

A new species of *Moenkhausia* Eigenmann (Characiformes: Characidae) from the upper rio Machado at Chapada dos Parecis, rio Madeira basin, Brazil

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A new species of *Moenkhausia* is described from the upper rio Machado at Chapada dos Parecis, rio Madeira basin, Rondônia State, Brazil. Among congeners, the new species is similar to *Moenkhausia chlorophthalma*, *M. cotinho*, *M. lineomaculata*, *M. plumbea*, and *M. petymbuaba* by having dark blotches on the anterior portion of the body scales, which are absent in the remaining species of the genus. The new species differs from aforementioned species by possessing blue eyes in life, 15-18 branched anal-fin rays, and a well-defined, round caudal-peduncle spot that does not reach the upper and lower margins of the caudal peduncle and does not extend to the tip of the middle caudal-fin rays.

Uma espécie nova de *Moenkhausia* é descrita do alto rio Machado na Chapada dos Parecis, bacia do rio Madeira, Rondônia, Brasil. Entre as congêneres, a espécie nova é semelhante à *Moenkhausia chlorophthalma*, *M. cotinho*, *M. lineomaculata*, *M. plumbea* e *M. petymbuaba* por ter manchas escuras na região anterior das escamas, que estão ausentes nas demais espécies do gênero. A espécie nova difere das espécies mencionadas acima por possuir olhos azuis em vida, 15-18 raios ramificados na nadadeira anal e uma mancha arredondada bem definida no pedúnculo caudal, que não alcança o limite superior e inferior do pedúnculo caudal, e não se estende sobre os raios medianos da nadadeira caudal.

Keywords: Amazon basin, Fish, *Moenkhausia cotinho*, Ostariophysa, Taxonomy.

Introduction

The species of *Moenkhausia* Eigenmann, 1903 are widely distributed throughout the Neotropical Cis-Andean river basins, except for those in Patagonia, with greatest diversity occurring in the basins of the Amazon and Guianas (Lima *et al.*, 2003). *Moenkhausia* is one of the most species-rich characid genera, currently comprising 80 valid species (Eschmeyer, 2015). Eigenmann (1903) proposed the genus based mainly on the combination of the presence of two rows of premaxillary teeth, five teeth on the inner row, completely pored lateral-line scales, a relatively straight lateral line, and small scales partially covering the caudal-fin lobes.

Lima *et al.* (2013) recorded twenty species of *Moenkhausia* in the rio Madeira basin, two of which were considered putatively new. During recent fieldwork in the upper rio Machado drainage, which is a major tributary of the rio Madeira in the state of Rondônia, an additional undescribed species was discovered and is herein described. The aim of the present contribution is to describe this new, beautifully-colored and apparently range-restricted species, and discuss its taxonomic placement among its congeners.

Material and Methods

Counts follow Fink & Weitzman (1974), except for the number of horizontal scale rows below lateral line, which is counted to the pelvic-fin insertion (excluding the axillary scale) rather than to the anal-fin origin. Measurements follow Fink & Weitzman (1974) with the addition of the distance from pelvic-fin origin to anal-fin origin. Standard length (SL) is expressed in millimeters (mm) and all other measurements are expressed as percentages of SL, except subunits of the head, which are expressed as percentages of head length. In the description, counts are followed by their absolute frequency in parentheses. Asterisks indicate the counts of the holotype. Scale *circuli* and *radii* were counted from the scale row immediately dorsal to the lateral line at the vertical through the dorsal-fin origin. Counts of supraneurals, branchiostegal rays, gill-rakers of the first branchial arch, tooth cusps, diminutive dentary teeth, unbranched anal-fin rays, procurent caudal-fin rays, and the position of pterygiophores were taken from cleared and stained (c&s) specimens prepared according to Taylor & Van Dyke (1985). Vertebrae of the Weberian apparatus are counted as four elements and the compound caudal centrum

(PU1+U1) as a single element. Precaudal vertebral counts include the Weberian apparatus and the vertebrae lacking haemal spines. Caudal vertebral counts include all vertebrae with haemal spines. Catalog numbers are followed by the total number of specimens and their SL range. The number of measured and counted specimens (if any) and the number of cleared and stained specimens (indicated by c&s) is given in parentheses, followed by their respective SL range. Institutional abbreviations follow Ferraris (2007) with the inclusion of UFRO-I (Universidade Federal de Rondônia, Porto Velho, Brazil).

