Check List the journal of biodiversity data

NOTES ON GEOGRAPHIC DISTRIBUTION

Check List 14 (1): 101–106
https://doi.org/10.15560/14.1.101

PENSOFT

First record of the miniature catfish *Malacoglanis gelatinosus* Myers & Weitzman, 1966 (Siluriformes, Trichomycteridae) in the Orinoco river basin

Diana C. Montoya-Ospina,[1] Juan G. Albornoz-Garzón,[1] Jorge E. García-Melo,[1,2] Francisco A. Villa-Navarro,[1] Carlos DoNascimiento[3]

1 Universidad del Tolima, Departamento de Biología, Grupo de Investigación en Zoología, Ibagué, Tolima, Colombia. **2** Pontificia Universidad Javeriana, Departamento de Biología, Facultad de Ciencias, Laboratorio de Ictiología, Unidad de Ecología y Sistemática, Bogotá, Colombia. **3** Colecciones Biológicas, Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Villa de Leyva, Boyacá, Colombia.
Corresponding author: Diana C. Montoya-Ospina, montoyadianac@gmail.com

Abstract
Malacoglanis gelatinosus, a species of miniature catfish of the family Trichomycteridae, is only known from 4 specimens from the Amazon basin. Recently, we collected 3 specimens from the upper basin of the Meta River, a tributary of the Orinoco. This is the first record of *M. gelatinosus* from the Orinoco river basin, which significantly expands the known geographic distribution of this species, making it one of the most broadly distributed species within the subfamily Sarcoglanidinae. High-resolution photographs of specimens, remarks on character variation, and an updated distribution in Colombia are provided.

Key words
Meta River; Neotropical region; Sarcoglanidinae; South America.

Academic editor: Gabriela Echevarría | Received 1 November 2017 | Accepted 28 November 2017 | Published 12 January 2018

Citation: Montoya-Ospina DC, Albornoz-Garzón JG, García-Melo JE, Villa-Navarro FA, DoNascimiento C (2018) First record of the miniature catfish *Malacoglanis gelatinosus* Myers & Weitzman, 1966 (Siluriformes, Trichomycteridae) in the Orinoco river basin, Venezuela. Check List 14 (1): 101–106. https://doi.org/10.15560/14.1.101

Introduction

The subfamily Sarcoglanidinae (Siluriformes, Trichomycteridae) is a distinctive group of miniature catfishes, comprising 11 species arranged in six genera: *Ammoglanis amapaensis* Mattos, Costa & de S. Gama, 2008, *Ammoglanis diaphanus* Costa, 1994, *Ammoglanis pulex* de Pinna & Winemiller, 2000, *Malacoglanis gelatinosus* Myers & Weitzman, 1966, *Microcambeva barbata* Costa & Bockmann, 1994, *Microcambeva draco* Mattos & Lima, 2010, *Microcambeva ribeirae* Costa, Lima & Bizerril, 2004, *Sarcoglanis simplex* Myers & Weitzman, 1966, *Stauroglanis gouldingi* de Pinna, 1989, *Stenolicmus ix* Wosiacki, Coutinho & de Assis Montag, 2011, and *Stenolicmus sarmientoi* de Pinna & Starnes, 1990.

The Sarcoglanidinae are distributed across the Amazon basin, in upper Orinoco basin of Venezuela, and in isolated coastal rivers in eastern Brazil (Vari et al. 2009, Mattos and Lima 2010, Wosiacki et al. 2011). Except for *Ammoglanis amapaensis*, *A. pulex*, and *Microcambeva ribeirae*, the remaining sarcoglanidine species are only known from a few specimens and not exceeding 3 individuals for most species (Mattos et al. 2008, Wosiacki et al. 2011). This paucity of representative material in col-

