

# Helminths of freshwater fishes in the reservoir of the Hydroelectric Power Station of Itaipu, Paraná, Brazil

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**ABSTRACT:** This study presents results from several expeditions in 1985, 1991-1995 and 2003 to the Medium Paraná River in the section that begins below the Itaipu Dam and ends at the trinational border of Brazil, Argentina and Paraguay, in the lotic and lentic zones of the reservoir of the Hydroelectric Power Station of "Itaipu Binacional" (localities Foz do Iguaçu, Santa Helena and Guaira). Ninety-eight species of freshwater fishes belonging to 22 families were examined for helminths. A host-parasite list based on Acanthocephala, Cestoda, Digenea, Monogenea and Nematoda collected from the region in question is provided. New host records are presented for Digenea and Nematoda. The Monogenea and Acanthocephala are being studied and will be published in a later paper, but are referred in the host-parasite list, in order to demonstrate the parasitism in the fishes of the reservoir. The results are compared with those presented by other authors from the Upper Paraná River.

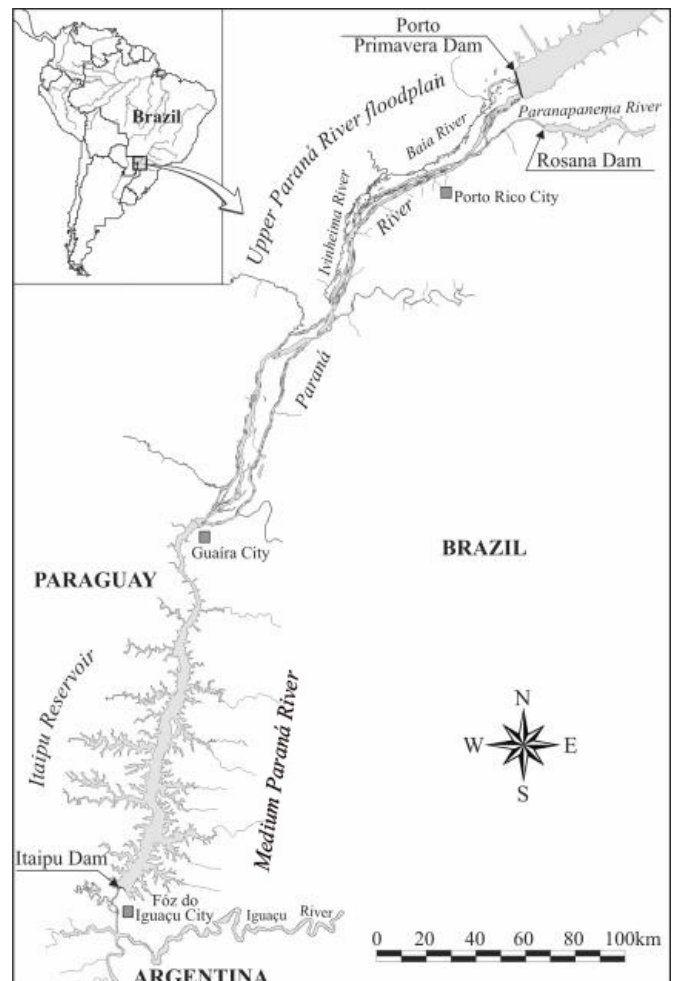
## INTRODUCTION

The Paraná River, the tenth longest river in the world, is a river in south-central South America, running through Brazil, Paraguay and Argentina. Together with its tributaries, it forms the larger of the two river systems that drain into the La Plata River, making it the second largest river system in South America, outranked only by the Amazon River. Along the course of the Paraná is the Itaipu Dam, the largest hydroelectric power station in the world, which creates a massive, deep reservoir behind it. Itaipu Binacional is a binational company undertaking run by Brazil and Paraguay at the Paraná River on the border section between the two countries.

Fish parasites in the Medium Paraná River basin have remained little known to date. This study reports results from several expeditions in 1985, 1991-1995 and 2003 to the Medium Paraná River in the section that begins below the Itaipu Dam and ends at the trinational border of Brazil, Argentina and Paraguay, and in the reservoir of the Hydroelectric Power Station of Itaipu Binacional, in the localities of Foz do Iguaçu (lentic zone, next to the dam at the end of the reservoir), Santa Helena (transition zone in the middle of the reservoir) and Guaira (lotic zone at the beginning of the reservoir) (Figure 1). A host-parasite list is presented in Table 1. The results were compared with those obtained by other authors in the floodplain of the Upper Paraná River and recently published in a checklist by Takemoto *et al.* (2009).

## MATERIALS AND METHODS

A total of 1,142 freshwater fish specimens belonging to 98 species and 22 families were examined for helminths. These were caught using gill nets in the Medium Paraná River in the localities of Foz do Iguaçu (25°32'52"



**FIGURE 1.** Location of the Medium Paraná River with the reservoir of the Hydroelectric Power Station of Itaipu and Upper Paraná River floodplain, Brazil.

N, 54°35'17" W), lentic zone, at the end of the Itaipu reservoir of the Hydroelectric Power Station of Itaipu Binational, Paraná State, Brazil; Santa Helena (24°51'37" N, 54°19'58" W), transition zone, in the middle of the reservoir; and Guaira (24°04'48" N, 54°15'21" W), lotic zone, at the beginning of the reservoir. Parasites collected were processed in accordance with the methodology used for each group. The names of fishes accepted as valid follow the most recent bibliography (Froese and Pauly 2010; Graça and Pavanelli 2007) and sometimes do not correspond to the names of parasite references. Material studied was deposited in the Helminthological Collection of the Oswaldo Cruz Institute, Fiocruz, Rio de Janeiro, Brazil.

## RESULTS AND DISCUSSION

Of the 98 fish species examined from the Medium Paraná River, lotic and lentic zones of the reservoir of the Hydroelectric Power Station of Itaipu, parasitism by helminths was verified in 78 species. Nematoda was the most prevalent group, identified in 63% of the fishes examined, followed by Digenea (47.4%), Monogenea (45.4%), Cestoda (19.5%) and Acanthocephala (14.4%).

Forty-eight species of Nematoda were recorded and nine of them were found in new hosts (Table 1): *Cucullanus* sp. (if), *Goezia* sp., *Ichthyouris laterifilamenta* Moravec, Kohn and Fernandes, 1992, *Paracamallanus amazonensis* Ferraz and Thatcher, 1992, *Procamallanus (Procamallanus) annipetterae* Kohn and Fernandes, 1988, *Procamallanus (Spirocamallanus) inopinatus* Travassos, Artigas and Pereira, 1928, *Procamallanus (Spirocamallanus) sp.*, *Raphidascaris (Sprentascaris) mahnerti* (Petter and Cassone, 1984) and *Rondonia rondoni* Travassos, 1920 (if).

Thirty four species of Digenea were recovered, 11 of them in new hosts (Table 1): *Crassicutis cichlasomae* Manter, 1936, *Dadaytrema oxycephala* (Diesing, 1836), *Dendrorchis sp.*, *Genarchella astyanactis* (Watson, 1976), *Genarchella tropica* (Manter, 1936), *Magnivitellinum simplex* Kloss, 1966, *Paralecithobohtrys brasiliensis* Freitas, 1947, *Prosthenhystera obesa* (Diesing, 1850), *Saccocoelioides godoyi* Kohn and Fróes, 1986, *Saccocoelioides magnus* Szidat, 1954 and *Saccocoelioides nanii* Szidat, 1954.

