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New species of *Tereancistrum* (Dactylogyridae) monogenean parasites of *Schizodon borellii* (Characiformes, Anostomidae) from Brazil, and emended diagnosis for *T. parvus*

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ABSTRACT. *Tereancistrum paranaensis* sp. n. is described from the gills of *Schizodon borellii* (Boulenger 1900) (Characiformes) from the upper Paraná river floodplain, Brazil. The new species is mainly characterized by morphology of copulatory complex, dorsal anchor with shaft recurved and pointed and arc-shaped dorsal bar. *Tereancistrum parvus* was described based on only one specimen and some characteristics were not observed. Now we provide an emendation to the diagnosis of this species.

Keywords: Dactylogyridae, ectoparasite, fish, piava, floodplain, Brazil.

Nova espécie de *Tereancistrum* (Dactylogyridae) monogenea parasita de *Schizodon borellii* (Characiformes, Anostomidae) do Brasil, com emenda da diagnose de *T. parvus*

RESUMO. *Tereancistrum paranaensis* sp. n. é descrito de brânquias de *Schizodon borellii* (Boulenger 1900) (Characiformes) da planície de inundação do alto rio Paraná, Brasil. A nova espécie é caracterizada principalmente pela morfologia do complexo copulatório, âncora dorsal com lâmina curvada e pontiaguda e barra dorsal em forma de arco. *Tereancistrum parvus* foi descrito baseado em somente um espécime e não foram observadas algumas características. Neste estudo, além da descrição de uma espécie, uma emenda na diagnose de *T. parvus* é apresentada.

Palavras-chave: Dactylogyridae, ectoparasitos, peixes, piava, Planície de inundação, Brasil.

Introduction

Schizodon borellii (Boulenger 1900), popularly known as "piava" (GRAÇA; PAVANELLI, 2007), is a fish of the order Characiformes with total length 30 cm and 2 kg. Its distribution area comprises the Paraná-Paraguay Basin, in South America (GARAVELLO; BRITSKI, 2003).

Tereancistrum was proposed by Kritsky et al. (1980) for parasites collected in Colombia and Brazil. Six species are described for this genus: *Tereancistrum kerri* Kritsky et al. 1980 from *Brycon melanopterus* (Cope, 1872); *Tereancistrum ornatus* Kritsky et al. 1980 from *Prochilodus reticulatus* Valenciennes, 1850; *Tereancistrum parvus* Kritsky et al. 1980 from *Leporinus fasciatus* Bloch 1974; *Tereancistrum toksonum* and *Tereancistrum curimba* Lizama et al. 2004 from *Prochilodus lineatus* (Valenciennes 1837) and *Tereancistrum arcuatus* Cohen et al. 2012 from *Salminus brasiliensis*.

In the present study, a new species of *Tereancistrum* is described from the gills of *S. borellii* from the upper Parana river floodplain, Brazil, and an emended diagnosis for *T. parvus* is also presented.

Material and methods

Sixteen specimens of *S. borellii* were collected from September 2006 to September 2007 using gill nets in the upper Paraná river floodplain (22º50' – 22º70'S; 53º15' – 53º40'W), South Brazil. Monogenea were removed from the gills under stereomicroscope, killed in a 1:4000 formalin solution and preserved in 5% formalin. Some specimens were mounted in Hoyer's medium to study the sclerotized structures. Other specimens, stained with Gomori's trichrome, were used to observe the internal organs (EIRAS et al., 2006). Measurements are in micrometres, with means followed by the range and number (n) of specimens measured in parentheses. Illustrations were prepared

with the aid of a drawing tube connected to a Nikon YS 2 microscope. Ecological terminology is based on Bush et al. (1997). Numbering (distribution) of haptoral hook pairs follows Mizelle (1936) and the description of coiled tube of male copulatory organ follows Kritsky et al. (1985). Vouchers specimens were deposited in the Instituto Oswaldo Cruz Collection (CHIOC), Rio de Janeiro, Rio de Janeiro State, Brazil.

Results

Dactylogyridae Bychowsky, 1933

Tereancistrum Kritsky, Thatcher and Kayton (1980)

***Tereancistrum paranaensis* sp. n.** (Figures 1 and 2)

Type-host: *Schizodon borellii* (Boulenger 1900) Anostomidae

Site: gill filaments

Type-locality: upper Paraná river floodplain; Brazil (22º50' – 22º70'S, 53º15' – 53º40'W)

Specimens deposited: holotype, CHIOC 37868; and paratypes, CHIOC 37866, CHIOC 37867

Prevalence: 31.25% (examined fish 16, infested fish 5)

Mean Intensity: 1.2 parasites per parasitized host (Standard deviation: 0.68)

Specimens studied: 6 specimens in Hoyer's medium and 4 stained with Gomori's trichrome.

