




Diversity of Nematoda and Digenea from different species of characiform fishes from Tocantins River, Maranhão, Brazil

Diversidade de Nematoda e Digenea coletados em diferentes espécies de Characiformes provenientes do rio Tocantins, Maranhão, Brasil

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Abstract

During a survey of the helminth fauna of characiform fishes from the Tocantins River, Brazil, 185 fish specimens from 22 species were studied. Twelve species of Nematoda and nine species of Digenea were collected. Some of these helminth species were reported for the first time in their hosts, thus representing new host records: *Procamallanus (Spirocamallanus) sp.* in *Bivibranchia notata*, *Brycon pesu*, *Chalceus macrolepidotus*, *Hemiodus microlepis* and *Hemiodus unimaculatus*; *Procamallanus (Spirocamallanus) inopinatus* in *Triporthesus elongatus*; *Goezia sp.* (larva) in *Boulengerella cuvieri*; *Rhabdochona acuminata* in *Brycon pesu* and *Triporthesus trifurcatus*; *Raphidascaris sp.* (larva) in *Caenotropus labyrinthicus*; *Cosmoxynema vianai* in *Cyphocharax gouldingi*; *Rondonia rondoni* in *Leporinus fasciatus* and *Mylesinus paucisquamatus*; *Klossinemella iheringi* in *Mylesinus paucisquamatus*; Cucullanidae gen. sp. in *Myloplus rubripinnis*; *Rhabdochona sp.* in *Triporthesus elongatus*; *Alphamphistoma sp.* in *Myleus setiger*; *Chalcinotrema sp.* in *Cyphocharax gouldingi*; *Pacudistoma guianense* in *Hemiodus unimaculatus* and *Myleus torquatus*; *Pseudocladorchis cylindricus* in *Hemiodus unimaculatus*; *Dadaytrema oxycephala* in *Mylesinus paucisquamatus*; *Travassosinia dilatata* in *Myloplus asterias*; and *Genarchella genarchella* in *Raphiodon vulpinus*. Studies identifying new hosts and new localities for parasites have contributed to the knowledge of local biodiversity. A list of previous records of helminths included in the present study, providing hosts, localities, and references, is presented here.

Keywords: Nematoda, Digenea, Characiformes, Tocantins River, Maranhão, Brazil.

Resumo

Durante a pesquisa da fauna helmintológica de Characiformes do rio Tocantins, Maranhão, Brasil, 185 peixes pertencentes a 22 espécies foram estudados. Doze espécies de Nematoda e nove espécies de Digenea foram coletadas. Algumas espécies de helmintos estão sendo registradas pela primeira vez em seus hospedeiros, representando novos registros: *Procamallanus (Spirocamallanus) sp.* em *Bivibranchia notata*, *Brycon pesu*, *Chalceus macrolepidotus*, *Hemiodus microlepis* e *Hemiodus unimaculatus*; *Procamallanus (Spirocamallanus) inopinatus* em *Triporthesus elongatus*; *Goezia sp.* (larva) em *Boulengerella cuvieri*; *Rhabdochona acuminata* em *Brycon pesu* e *Triporthesus trifurcatus*; *Raphidascaris sp.* (larva) em *Caenotropus labyrinthicus*; *Cosmoxynema vianai* em *Cyphocharax gouldingi*; *Rondonia rondoni* em *Leporinus fasciatus* e *Mylesinus paucisquamatus*; *Klossinemella iheringi* em *Mylesinus paucisquamatus*; Cucullanidae gen. sp. em *Myloplus rubripinnis*; *Rhabdochona sp.* em *Triporthesus elongatus*; *Alphamphistoma sp.* em *Myleus setiger*; *Chalcinotrema sp.* em *Cyphocharax gouldingi*; *Pacudistoma guianense* em *Hemiodus unimaculatus* e *Myleus torquatus*; *Pseudocladorchis cylindricus* em *Hemiodus unimaculatus*; *Dadaytrema oxycephala* em *Mylesinus paucisquamatus*; *Travassosinia dilatata* em *Myloplus asterias*; e *Genarchella genarchella* em *Raphiodon vulpinus*. Estudos que identificam novos hospedeiros e novas localidades para parasitos têm contribuído para o conhecimento da biodiversidade local. Uma lista dos registros prévios dos helmintos incluídos no presente estudo, com hospedeiros, localidades e referências é apresentada.

Palavras-chave: Nematoda, Digenea, Characiformes, rio Tocantins, Maranhão, Brasil.

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Introduction

South America presents a high ichthyological diversity, which shows the huge dimensions of the challenge involved in acquiring basic knowledge of the helminth fauna of fish in this continent (Luque et al., 2017). Despite recent increases in biodiversity research, parasites are still a neglected group, even though they represent a key role in the functioning of ecosystems (Marcogliese & Cone, 1997; Adlard et al., 2015; Rocha et al., 2016; Acosta et al., 2020). Thus, there is a risk that a large number of parasite species may be lost even before their existence becomes known or before their risk of extinction is understood. This emphasizes the importance of taxonomy and species cataloging (Moravec, 2007; Rocha et al., 2016).

The Tocantins-Araguaia basin is one of the most important hydrographic regions of Brazil. It is an area of endemism for several neotropical freshwater fish groups, as siluriforms and characiforms, as identified by several authors (e.g. Vari, 1988; Menezes & Lucena, 1998; Lima & Moreira, 2003), and an area of high diversity (Santos et al., 2004; Lucinda et al., 2007; Abell et al., 2008). The fish species present in this basin are a mixture of species from the Amazon River basin, either from its plain or from tributaries of the lower part of the river, and species from the central Brazil and Guiana shields (Ferreira et al., 2011). The Tocantins River arises in the state of Goiás, in central Brazil, and runs northwards through different sedimentary basins for 2,500 km across the states of Tocantins, Maranhão, and Pará. It is formed by the confluence of two main tributaries: the Paranã and Maranhão Rivers (Provete, 2013).

Neotropical freshwater fish constitute the most diverse continental vertebrate fauna on Earth, with more than 6,200 named species, assigned by taxonomists to 854 genera, 95 families, and 39 orders (Albert et al., 2020). The order Characiformes is the largest group of freshwater fish, with at least 2,300 valid species distributed in 520 genera. Characiforms are one of the largest components of the freshwater fish fauna worldwide and are distributed across the New World and Africa, but mainly in the Neotropical Region, and specifically from the south of North America to South America (Froese & Pauly, 2022). They inhabit a range of ecosystems extending from the swiftly flowing rivers and streams of the Andean piedmont and cordilleras of the Neotropics through to the lentic backwaters of lowland floodplains in the Americas and Africa. Within these habitats, characiforms range from dozens of miniature and diminutive species through to hundreds of midsized and to giant species. Neotropical characiforms form a monophyletic clade and are grouped in 14 families (Oliveira et al., 2011).

Despite the rich diversity of fish species, the parasite fauna of fish from the Tocantins River remains poorly known, although some research on new species of helminths and new geographical records of known species has been published (Moravec & Thatcher, 1999; Fernandes et al., 2013; Lacerda et al., 2013; Cárdenas et al., 2019; Cohen et al., 2020). Thus, the aim of the present study was to report on the fauna of Nematoda and Digenea parasitizing characiform fishes in the Tocantins River, Maranhão, Brazil.

Material and Methods

During August 2010, a survey of the helminth fauna in fish in the Tocantins River, state of Maranhão, municipalities of Estreito, Brazil (06° 33' 38" S, 47° 27' 04" W) and Imperatriz (05° 31' 35" S, 47° 29' 30" W) was carried out (Figure 1). From this, 185 characiform specimens belonging to 22 species were studied. These were acquired with the aid of local fishermen, and identified by Dr. Gustavo Wilson Nunam (*in memoriam*) from the "Museu Nacional, Departamento de Vertebrados, Ictiologia, UFRJ" and were examined for parasites immediately upon capture. Internal organs were separated in Petri dishes containing 0.65% NaCl and were examined with the aid of a stereoscopic microscope. The nematodes and digeneans found were washed in 0.65% NaCl and fixed in AFA (2% glacial acetic acid, 3% formaldehyde and 95% ethanol 70° GL). Nematodes were cleared with lactophenol or glycerin for examination under an optical microscope (Amato & Amato, 2010). The digeneans were stained with Langeron's alcoholic acid carmine, dehydrated in an ethyl alcohol series, cleared in clove oil and mounted in Canada balsam as permanent slides (Eiras et al., 2006). The helminths were observed using a Zeiss Axioscope 2 microscope equipped with a camera lucida.

A list of previous records of helminths with valid names included in the present study, reported from South America, is presented based on information from published articles obtained from databases. Parasites are organized according to class, order and family, within which species are presented in alphabetical order, including geographical distribution and references. Fish species are arranged in alphabetical order and valid names are taken from FishBase (Froese & Pauly, 2022).

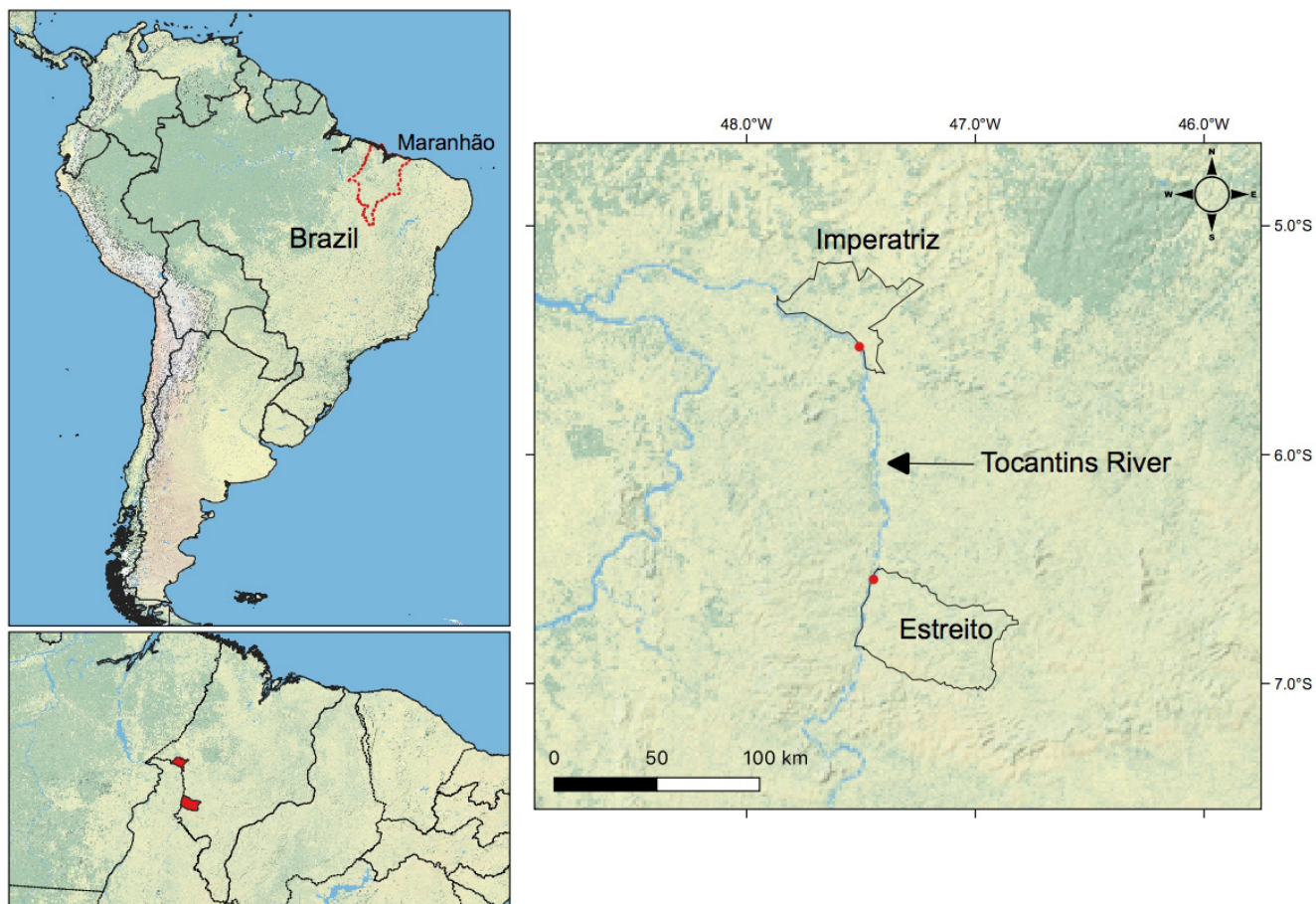


Figure 1. Map of Middle Tocantins River showing the collection points, Maranhão, Brazil, in the municipalities of Estreito and Imperatriz, Maranhão.

Results and Discussion

In the present study, twelve species of Nematoda and nine species of Digenea were collected. Some nematode species were identified at genus level due to they are consisted of immature specimens or only females, and the digeneans *Alphamphistoma* sp. and *Chalcinotrema* sp. were found in low numbers, unabling the specific identification. All hosts were parasitized by at least one species of digenean and/or one species of nematode. The prevalences and intensities were low, and this can be explained by the low number of specimens of hosts examined. However, two species, *Rondonia rondoni* Travassos, 1920 and *Klossinemella iheringi* (Travassos, Artigas & Pereira, 1928) parasitizing *Mylesinus paucisquamatus* Jégu & Santos and the latter also *Leporinus* sp. presented the highest intensity of infection (911 and 1,986, respectively) (Table 1).

Rondonia rondoni and *K. iheringi* belong to the family Atractidae and usually occur in fish hosts in large numbers (Dias et al., 2004; Campos et al., 2009). Although the life cycles of these nematode species are not known, it is highly likely that they are homoxenous, i.e. no intermediate hosts are involved (Moravec, 1998), which would explain the high indices found in the present study considering that they can reach the host easily.

Procamallanus Baylis, 1923 is one of the most common nematode genera living on fish in the Neotropical region. To date, *Procamallanus* (*Spirocamallanus*) *inopinatus* Travassos, Artigas & Pereira, 1928 and *Procamallanus* (*Spirocamallanus*) sp. were previously reported in several fish species in South America (see list below). *Procamallanus* (*S.*) *inopinatus* was first described by Travassos et al. (1928) from two undetermined *Leporinus* species found in the Mogi Guaçu River (state of São Paulo, Brazil). This is a widely distributed nematode species in South American freshwater fishes, which mainly parasitizes several characoid fish but also occurs in some other groups of fish that probably serve as postcyclic or pardefinitive hosts (Moravec et al., 1993a; Moravec, 1998). In the present study, *P. (S.) inopinatus* was found in hosts that had already been recorded, while *Procamallanus* (*S.*) sp. is reported here for the first time in *Bivibranchia notata* Vari & Goulding, *Brycon pesu* Müller & Troschel, *Hemiodus unimaculatus*

Table 1. Different host species with standard body length and weight in parenthesis, parasites, number of parasitized hosts/ number of examined hosts (NP/NE), range of infection (R), total number of parasites (TNP), site of infection (SI) [(I) intestine, swim bladder (SW), stomach (S), gall bladder (GB)] and development stage (DS) [adult (A), larva (L), metacercaria (M)], of nematodes and digeneans collected from characiform fishes from Tocantins River, Maranhão, Brazil.