Results

Moenkhausia parecis, new species

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Figs. 1-2

Holotype. MZUSP 116070, 77.9 mm SL, Brazil, Rondônia, Vilhena, rio Madeira basin, upper rio Machado, tributary of Igarapé Piracolina, near road BR 364, 12°48'56.5"S 60°06'37.6"W, 14 Sep 2013, W. M. Ohara, D. B. Hungria & B. S. Barros.

Paratypes. All from Brazil, Rondônia State, Vilhena. ANSP 198235, 5, 27.8-48.7 mm SL; INPA 46708, 10, 28.0-52.8 mm SL; MCP 48398, 10, 25.3-51.8 mm SL; MZUSP 116071, 57 (4 c&s, 28.8-42.6 mm SL), 22.0-65.5 mm SL; UFRO-I 22721, 84, 16.2-67.3 mm SL (18 measured, 44.7-77.9 mm SL); same data as holotype. MZUSP 115509, 47, 24.1-72.8 mm SL (12 measured, 44.0-71.6 mm SL), same locality as holotype, 3 Sep 2014, W. M. Ohara & P. L. Cunha. MZUSP 116072, 9, 23.0-59.6 mm SL; UFRO-I 22906, 7, 20.1-30.4 mm SL, same locality as holotype, 19 Jul 2013, I. da Costa. MZUEL 11836, 7, 22.9-60.6 mm SL; MZUSP 117066, 8, 26.5-71.2 mm SL, same locality as holotype, 12 Nov 2014, W. M. Ohara, F. C. P. Dagosta & V. Giovannetti.

Diagnosis. *Moenkhausia parecis* is distinguished from all congeners, except *M. clorophthalma* Sousa, Netto-Ferreira & Birindelli, 2010, some populations of *M. cotinho* Eigenmann, 1908 (see Discussion), *M. lineomaculata* Dagosta, Marinho & Benine, 2015, *M. petymbuaba* Lima & Birindelli, 2009, and *M. plumbea* Sousa, Netto-Ferreira & Birindelli, 2010 by the presence of a dark blotch on the anterior portion of each scale of the second to seventh longitudinal series (*vs.* pigmentation absent or, when present, concentrated at the posterior margin of scales, forming a reticulate pattern). *Moenkhausia parecis* can be readily distinguished from all aforementioned species by having completely blue eyes in life (*vs.* green in *M. clorophthalma*, mostly green with some red in

M. petymbuaba, lower portion blue and upper portion orange in *M. lineomaculata*, clear or red in *M. cotinho*, and clear, with a longitudinal dark stripe in *M. plumbea*). Additionally, it is distinguished from *M. clorophthalma*, *M. petymbuaba* and *M. plumbea* by having 15-18 (rarely 18) branched anal-fin rays (*vs.* 18-24), from *M. cotinho* and *M. lineomaculata* by having a smaller caudal-peduncle spot, with only the base of the middle caudal-fin rays pigmented (*vs.* blotch larger, base of all caudal-fin rays pigmented in *M. cotinho* and *M. lineomaculata*, except the outermost unbranched rays in some specimens of *M. lineomaculata*) and by the absence of a light area preceding caudal-peduncle spot (*vs.* presence of a light area preceding caudal-peduncle spot). It can be further distinguished from *M. clorophthalma*, *M. petymbuaba* and *M. plumbea* by having a well-defined, round caudal-peduncle spot, that does not extend to the tip of the middle caudal-fin rays (*vs.* caudal-peduncle spot absent or poorly defined in *M. clorophthalma* and *M. plumbea* or caudal-peduncle spot confluent with longitudinal stripe on body, reaching the tip of middle caudal-fin rays in *M. petymbuaba*).

