

First report of *Vandellia* sp. parasiting the Raspy river stingray *Potamotrygon scobina* in the Amazon basin

Primeiro registro de *Vandellia* sp. parasitando a arraia *Potamotrygon scobina* na bacia Amazônica

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Abstract

This study reports the first record of candiru, *Vandellia* sp. parasitizing the freshwater stingray *Potamotrygon scobina* in the Amazon basin, Brazil. In April 2018, a specimen of *Potamotrygon scobina* was collected by bottom long-term using fish as bait during the monitoring program in the Xingu River. During a routine inspection, a *Vandellia* sp. was observed in the branchial slit of the *Potamotrygon scobina* specimen. The trichomycterid was collected and preserved in 10% formaldehyde followed by preservation in 70% ethanol. This study is the first to record this parasite associated on a stingray in Brazil.

Keywords: Vampire fish, candiru, ectoparasites, freshwater stingray, Xingu River.

Resumo

Este estudo relata o primeiro registro de candirú *Vandellia* sp. parasitando a arraia de água doce *Potamotrygon scobina* na bacia amazônica, Brasil. Em abril de 2018, um espécime de *Potamotrygon scobina* foi capturado por meio de espinhel de fundo usando peixe como isca durante o programa de monitoramento no Rio Xingu. Durante uma inspeção de rotina, uma *Vandellia* sp. foi observada na fenda branquial do espécime de *Potamotrygon scobina*. O trichomycterídeo foi coletado e preservado em 10%, seguido de preservação em etanol 70%. Este estudo é o primeiro a registrar este parasita associado a uma arraia no Brasil.

Palavras-chave: Peixe vampiro, candirú, ectoparasitas, arraia de água doce, rio Xingu.

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Candirus belong to the family Trichomycteridae, which comprises eight subfamilies and approximately 45 valid genera, with 357 species (WoRMS, 2025). *Vandelliinae* comprises four genera (*Paracanthopoma*, *Paravandellia*, *Plectrochilus*, and *Vandellia*), in which *Vandellia* comprises only three valid species (*Vandellia cirrhosa*, *Vandellia beccarii*, and *Vandellia sanguinea*) (Dagosta & De Pinna, 2021; WoRMS, 2025). They are obligate hematophagous animals, reaching sizes between 2 and 20 centimeters in total length, expelling large amounts of mucus, which facilitates their entry into small cavities such as gill openings, characteristics that are related to their feeding behavior (De Pinna, 2013).

Candirus are known to parasitize mainly fish, in addition, there are reports of *Ochmacanthus* sp., a Candiru member of the subfamily Stegophilinae, parasitizing the tegument of the freshwater dolphin *Inia geoffrensis* (Araújo-Wang et al., 2019). Candirus are also known to cause serious problems to humans due to their ability to enter the urethra (van Ophoven & de Kernion, 2000), however, humans are not natural hosts for these parasites (Bauer, 2013). Candirus are usually found parasitizing the head area, specifically attached to the gill due to the increased vascularization in this area (Spotte et al., 2001; Araújo-Wang et al., 2019). *Vandellia* are incapable of actively sucking blood, so they make an incision with their opercular spines in the blood vessels of gills and feed as the host fish is actively bleeding (Zuanon & Sazima, 2004a).

South American freshwater stingrays are included in a single family (Potamotrygonidae), represent an important part of the Neotropical ichthyofauna and belong to the only group of elasmobranchs completely restricted to freshwater habitats (Fontenelle et al., 2021). Freshwater stingray species have been regularly captured for ornamental purposes for decades and can be used as a subsistence food source (Lucifora et al., 2022). Potamotrygonidae is a family of 40 valid species of freshwater stingrays found only in the South American rivers that drain to the Atlantic Ocean and Caribbean Sea (Loboda et al., 2021; Fricke & Fong, 2024). Many species are endemic to a single basin, however, species such as *Paratrygon aiereba* (Müller & Henle 1841), *Potamotrygon motoro* (Müller & Henle 1841), *Potamotrygon orbignyi* (Castelnau 1855) and *Potamotrygon scobina* Garman 1913 have broad distribution and they are found in almost all tributaries of the Amazon River (Loboda & Carvalho, 2013; Shibuya et al., 2016). Here we present the first report of the candiru *Vandellia* sp. parasitizing the freshwater stingray *Potamotrygon scobina* (Figure 1).



