

# Metacestodes of *Glossocercus auritus* (Cyclophyllidea, Gryporhynchidae) in *Poecilia reticulata* (Pisces, Poeciliidae) from Brazil

Metacestoides de *Glossocercus auritus* (Cyclophyllidea, Gryporhynchidae)  
 em *Poecilia reticulata* (Pisces, Poeciliidae) no Brasil

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## Abstract

Studies on fish parasites in Pampulha dam, Belo Horizonte, Minas Gerais, Brazil, found specimens of *Poecilia reticulata* Peters, 1859 harboring natural infection by larval stages of tapeworms. A total of 250 specimens of *P. reticulata* were collected and analyzed between February and August 2010, of which 23 were found infected (prevalence 9.2%) with one metacestode each (mean intensity 1, mean abundance 0.09). The analyses of the parasites, particularly the morphology of rostellar hooks, made it possible to identify *Glossocercus auritus* (Rudolphi, 1818). This is the first report of *G. auritus* metacestode in South America and *P. reticulata* is a newly known host for this parasite.

**Keywords:** Cestodes, *Poecilia reticulata*, *Glossocercus auritus*, new host, fish parasites.

## Resumo

Em estudo da helmintofauna de peixes oriundos da represa da Pampulha, Belo Horizonte, Minas Gerais, Brasil, exemplares de *Poecilia reticulata* Peters, 1859 foram encontrados naturalmente infectados por larvas de cestóides. De 250 espécimes de *P. reticulata* coletados e analisados entre fevereiro e agosto de 2010, 23 (prevalência de infecção 9,2%) apresentavam-se infectados por um metacestóides cada (intensidade média 1, abundância média 0,09). A análise dos parasitos, em especial a morfologia dos acúleos rostellares, permitiram a identificação de *Glossocercus auritus* (Rudolphi, 1818). Este é o primeiro registro de metacestóide de *G. auritus* para a América do Sul, sendo *P. reticulata* um novo hospedeiro conhecido para o parasito.

**Palavras-chave:** Cestóides, *Poecilia reticulata*, *Glossocercus auritus*, novo hospedeiro, parasitos de peixe.

## Introduction

The Gryporhynchidae (Cestoda: Cyclophyllidea) are intestinal tapeworms parasites of fish-eating birds, and their larval forms (metacestodes) are found infecting over a hundred freshwater fish species, mainly in the Palearctic region (reviewed by SCHOLZ et al., 2004). Although several species of these cestodes have been reported, studies relating to species composition and distribution of these parasites are scarce, and for a significant percentage of gryporhynchid species, their metacestodes and life cycle remain unknown. In South America, and specifically in Brazil, the only species for which metacestodes are known is *Valipora campylancristrota* (Wedl, 1855), found in *Prochilodus lineatus*

(Valenciennes, 1836), *Pimelodus maculatus* Lacépède, 1803, and *Hoplosternum littorale* (Hancock, 1828) in the State of Paraná, Southern Brazil (REGO et al., 1999; TAKEMOTO et al., 2009). Recently, *Valipora* sp. and another unidentified metacestodes were found in *Prochilodus argenteus* Spix & Agassiz, 1829 in the State of Minas Gerais (MONTEIRO et al., 2009).

In the present study, metacestodes of *Glossocercus auritus* (Rudolphi, 1818) are reported for the first time in *Poecilia reticulata* Peters, 1859 in Brazil.

## Material and Methods

The fish specimens were collected with the aid of a scoop net during monthly sampling conducted in Pampulha dam (19° 51' 77" S and 43° 58' 54" W), an artificial eutrophic waterbody located in the northern region of the city of Belo Horizonte, from

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February to August 2010. The specimens collected were placed in plastic containers with water and transported alive to the laboratory. Then they were measured with a caliper, killed by decapitation in accordance with the recommendations of the local animal experimentation ethics committee (CETEA/UFGM), dissected and examined for parasites under a stereomicroscope.

When the cysts obtained were removed intact, they were measured. The larvae were then mechanically excysted and transferred to Petri dishes containing saline solution (0.85% NaCl). They were then flattened under soft pressure between glass slides and fixed in Railliet-Henry solution at 70 °C. The parasites were stained with acetic alum carmine, dehydrated in an alcohol series, cleared in beechwood creosote and mounted as permanent preparations in Canada balsam.

Additionally, scolices of some specimens were squashed and the hooks obtained were mounted in non-permanent preparations after addition of lactophenol. A morphological analysis was conducted using a light microscope, and specimens were measured through an eyepiece graduated in millimeters. Drawings of the rostellar hooks were made with aid of a camera lucida and photographic documentation was obtained using a digital camera coupled to the microscope.

Some larvae obtained were also used to experimentally infect mice (*Mus musculus* Linnaeus, 1758), young chicken (*Gallus gallus domesticus* (Linnaeus, 1758)), and young and adult pigeons (*Columba livia* Gmelin, 1789). Metacestodes were force-fed to these hosts and, fifteen days after infection, the hosts were killed by cervical dislocation and examined for parasites.

