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New species of *Hyphessobrycon* from the Rio Teles Pires, Rio Tapajós basin, Brazil (Ostariophysi, Characiformes)

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A new species of *Hyphessobrycon* from the upper Rio Tapajós basin, in the Tapajós–Juruena ecoregion, is described. *Hyphessobrycon pinnistriatus* n. sp. is distinguished from its congeners by having a black, oblique stripe extending from the origin of the second branched ray to the distal end of the third branched anal-fin ray, lacking a conspicuous black midlateral stripe on the body, inner premaxillary teeth with up to seven cusps, and fins normally hyaline or with scattered chromatophores. The description of a new species that is restricted to the Tapajós–Juruena ecoregion is consistent with this region being an area of high endemism of freshwater fishes.

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Key words: *Hemigrammus unilineatus*; *Hyphessobrycon* s.s.; *Moenkhausia hemigrammoides*; Parque Estadual Cristalino.

INTRODUCTION

The Neotropical region is the most ichthyologically diverse in the world (Reis, 2013). Among Neotropical fish families, Characidae (*sensu* Mirande, 2010) is the most diverse and the characid *Hyphessobrycon* Durbin 1908 is among the most species rich. *Hyphessobrycon* comprises exclusively small-bodied species no larger than 83·0 mm Standard length (L_S) (*e.g. Hyphessobrycon togoi* Miquelarena & López 2006). It is also non-monophyletic (Mirande, 2009, 2010; Malabarba *et al.*, 2012; Carvalho & Malabarba, 2015) and defined by a non-exclusive combination of traits that are also present in other characid genera (*e.g.* lateral line incomplete, adipose fin present, caudal fin lacking scales; Zanata & Camelier, 2010; Ingenito *et al.*, 2013; Teixeira *et al.*, 2014; Ohara & Lima, 2015).

Despite the current lack of an exclusive definition of *Hyphessobrycon*, the need to name new species that fit the non-exclusive definition of this genus continues. In

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this study a new species is described that is from the upper Rio Tapajós basin and is tentatively placed in the *Hyphessobrycon* based on the current definition of that genus (*sensu* Durbin in Eigenmann, 1908, 1917) and is diagnosable from all other species in this genus.

MATERIALS AND METHODS

Counts and measurements were taken following Fink & Weitzman (1974). Measurements were made with callipers on the left side of the specimen whenever possible and are presented as percent of standard length (L_S) or head length (L_H). In the description, counts are followed by their frequency in parentheses and an asterisk indicates the count of the holotype. In the list of paratypes and material examined, the number of all specimens in the lot is followed by the number of those examined and the number of cleared and stained (c&s) individuals, if any. Counts of vertebrae, supraneurals, gill rakers on the first branchial arch, branchiostegal rays, procurrent caudal-fin rays, and small dentary teeth were taken from three c&s specimens prepared according to Taylor & van Dyke (1985). Vertebral counts include the four vertebrae in the Weberian apparatus as a single element and the fused first preural and first ural centra (PU1 + U1) of the caudal region as a single element. Patterns of circuli and radii are described based on scales sampled from the region between the lateral line and the insertion of the pelvic-fin. Comparisons and data of species not available for evaluation were taken from original descriptions. Catalogue numbers are followed by the total number of specimens in the lot, number of specimens measured and counted in parentheses and the L_S range of all specimens in the lot. Comparative material includes that listed in Carvalho & Langeani (2013) and Carvalho *et al.* (2010, 2014). The word igarapé refers to a small stream.

Institutional abbreviations follow Sabaj Pérez (2014): ANSP, Academy of Natural Sciences of Drexel University; CPUFMT, Coleção de Peixes da Universidade Federal de Mato Grosso, Cuiabá; DZSJRP, Departmento de Zoologia e Botânica, Universidade Estadual Paulista; FMNH, Field Museum of Natural History Chicago, IL; INPA, Instituto Nacional de Pesquisas da Amazônia, Manaus; LBP, Laboratório de Biologia e Genética de Peixes, Universidade Estadual Paulista; LIRP, Laboratório de Ictiologia de Ribeirão Preto, Departamento de Biologia, Faculdade de Filosofia, Ciências e Letras, Universidade de São Paulo; MCP , Museu de Ciências e Tecnologia, Pontifícia Universidade Católica do Rio Grande do Sul; MHNG, Muséum d'histoire naturelle, Genève; MNRJ, Museu Nacional, Universidade Federal do Rio de Janeiro; MZUSP, Museu de Zoologia da Universidade de São Paulo; UFRGS, Universidade Federal do Rio Grande do Sul; ZMA, Zoological Museum Amsterdam; ZUFMS, Coleção Zoológica da Universidade Federal de Mato Grosso do Sul.

RESULTS

HYPHESSOBRYCON PINNISTRIATUS NEW SPECIES

urn:lsid:zoobank.org:act:33DB49E2-487E-4BCD-99B6-0D7144C2A9CE *Hyphessobrycon* sp. 1 (Buckup *et al.*, 2011: 243; list of species). *Hyphessobrycon* sp. n. (Battirola *et al.*, 2015: 477 citation); Cabeceira *et al.* (2015: 199, 204; list of species and photo).