Figure 1. Specimen of *Potamotrygon scobina* collected in Xingu River, Pará State, Brazil. Photo by Paulo Trindade.

The observation was made in April 2018 in the Xingu River, at municipality Vitória do Xingu (02°52'59.4" S; 051°57'01.2" W), Pará State, Brazil (Figure 2). The Xingu River is a clearwater tributary in the lower Amazon River Basin, flows for approximately 2,300 km before entering the Amazon River and housing other species of *Potamotrygon* such as *Potamotrygon leopoldi* Castex & Castello 1970, the endemic one to Xingu River Basin, besides that *Potamotrygon orbignyi*, *Potamotrygon motoro*, and the *Paratrygon aiereba*. Although the Xingu River is known as

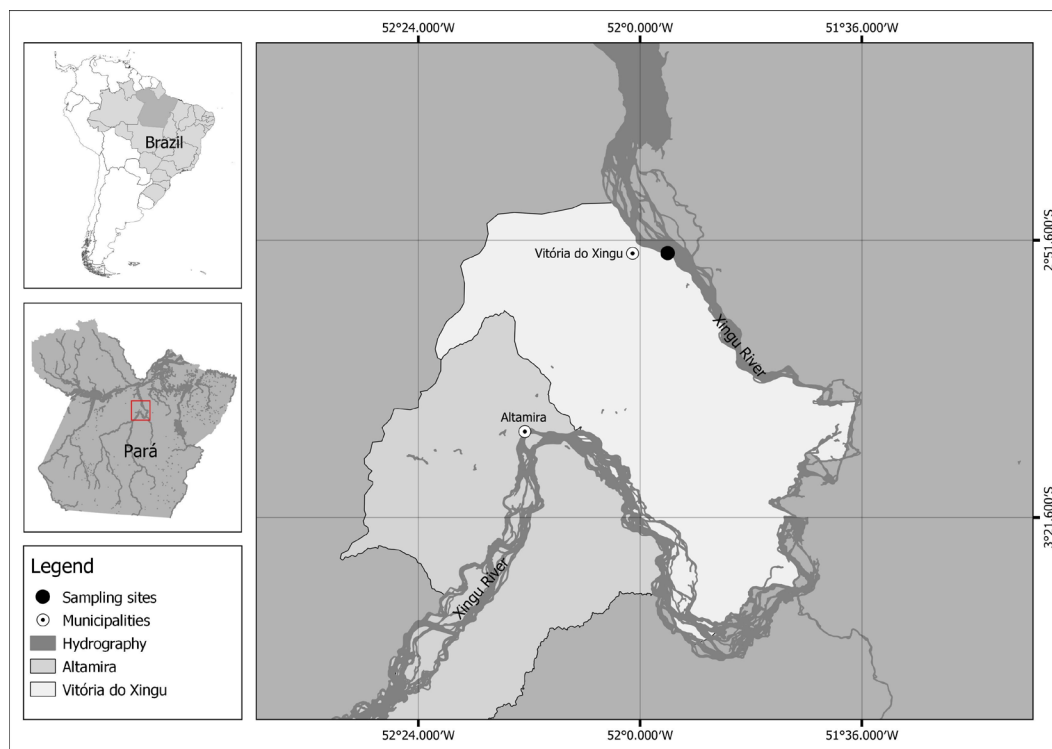


Figure 2. Sampling site of the specimen of *Potamotrygon scobina* parasitised by *Vandellia* sp., in Xingu River, Pará State, Brazil (02°53'37.18" S; 051°56'15.87" W).

place where *Potamotrygon scobina* occurs, the parasitism record and specimen identification were made in the field with the posterior live specimen released into the river, and due to evidence of hybridization between *Potamotrygon scobina* and its congeners (Sanches et al., 2021), we decided to maintain the identification as *Potamotrygon scobina*, since the occurrence of the species was described and also related to the Xingu basin by Sousa et al. (in press).

