

***Paranaella luquei* (Monogenea: Microcotylidae), an ectoparasite from the gills of *Steindachnerina brevipinna*, in the tributaries Corvo and Guairacá, Paranapanema River, Paraná, Brazil**

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Summary

Paranaella luquei is a monogenean from family Microcotylidae, which was found parasitizing the gills of *Steindachnerina brevipinna* (Eigenmann & Eigenmann, 1889), collected in two different tributaries of Paranapanema River, Paraná, Brazil. This parasite was the first species of Microcotylidae described parasitizing freshwater fishes (*Hypostomus* sp., *Hypostomus regani* (Ihering) and *Rhinelepis aspera* Spix & Agassiz (Loricariidae) in the country.

Keywords: *Paranaella*; *Steindachnerina brevipinna*; Microcotylidae; Corvo; Guairacá

Introduction

Family Microcotylidae is composed mostly of marine monogeneans and was first described in 1879 by Taschenberg, comprising eight subfamilies and 39 genera (Mamaev, 1986). According to Kohn and Cohen (1998) and Kohn and Paiva (1999), only 15 species of nine genera were recorded for South America, 14 from salt water and one from brackish water.

Kohn *et al.* (2000) described one species and one genus for a freshwater fish, *Paranaella luquei*, which was found in three species of hosts: *Hypostomus* sp., *Hypostomus regani* (Ihering) and *Rhinelepis aspera* Spix & Agassiz (Loricariidae), in Itaipu reservoir, Paraná River. It is considered the first record of the family Microcotylidae in freshwater in Brazil.

This species was recently found parasitizing the gills of *Steindachnerina brevipinna* near the reservoir of Rosana's hydropower plant, in tributaries of Paranapanema River.

There are no publications of parasitological studies related to this fish, but only a record of endoparasites of the genus *Diplostomum* sp. for *Steindachnerina insculpta* (Pavanelli

et al., 2004), an endemic species of the upper Paraná River (Pavanelli & Britski, 1999).

Materials and methods

The reservoir of Rosana's hydropower plant is located in the lower Paranapanema River (22° 36' S; 52° 52' W), with 27,600 ha of flooded area. It is a reservoir with residence time of 18.6 days and little depth, being an intermediary environment between lentic and lotic, influenced by the flow control. Tributaries Corvo and Guairacá were chosen for the study and sampling of specimens because they are influenced by the flow control of Rosana's hydropower plant.

Sampling of fishes used gill nets with different mesh sizes (measured between nodes not adjacent) for a period of 24 hours with collections at every eight hours.

Techniques used for sampling and treatment of parasites were proposed by Eiras *et al.* (2006), and carmim and Gomori's tricromic colorants were used.

Measurements were standardized and given in micrometers, unless otherwise stated. Illustrations were made with the help of a drawing tube attached to Nikon microscope YS 2 Voucher specimens were deposited in Coleção Helmintológica do Instituto Oswaldo Cruz (CHIOC), Rio de Janeiro, Brazil.

Results

Description: Based on 15 mature specimens. Body elongate, 2.5 mm – 5.45 mm (3.27 mm) in total length, 1.05 mm – 2.25 mm (1.52 mm) in width at level of ovary. Haptor distinguished from body, triangular, 1.02 mm – 1.50 mm (1.15 mm) long. Clamps formed by two individual and sclerotized parts, connected by a basal membrane,

arranged in two marginal rows, parallel and unequal: 35 – 46 in right side and 25 – 37 in left side. Clamps with small variation of size, depending on their position, with three distinguished regions: anterior 57.60 – 88.80 (75.4) width, 24 – 48 (36.38) length; median 48 – 96 (74.78) width, 24 – 43.2 (33.96) length; and posterior 52.80 – 84 (66.72) width, 19.20 – 38.40 (33.91) length. Body compact, with great quantity of vitellaria well developed and pigmented granules, extending from the lateral margins to the central region, with light reduction in the anterior extremity. One

pair of buccal organs, located in the anterior extremity with 60 – 135 (88.36) width, 60 – 120 (83.36) length, without spicules, right above a muscular pharynx 14.40 – 96 (61.23) width, 21.60 – 103.20 (60.30) long, connected to a thin esophagus that bifurcates before the genital atrium. Intestine ramified, co-extensive with vitellaria, extending to haptor. Testes 6 – 12 (8.48) in number, compact, median-posterior, close to haptor. Cirrus not observed. Genital atrium 115.20 – 192 (159.42) width, 98.20 – 177.60 (136.48) length, right under esophagus bifurcation, with