Description. Morphometric data of the holotype and paratypes presented in Table 1. Body compressed, moderately deep. Greatest body depth anterior to vertical through dorsal-fin origin. Dorsal profile of head convex from anterior tip of upper jaw to vertical through anterior nostril; straight or slightly concave from that point to tip of supraoccipital spine. Dorsal body profile convex from tip of supraoccipital spine to base of last dorsal-fin ray, approximately straight from that point to adipose-fin insertion and slightly concave along caudal peduncle. Ventral profile of body convex from anterior tip of dentary to anal-fin origin, straight along anal-fin base and slightly concave along caudal peduncle.

Mouth terminal, upper jaw slightly longer than lower jaw. Posterior terminus of maxilla reaching vertical through middle of pupil. Maxilla approximately at 45 degree angle relative to longitudinal axis of body. Nostrils close to each other, anterior opening circular, posterior opening crescent-shaped. Nostrils separated by narrow skin flap.

Premaxillary teeth in two rows; outer tooth row with 3(2), 4*(20), or 5(12) tricuspid teeth; inner tooth row with 5*(34) teeth bearing three to five cusps, symphyseal tooth of inner series narrow, asymmetric, with four cusps. Tooth cusps of the inner premaxillary row arranged in semicircular line, directed inward. Maxilla with 2(8), 3*(21), or 4(5) teeth along its anterodorsal margin, bearing three to five cusps (Fig. 2); anterior tooth usually largest. Dentary with 4*(31) or 5(2) larger tri- to pentacuspoid teeth, followed by a series of 9(1), 10(1), 11(1), or 12(1) diminutive teeth, conical or tricuspid, considerably smaller than the anterior larger teeth. Cusps of large dentary teeth arranged in semicircular line, directed outward. Central cusp of all teeth more developed than lateral cusps.



Fig. 1. *Moenkhausia parecis* new species, (a) holotype, MZUSP 116070, 77.9 mm SL (b) paratype, MZUSP 115509, 41.7 mm SL, immediately after capture, upper rio Machado, rio Madeira basin, Rondônia, Brazil.

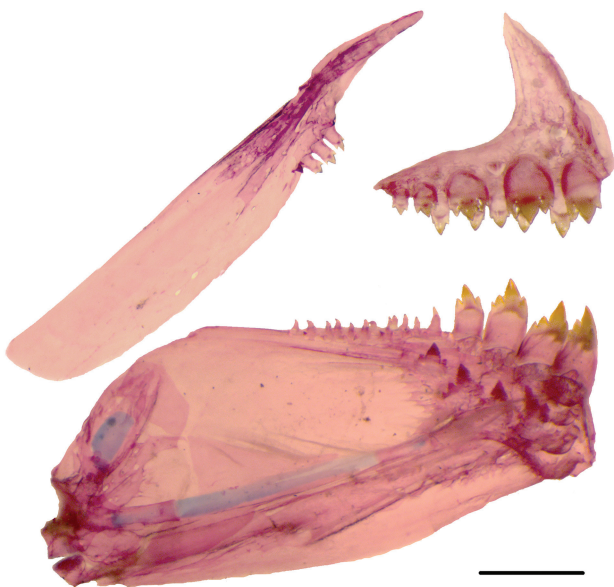


Fig. 2. Medial view of left side of premaxilla, maxilla and dentary of *Moenkhausia parecis*, MZUSP 116071, paratype, 26.2 mm SL. Scale bar = 1 mm.

Scales cycloid, moderately large, *circuli* distributed over whole area of scales; six to twenty *radii* well-defined and slightly divergent posteriorly. Lateral line complete, slightly curved downward, with 32(10) or 33*(20) perforated scales. Longitudinal scale rows between dorsal-fin origin and lateral line 5*(30). Longitudinal scale rows between lateral line and pelvic-fin origin 4*(30). Median series of scales along dorsal line between tip of supraoccipital spine and dorsal-fin origin 9(22) or 10*(6). Horizontal scale rows around caudal peduncle 14*(30). Single row of 5(1), 6(7), 7*(7), 8(7), 9(4), or 10(1) scales covering base of anterior most anal-fin rays. Caudal-fin lobes with small scales on basal third, squamation slightly more extensive on ventral lobe than on dorsal.