The specimens were collected under permit number 02001.011114/2020-52 issued by the Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA) as part of an ichthyofauna monitoring program for the construction of the Belo Monte Hydroelectric Plant. In April 2018, a specimen of *Potamotrygon scobina* was collected by a bottom long-line using fish as bait. A standard protocol was used to obtain total length (TL), standard length (SL), disc width (DW) in centimeters (cm), total weight (W) in grams (g) and sex was determined. The candiru was removed from the gill slit on the ventral surface of the ray and preserved in 10% formaldehyde followed by preservation in 70% ethanol. Upon returning to the laboratory, the candiru was measured (SL), identified and cataloged in the Laboratório de Ictiologia do Grupo de Ecologia Aquática (GEA 7331) of the Universidade Federal do Pará (UFPA), Belém, Pará state, Brazil.

The stingray (host) was an adult male of 80 cm TL, 55 cm SL, 50.2 cm DW and 6.600 g. The candiru was identified as a *Vandellia* sp. (Figure 3) with 8.75 cm SL was found attached in a branchial slit of the Stingray.

The candiru was identified as a hematophagous candiru of the genus *Vandellia* Valenciennes 1846. As described by Ohara et al. (2017) they have a very elongated body shape, small mouth lacking a suction cup shape like other members of the Trichomycteridae family; teeth arranged in irregular rows and concentrated in the middle of the upper jaw.

In South America, there are records of 75 different parasites that parasitize one or more species of freshwater stingrays (Gama, 2016). The parasites belong to the groups Cestoda, Monogenea, Digenea, Sporozoa, Nematoda, Acanthocephala, Ciliophora, Crustacea, Pentastomida and Pisces (Gama, 2016). This study has found that the family Potamotrygonidae is frequently parasitized by several groups of parasites on different locations of the body. Location of parasitism depends on the feeding mechanism and life cycle of the parasite, and they can be found both internal and external on the host.

For Potamotrygonidae, there are records of *Vandellia beccarii* (Di Caporiacco 1935) parasitizing *Potamotrygon orbignyi* and *Paracanthopoma* (Giltay 1935) in *Potamotrygon* sp. in the Orinoco River, near the border between

