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Redescription of *Moenkhausia megalops* (Eigenmann, 1907), a widespread tetra from the Amazon basin (Characiformes, Characidae)

Isabel M. Soares[1,2], Valter M. Azevedo-Santos[1], Ricardo C. Benine[1]

1 *Laboratório de Ictiologia, Departamento de Zoologia, IBB-UNESP Campus de Botucatu, Rua Professor Doutor Antônio Celso Wagner Zanin, 250, Botucatu, SP, 18618-689, Brazil*

2 *Coleção de Peixes, Instituto Nacional de Pesquisas da Amazônia, Av. André Araújo, 2936, Caixa Postal 2223, 69060-001 Manaus, Amazonas, Brazil*

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Corresponding author: *Isabel M. Soares* (bioimsoares@gmail.com)

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Abstract

Moenkhausia currently comprises 90 valid species and represents one of the very species-rich genera in Characidae. Most of these species need to be revised since their original descriptions are out-of-date and are uninformative. In this sense, *Moenkhausia megalops* is redescribed based on the examination of the holotype and additional specimens from drainages of the Amazon basin and the type locality. The species is distinguished from its congeners by the combination of the following characters: a conspicuous boot-shaped humeral spot, ventrally curved to anterior region of the body, followed by a second inconspicuous vertically elongated humeral spot; a dark longitudinal midlateral stripe on body extending from immediately posterior to the second humeral spot to the middle caudal-fin rays; a dark blotch on the upper caudal-fin lobe; and teeth with seven cusps on inner series of premaxilla and dentary.

Resumo

Moenkhausia compreende atualmente 90 espécies válidas e representa um dos gêneros mais ricos em espécies em Characidae. A maioria dessas espécies precisa ser revisada, por que as suas descrições originais estão defasadas e são pouco informativas. Neste sentido, *Moenkhausia megalops* é redescrita com base no exame do holótipo e de exemplares adicionais provenientes de drenagens da bacia Amazônica. A espécie é diferenciada das suas congêneres pela combinação dos seguintes caracteres: uma mancha umeral conspícua, em formato de bota, ventralmente curvada em direção à região anterior do corpo, seguida por uma segunda mancha umeral inconspícua, verticalmente alongada; uma faixa escura longitudinal médio-lateral se estendendo imediatamente posterior à segunda mancha umeral aos raios medianos da nadadeira caudal; uma mancha escura no lobo superior da nadadeira caudal; e dentes com sete cúspides na série interna do pré-maxilar e dentário.

Introduction

Moenkhausia (Eigenmann, 1903) represents one of the very species-rich genera in Characidae, currently comprising 90 valid species (Eschmeyer et al. 2017). The genus is widely distributed in the Neotropical cis-Andean river basins, notably occurring in the Amazon basin (e.g., Sousa et al. 2010, Petrolli and Benine 2015, Oliveira and Marinho 2016, Azevedo-Santos and Benine 2016). *Moenkhausia* species are characterized by a wide variation in shape and color patterns (Carvalho et al. 2014), and some of them are very appreciated as ornamental fish.

The phylogenetic relationships of the genus are still poorly understood, and *Moenkhausia* has been depicted as

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a polyphyletic group (Mirande 2010, Oliveira et al. 2011, Mariguela et al. 2013). Nevertheless, *Moenkhausia* is still diagnosed by the same combination of characters as proposed by Eigenmann (1917): premaxillary teeth in two series, with five multicuspid teeth in the inner series; caudal-fin covered by small scales; and complete lateral line.

Eigenmann, in Eigenmann and Ogle (1907) (hereafter Eigenmann, 1907), proposed the name *Astyanax megalops* based on a single specimen from Itaituba, Pará, Brazil. Later, Eigenmann (1910) listed the species in the genus *Moenkhausia* and expanded its geographical distribution from Gurupá to Itaituba, and Guyana.

The short and uninformative original description of *Astyanax megalops* Eigenmann (1907) allied to the poor condition of its preserved holotype has hindered a satisfactory understanding and definition of the species, currently valid as *Moenkhausia megalops*. The more detailed redescription provided by Eigenmann (1917) is still general and with no definitive diagnostic character or even a workable character combination. These ineffective descriptions allied to Géry's (1977) popular and straightforward identification key are possibly leading to inconsistent identifications throughout fish collections and inventorial publications (e.g., Mojica et al. 2005, Castellanos and Sánchez-Duarte 2007, and Lima et al. 2013). Géry and Zarske (2004: 42), in a brief discussion, stated that this is "a rare species" from the rio Tapajós basin and Guyana, and did not provide new features for its identification. Recently, Oliveira and Marinho (2016) did shed some light on the identity of *M. megalops* when distinguishing it from their new species, *Moenkhausia abyss*, by the shape of the humeral mark and by the pigmentation of the longitudinal midlateral stripe.

During an extensive analysis of lots of *Moenkhausia* deposited in the fish collection of the INPA (Instituto Nacional de Pesquisas da Amazônia), we recognize specimens of *Moenkhausia megalops* identified with different names, and here these are properly re-identified. Thus, we herein present a redescription of *M. megalops*, based on the examination of the holotype and additional material, including topotypes, and discuss our arguments concerning its taxonomic definition.