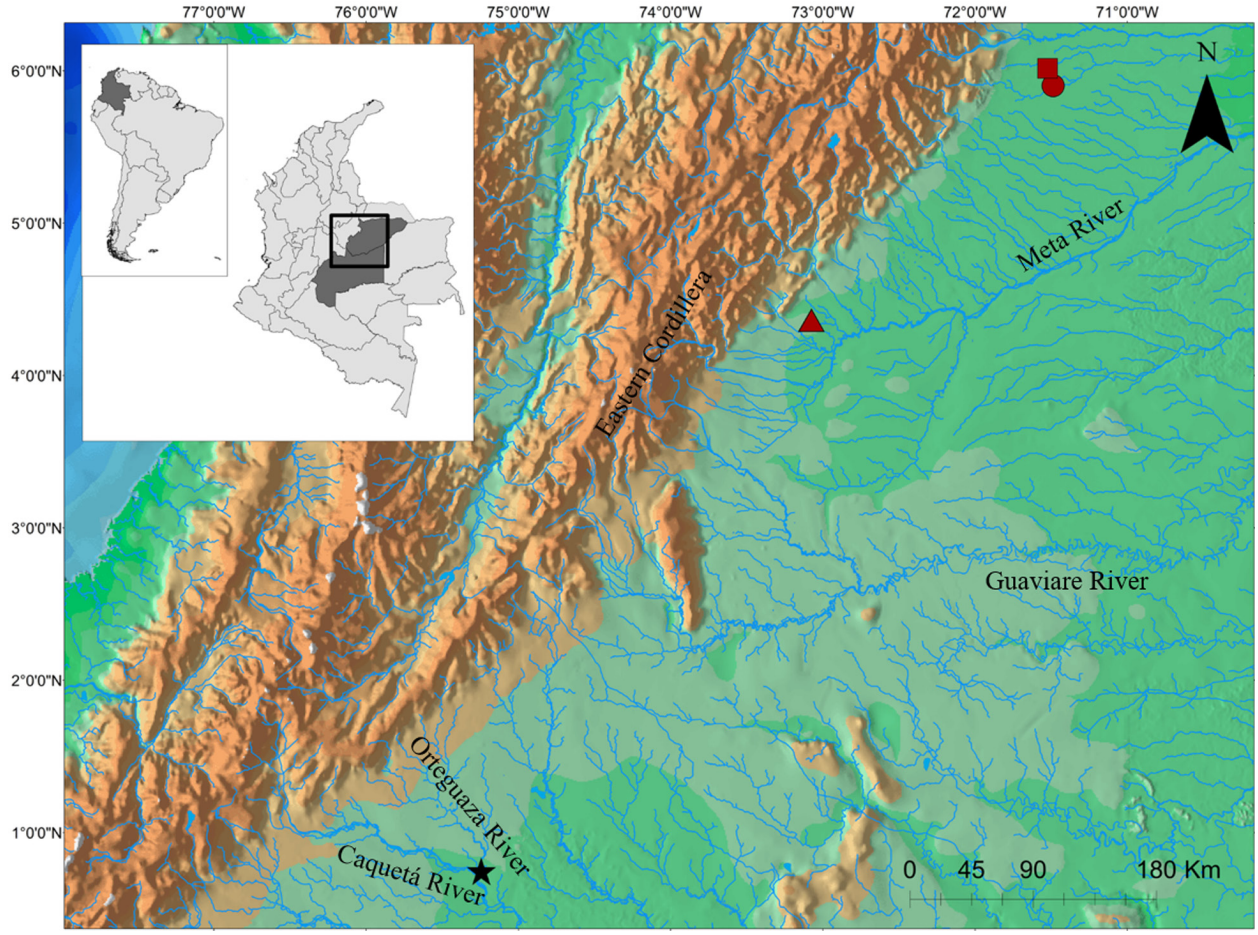

Figure 1. Records of *Malacoglanis gelatinosus* in Colombia. Red circle = Ariporo River, red square = Chire Nuevo River, red triangle = Caño Palomas, black star = type locality.

lections has been attributed to limited access to collecting sites and inadequate sampling techniques (Wosiacki et al. 2011). In fact, this last aspect appears to be the main factor, given the sand-dwelling habits of most species, coupled with their miniature size, translucent body, and cryptic color pattern (Wosiacki et al. 2011, Zuanon and Sazima 2004).