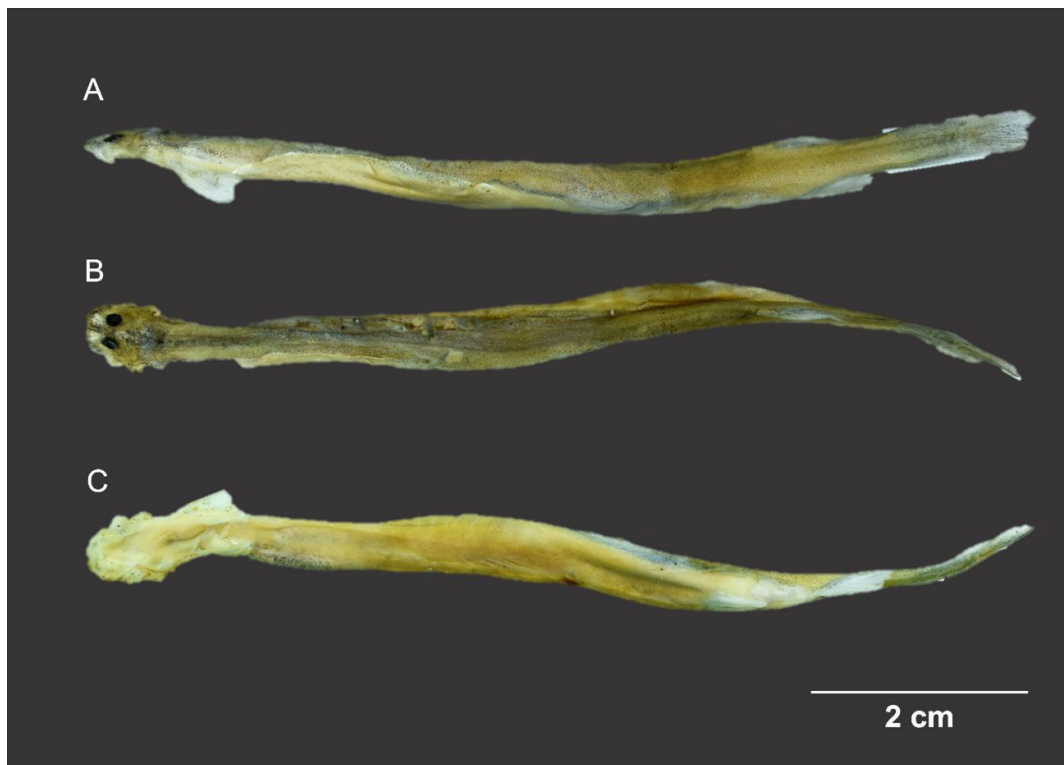


Figure 3. Lateral (A), dorsal (B) and ventral (C) views of the Candiru *Vandellia* sp. collected from the stingray host. Photo by Marcelo Andrade.

Colombia and Venezuela (Lasso et al., 2015). While for the Xingu River, the only records of parasites in stingrays were the Cestoda *Rhinebothroides freitasi* (Rêgo, 1979) Brooks, Mayes & Thorson, 1981 in *Potamotrygon leopoldi* (Marques & Brooks, 2003); the Monogenea and *Potamotrygonocotyle aramasae* Domingues, Pancera & Marques, 2007 from *Paratrygon aiareba* (Müller & Henle, 1841). However, none of these studies recorded the occurrence of candirus parasitizing freshwater stingrays in Brazil.

Because they are small and almost transparent, candirus attached to hosts are provided a level of protection from predators while they are attached to the host (De Pinna, 2013). In addition to parasitizing and protecting itself from predation, host migrations can greatly extend the potential range of the relatively small candirus (Lubich et al., 2021). *Paracanthopoma* sp. have been observed attached to the body of the large migratory fish, the Gilded catfish *Zungaro zungaro* (Humboldt 1821). Due to the large migratory distances of *Z. zungaro*, it is hypothesized that this behavior could facilitate the dispersal of candiru across the Amazon basin (Zuanon & Sazima, 2005). Unlike the observations of *Vandellia* sp. on long-distance migratory hosts, the observed parasitism of *Potamotrygon scobina*, is not considered a mechanism of wide dispersal like *Z. zungaro* (Zuanon & Sazima, 2005). Furthermore, it is known that Potamotrygonidae do not perform large migrations, only bathymetric movements (Garrone & Uieda, 2012). Despite the lack of potential for long-range facilitated migration, candirus could still benefit from the host's short-range movements, saving energy while moving unnoticed to predators (Lasso et al., 2015). In general, stingrays are benthic organisms that spend much time resting or buried on the river bottom, preferentially in sandy or muddy substrate where prey capture occurs via rapid uplift of the pectoral fins, exposing prey beneath the ray's body (Lasso et al., 2015; Kolmann et al., 2016). Vandelliinae are often found in similar substrate as stingrays so it is not surprising that the two species could occasionally interact (Zuanon & Sazima, 2004b). We conclude that this is the first record of *Vandellia* sp. parasitizing freshwater stingrays in Brazil. Furthermore, this study increases knowledge of the number of hosts that candirus use as hosts in natural systems.

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Ethics declaration

This research has implemented appropriate security and ethics measures for the conduction of field works, according to the Brazilian law and ethics standards. The specimens were collected under permit number 02001.011114/2020-52 issued by the Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA). The authors of this manuscript state that this research is of unique character, and that they are responsible for collection and interpretation of all data.

Conflict of interest

There is no conflict of interest to declare.