Material and methods

Counts and measurements were taken as described by Fink and Weitzman (1974) and Benine et al. (2015) on the left side of specimens whenever possible using a digital caliper with precision of 0.01 mm. Measurements are given as percents of standard length (SL), except subunits of the head, which are given as percents of head length (HL). Vertebral, supraneurals and procurrent caudal-fin ray counts were taken from cleared and stained specimens (c&s) prepared following Taylor and Van Dyke (1985). Vertebral counts include Weberian apparatus, counted as four elements, and the fused PU1+U1 of the caudal region counted as a single vertebral element. The gill-raker at the junction of the ceratobranchial and the epibranchial is included in the counting of gill-rakers of the lower limb. Scanning electron micrography (SEM) of teeth and jaws was taken from cleared and stained dissected specimens. The specimens were sexed by the visual examination of their gonads under a stereomicroscope since no externally dimorphic feature was observed. Counts and measurements from examined material were given whenever possible. In the description, counts are followed by the number of specimens examined in parentheses; asterisk indicates the counts of the holotype; unbranched rays are presented in lower-case Roman numerals. In the examined material account, the total number of specimens of each lot is listed first, followed by the number of analyzed specimens in parentheses (when different from total number of the lot), and then by those c&s. Specimens examined are deposited in the CAS, California Academy of Sciences, San Francisco; INPA, Instituto Nacional de Pesquisas da Amazônia, Manaus; and GEA, Laboratório de Ictiologia do Grupo de Ecologia Aquática, Universidade Federal do Pará, Belém.

Results

Moenkhausia megalops (Eigenmann, 1907)

Figs 1–4

Astyanax megalops Eigenmann in Eigenmann and Ogle 1907: 29 (type locality: Itaituba, Brazil).

Moenkhausia megalops: Eigenmann 1910, 3: 438, [in part]. Eigenmann 1917, 1: 65; 68; 91–92 [in part, identification key and a short redescription of the species]. Fowler 1948: 152-153 [list]. Géry 1977: 446 [identification key]; ?Ferreira 1993: 69 [list]. Maldonado-Ocampo 2001: 65 [list]. Lima et al. 2003: 148 [list]. ?Arbeláez et al. 2004: 102 [list; new record]. ?Camargo et al. 2004: 134 [list]. Géry and Zarske 2004: 42 [compared to *M. xinguensis*; placed in *M. xinguensis* group; identification key]. ?Lasso et al. 2004: 115 [list]. ?Ferreira et al. 2007: 180 [list]. ?Maldonado-Ocampo et al. 2008: 171 [list]. ?Hercos et al. 2009: 48 [list]. ?Miller-Hurtado et al. 2009: 167 [list; new record]. ?Ferreira et al. 2011: 280 [list]. Lasso and Sánchez-Duarte 2011: 473 [literature compilation]. ?Gonzáles et al. 2012: 46 [list; new record for Caura basin]. Souza et al. 2012: 34 [list]. Álvarez-León et al. 2013: 106 [list]. ?Duarte et al. 2013: 385 [list].–Oliveira and Marinho 2016: 566-571 [compared to *M. abyss*]. Petrolli et al. 2016: 168 [compared to *M. venerei*]. Marinho and Langeani 2016: 2–3; 10–11 [compared to *M. lepidura*]. Azevedo-Santos and Benine 2016: 208 [compared to *M. britskii*].

Diagnosis. *Moenkhausia megalops* differs from its congeners, except *M. abyss*, *M. celibela*, *M. gracilima*, *M. hasemani*, *M. hysterosticta*, *M. icae*, *M. inrai*, *M. lata*, *M. lepidura*, *M. loweae*, *M. mikia*, by the presence of a dark blotch on the upper caudal-fin lobe. It is readily distinguished from the aforementioned species by the peculiar conspicuous boot-shaped humeral spot, ventrally curved frontward, followed by a second inconspicuous vertically elongated humeral spot (*vs*. humeral spot absent in *M. celibela* and *M. loweae*; one conspicuous, oval, vertically elongated, humeral followed by a second inconspicuous spot in *M. inrai*; a very small humeral spot in *M. gracilima*, *M. hasemani*, *M. icae*, and *M. lepidura*; one dis-



Figure 1. *Moenkhausia megalops*, holotype, CAS 71433, 40.6 mm SL, Brazil, Pará State, Itaituba, rio Tapajós basin. Figure modified from CAS, all rights reserved.



Figure 2. *Moenkhausia megalops*, INPA 48895, 41.9 mm SL, Brazil, Amazonas State, rio Japurá basin.

placed, irregular, and vertically elongated humeral spot in *M. hysterosticta*; a single inconspicuous, thinner, vertically elongated humeral spot in *M. abyss*; a conspicuous vertically elongated, humeral spot, with the upper and lower edges turn frontward in *M. lata*; a rounded humeral spot in *M. mikia*).

Description. Morphometric data presented in Table 1. Overall body deep and slightly elongated. Body compressed, greatest body depth anterior to dorsal-fin origin. Dorsal profile of head slightly concave. Dorsal profile of body slightly convex from tip of supraoccipital spine to dorsal fin origin. Dorsal fin straight along its base, straight to slightly convex from posterior end of dorsal-fin base to adipose-fin origin, and slightly concave along caudal peduncle. Ventral profile of body convex from anterior tip of lower jaw to pelvic fin, slightly straight from pelvic-fin origin to anal-fin origin, straight and posterodorsally slanted along anal-fin base and slightly concave along caudal peduncle.