Two monotypic genera, *Sarcoglanis* and *Malacoglanis*, were described in the same paper where Sarcoglanidinae was proposed as a new subfamily of Trichomycteridae (Myers and Weitzman 1966). Based on a single specimen, *S. simplex* was described from the São Gabriel rapids in the Negro River. Additional specimens have since been collected in the Branco river drainage (Sabaj 2009), as well as in the Cuao River, a tributary of the upper Orinoco (DoNascimiento, pers. obs.). *Malacoglanis gelatinosus* was described based on 2 specimens collected in the Orteguaza River (Fig. 1, Table 1), a tributary of the Caquetá River (Amazon basin in Colombia), and later, Stewart et al. (1987) reported *M. gelatinosus* from the Napo River (Amazon basin in Ecuador). Here we report the presence of *M. gelatinosus* in the Orinoco river basin in Colombia; this expands considerably the geographic distribution of this species, which was thought to be restricted to the western Amazon basin.

Methods

Specimens were caught using a beach seine (10 m long, 1.5 m high, and with 0.5 mm mesh) in water <1.5 m deep along the bank of a 10 m long section of the channel at each site. These specimens were collected as part of the interinstitutional project "Aplicación de criterios biológicos y ecológicos para la identificación, caracterización y establecimiento de límites funcionales de humedales en tres ventanas: Ciénaga de Zapatosa y Ciénaga de la Virgen, Complejos de Humedales de Paz de Ariporo-Hato Corozal", under the contract number

Table 1. Records of *Malacoglanis gelatinosus* in Colombia. Type locality with geographic coordinates approximated.

Locality	Municipality	Department	Latitude (N)	Longitude (W)	Voucher
Ariporo River	Hato Corozal	Casanare	05°54′10″	071°29′15″	CZUT-IC 12838
Chire Nuevo River	Hato Corozal	Casanare	06°00′58.4″	071°31′25.2″	IAvH-P 13640
Caño Palomas	Cabuyaro	Meta	04°21′13.8″	073°03′15.14″	CZUT-IC 15543
Type locality	Florencia	Caquetá	01°27′10.94″	075°27′57.41″	Holotype: CAS-SU 50754 Paratype: CAS-SU 50755

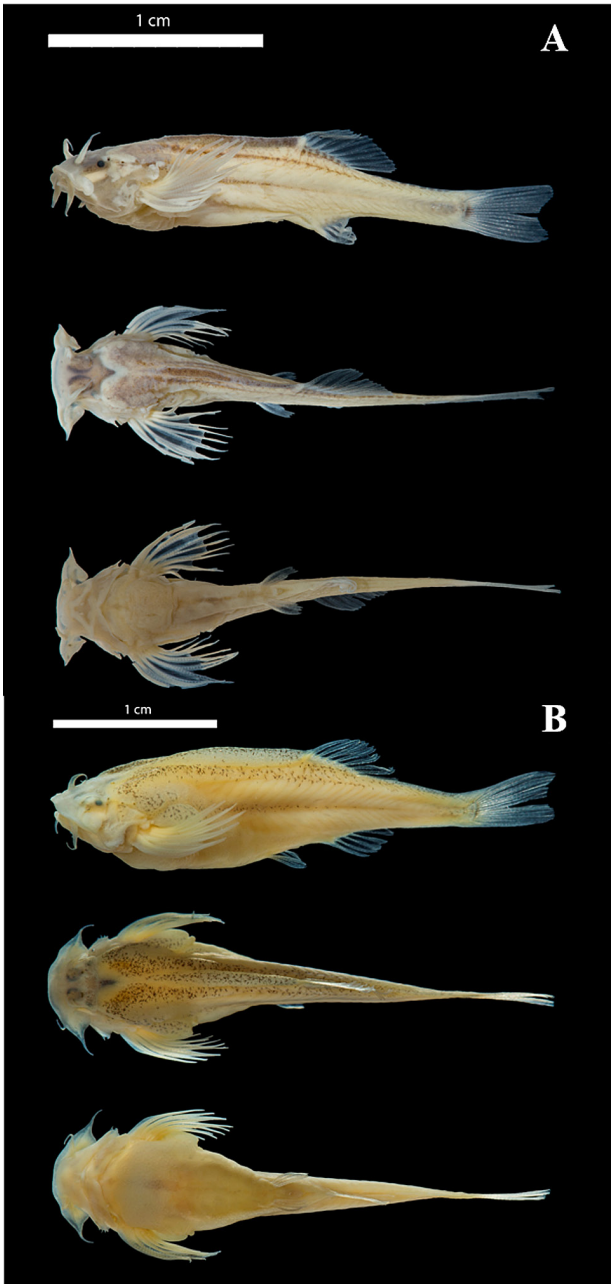

Figure 2. Specimens of *Malacoglanis gelatinosus.* **A.** Ariporo River (CZUT-IC 12838: 19.3 mm SL). **B.** Caño Palomas (CZUT-IC 15543: 18.0 mm SL). Scale bar = 1 cm.