Dorsal-fin rays ii,9*(29) or iii,8(2). Dorsal-fin origin approximately at midpoint of standard length, slightly posterior to vertical through pelvic-fin origin. First unbranched dorsal-fin ray half length of second or less. Distal profile of dorsal fin round. First dorsal-fin pterygiophore posterior to neural spine of 9th (4) vertebrae. Adipose fin present. Pectoral-fin rays i,11*(17) or i,12(13). Tip of adpressed pectoral fin reaching vertical through pelvic-fin

origin or falling just short of that point. Pelvic-fin rays 1,7(30). Tip of adpressed pelvic fin not reaching anal-fin origin, except in specimens smaller than 42.0 mm SL. Unbranched anal-fin rays iv(4). Branched anal-fin rays 15*(5), 16(20), 17(6), or 18(3). Posterior unbranched and anterior branched anal-fin rays longest, subsequent rays gradually decreasing in size. Distal margin of anal fin slightly concave. Principal caudal-fin rays i,9,8,i*(28); caudal fin forked, lobes somewhat pointed and of similar size. Dorsal procurrent caudal-fin rays 12(1) or 13(3), ventral procurrent caudal-fin rays 11(4).

Total vertebrae 32(1) or 33(3): precaudal vertebrae 16(4) and caudal vertebrae 17 (1) or 16(3). Supraneurals 4(3) or 5(1), slightly wider dorsally. Branchiostegal rays 4. First gill arch with one (4) gill-raker on hypobranchial, 7(2) or 9(2) on ceratobranchial, one (4) on cartilage between ceratobranchial and epibranchial, and 6 (4) on epibranchial.

Table 1. Morphometric data of the holotype and paratypes of *Moenkhausia parecis*. Paratype range includes the values of the holotype. N = 30; S.D. = Standard Deviation.

Characters	Holotype	Range	Mean±S.D.
Standard length (mm)	77.9	41.7-77.9	
Percentage of standard length			
Depth at dorsal-fin origin	38.7	35.6-40.1	38.0±1.1
Snout to dorsal-fin origin	54.7	53.0-56.9	54.5±1.0
Snout to pectoral-fin origin	30.1	29.6-33.0	31.4±0.9
Snout to pelvic-fin origin	51.7	51.6-55.2	53.4±1.0
Snout to anal-fin origin	71.9	67.6-72.7	70.6±1.3
Caudal peduncle depth	13.2	12.7-14.4	13.5±0.4
Caudal peduncle length	14.5	11.4-14.6	13.2±0.8
Pectoral-fin length	21.8	20.0-24.4	22.7±1.0
Pelvic-fin length	15.3	15.0-18.4	17.0±1.0
Pelvic-fin origin to anal-fin origin	21.6	17.8-21.6	19.5±1.0
Dorsal-fin base	14.5	14.3-16.6	15.3±0.5
Dorsal-fin length	24.0	24.0-30.1	27.2±1.5
Dorsal-fin origin to caudal fin origin	51.9	45.9-54.0	52.1±1.4
Anal-fin base	22.2	22.0-25.0	23.3±0.9
Anal-fin length	17.3	16.7-21.5	19.4±1.1
Posterior margin of eye to dorsal-fin origin	40.9	38.1-41.0	39.5±0.8
Head length	29.0	28.6-32.2	30.9±0.9
Percentage of head length			
Horizontal eye diameter	33.8	31.1-37.9	35.0±2.0
Snout length	26.6	24.5-30.1	27.3±1.4
Interorbital width	40.9	33.8-40.9	36.7±1.5
Upper jaw length	54.2	50.6-55.0	52.1±1.2