Eyes large. Snout rounded. Mouth at horizontal through middle of eye. Premaxillary teeth in two teeth series; outer row with 3(1), 4*(14), 5(39) or 6(7) tricuspid teeth with central cusp slightly longer; inner row with 5*(55) or 6(6) teeth with seven cusps, gradually decreasing in size. Maxillary with 1(2), 2(21), 3*(31) or 4(7) trito pentacuspidate teeth, with central cusp longer. Dentary with 3(1), 4*(56) or 5(2) anteriormost teeth larger, with seven cusps, followed by a medium sized tooth with three cusps, and 5(5), 6(5), 7(7), 8(12), 9(12), 10(11) or 11(6) smaller conical teeth (Fig. 3).

Dorsal-fin rays ii(60) 8(1) or 9*(59). Dorsal-fin origin slightly anterior to middle of body. First unbranched ray approximately one-half length of second unbranched ray. Adipose fin present. Pectoral-fin rays i(61), 11(6), 12*(29), 13(24) or 14(2); tip of adducted longest ray generally not reaching vertical through pelvic-fin origin. Pelvic-fin rays i(58), 6(2), 7*(55) or 8(1). Pelvic-fin origin slightly anterior to vertical through dorsal-fin origin; tip of adducted longest ray generally not reaching vertical through anal-fin origin. Anal-fin rays iii(34) or iv(19), 25(5), 26*(23), 27(19), 28(6) or 29(1). Anal-fin origin approximately to vertical through of last branched ray of dorsal fin. Caudal fin forked, lobes similar in size. Principal caudal-fin rays i(46) 9*(46) + 7(1) or 8*(45) i(46). Dorsal procurrent caudal-fin rays 13(6) and ventral procurrent caudal-fin rays 10(3) or 11(3).

Scales cycloid, relatively large. Lateral line complete, slightly curved anteriorly, with 34*(13), 35(26) or 36(19) perforated scales. Longitudinal scale rows between dorsal-fin origin and lateral line 5*(59) or 6(2); longitudinal scale rows between lateral line and pelvic-fin origin 4*(47) or 5(14). Predorsal region with 7(2), 8(24) or 9(23) scales in regular series; three specimens presented

Table 1. Morphometric data of *Moenkhausia megalops* (n = 64, holotype CAS 71433). Data of topotypes and non-topotypes are given separately. Range does not include holotype.

	holotype	non-type specimens (topotypes)			non-type specimens (non-topotypes)		
		n	range	mean	n	range	mean
Standard length (mm)	40.6	4	58.7–65.1	62.8	59	31.6–69.9	49.5
Head length (mm)	11.5	4	16.4–17.7	17.0	59	9.5–18.4	13.9
Percentages of standard length							
Head length	28.2	4	26.5–27.9	27.1	59	25.2–30.9	28.3
Dorsal-fin length	26.2	4	28.7–30.8	29.9	57	27.4–33.2	30.3
Dorsal-fin base	–	4	13.9–15.4	14.6	59	13.2–16.2	15.0
Pectoral-fin length	22.2	4	21.5–23.5	22.4	59	20.4–24.8	22.9
Pelvic-fin length	14.1	4	16.7–17.6	17.2	59	13.2–19.7	17.1
Anal-fin length	13.0	4	15.9–17.2	16.4	59	11.8–19.8	17.1
Anal-fin base	–	4	31.5–33.3	32.3	59	30.8–36.4	33.8
Depth at dorsal-fin origin	42.5	4	38.6–43.0	40.4	59	37.1–47.1	41.9
Head depth	32.9	4	29.9–32.4	31.2	59	30.8–37.2	33.5
Caudal peduncle depth	10.6	4	9.7–10.4	10.0	59	9.0–11.6	10.5
Eye to dorsal-fin origin	32.5	4	32.0–33.4	32.7	59	30.9–35.5	33.1
Snout to dorsal-fin origin	48.9	4	46.3–48.3	47.4	59	46.8–52.4	49.3
Snout to pectoral-fin origin	30.1	4	26.8–28.3	27.8	59	25.1–31.1	28.5
Snout to pelvic-fin origin	51.2	4	47.1–50.0	48.4	57	47.0–52.4	48.9
Snout to anal-fin origin	68.8	4	63.6–66.9	65.6	59	61.1–69.3	64.8
Percentages of head length							
Snout length	17.5	4	15.6–19.8	17.4	59	14.7–22.9	18.9
Upper jaw length	44.2	4	40.5–42.7	41.8	59	39.3–45.3	42.3
Horizontal eye diameter	48.7	4	43.0–46.7	45.0	59	42.6–50.8	47.3
Least interorbital width	32.7	4	35.2–36.9	35.8	59	30.9–39.3	34.2

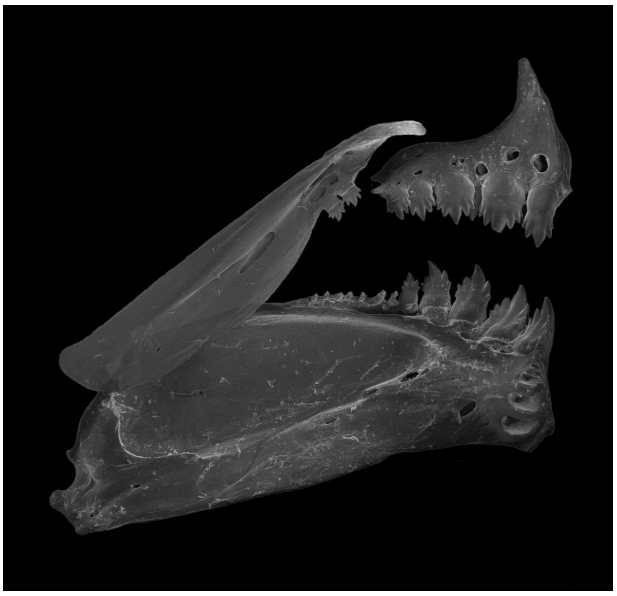


Figure 3. Scanning electronic micrography of dentition of *Moenkhausia megalops*, INPA 40617, 43.2 mm SL, left internal lateral view of premaxilla, maxilla and dentary bones. Scale bar: 300µm.

irregular series of scales. Circumpeduncular scales 12(5), 13(10) or 14(40). One row of small scales overlying almost the entire length of anal-fin base. Small scales covering two-thirds of base of caudal-fin lobes.