Eighteen species of Cestoda and ten of Acanthocephala were found in hosts already reported. Forty-four of the 98 species of fishes examined were parasitized with Monogenea and will be published in a later paper. The species of Acanthocephala referred herein were subject of a master thesis and are referred in another paper (Lopes et al. 2011).

Some morphological and taxonomical data based on these materials have already been published by Baptista-Farias et al. (2001), Cohen and Kohn (2008a, b), Cohen and Kohn (2009) Cohen et al. (2001), Fernandes and Kohn (2001), Kohn and Fernandes (1994; 2006), Kohn et al. (1995; 1999; 2000; 2003), Lopes et al. (2011) and Moravec et al. (1990; 1992a, b, c; 1993 a, b, c; 1994 a, b; 1997).

The Medium Paraná River underwent a great impact when changing from a lotic to a lentic environment. In addition, the natural barrier known as Sete Quedas was eliminated, because it was submerged in the reservoir when the Itaipu Dam was built. Thus, fish species that

had only lived in Sete Quedas (Guaira) below were able to climb and explore a new environment.

The floodplain of the Upper Paraná River was considered the last free stretch of the Paraná River. However, it has undergone severe changes in its system of flood and drought, since hydroelectric plants were built upstream and now control the water level of the river. Considering these changes, all the fauna, including the parasites of fishes, may be affected. Oscillations in the hydrologic flow, such as occur in floodplains, may influence the occurrence and size of fish parasite infrapopulations (Dogiel 1970). All these observed impacts on the floodplain can directly and indirectly affect the parasitic fauna of fish. Endoparasites, which typically have a complex life cycle, can be affected by changes in environments where the intermediate hosts live. Some species of the organisms that can serve as intermediate hosts may be favored and others may even be eliminated from the environment. Ectoparasites, those which are in direct contact with the environment, suffer directly from the changes caused by these impacts.

In the Medium Paraná River, 78 fish species out of 98 examined were parasitized by helminths. Nematoda was the most prevalent group, present in 63% of the fishes examined, followed by Digenea (47.4%), Monogenea (45.4%), Cestoda (19.5%) and Acanthocephala (14.4%). Since 1986, in the floodplain of the Upper Paraná River, 72 fish species have been examined and 278 species of helminths were recorded as parasitizing these. Monogeneans were identified with the largest number of species (95), followed by Digenea (73), Nematoda (71), Cestoda (47) and Acanthocephala (18). A checklist of fish hosts and their parasites was published recently by Takemoto et al. (2009).

In general, nematodes exhibit a low degree of host specificity. According to Eiras et al. (2010), the nematode *Procamallanus (Spirocamallanus) inopinatus* has already been identified in 51 fish species in Brazil. In the Medium Paraná River, *P. (S.) inopinatus* confirmed a low degree of host specificity and was identified in 15 species of fish (*Astyanax bimaculatus bimaculatus*, *A. b. lacustris*, *Brycon orbignyanus*, *Catathyridium jenynsii*, *Crenicichla haroldoi*, *Leporellus vittatus*, *Leporinus copelandii*, *L. friderici*, *Pterodoras granulosus*, *Serrasalmus marginatus*, *S. spilopleura*, *Trachydoras paraguayensis*, *Tracheliopterus galeatus*, *Pimelodus sp.* and *Potamotrygon motoro*). In the floodplain of the Upper Paraná River, this species was recorded in 10 host species (*Hoplias aff. malabaricus*, *Leporinus elongatus*, *L. obtusidens*, *L. lacustris*, *Metynniss lippincottianus*, *Pseudoplatystoma corruscans*, *Serrasalmus marginatus*, *S. maculatus*, *Schizodon borellii* and *Trachydoras paraguayensis*). Among all these species, only *S. marginatus* and *T. paraguayensis* were common in both environments studied.

Immature forms of nematodes of the family Anisakidae (*Contracaecum* sp., *Hysterothylacium* sp. and Anisakidae gen. sp.) were found in 24 fish species examined in the localities studied on the Medium Paraná River. In the floodplain of the Upper Paraná River, 17 hosts were reported to be parasitized by *Contracaecum* and/or *Hysterothylacium* larvae. Species of the Anisakidae deserve special attention; they parasitize fish as larvae, using them as intermediate or paratenic hosts and are

known to be agents of parasitoses in humans. However, to date, no reports of such zoonotic diseases have been made in the region. This is probably because the parasites are large and mainly parasitize the mesentery, which is not used as food by people.

Some species of Digenea also exhibit a low degree of host specificity. The metacercariae of *Austrodiplostomum compactum*, parasitic in the eyes of fish, were recorded for the first time in *Plagioscion squamosissimus* from the reservoir of the Hydroelectric Power Station of Itaipu by Kohn et al. (1995). In the floodplain, this larva was reported in the same host species by Pavanelli et al. (1997), as well as in some other host species: *Hoplias aff. malabaricus*, *Satanoperca pappaterra*, *Crenicichla britskii*, *Cichla kelberi* (= *Cichla monoculus*), *Cichlasoma paranaense* (Machado et al. 2005). Yamada et al. (2008) also reported it as parasitising *Hypostomus regani*, *Schizodon borellii*, *Serrasalmus marginatus* and *Auchenipterus osteomystax*. This parasite is very common in the "corvina" *P. squamosissimus*. Machado et al. (2005) reported a prevalence of 95% and recorded 397 parasites in one fish. Due to this high prevalence, this trematode species was probably introduced together with its definitive host.

The prevalence was also relatively high in *S. pappaterra* (71.9%) and in *C. kelberi* (65%). This parasite is ecologically important since it lives in the eyes of fish, damaging their vision and making them susceptible to predators. Thus, the parasite can complete its life cycle.

Among the hosts examined, 47 helminth species were common in both sampling sites. However, fishes from the Upper Paraná River floodplain showed a greater species diversity of helminth parasites. This difference probably occurred because, despite all the above-mentioned changes that are occurring in the floodplain, all animals necessary for completing the life cycles of the respective helminths are present in this environment. In the Itaipu reservoir, the impact was greater following the impoundment and many organisms may have disappeared. Some of them may act as intermediate hosts of helminth parasites.

The differences in the taxonomic diversification of the parasite assemblages of different fish species were mainly related to the environment, trophic level and temperature (Luque and Poulin 2008). Therefore, the Upper Paraná River floodplain, characterized by the presence of a wide variety of habitats and species, favors the occurrence of a greater diversity of fish parasites.

**TABLE 1.** List of helminths of freshwater fishes recorded in reservoir of the Hydroelectric Power Station of Itaipu, Parana, Brazil. E/P = number of examined / parasitized hosts, I = number of infected hosts by each species, A = Acanthocephala, C = Cestoda, D = Digenea, M = Monogenea, N = Nematoda, if = immature form, mc = metacercariae.