14-13-014-237PS and agreement 13-014 (FA 005 de 2013; Fondo de Adaptación and Instituto de Investigación de Recursos Biológicos Alexander von Humboldt).

Specimens were fixed in 10% formalin and preserved in 70% ethanol at Colección Zoológica of Universidad del Tolima, Ictiología, Ibagué, Colombia (CZUT-IC) and Colección de Peces Dulceacuícolas, Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Villa de Leyva, Colombia (IAvH-P).

Taxonomic identification of *Malacoglanis gelatinosus* was based on the original description (Myers and Weitzman 1966), complementary information provided in Baskin (1973) and de Pinna (1989), and photographs of the holotype available at CAS Ichthyology Primary Types Imagebase (http://researcharchive.calacademy.org/research/ichthyology/types/index.asp). The IAvH-P specimen was measured from digital photographs taken with a Leica MC 190 HD camera attached to a Leica S8APO stereomicroscope using the Leica Application Suite v. 3.3.0. The CZUT-IC specimens were measured on the left side of specimens to the nearest 0.1 mm using digital calipers. Measurements are expressed as percentages of standard (SL) or head length (HL). Methodology and terminology for measurements and counts follow de Pinna (1992), with the addition of (1) length of first and second pectoral-fin rays, and (2) eye diameter.

Results

***Malacoglanis gelatinosus* Myers and Weitzman, 1966**
Figure 2

Material examined. All from Colombia: CZUT-IC 12838, 1 spec., 19.4 mm SL, Casanare, Hato Corozal, Corregimiento La Chapa, Ariporo River (05°54′10″ N, 071°29′15″ W), 168 m above sea level (a.s.l.), 25 November 2015. CZUT-IC 15543, 1 spec., 18.0 mm SL, Meta, Cabuyaro, caño Palomas (04°21′13.8″ N, 073°03′15.14″ W), 200 m a.s.l, 11 December 2015. IAvH-P 13640, 1 spec., 13.1 mm SL, Casanare, Hato Corozal, vereda Santa María de Chire, Chire Nuevo River (06°00′58.4″ N, 071°31′25.2″ W), 174 m a.s.l., 21 February 2015.

We collected 2 specimens of *Malacoglanis gelatinosus* from the Ariporo River (Fig. 3A, B), a tributary of the Casanare River, which drains into the Meta River. An additional specimen was collected in the Caño Palomas (Fig. 3C), which drains directly into the Humea River. The Meta is a western tributary of the Orinoco, which originates in the Eastern Cordillera of the northern Andes of Colombia (Fig. 1, Table 2). Our specimens were collected in rivers with sandy and muddy bottoms, moderate water flow, and high turbidity. The Chire Nuevo River had abundant leaf litter and allochthonous material on the bottom (Fig. 2).

Identification. Our specimens of *Malacoglanis gelatinosus* (Fig. 2) are in agreement with the characters provided in the diagnosis and original description of this species (Myers and Weitzman 1966), as well as with photographs of the holotype. Our specimens generally agree in all morphometric and meristic characters of the original description, which was based on the holotype and a single paratype, but as can be expected from so few specimens, some of our counts show a broader range of variation (Table 2). In addition to those meristics reported by Myers and Weitzman (1966), we provide some additional meristics and complete morphometric data from our specimens (Tables 2, 3).