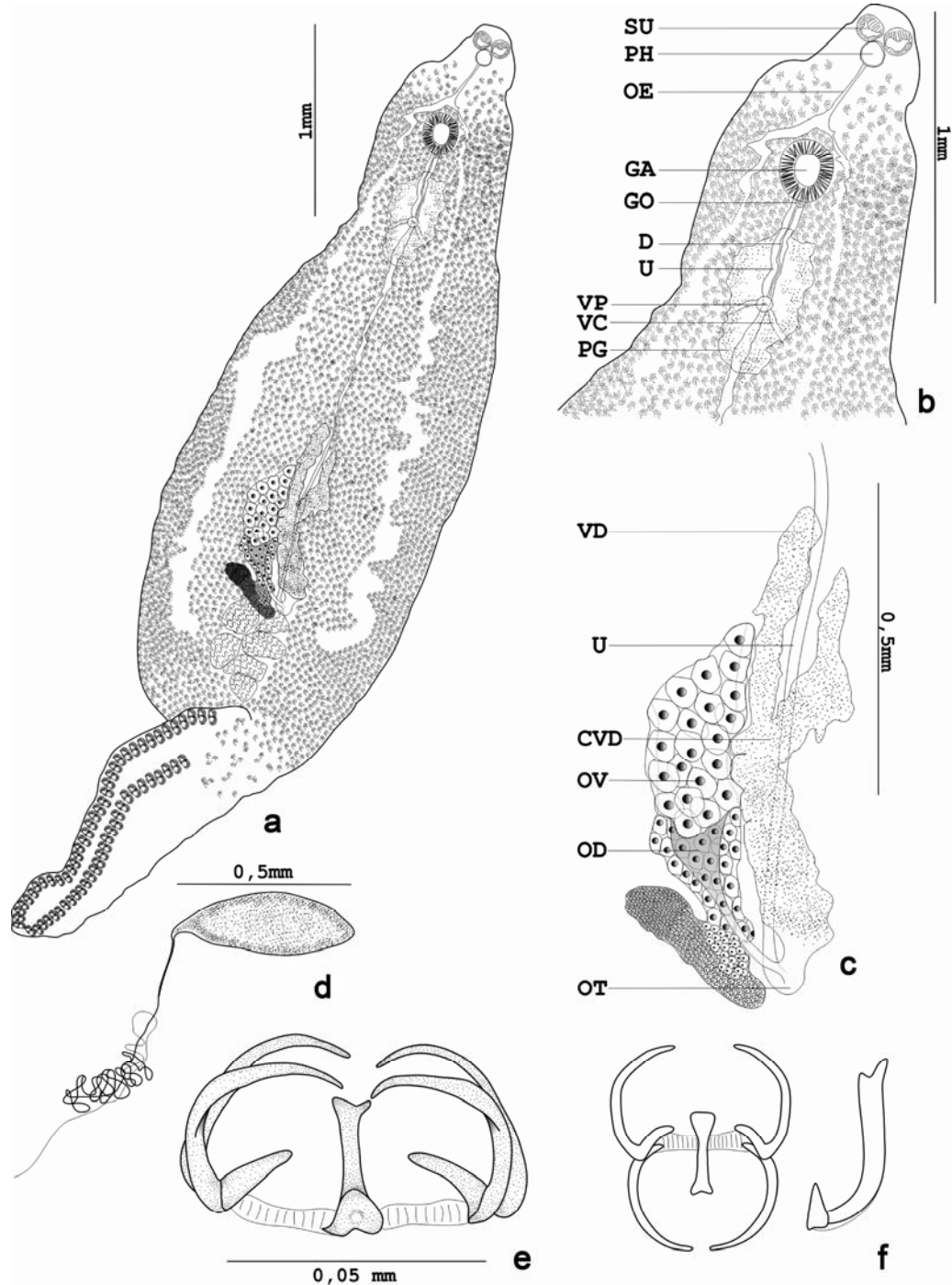


Fig. 1. **a:** Ventral view. **b:** SU - suckers; PH - pharynx; OE - oesophagus; GA - genital atrium; GO - male genital opening; D - vas deferens; U - uterus; VP - vaginal pore; VC - vaginal canal; PG - prostatic glands. **c:** ovary ventral view; VD - vitelloduct; U - uterus; CVD - common vitelloduct; OV - ovary; OD - oviduct; OT - ootype. **d:** egg. **e, f:** clamp.

radial muscles with 65 – 92 (78) thin spicules, with length of 24 – 36 (28.99), alternated in depth, along the entire margin. Ovary median, pre-testicular, with tubules overlapping in the anterior region, descending into the medial region and connecting to a sinuous oviduct that decreases its diameter until it finds the ootype, where it also connects with the common vitellogoduct (that bifurcates anteriorly into vitellogoducts with blind end above the ovary) and uterus. Uterus extends medially to the genital atrium. Vaginal pore medium-dorsal, located approximately 1 mm from the anterior extremity and divided into tubules that go towards vitellaria. Masculine pore right after the genital atrium. Eggs oval shaped, opercular opening not visible, length 450 – 550 (500), width 170 – 190 (180), with a long filament in the posterior region (Fig.1).