Color in alcohol. Overall ground color pale, with small dark chromatophores covering the entire head and body, densely concentrated on dorsal portion, gradually fading ventrally (Fig. 1a). Dorsal midline of head and body dark brown. Jaws, opercular and infraorbital areas densely pigmented with small dark chromatophores. Opercular areas with guanine. Humeral blotch vertically oriented, extending two scale rows above and one or two scale rows below lateral

line. Dorsal portion of humeral blotch spanning three scales in width; ventral portion narrower, spanning just over one scale. Area posterior to humeral blotch followed by faint and wide horizontal dark stripe spanning two scale rows above lateral line that fades posteriorly on caudal peduncle; horizontal dark stripe not conspicuous in specimens smaller than 44.5 mm SL. Deeper and narrower longitudinal dark stripe at horizontal septum, formed by underlying chromatophores, extending from vertical through dorsal-fin origin to caudal peduncle. One dark blotch at the anterior portion of each scale of the second to seventh dorsalmost scale rows. Well-defined, black, round caudal-peduncle spot, extending from posterior portion of caudal peduncle to base of middle caudal-fin rays, not extending to tip of fin rays. Caudal-peduncle spot not reaching upper and lower margins of caudal peduncle and restricted to middle caudal-fin rays. All fins with scattered dark chromatophores. Distal portion of interradiation membranes of anal fin with increased concentration of dark chromatophores.

Color in life. Dorsal portion of head and body light brown; ventral half yellowish (Fig. 1b). Eyes bright blue. Longitudinal iridescent clear stripe at midline of body. Second to seventh dorsalmost scale rows with brown blotches on its anterior portion. Humeral blotch and caudal-peduncle spot conspicuous. All fins intense orange to yellow.

Sexual dimorphism. No sexually dimorphic characters were found among analyzed specimens.

Etymology. The specific name *parecis* refers to the Chapada dos Parecis (plateau including the type locality), an important watershed that separates tributaries of three basins: rio Madeira, rio Tapajós and rio Paraguai. A noun in apposition.

Distribution. *Moenkhausia parecis* is known only from its type locality, a headwater tributary of igarapé Piracolina, itself a tributary of the upper rio Machado at Chapada dos Parecis, rio Madeira basin, about 9 km south of Vilhena, Mato Grosso near the border of Rondônia and Mato Grosso States, Brazil (Fig. 3). *Moenkhausia parecis* is possibly an additional species endemic to the rivers draining the Chapada dos Parecis (see list in Ohara & Lima, 2015).

Ecological notes. The type locality of *Moenkhausia parecis* is located at 585 m above sea level on the Chapada dos Parecis. It is a small “terra-firme igarapé” (= highland creek) with little preserved riparian vegetation and surrounded by large plantation fields (mostly soy and corn), near Vilhena, Mato Grosso. It is a clear water stream 1.5-2.5 m wide and 0.3-0.8 m deep, with swift currents, and a bottom composed of sand and dead leaves (Fig. 4). During snorkeling, *Moenkhausia parecis* was observed in small groups of 10-15 individuals swimming in midwater. Syntopic species included *Ancistrus verecundus* Fisch-Muller, Cardoso, da Silva & Bertaco, 2005, *Bryconops piracolina* Wingert & Malabarba, 2011,

Cetopsorhamdia sp. 3 (cf. Bockmann & Slobodian, 2013: 25), *Corydoras* sp., *Hyphessobrycon lucenorum* Ohara & Lima, 2015, *Hyphessobrycon* aff. *melonostichos* Carvalho & Bertaco, 2006 and *Pyrrhulina* sp. The stomach contents of the four (c&s) paratypes included ants, scales, unidentified insect fragments, seeds, unidentified vegetal fragments and sediments.

