

A new species of *Moenkhausia* (Characiformes, Characidae) from the Içá River, Amazon Basin, northern Brazil

Valter M. Azevedo-Santos¹, Ricardo C. Benine¹

¹ Laboratório de Ictiologia, Departamento de Zoologia, IBB-UNESP Campus de Botucatu, Botucatu, SP, 18618-970, Brazil

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Corresponding author: Valter M. Azevedo-Santos (valter.ecologia@gmail.com)

Abstract

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Tooth cusps
Moenkhausia tergimacula

A new species of the genus *Moenkhausia* is described from the Içá River, Amazon Basin. *Moenkhausia britskii* sp. n. is most similar to *M. grandisquamis* and *M. xinguensis*. From these two species it is readily distinguished by the pigmentation pattern of the humeral spot. *Moenkhausia britskii* further differs from *M. xinguensis* by the pattern of *radii* on the scales, which curve upward and downward (*vs.* scales with straight *radii*). Discussions on the putative relationship of the new species with *M. grandisquamis* and *M. xinguensis*, and on the peculiar upward and downward arched scale *radii* are provided.

Introduction

Eigenmann (1903) proposed the genus *Moenkhausia* to accommodate *Tetragonopterus xinguensis* Steindachner, 1882. In his description Eigenmann (1903: 145) defined the genus simply as “similar to *Markiana*” with “anal naked” and “caudal scaled”. Subsequently, some species originally described in other genera were transferred into *Moenkhausia* (Eigenmann 1910, Eigenmann 1917), and since then, many new species have been described (e.g., Travassos 1964, Fink 1979, Lucena and Lucena 1999, Benine 2002, Benine et al. 2007, Benine et al. 2009, Marinho 2010, Petrolli et al. 2016). At this time, more than 80 valid species (Eschmeyer et al. 2016) are recognized. The genus is widespread in the Neotropical river systems, with its greatest diversity occurring in the Amazon Basin (Eigenmann 1917, Lima et al. 2003).

During a taxonomic study of *M. grandisquamis* (Müller & Troschel, 1845) and *M. xinguensis* (Steindachner, 1882), we verified the existence of an undescribed species, very similar morphologically to the

formers, which is formally described herein. Given such similarity, the lack of phylogenetic definition for the genus, and the fact that the new species bears all the still used traditional generic diagnostic features (see Eigenmann 1903, Eigenmann 1917), we conservatively allocate our new species in *Moenkhausia*.

Material and methods

Measurements were taken following Fink and Weitzman (1974) and using a digital caliper (0.1 mm of precision). Counts were also performed according to Fink and Weitzman (1974) and taken at the left side of the specimens, whenever possible. Counts are followed by their frequency in parentheses; asterisks indicate values for the holotype. Detailed analysis of teeth, fin rays, and vertebrae were made from cleared and stained (c&s) specimens prepared according to Taylor and Van Dyke (1985), which was dissected following Weitzman (1974). Vertebral counts were taken from x-ray images and

cleared and counterstained (c&s) specimen. Weberian apparatus was counted as four vertebrae; and the fused preural and ural centrum PU1+U1, located in the caudal region, as one element.

Institutional acronyms cited in this work are explicated in Sabaj-Pérez (2016).

Results

Moenkhausia britskii sp. n.

<http://zoobank.org/ED47F6E9-E4E8-4753-B342-CB879F2A30BC>

Fig. 1

Holotype. MZUSP 120691, 52.9 mm SL, Brazil, Amazonas State, Santo Antônio do Içá Municipality, Rio Içá, approximately 60 km above its mouth, 3°0'7.68" S, 69°2'49.52" W, collected by H. A. Britski, N. A. Menezes, J. C. Garavello, T. R. Roberts, S. Gerken, 18 Oct 1968.

Paratypes. MZUSP 17537, 16 (1 c&s), 41.3–58.3 mm SL, same data as the holotype.