Etymology: the specific name refers to the Paraná river, where the parasite was collected.

Description**:** Body elongate, fusiform, length 322.4 (247–360; n = 3), greater width 140.6 (76.8–216; n = 5) in posterior half. Tegument thin and smooth. Cephalic region with two incipient lateral lobes on each side. Cephalic glands, head organs well developed, lying in four bilateral groups, dorsal-posteriorly to pharynx. Eyes 2; a few accessory granules in some specimens, in the cephalic area. Pharynx subspherical, muscular, 20.9 (20.6–32.3; n = 5) in diameter; oesophagus short bifurcated in two intestinal crura, confluent posteriorly. Peduncle short; haptor posterior, sub-rectangular. Hooks 11.1 long and similar; each with robust thumb, recurved point; inflated proximal portion of shank; filamentous hook loop approximately 1/3 shank length.

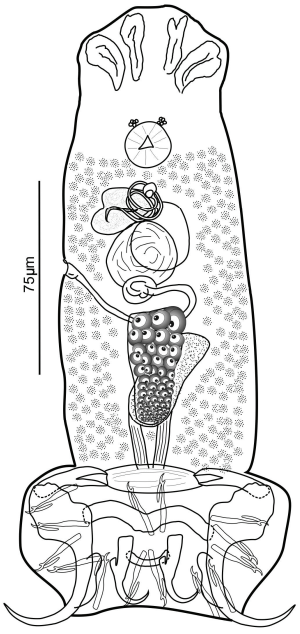

Figure 1. *Tereancistrum paranaensis* sp. n. from *Schizodon borellii*. Composite drawing of whole-mount (ventral view).

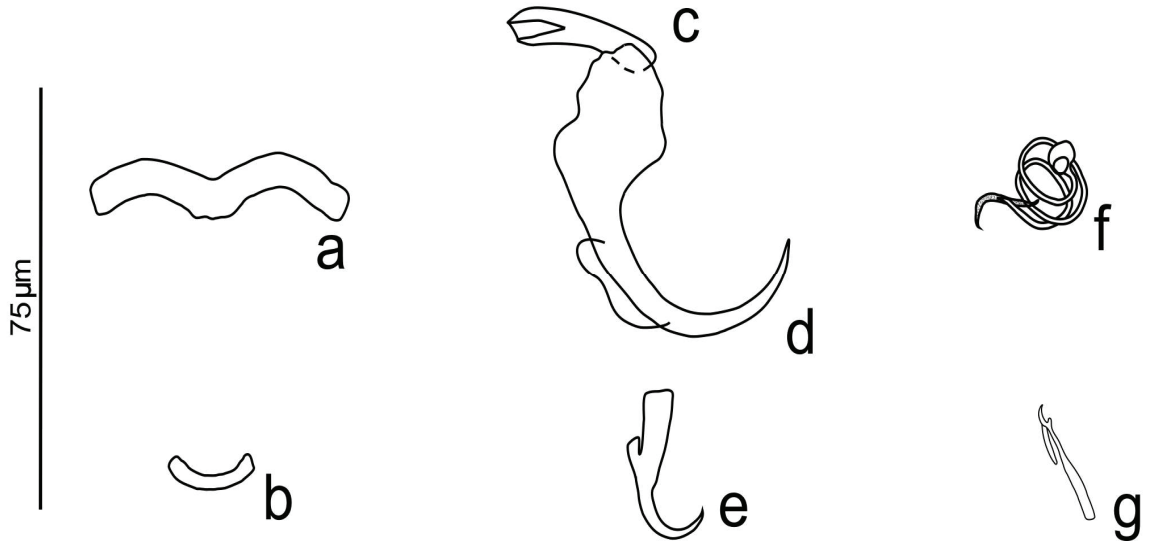

Figure 2. *Tereancistrum paranaensis* sp. n. from *Schizodon borellii*. a. ventral bar; b. dorsal bar; c. accessory sclerite; d. ventral anchor; e. dorsal anchor; f. copulatory complex; g. hook.

