

Monogenea (Platyhelminthes) parasites from the gills of *Hoplias aff. malabaricus* (Bloch, 1794) (Pisces: Erythrinidae) in the Upper Paraná River Floodplain, States of Paraná and Mato Grosso do Sul, Brazil

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ABSTRACT: In this paper, nine species of Monogenea were recorded parasitizing the gills of *Hoplias aff. malabaricus* from the Upper Paraná River. The host were collected by gillnets in different regions to the Upper Paraná River Floodplain between March 2010 and March 2011. The parasites were quantified, fixed and preserved according with specialized literature. All hosts analyzed were parasitized by monogeneans. The monogeneans species were recorded *Urocleidoides malabaricus*, *U. cuiabai*, *U. eremitus*, *U. brasiliensis*, *Cosmetocleithrum bulbocirrus*, *Vancleaveus janauacaensis*, *Anacanthorus* sp., Dactylogyridae gen. sp. and Dactylogyridae gen. 1. sp.

INTRODUCTION

Hoplias aff. malabaricus (Bloch, 1794), popularly known as “traíra” or “lobó”, is widely distributed in freshwater of South America (Oyakawa 2003). This fish is carnivores, sedentary and occur in several types of fluvial and lacustrine environments (Nakatani *et al.* 2001), especially in shallow water environments and near submerged or marginal vegetation. This fish is easily found in the Upper Paraná River Floodplain and although it is identified as *H. aff. malabaricus* several authors agree this fish is a species complex (Graça and Pavanelli 2007). Pazza and Júlio Jr. (2003), based on cytogenetic data, found three cytotypes in the region, two natives of the Upper Paraná River (*Hoplias* sp. 2 and sp. 3) and one specie introduced *Hoplias* sp. 1, which occur after the flood of Sete Quedas falls by Itaipú Reservoir. Oyakawa (2003) mentioned that the situation of the genera *Hoplias* is quite confusing, because of the large number of species described and the use of features appropriate for their delimitation.

In Brazil, the first record of monogenean species in *Hoplias aff. malabaricus* was *Urocleidoides eremitus* Kritsky, Thatcher and Boeger, 1986 from State of Amazonas. In 1995 Boeger and Popazoglo described *Gyrodactylus trairae* parasitizing the body surface of the same host from State of Rio de Janeiro. Rosim *et al.* (2011) reported six species of monogeneans in *H. aff. malabaricus* collected from rivers in different Brazilian regions: Guandu, Jaguari-Mirim and Machado from the Southeast. Araguaia, Cristalino and Cuiabá from Midwest and Paraná between the South and Midwestern regions.

Studies carried out between the years 2000 to 2007 about the diversity of fish parasites from the Upper Paraná River Floodplain registered the occurrence of 20

species of parasites in *H. aff. malabaricus*. However, in this paper, there were no register of monogeneans in this host (Takemoto *et al.* 2009). Recently Graça *et al.* (2013) studied the ecological aspects of monogeneans of *H. aff. malabaricus* from the Upper Paraná River Floodplain and recorded nine species of these parasites in this host. Currently, 10 species of monogeneans are known to *H. aff. malabaricus* (Kritsky *et al.* 1986; Boeger and Popazoglo 1995; Rosim *et al.* 2011; Graça *et al.* 2013).

The present study offers information about gill ectoparasites through a checklist of monogeneans species of *Hoplias aff. malabaricus* from Upper Paraná River Floodplain.

MATERIALS AND METHODS

The study area is part of the Upper Paraná River Floodplain in the Paraná and Mato Grosso do Sul States from Brazil (22°43'S, 53°10'W), where is located the base of advanced research at the State University of Maringá (UEM) - Center of Research in Limnology, Ichthyology and Aquaculture (Nupélia) (Figure 1). The sampling points are those used by the project PELD - CNPq (Long Term Ecological Projects) - Site 6. The Site six covers most of the last remaining lowland not dammed the River Paraná in Brazil. In this stretch, the River presents a broad canal anastomosed with reduced slope, sometimes with extensive floodplain and large accumulation of sediment in its bed, resulting in more than 300 bars and small islands, sometimes with large islands and floodplain narrower (Agostinho *et al.* 1995). The floodplain has an extension of approximately 130 km and it is connected numerous secondary channels, backwaters, Baía River and the lower reaches of Ivaí and Ivinheima Rivers.