Diagnosis. *Moenkhausia britskii* sp. n. differs from all congeners, except *M. grandisquamis* (Müller & Troschel, 1845), *M. tergimacula* Lucena & Lucena, 1999 and *M. xinguensis* (Steindachner, 1882), by the presence of a single humeral spot, presence of a silvery lateral stripe, absence of a dark line at the base of the anal-fin rays, absence of a caudal lobule mark, dorsal fin hyaline, five series of scales above lateral line and four series of scales below lateral line. *Moenkhausia britskii* differs from *M. tergimacula* by the absence of a dark spot located anteriorly to the dorsal-fin origin; and from *M. xinguensis* by the scales showing upward and downward bent *radii* (*vs.* scales with straight *radii*) (Fig. 2). Finally, it differs from *M. grandisquamis* by having a larger humeral spot, located over the third to fifth or fourth to sixth lateral-line scales and extending vertically over three or four horizontal scale rows above the lateral line (*vs.* smaller humeral spot, located over second to third or third to fourth scale of the series immediately above the lateral line) (Fig. 3). The new species also differs by having four or five cusps on the second tooth of the inner row of the premaxilla (Fig. 4) (*vs.* eight, seven, occasionally six cusps on the



Figure 1. *Moenkhausia britskii*, MZUSP 120691, holotype, 52.9 mm SL, from Içá River, Amazon basin.

second tooth of the inner row of the premaxilla in *M. grandisquamis*).

Description. Morphometric data are given in Table 1. Greatest body depth at dorsal-fin origin. Dorsal profile of body slightly convex from tip of supraoccipital spine to dorsal-fin origin. Dorsal-fin base posteroventrally inclined. Profile straight or slightly convex from end of dorsal fin to adipose-fin origin; adipose-fin base posteroventrally inclined; caudal peduncle concave both dorsally and ventrally; ventral profile of body convex from tip of lower jaw to anal-fin origin; anal-fin base posterodorsally inclined. Prepelvic region transversally flattened, mainly at pelvic-fin insertion.

Mouth terminal. Posterior tip of maxilla extending beyond vertical through anterior margin of orbit. Premaxillary teeth arranged in two rows; outer row with 4(1), 5*(15) or 6 (1) tricuspidate teeth with central cusp longer; inner row with 5* (17) tetra- to pentacuspitate teeth (Fig. 5). Maxilla with 1* (14) or 2(3) tricuspid teeth. Dentary with 4* (17) tetra- to pentacuspitate teeth; central cusp usually longer, followed by five to ten small teeth decreasing in size posteriorly, with one to three cusps.

Dorsal-fin rays ii, 9. Pectoral-fin rays i, 10 (1), i, 11 (10), or i, 12* (6). Pelvic-fin rays i, 7. Anal-fin rays iii, 23 (4), iii, 24 (4), iii, 25* (8), or iii, 26 (1). Adipose fin present.

Scales cycloid with striae curved upward and downward. Lateral line slightly curved, with 30 (3), 31 (6), 32*