Holotype

DZSJRP 20598, 29·8 mm L_S, Brazil, Mato Grosso State, Municipality of Novo Mundo, Parque Estadual Cristalino, igarapé affluent of Rio Cristalino, 09° 27′ 10·5″ S; 55° 49′ 52·7″ W, 806 m a.s.l., 15 May 2013, F. G. Cabeceira, D. R. Silva & V. Rocha (Fig. 1).

FIG. 1. *Hyphessobrycon pinnistriatus*, holotype, DZSJRP 20598, 29·8 mm standard length, igarapé affluent of Rio Cristalino, Parque Estadual Cristalino, municipality of Novo Mundo, Mato Grosso, Brazil.

Paratypes

All from Brazil, Mato Grosso State, Rio Teles Pires drainage, upper Rio Tapajós basin: DZSJRP 20599, 5, 22·4–25·5 mm L_S and three c&s, 23·6–27·1 mm L_S; UFRGS 20593, 6, 15·0–26·3 mm L_S; LBP 20309, 5, 18·1–24·0 mm L_S, MCP 49166, 5, 19·4–27·9 mm L_S; MZUSP 118376, 5, 22·9–25·7 mm L_S; same data as holotype; CPUFMT 1586, 8, 16·8–20·0 mm L_S; LIRP 12252, 10, 16·3–25·6 mm L_S; ZUFMS 4183, 5, 19·0–26·0 mm L_S, same locality as holotype, 10 September 2014, F. G. Cabeceira. INPA 35294, 17, 17·1–19·3 mm L_S, Mato Grosso State, Paranaíta, Teles Pires, igarapé Grande, 09° 32′ 51″ S; 56° 18′ 34″ W, 1 October 2009, R. R. de Oliveira & H. Espírito-Santo. INPA 44667, 4, 18·4–19·8 mm L_S, Mato Grosso, Paranaíta, Rio Teles Pires, igarapé on left margin, above camping site, 09° 23′ 50″ S; 56° 46′ 35″ W, 3 October 2009, R. R. de Oliveira and team. INPA 44745, 1, 14·5 mm L_S, Mato Grosso, Paranaíta, Rio Paranaíta, stony on left margin of Rio Teles Pires, 09° 30′ 57″ S; 56° 42′ 36″ W, 8 October 2009, R. R. de Oliveira and team. INPA 44858, 7, 17·2–20·7 mm L_S, Mato Grosso, Paranaíta, Rio Teles Pires, igarapé do Jaú, left margin of Rio Teles Pires, 09° 26′ 56″ S; 56° 31′ 27″ W, 30 September 2009, R. R. de Oliveira and team. INPA 44883, 40, 18·1–21·8 mm L_S, Mato Grosso, Paranaíta, Rio Teles Pires, igarapé of Santa Helenaon left margin of Rio Teles Pires, 09° 33′ 48″ S; 56° 18′ 44″ W, 1 October 2009, R. R. de Oliveira and team. INPA 45401, 21, 19·4–24·5 mm L_S, Mato Grosso, Paranaíta, Tapajós, Rio Teles Pires, CHTP inventory, stretch 07, 09° 26′ 54″ S; 56° 29′ 39″ W, 14 November 2012, Solange, Reginaldo & Rosalvo. INPA 45472, 12, 22·0–27·6 mm L_S, Mato Grosso, Paranaíta, Rio Teles Pires, Rio Paranaíta, CHTP inventory, stretch 4, 09° 30′ 52″ S; 56° 42′ 43″ W, 16 December 2012, Solange, Reginaldo & Rosalvo. INPA 45501, 9, 22·3–26·4 mm L_S, Mato Grosso, Paranaíta, Rio Teles Pires, Rio Santa Helena, CHTP (Companhia Hidréletrica Teles Pires) inventory, stretch 8, 09° 31′ 45″ S; 56° 19′ 49″ W, 20 December 2012, Solange, Reginaldo & Rosalvo. INPA 45684, 3, 16·5–19·0 mm L_S, Mato Grosso, Paranaíta, Rio Teles Pires, Rio de Santa Helena, CHTP inventory, stretch 8, 09° 31′ 45″ S; 56° 19′ 49″ W, 17 April 2013, Solange, Reginaldo & Rosalvo. INPA 45772, 10, 16·8–18·7 mm L_S, Mato Grosso, Paranaíta, Rio Teles Pires, CHTP inventory, stretch 7, 09° 26′ 54″ S; 56° 29′ 39″ W, 28 June 2013, Solange, Reginaldo & Rosalvo. MNRJ 34515, 1, 16·4 mm

L_S (ethylic alcohol), 32, 14·9–29·3 mm L_S, Mato Grosso, Guarantã do Norte, small igarapé tributary of Braço do Norte, on road to Balneário Strege 09° 56′ 55″ S; 55° 01′ 51″ W, 245 m a.s.l., 11 February 2012, P. A. Buckup, J. Maldonado, J. Birindelli, C. Chamon & V. Felzman. MNRJ 24689, 8, 25·1–30·8 mm L_S, Mato Grosso State, Carlinda, small stream unnamed, crossing road MT-208 through north-east to intersecting road with MT-320, 09° 59′ 04″ S; 55° 46′ 03″ W, 23 January 2002, P. A. Buckup, A. Aranda, F. Silva & C. Figueiredo.