A total of 54 specimens of *H. aff. malabaricus* were collected quarterly from March 2010 to March 2011, totaling five collection campaigns. The fishes were euthanized with benzocaine 10%. Subsequently, the specimens were identified, the gills removed and fixed in formalin 5%. Collecting, preparation, fixation and mounting of parasites were treated according to Eiras *et al.* (2006). The identification was according to Kritsky *et al.* (1986), Boeger and Vianna (2006) and Rosim *et al.* (2011). Voucher parasite specimens are deposited in the Helminthological Collection of the Instituto Oswaldo Cruz (CHIOC), Rio de Janeiro, Rio de Janeiro, Brazil.

RESULTS

In total, 3640 specimens of monogeneans were registered in this study. All fishes were parasitized by at least one species of parasites. *Urocleidoides cuiabai* Rosim, Mendoza-Franco and Luque, 2011 was the most prevalent species (96.29%), followed by *U. malabaricus* Rosim,

Mendoza-Franco and Luque, 2011 (92.59%). The species with the lowest prevalence were *Dactylogyridae* gen. 1. sp. and *Cosmetocleithrum bulbocirrus* Kritsky, Thatcher and Boeger, 1986 (1.85%). The list of species of monogenetic and information on levels of parasitism are presented in Table 1.

DISCUSSION

Platyhelminthes Gegenbaur, 1859

Monogenea van Beneden, 1858

Dactylogyridae Bychowsky, 1933

Ancyrocephalinae Bychowsky, 1937

***Urocleidoides* Mizelle and Price, 1964**

The genus *Urocleidoides* was reviewed by Kritsky *et al.* (1986) and from the 30 species listed by Kritsky and Thatcher (1983), only eight were kept in this genus (Kritsky *et al.* 1986). *Urocleidoides* has 22 species in South

FIGURE 1. List of species of monogeneans collected from gills of the *Hoplias aff. malabaricus* in Upper Paraná River Floodplain, PR / MS, from March 2010 to March 2011. Access number in Helminthological collection (AN); number of fish infested (NI); number of parasites collected (NP); average intensity (AI); amplitude of parasitism (AP).

MONOGENEA	AN	NI	NP	AI	AP
<i>Urocleidoides malabaricus</i>	CHIOC 37791	50	691	13.82	1 – 117
<i>Urocleidoides eremitus</i>	CHIOC 37790	35	736	21.02	1 – 143
<i>Urocleidoides cuiabai</i>	CHIOC 37793	52	1532	29.46	1 – 193
<i>Urocleidoides brasiliensis</i>	CHIOC 37795	37	240	6.48	1 – 42
<i>Anacanthorus</i> sp.	CHIOC 37800	30	215	7.16	1 – 29
<i>Vancleaveus janauacaensis</i>	CHIOC 37797	2	2	1	1 – 2
<i>Cosmetocleithrum bulbocirrus</i>	CHIOC 37799	1	1	1	-
<i>Dactylogyridae</i> gen. sp.	CHIOC 37802 a-b	26	222	8.53	1 – 47
<i>Dactylogyridae</i> gen. 1. sp.	CHIOC 37803	1	1	1	-

