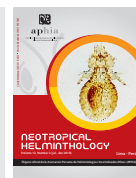




Neotropical Helminthology



ORIGINAL ARTICLE / ARTÍCULO ORIGINAL

METAZOAN PARASITES OF *ACESTRORHYNCHUS FALCATUS* (CHARACIFORMES: ACESTRORHYNCHIDAE) FROM FLOODPLAIN LAKES OF THE BRAZILIAN AMAZON

METAZOARIOS PARÁSITOS DE *ACESTRORHYNCHUS FALCATUS* (CHARACIFORMES: ACESTRORHYNCHIDAE) COLECTADOS EN LAGOS INUNDABLES DE LA AMAZONÍA BRASILEÑA

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ABSTRACT

This work describes the metazoan parasites of *Acestrorhynchus falcatus* (Bloch, 1794) (Characiformes: Acestrorhynchidae) caught in floodplain lakes of the Brazilian Amazon. The studied lakes were: Baixio, Preto, São Tomé, Ananá, Araçá and Maracá, located between the cities of Manaus and Coari in Central Amazonia. Sixty-six specimens of *A. falcatus* were collected and examined in March, June, September, and December 2013. A total of 263 specimens of parasites belonging to 11 species were found. These included 166 endoparasitic specimens (63.12%) and 97 ectoparasitic specimens (36.88%). Seven species are reported for the first time: *Quadrigyrus torquatus* Van Cleave, 1920 (Acanthocephala); *Anisakis* sp. (Nematoda), *Pseudoproleptus* sp. (Nematoda); *Travassosnema travassosi paranaensis* Costa, Moreira & Oliveira, 1991 (Nematoda); *Amplexibranchius bryconis* Thatcher & Paredes, 1985 (Copepoda); *Acusicola pellonidis* Thatcher & Boeger, 1983 (Copepoda) and *Argulus amazonicus* Malta & Silva, 1986 (Brachiura). *Acestrorhynchus falcatus* has an intermediate position in the trophic web of the studied floodplain lakes, being intermediate, paratenic and definitive host of different parasite species.

Keywords: *Acestrorhynchus falcatus* – Amazonia – ectoparasites – endoparasites – fish – host

RESUMEN

Este trabajo describe los metazoarios parásitos de *Acestrorhynchus falcatus* (Bloch, 1794) (Characiformes: Acestrorhynchidae) capturados en lagos inundables de la Amazonía brasileña. Los lagos estudiados fueron: Baixio, Preto, São Tomé, Ananá, Araçá y Maracá, localizados entre las ciudades de Manaus y Coari en la Amazonía Central. Sesenta y seis *A. falcatus* fueron colectados y examinados en marzo, junio, septiembre y diciembre de 2013. Fueron encontrados 263 especímenes de parásitos pertenecientes a 11 especies. Del total de parásitos, 166 especímenes (63,12%) fueron endoparásitos y 97 especímenes (36,88%) ectoparásitos. Siete especies son citadas por primera vez: *Quadrigyrus torquatus* Van Cleave, 1920 (Acanthocephala); *Anisakis* sp. (Nematoda), *Pseudoproleptus* sp. (Nematoda); *Travassosnema travassosi paranaensis* Costa, Moreira & Oliveira, 1991 (Nematoda); *Amplexibranchius bryconis* Thatcher & Paredes, 1985 (Copepoda); *Acusicola pellowidii* Thatcher & Boeger, 1983 (Copepoda) y *Argulus amazonicus* Malta & Silva, 1986 (Brachiura). *Acestrorhynchus falcatus* tiene una posición intermediaria en la red trófica de los lagos estudiados, siendo un hospedero intermediario, paraténico y definitivo de diferentes especies de parásitos.

Palabras clave: *Acestrorhynchus falcatus* – Amazonia – ectoparásitos – endoparásitos – hospedero – peces

INTRODUCTION

Species of *Acestrorhynchus* are benthopelagic fish, exclusively of freshwater that are distributed in rivers and lakes of South America. Eleven species occur in the Amazonas and Orinoco River basins, and in rivers of Guianas. Two species are restricted to the River São Francisco in the River Paraná. One species occurs in the River Paraná, Uruguay and Paraguay River basins (Toledo-Piza, 2007; Pretti *et al.*, 2009).

Acestrorhynchus falcatus occurs in the Amazonas and Orinoco River basins and in rivers of Suriname and French Guyana. This species can be differentiated from other *Acestrorhynchus* by presenting a humeral spot next to the operculum and next to the caudal fin. It can reach 30 cm of length, is sedentary, diurnal and piscivorous, but younger specimens can also feed on crustaceans (Soares *et al.*, 2008; Pretti *et al.*, 2009).