HOSTS	COMMON NAME	E/P	I	HELMINTHS	
<b>Acestrorhynchidae</b>					
<i>Acestrorhynchus lacustris</i>	peixe-cachorro	11/6	1	N	<i>Contracaecum</i> sp. (if)
			4	N	<i>Travassosnema travassosi paranaensis</i> Moravec, Kohn and Fernandes, 1993
			2	D	<i>Rhipidocotyle gibsoni</i> Kohn and Fernandes, 1994
			3	M	Monogenea gen. sp.
<b>Achiridae</b>					
<i>Catathyridium jenynsii</i> [= <i>Achirus jenynsii</i> ]	linguado	19/4	3	N	Anisakidae gen. sp. (if)
			1	N	<i>Procamallanus (Spirocamallanus) inopinatus</i> Travassos, Artigas and Pereira, 1928
			1	D	<i>Prosorhynchoides rioplatensis</i> (Szidat, 1970)
<b>Anostomidae</b>					
<i>Leporellus vittatus</i>	solteira	11/4	2	N	Anisakidae gen. sp. (if)
			1	N	<i>Procamallanus (S.) inopinatus</i> Travassos, Artigas and Pereira, 1928
			2	M	Monogenea gen. sp.
<i>Leporinus copelandii</i>	piauí	9/5	4	N	<i>Procamallanus (S.) inopinatus</i> Travassos, Artigas and Pereira, 1928
			1	A	Acanthocephala gen. sp.
<i>Leporinus elongatus</i>	piapara	3/2	1	D	<i>Genarchella astyanactis</i> (Watson, 1976) (new host record and first report in South America)
			1	D	<i>Saccocoeloides magnus</i> (Szidat, 1954) (new host record)
			9	N	<i>Procamallanus (S.) inopinatus</i> Travassos, Artigas and Pereira, 1928
<i>Leporinus friderici</i>	piava	15/12	2	N	<i>Goezia</i> sp.
			3	D	<i>Saccocoeloides godoyi</i> Kohn and Fróes, 1986
			1	D	Diplostomidae gen. sp. (mc)
<i>Leporinus obtusidens</i>	piapara	5/5	3	D	<i>Sanguinicola</i> sp. (referred as <i>Plehnella</i> sp. by Fernandes and Kohn, 2001)
			1	C	Cestoda gen. sp.
<i>Schizodon borellii</i>	piava	9/2	1	N	Anisakidae gen. sp. (if)
			2	M	Monogenea gen. sp.
<i>Schizodon fasciatus</i>	Piava	5/5	1	N	Capillariidae gen. sp. 1 of Moravec, Kohn and Fernandes, 1992
			2	N	<i>Dichelyne leporini</i> Petter, 1989
			1	N	<i>Procamallanus (S.) iheringi</i> Travassos, Artigas and Pereira, 1928
			4	A	<i>Octospiniferoides incognita</i> Schmidt and Huggins, 1973
<i>Schizodon knerii</i>	piava	7/3	2	N	<i>Chalcinotrema thatcheri</i> Kohn, Fernandes and Gibson, 1999

TABLE 1. CONTINUED.

HOSTS	COMMON NAME	E/P	I	HELMINTHS	
<i>Schizodon knerii</i>	piava	7/3	1	D	<i>Paralecithobothrys brasiliensis</i> Freitas, 1947 (new host record)
			2	D	<i>Saccocoeloides magnus</i> Szidat, 1954 (new host record)
			2	A	Acanthocephala gen. sp.
			1	M	Monogenea gen. sp.
<b>Auchenipteridae</b>					
<i>Ageneiosus militaris</i> [= <i>Ageneiosus valenciennesi</i> ]	manduvê, bagre	10/4	2	N	<i>Cucullanus (Cucullanus) pinnai pinnai</i> Travassos, Artigas and Pereira, 1928
			1	N	<i>Goezia</i> sp. (if) of Moravec, Kohn and Fernandes, 1993
			1	D	Clinostomidae (mc)
<i>Auchenipterus osteomystax</i> (referred as <i>Auchenipterus nuchalis</i> by Moravec, Kohn and Fernandes, 1993)	surumanha	68/16	6	N	<i>Cucullanus brevispiculus</i> Moravec, Kohn and Fernandes, 1993
			4	D	<i>Microrchis oligovitelum</i> Lunaschi, 1987
			9	M	Monogenea gen.sp.
<i>Trachelyopterus galeatus</i> [= <i>Parauchenipterus galeatus</i> ]	cangati	24/12	1	N	<i>Contraecum</i> sp. 2 (if) of Moravec, Kohn and Fernandes, 1993
			1	N	<i>Goezia</i> sp. (if)
			1	N	<i>Procamallanus (S.) inopinatus</i> Travassos, Artigas and Pereira, 1928 (new host record)
			8	D	<i>Microrchis oligovitelum</i> Lunaschi, 1987
			1	C	<i>Cangatiella arandasi</i> Pavanelli and Machado, 1991
5	M	Monogenea gen. sp.			
<b>Characidae</b>					
<i>Astyanax bimaculatus bimaculatus</i> [= <i>Astyanax bimaculatus</i> ]	tambuí	31/12	1	N	<i>Procamallanus (S.) inopinatus</i> Travassos, Artigas and Pereira, 1928
			4	D	<i>Magnivitellinum simplex</i> Kloss, 1966
			8	M	Monogenea gen. sp.
<i>Astyanax bimaculatus lacustris</i>	tambuí	19/4	1	N	<i>Cosmoxyinemoides aguirrei</i> Travassos, 1949
			1	N	<i>Procamallanus (S.) inopinatus</i> Travassos, Artigas and Pereira, 1928
			1	N	<i>Travnema travnema</i> Pereira, 1938
			3	M	Monogenea gen. sp.
<i>Astyanax eigenmanniorum</i>	tambuí, lambari	11/3	3	N	<i>Travnema</i> sp.
<i>Brycon hilarii</i>	piracanjuba	7/2	1	N	Anisakidae gen. sp.
			1	N	<i>Goezia brasiliensis</i> Moravec, Kohn and Fernandes, 1994
			1	N	<i>Goezia brevicaeca</i> Moravec, Kohn and Fernandes, 1994
<i>Brycon orbignyianus</i>	Piracanjuba, matrinchão	12/4	2	N	<i>Goezia</i> sp. (new host record)
			2	N	<i>Procamallanus (S.) inopinatus</i> Travassos, Artigas and Pereira, 1928 (new host record)
			1	M	Monogenea gen. sp.
			4	N	Anisakidae gen. sp. (if)
<i>Cynopotamus kincaidi</i>	peixe-cachorro, saicanga	8/6	1	N	<i>Procamallanus (S.)</i> sp. (new host record)
			1	D	<i>Prosthenhystera obesa</i> (Diesing, 1850) (new host record)
			2	M	Monogenea gen. sp.
<i>Galeocharax humeralis</i>	cigarra	5/2	1	N	<i>Contraecum</i> sp. 1 (if) of Moravec, Kohn and Fernandes, 1993
<i>Galeocharax knerii</i>	Cigarra, cadela	24/4	2	N	<i>Contraecum</i> sp. 1 (if) of Moravec, Kohn and Fernandes, 1993
			1	N	<i>Hysterothylacium</i> sp. (if) of Moravec, Kohn and Fernandes, 1993
<i>Piaractus mesopotamicus</i>	pacu	29/26	2	C	Cestoda gen. sp. (if)
			2	N	<i>Goezia</i> sp. (if)
			1	N	<i>Rondonia rondoni</i> Travassos, 1920
			1	N	<i>Spectatus</i> sp. (juvenile female) of Moravec, Kohn and Fernandes, 1997
			2	D	<i>Curumai curumai</i> Travassos, 1961
			3	D	<i>Dadaytrema oxycephala</i> (Diesing, 1836)
			1	C	Cestoda gen. sp.
23	M	Monogenea gen.sp.			
<i>Roebooides paranensis</i>	dentudo	36/21	12	D	<i>Magnivitellinum simplex</i> Kloss, 1966 (new host record)
			7	M	Monogenea gen. sp.
<i>Salminus brasiliensis</i> [= <i>Salminus maxillosus</i> ]	dourado	26/21	1	N	Acuariinae gen. sp. (if) of Moravec, Kohn and Fernandes, 1993
			9	N	<i>Hysterothylacium</i> sp. (if) of Moravec, Kohn and Fernandes, 1993
			1	N	<i>Paracapillaria piscicola</i> (Travassos, Artigas and Pereira, 1928)



TABLE 1. CONTINUED.