References

- Araújo-Wang C, Schormans EK, Wang JY. Ecological interaction of a “parasitic” candiru catfish and botos (*Inia geoffrensis*). *Mar Mamm Sci* 2019; 35(4): 1347-1354. <http://doi.org/10.1111/mms.12593>.
- Bauer IL. Candiru - a little fish with bad habits: need travel health professionals worry? A review. *J Travel Med* 2013; 20(2): 119-124. <http://doi.org/10.1111/jtm.12005>. PMID:23464720.
- Dagosta FCP, De Pinna MCC. Two new catfish species of typically Amazonian lineages in the Upper Rio Paraguay (Aspredinidae: Hoplomyzontinae and Trichomycteridae: Vandelliinae), with a biogeographic discussion. *Pap Avulsos Zool* 2021; 61: e20216147. <http://doi.org/10.11606/1807-0205/2021.61.47>.
- De Pinna M. Trichomycteridae. In: Queiroz LJ, Torrente-Vilara G, Ohara WM, Pires THS, Zuanon JAS, Doria CRC, editors. *Peixes do rio Madeira*. São Paulo: Diaeto Latin American Documentary; 2013. p. 142-179. (vol. 2).
- Fontenelle JP, Lovejoy NR, Kolmann MA, Marques FP. Molecular phylogeny for the Neotropical freshwater stingrays (Myliobatiformes: Potamotrygoninae) reveals limitations of traditional taxonomy. *Biol J Linn Soc Lond* 2021; 134(2): 381-401. <http://doi.org/10.1093/biolinnean/blab090>.
- Fricke R, Fong JD. *Eschmeyer's catalog of fishes: genera/species by family/subfamily* [online]. 2024 [cited 2024 Dec 20]. Available from: <http://researcharchive.calacademy.org/research/ichthyology/catalog/SpeciesByFamily.asp>
- Gama CS. Parasitas de raias de água doce (Potamotrygonidae): estado atual do conhecimento e lista de espécies. In: Lasso CA, Rosa RS, Morales-Betancourt MA, Garrone-Neto D, Carvalho M, editors. *XV. Rayas de agua Dulce (Potamotrygonidae) de Suramérica. Parte II: Colombia, Brasil, Perú, Bolivia, Paraguay, Uruguay y Argentina*. Bogotá: IAvH; 2016. p. 83-102. (Serie Recursos Hidrobiológicos y Pesqueros Continentales de Colombia).
- Garrone D No, Uieda VS. Activity and habitat use of two species of stingrays (Myliobatiformes: Potamotrygonidae) in the upper Paraná River basin, Southeastern Brazil. *Neotrop Ichthyol* 2012; 10(1): 81-88. <http://doi.org/10.1590/S1679-62252012000100008>.
- Kolmann MA, Welch KC Jr, Summers AP, Lovejoy NR. Always chew your food: freshwater stingrays use mastication to process tough insect prey. *Proc Biol Sci* 2016; 283(1838): 20161392. <http://doi.org/10.1098/rspb.2016.1392>. PMID:27629029.
- Lasso CA, Nascimiento C, Morales-Betancourt MA, Lasso-Alcalá OM. Parasitism of freshwater stingrays (Potamotrygonidae) by hematophagous catfishes (Vandelliinae). *Ichthyol Explor Freshwat* 2015; 26(1): 83-86.
- Loboda TS, Carvalho MR. Systematic revision of the *Potamotrygon motoro* (Müller & Henle, 1841) species complex in the Paraná-Paraguay basin, with description of two new ocellated species (Chondrichthyes: Myliobatiformes: Potamotrygonidae). *Neotrop Ichthyol* 2013; 11(4): 693-737. <http://doi.org/10.1590/S1679-62252013000400001>.
- Loboda TS, Lasso CA, Rosa RS, Carvalho MR. Two new species of freshwater stingrays of the genus *Paratrygon* (Chondrichthyes: Potamotrygonidae) from the Orinoco basin, with comments on the taxonomy of *Paratrygon aiareba*. *Neotrop Ichthyol* 2021; 19(2): e200083. <http://doi.org/10.1590/1982-0224-2020-0083>.
- Lubich CCF, Martins AR, Freitas CEC, Hurd LE, Siqueira-Souza FK. A candiru, *Paracanthopoma* sp. (Siluriformes: Trichomycteridae), associated with a thorny catfish, *Doras phlyszakion* (Siluriformes: Doradidae), in a tributary of the middle Rio Negro, Brazilian Amazon. *AleP* 2021; 51(3): 241-244. <http://doi.org/10.3897/aiep.51.64324>.