The taxonomic identification was based on morphological criteria, especially the rostellar hook morphology (number, shape and size), as recommended by several authors (BONA, 1994; SCHOLZ; SALGADO-MALDONADO, 2001; SCHOLZ et al., 2002a, 2004).

Ecological terms were used as proposed by Bush et al. (1997). The specimens studied were deposited in the collection of the Laboratory of Taxonomy and Biology of Invertebrates, at the Department of Parasitology, Universidade Federal de Minas Gerais (UFMG) (accession number 6157 a-j).

## Results and Discussion

Of 250 specimens of *P. reticulata* with mean length 2.1 mm (range: 1.2-4 mm) examined, 23 were found naturally infected by metacestodes. Through morphological examination, the following species was identified:

***Glossocercus auritus*** (Rudolphi, 1818), (Figure 1).

Synonymous: *Taenia aurita*; *Parvitaenia aurita*; *Anomotaenia aurita*.

Host: *Poecilia reticulata* Peters, 1859 – new host record.

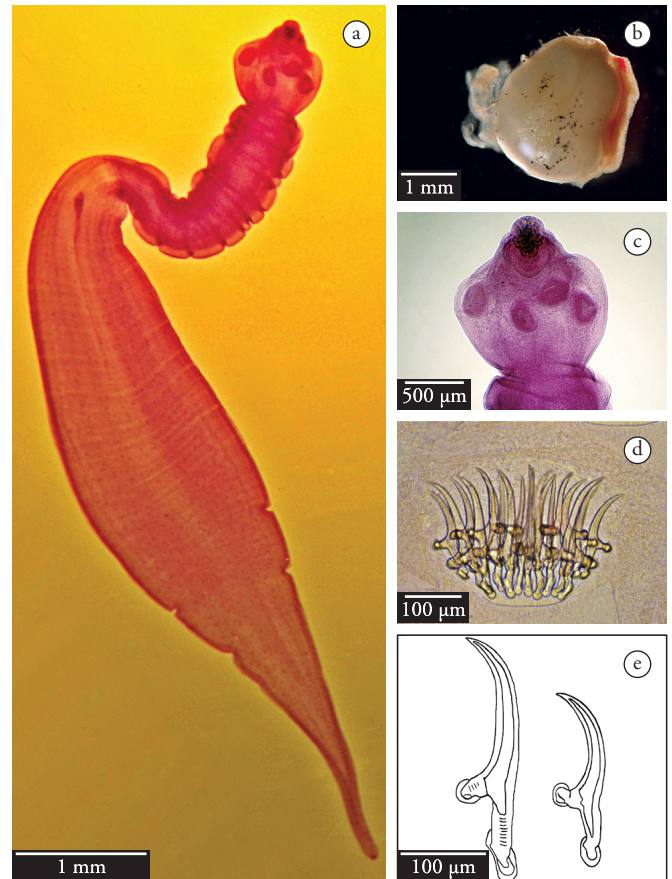
Site of infection: Mesentery.

Locality: Pampulha dam, Belo Horizonte, Minas Gerais, Southeastern Brazil – new geographical record.

Prevalence: 9.2% (23/250).

Mean intensity: 1.

Mean abundance:  $0.09 \pm 0.3$ .



**Figure 1.** *Glossocercus auritus* – Metacestodes found in *Poecilia reticulata* from Pampulha dam, Belo Horizonte, Minas Gerais, Brazil. a) excysted larvae; b) whole cyst; c) detail of the scolex; d) detail of the armed rostellum; e) distal hook (left) and proximal hook (right).

Experimental infection: unsuccessful.

Morphological description: Based on 10 specimens. Larvae encysted in oval shaped cysts measuring 3.1 (2.6-4.0) mm long x 2.6 (2.2-3.0) mm wide (Figure 1b). After mechanical excystation, the larvae showed extension and contraction movements of the body. Some of them had an evaginated scolex. The parasite was relatively very large (Figure 1a); its body was formed by an elongated scolex measuring  $3.25 \pm 0.86$  (1.98-5.02) mm long x  $1.04 \pm 0.17$  (0.77-1.22) mm wide, and a posterior tapered part measuring  $10.38 \pm 2.75$  (6.85-15.71) mm long x  $1.71 \pm 0.39$  (1.21-2.28) mm wide (Figure 1b). The scolex (Figure 1c) showed four spherical to oval suckers measuring  $259 \pm 27$  (205-321)  $\mu$ m long x  $192 \pm 16$  (150-225)  $\mu$ m wide, and a muscular rostellum. The rostellar pouch was  $262 \pm 13$  (239-273)  $\mu$ m long x  $277 \pm 28$  (239-341)  $\mu$ m wide. It had a rostellum armed with 20 hooks arranged in two crowns of 10 hooks each (Figure 1d). The hooks (Figure 1e) presented massive sclerification (epiphyseal thickening) of the handle and guard. The distal hook had  $251 \pm 5$  (246-259)  $\mu$ m with a  $149 \pm 7$  (137-164)  $\mu$ m blade, a  $105 \pm 6$  (96-116)  $\mu$ m handle and a blade/handle ratio of 1.41 (1.29-1.64). The proximal hook had  $182 \pm 6$  (171-191)  $\mu$ m with a  $100 \pm 3$  (96-102)  $\mu$ m blade, a  $84 \pm 3$  (82-89)  $\mu$ m handle and a blade/handle ratio of 1.20 (1.15-1.25). A comparison between the measurements of