There are few studies on the fauna of parasites of *A. falcatus*. In the Amazon Region, there are non-studies concerning to parasites of this fish species. Thus, the present study pretends to identify the metazoan parasites of *A. falcatus* collected in floodplain lakes of the Brazilian Amazon.

MATERIAL AND METHODS

Sixty-six *A. falcatus* (Figure 1) with mean 17.82 ± 2.33 cm standard length and mean 86.45 ± 43.54 g weight were collected between March and December 2013 from six floodplain lakes of the Brazilian Amazon: Lake Baixio (03°17'27, 2"S/ 60°04'29,6"W) at the city of Iranduba, Lake Preto (03°21'17, 1"S/ 60°37'28,6"W) at Manacapuru; Lake Ananá (03°53'54,8"S/ 61°40'18,4"W) at Anori; Lake Araçá (S03°45' 04,3" S/ 62°21' 25,9" W) at Codajás and Lake Maracá (03°50'32,8"S/ 62°34'32,4"W) at Coari and Lake São Tomé (03°49' 39,0"S/ 61°25' 24,6" W).

Fish were caught using 100 mm between adjacent nodes-meshed, 20 m long x 2 m high gillnets. Posteriorly the fishes were quickly immersed in 75 mg clove oil·L⁻¹ solution and euthanized (CONCEA, 2013). In the field, fishes were measured and weighed. The gills, operculum and fins were examined for the presence of ectoparasites. Gills and nostrils were removed and preserved in 5% formalin; the gastrointestinal tract was preserved in 70% ethanol for posterior analyses at the laboratory of Fish Parasitology (LPP) in the National Institute of Amazonian Research (INPA).

At the laboratory, the parasites found were processed according to Amato *et al.* (1991). Specimens were studied using a light microscope Zeiss Axioscope 2. Voucher specimens were deposited at the invertebrate collection of the National Institute of Amazon Research (INPA), Manaus, Brazil. The ecological terminology applied to parasites followed Bush *et al.* (1997).

RESULTS

A number of 263 specimens of parasites belonging to 11 species were found parasitizing *A. falcatus* (Table 1). From the total number of parasites, 166 specimens (63.12%) were endoparasites and 97 specimens (36.88%) were ectoparasites.

Seven parasites species were in the stage of adult and the other were immatures. The highest prevalence was for *Diaphorocleidus* sp. (32.14%), the highest mean intensity was for Anisakidae larvae (Table 1)

DISCUSSION

Species of *Diaphorocleidus* were found in Characidae species: *Bryconops affinis* (Günther, 1864), *Astyanax bimaculatus* (Linnaeus, 1758), *Hemigrammus microstomus* Durbin, 1918 and *Gymnocorymbus ternetzi* (Boulenger, 1895) (Jogunoori *et al.*, 2004). For Acestrorhynchidae *Diaphorocleidus* sp. was found in *Acestrorhynchus lacustris* (Lütken, 1875) from São Paulo (Camargo *et al.*, 2015), in *A. falcirostris* Cuvier, 1818 and *A. falcatus* from Amapá (Hoshino *et al.*, 2016). In the present study, *Diaphorocleidus* sp. was found parasitizing *A. falcatus*, representing the first occurrence of a *Diaphorocleidus* species in the Brazilian Amazon.

Clinostomum marginatum (Rudolphi, 1819) was cited in *A. falcirostris* and *A. falcatus* collected in Amapá, Brazil (Hoshino *et al.*, 2016). In Brazilian floodplain lakes *C. marginatum* was found parasitizing different organs of *A. falcirostris* (Dumbo, 2014). In the present study, metacercariae of *C. marginatum* were found in the gills and intestine of *A. falcatus*.

Table 1. Metazoan parasites in *Acestrorhynchus falcatus* (Bloch, 1794) from floodplain lakes of the Brazilian Amazon. P% = prevalence, N = number of parasites, I = intensity of infection, mI = mean intensity, mA = mean abundance.