- Lucifora LO, Scarabotti PA, Barbini SA. Predicting and contextualizing sensitivity to overfishing in Neotropical freshwater stingrays (Chondrichthyes: Potamotrygonidae). *Rev Fish Biol Fish* 2022; 32(2): 669-686. <http://doi.org/10.1007/s11160-021-09696-2>.
- Marques FPL, Brooks DR. Taxonomic review of *Rhinebothroides* (Eucestoda: Tetraphyllidea: Phyllobothriidae), parasites of neotropical freshwater stingrays (Rajiformes: Myliobatoidei: Potamotrygonidae). *J Parasitol* 2003; 89(5): 994-1017. <http://doi.org/10.1645/GE-3059>. PMID:14627149.
- Ohara WM, Lima FCT, Salvador GN, Andrade MC. *Peixes do rio Teles Pires: diversidade e guia de identificação*. Goiânia: Gráfica e Editora Amazonas; 2017.
- Sanches D, Martins T, Lutz Í, Veneza I, Silva RD, Araújo F, et al. Mitochondrial DNA suggests hybridization in freshwater stingrays *Potamotrygon* (Potamotrygonidae: Myliobatiformes) from the Xingu River, Amazonia and reveals speciation in *Paratrygon aireba*. *An Acad Bras Cienc* 2021; 93(3): e20191325. <http://doi.org/10.1590/0001-3765202120191325>.
- Shibuya A, Zuanon J, Carvalho MR. Alimentação e comportamento predatório em raias (Potamotrygonidae). In: Lasso CA, Rosa RS, Morales-Betancourt MA, Garrone-Neto D, Carvalho M, editors. *XV. Rayas de agua Dulce (Potamotrygonidae) de Suramérica. Parte II: Colombia, Brasil, Perú, Bolivia, Paraguay, Uruguay y Argentina*. Bogotá: IAvH; 2016. p. 67-81. (Serie Recursos Hidrobiológicos y Pesqueros Continentales de Colombia).
- Sousa L, Loboda TS, Shibuya A. Order Myliobatiformes, Potamotrygonidae. In: Sousa L, Giarrizzo T, Sabaj M, editors. *Peixes do Xingu*. Altamira: Universidade Federal do Pará; in press.
- Spotte S, Petry P, Zuanon JAS. Experiments on the feeding behavior of the Hematophagous Candiru, *Vandellia* cf. *plazaii*. *Environ Biol Fishes* 2001; 60(4): 459-464. <http://doi.org/10.1023/A:1011081027565>.
- van Ophoven A, de Kernion JB. Clinical management of foreign bodies of the genitourinary tract. *J Urol* 2000; 164(2): 274-287. [http://doi.org/10.1016/S0022-5347\(05\)67342-9](http://doi.org/10.1016/S0022-5347(05)67342-9). PMID:10893567.
- WoRMS Editorial Board – WoRMS. *World Register of Marine Species*. 2025. <http://doi.org/10.14284/170>.
- Zuanon J, Sazima I. Candiru, peixe-vampiro. *Ciência Hoje* 2004a; 34(202): 64-67.
- Zuanon J, Sazima I. Vampire catfishes seek the aorta not the jugular: candirus of the genus *Vandellia* (Trichomycteridae) feed on major gill arteries of host fishes. *Aqua: J Ichthyol Aquatic Biol* 2004b; 8(1): 31-36.
- Zuanon J, Sazima I. Free meals on long-distance cruisers: the vampire fish rides giant catfishes in the Amazon. *Biota Neotrop* 2005; 5(1): 109-114. <http://doi.org/10.1590/S1676-06032005000100012>.