**Table 1.** Morphometric comparison between rostellar hook measurements of metacestodes of *Glossocercus* spp. obtained in the present study and those reported by other authors (in micrometers).

	<i>Glossocercus auritus</i>		<i>Glossocercus caribaensis</i>		<i>Glossocercus cyprinodontis</i>
	Present study	Scholz et al. (2001)	Scholz et al. (2001)	Scholz et al. (2002b)	Scholz et al. (2004)
<b>Locality</b>	Brazil	Mexico	Mexico	USA	USA
<b>Host</b>	<i>Poecilia reticulata</i>	<i>Poecilia sphenops</i> <i>Poeciliopsis gracilis</i>	<i>Cichlasoma urophthalmus</i> <i>Fundulus persimilis</i>	<i>Fundulus heteroclitus</i> <i>Fundulus majalis</i>	<i>Cyprinodon variegatus</i>
<b>Distal hook</b>					
Length	246-259	242-267	189-211	186-205	180-195
Blade	137-164	141-165	106-128	113-126	122-128
Handle	96-116	102-114	77-88	72-83	86-93
Blade/Handle Ratio	1.29-1.64	1.56-1.89	1.20-1.61	1.42-1.73	1.30-1.49
<b>Proximal hook</b>					
Length	171-191	189-202	134-146	124-143	129-141
Blade	96-102	93-115	66-82	68-83	79-86
Handle	82-89	83-96	62-75	56-68	62-74
Blade/Handle Ratio	1.15-1.25	1.10-1.39	0.97-1.23	1.09-1.29	1.08-1.27

rostellar hooks of the parasites in the present study and in others *Glossocercus* spp. metacestode reports is presented in the Table 1.

At least eight species of *Glossocercus* Chandler, 1935 have already been described (PICHELIN et al., 1998), and metacestodes of three of them (*G. aurita*, *G. cyprinodontis* Chandler, 1935, *G. caribaensis* (Rysavy and Macko, 1973)) are known. Metacestodes of these species differ mainly in terms of morphology and hook measurements, which are significantly larger in *G. auritus* (Table 1).

*Glossocercus auritus*, a species described from adult parasites recovered from Little Blue Heron (*Egretta caerulea* (Linnaeus, 1758)) in Brazil, is considered to be the type species of the genus, with regard to adult specimens (BONA, 1994). Since its description, this parasite has been found infecting *Ardea alba* Linnaeus 1758, *A. herodias* Linnaeus, 1758, *E. tricolor* (Statius Muller, 1776), *E. thula* (Molina, 1782), *Nyctanassa violacea* (Linnaeus, 1758) in Cuba, Mexico and Nicaragua (SCHOLZ et al., 2001; ORTEGA-OLIVARES et al., 2008). Two of these ardeids, *A. alba* and *E. thula*, have been found at Pampulha dam (PIMENTA et al., 2007), and can thus be considered potential definitive hosts of *G. auritus* in this locality.

The larval form of *G. auritus*, in turn, was found for the first time in *Poecilia sphenops* Valenciennes in Cuvier & Valenciennes, 1846, and *Poeciliopsis gracilis* (Heckel, 1848) in Mexico (SCHOLZ et al., 2001), and later in *Poecilia catemaconis* Miller, 1975, *Poecilia mexicana* Steindachner, 1863, and *Astyanax fasciatus* (Cuvier, 1819) in that same country (SCHOLZ; SALGADO-MALDONADO, 2001; SCHOLZ et al., 2004; SALGADO-MALDONADO et al., 2005). The morphology and measurements of parasites obtained from *P. reticulata* in the present study are consistent with data presented by these authors.

In the present study, attempts to recovery adult parasites from vertebrate host were unsuccessful after experimental infection, and their absence in the hosts evaluated could be attributable to a potential host specificity of this cestode for ardeids. In fact, there are no records of experimental or natural infection in mammals and non-ardeid birds.

The diversity and life cycle of gryporhynchid parasites of Brazilian fishes need further studies to improve the knowledge about these biological interactions. This is the first report on metacestodes of *G. auritus* in Brazil and South America, and *P. reticulata* is a new intermediary host recorded for this parasite.

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