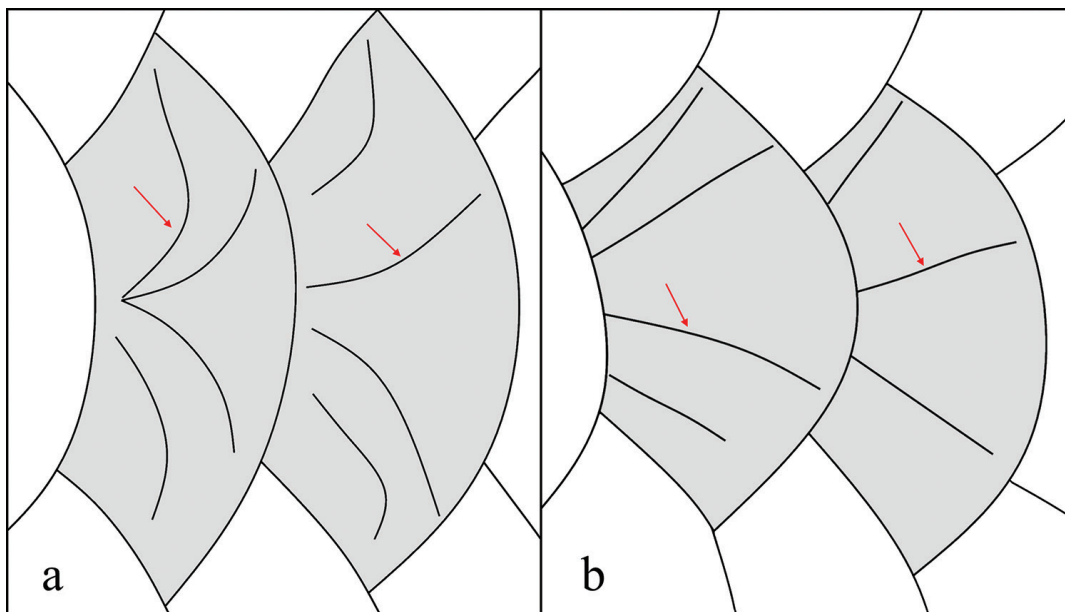


Figure 2. Illustration of two scales (gray color) with arrows indicating the radii of the scales: **a)** *Moenkhausia britskii*, holotype, MZUSP 120691, 52.9 mm SL; **b)** *Moenkhausia xinguensis*, INPA 39991, 42.3 mm SL.

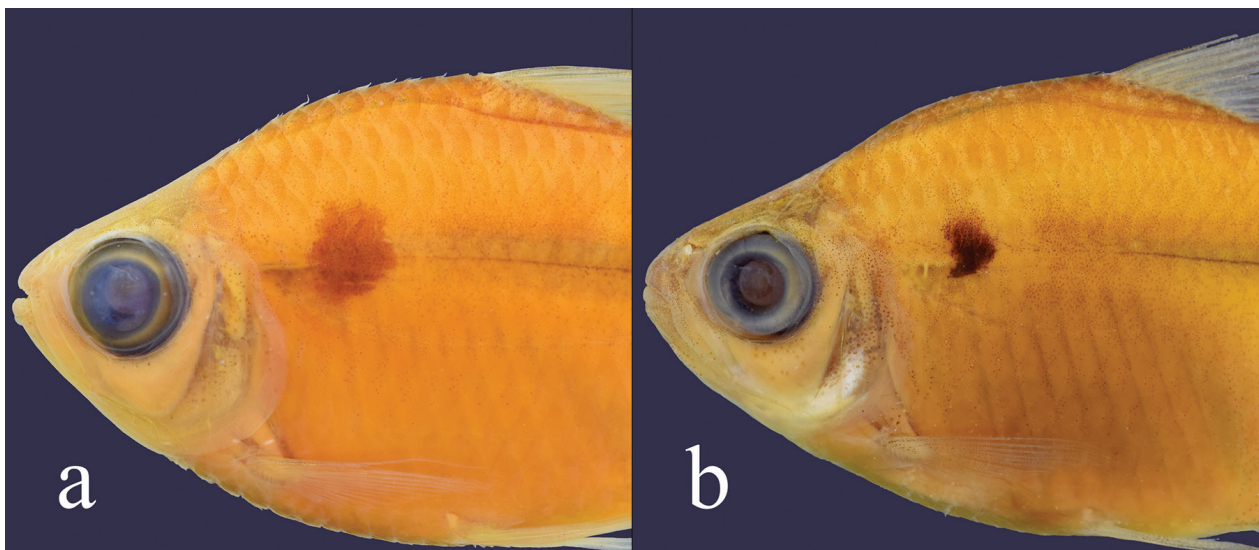


Figure 3. Humeral spot: **a)** *Moenkhausia britskii*, 50.5 mm SL, paratype, MZUSP 17537; **b)** *Moenkhausia grandisquamis*, 48.2 mm SL, MZUSP 38244.