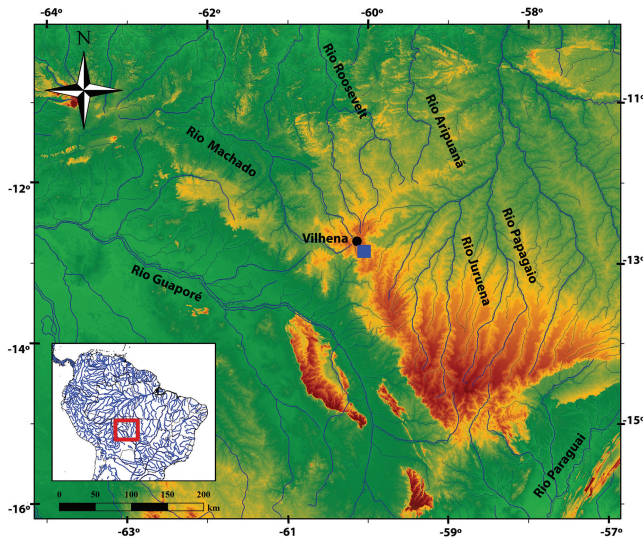


Fig. 3. Type locality (blue square) of *Moenkhausia parecis*, a tributary of the igarapé Piracolina, upper rio Machado drainage, rio Madeira basin, Brazil.



Fig. 4. Tributary of igarapé Piracolina, upper rio Machado, Vilhena, Rondônia, Brazil, type locality of *Moenkhausia parecis*.

Conservation status. Despite intensive and broad collecting efforts in the rio Madeira basin during 2009 to 2013 (Queiroz *et al.*, 2013) and recent surveys conducted in the southeastern portion of Rondônia State and northwest of Mato Grosso State undertaken in 2010-2011 and 2013-2014, *Moenkhausia parecis* was only collected at its type locality. Additionally, examination of several fish collections failed to reveal additional specimens. Thus, it is possible that the species is restricted to the upper rio Machado, at the Chapada dos Parecis. The type locality of *M. parecis* is a small forest fragment near Vilhena town that is surrounded by farms. According to the International Union for Conservation of Nature (IUCN) categories and criteria (IUCN Standards and Petitions Subcommittee, 2014), *Moenkhausia parecis* might be considered as ‘Vulnerable (D2)’, based on its occupation area (AOO) apparently less than 20 km² and the plausible future threat (agricultural development and expansion of Vilhena town around its very restricted distribution) that could lead the species to become critically endangered or extinct.

Discussion

The traditional classification system of the Characidae developed by Eigenmann (1917, 1918, 1921) delimited several genera based on morphological characters such as the form of the teeth, squamation of the caudal-fin, presence or absence of the adipose fin, and length of the lateral line. These characters were found subsequently to be highly homoplastic within the Characidae (Weitzman & Fink, 1983; Mirande, 2010; Marinho *et al.*, 2014; Dagosta *et al.*, 2014). As a consequence, Eigenmann’s classification scheme resulted in the artificial delimitation of many groups of species.

The genus *Moenkhausia* still lacks a phylogenetic definition. Recent cladistic analyses (Mirande, 2010; Oliveira *et al.*, 2011; Mariguela *et al.*, 2013) have confirmed previous suggestions of its non-monophyly (e.g. Fink, 1979; Costa, 1994). Meanwhile, putative monophyletic groups including members of *Moenkhausia* have been suggested mainly based on color pattern and some of them confirmed by cladistic studies (e.g. the “*Moenkhausia oligolepis* /*M. sanctaefilomenae*-species complex” (Benine *et al.*, 2009).

One of the most remarkable features of *Moenkhausia parecis* is the presence of a dark blotch at the anterior portion of each scale of the second to seventh scale rows. This color pattern, which is relatively unusual within Characidae, is also present in *Moenkhausia chlorophthalma*, *M. lineomaculata*, *M. plumbea*, *M. petyumbuaba*, and some populations of *M. cotinho*. Such feature was used by Sousa *et al.* (2010) to indicate a possible close relationship among the former three species. Based on body coloration and aspects of external morphology such as the relatively large head, the vertical orientation of the humeral blotch, the round dorsal-fin distal margin, and the relatively short anal-fin base, *Moenkhausia parecis* is similar to these species and may be closely related

to them. However, such relationships are speculative and the monophyly of this group of species should be tested in a cladistic context.