Host	Parasite	NP/NE	R	TNP	SI	DS
<i>Bivibranchia notate</i> Vari & Goulding, 1985 (91-107 g; 12.5-18.9 cm)	Nematoda <i>Procamallanus (Spirocamallanus) sp.*</i>	1/ 17	0-1	1	I	A
<i>Boulengerella cuvieri</i> (Spix & Agassiz, 1829) (179-408 g; 37.4-512.2cm)	Nematoda <i>Goezia sp.*</i>	1/ 13	0-3	3	I	L
<i>Brycon pesu</i> Müller & Troschel, 1845 (85-112 g; 14.2-34.6 cm)	Nematoda <i>Rhabdochona acuminata</i> (Molin, 1860)*	1/ 10	0-2	2	I	A
	<i>Procamallanus (Spirocamallanus) sp.*</i>	1/ 10	0-1	1	I	A
<i>Bryconops alburnoides</i> Kner, 1858 (101-107 g; 16.9-19.6 cm)	Nematoda <i>Procamallanus sp.</i>	1/ 6	0-1	1	I	A
<i>Caenotropus labyrinthicus</i> (Kner, 1858) (111-141 g; 36.2-71.3 cm)	Nematoda <i>Raphidascaris sp.*</i>	1/ 8	0-5	5	I	L
<i>Chalceus macrolepidotus</i> Cuvier, 1818 (95-128 g; 23.8-51.3 cm)	Nematoda <i>Procamallanus (Spirocamallanus) sp.*</i>	1/ 7	0-1	1	I	A
<i>Cyphocharax gouldingi</i> Vari, 1992 (132-149 g; 69-89 cm)	Digenea <i>Chalcinotrema sp.*</i>	1/ 8	0-3	3	I	A
	<i>Austrodiplostomum compactum*</i>	1/ 8	0-4	4	GB	M
	Nematoda <i>Cosmoxyinema vianai</i> Travassos, 1949*	1/ 8	0-1	1	I	A
<i>Hemiodus microlepis</i> Kner, 1858 (99-163 g; 29-99.3 cm)	Nematoda <i>Procamallanus (Spirocamallanus) inopinatus</i> Travassos, Artigas & Pereira, 1928	1/ 9	0-3	3	I	A
	<i>Procamallanus (Spirocamallanus) sp.</i>	1/ 9	0-4	4	I	A
<i>Hemiodus unimaculatus</i> (Bloch, 1794) (102-179 g; 18.9-154.2 cm)	Digenea <i>Pacudistoma guianensis</i> Thatcher & Jégu, 1998*	1/ 22	0-6	6	I	A
	<i>Pseudocladorchis cylindricus</i> (Diesing, 1836)*	1/ 22	0-1	1	I	A
	Nematoda <i>Procamallanus (Spirocamallanus) sp.*</i>	1/ 22	0-1	1	I	A
<i>Hoplias malabaricus</i> (Bloch, 1794) (204-208 g; 167.2-251.2 cm)	Nematoda <i>Cystidicoloides sp.</i>	1/ 3	0-1	1	S	A
<i>Leporinus fasciatus</i> (Bloch, 1794) (113-130 g; 23-36.6 cm)	Nematoda <i>Rondonia rondoni</i> Travassos, 1920*	1/ 2	0-2	2	I	A
<i>Leporinus friderici</i> (Bloch, 1794) (204-208 g; 167.2-251.2 cm)	Digenea <i>Genarchella genarchella</i> Travassos, 1928	1/ 3	0-1	1	I	A
<i>Leporinus sp.</i> (51-162 g; 44.6-93.6 cm)	Digenea <i>Prosthenhystera obesa</i> (Diesing, 1850)	1/ 9	0-1	1	BV	A
	Nematoda <i>Rondonia rondoni</i>	1/ 8	0-1986	1986	I	A

*New host record

Table 1. Continued...

Host	Parasite	NP/NE	R	TNP	SI	DS
<i>Mylesinus paucisquamatus</i> Jégu & Santos, 1988 (123-155 g; 65.3-158.2 cm)	Nematoda <i>Klossinemella iheringi</i> (Travassos, Artigas & Pereira, 1928)*	2/ 7	435-735	1220	I	A
	Nematoda <i>Rondonia rondoni</i> *	2/ 7	785-911	1696	I	A
	Digenea <i>Dadaytrema oxycephala</i> (Diesing, 1836)*	1/ 7	0-1	3	I	A
<i>Myloplus asterias</i> (Müller & Troschel, 1844) (136 g; 131.7cm)	Digenea <i>Travassosinia dilatata</i> (Daday, 1907)*	1/ 1	1	9	I	A
<i>Myleus setiger</i> Müller & Troschel, 1844 (150 g; 151.7 cm)	Digenea <i>Alphamphistoma</i> sp.	1/ 1	1	1	I	A
<i>Myloplus torquatus</i> (Kner, 1858) (25.9-152 g; 90.6-184.2 cm)	Digenea <i>Dadaytrema oxycephala</i>	1/ 3	0-1	3	I	A
	<i>Pacudistoma guianensis</i> Thatcher & Jégu, 1998*	1/ 3	0-1	1	I	A
<i>Myloplus rubripinnis</i> (Müller & Troschel, 1844) (77 g; 26.6 cm)	Nematoda Cucullanidae gen. sp.*	1/ 1	1	1	I	A
<i>Triportheus elongatus</i> (Günther, 1864) (77-166 g; 10.9-90.7 cm)	Nematoda <i>P (S.) inopinatus</i>	2/ 25	1-7	8	I	A
	<i>Rhabdochona</i> sp.*	1/ 25	0-1	1	I	A
<i>Triportheus trifurcatus</i> Castelnau, 1855 (102-259 g; 34-115.8 cm)	Nematoda <i>Rhabdochona acuminata</i> *	1/ 23	0-20	20	I	A
<i>Raphiodon vulpinus</i> Spix & Agassiz, 1829 (210-359 g; 133-264 cm)	Digenea <i>Genarchella genarchella</i> *	1/ 5	0-1	1	S	A
<i>Serrasalmus maculatus</i> Kner, 1858 (85-153 g; 15.6-121.3 cm)	Nematoda <i>Procamallanus (S.) inopinatus</i>	2/ 7	1-2	3	I	A

*New host record

(Bloch) and *Chalceus macrolepidotus* Cuvier, which thus represent four new hosts records for this nematode. Until now, the helminth fauna of *C. macrolepidotus* was unknown, and *Procamallanus (S.)* sp. represents the first helminth record in this fish host.

Rhabdochona acuminata (Molin, 1860) Drasche, 1884 was originally described as *Spiroptera acuminata* by Molin (1860), found in *Brycon falcatus* Müller & Troschel. Travassos et al. (1928) detailed the description and reproduced the figures of Drasche (1884) (who found this nematode in *Barbus* sp. and *B. falcatus*); and reported findings of *R. acuminata* (= *Rhabdochona elegans*) in *Tetragonopterus* sp. Subsequently, this species has been reported in several hosts and localities (see list below).

The presence of the nematodes *Cosmoxynema vianai* Travassos, 1949, *Cystidicoloides* sp., *Goezia* sp., *K. iheringi*, *R. acuminata*, *Rhabdochona* sp., *Raphidascaaris* sp. and *R. rondoni* represents new geographical records (Tocantins River). This emphasizes the role of fish as definitive hosts for diverse nematode species.

Dadaytrema oxycephala (Diesing, 1850), *Prosthenhystera obesa* (Diesing, 1850) and *Genarchella genarchella* Travassos, 1928 are generalist parasites and have been reported in different freshwater fishes (see Kohn et al., 2007). *Dadaytrema oxycephala* is a parasite with wide geographical distribution in South America, where there are 22 records of this digenean parasitizing characiforms and 11 records of it parasitizing siluriform fishes (Negreiros et al., 2020).

Prosthenhystera obesa is also widely distributed in characiform and siluriform fish in Brazil and in a single species of characiform fish in Argentina (Kohn et al., 2007; Martins et al., 2012; Vasconcelos et al., 2013; Sabas & Brasil-Sato 2014; Fernandes et al., 2017). Regarding other studies with characiform and siluriform fishes, the low intensity indices for *P. obesa* (only one specimen per fish) observed in the present study were similar to those reported by Martins et al. (2012) in *Leporinus reinhardti* Lütken and *Pimelodus pohli* Ribeiro & Lucena; by Vasconcelos et al. (2013) in *Astyanax* aff. *bimaculatus*; by Brasil-Sato & Pavanelli (2004) in *Pimelodus maculatus* Lacepède; by Sabas & Brasil-Sato (2014) in *P. pohli*; by Brasil-Sato (2002) and Karling et al. (2013) in *Salminus brasiliensis* (Cuvier); and by Fernandes et al. (2017) in *Acestrorhynchus falcistrostris* (Cuvier). In those reports, from one to no more than three specimens per fish were found. Considering the relative size of *P. obesa* and the site of infection, higher intensity could be harmful to both the host and the parasite. According to Martins et al. (2012), placement of the parasite in the gall bladder is a factor that controls the intensity. These factors may explain the low intensity found for this helminth in the present study.

Adult forms of *G. genarchella* have been reported in a wide diversity of fish species in Brazil and Argentina (Kohn et al., 2007). In the present study, this parasite presented low intensity (only one specimen per fish), parasitizing *Leporinus friderici* (Bloch) and *Rhaphiodon vulpinus* Spix & Agassiz. Similar results were obtained in other studies in Brazil, e.g., the reports in *Cichla piquiti* Kullander & Ferreira by Franceschini et al. (2013b), in *Hemibrycon surinamensis* Géry by Hoshino et al. (2014), in *A. falcistrostris* by Fernandes et al. (2017) and in *Megaleporinus obtusidens* (Valenciennes) by Wendt et al. (2018). However, the mean intensities of *G. genarchella* in the stomach and intestine of *Peckoltia braueri* (Eigenmann) presented by Cardoso et al. (2017) were slightly higher (6.0 and 24, respectively) than those of the present study. The mean abundance values for this parasite reported by Hoshino & Tavares-Dias (2019) in *H. surinamensis* were 25.3 in the rainy season and 6.6 in the dry season.

Genarchella genarchella has mollusks and Cypriniformes species as intermediate hosts, and Characiformes and Siluriformes species as definitive hosts (Lefebvre & Poulin, 2005). The finding of adult forms of *G. genarchella* in the present study confirms that the characiforms *L. friderici* and *R. vulpinus* act as the definitive hosts for this digenean.

Pacudistoma guianense was originally described by Thatcher and Jégu in 1998, from the intestine of *Myleus ternetzi* (Norman) in French Guyana. The present report provides the first record of this species in Brazil, and with a new host record, *Hemiodus unimaculatus* (Bloch). The digeneans *Alphamphistoma* sp., *Chalcinotrema* sp., *Dadaytrema oxycephala*, *P. obesa* (Diesing, 1850), *Pseudocladorchis cylindricus* (Diesing, 1836) and *Travassosinia dilatata* (Daday, 1907) are reported here for the first time in the Tocantins River. The records of these species in different localities and from characiform hosts are presented here in a list, and these records demonstrate the wide geographical distribution of these species in South America. Trematodes form an important part of the biological diversity of different ecosystems and represents the second-richest group of helminths in fish species in South America (Luque et al., 2017). In freshwater fishes, this group is the most frequent, followed by nematodes, in terms of the number of parasite associations recorded in Neotropical fishes (Luque & Poulin, 2007).

Knowledge of the parasitic fauna of wild fish constitutes a biodiversity assessment tool. It enables better understanding of host biology and the relationship between hosts and their parasites, which may form environmental indicators (Takemoto et al., 2009; Tavares-Dias et al., 2013; Shah et al., 2014). Studies identifying new hosts and new localities for parasites have contributed to knowledge of local biodiversity, as well as to understanding the evolution of parasites and their hosts (Lacerda et al., 2008).

Some of the nematode and digenean parasites of Characiformes are reported here for the first time in their hosts, thus representing new hosts and geographical records (Table 1), demonstrating a diversity of parasitic species in different host species in the Tocantins-Araguaia basin. These data corroborate the prediction that many helminth species are still to be described and/or reported, and contribute to significant knowledge of South American biodiversity. The previous reports of these nematodes and digeneans in characiform hosts that were studied here are presented in the list below, including data from the present study.

List of previous records of helminths included in the present study, providing hosts, localities and references. Abbreviation of the Brazilian states: AC: Acre, AL: Alagoas, AP: Amapá, AM: Amazonas, BA: Bahia, ES: Espírito Santo, GO: Goiás, MA: Maranhão, MT: Mato Grosso, MS: Mato Grosso do Sul, MG: Minas Gerais, PA: Pará, PB: Paraíba, PR: Paraná, PE: Pernambuco, RJ: Rio de Janeiro, RN: Rio Grande do Norte, RS: Rio Grande do Sul, RO: Rondonia, SC: Santa Catarina, SP: São Paulo, SE: Sergipe.

DIGENEA

Alphamphistoma sp.

Host: *Myleus setiger* (present study)

Locality: BRAZIL: Tocantins River (MA) (present study).

Austrodiplostomum compactum (Lutz, 1928) Dubois, 1970 (Metacercariae)

Hosts: *Acestrorhynchus lacustris* (Lütken), ***Cyphocharax gouldingi* Vari (present study)**, *Cyphocharax gilbert* (Quoy & Gaimard), *Hoplias* aff. *malabaricus*, *Hoplias malabaricus* (Bloch), *Hoplias* spp., *Leporinus amblyrhynchus* Garavello & Britski, *Metynnis maculatus* (Kner), *Piaractus mesopotamicus* (Holmberg), *Potamorhina latior* (Spix & Agassiz), *Potamorhina pristigaster* (Steindachner), *Prochilodus lineatus* (Valenciennes), *Pygocentrus nattereri* Kner, *Schizodon borellii* (Boulenger), *S. intermedius* Garavello & Britski, *S. nasutus* Kner, *Serrasalmus maculatus* Kner.