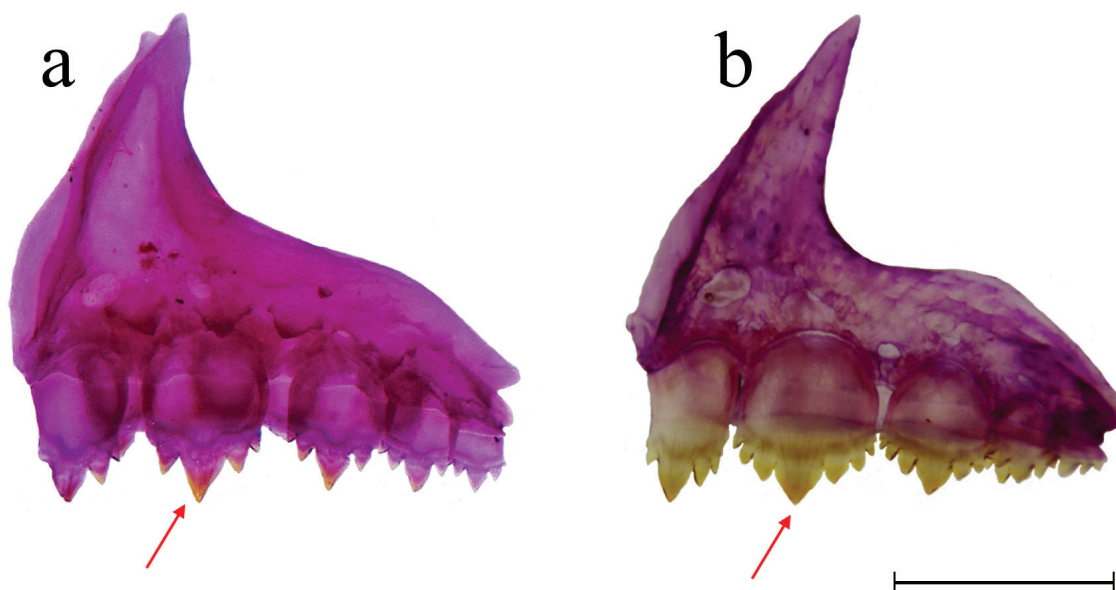


Figure 4. Arrows (red color) indicating the second tooth of the inner row of the premaxilla: **a)** *Moenkhausia britskii*, paratype, MZUSP 17537; **b)** *Moenkhausia grandisquamis*, MZUSP 38244. Medial view. Scale bar = 1 mm.

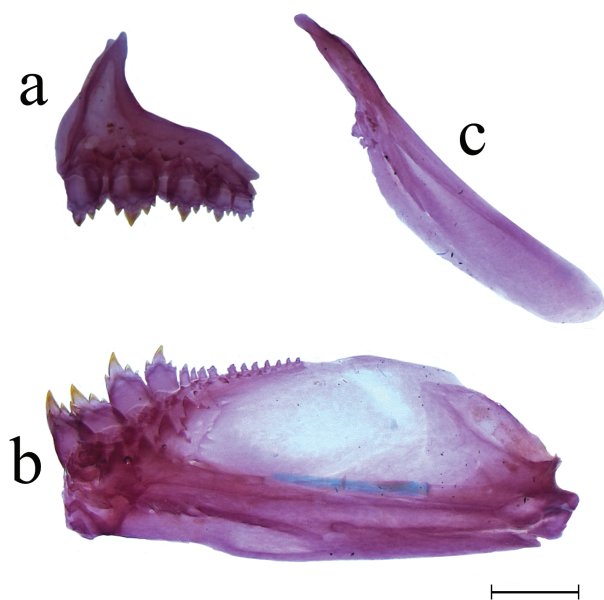


Figure 5. *Moenkhausia britskii*, MZUSP 17537, paratype: **(a)** premaxilla; **(b)** dentary; **(c)** maxilla. Medial view. Scale bar = 1 mm.

(6) or 33(2) pored scales. Five transversal scales above lateral line and four transversal scales below lateral line. A single series of scales covering base of second to eleventh branched anal-fin rays. Small scales covering the proximal two-third of caudal-fin lobes.

Total number of vertebrae 32 (2). Gill rakers on lower limb 8 (1); 11* (15); 12 (1); gill rakers on upper limb 7(1), 8(9) or 9*(7). Supraneurals 4 (2).

Color in alcohol. Overall coloration yellow tan. Concentration of few dark chromatophores on upper lip.

Infraorbital and opercular series light silvery due to the scarce remaining guanine pigmentation. Dark chromatophores more densely concentrated along dorsal midline. Sparsely distributed dark chromatophores dorsal of horizontal septum. A dark line marks the horizontal septum. A silvery-gray midlateral stripe extending from posterior margin of humeral spot to caudal peduncle. Irregularly shaped, humeral spot located over third to fifth or fourth to sixth lateral-line scales and extending vertically over three or four horizontal scale rows above lateral line. Paired fins and anal fin hyaline. Adipose with very few dark chromatophores.

Distribution. Known from the Igarapé da Cachoeira, Içá River, Amazon basin, Santo Antônio do Içá, Amazonas, Brazil (Fig. 6).