A few other small characids possess similar body coloration to *Moenkhausia parecis*, such as *A. maculisquamis* Garutti & Britski, 1997, which is a member of the *Astyanax bimaculatus* (Linnaeus, 1758) complex. However, that species complex is defined by possession of a black, horizontally ovate humeral spot, and two diffuse vertical dark bars in the humeral region (Garutti & Britski, 1997; Garutti & Britski, 2000; Garutti & Langeani, 2009), neither of which occurs in *Moenkhausia parecis*. Therefore, there is no further evidence of a close relationship of the new species to members of this group. Two species of *Jupiaba* Zanata, *J. kurua* Birindelli, Zanata, Sousa & Netto-Ferreira, 2009 and *J. meunieri* (Géry, Planquette & Le Bail, 1996) possess dark blotches on the anterior portion of the body scales, as does *Moenkhausia parecis*. Birindelli *et al.* (2009) used that color pattern to indicate a close relationship between these species of *Jupiaba*. However, *Moenkhausia parecis* lacks the synapomorphic features of *Jupiaba* (Zanata, 1997; Zanata & Lima, 2005) including the presence of pelvic bone anteriorly developed as a spine, with its anterior portion free from musculature, and clearly does not belong to *Jupiaba*.

As mentioned, series of dark blotches on the body scales are also found in some populations of *Moenkhausia cotinho*, a widespread species of the Amazon, Orinoco and Essequibo basins. Members of *Moenkhausia cotinho* have a light area anterior to a large dark blotch on the caudal-fin base. These caudal marks, along with dark pigmentation concentrated on the distal border of the scales, forming a dark reticulate pattern, characterizes the “*Moenkhausia oligolepis/M. sanctaefilomenae*-species complex” (Costa, 1994; Lima & Toledo-Piza, 200; Lima *et al.*, 2007). According to Lima & Toledo-Piza (2001) and Lima *et al.* (2007), *M. cotinho* is closely related to this group of species, despite not having the characteristic reticulate pattern on the majority of the body. Sousa *et al.* (2010), however, mentioned the presence of such reticulation on the scales below the lateral line in *M. cotinho*, and also noted the blotches on the anterior portion of the scales.

Given the divergent information regarding the coloration of *Moenkhausia cotinho* and presence of a series of dark blotches on body scales in some populations, by which it resembles *Moenkhausia parecis*, we conducted a broader examination of several lots of *M. cotinho* deposited at MZUSP in order to better understand the coloration pattern of the widespread species. According to our investigations, the species varies in both the series of blotches on the body scales and the reticulate color pattern. Most analyzed specimens have small, approximately round blotches located beneath the posterior portion of each scale and over the base of the subsequent, especially dorsal to the lateral line. It also possesses the reticulate pattern on body, formed by a thin patch of dark pigmentation

on the posterior scale borders. This reticulation is more conspicuous in adult specimens (e.g. MZUSP 106355, 107442, 109594, 115856). Other specimens possess only small blotches on the scales, and lack reticulation (e.g. MZUSP 7274, 100593) and others lack both patterns (e.g. MZUSP 40372, 105307, 106825), resulting in an overall pale body. Given the wide geographical distribution of *M. cotinho* and the substantial color variation, a detailed taxonomic revision should be conducted in order to clarify whether we are dealing with a species complex. For the purpose of the present contribution, all populations of *M. cotinho* can be easily diagnosed from *M. parecis* by having the caudal-peduncle blotch wide, reaching upper and lower margins of caudal peduncle (*vs.* spot smaller, not reaching upper and lower edges of caudal peduncle), and by possessing a light area devoid of dark chromatophores anterior to the caudal-peduncle spot, which is bright yellow in life (see Dagosta *et al.*, 2015, fig. 5) (*vs.* pigmentation pattern of body extending to the end of caudal peduncle, not leaving a clear area anterior do the caudal-peduncle spot; no distinct coloration in this region in life).