Localities: BRAZIL: Lakes Ananá, Araçá, Baixio, Catalão, Iauara, Maracá, Preto (Solimões River floodplain), lake of Purus River (AM); Tocantins River (MA) (present study); Carioca Lake (MG); Paraná River, Porto Rico Region, Rosana reservoir (Paranapanema River), Upper Paraná River floodplain (PR); Dam of the Water Treatment Station (ETA), Guandu River (RJ); Batalha River, Chavantes reservoir (medium Paranapanema River), Jurumirim reservoir (Paranapanema River), Santa Bárbara River (mid Tietê river), Mogi Guaçu River (SP).

References: Abdallah et al. (2005), Belei et al. (2013), Corrêa et al. (2020), Gião et al. (2020), Lahun et al. (2020), Machado et al. (2005), Morais et al. (2011), Pavanelli et al. (1997), Pedro et al. (2016), Ramos et al. (2013, 2016), Santos et al. (2012), Vital et al. (2016), Yamada et al. (2008).

Chalcinotrema sp.

Host: *Cyphocharax gouldingi* (present study)

Locality: Brazil: Tocantins River (MA) (present study).

Dadaytrema oxycephalum (Diesing, 1850) Vaz, 1932

Hosts: *Brycon orbignyanus* (Valenciennes); *Colossoma macropomum* (Cuvier); ***Mylesinus paucisquamatus* (present study)**; *Myleus micans* (Lütken); *Myleus* sp.; *Myloplus asterias* (= *Myleus asterias*); *M. rhomboidalis* (= *Myleus rhomboidalis*) (Cuvier); ***M. torquatus* (= *Myletes torquatus*, *Myleus torquatus*) (Kner) (present study)**; *Mylossoma aureum* (Spix & Agassiz); *M. duriventre* (Cuvier); *Piaractus brachypomus* (= *Colossoma bidens*) (Cuvier); *P. mesopotamicus* (= *Colossoma mitrei*); *Pterodoras granulatus* (Valenciennes); *Salminus brasiliensis* (= *Salminus maxillosus*) (Cuvier); *Salmo* sp.

Localities: ARGENTINA: Medium of Paraná River, Corrientes; Colastine River (Medium Paraná River) and Paraná-Guazú River (Lower Paraná River). BRAZIL: Amazon River, Janauacá Lake (Manaus), Jari River (a tributary of the Amazon River) (AM); Macapá (AP); Tocantins River, MA (present study); São Francisco River (MG); Aquidauana River, Cuiabá River, Miranda River, Paraguay River, Paraná River, Pantanal (MS); Amazon River, Cachimbo (PA); Upper Paraná River (PR); Mogi Guaçu River, Paranapanema River (SP); VENEZUELA: Caura River.

References: Brasil-Sato & Santos (2003), Campos et al. (2009), Conroy (1985, apud Kohn et al., 2007), Fernandes et al. (2019), Hamann (1982a, b), Heyneman et al. (1960), Kohn & Fernandes (1987); Nuñez et al. (2017), Oliveira & Tavares-Dias (2016), Oliveira et al. (2019), Pantoja et al. (2019), Thatcher (1979, 1999), Travassos et al. (1928), Vaz (1932), Vicente et al. (1978).

Genarchella genarchella Travassos, 1928

Hosts: *Acestrorhynchus falcistrostris*; *Charax stenopterus* (= *Asiphonichthys stenopterus*) (Cope); *Cynopotamus humeralis* (= *Acestrorhynchus* sp.) [sic]; *Hemibrycon surinamensis*; ***Leporinus friderici* (Bloch) (present study)**; *Megaleporinus obtusidens* (= *Leporinus obtusidens*); *Oligosarcus jenynsii* (Günther); ***Rhaphiodon vulpinus* Spix & Agassiz (present study)**; *Salminus brasiliensis* (= *Salminus maxillosus*).

Localities: ARGENTINA: Paraná River, Puerto Itália, Corrientes. BRAZIL: Emas Waterfall, Pirassununga (SP); Mogi Guaçu River, Emas Experimental Station, Pirassununga, (SP); Floodplain Lake of the Solimões River (Ananá), (AM); Lake Guaíba (RS); Igarapé Fortaleza Basin (AP); Tocantins River (MA) (present study).

References: Fernandes et al. (2017), Hamann (1986, 1989), Hoshino et al. (2014), Kohn & Fernandes (1988), Kohn et al. (1990), Szidat (1956), Travassos & Kohn (1965), Travassos et al. (1928), Wendt et al. (2018).

Pacudistoma guianense Thatcher & Jégu, 1998

Hosts: *Hemiodus unimaculatus* (present study), *Myloplus ternetzi* (= *Myleus ternetzi*) (Norman); *M. torquatus* (Kner) (present study).

Localities: **BRAZIL:** Tocantins River (MA); **FRENCH GUYANA:** Sinnamary River.

Reference: Thatcher & Jégu (1998).

Prosthenhystera obesa (Diesing, 1850) Travassos, 1922

Hosts: *Acestrorhynchus falcatus* (Bloch); *A. falcistrostris*; *Astyanax bimaculatus* (Linnaeus); *Boulengerella cuvieri* (= *Xiphostoma cuvieri*) (Spix & Agassiz); *Brycon orthotaenia* (= *Brycon lundii*; *Triurobrycon lundii*) Günther; *Brycon* sp.; *Charax gibbosus* (Linnaeus); *Cynopotamus amazonum* (= *Cynopotamus amazanum*) (Günther); *Galeocharax humeralis* (= *Acestrorhynchus* sp.) (Valenciennes); *Hypomasticus copelandii* (= *Leporinus copelandii*) (Steindachner); *Leporellus vittatus* (Valenciennes); *Leporinus friderici* (= *Leporinus friderici friderici*); **Leporinus sp. (present study)**; *Oligosarcus* sp. (= *Acestrorhynchus* sp.); *Psalidodon fasciatus* (= *Astyanax fasciatus*) (Cuvier); *Salminus brasiliensis* (= *Salminus brevidens*, *Salminus maxillosus*); *S. franciscanus* (= *Salminus brevidens*) Lima & Britski; *S. hilarii* Valenciennes.

Localities: **ARGENTINA:** Delta of Paraná River, Irigoyen Channel, Talavera Island. **BRAZIL:** Cruzeiro do Sul (AC); Lake Ananá (Solimões River) (AM); Rio Grande (BA); Jupranã Lagoon (ES); **Tocantins River (MA) (present study)**; Lassance, Pirapora, São Francisco River (MG); Porto Esperança (MS); Porto Esperança (Paraguai River), Porto São João (Cuiabá River), Salobra (MT); Emas (Pirassununga), Ilha Seca, Mogi Guaçu River, Porto Tibiriçá (SP); Paraná River, Foz do Iguaçu (PR).

References: Brasil-Sato (2002), Diesing (1850), Fernandes et al. (2017), Isaac et al. (2000), Karling et al. (2013), Kloss (1966), Kohn & Fernandes, (1981), Kohn et al. (1997), Lunaschi & Sutton (1995), Pavanelli et al. (1992, apud Kohn et al., 2007), Travassos (1941), Travassos & Kohn (1965), Travassos (1922), Travassos et al. (1928), Virgilio et al. (2021).

Pseudocladorchis cylindricus (Diesing, 1836) Daday, 1907

Hosts: *Hemiodus unimaculatus* (present study); *Mylesinus paraschomburgkii* Jégu, Santos & Ferreira; *Myloplus ternetzi* (= *Myleus ternetzi*); *Mylossoma aureum*; *Piaractus brachypomus* (= *Colossoma bidens*); *Pterodoras granulosus*.

Localities: **BRAZIL:** Uatumã, Pitinga and Capucapu Rivers (AM); Araguari River (AP); **Tocantins River (MA) (present study)**; (MT); Trombetas River (PA); **FRENCH GUYANA:** Sinnamary River.

References: Daday (1907), Diesing (1836), Thatcher & Jégu (1996, 1998), Travassos et al. (1928), Viana (1924).

Travassosinia dilatata (Daday, 1907) Vaz, 1932

Hosts: *Myloplus asterias* (present study); *Myleus micans*; *Myleus* sp.; *Piaractus brachypomus* (= *Colossoma brachypomus*); *P. mesopotamicus* (= *Colossoma mitrei*); *Salminus brasiliensis*.

Localities: **ARGENTINA:** Paraná-Guazú River, Entre Ríos Province; Medium Paraná River; **BRAZIL:** São Francisco River (MG); Cachimbo (PA); Paranapanema River (SP); **Tocantins River (MA) (present study)**.

References: Brasil-Sato & Santos (2003), Daday (1907), Hamann (1982a), Nuñez et al. (2017), Travassos et al. (1928), Vaz (1932), Vicente et al. (1978).

NEMATODA

Cosmoxyinema vianai Travassos, 1949

Hosts: *Curimatella meyeri* (Steindachner); *Cyphocharax gilberti*; **C. gouldingi (present study)**; *C. naegelii* (Steindachner); *Pseudocurimata* sp.; *Steindachnerina brevipinna* (Eigenmann & Eigenmann); *S. elegans* (Steindachner); *S. insculpta* (Fernández-Yépez).

Localities: BRAZIL: Cruzeiro do Sul (AC); Barra Seca River, Juparanã Lagoon (ES); **Tocantins River (MA) (present study);** Upper Paraná River (PA); Paraná River (Guaira), Tributaries Guairacá and Corvo (lower Paranapanema river) (PR); Guandu River (RJ); Mogi Guaçu River, Peixe River (SP).

References: Abdallah et al. (2005, 2012), Ceschini et al. (2010a, b), Eiras et al. (2010), Luque et al. (2011), Moravec et al. (1992), Takemoto et al. (2009), Travassos (1948), Vicente et al. (1985), Virgilio et al. (2021), Yamaguti (1961).

Cucullanidae gen. sp.

Host: *Myloplus rubripinnis* (present study).

Locality: Tocantins River (MA)

Cystidicoloides sp.

Hosts: *Psalidodon fasciatus* (= *Astyanax fasciatus*); *Hoplerythrinus unitaeniatus* (Spix & Agassiz); ***Hoplias malabaricus* (present study);** *Leporinus friderici*.

Localities: BRAZIL: Igarapé Fortaleza basin (a tributary of the Amazon River system) (AM); **Tocantins River, MA (present study);** Floodplain of the Upper Paraná River (PR); Upper São Francisco River (MG).

References: Vieira-Menezes et al. (2017), Gonçalves et al. (2016), Guidelli et al. (2011) (Cited as larvae in all these references).

Goezia sp. (larva)

Hosts: *Boulengerella cuvieri* (present study); *Brycon orbignyanus*; *Hoplias malabaricus*; Hybrids *Colossoma macropomum* × *Piaractus mesopotamicus*; Hybrids *P. mesopotamicus* × *P. brachypomus*; *Mylossoma duriventre*; *Psalidodon fasciatus* (= *Astyanax fasciatus*); *Rhaphiodon vulpinus*; *Salminus hilarii*; *Serrasalmus marginatus* Valenciennes; *Tetragonopterus chalcus* Spix & Agassiz; *Triportheus guentheri* (Garman); *T. nematurus* (Kner).

Localities: BRAZIL: Tocantins River (MA) (present study); Três Marias Reservoir (upper São Francisco River) (MG); Medalha lagoon (Pantanal, Corumbá), Fish farms (MS); Paraná River (Guaira and Foz do Iguaçu), Reservoir of Hydroelectric Power Station of Itaipu (Foz do Iguaçu), Upper Paraná River floodplain (PR); Marginal lagoons of the Mogi Guaçu River (Pirassununga) (SP).

References: Albuquerque et al. (2016), Costa-Pereira et al. (2014), Duarte et al. (2016), Fernandes et al. (2019), Guimarães et al. (2021), Jerônimo et al. (2020), Moravec et al. (1993a, 1994), Vieira-Menezes et al. (2017)

Klossinemella iheringi (Travassos, Artigas & Pereira, 1928) Costa, 1961

Hosts: *Hoplias malabaricus*; *Hypomasticus copelandii* (= *Leporinus copelandii*); *Leporinus fasciatus* (Bloch); *Mylesinus paraschomburgkii*; ***M. paucisquamatus* (present study);** *Myleus* sp.; *Myloplus asterias*; *Piaractus brachypomus* (Cuvier), *Salminus hilarii*; *Schizodon nasutus*; *Tetragonopterinae* gen. sp.

Localities: BRAZIL: Tocantins River (MA) (present study); Cuiabá River, São Lourenço River (MT); Emas Experimental Station, Mogi Guaçu River, Pirassununga (SP); Trombetas River (PA).

References: Kohn & Fernandes (1987), Moravec & Thatcher (1997), Travassos & Kohn (1965), Travassos et al. (1928), Vicente et al. (1985).

Procamallanus (*Spirocamallanus*) *inopinatus* Travassos, Artigas & Pereira, 1928

Hosts: *Acestrorhynchus falcatus*; *A. lacustris*; *Anostomoides passionis* Santos & Zuanon; *Astyanax altiparanae* Garutti & Britski; *Astyanax bimaculatus lacustris* [sic]; *Astyanax bimaculatus schubarti* [sic]; *Astyanax bimaculatus* (= *Astyanax bimaculatus bimaculatus*); *Astyanax* sp.; *Brachychalcinus orbicularis* (= *Ephyppicharax orbicularis*) (Valenciennes); *Brycon amazonicus* (Spix & Agassiz); *B. brevicaudatus* [sic]; *B. cephalus* (= *Brycon erythropterum*) (Günther); *B. hilarii* (Valenciennes); *B. melanopterus* (Cope); *B. orbygnianus* (Valenciennes); *B. orthotaenia* (= *Brycon lundii*); *Brycon* sp.; *Colossoma macropomum*; *Cynopotamos humeralis* [sic]; *Gasteropelecus sternicla* (Linnaeus); ***Hemiodus microlepis* Kner (present study);** *Hypomasticus copelandii* (= *Leporinus copelandii*); *Hoplerythrinus unitaeniatus*; *Hoplias* aff. *malabaricus*; *Hoplias malabaricus*; *Hoplias missioneira* Rosso, Mabragna, González-Castro, Delpiani, Avigliano, Schenone &

Díaz de Astarloa; *Lebiasina multimaclulata* Boulenger; *Leporinus friderici*; *L. maculatus* Müller & Troschel; *Leporinus* sp.; *Markiana geayi* (Pellegrin); *Megaleporinus elongatus* (= *Leporinus elongatus*) (Valenciennes); *M. macrocephalus* (= *Leporinus macrocephalus*) (Garavello & Britski); *M. obtusidens* (= *Leporinus obtusidens*); *M. piavussu* (Britski, Birindelli & Garavello); *Metynnix hypsauchen* (Müller & Troschel); *M. lippincottianus* (Cope); *Piaractus mesopotamicus*; *Poptella paraguayensis* (Müller & Troschel); *Psalidodon fasciatus* (= *Astyanax fasciatus*, *Astyanax fasciatus fasciatus*); *Psalidodon schubarti* (= *Astyanax schubarti*) (Britski); *Pygocentrus nattereri*; *Rhaphiodon vulpinus*; *Schizodon borellii*; **Serrasalmus maculatus (present study)**; *S. marginatus*; *S. spilopleura* Kner; *Triporthus angulatus* (Spix & Agassiz); *T. auritus* (Valenciennes); *T. curtus* (Garman); **T. elongatus (present study)**; *T. cf elongatus*; *T. rotundatus* (Jardine).