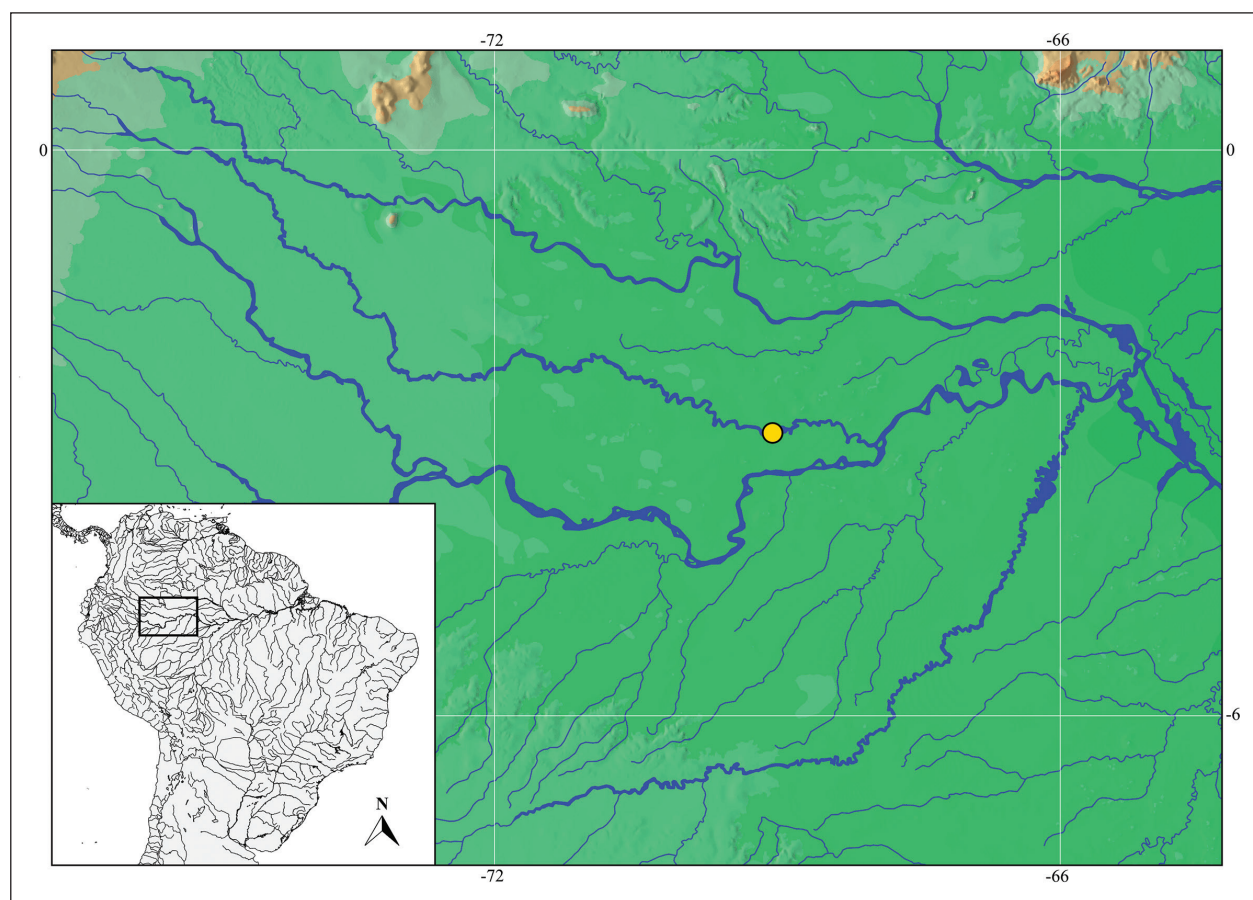
Etymology. The specific epithet *britskii* is in honor of Dr. Heraldo Antônio Britski, collector of this new species and for his enormous and valuable contributions to our knowledge of the Neotropical Ichthyology.

Discussion

Aside from an overall similarity in proportions and morphometric and meristic data, *Moenkhausia britskii* sp. n. and *M. grandisquamis* share with *M. xinguensis* the unique combination of a single humeral spot, presence of a silvery lateral stripe, absence of a dark line at the base of the anal-fin rays, absence of a caudal lobule mark, dorsal fin hyaline, and five series of scales above and four series of scales below lateral line. *Moenkhausia tergimaculata* also fits in this combination except for the humeral spot, which is represented by a field of sparse dark chromato-

Table 1. Morphometric data of holotype and paratypes of *Moenkhausia britskii* from Içá River, Amazon basin (n = 17). Range includes the holotype.