Ventral anchor 24.9 (20.8–28.4; n = 6) long, evenly curved shaft and point, anchor base 7.1 (5.9–7.8; n = 3) wide. Dorsal anchor 44.6 (42–49.1; n = 6) long, shaft recurved and pointed, base 16.7 (14.7–18.6; n = 6) wide. Ventral bar 18.3 (14.7–20.6; n = 3) wide and 2.6 (2.0–2.9; n = 3) long, broadly M-shaped. Dorsal bar 54 (44.1–68.6; n = 6) wide, 6.9 (5.9–7.8; n = 6) long, arc-shaped. Accessory sclerite small, has half the length of the anchor and the presence of muscle between them. Gonads intercecal, overlapping. Testis fusiform; seminal vesicle usually large, lying in midline immediately posterior to copulatory complex; prostatic reservoir ovate. Copulatory complex situated posterior to pharynx. Male copulatory organ with coils of about 2.5 rings, ring diameter 18.3 (15.7–20.6; n = 6), accessory piece small, non-articulated to male copulatory organ base (MCO). Ovary fusiform, elongated; vagina sclerotized, dextral; spherical seminal receptacle. Uterus delicate. Vitelline follicles throughout trunk but absent in regions of gonads and copulatory complex.

Remarks: The new species closely resembles the other members of *Tereancistrum* by presenting a distinctly spatulate accessory sclerite associated to the ventral anchor. *Tereancistrum paranaensis* sp. n. is similar to *T. kerri* by dorsal bar, ventral anchor and vagina but the new species has copulatory complex with coiled and dorsal anchor e a very large superficial root and ventral bar M-shaped, these features not present in *T. kerri*

Tereancistrum ornatus and *T. curimba* are morphologically closed to *T. paranaensis* sp. n. by accessory sclerite, copulatory complex and ventral bar, but differs from dorsal bar (Y-shaped) with ends modified. Dorsal anchor has widely divergent roots, short shaft and straight point are significantly different. *Tereancistrum curimba* and *T. toksonum* were also described in the floodplain of the upper Paraná river but *T. toksonum* differs from the new species by the dorsal bar Y-shaped; ventral bar formed by thin sclerotized membrane with thick posterior margin and dorsal anchor with long divergent roots, short shaft and straight point. *Tereancistrum arcuatus* differs from the new species by the MCO, which is an arcuate tube, while the *Tereancistrum paranaensis* sp. n. has a coiled copulatory organ.

Tereancistrum parvus Kritsky, Thatcher and Kayton 1980 (Figures 3 and 4)

Host: *Schizodon borellii* (Boulenger 1900) Characiformes

Site: gill filaments

Locality: upper Paraná river floodplain; Brazil (22º50' – 22º70'S and 53º15' – 53º40'W)

Specimens deposited: Voucher specimens CHIOC 37863, 37864, 37865

Prevalence: 25% (examined 16, infested 4)

Mean Intensity: 4.6 parasites per parasitized host

Specimens studied: 14 specimens in Hoyer's medium and 3 stained with Gomori's trichrome.

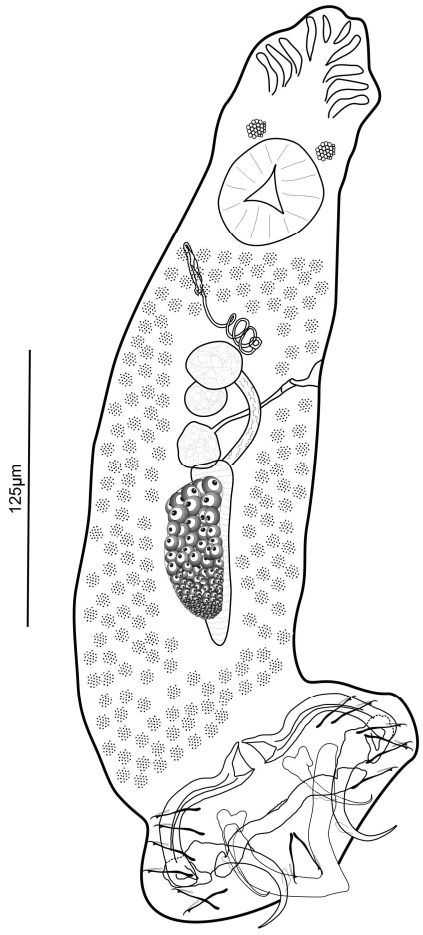

Figure 3. *Tereancistrum parvus* Kritsky et al. (1980) from *Schizodon borellii*. Composite drawing of whole-mount (ventral view)

Emended diagnosis: Body elongate, fusiform, length 390 (384–408; n = 7), greater width 105.8 (96–144; n = 10) in posterior half. Tegument thin and smooth. Cephalic region with four bilateral incipient lateral lobes. Cephalic glands, head organs well developed, lying in several bilateral groups dorsal-posteriorly to pharynx. Eyes 2; a few accessory granules in some specimens in the cephalic area. Pharynx subspherical, muscular, 39.1 (24.5–49; n = 11) in diameter; oesophagus and intestinal crura not observed. Peduncle short; haptor posteroventral, sub-hexagonal. Hook distribution of ancyrocephaline arrangement (Mizelle 1936). Hooks 24 (n = 5) long and similar; each with small thumb, recurved point; inflated proximal portion of shank; filamentous hook loop approximately 1/3 shank length. Ventral anchor 67.6 (60.8–82.3; n = 9) long,