Localities: **ARGENTINA:** Aeroclub Pond, Riachuelo Basin, Paraná River; Riachuelo Basin, tributary of the Paraná River, Corrientes; Lagunas Perez and Totorá, Riachuelo Basin; Ramada Poso Pond, Riachuelo Basin, an inflow from Paraná River; Medium Paraná River and Santa Lucia River; Pilcomayo River, Province of Salta. **BRAZIL:** Fish farms in the municipalities of Cruzeiro do Sul and Rio Branco (AC); Fish farms from lower São Francisco River (AL, SE); Manaus, floodplain lakes of the Brazilian Amazon, intensive husbandry system in a stream channel, Negro and Solimões River, Coari Lake (a tributary of the middle Solimões River) (AM); Curiaú River, fish farms, Jari River Basin, Matapi River, Vila Nova River (tributary of the Amazon River), Igarapé Fortaleza Basin (tributary of Amazon River system) (AP); Juparanã Lagoon (ES); **Tocantins River (MA) (present study)**; Harmonia (Alfenas), Salobra, Swamp of Nova Ponte (municipality of Perdizes), Três Marias Reservoir (upper São Francisco River) (MG); Amambai River, Juba River, Miranda River, Negro River (a tributary of Paraguay River, Pantanal), Pantanal Mato-Grossense (Paraguay River) (MT); Curuá River (Cachimbo), Xingu River (PA); Areia (Patos) (PB); Medium Paraná River, Paraná River (Guaira and Foz do Iguaçu), reservoir of hydroelectric power station of Itaipu, upper Paraná River (PR); Guandu River (RJ); Cruzeta (RN); Machado River (Porto Velho) (RO); Batalha River, Peixe River, Pond in Aguai, Ponds of Latin American Regional Centre of Aquaculture (Pirassununga), Rio das Pedras farm (Campinas), Emas Waterfall (Mogi Guaçu River), Emas (Pirassununga), Experimental Station of Pirassununga (Mogi Guaçu River), Lakes of the Mogi Guaçu River, Paraná River (Porto Cabral) (SP). **PARAGUAY:** North of Carapegua. **PERU:** Fish farm, city of Nauta. **VENEZUELA:** Corrosal Brook near ranch Santa Marta (a tributary of the Suripá River near Palmarita); Mountain brook near San Esteban, northern Venezuela; Ranch Hato Las Mercedes, near Boca de Anaro on the Suripá River, State of Barinas.

References: Abdallah et al. (2012), Adriano et al. (2005), Ailán-Choke et al. (2020), Alcântara & Tavares-Dias (2015), Almeida-Berto et al. (2018), Andrade & Malta (2006), Andrade et al. (2001), Azevedo et al. (2007, 2010), Baia et al. (2018, 2019), Borges et al. (2021), Camargo et al. (2015), Carvalho et al. (2020), Corrêa et al. (2020), Dias et al. (2015), Fábio (1982), Feltran et al. (2004), Fernandes et al. (2019), Fujimoto et al. (2019), Gião et al. (2020), Gonçalves et al. (2016), Guidelli et al. (2006), Hamann (1986, 1995/1996, 1999), Kloss (1966), Kohn & Fernandes (1987), Kohn et al. (1985, 2011), Lehun et al. (2020), Martins et al. (2017), Morais et al. (2019), Moravec et al. (1993b, 1997), Moreira et al. (1994), Moreira et al. (2009, 2010), Morey & Malta (2018), Negreiros et al. (2021), Oliveira et al. (2015, 2016, 2018, 2019), Pedro et al. (2016), Pereira et al. (2018), Pereira (1935), Petter & Dlouhy (1985), Petter & Thatcher (1988), Pinto & Fernandes (1972), Pinto & Noronha (1972, 1976), Pinto et al. (1974, 1975, 1976), Ramallo et al. (2020), Ribeiro et al. (2016), Rivadeneyra et al. (2020), Santos & Tavares-Dias (2017), Santos et al. (1979), Saraiva et al. (2006a, b), Silva et al. (2011), Takemoto & Lizama (2010), Takemoto et al. (2009), Travassos & Kohn (1965), Travassos et al. (1928), Vicentin et al. (2011, 2013), Virgilio et al. (2021), Yamaguti (1961).

Procamallanus (Spirocamallanus) sp.

Hosts: *Bivibranchia notata* (present study); *Brycon pesu* Müller & Troschel (present study); *Chalceus macrolepidotus* Cuvier (present study); *Cynopotamus kincaidi* (Schultz); *Geophagus brasiliensis* (Quoy & Gaimard); *Hemiodus microlepis* (present study); *H. unimaculatus* (present study); *Salminus hilarii*; *Triporthus angulatus*.

Localities: **BRAZIL: Tocantins River (MA) (present study)**; Três Marias Reservoir, upper São Francisco River (MG); Medium Paraná River (reservoir of the Hydroelectric Power Station of Itaipu) (PR).

References: Duarte et al. (2016), Kohn et al. (2011).

Procamallanus sp.

Hosts: *Acestrorhynchus lacustris*; *Bryconops alburnoides* Kner (present study); *Megaleporinus macrocephalus* (= *Leporinus macrocephalus*); *Psalidodon fasciatus* (= *Astyanax fasciatus*); *Schizodon altoparanae* Garavello & Britski.

Localities: **BRAZIL: Tocantins River (MA) (present study)**; Aquidauana, Miranda and Paraguay Rivers (Pantanal) (MS); Upper São Francisco River (Três Marias) (MG); Upper Paraná River floodplain (PR).

References: Carvalho et al. (2003), Lehun et al. (2020), Santos et al. (2003), Vieira-Menezes et al. (2017).

Raphidascaris sp.

Hosts: *Caenotropus labyrinthicus* (Kner) (present study); *Cyphocharax gilbert*; *Geophagus brasiliensis*; *Prochilodus lineatus*; *Serrasalmus* sp.

Localities: **BRAZIL:** Guandu River (RJ); Paraná River (Guaira), upper Paraná River floodplain (PR); Cruzeiro do Sul (AC); **Tocantins River (MA) (present study).**

References: Abdallah et al. (2005), Moravec et al. (1993a), Virgilio et al. (2021), Lehun et al. (2020).

Rhabdochona acuminata (Molin, 1860)

Hosts: *Acestrorhynchus britskii* Menezes; *A. lacustris*; *Astyanax asuncionensis* Géry; *A. bimaculatus*; *Barbus* sp.; *Brycon amazonicus*; *B. falcatus* Müller & Troschel; *B. melanopterus*; *B. orbignyanus*; ***B. pesu* (present study)**; *Bryconamericus iheringi* (Boulenger); cichlid sp. [sic]; *Hoplias* aff. *malabaricus*; *Leporellus vittatus*; *Leporinus friderici*; *L. pearsoni* Fowler; *Megaleporinus macrocephalus* (= *Leporinus macrocephalus*); *Myloplus rubripinnis*; *Psalidodon fasciatus* (= *Astyanax fasciatus*); *P. schubarti* (= *Astyanax schubarti*) (Britski); *Salminus hilarii*; Tetragonopterinae gen. sp.; *Tetragonopterus argenteus* Cuvier; *Tetragonopterus* sp.; *Triportheus angulatus*; *T. auritus*; *T. nematurus*; ***T. trifurcatus* (present study).**

Localities: **ARGENTINA:** El Tunal Reservoir, Salta; Medina River, Province of Tucuman. **BRAZIL:** fish farms in the municipalities of Cruzeiro do Sul and Rio Branco (AC); Solimões River (AM); Jari River (AP); **Tocantins River (MA) (present study)**; Três Marias Reservoir (upper São Francisco river) (MG); Mato Grosso (MT); Upper Paraná River (PR); Lajes Reservoir (RJ); Lake Guaíba (RS); Experimental Station (Mogi Guaçu River, Pirassununga), Mogi Guaçu River, Paranapanema River, Peixe River, Taquari River, Tietê River, Veados River, Lakes of Mogi Guaçu River (SP). **ECUADOR:** Hacienda Primavera, Napo River; San Pablo Kantस्या, Aguarico River, Province of Napo.

References: Abdallah et al. (2012), Borges et al. (2021), Cancino & Ramallo (2008) *apud* Ramallo & Cancino (2021), Corrêa et al. (2020), Costa et al. (2011), Duarte et al. (2016), Fernandes et al. (2019), Gallas et al. (2019), Kloss (1966), Kohn & Fernandes (1987), Martins et al. (2017), Molin (1860), Negreiros et al. (2021), Paraguassú & Luque (2007), Petter (1987), Ramallo (2005), Ribeiro et al. (2016), Travassos & Kohn (1965), Travassos et al. (1928), Vicente et al. (1985), Virgilio et al. (2021), Yamada et al. (2017).

Rhabdochona sp.

Hosts: *Brycon orthotaenia*; *Gymnocorymbus ternetzi* (Boulenger); *Leporinus octofasciatus* Steindachner; *Psalidodon fasciatus* (= *Astyanax fasciatus*); *Salminus brasiliensis*; *Tetragonopterus argenteus*; ***Triportheus elongatus* (present study).**

Localities: **BRAZIL: Tocantins River (MA) (present study)**; Três Marias Reservoir, upper São Francisco River (MG); Fish farm (SC); Emas (Pirassununga), Mogi Guaçu River, Pirassununga (SP).

References: Kohn & Fernandes (1987), Luque et al. (2011), Pinto et al. (2010), Mesquita et al. (2012), Santos et al. (2017), Vieira-Menezes et al. (2017)

Rondonia rondoni Travassos, 1920

Hosts: Hybrid *P. mesopotamicus* x *P. brachypomus*; ***Leporinus fasciatus* (present study)**; ***Leporinus* sp. (present study)**; *Mylesinus paraschomburgkii*; ***M. paucisquamatus* (present study)**; *Myletes* sp.; *Myleus micans*; *Myleus* sp.; *Myloplus asterias* (= *Myleus asterias*); *M. torquatus* (= *Myleus torquatus*); *Piaractus brachypomus*; *P. mesopotamicus* (= *Colossoma mitrei*); *Rhaphiodon vulpinus*; *Salminus* sp.; *Tometes camunani* Andrade, Giarrizzo & Jégu.

Localities: **ARGENTINA:** Medium Paraná River, Corrientes. **BRAZIL:** Uatumã, Pitinga, Capucapu River (AM); Araguari River (AP); **Tocantins River (MA) (present study)**; Aquidauana, Miranda and Paraguai Rivers (Pantanal), Porto Esperança (Paraguai River) (MS); São Francisco River (Três Marias) (MG); Cuiabá River (São João), Cuiabá and Paraguai Rivers (Pantanal), Salobra (MT); Emas Experimental Station (Pirassununga), fish farm of CEPTA (Pirassununga), fish farms from northwest of São Paulo State, ponds of CERLA (Pirassununga), Emas waterfall (Pirassununga), Mogi-Guaçu River (Emas), Mogi-Guaçu River (Reservoir of Aquaculture Center at Unesp, Jaboticabal), Porto Cabral (Paraná River) (SP); Jari River, Trombetas River Basin (PA); Medium Paraná River (Hydroelectric Power Station of Itaipu) (PR). **PERU:** Fish farm located in the city of Nauta.

References: Andrade et al. (2013), Brasil-Sato & Santos (2003), Campos et al. (2009), Cuadros et al. (2021), Franceschini et al. (2013a), Hamann (1982a), Kohn & Fernandes (1987), Kohn et al. (1985, 2011), Luque et al. (2011), Martins & Urbinati (1993), Masi Pallares et al. (1973), Parra et al. (1997), Rêgo & Vicente (1988), Santos et al. (2003), Thatcher & Jégu (1996), Travassos (1920, 1923, 1940, 1945), Travassos & Freitas (1943), Travassos & Kohn (1965), Travassos et al. (1928), Travassos et al. (1939).