Discussion

Myers and Weizman (1966) provided a very accurate and detailed description of *Malacoglanis gelatinosus* that con-

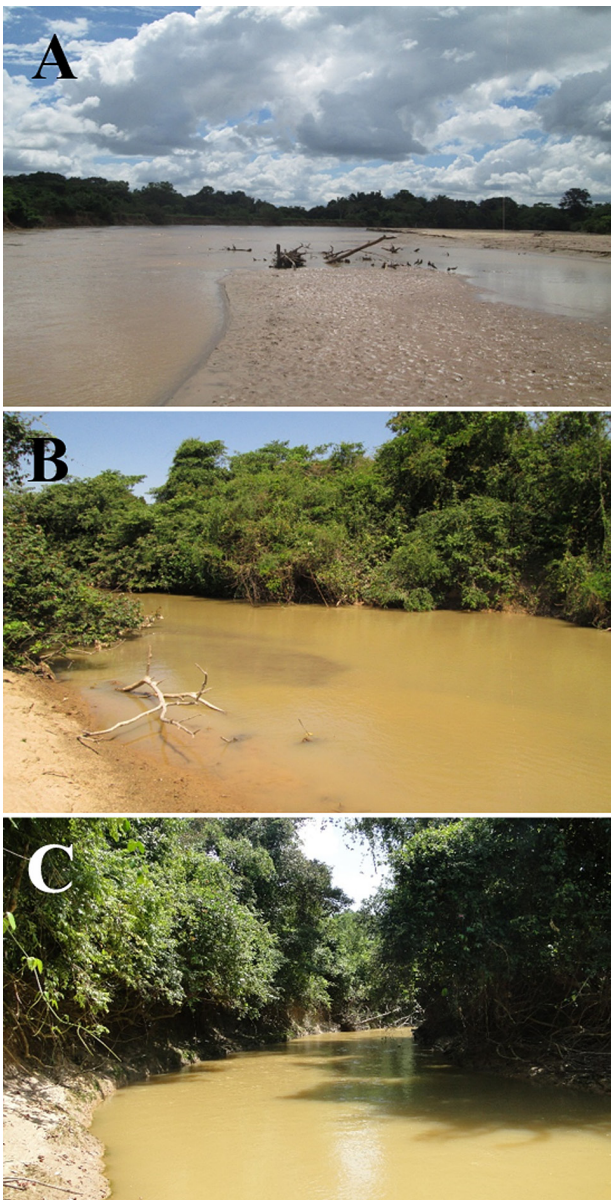

Figure 3. Habitat where *Malacoglanis gelatinosus* was collected in the Orinoco river basin. **A.** Ariporo River (CZUT-IC 12838). **B.** Chire Nuevo River (IAvH-P 13640). **C.** Caño Palomas (CZUT-IC 15543).

forms to the current standards of taxonomic descriptions of fishes. Although these authors described and illustrated the pattern of sensory pores of the lateral line system, they did not identify the homology of individual pores or their correspondence to the lateral line canals. A standardized nomenclature and terminology for laterosensory pores in loricarioid catfishes was proposed later by Arratia and Huaquin (1995) and Schaefer and Aquino (2000). In this sense, *M. gelatinosus* has 2 supraorbital sensory pores: s3 placed behind the posterior nostril and a single median s6, anterior to the nape. The infraorbital canal is represented by only 1 pore, which corresponds to the posteriormost section of the canal. The preopercular canal has 1 sensory pore, at the lateral margin of neurocranium. The postotic canal has a single pterotic branch with its terminal pore situated also at the margin of the cranium. The lateral line canal on the trunk is short, consisting of only 2 sensory pores. The presence of a single sensory pore s6 was proposed as a synapomorphy (among others) supporting the sister-group relationship of *Malacoglanis* and *Sarcoglanis* (Costa and Bockmann 1994).

Sarcoglanis simplex and *Malacoglanis gelatinosus* show the broadest geographic distribution recorded for any sarcoglanidine species, with both encompassing 2 main rivers systems, the Amazon and the Orinoco. In contrast, most sarcoglanidines are only known from their type localities in a single river (i.e. *Ammoglanis diaphanus*, *Microcambeva barbata*. *M. draco*, *Stenolicmus ix*, and *S. sarmientoi*). The distribution range of *S. simplex* spans the Negro drainage (Amazon basin) and the upper basin of the Orinoco (both systems connected by the Casiquiare canal) (Winemiller and Willis 2011), a common distribution pattern in other groups of fishes (Winemiller et al. 2008). In contrast, *M. gelatinosus* has a disjunct distribution in the upper Caquetá and Meta rivers in Colombia. There are two other species belonging to different families of catfishes that also exhibit a similar distribution pattern: *Centromochlus altae* Fowler, 1945 (Auchenipteridae) (DoNascimiento pers. obs.) and *Chaetostoma platyrhynchus* (Fowler, 1943) (Loricariidae) (Ballen et al. 2016). Further investigations to detect other species with similar disjunct distributions in the Caquetá and Meta rivers are required to assess this biogeographic pattern and test hypotheses of past connections between these Andean tributaries of the Amazon and Orinoco rivers.