HOSTS	COMMON NAME	E/P	I	HELMINTHS	
<i>Salminus brasiliensis</i> [= <i>Salminus maxillosus</i> ]	dourado	26/21	13	D	<i>Neocladocystis intestinalis</i> (Vaz, 1932)
			2	D	<i>Prosthenhytera obesa</i> (Diesing, 1850)
			9	D	<i>Rhipidocotyle jeffersoni</i> (Kohn, 1970)
			1	D	<i>Thometrema overstreei</i> (Brooks, Mayes and Thorson, 1979)
			6	C	Cestoda gen. sp. (if)
			12	M	Monogenea gen. sp.
<i>Serrasalmus marginatus</i>	piranha	58/17	1	N	<i>Contracaecum</i> sp. (if)
			1	N	<i>Cucullanus</i> sp. 3 of Moravec, Kohn and Fernandes, 1993
			4	N	<i>Goezia</i> sp. (if) of Moravec, Kohn and Fernandes, 1993
			3	N	<i>Procamallanus</i> ( <i>S.</i> ) <i>inopinatus</i> Travassos, Artigas and Pereira, 1928
<i>Serrasalmus spilopleura</i>	piranha	12/6	7	M	Monogenea gen. sp.
			3	N	<i>Procamallanus</i> ( <i>S.</i> ) <i>inopinatus</i> Travassos, Artigas and Pereira, 1928
<i>Triportheus angulatus</i>	sardinha	6/4	3	M	Monogenea gen. sp.
			2	N	Anisakidae gen. sp. (if)
<i>Cichla monoculus</i>	tucunaré	7/6	1	N	<i>Procamallanus</i> ( <i>S.</i> ) sp.
			3	M	Monogenea gen. sp.
			1	N	Anisakidae gen. sp. (if)
			2	N	<i>Procamallanus</i> ( <i>Procamallanus</i> ) <i>peraccuratus</i> Pinto, Fábio, Noronha and Rolas, 1976
			1	D	Diplostomidae gen. sp. (mc)
<i>Crenicichla haroldoi</i>	joaninha	1/1	3	C	<i>Proteocephalus macrophallus</i> (Diesing, 1850)
			4	C	<i>Proteocephalus microscopicus</i> (Woodland, 1935)
			1	N	<i>Procamallanus</i> ( <i>S.</i> ) <i>inopinatus</i> Travassos, Artigas and Pereira, 1928
			1	C	Cestoda gen. sp. (if)
<i>Crenicichla niederleini</i> [referred as <i>C. lepidota</i> by Moravec, Kohn and Fernandes, 1993]	joaninha	47/44	1	N	<i>Contracaecum</i> sp. 1 (if) of Moravec, Kohn and Fernandes, 1993
			2	N	<i>Hysterothylacium</i> sp. (if) of Moravec, Kohn and Fernandes, 1993
			34	N	<i>Procamallanus</i> ( <i>P.</i> ) <i>peraccuratus</i> Pinto, Fábio, Noronha and Rolas, 1976
			3	D	<i>Crassicutis cichlasomae</i> Manter, 1936 (new host record)
			18	D	Diplostomidae gen. sp. (mc)
			8	D	<i>Neascus</i> sp. (mc)
			9	M	Monogenea gen. sp.
			2	N	<i>Hysterothylacium</i> gen. sp. (if)
			2	N	<i>Procamallanus</i> ( <i>P.</i> ) <i>peraccuratus</i> Pinto, Fábio, Noronha and Rolas, 1976
			1	N	<i>Procamallanus</i> ( <i>S.</i> ) sp.
<i>Geophagus brasiliensis</i>	cará	18/11	1	N	<i>Raphidascaris</i> ( <i>Sprentascaris</i> ) sp. (if) of Moravec, Kohn and Fernandes, 1993
			5	D	<i>Crassicutis cichlasomae</i> Manter, 1936
			2	D	Diplostomidae gen. sp. (mc)
			2	M	Monogenea gen. sp.
			<b>Curimatidae</b>		
<i>Cyphocharax gilbert</i> [= <i>Pseudocurimata gilberti</i> ]	saguiru	5/5	2	N	<i>Cosmoxyinema vianai</i> Travassos, 1949
			1	N	<i>Cosmoxyinemoides aguirrei</i> Travassos, 1949
			1	N	<i>Guyanema</i> sp. of Moravec, Kohn and Fernandes, 1993
			2	N	<i>Travnema araujoii</i> Fernandes, Campos and Artigas, 1983
			1	D	<i>Zonocotyle bicaecata</i> Travassos, 1948
			1	M	Monogenea gen. sp.
<i>Cyphocharax nagelii</i>	saguiru	3/3	1	N	<i>Cosmoxyinemoides</i> sp.
			2	D	Diplostomidae gen. sp. (mc)
<i>Potamorhina squamoralevis</i>	saguiru, papa-terra	5/4	2	D	<i>Saccocoelioides godoyi</i> Kohn and Fróes, 1986 (new host record)
			1	N	<i>Ichthyouris laterifilamenta</i> Moravec, Kohn and Fernandes, 1992 (new host record)
<i>Satanoperca pappaterra</i>	cará	9/3	3	M	Monogenea gen. sp.
			1	C	Cyclophillidae gen. sp.
<i>Steindachnerina elegans</i> [= <i>Pseudocurimata elegans</i> ]	saguiru	5/2	2	M	Monogenea gen. sp.
			1	N	<i>Cosmoxyinemoides aguirrei</i> Travassos, 1949
			1	N	<i>Travnema travnema</i> Pereira, 1938

TABLE 1. CONTINUED.