References

- Abdallah VD, Azevedo RK, Carvalho ED, Silva RJ. New hosts and distribution records for nematode parasites of freshwater fishes from São Paulo State, Brazil. *Neotrop Helminthol* 2012; 6(1): 43-57.
- Abdallah VD, Azevedo RK, Luque JL. Ecologia da comunidade de metazoários parasitos do sairú *Cyphocharax gilbert* (Quoy e Gaimard, 1824) (Characiformes: Curimatidae) do Rio Guandu, Estado do Rio de Janeiro, Brasil. *Rev Bras Parasitol Vet* 2005; 14(4): 154-159. PMID:16445872.
- Abell R, Thieme ML, Revenga C, Bryer M, Kottelat M, Bogutskaya N, et al. Freshwater ecoregions of the world: a new map of biogeographic units for freshwater biodiversity conservation. *Bioscience* 2008; 58(5): 403-414. <http://dx.doi.org/10.1641/B580507>.
- Acosta AA, Smit NJ, Silva RJ. Diversity of helminth parasites of eight siluriform fishes from the Aguapeí River, upper Paraná basin, São Paulo state, Brazil. *Int J Parasitol Parasites Wildl* 2020; 11: 120-128. <http://dx.doi.org/10.1016/j.ijppaw.2020.01.003>. PMID:32025487.
- Adlard RD, Miller TL, Smit NJ. The butterfly effect: parasite diversity, environment, and emerging disease in aquatic wildlife. *Trends Parasitol* 2015; 31(4): 160-166. <http://dx.doi.org/10.1016/j.pt.2014.11.001>. PMID:25488771.
- Adriano EA, Rêgo RF, Santos SMC, Ceccarelli PS. Distribuição e prevalência de parasitos protozoa e metazoa infectando piraputanga (*Brycon hilarii*) no Pantanal Mato-grossense, Brasil. *Bol Téc Cepta* 2005; 18: 29-38.
- Ailán-Choke LG, Tavares LER, Luque JL, Pereira FB. An integrative approach assesses the intraspecific variations of *Procamallanus* (*Spirocamallanus*) *inopinatus*, a common parasite in Neotropical freshwater fishes, and the phylogenetic patterns of Camallanidae. *Parasitology* 2020; 147(14): 1752-1764. <http://dx.doi.org/10.1017/S0031182020001687>. PMID:32921341.
- Albert JS, Tagliacollo VA, Dagosta F. Diversification of Neotropical Freshwater Fishes. *Annu Rev Ecol Evol Syst* 2020; 51(1): 27-53. <http://dx.doi.org/10.1146/annurev-ecolsys-011620-031032>.
- Albuquerque MC, Clapp MDS, Brasil-Sato MCB. Endoparasites of two species of forage fish from the Três Marias reservoir, Brazil: new host records and ecological indices. *Braz J Vet Med* 2016; 38(Suppl 3): 139-145.
- Alcântara NM, Tavares-Dias M. Structure of the parasites communities in two Erythrinidae fish from Amazon River system (Brazil). *Rev Bras Parasitol Vet* 2015; 24(2): 183-190. <http://dx.doi.org/10.1590/S1984-29612015039>. PMID:26083690.
- Almeida-Berto MDFC, Monteiro CM, Brasil-Sato MD. Parasitic helminths of the non-native serrasalmid fish *Metynnix lippincottianus* from the Três Marias Reservoir, Southeast Brazil. *Rev Bras Parasitol Vet* 2018; 27(3): 289-294. <http://dx.doi.org/10.1590/s1984-296120180040>. PMID:30133590.
- Amato JFR, Amato SB. Técnicas gerais para coleta e preparação de helmintos endoparasitos de aves. In: Von Matter S, Straube FC, Accordi IA, Piacentini VQ, Cândido-Jr JF. *Ornitologia e Conservação: Ciência Aplicada, Técnicas de Pesquisa e Levantamento*. Rio de Janeiro: Technical Books; 2010. p. 369-393.
- Andrade MC, Giarrizzo T, Jégu M. *Tometes camunani* (Characiformes: Serrasalmidae), a new species of phytophagous fish from the Guiana Shield, rio Trombetas basin, Brazil. *Neotrop Ichthyol* 2013; 11(2): 297-306. <http://dx.doi.org/10.1590/S1679-62252013000200008>.
- Andrade SMS, Malta JC, Ferraz E. Fauna parasitológica de alevinos de Matrinchã, *Brycon cephalus* (Günther, 1869) coletados nos rios Negro e Solimões, na Amazônia Central. *Acta Amazon* 2001; 31(2): 263-273. <http://dx.doi.org/10.1590/1809-43922001312273>.
- Andrade SMS, Malta JCO. Parasite fauna monitoring of matrinxã *Brycon amazonicus* (Spix & Agassiz, 1829) raised in an intensive husbandry system a stream channel in the state of Amazonas, Brazil. *Braz J Biol* 2006; 66(4): 1123-1132. <http://dx.doi.org/10.1590/S1519-69842006000600020>. PMID:17299949.
- Azevedo GB, Madi RR, Ueta MT. Metazoários parasitas de *Astyanax altiparanae* (Pisces: Characidae) na Fazenda Rio das Pedras, Campinas, SP, Brasil. *Bioikos (Campinas)* 2007; 21(2): 89-96.
- Azevedo RK, Abdallah VD, Luque JL. Acanthocephala, Annelida, Arthropoda, Myxozoa, Nematoda and Platyhelminthes parasites of fishes from the Guandu River, Rio de Janeiro, Brazil. *Check List* 2010; 6(4): 659-667. <http://dx.doi.org/10.15560/6.4.659>.
- Baia RRJ, Florentino AC, Silva LMA, Tavares-Dias M. Patterns of the parasite communities in a fish assemblage of a river in the Brazilian Amazon region. *Acta Parasitol* 2018; 63(2): 304-316. <http://dx.doi.org/10.1515/ap-2018-0035>. PMID:29654690.

Baia RRJ, Santos GG, Silva AS, Souza BO, Tavares-Dias M. Parasite fauna of tambaqui reared in net-cages at two stocking densities. *Bol Inst Pesca* 2019; 45(3): e492. <http://dx.doi.org/10.20950/1678-2305.2019.45.3.492>.

Belei F, Ferreira SR, Perin LM, Braga FR, Sampaio WMS, Araújo JV, et al. First report of *Austrodiplostomum compactum* and *Ithyoclinostomum dimorphum* in trahira (*Hoplias malabaricus*) from the middle course of the Rio Doce, Minas Gerais, Brazil. *Arq Inst Biol (Sao Paulo)* 2013; 80(2): 249-252. <http://dx.doi.org/10.1590/S1808-16572013000200017>.

Borges WF, Oliveira MSB, Tavares-Dias M. Diversity of metazoan parasites in fish *Triporthus angulatus* and *Triporthus auritus* living in sympatry in the Brazilian Amazon. *Rev Bras Parasitol Vet* 2021; 30(3): e008221. <http://dx.doi.org/10.1590/s1984-29612021064>. PMID:34378770.

Brasil-Sato MC, Pavanelli GC. Digenea de *Pimelodus maculatus* (Osteichthyes, Pimelodidae) das bacias dos rios São Francisco e Paraná, Brasil. *Parasitol Latinoam* 2004; 59(3-4): 123-131. <http://dx.doi.org/10.4067/S0717-77122004000300006>.

Brasil-Sato MC, Santos MD. Helmintos de *Myleus micans* (Lütken, 1875) (Characiformes: Serrasalminae) do Rio São Francisco, Brasil. *Rev Bras Parasitol Vet* 2003; 12(3): 131-134.

Brasil-Sato MC. Digenea of *Salminus brasiliensis* (Cuvier, 1817) (Osteichthyes, Characidae) of the São Francisco River basin, Brazil. *Rev Bras Parasitol Vet* 2002; 11(2): 95-98.

Camargo AA, Pedro NHO, Pelegrini LS, Azevedo RK, Silva RJ, Abdallah VD. Parasites of *Acestrorhynchus lacustris* (Lütken, 1875) (Characiformes: Acestrorhynchidae) collected from the Peixe River, southeast Brazil. *Acta Sci Biol Sci* 2015; 37(2): 231-237. <http://dx.doi.org/10.4025/actascibiolsci.v37i2.24303>.

Campos CM, Takemoto RM, Fonseca VE, Moraes FR. Ecology of the parasitic endohelminth community of *Piaractus mesopotamicus* (Holmberg, 1887) (Characiformes) from Aquidauana and Miranda Rivers, Pantanal, state of Mato Grosso do Sul, Brazil. *Braz J Biol* 2009; 69(1): 87-91. <http://dx.doi.org/10.1590/S1519-69842009000100010>. PMID:19347149.

Cárdenas MQ, Fernandes BM, Justo MC, Cohen SC. A new species of *Ichthyouris* Inglis, 1968 (Nematoda: Pharyngodonidae) parasitizing two characiform fishes from Tocantins River, Maranhão State, Brazil. *Comp Parasitol* 2019; 86(1): 5-9. <http://dx.doi.org/10.1654/1525-2647-86.1.5>.

Cardoso ACF, Oliveira MSB, Neves LR, Tavares-Dias M. Metazoan fauna parasitizing *Peckoltia braueri* and *Pterygoplichthys pardalis* (Loricariidae) catfishes from the northeastern Brazilian Amazon. *Acta Amaz* 2017; 47(2): 147-154. <http://dx.doi.org/10.1590/1809-4392201603232>.

Carvalho A, Ferreira RL, Araújo P, Tavares-Dias M, Matos E, Videira MN. Condition Factor and ecology of endohelminths in *Metynnippinnocottianus* from the curiaú river, in eastern amazon (Brazil). *Bol Inst Pesca* 2020; 46(2): e559. <http://dx.doi.org/10.20950/1678-2305.2020.46.2.559>.

Carvalho S, Guidelli GM, Takemoto RM, Pavanelli GC. Ecological aspects of endoparasite fauna of *Acestrorhynchus lacustris* (Lütken, 1875) (Characiformes, Acestrorhynchidae) on the Upper Paraná River floodplain, Brazil. *Acta Sci Biol Sci* 2003; 25(2): 479-483. <http://dx.doi.org/10.4025/actascibiolsci.v25i2.2043>.

Ceschini TL, Takemoto RM, Yamada FH, Moreira LHA, Pavanelli GC. Endoparasites of *Steindachnerina brevipinna* (Eigenmann and Eigenmann, 1889), collected in the tributaries Corvo and Guairacá of Paranapanema River, Paraná State, Brazil. *Acta Sci Biol Sci* 2010a; 32(2): 125-130. <http://dx.doi.org/10.4025/actascibiolsci.v32i2.4102>.

Ceschini TL, Takemoto RM, Yamada FH, Moreira LHA, Pavanelli GC. Metazoan parasite community of *Steindachnerina brevipinna* (Curimatidae) from Southern Brazil. *Helminthologia* 2010b; 47(3): 164-169. <http://dx.doi.org/10.2478/s11687-010-0025-8>.

Cohen SC, Justo MCN, Cárdenas MQ, Meneses YC, Bezerra CAM, Viana DC. Conceitos básicos e estado da arte dos helmintos parasitos de peixes da bacia Tocantins-Araguaia. In: Prandel JA. *Conhecimentos teóricos, metodológicos e empíricos para o avanço da sustentabilidade no Brasil*. Ponta Grossa, PR: Atena Editora; 2020. p. 54-74. <http://dx.doi.org/10.22533/at.ed.9432030015>.

Corrêa LL, Takemoto RM, Ueta MT, Adriano EA. New records and prevalence of metazoan parasites of fish in the southeastern Brazilian region. *Ann Parasitol* 2020; 66(1): 27-37. <http://dx.doi.org/10.17420/ap6601.235>. PMID:32198993.

Costa DPC, Albuquerque MC, Brasil-Sato MC. *Rhabdochona* (*Rhabdochona*) *acuminata* (Nematoda) em peixes (Characiformes, Acestrorhynchidae) do reservatório de Três Marias, alto rio São Francisco, Brasil. *Neotrop Helminthol* 2011; 5(1): 16-23.

Costa-Pereira R, Paiva F, Tavares LER. Variation in the parasite community of the sardine fish *Triporthus nematurus* (Actinopterygii: Characidae) from the Medalha lagoon in the Pantanal wetland, Brazil. *J Helminthol* 2014; 88(3): 272-277. <http://dx.doi.org/10.1017/S0022149X1300014X>. PMID:23506711.

Cuadros RC, Rivadeneyra NLS, Flores-Gonzales A, Mertins O, Malta JCO, Serrano-Martínez ME, et al. Intestinal histological alterations in farmed red-bellied pacu *Piaractus brachipomus* (Characiformes: Serrasalminae) heavily infected by roundworms. *Aquacult Int* 2021; 29(3): 989-998. <http://dx.doi.org/10.1007/s10499-021-00670-0>.

Daday J. In Sudamerikanischen fischen lebewde trematoden. *Arten Zool Jahrb Syst* 1907; 24: 369-590.

- Dias MKR, Neves LR, Marinho RGB, Pinheiro DA, Tavares-Dias M. Parasitismo em tambatinga (*Colossoma macropomum* x *Piaractus brachypomus*, Characidae) cultivados na Amazônia, Brasil. *Acta Amaz* 2015; 45(2): 231-238. <http://dx.doi.org/10.1590/1809-4392201400974>.
- Dias PG, Furuya WM, Pavanelli GC, Machado MH, Takemoto RM. Carga parasitária de *Rondonia rondoni* Travassos, 1920 (Nematoda, Atrictidae) e fator de condição do armado, *Pterodoras granulosus* Valenciennes, 1833 (Pisces, Doradidae). *Acta Sci Biol Sci* 2004; 26(2): 151-156. <http://dx.doi.org/10.4025/actascibiolsci.v26i2.1613>.
- Diesing KM. Monographie der Gattungen Amphistoma and Diplodiscus. *Ann Wien Mus Naturg* 1836; 1: 235-260.
- Diesing KM. *Systema Helminthum*. Vindobonae: W. Braumüller; 1850.
- Drasche R. Revision der in der Nematoden-Sammlung des k.k. zoologischen Hofcabinetes befindlichen Originalexemplare Diesing's und Molin's. *Verh KK Zool-Bot Ges Wien* 1884; 33: 193-218.
- Duarte R, Santos-Clapp MD, Brasil-Sato MC. Endohelminthes of *Salminus hilarii* Valenciennes (Actinopterygii: Bryconidae) and their ecological descriptors in the upper São Francisco River, Brazil. *Rev Bras Med Vet* 2016; 38(Suppl 3): 151-156.
- Eiras JC, Takemoto RM, Pavanelli GC. *Diversidade dos parasitas de peixes de água doce do Brasil*. Maringá: Editora Clichetec; 2010.
- Eiras JC, Takemoto RM, Pavanelli GC. *Métodos de estudos e técnicas laboratoriais em parasitologia de peixes*. Maringá: Eduem; 2006.
- Fábio SP. Sobre alguns nematoda parasitos de *Hoplias malabaricus*. *Arq Univ Fed Rural Rio de Janeiro* 1982; 5: 179-186.
- Feltran RB, Marçal O Jr, Pinese JF, Takemoto RM. Prevalência, abundância, intensidade e amplitude de infecção de nematóides intestinais em *Leporinus friderici* (Bloch, 1794) e *L. obtusidens* (Valenciennes, 1836) (Pisces, Anostomidae), na represa de Nova Ponte (Perdizes, MG). *Rev Bras Zool* 2004; 6(2): 169-179.
- Fernandes BMM, Cohen SC, Mendonça HS, Justo MN. *Annakohniella travassosi* n. gen., n. sp. (Digenea: Cryptogonimidae) Parasite of *Rhaphiodon vulpinus* (Pisces: Cynodontidae) from Brazil. *Comp Parasitol* 2013; 80(1): 17-21. <http://dx.doi.org/10.1654/4582.1>.
- Fernandes BMM, Justo MCN, Anjos CS, Malta JCO, Dumbo JC. Digenea parasitos de *Acestrorhynchus falcirostris* (Osteichthyes, Acestrorhynchidae) no estado do Amazonas, Brasil. *Rev Bras Parasitol Vet* 2017; 26(4): 439-445. <http://dx.doi.org/10.1590/s1984-29612017059>. PMID:29069159.
- Fernandes ES, Casali GP, Takemoto RM. Metazoan endoparasites of *Brycon orbignyanus* (Characidae: Bryconinae) in a neotropical floodplain. *Acta Sci Biol Sci* 2019; 41(1): e40493. <http://dx.doi.org/10.4025/actascibiolsci.v41i1.40493>.
- Ferreira E, Zuanon J, Santos G, Amadio S. The fish fauna of the Parque Estadual do Cantão, Araguaia River, State of Tocantins, Brazil. *Biota Neotrop* 2011; 11(2): 277-284. <http://dx.doi.org/10.1590/S1676-06032011000200028>.
- Franceschini L, Zago AC, Schalch SHC, Garcia F, Romera DM, Silva RJ. Parasitic infections of *Piaractus mesopotamicus* and hybrid (*P. mesopotamicus* x *Piaractus brachypomus*) cultured in Brazil. *Rev Bras Parasitol Vet* 2013a; 22(3): 407-414. <http://dx.doi.org/10.1590/S1984-29612013000300015>. PMID:24142174.
- Franceschini L, Zago AC, Zocoller-Seno MC, Veríssimo-Silveira R, Ninhaus-Silveira A, Silva RJ. Endohelminths in *Cichla piquiti* (Perciformes, Cichlidae) from the Paraná River, São Paulo State, Brazil. *Rev Bras Parasitol Vet* 2013b; 22(4): 475-484. <http://dx.doi.org/10.1590/S1984-29612013000400006>. PMID:24473871.
- Froese R, Pauly D. *Characiformes* [online]. 2022 [cited 2022 May 22]. Available from: <https://www.fishbase.se/summary/OrdersSummary.php?order=Characiformes>
- Fujimoto RY, Hide DMV, Paixão PEG, Abe HA, Dias JAR, Sousa NC, et al. Fauna parasitária e relação parasito-hospedeiro de tambaquis criados na região do Baixo São Francisco, nordeste do Brasil. *Arq Bras Med Vet Zootec* 2019; 71(2): 563-570. <http://dx.doi.org/10.1590/1678-4162-10306>.
- Gallas M, Calegari-Marques C, Amato SB. First report of *Rhabdochona acuminata* (Nematoda, Rhabdochonidae) in *Astyanax aff. fasciatus* (Characiformes, Characidae) from Lake Guaíba, southern Brazil. *Neotrop Biol Conserv* 2019; 14(4): 479-488. <https://doi.org/10.3897/neotropical.14.e49025>.
- Gião T, Pelegrini LS, Azevedo RK, Abdallah VD. Biodiversity of parasites found in the trahira, *Hoplias malabaricus* (Bloch, 1794), collected in the Batalha River, Tietê-Batalha drainage basin, SP, Brazil. *An Acad Bras Cienc* 2020; 92(2): e20180610. <http://dx.doi.org/10.1590/0001-3765202020180610>. PMID:32556046.
- Gonçalves RA, Oliveira MS, Neves LR, Tavares-Dias M. Seasonal pattern in parasite infracommunities of *Hoplerythrinus unitaeniatus* and *Hoplias malabaricus* (Actinopterygii: Erythrinidae) from the Brazilian Amazon. *Acta Parasitol* 2016; 61(1): 119-129. <http://dx.doi.org/10.1515/ap-2016-0016>. PMID:26751882.
- Guidelli G, Tavechio WG, Takemoto RM, Pavanelli GC. Fauna parasitária de *Leporinus lacustris* e *Leporinus friderici* (Characiformes, Anostomidae) da planície de inundação do alto rio Paraná, Brasil. *Acta Sci Biol Sci* 2006; 28(3): 281-290. <http://dx.doi.org/10.4025/actascibiolsci.v28i3.228>.