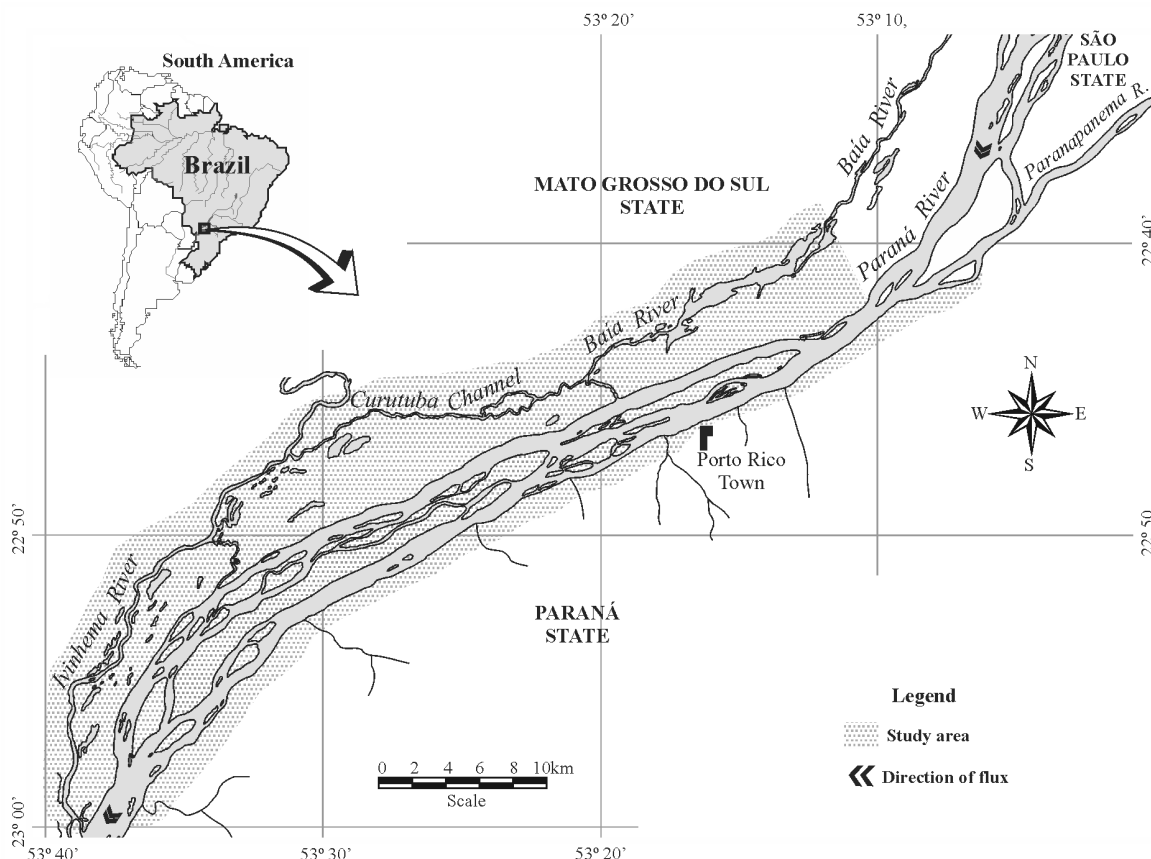


FIGURE 1. Upper Paraná River Floodplain located in the States of Paraná and Mato Grosso do Sul, Brazil.

America (Cohen *et al.* 2013), four of them described recently by Rosim *et al.* (2011) parasitizing *Hoplias* aff. *malabaricus*. According to Eiras *et al.* (2010), the genus *Urocleidoides* does not have host specificity, and this genus can be found in fish of different orders, such as: Siluriformes, Characiformes, Gymnotiformes and Cyprinodontiformes. However, *Urocleidoides cuiabai*, *U. malabaricus*, *U. brasiliensis* and *U. eremitus* so far, has been recorded only in *H. aff. malabaricus*, indicating the specificity for this host.

***Urocleidoides eremitus* Kritsky, Thatcher and Boeger, 1986**

Urocleidoides eremitus was described parasitizing *Hoplias* aff. *malabaricus* collected at Lake Janauacá in Manaus, Amazonas State, Brazil. Recently, Rosim *et al.* (2011) registered *U. eremitus* in *H. aff. malabaricus* collected in four Rivers in Brazil such as, Guandu River in the State of Rio de Janeiro, Jaguari-Mirim River in the State of São Paulo, Machado River in the State of Minas Gerais and Cuiabá River in the State of Mato Grosso.

***Urocleidoides malabaricus* Rosim, Mendoza-Franco and Luque, 2011**

***Urocleidoides cuiabai* Rosim, Mendoza-Franco and Luque, 2011**

***Urocleidoides brasiliensis* Rosim, Mendoza-Franco and Luque, 2011**

Urocleidoides malabaricus, *U. cuiabai* and *U. brasiliensis* were described by Rosim *et al.* (2011) parasitizing the gills of *Hoplias* aff. *malabaricus* collected in different rivers of Brazil. *Urocleidoides malabaricus* was only registered in the hosts collected in the Paraná and Cuiabá Rivers. *Urocleidoides cuiabai* was registered in hosts collected in Paraná, Cuiabá, Guandu, Jaguari-Mirim, Araguaia and Cristalino Rivers (the latter two river are located in the State of Mato Grosso). *Urocleidoides brasiliensis* was registered in *H. aff. malabaricus* collected in Guandu, Cuiabá, Cristalino and Paraná Rivers. These same species, described by Rosim *et al.* (2011), were found in *H. aff. malabaricus* collected in the Upper Paraná River Floodplain by Graça *et al.* (2013).