Parasites	Accession N ^o	P%	N	I	mI	mA
MONOGENOIDEA						
<i>Diaphorocleidus</i> sp.	INPA - 643	32.14	80	1-15	4.44 ± 3.91	1.42 ± 3.03
DIGENEA						
<i>Clinostomum marginatum</i>	INPA - 690	7.14	8	1-3	2 ± 0.70	0.14 ± 0.54
ACANTOCEPHALA						
<i>Quadrigyrus torquatus</i>	INPA - 55	7.14	8	1-2	2,00	0.14 ± 0.51
NEMATODA						
<i>Anisakis</i> sp.	INPA - 87	5.36	30	1-3	10 ± 5.62	0.53 ± 2.37
<i>Pseudopropleptus</i> sp.	INPA - 88	19.64	6	1-5	0.54 ± 0.81	0.10 ± 0.48
<i>Procamallanus (Spirocamallanus) inopinatus</i>	INPA - 89	8.93	19	1-16	3.8 ± 1.21	0.33 ± 0.86
<i>Travassosnema travassosi paranaensis</i>	INPA - 90	3.57	6	2	3,00	0.10 ± 0.44
Larvas Anisakidae	INPA - 91	25.00	89	1-23	6.35 ± 6.89	1.58 ± 4.37
COPEPODA						
<i>Amplexibranchius bryconis</i>	INPA - 2339	10.71	11	1-3	1.83 ± 1.11	0.19 ± 0.68
<i>Acusicola pellowidis</i>	INPA - 2340	7.14	5	1-2	1.25 ± 0.43	0.08 ± 0.33
BRANCHIURA						
<i>Argulus amazonicus</i>	INPA - 2341	1.79	1	1	1,00	0,02



Figure 1. Lateral view of *Acestrorhynchus falcatus* (Bloch, 1794) captured in floodplain lakes of the Brazilian Amazon

For *A. falcatus*, the acanthocephalans *Palliolisentis polyonca* Schmidt & Huggins, 1973 (Thatcher, 2006) and *Neoechinorhynchus pterodoridis* Thatcher, 1981 (Hoshino *et al.*, 2016) were found parasitizing the intestine. For species of *Acestrorhynchus*, the acanthocephalan *Quadrigyris torquatus* Van Cleave, 1920 was cited parasitizing *A. lacustris* (Carvalho *et al.*, 2003) and *A. falcirostris* (Dumbo, 2014). In the present study *Q. torquatus* was found in the intestine of *A. falcatus*, being the first record of this parasite in this fish species. Additionally, the number of known host for this acanthocephalan is expanded to a new host.

In floodplain lakes of the Brazilian Amazon, *Anisakis* sp., *P. (S.) inopinatus* and *Pseudoproleptus* sp. were found in *Pygocentrus nattereri* Kner, 1858 (Morais, 2011); *Anisakis* sp. and *P. (S.) inopinatus* in *C. monoculus* (Santana, 2013); *Anisakis* sp., *P. (S.) inopinatus*, *Pseudoproleptus* sp. and *Travassosnema travassosi paranaensi* in *A. falcirostris* (Dumbo, 2014) and *P. (S.) inopinatus* and *Pseudoproleptus* sp. in *Astronotus ocellatus* (Agassiz, 1831) (Attroch, 2016). In the present study all these nematodes were found parasitizing different organs of *A. falcatus*. The only species specific for *Acestrorhynchus* is *T. travassosi paranaensi* that was found in *A. lacustris* (Moravec *et al.*, 1993). In the present study, *Anisakis* sp., *Pseudoproleptus* sp.

and *T. travassosi paranaensi* are cited for the first time in *A. falcatus*.

The feeding habits of fish are the main factor that determines the composition of endoparasite species, because they are transmitted through the trophic web in predator-prey relationships (Marcogliese, 2002). In the present study additionally to the adult and immature nematodes quote above, numerous Anisakidae larvae were found. In this way, *A. falcatus* has an intermediate position in the trophic web of the studied floodplain lakes, being intermediate, paratenic and definitive host of different endoparasites.

For *Acestrorhynchus* the copepod parasite species known are: *Ergasilus turucuyus* Malta & Varella, 1996 from *A. falcatus*, *A. falcirostris* and *A. microlepis* (Shomburgk, 1841) (Malta & Varella, 1996); *E. turucuyus*, *Amplexibranchius bryconis*, *Acusicola pellowidii* and *Miracetyma piraya* Malta, 1993 from *A. falcirostris* (Dumbo, 2014). In the present study, *A. bryconis* and *A. pellowidii* are cited for the first time in *A. falcatus*.

For *Acestrorhynchus*, *Dolops bidentata* Bouvier, 1899, *D. geayi* Bouvier, 1897, *Argulus chicomendesi* Malta & Varella, 2000 and *A. amazonicus* Malta & Silva, 1986 are cited parasitizing *A. falcirostris* (Matta & Silva, 1986; Dumbo, 2014). In the present study, *A. amazonicus*

was found in *A. falcatus*, representing the first occurrence of this parasite in this fish species.

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