Supraneurals 4*(5) or 5(1) with lateral bony lamellae. Precaudal vertebrae 13*(3) or 14(4); caudal vertebrae 20*(6) or 21(1); total vertebrae 33*(3), 34(3) or 35(1). First gill-arch with 8(45), 9(19) or 10(1) gill-rakers on upper limb and 13(12), 14(29) or 15(24) gill-rakers on lower limb.

Color in alcohol. General ground color pale yellow. Body dorsal surface with dark chromatophores from tip of snout to caudal peduncle, resulting in a dark dorsal stripe on the dorsum. Dorsolateral portion of head and body with scattered dark chromatophores. Two vertically elongated humeral spots; the first humeral spot very conspicuous, boot-shaped, located over third to fourth lateral line scales and extending over two horizontal series of scales above lateral line; the second humeral spot, less conspicuous, located over seventh to eighth lateral line scales and extending over two horizontal series of scales above lateral line. Broad band from the second humeral spot to middle caudal-fin rays, covering two series of scales above lateral line. Abdominal region almost devoid of chromatophores. Dorsal fin with scattered dark chromatophores. Adipose fin with scattered dark chromatophores sometimes concentrated on the edge of the fin. Pectoral and pelvic fin hyaline. Anal fin with a dark band in the mid-basal region, not reaching tip of the rays. Posterior margin of upper caudal-fin lobe with a dark blotch, reaching tip of middle caudal-fin rays or, sometimes, reaching the lower caudal-fin lobe.

Color in life. Overall body color silvery on flanks. Dorsal and lateral surface of head, dorsolateral portions of

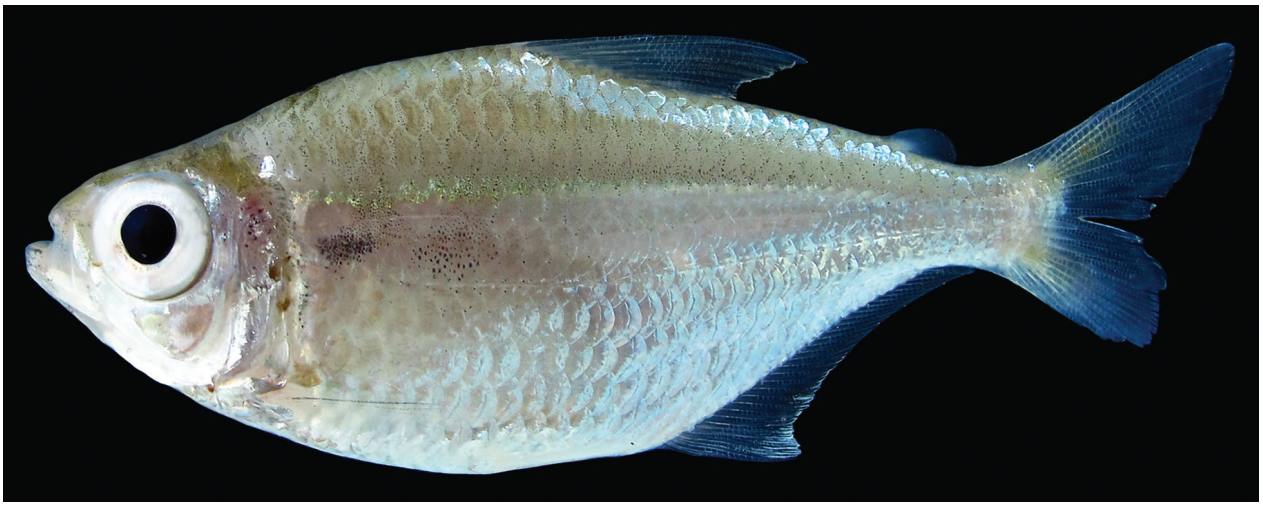


Figure 4. *Moenkhausia megalops*, GEA 2127, 61.4 mm SL, live specimen, Brazil, Pará State, rio Aurá, tributary of rio Guamá basin, Utinga State Park, Água Preta lake. Photo by M. Andrade.

body yellowish. Ventral surface of head, and ventrolateral portion of body covered with guanine. Anterior portion of maxilla and dentary, and top of head with small dark chromatophores. Few dark chromatophores on opercle. Scales on dorsal portion of body bordered by dark chromatophores, forming like reticulate pattern. Longitudinal midlateral band covered with guanine. Humeral region with two vertically elongate humeral spot, anterior spot more conspicuous and boot-shaped. Posterior humeral less conspicuous and vertically elongate. All fins hyaline with some scattered chromatophores. Caudal fin yellowish on base (Fig. 4).

Sexual dimorphism. None of the adult specimens examined had hooks on fins or any other apparent sexually dimorphic features.

