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EDITORIAL

HELMINTH FAUNA OF FISHES FROM THE UPPER PARANÁ RIVER FLOODPLAIN, BRAZIL

FAUNA HELMÍNTICA DE PECES DE ALTA PLANICIE DEL RÍO PARANÁ, BRASIL

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The Paraná River is formed by junction of the Grande and Paranaíba Rivers and is the principal river of the La Plata basin. From source to mouth in the La Plata River estuary, the Paraná River flows for approximately 4,695 km (Petri & Fúlfaro, 1985) and drains most of South-Central South America. There are several dams in the main channel and tributaries of the Paraná River, but a floodplain still remains with a complex of tributaries, side channels, lakes, and marginal dikes (Stevaux, 1994; Souza Filho, 2009). This floodplain extends to the States of Paraná and Mato Grosso do Sul, encompassing areas of the Ilha Grande National Park, the Ivinheima State Park and the Environmental Protection Area (APA) of the islands and floodplain of the Paraná River (Figure 1).

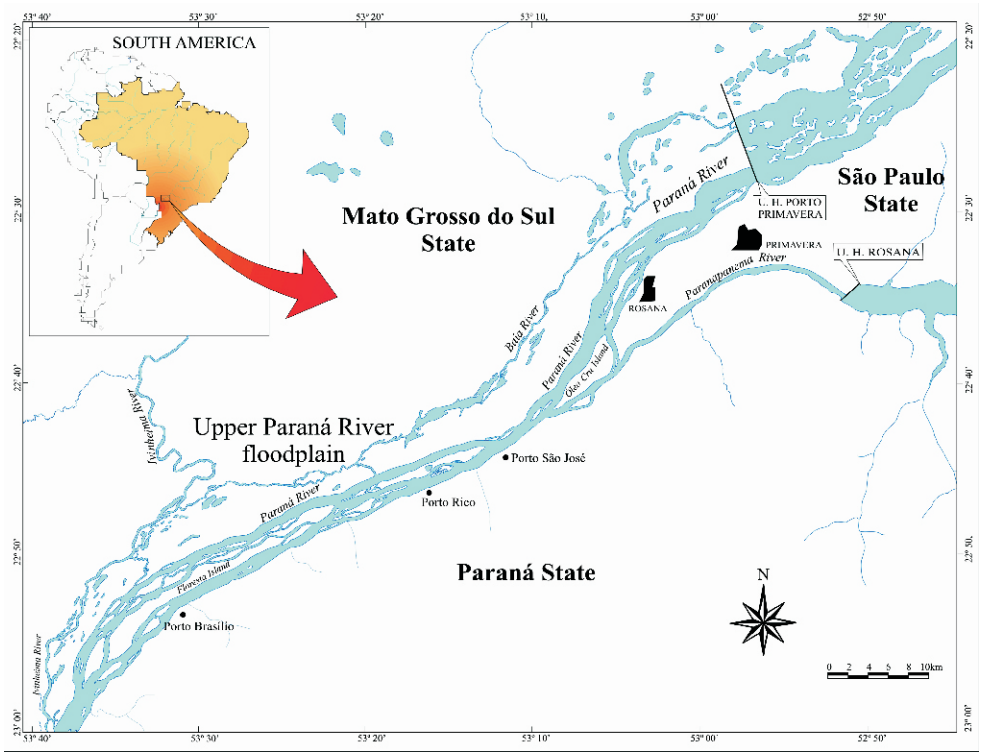

Figure 1. Map of the Upper Paraná River floodplain located in the States of Paraná and Mato Grosso do Sul, Brazil.

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Among the disturbances acting on this floodplain, one of the most serious is the Porto Primavera Dam that was constructed in 1998 along the border between the States of São Paulo and Mato Grosso do Sul. This dam reduced the length of the floodplain from 480 to 230 km (Agostinho *et al.*, 2004; 2008), and altered the seasonal flood regime. Recently, the Upper Paraná River floodplain was incorporated into the Biosphere Reserve of the Atlantic Forest- MAB/UNESCO (Agostinho *et al.*, 2004), and this study site has been included in the Brazilian Long-Term Ecological Research Program since 1999 (PELD/CNPq - Site 6).

Floods can alter the population dynamics of the ichthyofauna, as well as their physiological and biological conditions, thereby influencing the structure and composition of the parasitic fauna. In addition, chemical and physical variables of the water such as dissolved oxygen, temperature and turbulence can contribute to the emergence and increase in the population of some parasite species (Pavanelli *et al.,* 1997).

The parasite fauna of freshwater fish may have different compositions depending on the host species, the level of this host in the food chain, their age, size, sex, and other biotic and abiotic factors. Therefore, the floodplain of the Paraná River, characterized by a wide variety of habitats and species (182 fish species recorded by Pavanelli *et al.,* 2004), favors the occurrence of a wide variety of fish parasites.

