscope, by transparency. (Photo: Claudia Goga).
Figura 4. Metacercar extras din chist (stereomicroscop, prin transparență).

Figure 5. Metacercaria – anterior extremity of the body (fresh preparation between slide and cover glass; optical microscope, 10x X 20x). (Photo: Claudia Goga). / Figura 5. Metacercar extremitatea anterioară a corpului (preparat nativ între lamă şi lamelă; microscop optic, 10x X 20x).

Figure 6a. Metacercaria – posterior extremity of the body (fresh preparation between slide and cover glass; optical microscope, 10x X 20x). (Photo: Claudia Goga) / Figura 6a. Metacercar extremitatea posterioară a corpului (preparat nativ între lamă şi lamelă; microscop optic, 10x X 20x).

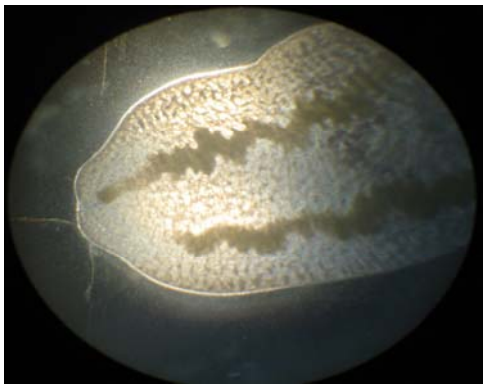

Figure 6b. Metacercaria – posterior extremity of the body (fresh preparation between slide and cover glass; optical microscope, 10x X 20x). (Photo: Claudia Goga).
Figura 6b. Metacercar extremitatea posterioară a corpului (preparat nativ între lamă şi lamelă; microscop optic, 10x X 20x).

Figure 7. Ichthyophagous bird (*Egretta garzetta*) (final host) parasitized by flukes, in the oesophagus zone). (http:// fishparasite. Clinostomum).
Figura 7. Pasăre ihtiofagă (*Egretta garzetta*) (gazdă definitivă) parazitată cu digene adulte în regiunea esofagului).

REFERENCES

CHAN-WONG PARK. 2009. *A human case of clinostomum complanatum infection in Korea*. Korean Journal of Parasitology. **47**(4): 401-404.

CIOBOIU OLIVIA. 1998. *Structura şi dinamica unor populaţii de gasteropode din lacuri mici de acumulare din Câmpia Olteniei,* 1 *Viviparus acerosus* Bourg. Argesis. Studii şi comunicări. Ştiinţele Naturii. Piteşti: 23-28.

CIOBOIU OLIVIA. 1999. *Structura şi dinamica unor populaţii de gasteropode din lacuri mici de acumulare din Câmpia Olteniei,* II *Radix auricularia* L. Oltenia. Studii şi comunicări. Stiinţele Naturii. Muzeul Olteniei Craiova. **25**: 57-61.

CIOBOIU OLIVIA. 2000. *Structura şi dinamica unor populaţii de gasteropode din lacuri mici de acumulare din Câmpia Olteniei,* III *Physa acuta* Drap., *Viviparus viviparus* L. Armonii naturale. Studii şi comunicări. Ştiinţele Naturii. Muzeul Judeţean Arad. (3): 406-418.

CIOBOIU OLIVIA & BREZEANU GH. 2000. *Structure of the Gastropod populations from small dam lakes in Oltenia Plain.* Proceedings of the Institute of Biology. Annual Scientific Session. Bucharest. 2: 99-107.

EIRAS J. C. 1999. *Histological studies on the effects of Clinostomum marginatum in its second intermediate host Loricariichthyes platymetopon of the upper Parana river, Brazil*. Acta Scientiarum. Brazil. **21**(2): 237-241.

GOGA IONELIA CLAUDIA. 2009. *Boli parazitare semnalate la peştii dulcicoli din bazinul hidrografic Valea Preajba*. Diversitatea, valorificarea raţională şi protecţia lumii animale. Ştiinţa. Chişinău. Moldova: 256-260.

GOGA IONELIA CLAUDIA. 2009a. *Basic data on the piscicultural communities from the hydrographic basin Preajba Valley Conferinţa Internaţională*. Oltenia. Studii şi comunicări. Ştiinţele Naturii. Muzeul Olteniei Craiova. **25**: 165-169.

GOGA IONELIA CLAUDIA. 2010. *The mycosis generated by Saprolegnia parasitica in the fresh – water fish of the cyprinidae family*. Oltenia. Studii şi comunicări. Ştiinţele Naturii. Muzeul Olteniei Craiova. **26**(2): 161-164.

KAZUBSKA B. 1974. *Clinostomum complanatum* and *Euclinostomum heterostomum* (Trematoda, Clinostomidae); Their occurrence and possibility of acclimatisation in artificially heated lakes in Poland. Acta Parasitologica. Poland. **22**(24): 285-93.

MALEK M. & MOBEDI I. 2001. *Occurence of Clinostomum complanatum (Rudolphi, 1819) (Digenea: Clinostomatidae) in Capoeta capoeta gracilis (Osteichthys: Cyprinidae) from Shrioud River, Iran*. Iranian Journal Public. Health. **30**(3-4): 95-98.

MUNTEANU GABRIELA & BOGATU D. 2008. *Tratat de ihtiopatologie*. Excelsior Art. Timişoara: 242-272.

ROGERIO TUBINO VIANNA, JOABER PEREIRA JUNIOR, DEODORO ATLANTE BRANDAO. 2005. *Clinostomum complanatum* (Digenea, Clinostomidae) density in *Rhamdia quelen* (Siluriformes, Pimelodidae) from South Brazil. Brazilian Archives of Biology and Technology. **48**(4): 635-642.

ROMAN ELENA. 1955. *Cercetări asupra parazitofaunei peştilor din Dunăre*. Academia Republicii Populare Române. Bucureşti: 21-37.

VULPE V. 2007. *Paraziţi şi parazitoze ale peştilor dulcicoli.* Edit. Stef, Iaşi: 169-171.

***. http:// fishparasite. Clinostomum (accessed April, 2011).

Goga Ionelia Claudia
The Oltenia Museum, Nature Sciences
Str. Popa Şapcă No..8, RO-200422,
E-mail: ioneliagoga@yahoo.com

Codreanu - Bălcescu Doina
Institute of Biology of the Romanian Academy,
Str. Splaiul Independenţei No. 296, Bucharest, Romania,
E-mail: doina_cb@yahoo.co.uk

Received: March 12, 2011
Accepted: July 23, 2011