Geographic distribution. *Moenkhausia megalops* is widespread in the Amazon basin. In Brazil, the species is known from rio Japurá, Demeni (tributary of rio Negro), Branco, Takutu, Mapuera, Cachorro, Jari, and Trombetas, left margin of rio Amazonas basin; and rio Jamari, Curuá-Una, Tapajós, Teles Pires, Xingu, Tocantins, Araguaia, and Aurá, right margin of rio Amazonas basin. *Moenkhausia megalops* also occurs in the rio Ventuari and Orinoco, Venezuela. The map shows the localities of the material examined in the present study (Fig. 5).

Material examined. *Moenkhausia megalops*. Holotype: CAS 71433, 40.6 mm SL, Brazil, Pará State, Itaituba, rio Tapajós basin. Non-type specimens. Brazil. Amazonas State, rio Japurá: INPA 48895, 6, 41.5–52.3 mm SL, Japurá, in front of the Taboca community, right margin, 2º12’34.72”S 69º14’01.11”W, 09 Sep 2014, RA Collins; INPA 48928, 1, 45.4 mm SL, Japurá, in front of the port of the city, 2º28’12.22”S 67º40’09.44”W, 28 Aug 2014, IM Soares, PM Ito, R Collins & Astrogildo. Mato Grosso State, rio Teles Pires, tributary of rio Tapajós basin: INPA 48893, 4, 51.6–58.7 mm SL, Paranaíta, 10º01’21.38”S 57º05’12.78”W, 24 Feb 2013, Solange, Reginaldo & Rosalvo. Pará State, rio Aurá, tributary of rio Guamá basin: GEA 2127, 5, 51.0–61.4 mm SL, Belém, Utinga State Park, Água Preta lake, 1°25’25.7”S 48°25’09.3”W, 10 Jul 2013, MC Andrade et al.; GEA 2128 1, 64.7 mm SL, Belém, Utinga State Park, Bolonha lake, 1°24’59.3”S 48°25’48.1”W, 8 Jul 2013, MC Andrade et al. Pará State, rio Curuá-Una, tributary of rio Amazonas basin: INPA 40963, 5, 63.3–69.9 mm SL, Santarém, 02º49’11.3”S 54º18’12.8”W, Nov 1982, EG Ferreira. Pará State, rio Jari basin: MZUSP 102044, 2, 38.1–40.7 mm SL, Monte Dourado, right margin of rio Iratapuru, in front of Iratapuru village, upstram to Santo Antônio waterfall, 0º34’3”S 52º34’41”W, 11 Oct 2007, M Carvalho, A Akama, C Oliveira & F Marques. Pará State, rio Tapajós: INPA 6885, 4, 58.7–65.1 mm SL, Itaituba, below mouth of the rio Jamanxim, 04º33’41”S 56º15’50”W, 23 Oct 1991, L Rapp Py-Daniel & J Zuanon. Pará State, rio Tocantins: INPA 48894, 3, 61.8–68.7 mm SL, Capuerana, 04º42’31.06”S 49º25’53.09”W, 10 Nov 1981, Equipe de Ictiologia do INPA. Pará State, rio Trombetas basin: INPA 3235, 1, 46.62 mm SL, Oriximiná, Cachoeira Porteira, 01º04’47”S 57º03’16”W, 16 Apr 1985, EG Ferreira & M Jégu; INPA 3365, 4, 51.4–58.7 mm SL, Oriximiná, Ilha Trava, 0º58’53.4”S 57º01’47.8”W, 28 Apr 1988, EG Ferreira; INPA 5727, 3, 53.0–55.4 mm SL, Oriximiná, rio Mapuera, tributary of rio Trombetas, 01º05’27.5”S 57º04’19.9”W, 26 May 1988, EG Ferreira; INPA 12160, 6, 44.2–50.8 mm SL, Oriximiná, Cachoeira Porteira, 01º04’47”S 57º03’16”W, 15 Apr 1985, EG Ferreira & M Jégu; INPA 39193, 1, 53.4 mm SL, Oriximiná, rio Cachorro, tributary of rio Trombetas, 0º59’28.7”S 57º03’20.8”W, 27 May 1988, EG Ferreira. Pará State, rio Xingu basin: INPA 43923, 4, 44.8–50.3 mm SL, Anapu, about 3.5 km east upstream of crossing of BR ferry, left margin, 03º07’55”S 51º40’08”W, 01 Feb 2014, MH Sabaj-Pérez, M Arce, AP Gonçalves, J Zuanon, DB Fitzgerald