HOSTS	COMMON NAME	E/P	I	HELMINTHS			
<i>Steindachnerina elegans</i> [= <i>Pseudocurimata elegans</i> ]	saguiru	5/2	1 A	<i>Acanthocephala</i> gen. sp.			
<i>Steindachnerina inculpta</i>	saguiru	3/2	2 D	<i>Diplostomidade</i> gen.sp (mc)			
<b>Cynodontidae</b>							
<i>Rhaphiodon vulpinus</i>	peixe-cadela, dourado- cachorro	48/31	3 N	<i>Contracaecum</i> sp. 1 (if) of Moravec, Kohn and Fernandes, 1993			
			1 N	<i>Contracaecum</i> sp. 2 (if) of Moravec, Kohn and Fernandes, 1993			
			1 N	<i>Cucullanus</i> sp. (if) (new host record)			
			1 N	<i>Goezia</i> sp. (if) of Moravec, Kohn and Fernandes, 1993			
			2 N	<i>Guyanema raphiodoni</i> Moravec, Kohn and Fernandes, 1993			
			16 N	<i>Hysterothylacium</i> sp. (if) of Moravec, Kohn and Fernandes, 1993			
			1 N	<i>Rondonia rondoni</i> Travassos, 1920 (if) (new host record)			
			1 D	<i>Saccocoelioides nanii</i> Szidat, 1954 (new host record)			
			16 M	<i>Monogenea</i> gen.sp.			
<b>Doradidae</b>							
<i>Oxydoras knerii</i>	armado, abotoado	3/1	1 A	<i>Paracavisoma impudica</i> (Diesing, 1851)			
			2 N	<i>Cucullanus pinnae pterodorasi</i> Moravec, Kohn and Fernandes, 1992			
			1 N	<i>Goezia</i> sp.			
			1 N	<i>Hysterothylacium</i> sp.(if)			
			2 N	<i>Neoparaseuratum travassosi</i> Moravec, Kohn and Fernandes, 1992			
			2 N	<i>Paracamallanus amazonensis</i> Ferraz and Thatcher, 1992			
			<i>Pterodoras granulosus</i>	armado, abotoado	25/22	3 N	<i>Procamallanus</i> ( <i>S.</i> ) <i>inopinatus</i> Travassos, Artigas and Pereira, 1928
						14 N	<i>Rondonia rondoni</i> Travassos, 1920
						3 D	<i>Curumai curumai</i> Travassos, 1961
						6 D	<i>Dadaytrema oxycephala</i> (Diesing, 1836)
			3 C	<i>Monticellia belavistensis</i> Pavanelli, Machado, Takemoto, Massado and Santos, 1994			
			12 M	<i>Monogenea</i> gen. sp.			
			12 N	<i>Ichthyouris laterifilamenta</i> Moravec, Kohn and Fernandes, 1992			
			10 N	<i>Neoparaseuratum travassosi</i> Moravec, Kohn and Fernandes, 1992			
			1 N	<i>Parasynodontisia petterae</i> Moravec, Kohn and Fernandes, 1992			
			15 N	<i>Procamallanus</i> ( <i>S.</i> ) <i>inopinatus</i> Travassos, Artigas and Pereira, 1928			
<i>Trachydoras paraguayensis</i>	armadinho	21/19	3 N	<i>Rondonia rondoni</i> Travassos, 1920			
			1 M	<i>Monogenea</i> gen. sp.			
<b>Erythrinidae</b>							
<i>Hoplias malabaricus</i>	traíra	20/10	1 N	<i>Contracaecum</i> sp. 1 (if)			
			1 N	<i>Guyanema raphiodoni</i> Moravec, Kohn and Fernandes, 1993			
			3 D	<i>Diplostomidae</i> gen. sp. (mc)			
			1 D	<i>Pseudosellacotyla lutzi</i> (Freitas, 1941)			
			1 M	<i>Monogenea</i> gen. sp.			
<b>Heptapteridae</b>							
<i>Pimelodella gracilis</i>	mandi, roncadador	5/3	1 N	<i>Hysterothylacium</i> sp. (if)			
			1 N	<i>Cucullanus</i> ( <i>C.</i> ) <i>pinnae pinnae</i> Travassos, Artigas and Pereira, 1928			
			2 N	<i>Rondonia rondoni</i> Travassos, 1920 (new host record)			
			1 C	Cestoda gen. sp.			
			1 M	<i>Monogenea</i> gen. sp.			
<i>Pimelodella lateristriga</i>	mandi-chorão, mandi-roncadador	2/2	2 N	<i>Brasilnema pimelodellae</i> Moravec, Kohn and Fernandes, 1992			
			1 N	<i>Cucullanus pimelodellae</i> Moravec, Kohn and Fernandes, 1993			
			2 N	<i>Procamallanus</i> ( <i>Spirocamallanus</i> ) <i>pimelodus</i> Pinto, Fábio, Noronha and Rolas, 1974			
			1 D	<i>Parspina argentinensis</i> (Szidat, 1954)			
<i>Rhamdia quelen</i>	bagre	1/1	1 C	Cestoda gen. sp.			
			1 D	<i>Acanthostomum gnerii</i> Szidat, 1954			
			1 M	<i>Monogenea</i> gen. sp.			
<b>Loricariidae</b>							
<i>Hypostomus</i> aff. <i>albopunctatus</i>	casculo-viola, casculo-ferro	1/1	1 M	<i>Monogenea</i> gen.sp.			
<i>Hypostomus cochliodon</i>	casculo	2/2	2 A	<i>Acanthocephala</i> gen. sp.			

TABLE 1. CONTINUED.

HOSTS	COMMON NAME	E/P	I	HELMINTHS	
<i>Hypostomus regani</i> [= <i>Plecostomus regani</i> ]	cascudo	11/9	1	N	Nematoda gen. sp.
			2	N	<i>Procamallanus (Procamallanus) annipetterae</i> Kohn and Fernandes, 1988
			3	D	<i>Crassicutis intermedius</i> (Szidat, 1954)
			2	A	Acanthocephala gen. sp.
			6	M	Monogenea gen.sp.
<i>Hypostomus ternetzi</i>	cascudo	4/1	1	M	Monogenea gen.sp.
<i>Hypostomus</i> sp. 1	cascudo-pintado	7/1	1	M	Monogenea gen.sp.
<i>Hypostomus</i> sp. 2	cascudo	30/11	2	N	<i>Procamallanus (P.) annipetterae</i> Kohn and Fernandes, 1988
			1	N	<i>Raphidascaris (Sprentascaris) hypostomi</i> (Petter and Cassone, 1984)
			3	D	<i>Crassicutis intermedius</i> (Szidat, 1954)
			1	D	Diplostomidae gen. sp. (mc)
			2	A	<i>Gorytocephalus</i> sp.
<i>Loricaria</i> sp.	cascudo	4/3	1	N	Anisakidae gen. sp. (if)
			1	N	<i>Cucullanus (C.) pinnae pinnae</i> Travassos, Artigas and Pereira, 1928
			1	N	<i>Raphidascaris (S.) mahnerti</i> (Petter and Cassone, 1984)
			2	D	<i>Crassicutis cichlasomae</i> Manter, 1936 (new host record)
			1	D	Diplostomidae gen. sp. (mc)
			1	A	Acanthocephala gen. sp.
			2	M	Monogenea gen. sp.
<i>Loricariichthys platymetopon</i>	cascudo-chinelo	8/8	7	N	<i>Raphidascaris (S.) mahnerti</i> (Petter and Cassone, 1984)
			2	D	Diplostomidae gen. sp. (mc)
			1	M	Monogenea gen.sp.
<i>Loricariichthys rostratus</i>	cascudo-chinelo	7/6	4	N	<i>Raphidascaris (S.) mahnerti</i> (Petter and Cassone, 1984) (new host record)
			1	D	Diplostomidae gen. sp. (mc)
<i>Loricariichthys</i> sp.	cascudo	25/21	1	N	<i>Hysterothylacium</i> sp. (if) of Moravec, Kohn and Fernandes, 1993
			22	N	<i>Raphidascaris (S.) mahnerti</i> (Petter and Cassone, 1984)
			4	D	Diplostomidae gen. sp. (mc)
			2	C	Cestoda gen. sp. (if)
<i>Megalancistrus paranus</i> [= <i>Megalancistrus aculeatus</i> ; <i>Pterygoplichthys aculeatus</i> ]	cascudo-abacaxi	11/8	7	N	<i>Ichthyouris brasiliensis</i> Moravec, Kohn and Fernandes, 1992
			3	N	<i>Procamallanus (P.) annipetterae</i> Kohn and Fernandes, 1988 (new host record)
			1	D	<i>Dadaytrema</i> sp.
			1	D	<i>Genarchella tropica</i> (Manter, 1936) (new host record and first report in South America)
<i>Pseudohemiodon laticeps</i> [= <i>Loricaria laticeps</i> ]	cascudo-chicote	2/2	4	D	<i>Saccocoelioides magnus</i> Szidat, 1954 (new host record)
			2	N	<i>Raphidascaris (S.) mahnerti</i> (Petter and Cassone, 1984)
<i>Pterygoplichthys</i> sp.	cascudo-pintado	1/1	1	D	Diplostomidae gen. sp. (mc)
<i>Rhinelepis strigosa</i> [= <i>Rhinelepis aspera</i> ]	cascudo-preto	6/3	1	D	<i>Dendrorchis</i> sp. (new host record)
			1	N	<i>Parasynodontisia petterae</i> Moravec, Kohn and Fernandes, 1992
			1	M	Monogenea gen.sp.
<b>Parodontidae</b>					
<i>Apareiodon affinis</i>	canivete	18/1	1	M	Monogenea gen. sp.
<b>Pimelodidae</b>					
<i>Bergiaria westermanni</i>	mandi-beiçudo	5/3	2	A	Acanthocephala gen. sp.
<i>Hemisorubim platyrhynchos</i>	jurupoca, jeripoca	5/4	1	D	<i>Sanguinicola</i> sp. (as <i>Pleniella</i> sp. by Fernandes and Kohn, 2001)
			3	C	Cestoda gen. sp.
			1	M	Monogenea gen. sp.
<i>Hypophthalmus edentatus</i>	mapará	19/13	8	N	<i>Hysterothylacium</i> sp. (if)
			9	N	<i>Paracamallanus amazonensis</i> Ferraz and Thatcher, 1992
<i>Iheringichthys labrosus</i>	mandi	19/11	1	M	Monogenea gen. sp.
			1	N	<i>Goezia</i> sp.
			5	N	<i>Procamallanus (S.) pimelodus</i> Pinto, Fábio, Noronha and Rolas, 1974
			2	D	<i>Auriculostoma platense</i> (Szidat, 1954)
			2	D	<i>Parspina</i> sp.
			4	M	Monogenea gen.sp.