Measurements	Holotype	Range	Mean	SD
Standard length (mm)	52.9	41.3–58.3	50.2	-
Percents of standard length				
Greatest depth	47.6	41.2–47.7	45.1	1.6
Snout to dorsal-fin origin	52.8	49.6–53.9	52.1	1.2
Snout to pectoral-fin origin	29.2	28.7–31.7	30.5	0.9
Snout to pelvic-fin origin	53.4	50.5–55.1	52.5	1.3
Snout to anal-fin origin	70.8	67.7–71.7	70.3	1.1
Caudal peduncle depth	11.5	10.5–12.3	11.4	0.5
Caudal peduncle length	8.9	8.5–11.2	9.3	0.7
Pectoral-fin length	23.2	21.5–25.6	23.5	0.9
Pelvic-fin length	20.3	17.9–21.9	19.8	1.2
Dorsal-fin length	33.7	31.2–34.4	32.8	1.1
Dorsal-fin base	16.8	14.6–18.7	16.0	0.9
Anal-fin length	18.7	18.6–22.7	20.3	1.4
Anal-fin base	30.9	28.8–31.4	30.1	0.7
Eye to dorsal-fin origin	36.4	34.3–38.8	36.7	1.1
Dorsal-fin origin to caudal-fin origin	58.4	55.3–58.5	56.9	1.0
Head length	28.1	26.3–30.3	28.3	1.1
Head depth	31.9	29.5–33.1	31.5	1.2
Percents of head length				
Snout length	25.8	23.2–28.3	25.8	1.5
Upper jaw length	43.7	40.1–47.9	44.3	2.2
Horizontal orbital diameter	44.9	41.4–50.6	45.3	2.8
Least interorbital width	53.7	46.7–57.9	52.1	3.0

**Figure 6.** Partial map of South America with yellow circle indicating the distribution of *Moenkhausia britskii*.

phores at the humeral area, and an unusual conspicuous dark blotch located just ahead of the origin of the dorsal fin (see Lucena and Lucena 1999 for more details). Thus, these probably closely related species should be necessarily considered in a phylogenetic analysis of the genus, since the group encompasses its type species, *M. xinguensis*.

The peculiar upward and downward arched scale *radii* observed in *Moenkhausia britskii* sp. n., is also present in *M. grandisquamis*. Indeed, this feature was first described by Eigenmann (1917: 67) as “some striae of the scales diverging from the middle line of each scale in nearly opposite directions, up and down” to directly differentiate *M. grandisquamis* from *M. ovalis* (Günther, 1868). Moreover, Eigenmann (1917: 85) emphatically argued that this feature actually would distinguish *M. grandisquamis* “from all others of the genus”, evidencing the uniqueness of such character. Thus, considering the coloration pattern, and overall morphometric and meristic similarities between *M. grandisquamis* and *M. britskii*, it is plausible to consider such a condition synapomorphic and indicative of close relationship between these two species. Nonetheless, our comparative study also demonstrates that *Stichonodon insignis* (Steindachner, 1876) has scales with upward and downward curved *radii*. However, this is a highly modified deep-bodied species currently allocated at the Stethaprioninae (Nelson et al. 2016). Accordingly, occurrence of this trait in distantly related groups must be considered convergent/homoplastic for the time being. Distribution and significance of this rare character for systematics of Characidae shall be evaluated by more detailed comparison and a phylogenetic analysis encompassing more taxa.