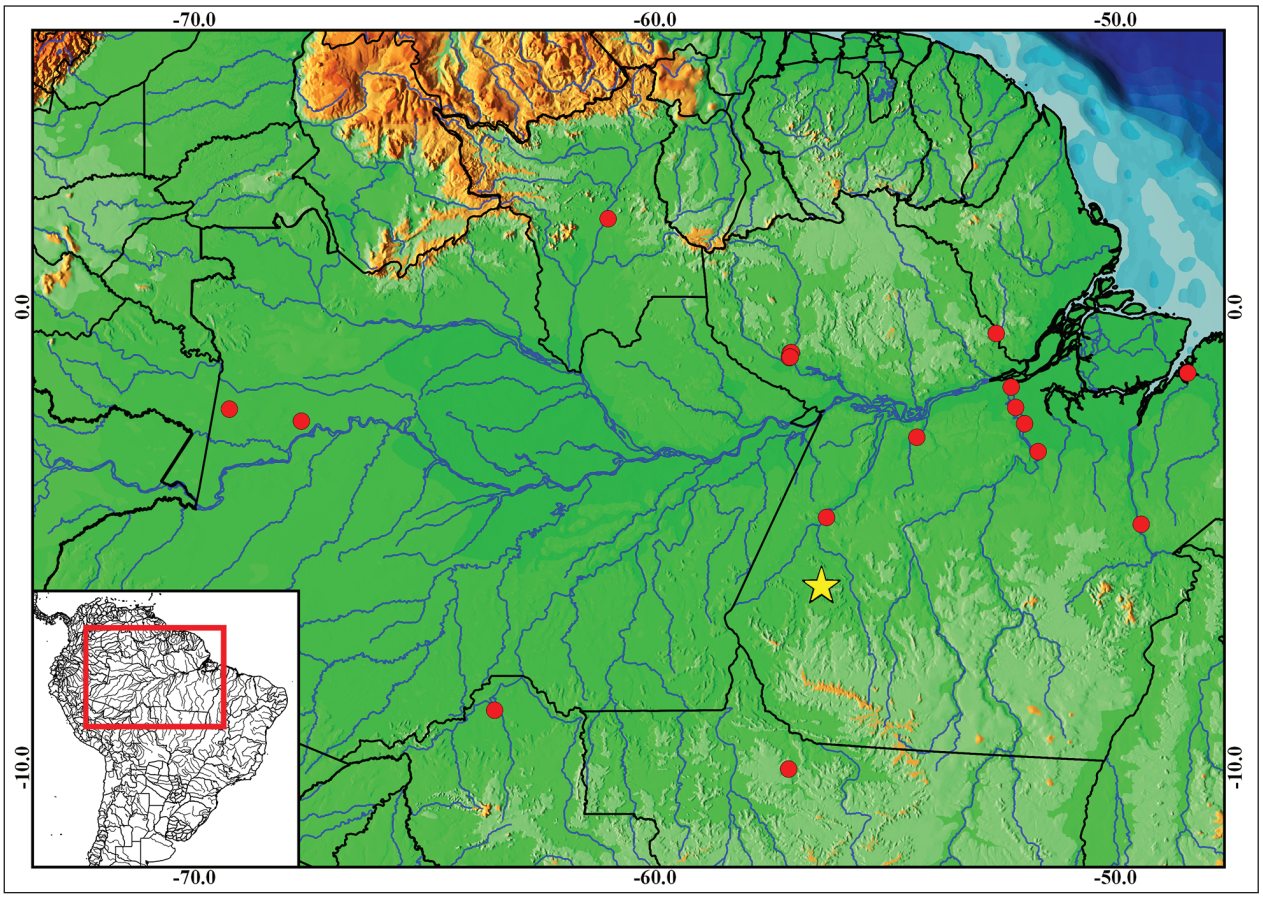


Figure 5. Distribution of *Moenkhausia megalops*. Circles represent lots examined; star indicates type locality in the rio Tapajós basin.

& RR Reyes; INPA 40617, 117, 33.66–45.74 mm SL (5, 34.24–45.74 mm SL, 7 c&s, 43.2–45.0 mm SL), Porto de Moz, at 7 km north of Senador José Porfírio, 02º31'32"S 51º57'48"W, 23 Sep 2013, MH Sabaj Pérez et al; INPA 40700, 8, 31.6–44.9 mm SL, Porto de Moz, downstream end of public beach, right margin, 3 km from Porto de Moz, 01º43'54"S 52º15'16"W, 24 Sep 2013, MH Sabaj-Pérez et al; INPA 43324, 3, 47.2–60.8 mm SL, Porto de Moz, beach along right margin, 7.5 km south upstream of mouth of rio Veiros, 02º10'24"S 52º09'24"W, 06 Mar 2013, MH Sabaj-Pérez, M Arce, AP Gonçalves, J Zuanon, DB Fitzgerald, RR Reyes, DRG Ribeiro & AR Martins. Rondônia State, rio Jamari: INPA 48892, 5, 42.2–51.5 mm SL, Porto Velho, rock at 3 km upstream Samuel megadam, 08º44'47.24"S 63º28'22.68"W, 06 Sep 1985, GM dos Santos. Roraima State, rio Branco: INPA 36938, 1, 44.7 mm SL, Caracaraí, rocks in front of the Água Fria stream, 01º55'23"N 61º00'29"W, 19 Sep 2011, L Rapp Py-Daniel, MCC de Pinna, RR de Oliveira & AS Oliveira. Venezuela. rio Orinoco basin: ANSP 190778, 2, 21–30.2 mm SL, rio Ventuari, at Raudales Chipirito, 88.5 km east of San Fernando de Atabapo, 1 Apr 2010, M Sabaj-Pérez, NK Lujan, DC Werneke, T Carvalho, S Meza V, A Luna & O Santaella; ANSP 191245, 1, 28 mm SL, rio Orinoco near mouth of Rio Ventuari, Macuruco Landing, 75 km E of San Fernando de Atabapo, 4 Apr 2004, MH Sabaj, NK Lujan, DC Werneke et al.

Discussion. The species richness of *Moenkhausia*, because of the broad geographic distribution and the doubts about its relationships justify the need of taxonomic revisions, mainly of the species whose diagnoses are too uninformative to differentiate one species from its congeners. *Moenkhausia megalops* is a prominent example for this statement since Eigenmann (1907) provided only one specimen to describe *M. megalops* (CAS 71433) from Itaituba (Pará State, Brazil) and did not define characters useful to differentiate this species from others *Moenkhausia* species.