TABLE 1. CONTINUED.

HOSTS	COMMON NAME	E/P	I	HELMINTHS
<i>Megalonema platanum</i>	pati, bagre	4/2	1 N	<i>Hysterothylacium</i> sp. (if)
			1 D	<i>Genarchella</i> sp.
<i>Pimelodus maculatus</i>	mandi	29/18	7 N	<i>Cucullanus</i> ( <i>C.</i> ) <i>pinnai pinnai</i> Travassos, Artigas and Pereira, 1928
			1 N	<i>Dichelyne pimelodi</i> Moravec, Kohn and Fernandes, 1997
			2 N	<i>Procamallanus</i> ( <i>S.</i> ) <i>pimelodus</i> Pinto, Fábio, Noronha and Rolas, 1974
			3 D	<i>Auriculostoma platense</i> (Szidat, 1954)
			1 C	<i>Monticellia magna</i> (Rego, Santos and Silva, 1974)
			5 A	<i>Neoechinorhynchus</i> sp.
			6 M	<i>Monogenea</i> gen.sp.
<i>Pimelodus ornatus</i>	mandi	2/2	2 N	<i>Cucullanus</i> ( <i>C.</i> ) <i>pinnai pinnai</i> Travassos, Artigas and Pereira, 1928
			1 D	<i>Genarchella genarchella</i> Travassos, Artigas and Pereira, 1928
<i>Pimelodus</i> sp.	mandi	40/23	2 N	<i>Cucullanus</i> ( <i>C.</i> ) <i>pinnai pinnai</i> Travassos, Artigas and Pereira, 1928
			1 N	<i>Procamallanus</i> ( <i>S.</i> ) <i>inopinatus</i> Travassos, Artigas and Pereira, 1928
			1 N	<i>Raphidascaris</i> ( <i>S.</i> ) sp.
			1 N	<i>Raphidascaris</i> ( <i>S.</i> ) sp. (if)
			1 N	<i>Rondonia rondoni</i> Travassos, 1920
			2 D	<i>Auriculostoma platense</i> (Szidat, 1954)
			4 D	Diplostomidae gen. sp.
			1 A	<i>Acanthocephala</i> gen. sp.
			10 M	<i>Monogenea</i> gen.sp.
			1 N	<i>Oxyuroidea</i> gen.sp.
<i>Pinirampus pirinampu</i>	barbado	17/10	9 C	<i>Rudolphiella piranabu</i> (Woodland, 1934)
<i>Pseudopimelodus mangurus</i> [= <i>Pseudopimelodus roosevelti</i> ]	jaú-sapo, bagre-sapo	2/1	1 D	<i>Iheringtrema iheringi</i> Travassos, 1948
			1 N	Capillariidae gen. sp. 2 of Moravec, Kohn and Fernandes, 1993
			2 N	<i>Contraecum</i> sp. 2 (if) of Moravec, Kohn and Fernandes, 1993
			4 N	<i>Cucullanus pseudoplatystomae</i> Moravec, Kohn and Fernandes, 1993
			1 N	<i>Goezia brasiliensis</i> Moravec, Kohn and Fernandes, 1994
<i>Pseudoplatystoma corruscans</i>	pintado, sorubim	7/7	1 D	<i>Clinostomum marginatum</i> (Rudolphi, 1819) (if)
			1 D	<i>Dadaytrema oxycephala</i> (Diesing, 1836) (new host record)
			1 D	Diplostomidae sp. (mc)
			1 C	<i>Choanoscolex abscissus</i> (Riggenbach, 1895)
			1 C	<i>Harriscolex kaparari</i> (Woodland, 1935)
			1 C	<i>Spasskyelina spinulifera</i> (Woodland, 1935)
			1 M	<i>Monogenea</i> gen. sp.
			1 D	<i>Sanguinicola</i> sp.
<i>Sorubim lima</i>	mandi-chinelo, chinelo, jurupoca	5/4	1 C	<i>Goezeella nupeliensis</i> Pavanelli and Rego, 1991
			1 C	<i>Manaosia bracodemoca</i> Woodland, 1935
			3 C	<i>Paramonticellia itaipuensis</i> Pavanelli and Rego, 1991
			2 N	<i>Cucullanus</i> ( <i>C.</i> ) <i>pinnai pinnai</i> Travassos, Artigas and Pereira, 1928
			1 N	<i>Cucullanus</i> ( <i>Cucullanus</i> ) <i>zungaro</i> Vaz and Pereira, 1934
<i>Zungaro zungaro</i> [= <i>Pseudopimelodus zungaro</i> ; <i>Paulicea luetkeni</i> ]	bagre-sapo, jaú	6/4	1 N	<i>Seuratoidea</i> gen.sp. (if)
			1 D	<i>Iheringtrema iheringi</i> Travassos, 1948
			2 C	<i>Goezeella agostinhoi</i> Pavanelli and Santos, 1992
			1 C	<i>Megathylacus brooksi</i> Rego and Pavanelli, 1985
			1 C	<i>Peltidocotyle rugosa</i> Diesing, 1850
			1 C	<i>Travassielia avitellina</i> Rego and Pavanelli, 1987
			1 C	<i>Travassielia avitellina</i> Rego and Pavanelli, 1987
<b>Potamotrygonidae</b>				
<i>Potamotrygon motoro</i>	raia	5/3	1 N	<i>Procamallanus</i> ( <i>P.</i> ) <i>peraccuratus</i> Pinto, Fábio, Noronha and Rolas, 1976
			1 N	<i>Procamallanus</i> ( <i>S.</i> ) <i>inopinatus</i> Travassos, Artigas and Pereira, 1928
			1 D	<i>Genarchella tropica</i> (Manter, 1936) (new host record and first report in South America)
			3 C	Cestoda gen. sp.
1 M	<i>Monogenea</i> gen.sp.			
<b>Prochilodontidae</b>				
<i>Prochilodus lineatus</i> [= <i>Prochilodus scrofa</i> ]	curimbatá	45/22	1 N	<i>Contraecum</i> sp. 2 (if) of Moravec, Kohn and Fernandes, 1993
			1 N	<i>Spinitectus asperus</i> Travassos, Artigas and Pereira, 1928



TABLE 1. CONTINUED.