Comparative material. *Brachychalcinus* sp.: LBP 10653, 1, 58.8 mm SL, **Brazil**. *Moenkhausia agnase*: LBP 14869, 3, 62.1–65.5 mm SL, **Peru**. *Moenkhausia aurantia*: LBP 18999, 4, 20.7–40.9 mm SL, **Brazil**. *Moenkhausia australe*: LBP 4655, 10 of 65, 29.5–36.7 mm SL, **Brazil**. *Moenkhausia bonita*: LBP 7592, 12, 31.1–34.5 mm SL, **Brazil**. *Moenkhausia celibela*: LBP 14250, 7 of 23, 20.6–34.2 mm SL, **Brazil**. *Moenkhausia ceros*: LBP 4504, 12 of 25, 20.7–30.5 mm SL, **Brazil**. *Moenkhausia chrysargyrea*: USNM 226155, 37, 42.4–53.3 mm SL, **Suriname**. *Moenkhausia comma*: LBP 16714, 12, 46.28–63.22 mm SL, **Brazil**. *Moenkhausia copei*: LBP 2300, 1, 36.7 mm SL, **Venezuela**. *Moenkhausia cosmops*: LBP 8164, 6, 43.6–65.2 mm SL, **Brazil**. *Moenkhausia costae*: LBP 10298, 3, 33.7–48.9 mm SL, **Brazil**; LBP 10298, 3, 33.7–48.9 mm SL, **Brazil**. *Moenkhausia cotinho*: MZUSP 29827, 12 of 45, 33.91–49.88 mm SL, **Brazil**. *Moenkhausia dasalmas*: LBP 17135, 8 of 38, 24.5–41.3 mm SL, **Brazil**. *Moenkhausia dichroua*: LBP 3760, 10, 70.23–44.52 mm SL, **Brazil**. *Moenkhausia* aff. *grandisquamis*: MZUSP 099992, 50, 11.3–55.1 mm SL, **Brazil**. *Moenkhausia grandisquamis*: MZUSP 101448, 9, 52.4–96.6 mm SL, **Brazil**; ANSP 175609, 15, 49.5–66.7 mm SL, **Guyana**; MZUSP 38244, 30, topotypes, 25.0–44.1 mm SL, **Suriname**. *Moenkhausia hemigrammoides*: LBP 13243, 3, 31.2–34.6 mm SL,

Brazil. *Moenkhausia intermedia*: LBP 17196, 4, 52.74–68.54 mm SL, **Brazil**. *Moenkhausia jamesi*: MZUSP 17583, 2, 54.40–50.35 mm SL, **Brazil**. *Moenkhausia justae*: MZUSP 55752, 12, 51.19–42.03 mm SL, **Brazil**. *Moenkhausia lata*: LBP 19969, 6 of 11, 41.0–61.7 mm SL, **Brazil**. *Moenkhausia levidorsa*: INPA 11611, 5, 40.06–60.46 mm SL, **Brazil**. *Moenkhausia lopesi*: LBP 16063, 8, 40.98–43.52 mm SL, **Brazil**. *Moenkhausia megalops*: INPA 48026, 2, 51.3–65.9 mm SL, **Brazil**. *Moenkhausia oligolepis*: LBP 10807, 5, 31.64–46.4 mm SL, **Brazil**. *Moenkhausia phaenota*: LBP 8029, 9, 45.8–32.7 mm SL, **Brazil**. *Moenkhausia pirauba*: **LBP16148**, 11, 85.2–69.4 mm SL, **Brazil**. *Moenkhausia sanctaefilomenae*: LBP 1474, 7, 25.72–55.18 mm SL, **Brazil**. *Moenkhausia sthenosthoma*: MZUSP 117143, 1, paratype, **Brazil**. *Moenkhausia surinamensis*: LBP 21009, 4, 43.4–63.8 mm SL, **Brazil**. *Moenkhausia tergimacula*: MCP 202287, paratype, **Brazil**. *Moenkhausia veneirei*: MZUSP 119006, holotype, **Brazil**. *Moenkhausia xinguensis*: LBP 16745, 23, 53.6–33.9 mm SL, **Brazil**; INPA 39991, 20, 50.4–34.5 mm SL, **Brazil**; INPA 47044, 38, 51.6–32.8 mm SL, **Brazil**; INPA 40483, 2, 41.8–60.3 mm SL, **Brazil**; INPA 47140, 20.7–42.2 mm SL, **Brazil**. *Poptella* sp. 1: LBP 7792, 10, 31.0–35.3 mm SL, **Brazil**. *Poptella* sp. 2: LBP 4012, 3, 48.5–51.5 mm SL, **Brazil**. *Poptella* sp. 3: MZUSP 117635, 6 of 53, 27.6–36.5 mm SL, **Brazil**. *Stichonodon insignis*: INPA 042300, 1, 68.3 mm SL, **Brazil**. *Tetragonopterus argenteus*: LBP 185, 02, 70.4–71.6 mm SL, **Brazil**. *Tetragonopterus chalcus*: LBP 16663, 5, 40.5–64.8 mm SL, **Brazil**.

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