Comparative material. **Brazil**, except when noted. *Astyanax maculisquamis*: MZUSP 48181, 72 paratypes, 35.3-76.4 mm SL, Mato Grosso, rio Madeira basin. *Moenkhausia clorophthalma*: MZUSP 97092, 28 paratypes, 38.0-64.8 mm SL, MZUSP 107307, 75, 23.0-38.2 mm SL, Pará, rio Xingú basin. *Moenkhausia cosmops*: All from the rio Tapajós basin, Mato Grosso State. MZUSP 93494, holotype, 42.9 mm SL. MZUSP 93495, 17 paratypes, 22.3-48.4 mm SL. MZUSP 93551, 3, 22.2-31.5 mm SL. MZUSP 96042, 5, 37.3-50.7 mm SL. MZUSP 93552, 2, 17.2-25.4 mm SL. LIRP 8181, 3 of 6, 45.3-53.1 mm SL. MZUEL 8750, 1, 33.5 mm SL. MZUEL 8749, 18 of 95, 19.5-30.8 mm SL. *Moenkhausia cf. cotinho*: MZUSP 7274, 9, 51.9-59.2 mm SL, Amazonas, rio Amazonas basin. MZUSP 58335, 8, 31.8-38.2 mm SL, MZUSP 109594, 29, 19.2-49.0 mm SL, Amazonas, rio Negro basin. MZUSP 61956, 32, 28.6-37.3 mm SL, MZUSP 100593, 2, 47.3-50.5 mm SL, Mato Grosso, rio Madeira basin. MZUSP 105318, 5, 43.3-61.2 mm SL, MZUSP 106321, 1, 38.5 mm SL, MZUSP 107442, 24, 39.4-53.6 mm SL, MZUSP 107635, 9, 34.2-39.0 mm SL, MZUSP 107651, 21, 32.4-52.1 mm SL, MZUSP 115856, 19, 28.4-42.4 mm SL, Mato Grosso, rio Tapajós basin. MZUSP 98316, 2, 39.7-53.6 mm SL, MZUSP 99867, 3, 47.9-62.2 mm SL, Pará, rio Tapajós basin. MZUSP 91408, 1, 49.0 mm SL, Mato Grosso, rio Xingu basin. MZUSP 97192, 5, 31.8-41.7 mm SL, MZUSP 111592, 3, 40.7-45.7 mm SL, Pará, rio Xingu basin. MZUSP 40372, 18, 23.1-34.0 mm SL, Goiás, rio Tocantins basin. MZUSP 105307, 31, 25.6-47.4 mm SL, MZUSP 106825, 4, 32.4-34.5 mm SL, Pará, rio Tocantins basin. **Venezuela**: MZUSP 106355, 3, 17.3-42.1 mm SL, Amazonas, rio Orinoco basin. *Moenkhausia diktyota*: MZUSP 62615, 9 paratypes, 28.4-52.3 mm SL, Amazonas, rio Negro basin. *Moenkhausia oligolepis*: MZUSP 100669, 11, 34.6-48.5 mm SL, Pará, rio Tapajós basin. MZUSP 115994, 1, 63.3 mm SL, Pará, rio Xingu basin. MZUSP 115631, 14, 31.1-37.8 mm SL, Mato Grosso, rio Madeira basin. *Moenkhausia petymbuaba*:

MZUSP 30231, 5 paratypes, 44.8-51.1 mm SL, MZUSP 96867, 37, 35.7-49.2 mm SL, Pará, rio Xingú basin. *Moenkhausia plumbea*: MZUSP 101435, 24 paratypes, 20.4-45.9 mm SL, Pará, rio Tapajós basin. *Moenkhausia pyrophthalma*: MZUSP 45290, 7 paratypes, 20.4-30.0 mm SL, MZUSP 91286, 63, 23.3-26.5 mm SL, Mato Grosso, rio Tocantins basin. MZUSP 89128, 24, 28.3-33.2 mm SL, Goiás, rio Tocantins basin. *Moenkhausia sanctaefilomenae*: MZUSP 47399, 9, 33.6-64.3 mm SL, Minas Gerais, rio Jequitinhonha basin. MZUSP 89946, 9, 32.2-48.0 mm SL, Mato Grosso, rio Paraguai basin. MZUSP 115581, 2, 38.8-42.1 mm SL, Mato Grosso do Sul, rio Paraguai basin. MZUSP 113917, 2, 45.0-45.5 mm SL, Bahia, rio São Francisco basin.

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