The parasite fauna of fish from the upper Paraná River floodplain was previously detailed by Pavanelli *et al.* (1997, 2004) and recently by Takemoto *et al.* (2009). Among the fish parasites recorded in the Upper Paraná River floodplain, helminthes have the greatest number of species. At the moment 304 species were recorded, including Monogenea, Digenea, Cestoda, Nematoda and Acanthocephala.

The highest number of host-helminthes parasite associations in the floodplain was recorded for the fishes curimba, *Prochilodus lineatus (Valenciennes, 1837)* (Prochilodontidae) and piau, *Leporinus friderici* Bloch, 1794 (Anostomidae), which had 25 records each.

This result confirms the results obtained by Takemoto *et al.* (2005), who found that the host population density is the major determinant of endoparasite species richness in the fishes of the floodplain. Curimba and piau are abundant species in the floodplain.

Class Monogenea presented de highest number of species with 95 (Figure 2), including species that parasitize the gills, nostrils, and urinary bladder. The monogeneans are characterized by presenting a relatively high degree of host specificity in comparison to other groups of parasites. The number of species recorded in this class tends to increase in the floodplain, since previous studies showed high species richness in all fish species.

Of the 304 helminthes species reported in the Upper Parana River floodplain, 40 were described as new species. The cestodes presented the greatest number of new species with 20 species, followed by Monogenea with 16 new species, Digenea with three new species and Acanthocephala with only one new species. No new species of nematodes has been described in the floodplain.

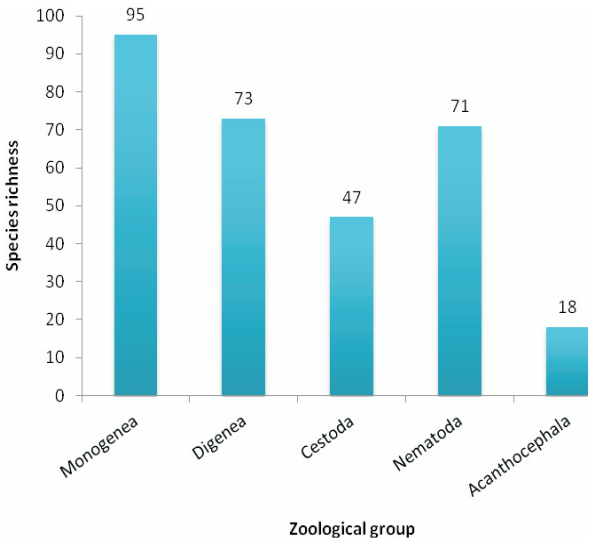

Figure 2. Species richness of fish helminthes parasites according to zoological group reported in the Upper Paraná River floodplain.

Digenea and Nematoda showed 73 and 71 species, respectively. This high number of species is due to the fact that fish may act as intermediate hosts harboring larval forms, or as definitive host harboring the adult forms. Moreover, most of the analyzed fish occupy intermediate positions in the food chain and can be infected in both ways.

The small fish species considered fodder, such as *Aphyocharax anisitsi* Eigenmann & Kennedy, 1903, *Psellogrammus kennedyi* (Eigennann, 1903), *Hemigrammus marginatus* Ellis, 1911 and *Moenkhausia aff. sanctaefilomenae* Steindachner, 1907 were parasitized by several species of parasites in the larval stage, showing that these fish act mainly as intermediate hosts of several species of helminthes, as they serve as food for other fish species and several groups of animals, which are considered definitive hosts, completing the cycle of the parasites. However, these species also harbor some species of parasites in adult stage.

Nematodes in general have low host specificity, mainly at the larval stage. The larva of *Contracaecum* sp. was found in 17 different species of fish. This nematode belongs to the family Anisakidae that has great public health significance because of its zoonotic potential. However, no records of this zoonotic disease in the studied region is probably due to the fact that this parasite is located in the mesentery, which is not used for human consumption. The nematode *Procamallanus* (*Spirocamallanus*) *inopinatus* Travassos, Artigas & Pereira, 1928) that parasitize the fish in the adult stage, also has low specificity and was collected in nine different species of fish *Serrasalmus marginatus* Valenciennes, 1837, *S. maculatus* (Kner, 1958), *Schizodon borelli* (Boulenger, 1900), *Hoplias aff. malabaricus* (Bloch, 1794), *Metynnis lippincottianus* (Cope, 1870), *Leporinus elongatus* Valenciennes, 1850, *L. obtusidens* Valenciennes, 1847, *L. lacustris* Amaral Campos, 1945 and *L. friderici* Bloch, 1794.

Studies on taxonomic and systematic approaches are important to understand how biotic and abiotic factors affect the species, since it is not possible to understand the effects on population, without knowing the species. The study of the helminth fauna of fishes from the floodplain may be considered initial, considering that from the 184 recorded fish species, only 89 were examined for parasites. This shows that many studies will be necessary to know the entire parasite fauna.

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