Eigenmann (1907) did not describe conspicuous features related to the humeral mark and pigmentation on the upper caudal-fin lobe. The 'form' described herein has the quite peculiar anterior humeral mark and a dark pigmented upper caudal-fin lobe, both not seen in the holotype of *Astyanax megalops* or even described in the original and subsequent descriptions by Eigenmann (1907, 1917). Nevertheless, Eigenmann (1907: 29) had already claimed that the color was "apparently much faded", suggesting that the specimens analyzed were already in an unsatisfactory preservation condition, and consequently the coloration features could not be noticed.

Another character not mentioned by Eigenmann (1907) is the shape of premaxillary and dentary teeth. Indeed, one strong evidence to associate the name *M. megalops* to this specific form is that the holotype of *Moenkhausia mega-*

lops has premaxillary and dentary teeth with seven cusps. In addition, another evidence to link the specimens examined to the name *M. megalops* is that this is the unique form in the rio Tapajós with large eyes (42.6–50.8 mm HL), a broad silvery lateral stripe, and scales with non-curved *radii*, as seen in the holotype of *M. megalops*. For these reasons, we are convinced that this population must be linked to the name *M. megalops*, confirming previous identifications [e.g., Souza et al. (2012), and Oliveira and Marinho (2016)].

Among the congener species, *Moenkhausia grandisquamis*, another species quite abundant in the rio Tapajós basin with a conspicuous silvery lateral band, also has premaxillary and dentary teeth with seven or eight cusps (see Azevedo-Santos and Benine 2016). Eigenmann (1917) included a form from Itaituba identified by Ulrey (1895) as *Tetragonopterus grandisquamis* in the synonymy of *M. megalops* and distinguished the true *M. grandisquamis* (Müller & Troschel, 1845) from *M. megalops* by differences in morphometric proportions and scale striae. We partially agree with Eigenmann, given that *M. megalops*, in fact, does not present scales with curved *radii*, as those in *M. grandisquamis*, but we observed considerable morphometric overlapping between these species. However, our comparative examinations evidenced that *M. megalops* has a narrower, somewhat rectangular second infraorbital versus a wider and trapezoidal bone in *M. grandisquamis*. Eigenmann (1917: 92) pointed out that the specimen of *M. megalops* "from the Essequibo 2488C is deeper and has a narrower second suborbital than the type". The examinations of the holotype (CAS 71433) and the specimen from the Essequibo (now FMNH 53966 - photograph) confirm the deeper body of the latter, even though it clearly has a wider second infraorbital that fits to *M. grandisquamis*, contrary to Eigenmann's statement. For these reasons, we treated Eigenmann's (1910; 1917) material as in part synonyms.

Hardman et al. (2002) listed *Moenkhausia megalops* to Guyana, although solely based on Eigenmann's material, since this species was not collected in their comparative survey. Watkins et al. 2004 listed *M. megalops* for both Essequibo and Burro-Burro river drainages in Guyana. We examined material from Essequibo (ANSP 175609) and Burro-Burro (ANSP 176990 – photograph) and confirmed both as *M. grandisquamis*. We also had the opportunity to examine images of the material listed as *M. megalops* by Souza et al., 2012 and confirm this identification. These authors tested the influence of the Rupununi Portal on freshwater fish distribution on Rupununi District, Guyana, and their results showed that *M. megalops* is restricted to rio Takutu, Rio Branco drainage. Thus, we still do not have evidence of occurrence of *M. megalops* in the Essequibo river, Guyana.

Although we were not able to confirm these informations, there are also records of occurrence of *M. megalops* for other rivers in the Amazon basin that were not included in our Geographic distribution section, such as rio Purus (Duarte et al. 2013), and from Colombia (Maldonado-Ocampo 2001, Arbeláez et al. 2004, Maldonado-Ocampo et al. 2008; Miller-Hurtado et al. 2009), and Venezuela (Lasso et al. 2004, Gonzáles et al. 2012). However, we analyzed photographs of specimens from Rio Orinoco, Venezuela (ANSP 190778; ANSP 191245) that presents the diagnostic humeral and caudal marks of *M. megalops* and could be tentatively identified as this species. We were not able to examine teeth and scale morphology. Nevertheless, we herein provide sufficient elements for the unequivocal differentiation of *M. megalops* from congeners, which subsequent inventorial and revisionary works may count on.