HOSTS	COMMON NAME	E/P	I	HELMINTHS	
<i>Prochilodus lineatus</i> [= <i>Prochilodus scrofa</i> ]	curimatá	45/22	10	D	<i>Saccocoeloides nanii</i> Szidat, 1954
			10	D	<i>Saccocoeloides elongatus</i> Szidat, 1954
			10	A	<i>Neoechinorhynchus</i> ( <i>Neoechinorhynchus</i> ) <i>curemai</i> Noronha, 1973
			1	M	Monogenea gen. sp.
<b>Rhamphichthyidae</b>					
<i>Rhamphichthys rostratus</i>	peixe-espada	1/1	1	N	<i>Cucullanus rhamphichthydis</i> Moravec, Kohn and Fernandes, 1997
<b>Sciaenidae</b>					
<i>Plagioscion squamosissimus</i>	corvina	61/53	1	N	<i>Contracaecum</i> sp. 1 (if) of Moravec, Kohn and Fernandes, 1993
			14	N	<i>Hysterothylacium</i> sp. (if) of Moravec, Kohn and Fernandes, 1993
			1	N	<i>Ichthyouris brasiliensis</i> Moravec, Kohn and Fernandes, 1992
			5	N	<i>Paracamallanus amazonensis</i> Ferraz and Thatcher, 1992 (new host record)
			22	D	<i>Austrodiplostomum compactum</i> Lutz, 1928 (mc)
			1	D	<i>Genarchella astyanactis</i> (Watson, 1976) (new host record and first report in South America)
			1	C	Cestoda gen. sp. (if)
9	M	Monogenea gen. sp.			
<b>Sternopygidae</b>					
<i>Eigenmania virescens</i>	tuvira	5/1	1	M	Monogenea gen. sp.
<i>Sternopygus macrurus</i>	sarapó, tuvira	1/1	1	C	Cestoda gen. sp.

TABLE 2. List of freshwater fishes not parasitized recorded in reservoir of the Hydroelectric Power Station of Itaipu, Parana, Brazil.

FISHES	COMMON NAME	N
<b>Anostomidae</b>		
<i>Leporinus</i> sp.	piau, piava	10
<i>Schizodon altoparanae</i>	piau	4
<i>Schizodon nasutus</i>	piau, timborê	1
<b>Auchenipteridae</b>		
<i>Ageneiosus inermis</i> [= <i>A. brevifilis</i> ]	perna de moça	1
<i>Ageneiosus ucayalensis</i>	mandubé, mandi-leiteiro	1
<b>Callichthyidae</b>		
<i>Callichthys callichthys</i>	casquinho, tamoatá	1
<b>Characidae</b>		
<i>Moenkhausia intermedia</i>	viuvinha	2
<b>Cichlidae</b>		
<i>Oreochromis niloticus niloticus</i>	tilápia	1
<i>Tilapia rendalli</i>	tilápia	1
<b>Curimatidae</b>		
<i>Curimata</i> sp.	papa-terra	1
<b>Doradidae</b>		
<i>Rhinodoras dorbignyi</i>	armado	1
<b>Gymnotidae</b>		
<i>Gymnotus carapo</i>	sarapó, morenita	1
<b>Loricariidae</b>		
<i>Ancistrus cirrhosus</i>	casco-roseta	2
<i>Hypostomus luteomaculatus</i>	casco-amarelo	2
<i>Hypostomus margaritifer</i>	casco	1
<i>Hypostomus</i> sp. 3	casco-tarzã	5
<b>Parodontidae</b>		
<i>Parodon tortuosus</i>	canivete	6
<b>Pimelodidae</b>		
<i>Pimelodus fur</i>	mandi-prata	1
<b>Rivulidae</b>		
<i>Rivulus</i> sp.	charuto	1
<b>Sternopygidae</b>		
<i>Eigenmannia trilineata</i>	tuvira	1

**ACKNOWLEDGMENTS:** The authors are grateful to the directorate of the "Itaipu Binacional", in special to the "Superintendência de Gestão Ambiental" and to the staff of the "Divisão de Reservatório", for the facilities offered to examine the fishes, to Mariana dos Santos Lopes from the "Laboratório de Helminthos Parasitos de Peixes, Instituto Oswaldo Cruz" for helping us both in field and laboratory. A. Kohn was supported by a research fellowship (I) and S.C. Cohen was supported by a research grant (no. 461719/2008-6) from the "Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq."

**LITERATURE CITED**

- Baptista-Farias M.F.D., A. Kohn and S.C. Cohen. 2001. Ultrastructure of spermatogenesis and sperm development in *Saccocoeloides godoyi* Kohn & Fróes, 1986 (Digenea, Haploporidae). *Memórias do Instituto Oswaldo Cruz* 96(1): 61-70.
- Cohen S.C. and A. Kohn. 2008a. A new species of the genus *Notozothecium* (Monogenea, Dactylogyridae) parasitizing the gills of *Raphiodon vulpinus* (Cyprinodontidae, Characiformes) from the Paraná River, State of Paraná, Brazil. *Revista Mexicana de Biodiversidad* 79: 21S-24S.
- Cohen S.C. and A. Kohn. 2008b. New data on species of *Demidospermus* (Dactylogyridae, Monogenea) parasitizing fishes from the reservoir of the Itaipu Hydroelectric Power Station, Paraná State, Brazil, with new synonymies. *Revista Brasileira de Parasitologia Veterinária* 17: 167-170.
- Cohen S.C. and A. Kohn. 2009. On Dactylogyridae (Monogenea) of four species of characid fishes from Brazil. *Checklist* 5 (2): 351-356.
- Cohen S.C., A. Kohn and M.F.D. Baptista-Farias. 2001. Ultrastructure of the tegument of *Saccocoeloides godoyi*. *Journal of Helminthology* 75: 15-21.
- Dogiel V.A. 1970. Ecology of the parasites of freshwater fishes. ; p. 1-47 In: Dogiel, V.A., Petrushevski, G.K., Polyanski, Y.I. (eds). *Parasitology of fishes*. London: Olivier & Boyd, Cap. 1.
- Eiras J.C., R.M. Takemoto and G.C. Pavanelli. 2010. *Diversidade dos parasitas de peixes de água doce do Brasil*. Maringá: Clhetec. 333 p.
- Fernandes B.M.M. and A. Kohn. 2001. On some trematodes parasites of fishes from Paraná. River. *Brazilian Journal of Biology* 61 (3): 461-466.
- Froese R. and D. Pauly. 2010. *Fish Base. World Wide Web Electronic Publication*. Electronic database accessible at www.fishbase.org. version 07/2010. Captured on 30 July 2010.
- Graça W.J. and C.S. Pavanelli. 2007. *Peixes da planície de inundação do alto rio Paraná e áreas adjacentes*. Maringá: EDUEM. 241 p.
- Kohn A., M.F.D. Baptista-Farias and S.C. Cohen. 2000. *Paranaella luquei* gen. et sp. n. (Monogenea: Microcotylidae) parasite of Brazilian catfishes. *Folia Parasitologica* 47: 279-283.
- Kohn A. and B.M.M. Fernandes. 1994. *Rhipidocotyle gibsoni* n. sp. from a Brazilian freshwater fish and *Rhipidocotyle froesi* n. sp. for *R. baculum* (Linton, 1905) of Eckmann (1932) (Bucephalidae: Digenea). *Memórias do Instituto Oswaldo Cruz* 89: 567-570.