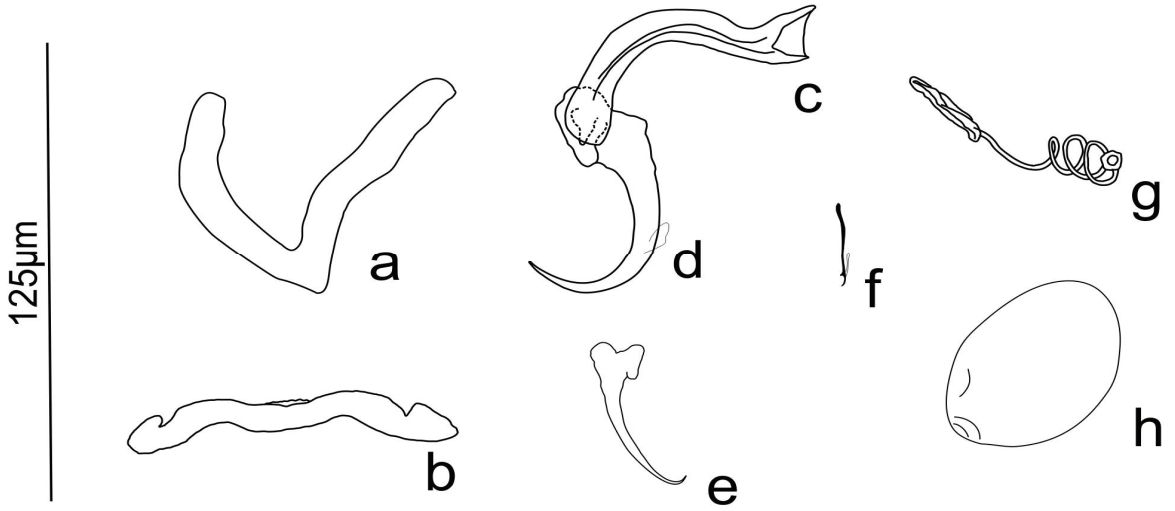

Figure 4. *Tereancistrum parvus* Kritsky et al. (1980) from *Schizodon borellii*. a. dorsal bar; b. ventral bar; c. accessory sclerite; d. ventral anchor; e. dorsal anchor; f. hook; g. copulatory complex; h.egg.

with well-developed superficial and incipient deep root, anchor base 20.7 (18.6–24.5; n = 8) wide. Dorsal anchor 49 (44.1–78.4; n = 9) long, with a superficial depression on root, shaft elongated and pointed, base 15.2 (11.8–19.6; n = 8) wide. Ventral bar 89.9 (83.3–98; n = 10) wide and 10 (7.8–12.7; n=11) long, slightly undulated. Dorsal bar 79.7 (72.5–88.2; n = 9) wide, 9.8 (7.8–10.8; n = 10) long, broadly V-shaped. Gonads intercecal, overlapping. Testis fusiform; vas deferens dextral; seminal vesicle usually large, lying in midline immediately inferior to copulatory complex; prostatic reservoir oval. Copulatory complex situated inferior to pharynx. Male copulatory organ has coils of about 3.5 rings, ring diameter 13.9 (n = 13), accessory piece small, not articulated to male copulatory organ base. Ovary fusiform, elongated; vagina sclerotized, sinistral; seminal receptacle spherical. Uterus delicate. Vitelline follicles throughout trunk, but absent in regions of gonads and copulatory complex. Egg oval 39.2 (n = 1) wide and 53.9 (n = 1) long.

Remarks: Despite being originally collected from the Amazon Basin, *T. parvus* was described parasitizing specimens of *Leporinus fasciatus* from the Steinhart Aquarium, San Francisco, in 1968 (KRITSKY et al., 1980). This description was based on only one specimen. Thus, a detailed description is presented with information that was not presented in the original description, such as the position of the vagina, the egg morphology, testis, ovary and seminal vesicle. This study reports a new record of host and locality for the parasite.

Conclusion

The new species *Tereancistrum paranaensis* is mainly characterized by the morphology of the copulatory complex (male copulatory organ with coils of about 2.5 rings and accessory piece small, non-articulated to male copulatory organ base), the morphology of dorsal anchor and dorsal bar shaped U. For the species *Tereancistrum parvus* an emended diagnosis was made with information that was not presented in the original description as the position of the vagina, the egg morphology, testis, ovary and seminal vesicle.

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