Comparative material. Guyana. *Moenkhausia grandisquamis*: Essequibo river, ANSP 175609, 15, 49.5–66.7 mm SL, Essequibo campsite. Brazil. *Moenkhausia celibela*: Amazonas, rio Negro: INPA 48592, 4, 30.6–32.6 mm SL, Novo Airão, Anavilhanas Archipelago. Pará, rio Tapajós: INPA 41451, 48, 11.8–29.1 mm SL, Aveiro, Paraíso stream. Pará, rio Trombetas: INPA 48604, 2, 26.7–27.9 mm SL, Oriximiná, Saracá stream. INPA48612, 1, 22.23 mm SL, Oriximiná, Saracá stream. Pará, rio Xingu basin: INPA 47135, 33, 23.5–39.2 mm SL, Altamira, rio Bacajaí. *Moenkhausia gracilima*: Amazonas, rio Japurá: INPA 49317, 7, 24.3–32.5 mm SL, Japurá. Amazonas, rio Juruá: INPA 28984, 1, 24.7 mm SL, Carauarí, Uacari Sustainable Development Reserve. Amazonas, rio Madeira basin: INPA 50799, 1, 29.6 mm SL, Nova Olinda do Norte, rio Abacaxis. Mato Grosso, rio Tapajós basin: INPA 48419, 2, 28.1–28.2 mm SL, rio Teles Pires, uncertain locality. Pará, rio Tocantins: INPA 39587, 2, 31.5–42.3 mm SL, Tucuruí, downstream of dam. Pará, rio Trombetas: INPA 34352, 7, 21.4–29.1 mm SL, Oriximiná. Roraima, rio Branco basin: INPA 36942, 7, 21.1–29.6 mm SL, Caracaraí, bedrock in front of Água Fria stream. INPA 48801, 1, 29.2 mm SL, Bonfim, rio das Arraias, tributary of rio Takutu. *Moenkhausia grandisquamis*: Amazonas, rio Purus basin: INPA 36565, 2, 56.5–61.9 mm SL, Beruri, Praia Grande, Piagaçú-Purus Sustainable Development Reserve. Pará, rio Xingu basin: INPA 37985, 10, 33.5–42.5 mm SL, Altamira, Tapuama. *Moenkhausia heikoi*: Pará, rio Xingu basin: INPA 38002, 5, 38.4–48.9 mm SL, Altamira, Espelho waterfall. INPA 43663, 16, 20.3–43.9 mm SL, Altamira. INPA 47005, 1, 44.3 mm SL, Altamira, rio Iriri, Grande waterfall. *Moenkhausia hysterosticta*: Amazonas, rio Purus: INPA 36577, 24, 35.1–42.4 mm SL, Beruri, Praia Grande, Piagaçú-Purus Sustainable Development Reserve. INPA 36590, 12, 38.9–42.7 mm SL, Tapauá, Abufari beach. INPA 36607, 2, 39.8–40.1 mm SL, Praia Grande, above Carapanã. *Moenkhausia lata*: Amazonas, rio Purus basin: INPA 41936, 1, 54.9 mm SL, Tapauá, rio Ipixuna, Jiboia stream. Amazonas, rio Uatumã basin: INPA 5467, 2, 65.3–66.2 mm SL, Presidente Figueiredo, Samaúma stream. INPA 25572, 1, 55.8 mm SL, Presidente Figueiredo, Morena waterfall. Pará, rio Tapajós: INPA 41517, 1, 50.6 mm SL, Aveiro. Pará, rio Tocantins basin: INPA 16491, 14, 43.4–48.3 mm SL, Tucuruí, Breu Branco. Pará, rio Trombetas basin: INPA

50262, 7, 53.8–60.5 mm SL, Oriximiná, access to Água Fria stream. INPA 50307, 3, 46.9–54.5 mm SL, Oriximiná, beach in front of Cachoeira Porteira. Pará, rio Xingu: INPA 43325, 5 of 36, 41.7–53.8 mm SL, Porto de Moz, beach on the right bank. INPA 43918, 7, 40.4–43.7 mm SL, Porto de Moz, public beach on the right bank of rio Xingu. *Moenkhausia lepidura*: Amazonas, rio Purus basin: INPA 41835, 7, 74.4–92.3 mm SL, Tapauá, Jacinto stream. INPA 42508, 1 of 4, 64.4 mm SL, rio Ipixuna, Floresta Tapauá. Amazonas, rio Madeira basin: INPA 50628, 3, 54.0–66.2 mm SL, Nova Olinda do Norte, rio Abacaxis. Amazonas, rio Negro basin: INPA 12717, 6, 64.1–81.3 mm SL, Barcelos, rio Caurés, Curirarra lake. Mato Grosso, rio Tapajós basin: INPA 45966, 6, 56.9–75.1, Paranaíta, rio Teles Pires, rio São Benedito. Pará, rio Xingu basin: INPA 47043, 23, 44.0–59.1 mm SL, Altamira, rio Iriri. Rondônia, rio Guaporé basin: INPA 36155, 15, 46.1–67.7 mm SL, Vale do Guaporé, rio Novo. Tocantins, rio Tocantins-Araguaia basin: INPA 20407, 1, 68.5 mm SL, Caseara, Paredão lake. *Moenkhausia loweae*: Pará, rio Xingu basin: INPA 47139, 6, 41.2–52.2 mm SL, Altamira, rio Bacajaí. INPA 49936, 2 of 3, 52.9–58.5 mm SL, Brasil Novo. *Moenkhausia mikia*: Amazonas, rio Japurá: INPA 34611, 4, 35.6–48.6 mm SL, Maraã, Amanã lake. Amazonas, rio Madeira basin: INPA 44270, 3, 36.4–37.1 mm SL, Autazes, rio Madeirinha. Amazonas, rio Negro basin: INPA 30617, 1, 49.4 mm SL, rio Preto da Eva. INPA 49383, 15, 40.2–48.1 mm SL, São Gabriel da Cachoeira, Curucuí waterfall. Amazonas, rio Uatumã: INPA 37281, 1, 47.5 mm SL, São Sebastião do Uatumã. Mato Grosso, rio Tapajós basin: INPA 44563, 3, 36.6–39.3 mm SL, Paranaíta, rio Teles Pires. Pará, rio Trombetas: INPA 39130, 2, 46.6–46.6 mm SL, Oriximiná, Porto Trombetas. Pará, rio Xingu: INPA 47282, 31, 45.2–58.1 mm SL, Altamira, Cajú beach, above Jericoá waterfall.

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