Acknowledgements

We thank the Fundación Omacha, WWF-Colombia, Instituto de Investigación de Recursos Biológicos Alex-

Table 2. Meristic characters of specimens of *Malacoglanis gelatinosus* collected in the Orinoco river basin contrasted to values from the original description (Myers and Weitzman 1966). *Median fin-rays counts follow Datovo et al. (2016).

Character	Orinoco specimens	Types
Number and arrangement of dentary teeth	4–9 teeth along a single row in each dentary	Not indicated in original description
Opercular odontodes	2–6	3
Interopercular odontodes	4–6	4
Dorsal fin*	i^{P}, ii, 6	iii, 6/ii, 7
Anal fin*	i^{P}, ii, 4	iii, 4
Pelvic-fin branched rays	2–3 (most medial ray unbranched)	3
Dorsal procurrent caudal-fin rays	5–6	Not indicated in original description
Ventral procurrent caudal-fin rays	4	Not indicated in original description
Caudal-fin skeleton	PH + 1 + 2, 3 + 4 + 5	Not indicated in original description

Table 3. Morphometric values of specimens of *Malacoglanis gelatinosus* from the Orinoco River basin. (SL): percentage of standard length, (HL): percentage of head length.

	N	Mean	Range	Standard deviation
Standard length (mm)	3	—	13.1–19.3	—
Total length (SL)	3	—	108.8–120.6	—
Body depth (SL)	3	21.7	18–27.6	5.1
First pectoral-fin ray (SL)	3	20.9	18.2–25	3.6
Second pectoral-fin ray (SL)	3	21	19.9–23	1.7
Predorsal length (SL)	3	59.1	57.4–61.3	2
Preanal length (SL)	3	63.5	60.7–67.2	3.3
Prepelvic length (SL)	3	49.4	45.8–56.2	5.9
Dorsal-fin base (SL)	3	12.2	11.7–12.7	0.5
Anal-fin base (SL)	3	8.7	7.3–10.1	1.4
First pelvic-fin ray (SL)	3	8.1	7.7–8.8	0.6
Caudal-peduncle length (SL)	3	27.1	26.9–27.3	0.2
Caudal-peduncle depth (SL)	3	8.2	7.1–9.2	1.1
Head length (SL)	3	22.2	21.2–22.8	0.9
Head width (HL)	3	89.7	87.4–93	2.9
Head depth (HL)	3	74.8	70–82.9	7
Snout length (HL)	3	41.9	38–48.3	5.6
Mouth width (HL)	3	36.8	34.1–40.9	3.6
Interorbital distance (HL)	3	43.2	42.3–44.3	1
Eye diameter (HL)	3	5.8	5.2–6.8	0.8
Maxillary barbel length (HL)	2	43.6	43.6–43.6	0.1
Nasal barbel length (HL)	3	45.7	40.6–49.1	4.5
Rictal barbel length (HL)	2	46.3	45.7–47	0.9

ander von Humboldt, and FEDEPALMA for funding the projects. Special thanks are due to Cristhian C. Conde-Saldaña who prepared the map. This manuscript was enriched and improved by the helpful comments from G. Echevarría and the anonymous reviewers.

Authors' Contributions

DCMO and JGAG collected the specimens; CD identified the specimens; JEGM photographed the specimens; DCMO and CD wrote the manuscript; DCMO, JGAG, and CD obtained anatomical data; All authors reviewed the text.

References

Arratia G, Huaquin L (1995) Morphology of the lateral line system and of the skin of diplomystid and certain primitive loricarioid catfishes and systematic and ecological considerations. Bonner Zoologische Monographien 36: 1–110.