- Guidelli G, Tavechio WLG, Takemoto RM, Pavanelli GC. Relative condition factor and parasitism in anostomid fishes from the floodplain of the Upper Paraná River, Brazil. *Vet Parasitol* 2011; 177(1-2): 145-151. <http://dx.doi.org/10.1016/j.vetpar.2010.11.035>. PMID:21176864.
- Guimarães CBS, Pflanzler SB Jr, Pinheiro HP, Mendes TMF, Ueta MT. Centesimal composition and meat yield of *Hoplias malabaricus*: association with intestinal parasites. *Rev Bras Parasitol Vet* 2021; 30(1): e021120. <http://dx.doi.org/10.1590/s1984-29612021020>. PMID:33909835.
- Hamann MI. Fauna parasitaria de *Serrasalmus spilopleura* Kner, 1860 en ambientes lenfíticos de la provincia de Corrientes, Argentina. *Rev Ictiol* 1995/1996; 4(1-2): 11-17.
- Hamann MI. Genarchella Travassos, Artigas y Pereira, 1928 (Digenea, Hemiuridae) parasitos de peces de agua dulce del río Paraná, provincia de Corrientes, República Argentina. I: Anatomía y posición sistemática. II.: Contribuciones ecológicas. *Physis* 1989; 47(112): 15-30.
- Hamann MI. *Halipegus ovoeaudatus* (Vulpian, 1859) Looss, 1899 (Herniuridae, Halipeginae) parasita de *Rana esculenta* Linne, de Europa y *Genarehella genarehella* Travassos, Artigas Pereira, 1928 (Herniuridae, Halipeginae) parasita de *Salminus maxillosus* Valenciennes, 1840 del sudeste de América del Sur. Anatomía y posición sistemática. *Physis* 1986; 44: 19-24.
- Hamann MI. Parasitos del pacu (*Colossoma mitrei*) del río Paraná medio, República Argentina (Pisces, Serrasalminidae). *Hist Nat Corrientes* 1982a; 2: 153-160.
- Hamann MI. Parasitos en peces de la familia Doradidae del río Paraná medio, República Argentina (Pisces, Siluriformes). *Hist Nat Corrientes* 1982b; 2: 193-199.
- Hamann MI. Population biology of *Spirocamallanus inopinatus* (Travassos, Artigas et Pereira, 1928) (Nematoda, Camallanidae) in *Serrasalmus spilopleura* Kner, 1860 (Pisces: Characidae) from Corrientes, Argentina. *Parasitol Res* 1999; 59(1-2): 1-6.
- Heyneman D, Brenes MRR, Diaz-Hungria C. Trematodes de Venezuela II. Algunos trematodos de peces, reptiles y aves con descripción de una nueva especie del género Lubens. *Mem Soc Cienc Nat La Salle* 1960; 20: 138-149.
- Hoshino EM, Tavares-Dias M. Interannual and seasonal variation in protozoan and metazoan parasite communities of *Hemibrycon surinamensis*, a characid fish inhabiting the Brazilian Amazon. *Acta Parasitol* 2019; 64(3): 479-488. <http://dx.doi.org/10.2478/s11686-019-00057-5>. PMID:31020493.
- Hoshino MDFG, Hoshino EM, Tavares-Dias M. First study on parasites of *Hemibrycon surinamensis* (Characidae), a host from the eastern Amazon region. *Rev Bras Parasitol Vet* 2014; 23(3): 343-347. <http://dx.doi.org/10.1590/S1984-29612014069>. PMID:25271454.
- Isaac C, Guidelli GM, Takemoto RM, Pavanelli GC. *Prosthenhystera obesa* (Digenea), parasite of *Salminus maxillosus* (Characidae) of the floodplain of the upper Paraná River, Paraná, Brazil: influence of the size and sex of host. *Acta Sci Biol Sci* 2000; 22(2): 523-526.
- Jerônimo GT, Ventura AS, Pádua SB, Porto EL, Ferreira LC, Ishikawa MM, et al. Parasitological assessment in hybrids Serrasalminidae fish farmed in Brazil. *Rev Bras Parasitol Vet* 2020; 29(4): e012920. <http://dx.doi.org/10.1590/s1984-29612020084>. PMID:33084783.
- Karling LC, Isaac A, Affonso IP, Takemoto RM, Pavanelli GC. The impact of a dam on the helminth fauna and health of a neotropical fish species *Salminus brasiliensis* (Cuvier 1816) from the upper Paraná River, Brazil. *J Helminthol* 2013; 87(2): 245-251. <http://dx.doi.org/10.1017/S0022149X1200034X>. PMID:22776324.
- Kloss GR. Helminthos parasitos de espécies simpátricas de *Astyanax* (Pisces, Characidae). *Pap Avulsos Zool* 1966; 18: 189-219.
- Kohn A, Fernandes BM, Gibson DI, Fróes OM. On the Brazilian species of halipegine genera (Trematoda: Derogenidae) from fishes, with new morphological data, hosts and synonyms. *Syst Parasitol* 1990; 16(3): 201-211. <http://dx.doi.org/10.1007/BF00009148>.
- Kohn A, Fernandes BMM, Baptista-Farias MFD. Redescription of *Prosthenhystera obesa* (Diesing, 1850) (Callodistomidae, Digenea) with new host records and data on morphological variability. *Mem Inst Oswaldo Cruz* 1997; 92(2): 171-179. <http://dx.doi.org/10.1590/S0074-02761997000200008>.
- Kohn A, Fernandes BMM, Cohen SC. *South American trematodes parasites of fishes*. Rio de Janeiro: Imprinta Express; 2007.
- Kohn A, Fernandes BMM, Macedo B, Abramson B. Helminths parasites of freshwater fishes from Pirassununga, SP, Brazil. *Mem Inst Oswaldo Cruz* 1985; 80(3): 327-336. <http://dx.doi.org/10.1590/S0074-02761985000300009>.
- Kohn A, Fernandes BMM. Estudo comparativo dos helmintos parasitos de peixes do Rio Mogi Guassu, coletados nas excursões realizadas entre 1927 e 1985. *Mem Inst Oswaldo Cruz* 1987; 82(4): 483-500. <http://dx.doi.org/10.1590/S0074-02761987000400006>. PMID:3507917.
- Kohn A, Fernandes BMM. Revision of the Brazilian species of the genus *Halipegus* Looss, 1899 (Trematoda: derogenidae). *Syst Parasitol* 1988; 11(2): 129-137. <http://dx.doi.org/10.1007/BF00012263>.
- Kohn A, Fernandes BMM. The adult form of *Himasthla piscicola* Stunkard, 1960 and other trematodes from Brazilian fresh-water fishes. *J Helminthol* 1981; 55(2): 85-87. <http://dx.doi.org/10.1017/S0022149X00025530>.
- Kohn A, Moravec F, Cohen SC, Canzi C, Takemoto RM, Fernandes BMM. Helminths of freshwater fishes in the reservoir of the Hydroelectric Power Station of Itaipu, Paraná, Brazil. *Check List* 2011; 7(5): 681-690. <http://dx.doi.org/10.15560/7.5.681>.

- Lacerda AC, Takemoto RM, Poulin R, Pavanelli GC. Parasites of the fish *Cichla piquiti* (Cichlidae) in native and invaded Brazilian basins: release not from the enemy, but from its effects. *Parasitol Res* 2013; 112(1): 279-288. <http://dx.doi.org/10.1007/s00436-012-3135-z>. PMID:23052767.
- Lacerda ACF, Takemoto RM, Pavanelli GC. Digenea, Nematoda, Cestoda, and Acanthocephala, parasites in Potamotrygonidae (Chondrichthyes) from the upper Paraná River floodplain, states of Paraná and Mato Grosso do Sul, Brazil. *Check List* 2008; 4(2): 115-122. <http://dx.doi.org/10.15560/4.2.115>.
- Lefebvre F, Poulin R. Progenesis in digenean trematodes: a taxonomic and synthetic overview of species reproducing in their second intermediate hosts. *Parasitology* 2005; 130(Pt 6): 587-605. <http://dx.doi.org/10.1017/S0031182004007103>. PMID:15977895.
- Lehun AL, Hasuike WT, Silva JOS, Ciccheto JRM, Michelin G, Rodrigues AFC, et al. Checklist of parasites in fish from the upper Paraná River floodplain: an update. *Rev Bras Parasitol Vet* 2020; 29(3): e008720. <http://dx.doi.org/10.1590/s1984-29612020066>. PMID:32935771.
- Lima FCT, Moreira CR. Three new species of *Hyphessobrycon* (Characiformes: Characidae) from the upper rio Araguaia basin in Brazil. *Neotrop Ichthyol* 2003; 1(1): 21-33. <http://dx.doi.org/10.1590/S1679-62252003000100003>.
- Lucinda PHF, Freitas IS, Soares AB, Marques EE, Agostinho CS, Oliveira RJ. Fish, Lajeado reservoir, rio Tocantins drainage, state of Tocantins, Brazil. *Check List* 2007; 3(2): 70-83. <http://dx.doi.org/10.15560/3.2.70>.
- Lunaschi LI, Sutton CA. On some digenean parasites of fishes from the Irigoyen Canal, Talavera Island, Buenos Aires Province. *Neotropica* 1995; 41(105/106): 99-104.
- Luque JL, Aguiar JC, Vieira FM, Gibson DI, Santos CP. Checklist of Nematoda associated with the fishes of Brazil. *Zootaxa* 2011; 3082(1): 1-88. <http://dx.doi.org/10.11646/zootaxa.3082.1.1>.
- Luque JL, Pereira FB, Alves PV, Oliva ME, Timi JT. Helminth parasites of South American fishes: current status and characterization as a model for studies of biodiversity. *J Helminthol* 2017; 91(2): 150-164. <http://dx.doi.org/10.1017/S0022149X16000717>. PMID:27855726.
- Luque JL, Poulin R. Metazoan parasite species richness in Neotropical fishes: hotspots and the geography of biodiversity. *Parasitology* 2007; 134(6): 865-878. <http://dx.doi.org/10.1017/S0031182007002272>. PMID:17291392.
- Machado PM, Takemoto RM, Pavanelli GC. *Diplostomum (Austrodiplostomum) compactum* (Lutz, 1928) (Platyhelminthes, Digenea) metacercariae in fish from the floodplain of the Upper Paraná River, Brazil. *Parasitol Res* 2005; 97(6): 436-444. <http://dx.doi.org/10.1007/s00436-005-1483-7>. PMID:16151731.
- Marcogliese DJ, Cone DK. Food webs: a plea for parasites. *Trends Ecol Evol* 1997; 12(8): 320-325. [http://dx.doi.org/10.1016/S0169-5347\(97\)01080-X](http://dx.doi.org/10.1016/S0169-5347(97)01080-X). PMID:21238094.
- Martins AN, Sabas CSS, Brasil-Sato MC. *Prosthenthystera obesa* (Diesing, 1850) (Digenea, Callodistomidae) in the São Francisco River basin, Brazil: new host records and their ecological parameters. *Neotrop Helminthol* 2012; 6(1): 31-41.
- Martins ML, Urbinati EC. *Rondonia rondoni* Travassos, 1919 (Nematoda, Atractidae) parasite of *Piaractus mesopotamicus* Holmberg, 1887 (Osteichthyes: Characidae), in Brazil. *Ars Vet* 1993; 9(1): 75-81.
- Martins WMO, Justo MCN, Cárdenas MQ, Cohen SC. Seasonality of parasitic helminths of *Leporinus macrocephalus* and their parasitism rates in farming systems in the Amazon. *Rev Bras Parasitol Vet* 2017; 26(4): 419-426. <http://dx.doi.org/10.1590/s1984-29612017062>. PMID:29160356.
- Masi Pallares R, Benitez Usher CA, Vergara G. Helminthes en peces y reptiles del Paraguay (1era. Parte). *Rev Parag Microbiol* 1973; 8(1): 67-96.
- Menezes NA, Lucena CAS. Revision of the subfamily Roestinae (Ostariophysi: Characiformes: Cynodontidae). *Ichthyol Explor Freshwat* 1998; 9(3): 279-291.
- Mesquita RLB, Santos SMC, Ceccarelli OS, Luque JL. Metazoários endoparasitos de *Salminus brasiliensis* (Cuvier, 1816) (Characiformes: Characidae) do rio Mogi Guaçu, SP, Brasil. *Rev Bras Zootecias* 2012; 14(1-3): 95-102.
- Molin R. Una monografía del genere Spiroptera. *Sitz.-Ber O Akad Wiss* 1860; 38: 911-1005.
- Morais AM, Cárdenas MQ, Malta JCO. Nematofauna of red piranha *Pygocentrus nattereri* (Kner, 1958) (Characiformes: Serrasalminidae) from Amazonia, Brazil. *Rev Bras Parasitol Vet* 2019; 28(3): 458-464. <http://dx.doi.org/10.1590/s1984-29612019055>. PMID:31390437.
- Morais AM, Varella AMB, Fernandes BM, Malta JCO. *Clinostomum marginatum* (Braun, 1899) and *Austrodiplostomum compactum* (Lutz, 1928) metacercariae with zoonotic potential of *Pygocentrus nattereri* (Kner, 1858) (Characiformes: Serrasalminidae) from Central Amazon, Brazil. *Neotrop Helminthol* 2011; 5(1): 8-15.
- Moravec F, Kohn A, Fernandes BMM. Nematode parasites of fishes of the Paraná River, Brazil. Part 3. Camallanoidea and Dracunculoidea. *Folia Parasitol (Praha)* 1993a; 40(3): 211-229.
- Moravec F, Kohn A, Fernandes BMM. Nematode parasites of fishes of the Paraná River, Brazil. Part 2. Seuratoidea, Ascaridoidea, Habronematoidea and Acuarioidea. *Folia Parasitol (Praha)* 1993b; 40(2): 115-134. <http://dx.doi.org/10.14411/fp.2012.017>.