***Vancleaveus* Kritsky, Thatcher and Boeger, 1986**

***Vancleaveus janauacaensis* Kritsky, Thatcher and Boeger, 1986**

Currently, the genus *Vancleaveus* is composed of five species registered in gills of Siluriformes (Cohen *et al.* 2013). *Vancleaveus janauacaensis* was described parasitizing gills of *Pterodoras granulosus* (Valenciennes, 1821) collected in Lake Janauacá in Manaus in State of Amazonas, Brazil. Recently, *V. janauacaensis* was also registered in *P. granulosus* by Chemes and Takemoto (2011) in the Middle Paraná River in Argentina.

***Cosmetocleithrum* Kritsky, Thatcher and Boeger, 1986**

***Cosmetocleithrum bulbocirrus* Kritsky, Thatcher and Boeger, 1986**

The genus *Cosmetocleithrum* has eight species of fish parasites in Siluriformes (Cohen *et al.* 2013). *Cosmetocleithrum bulbocirrus* was described parasitizing

gills of *Pterodoras granulosus* also collected at Lake Janauacá in Manaus. This parasite also was registered in *Oxydoras niger* (Valenciennes, 1821) by Silva *et al.* (2011) in Coari Lake, tributary of the Solimões River in Amazonas State, Brazil.

DACTYLOGYRIDAE Bychowsky, 1933

Dactylogyridae gen. sp. of Rosim, Mendoza-Franco and Luque, 2011

Rosim *et al.* (2011) registered Dactylogyridae gen. sp. in *Hoplias* aff. *malabaricus* collected in the Jaguari-Mirim, Machado, Cuiabá and Paraná Rivers. Graça *et al.* (2013) reported this parasite specie in *H. aff. malabaricus* collected in the Upper Paraná River Floodplain. These authors, as well as Rosim *et al.* (2011), found none diagnostic features for the inclusion of this species in a known genus.

Dactylogyridae gen. 1. sp.

Dactylogyridae gen. 1 sp. did not have any characteristics that enable the fit in a genera known of monogeneans. This species has a complex copulatory and haptor totally different of the species found by Rosim *et al.* (2011).

Dactylogyridae gen. 1. sp., *Cosmetocleithrum bulbocirrus* and *Vancleaveus janauacaensis* were recorded for the first time in *Hoplias* aff. *malabaricus* by Graça *et al.* (2013). The infestation of parasites of this species in this host can be considered accidental, since the parasitism indexes were low. Another fact that supports this statement is that *C. bulbocirrus* and *V. janauacaensis* has been recorded only in Siluriform fishes.

Dactylogyridae Bychowsky, 1933

Anacanthorinae Price, 1967

***Anacanthorus* Mizelle and Price, 1965**

Anacanthorus is a genus represented by 70 species of monogeneans. It has been described for Characiformes species, according the checklist presented by Cohen *et al.* (2013): Species of *Anacanthorus* were registered by Takemoto *et al.* (2009) parasitizing the gills of *Salminus brasiliensis* (Cuvier, 1816) and *Serrasalmus marginatus* Valenciennes, 1837 from the the Upper Paraná River Floodplain. Cohen *et al.* (2012) described five new species of *Anacanthorus* in *S. brasiliensis* in the Paraná River, *Anacanthorus bicuspidatus*, *A. contortus*, *A. daulometrus*, *A. douradensis* and *A. parakruidenieri*. The first record of a species of *Anacanthorus* in this *Hoplias* aff. *malabaricus* was recently by Graça *et al.* (2013). The species recorded in this study differs from other species of *Anacanthorus* registered in other hosts and it is probably a new species.

ACKNOWLEDGMENTS: We are grateful to Graduate Program in Comparative Biology (PGB), Graduate Program Ecology of Continental Aquatic Environments (PEA), and State University of Maringá (UEM) that provided logistical support and structure during fieldwork. The Nupélia and PELD Project provided support in the collections. RJG and FHO received PhD fellowships from CNPq and CAPES, respectively. RMT is a CNPq partner (process # 305829/2010-6).

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RECEIVED: July 2013

ACCEPTED: October 2013

PUBLISHED ONLINE: November 2013

EDITORIAL RESPONSIBILITY: Simone Chinicz Cohen