Ballen GA, Urbano-Bonilla A, Maldonado-Ocampo JA (2016) Description of a new species of the genus *Chaetostoma* from the Orinoco River drainage with comments on *Chaetostoma milesi* Fowler, 1941 (Siluriformes: Loricariidae). Zootaxa 4105 (2): 181–197. https://doi.org//10.11646/zootaxa.4105.2.6

Baskin JN (1973) Structure and relationships of the Trichomycteridae. PhD dissertation, City University of New York, New York, 389 pp.

Costa WJEM, Bockmann FA (1994) A new genus and species of Sarcoglanidinae (Siluriformes: Trichomycteridae) from southeastern Brazil, with a re-examination of subfamilial phylogeny. Journal of Natural History 28 (3): 715–730. https://doi.org/10.1080/00222939400770331

Datovo A, de Aquino P. de PU, Langeani F (2016). A new species of *Ituglanis* (Siluriformes: Trichomycteridae) from the Tocantins and Paranaíba river basins, central Brazil, with remarks on the systematics of the genus. Zootaxa 4171 (3): 439–458. https://doi.org/10.11646/zootaxa.4171.3.2

Mattos JLO, Lima SMQ (2010) *Microcambeva draco*, a new species from northeastern Brazil (Siluriformes: Trichomycteridae). Ichthyological Exploration of Freshwaters 21 (3): 233–238.

Mattos JLO, Costa WJEM, Gama C de S (2008) A new miniature species of *Ammoglanis* (Siluriformes: Trichomycteridae) from the Brazilian Amazon. Ichthyological Exploration of Freshwaters 19 (2): 161–166.

Myers GS, Weitzman SH (1966). Two remarkable new trichomycterid catfishes from the Amazon basin in Brazil and Colombia. Journal of Zoology 149 (3): 277–287. https://doi.org/10.1111/j.1469-7998.1966.tb04049.x

de Pinna MCC (1989). A new scarcoglanidine catfish, phylogeny of its subfamily, and an appraisal of the phyletic status of the Trichomycterinae (Teleostei, Trichomycteridae). American Museum Novitates 2950: 1–39.

de Pinna MCC (1992). *Trichomycterus castroi*, a new species of trichomycterid catfish from the Rio Iguaçu of Southeastern Brazil (Teleostei: Siluriformes). Ichthyological Exploration of Freshwaters 3: 89–95.

Sabaj Pérez M (2009) Photographic atlas of fishes of the Guiana Shield. In: Vari RP, Ferraris CJ Jr, Radosavljevic A, Funk VA (Eds) Checklist of the freshwater fishes of the Guiana Shield. Bulletin of the Biological Society of Washington 17: 53–93.

Schaefer SA, Aquino AE (2000). Postotic laterosensory canal and pterotic branch homology in catfishes. Journal of Morphology 246: 212–227. http://doi.org/b5zg7w

Stewart D, Barriga S R, Ibarra, M (1987). Ictiofauna de la Cuenca del río Napo, Ecuador Oriental: lista anotada de especies. Revista Politécnica 12 (4): 9–63.

Vari RP, Ferraris CJ, Radosavljevic Jr A, Funk VA (Eds) (2009) Checklist of the freshwater fishes of the Guiana Shield. Bulletin of the Biological Society of Washington 17: i–vii + 1–95.

Winemiller KO, Willis SC (2011). The Vaupes Arch and Casiquiare Canal: barriers and passages (Chapter 14). In: Albert JS, Reis RE (Eds) Historical biogeography of Neotropical freshwater fishes. University of California Press, Berkeley, 225–242.

Winemiller KO, López-Fernández H, Taphorn DC, Nico LG, Barbarino-Duque A (2008). Fish assemblages of the Casiquiare River, a corridor and zoogeographical filter for dispersal between the Orinoco and Amazon basins. Journal of Biogeography 35: 1551–1563. https://doi.org/10.1111/j.1365-2699.2008.01917.x

Wosiacki WB, Coutinho DP, De Assis Montag, LF (2011). Description of a new species of sand-dwelling catfish of the genus *Stenolicmus* (Siluriformes; Trichomycteridae). Zootaxa 2752: 62–68.

Zuanon J, Sazima I (2004). Natural history of *Stauroglanis gouldingi* (Siluriformes: Trichomycteridae), a miniature sand-dwelling candiru from central Amazonian streamlets. Ichthyological Exploration of Freshwaters 15 (3): 201–208.