- Moravec F, Kohn A, Fernandes BMM. Structure of the cephalic end of two little-known oxyuroid genera, *Travnema* Pereira, 1938 and *Cosmoxynemoides* Travassos, 1949, parasites of fishes, as revealed by SEM. *J Helminthol* 1994; 68(4): 319-322. <http://dx.doi.org/10.1017/S0022149X00001565>. PMID:7706679.
- Moravec F, Kohn A, Fernandes BMM. Three new species of oxyuroid nematodes, including two new genera, from freshwater catfishes in Brazil. *Syst Parasitol* 1992; 21(3): 189-201. <http://dx.doi.org/10.1007/BF00009699>.
- Moravec F, Prouza A, Royero R. Some nematodes of freshwater fishes in Venezuela. *Folia Parasitol (Praha)* 1997; 44(1): 33-47. PMID:9188173.
- Moravec F, Thatcher VE. *Myleusnema brasiliense* sp. n. (Nematoda: Kathlaniidae), a new intestinal parasite of the serrasalmid fish *Myleus* sp. in Brazil. *Folia Parasitol (Praha)* 1999; 46(3): 216-220.
- Moravec F, Thatcher VE. New data on the morphology and systematic status of *Klossinemella iheringi* (Nematoda, Atractidae) from an Amazonian serrasalmid fish. *Folia Parasitol (Praha)* 1997; 44(1): 48-54.
- Moravec F. Nematode parasites of fishes: recent advances and problems of their research. *Parassitologia* 2007; 49(3): 155-160. PMID:18410073.
- Moravec F. *Nematodes of freshwater fishes of the Neotropical Region*. Czech Republic: Academia, Prague; 1998.
- Moreira LHA, Takemoto RM, Yamada FH, Ceschini TL, Pavanelli GC. Ecological aspects of metazoan endoparasites of *Metynnis lippincottianus* (Cope, 1870) (Characidae) from Upper Paraná River floodplain, Brazil. *Helminthologia* 2009; 46(4): 214-219. <http://dx.doi.org/10.2478/s11687-009-0040-9>.
- Moreira LHA, Yamada FH, Ceschini TL, Takemoto RM, Pavanelli GC. The influence of parasitism on the relative condition factor (Kn) of *Metynnis lippincottianus* (Characidae) from two aquatic environments: the upper Parana River floodplain and Corvo and Guairaca rivers, Brazil. *Acta Sci Biol Sci* 2010; 32(1): 83-86. <http://dx.doi.org/10.4025/actasciobiolsci.v32i1.3668>.
- Moreira NIB, Oliveira CL, Costa HMA. *Spirocamallanus inopinatus* (Travassos, Artigas-Pereira, 1928) and *Spirocamallanus saofranciscensis* sp. n. (Nematoda, Camallanidae) from fishes of Tres Marias Reservoir. *Arq Bras Med Vet Zootec* 1994; 46(5): 485-500.
- Morey GAM, Malta JCO. Metazoan parasites of *Acestrorhynchus falcatus* (Characiformes: Acestrorhynchidae) from floodplain lakes of the Brazilian Amazon. *Neotrop Helminthol* 2018; 12(2): 147-152.
- Negreiros LP, Neves LR, Tavares-Dias M. Parasites in *Leporinus macrocephalus* (Anostomidae) of four fish farms from the western Amazon (Brazil). *An Acad Bras Cienc* 2021; 93(3): e20190988. <http://dx.doi.org/10.1590/0001-3765202120190988>. PMID:34161511.
- Negreiros LP, Pereira FB, Tavares-Dias M. *Dadaytrema oxycephala* (Digenea: Cladorchiidae) in definitive host *Pimelodus blochii* (Pisces: Pimelodidae), with morphological and geographic distribution data in fishes from the South America. *J Parasit Dis* 2020; 44(1): 62-68. <http://dx.doi.org/10.1007/s12639-019-01161-z>. PMID:32174706.
- Núñez MO, Arredondo NJ, Pertierra AAG. Adult Trematodes (Platyhelminthes) of freshwater fishes from Argentina: a checklist. *Rev Suisse Zool* 2017; 124(1): 91-113. <http://dx.doi.org/10.5281/zenodo.322669>.
- Oliveira C, Avelino GS, Abe KT, Mariguela TC, Benine RC, Ortí G, et al. Phylogenetic relationships within the speciose family Characidae (Teleostei: Ostariophysi: Characiformes) based on multilocus analysis and extensive ingroup sampling. *BMC Evol Biol* 2011; 11(1): 275. <http://dx.doi.org/10.1186/1471-2148-11-275>. PMID:21943181.
- Oliveira MSB, Corrêa LL, Prestes L, Neves LR, Brasiliense ARP, Ferreira DO, et al. Comparison of the endoparasite fauna of *Hoplias malabaricus* and *Hoplerhynchus unitaeniatus* (Erythrinidae), sympatric hosts in the eastern Amazon region (Brazil). *Helminthologia* 2018; 55(2): 157-165. <http://dx.doi.org/10.2478/helm-2018-0003>. PMID:31662642.
- Oliveira MSB, Corrêa LL, Tavares-Dias M. Helminthic endofauna of four species of fish from lower Jari River, a tributary of the Amazon basin in Brazil. *Bol Inst Pesca* 2019; 45(1): e393. <https://doi.org/10.20950/1678-2305.2019.45.1.393>.
- Oliveira MSB, Gonçalves RA, Neves LR, Tavares-Dias M. Parasitic Endohelminths of *Metynnis hypsauchen* (Characidae) from Jari River basin, Brazilian Amazon. *Neotrop Helminthol* 2015; 9(2): 235-242.
- Oliveira MSB, Gonçalves RA, Tavares-Dias M. Community of parasites in *Triporthus curtus* and *Triporthus angulatus* (Characidae) from a tributary of the Amazon River system (Brazil). *Stud Neotrop Fauna Environ* 2016; 51(1): 29-36. <http://dx.doi.org/10.1080/01650521.2016.1150095>.
- Oliveira MSB, Tavares-Dias M. Communities of parasite metazoans in *Piaractus brachypomus* (Pisces, Serrasalminidae) in the lower Amazon River (Brazil). *Rev Bras Parasitol Vet* 2016; 25(2): 151-157. <http://dx.doi.org/10.1590/S1984-29612016022>. PMID:27334815.
- Pantoja C, Scholz T, Luque JL, Jones A. First molecular assessment of the interrelationships of cladorchiid digeneans (Digenea: Paramphistomoidea), parasites of Neotropical fishes, including descriptions of three new species and new host and geographical records. *Folia Parasitol* 2019; 66: 011. <http://dx.doi.org/10.14411/fp.2019.011>.
- Paraguassú AR, Luque JL. Metazoários parasitos de seis espécies de peixes do Reservatório de Lajes, Estado do Rio de Janeiro, Brasil. *Rev Bras Parasitol Vet* 2007; 16(3): 121-128. <http://dx.doi.org/10.1590/S1984-29612007000300002>. PMID:18078597.

- Parra JEP, Brandão DA, Ceccarelli PS. Identificação e prevalência de nematódeos do pacu *Piaractus mesopotamicus* (Holmberg, 1887), da Estação de Piscicultura do CEPTA, Pirassununga, SP, Brasil. *Cienc Rural* 1997; 27(2): 291-295. <http://dx.doi.org/10.1590/S0103-84781997000200020>.
- Pavanelli GC, Machado MH, Takemoto RM. Fauna helmintica de peixes do rio Paraná, região de Porto Rico, Paraná. In: Vazzoler AEAM, Agostinho AA, Hahn NS. *A planície de inundação do alto rio Paraná: aspectos físicos, biológicos e sócioeconômicos*. Maringá: EDUEM; 1997. p. 307-329.
- Pedro NHO, Pellegrini LS, Azevedo RK, Abdallah VD. Biodiversity of metazoan parasites in *Acestrorhynchus lacustris* (Lütken, 1875) (Characiformes: Acestrorhynchidae) from the Batalha River, São Paulo State, Brazil. *Pan-Am J Aquat Sci* 2016; 11(4): 336-344.
- Pereira C. Ascaridida e Spirurata parasitos de peixes do nordeste brasileiro. *Arq Inst Biol (Sao Paulo)* 1935; 6: 53-62.
- Pereira ES, Mauad JRC, Takemoto RM, Lima-Junior SE. Fish parasite diversity in the Amambai river, State Mato Grosso do Sul, Brazil. *Acta Sci Biol Sci* 2018; 40(1): e36330. <http://dx.doi.org/10.4025/actasciobiolsoci.v40i1.36330>.
- Petter AJ, Dlouhy C. Nématodes de Poissons du Paraguay. III. Camallanina. Description d'une espèce et d'une sous-espèce nouvelles de la famille des Guyanemidae. *Rev Suisse Zool* 1985; 92(1): 165-175. <http://dx.doi.org/10.5962/bhl.part.81607>.
- Petter AJ, Thatcher VE. Observations sur la capsule buccale de *Spirocamallanus inopinatus* (Nematoda), parasite de poissons brésiliens. *Bull Mus Natl Hist Nat* 1988; 10(4): 685-692.
- Petter AJ. Nématodes de Poissons de l'Equateur. *Rev Suisse Zool* 1987; 94(1): 61-76. <http://dx.doi.org/10.5962/bhl.part.79711>.
- Pinto RM, Fábio SP, Noronha D, Rolas FJT. Novas considerações morfológicas e sistemáticas sobre os *Procamallanus* brasileiros (Nematoda, Camallanoidea). *Mem Inst Oswaldo Cruz* 1976; 74(1): 77-84. <http://dx.doi.org/10.1590/S0074-02761976000100008>.
- Pinto RM, Fábio SP, Noronha D, Rolas FJT. Novas contribuições ao conhecimento do gênero *Procamallanus* (Nematoda, Camallanoidea). *Mem Inst Oswaldo Cruz* 1975; 73(3): 183-191. <http://dx.doi.org/10.1590/S0074-02761975000200003>.
- Pinto RM, Fábio SP, Noronha D, Rolas FJT. *Procamallanus* brasileiros - Parte I (Nematoda, Camallanoidea). *Mem Inst Oswaldo Cruz* 1974; 72(3-4): 205-211. <http://dx.doi.org/10.1590/S0074-02761974000200005>.
- Pinto RM, Fernandes BMM. Sobre *Procamallanus probus* sp. n. (Nematoda, Camallanoidea). *Atas Soc Rio de* 1972; 15(3): 133-136.
- Pinto RM, Noronha D, Knoff M, Gomes DC. *Rhabdochona* (*R.*) *uruyeni* (Nematoda, Rhabdochonidae) in Brazil: presente status of South American *Rhabdochona* Railliet with a worldwide bibliographical survey of the genus from 1985 to 2010. *Neotrop Helminthol* 2010; 4(1): 49-69.
- Pinto RM, Noronha D. *Procamallanus* brasileiros (Nematoda, Camallanoidea): considerações finais, com chave para determinação das espécies. *Mem Inst Oswaldo Cruz* 1976; 74(3-4): 323-339. <http://dx.doi.org/10.1590/S0074-02761976000300011>.
- Pinto RM, Noronha D. Redescricao de *Procamallanus inopinatus* Travassos, Artigas & Pereira, 1928, (Nematoda, Camallanoidea). *Atas Soc Biol Rio de* 1972; 15: 105-108.
- Provete DB. Tocantins River. In: Howarth RW, editor. *Biomes & ecosystems*. New Jersey: Salem Press; 2013. p. 1237-1239.
- Ramallo G, Cancino F, Ruiz A, Ailán-Choke LG. Gastrointestinal nematodes of freshwater fish from Pilcomayo River, Argentina, including description of a new species of *Procamallanus* (*Spirocamallanus*) sp. nov. *Zootaxa* 2020; 4810(3): 468-480. <http://dx.doi.org/10.11646/zootaxa.4810.3.4>. PMID:33055732.
- Ramallo G, Cancino F. First records of parasitic nematodes in two species of river fish, San Juan Province, Argentina. *Annals Parasitol* 2021; 67(3): 543-547. <http://dx.doi.org/10.17420/ap6703.369>.
- Ramallo G. Observations on two *Rhabdochona* species (Nematoda: Rhabdochonidae) from freshwater fishes in Argentina, including description of *Rhabdochona fabianae* n. sp. *J Parasitol* 2005; 91(2): 415-419. <http://dx.doi.org/10.1645/GE-3413>. PMID:15986618.
- Ramos IP, Franceschini L, Zago AC, Zica EOP, Wunderlich AC, Carvalho ED, et al. New host records and a checklist of fishes infected with *Austrodiplostomum compactum* (Digenea: Diplostomidae) in Brazil. *Rev Bras Parasitol Vet* 2013; 22(4): 511-518. <http://dx.doi.org/10.1590/S1984-29612013000400010>. PMID:24473875.
- Ramos IP, Franceschini L, Zago AC, Zica EOP, Wunderlich AC, Lima FP, et al. *Austrodiplostomum compactum* metacercariae (Digenea: Diplostomidae) in *Schizodon intermedius* (Characiformes: Anostomidae) from Jurumirim reservoir, Brazil. *Rev Bras Parasitol Vet* 2016; 25(2): 240-243. <http://dx.doi.org/10.1590/S1984-29612016035>. PMID:27334827.
- Rêgo AA, Vicente JJ. Excursão científica a Zona do Pantanal, Estado de Mato Grosso, para coletas de helmintos. *Cienc Cult* 1988; 40: 65-68.
- Ribeiro TS, Ueda BH, Pavanelli GC, Takemoto RM. Endoparasite fauna of *Brycon amazonicus* and *B. melanopterus* (Characidae, Bryconinae) from Negro and Solimões rivers, Amazon, Brazil. *Acta Amazon* 2016; 46(1): 107-110. <http://dx.doi.org/10.1590/1809-4392201502153>.