Taxonomic summary

Type host: *Steindachnerina brevipinna* (Eigenmann & Eigenmann, 1889).

Infection site: gill filaments.

Type locality: tributaries Corvo and Guairacá, Paranaema River, Paraná, Brasil.

Voucher specimens: CHIOC: N° 37264, 37265

Examined material: CHIOC: Paratypes N° 33.954 b-i, 33.955a-b, 33.956, 33.957, 34.203 a-b e 34.204 a-b.

Mean Intensity of infection: 2.7.

Prevalence: 26.98 %.

Discussion

By presenting asymmetrical haptor with clamps, genital atrium with spicules, numerous testes, absence of terminal anchors, ovary pre-testicular, vitellaria co-existing with intestine and eggs with a long filament in the posterior region, make this species close to the family Microcotylidae.

According to Taschenberg, (1879) *apud* Yamaguti (1963), organisms belonging to that family were found exclusively in marine teleost fishes.

The first record of this family for freshwater fishes was in 1918, in the gills of *Aplodinotus grunniens* in the United States (MacCallum, 1918); over the years they have been found in other countries like Mexico (Bravo-Hollis & Jiménez, 1983), Chile (Oliva & Munoz 1985; Fernandez, 1987), Peru (Tantalean, 1974; Tantalean *et al.*, 1982; Luque, 1994) and Venezuela (Conroy *et al.*, 1995). *Paranaella luquei* was the first and only species from this family described for three different freshwater fishes in Brazil (Kohn *et al.*, 2000).

The presence of a genital atrium formed by a muscular ring with numerous spicules, elongated and organized, excludes this species from the genus *Microcotyle* and fits the genus *Paranaella*, in addition to their morphological similarity.

Paranaella luquei from *S. brevipinna* (Fig. 1) differs from original described mainly by having: smaller body length (mean 3.27 against 5.9 mm); being internal structures arranged more compact or massive than *P. luquei* described from original work, the number of testes is lower (mean 8

against 19); ovary in this parasite specie overlaps in the final region, which is not the case for original described.

Hosts of related parasites belong to distinct orders, *Steindachnerina brevipinna* (Characiformes) and *Hypostomus* sp., *Hypostomus regani* and *Rhinelepis aspera* (Siluriformes). One relation between these hosts is regarding feeding habits, all species are considered detritivorous (Hahn *et al.*, 2004), and are also inhabiting rivers from the same hydrographic basin (Paraná Basin). However, *S. brevipinna* and *H. regani* originally belongs to Prata River Basin and was established in the region only after the flooding of Sete Quedas Falls by the construction of Itaipu's reservoir (Graça & Pavanelli, 2007; Prioli *et al.*, 2004). Therefore, there is a possibility that fishes have come into contact with parasites before the flooding, since Prata River discharges into the Atlantic Ocean. Also, the monogenean possibly had gone through a slow and cumulative process where mutations and selections led to the adaptive success in the transition from marine to freshwater habitats.

Steindachnerina brevipinna is an exclusive freshwater fish, small sized and with a maximum length recorded of 160 mm (Graça & Pavanelli, 2007), which is why parasites occupied a large space in the gills and were found up to eight specimens in a single host. Therefore, these parasites can cause damage to the host. In a large quantity these organisms would eventually interfere in the water flow between gill filaments, then reducing the oxygen needed to maintain its dynamic balance, even leading to death by anoxia or predation. This probably could occur because most parasites observed occupied a position which involved a large quantity of gill filaments. They were fixed, with the haptor directed to the branchial arches and the front part of the body folded over several filaments.

Another interesting fact observed was that the gills of these fish did not harbor any other species of monogenean, there was only one record of the protozoan *Henneguya* sp. However Lizama *et al.* (2005), noted that *Prochilodus lineatus* (Valenciennes, 1836), a common fish in Paraná River that has the same feeding habits of *S. brevipinna*, proved to be quite broad regarding the number of species of branchial ectoparasites, a total of six.

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