- Kohn A. and B.M.M. Fernandes. 2006. Redescription of *Rhipidocotyle jeffersoni* (Kohn, 1970) Overstreet & Curran, 2002 (Digenea; Bucephalidae). *Zootaxa* 1193: 41-47.
- Kohn A., B.M.M. Fernandes and M.F.D. Baptista-Farias. 1995. Metacercariae of *Diplostomum* (*Austrodiplostomum*) *compactum* (Trematoda, Diplostomidae) in the eyes of *Plagioscion squamosissimus* (Teleostei, Sciaenidae) from the reservoir of the Hydroelectric Power Station of Itaipu, Brazil. *Memórias do Instituto Oswaldo Cruz* 90: 341-344.
- Kohn A., B.M.M. Fernandes, M.F.D. Baptista-Farias, S.C. Cohen, D.R. Fernandez and C. Canzi. 2003. Helminths em peixes do reservatório de Itaipu e áreas de influência. *Revista Brasileira de Medicina Veterinária* 25: 148-153.
- Kohn A., B.M.M. Fernandes and D.I. Gibson. 1999. *Chalcinotrema thatcheri* n. sp. (Digenea: Haploporidae) from Brazilian freshwater fishes, a redescription of *C. ruelasueltensis* Thatcher, 1978 and comments on the validity of the genus. *Systematic Parasitology* 44: 211-215.
- Lopes, M.S., B.M.M. Fernandes, S.C. Cohen and A. Kohn. 2011. New hosts for two species of Acanthocephala of fishes from Paraná River, State of Paraná, Brazil. *Revista Brasileira de Zoociências* 13 (in press).
- Luque J.L. and R. Poulin. 2008. Linking ecology with parasite diversity in Neotropical fishes. *Journal of Fish Biology* 72: 189-204.
- Machado P. M., R.M. Takemoto and G.C. Pavanelli. 2005. *Diplostomum* (*Austrodiplostomum*) *compactum* (Lutz, 1928) (Platyhelminthes, Digenea) metacercariae in fish from the floodplain of the Upper Paraná River, Brazil. *Parasitology Research* 97:436-444.
- Moravec F., A. Kohn and B.M.M. Fernandes. 1990. First record of *Raphidascaris* (*Sprentascaris*) *hypostomi* (Petter et Cassone, 1984) comb. n. and *R. (S.) mahnerti* (Petter et Cassone, 1984) comb. n. (Nematoda, Anisakidae) from Brazil with remarks on the taxonomic status of the genus *Sprentascaris* Petter et Cassone, 1984. *Folia Parasitologica* 37: 131-140.
- Moravec F., A. Kohn and B.M.M. Fernandes. 1992a. *Neoparaseuratium travassosi* n. g., n. sp. (Nematoda: Quimiperidae), a new parasite from thorny catfish *Pterodoras granulosus* in Brazil. *Memórias do Instituto Oswaldo Cruz* 87, supl. I: 145-150.
- Moravec F., A. Kohn and B.M.M. Fernandes. 1992b. Three new species of oxyuroid nematodes, including two new genera from freshwater catfishes in Brazil. *Systematic Parasitology* 21: 189-201.
- Moravec F., A. Kohn and B.M.M. Fernandes. 1992c. Nematode parasites of fishes of the Paraná River, Brazil. Part 1. Trichuroidea, Oxyuroidea and Cosmocercoidea. *Folia Parasitologica* 39: 327-353.
- Moravec F., A. Kohn and B.M.M. Fernandes. 1993a. Nematode parasites of fishes of the Paraná River, Brazil. Part 2. Seuratoidea, Ascaridoidea, Habronematoidea and Acuarioidea. *Folia Parasitologica* 40: 115-134.
- Moravec F., A. Kohn and B.M.M. Fernandes. 1993b. Nematode parasites of fishes of the Paraná River, Brazil. Part 3. Camallanoidea and Dracunculoidea. *Folia Parasitologica* 40: 211-229.
- Moravec F., A. Kohn and B.M.M. Fernandes. 1993c. *Travassosnema travassosi paranaensis* subsp. n. and first description of the female of *Guyanema raphiodoni* Moravec, Kohn & Fernandes, 1993 (Nematoda: Guyanemidae), dracunculoid parasites of characid fishes in Brazil. *Annales de Parasitologie Humaine et Comparée* 68: 229-233.
- Moravec F., A. Kohn and B.M.M. Fernandes. 1994a. Two new species of the genus *Goezia*, *G. brasiliensis* sp. n. and *G. brevicaeca* sp. n. (Nematoda: Anisakidae), from freshwater fishes in Brazil. *Folia Parasitologica* 41: 271-278.
- Moravec F., A. Kohn and B.M.M. Fernandes. 1994b. 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. *Journal of Helminthology* 68: 319-322.
- Moravec F., A. Kohn and B.M.M. Fernandes. 1997. New observations on seuratooid nematodes parasitic in fishes of the Paraná River, Brasil. *Folia Parasitologica* 44: 209-223.
- Pavanelli G. C., M.H. Machado and R.M. Takemoto. 1997. Fauna helmíntica de peixes do rio Paraná, região de Porto Rico, Paraná; p. 307-329. In A.A.E.A.M. Vazzoler, A.A. Agostinho and N.S. Hahn. *A planície de inundação do alto rio Paraná: aspectos físicos, biológicos e sócio-econômicos*. Maringá: Ed. Universidade Estadual de Maringá.
- Takemoto R. M., G.C. Pavanelli, M.A.P. Lizama, A.C.F. Lacerda, F.H. Yamada, L.H.A. Moreira, T.L. Ceschini and S. Bellay. 2009. Diversity of parasites of fish from the Upper Paraná River floodplain, Brazil. *Brazilian Journal of Biology* 69: 691-705.
- Yamada F.H., L.H.A. Moreira, T.L. Ceschini, R.M. Takemoto and G.C. Pavanelli. 2008. Novas ocorrências de metacercária de *Austrodiplostomum compactum* (Lutz, 1928) (Platyhelminthes: Digenea) parasito de olhos de peixes da Bacia do rio Paraná. *Revista Brasileira de Parasitologia Veterinária* 17:163-168.

RECEIVED: March 2011

LAST REVISED: August 2011

ACCEPTED: September 2011

PUBLISHED ONLINE: October 2011

EDITORIAL RESPONSIBILITY: Inga Ludmila Veitenheimer Mendes