- Rivadeneira NLS, Mertins O, Cuadros RC, Malta JCO, de Matos LV, Mathews PD. Histopathology associated with infection by *Procamallanus (Spirocamallanus) inopinatus* (Nematoda) in farmed *Brycon cephalus* (Characiformes) from Peru: a potential fish health problem. *Aquacult Int* 2020; 28(2): 449-461. <http://dx.doi.org/10.1007/s10499-019-00474-3>.
- Rocha CFD, Bergallo HG, Bittencourt EB. More than just invisible inhabitants: parasites are important but neglected components of the biodiversity. *Zoologia* 2016; 33(3): e20150198. <http://dx.doi.org/10.1590/S1984-4689zool-20150198>.
- Sabas CSS, Brasil-Sato MC. Helminth fauna parasitizing *Pimelodus pohli* (Actinopterygii: Pimelodidae) from the upper São Francisco River, Brazil. *Rev Bras Parasitol Vet* 2014; 23(3): 375-382. <http://dx.doi.org/10.1590/S1984-29612014067>. PMID:25271459.
- Santos E, Vicente JJ, Jardim CR. Helminths de peixes de rios amazônicos da Coleção Helmintológica do Instituto Oswaldo Cruz. II. Nematoda. *Atas Soc Biol Rio de Janeiro* 1979; 20: 11-19.
- Santos GM, Juras AA, Merona B, Jégu M. *Peixes do baixo rio Tocantins. 20 anos depois da Usina Hidrelétrica Tucuruí*. Brasília: Eletronorte; 2004.
- Santos MA, Jerônimo GT, Cardoso L, Tancredo KR, Medeiros PB, Ferrarezi JV, et al. Parasitic fauna and histopathology of farmed freshwater ornamental fish in Brazil. *Aquaculture* 2017; 470: 103-109. <http://dx.doi.org/10.1016/j.aquaculture.2016.12.032>.
- Santos PHN, Tavares-Dias M. First study on communities of parasites in *Tripurtheus rotundatus*, a Characidae fish from the Amazon River system (Brazil). *Rev Bras Parasitol Vet* 2017; 26(1): 28-33. <http://dx.doi.org/10.1590/s1984-29612016078>. PMID:27925070.
- Santos RS, Marchiori N, Santarem VA, Takahashi HK, Mourino JLP, Martins ML. *Austrodiplostomum compactum* (Lutz, 1928) (Digenea, Diplostomidae) in the eyes of fishes from Paraná River, Brazil. *Acta Sci Biol Sci* 2012; 34(2): 225-231. <http://dx.doi.org/10.4025/actascibiols.v34i2.9337>.
- Santos SMC, Ceccarelli PS, Rêgo RF. Helminths em peixes do Pantanal sul-mato-grossense: primeira expedição do Programa Pantanal. *Bol Téc CEPTA* 2003; 16: 15-26.
- Saraiva A, Rosim DF, Silva-Souza AT. Nematode parasites of characoid fishes from Brazil. *Bull Eur Assoc Fish Pathol* 2006a; 26(6): 271-274.
- Saraiva A, Silva F, Silva-Souza A. Nematode parasites of the characid fish *Brycon hilarii* from the River Juba, Mato Grosso, Brazil. *Helminthologia* 2006b; 43(3): 158-160. <http://dx.doi.org/10.2478/s11687-006-0029-6>.
- Shah HB, Yousuf AR, Chishti MZ, Shahnaz S, Ahmad F. Trophic status and helminth infracommunities of fish populations in Kashmir Himalayan lakes. *J Helminthol* 2014; 88(3): 264-271. <http://dx.doi.org/10.1017/S0022149X13000114>. PMID:23510501.
- Silva AMO, Tavares-Dias M, Fernandes JS. Helminthes Parasitizing *Semaprochilodus insignis* Jardine, 1841 (Osteichthyes: Prochilodontidae) from the Central Amazonia (Brazil), and their relationship with the host. *Neotrop Helminthol* 2011; 5(2): 225-233.
- Szidat L. The life cycle of progenitive cercariae of *Genarchella genarchella* Travassos 1928 (Trematoda, Hemiuridae) and the possibility of hormonal control of the parasites by their hosts. *Z Tropenmed Parasitol* 1956; 7(2): 132-153. PMID:13353429.
- Takemoto RM, Lizama MAP. Helminth fauna of fishes from the upper Paraná River floodplain, Brazil. *Neotrop Helminthol* 2010; 4(1): 5-8.
- Takemoto RM, Pavanelli GC, Lizama MAP, Lacerda ACF, Yamada FH, Ceschini TL, et al. Diversity of parasites of fish from the upper Paraná River floodplain, Brazil. *Braz J Biol* 2009;69(2 Suppl 2): 691-705. <http://dx.doi.org/10.1590/S1519-69842009000300023>. PMID:19738975.
- Tavares-Dias M, Neves LR, Pinheiro DA, Oliveira MSB, Marinho RGB. Parasites in *Curimata cyprinoides* (Characiformes: Curimatidae) from eastern Amazon, Brazil. *Acta Sci Biol Sci* 2013; 35(4): 595-601. <http://dx.doi.org/10.4025/actascibiols.v35i4.19649>.
- Thatcher VE, Jégu M. Amphistomes as species markers of the serrasalmid fish, *Myleus ternetzi* (Norman), from French Guiana, with descriptions of two new species and one new genus. *Amazoniana* 1998; 15(1-2): 103-112.
- Thatcher VE, Jégu M. Intestinal helminths as population markers of the Amazonian fish *Mylesinus paraschomburgkii*, with descriptions of five new genera and seven new species of trematodes. *Amazoniana* 1996; 14(1-2): 143-155.
- Thatcher VE. Paramphistomidae (Trematoda: Digenea) de peixes de água doce: dois novos gêneros da Colômbia e uma redescritção de *Dadaytrema oxycephala* (Diesing, 1936) Travassos, 1934 da Amazônia. *Acta Amaz* 1979; 9(1): 203-208. <http://dx.doi.org/10.1590/1809-43921979091203>.
- Thatcher VE. Surface morphology of some amphistomes (Trematoda) of Amazonian fishes and the description of a new genus and species. *Acta Amaz* 1999; 29(4): 607-614. <http://dx.doi.org/10.1590/1809-43921999294614>.
- Travassos L, Artigas P, Pereira C. Fauna helmintológica dos peixes de água doce do Brasil. *Arq Inst Biol (São Paulo)* 1928; 1: 5-68.
- Travassos L, Freitas JFT, Lent H. Relatório da excursão científica do Instituto Oswaldo Cruz realizada na zona da Estrada de ferro Noroeste do Brasil, em outubro de 1938. Pesquisas helmintológicas. *Bol Biol* 1939; 4: 221-249.
- Travassos L, Freitas JFT. Relatório da sétima excursão científica do Instituto Oswaldo Cruz realizada à zona da estrada de ferro Noroeste do Brasil, em maio de 1942. *Mem Inst Oswaldo Cruz* 1943; 38(3): 385-412. <http://dx.doi.org/10.1590/S0074-02761943000300007>.

- Travassos L, Kohn A. Lista dos helmintos parasitos de peixes encontrados na estação experimental de biologia e piscicultura de Emas, Pirassununga, Estado de São Paulo. *Pap Avulsos Zool* 1965; 17: 35-52.
- Travassos L. Esboço de uma chave geral dos nematódeos parasitos. *Rev Vet Zoot* 1920; 10: 59-70.
- Travassos L. Contribuições para o conhecimento da fauna helmintológica brasileira -XIV. Espécies brasileiras da família Gorgoderidae Looss, 1901. *Bras Med* 1922; 36: 17-20.
- Travassos L. Informações sobre a fauna helmintológica de Mato Grosso. *Folha Med* 1923; 5: 29-30.
- Travassos L. Relatório da quarta excursão do Instituto Oswaldo Cruz à zona da Estrada de ferro Noroeste do Brasil, realizada em agosto e setembro de 1940. *Mem Inst Oswaldo Cruz* 1940; 35(4): 697-722. <http://dx.doi.org/10.1590/S0074-02761940000400001>.
- Travassos L. Relatório da quinta excursão do Instituto Oswaldo Cruz realizada à zona da Estrada de Ferro Noroeste do Brasil, em janeiro de 1941. II. *Mem Inst Oswaldo Cruz* 1941; 36(3): 272-295. <http://dx.doi.org/10.1590/S0074-02761941000300003>.
- Travassos L. Relatório da excursão do Instituto Oswaldo Cruz ao rio Paraná (Porto Cabral), em março e abril de 1944. *Mem Inst Oswaldo Cruz* 1945; 42(1): 151-165. <http://dx.doi.org/10.1590/S0074-02761945000100010>.
- Travassos L. Contribuição ao conhecimento da fauna helmintológica dos peixes d'água doce do Brasil. IV. Dois novos gêneros de Cosmocercidae (Nematoda) e uma nota de nomenclatura helmintológica. *Mem Inst Oswaldo Cruz* 1948; 46(3): 633-641. <http://dx.doi.org/10.1590/S0074-02761948000300007>.
- Vari RP. The Curimatidae, a lowland neotropical fish family (Pisces: Characiformes): Distribution, endemism, and phylogenetic biogeography. In: Vanzolini PE, Heyer WR, editors. *Proceedings of a workshop on Neotropical distribution patterns*. Rio de Janeiro: Academia Brasileira de Ciências; 1988. p. 343-377.
- Vasconcelos ACP, Lopes ACM, Santos JMS, Jeraldo VLS, Melo CM, Madi RR. Molecular analysis and biodiversity of metazoan parasites of the yellow tail lambari, *Astyanax aff. bimaculatus* (Teleostei, Characidae), in lower San Francisco, northeastern Brazil. *Neotrop Helminthol* 2013; 7(1): 41-49.
- Vaz Z. *Contribuição ao conhecimento dos trematóides de peixes fluviais do Brasil* [tese]. São Paulo: Universidade de São Paulo; 1932.
- Viana L. Tentativa de catalogação das espécies brasileiras de trematódeos. *Mem Inst Oswaldo Cruz* 1924; 17(1): 95-227. <http://dx.doi.org/10.1590/S0074-02761924000100004>.
- Vicente JJ, Rodrigues HO, Gomes DC. Nematóides do Brasil. 1ª parte: nematóides de peixes. *Atas Soc Biol Rio de Janeiro* 1985; 25: 1-79.
- Vicente JJ, Santos E, Souza SV. Helmintos de peixes de rios amazônicos da coleção helmintológica do Instituto Oswaldo Cruz. 1. Trematoda. *Atas Soc Biol Rio de Janeiro* 1978; 19: 9-15.
- Vicentin W, Vieira KRI, Tavares LER, Costa FES, Takemoto RM, Paiva F. Metazoan endoparasites of *Pygocentrus nattereri* (Characiformes: Serrasalminae) in the Negro River, Pantanal, Brazil. *Rev Bras Parasitol Vet* 2013; 22(3): 331-338. <http://dx.doi.org/10.1590/S1984-29612013000300003>. PMID:24142162.
- Vicentin W, Vieira KRV, Costa FES, Takemoto RM, Tavares LER, Paiva F. Metazoan endoparasites of *Serrasalmus marginatus* (Characiformes: Serrasalminae) in the Negro River, Pantanal, Brazil. *Rev Bras Parasitol Vet* 2011; 20(1): 61-63. <http://dx.doi.org/10.1590/S1984-29612011000100012>. PMID:21439234.
- Vieira-Menezes FG, Costa DP, Brasil-Sato MC. Nematodes of *Astyanax fasciatus* (Actinopterygii: Characidae) and their parasitic indices in the São Francisco River, Brazil. *Rev Bras Parasitol Vet* 2017; 26(1): 10-16. <http://dx.doi.org/10.1590/s1984-29612016074>. PMID:28177039.
- Virgilio LR, da Silva Lima F, Takemoto RM, Camargo LMA, de Oliveira Meneguetti DU. Endofauna of helminth parasites of fish in the amazonic basin. *South Am J Bas Edu Tec Technol* 2021; 8(1): 102-116.
- Vital JF, Murrieta-Morey GA, Pereira NB, Malta JCO. Metacercárias de *Austrodiplostomum compactum* (Lutz, 1928) em peixes de lagos de várzea da Amazônia Brasileira. *Folia Amaz* 2016; 25(2): 153-158. <http://dx.doi.org/10.24841/fa.v25i2.399>.
- Wendt EW, Monteiro CM, Amato SB. Helminth fauna of *Megaleporinus obtusidens* (Characiformes: Anostomidae) from Lake Guaíba: analysis of the parasite community. *Parasitol Res* 2018; 117(8): 2445-2456. <http://dx.doi.org/10.1007/s00436-018-5933-4>. PMID:29858940.
- Yamada FH, Bongiovani MF, Yamada POF, Silva RJ. Parasite infracommunities of *Leporinus friderici*: A comparison of three tributaries of the Jurumirim Reservoir in southeastern Brazil. *An Acad Bras Cienc* 2017; 89(2): 953-963. <http://dx.doi.org/10.1590/0001-3765201720160554>. PMID:28489196.
- Yamada FH, Moreira LHA, Ceschini TL, Takemoto RM, Pavanelli GC. Novas ocorrências de metacercária de *Austrodiplostomum compactum* (Lutz, 1928) (Platyhelminthes: Digenea) parasito de olhos de peixes da bacia do rio Paraná. *Rev Bras Parasitol Vet* 2008; 17(3): 163-166. <http://dx.doi.org/10.1590/S1984-29612008000300010>. PMID:19245765.
- Yamaguti S. *Systema helminthum*. New York: Interscience Publishers; 1961. (vol. 3).