Diagnosis

Hyphessobrycon pinnistriatus differs from all congeners by having a black, oblique stripe that is largely parallels and covers the second and third anal-fin rays (Fig. 1), extending from the origin of the second branched ray to the distal end of the third branched anal-fin ray (*v*. anal fin hyaline, with uniformly distributed chromatophores, or margin blackish in all other species of *Hyphessobrycon*). Additionally, the new species can be distinguished from other congeners by lacking a conspicuous black midlateral stripe on the body, inner premaxillary teeth with up to seven cusps and from *Hemigrammus unilineatus* (Gill 1858), a non-congener but similar species, by having 20–23 branched anal-fin rays (*v*. 24–25), maxilla with two or three tetra to heptacuspidad maxillary teeth (*v*. three to seven tricuspidad maxillary teeth) and caudal fin lacking scales (*v*. caudal-fin lobes scaled).

Description

Morphometric data summarized in Table I. Body compressed, moderately elongated, greatest body depth at vertical through dorsal-fin origin. Dorsal profile of head convex from tip of upper jaw to vertical through anterior nostril; slightly straight or concave from that point to the tip of supraoccipital spine. Dorsal profile of body slightly convex from posterior tip of supraoccipital spine to base of last dorsal-fin ray and straight through to adipose-fin origin; last dorsal-fin ray not reaching vertical through anal-fin origin. Ventral profile of body convex from tip of lower jaw to pelvic-fin origin and slightly convex from that point to anal-fin origin and straight a long anal-fin base. Dorsal and ventral profiles of caudal peduncle straight.

Eyes lacking distinct adipose eyelid. Jaws coequal at anteriormost margin. Maxilla extending posteriorly just past anterior margin of orbit, slightly curved and aligned at an *c*. 45° angle relative to the longitudinal axis of the body. Nostrils close to each other, anterior opening small and circular, posterior opening twice as large as anterior opening and reniform to boomerang shaped. Nostrils separated by a skin flap. Frontals united anteriorly, with narrowly triangular fontanel; parietal fontanel large, extending from epiphyseal bar to supraoccipital spine. Infraorbital series with six elements. Laterosensory canal present from first infraorbital to sixth infraorbital, close to inner margin of orbital rim. Third infraorbital largest, twice as large as others (in length and depth) and contacting the laterosensory canal of preopercle ventrolaterally.

Maxilla with 2(8) or 3(30)*tetra to heptacuspid teeth along the anteroventral margin [Fig. 2(a)]. Premaxillary teeth in two rows: outer row with 3*(28), 4(9), or 5(1), pentacuspid teeth and inner row with 5*(35) or 6(3) penta to heptacuspid teeth [Fig. 2(b)]. Dentary with 5*(36) or 6(2) large, penta to hexacuspid teeth, followed by a series of 6(1), 8(2) small tetracuspid or conical teeth decreasing in size posteriorly [Fig. 2(c)]. Dorsal border of maxilla relatively straight. Central median cusp of all teeth longer

TABLE I. Morphometric data ($n = 38$ including the holotype) for the holotype and paratypes of *Hyphessobrycon pinnistriatus* from the Rio Teles Pires, Rio Tapajós basin

	Holotype	Paratypes	Mean	S.D.
Standard length L_S (mm)	29·8	19·4–30·8	25·4	–
Per cent of L_S				
Body depth	36·9	31·7–38·8	35·7	1·5
Head length	28·0	25·8–30·0	28·4	0·9
Head depth	28·1	25·5–29·7	28·3	1·1
Predorsal length	50·7	48·4–52·8	51·3	0·9
Prepelvic length	48·8	45·2–49·6	48·1	1·0
Pelvic fin to anal fin distance	13·3	11·9–15·6	13·7	0·9
Caudal-peduncle depth	10·1	9·3–11·6	10·3	0·5
Dorsal-fin base length	15·0	13·3–17·4	14·7	0·8
Anal-fin base length	31·3	29·0–33·9	31·5	1·3
Pectoral-fin length	19·0	16·4–25·6	21·3	1·6
Pelvic-fin length	14·7	14·4–19·0	16·1	1·3
Dorsal-fin length	28·5	27·9–35·0	30·8	1·5
Anal-fin length	19·8	19·0–25·2	21·9	1·4
Caudal-peduncle length	13·5	12·2–14·7	13·5	0·5
Dorsal fin to adipose fin distance	38·6	36·7–41·2	38·8	1·0
Eye to dorsal-fin origin	34·4	33·3–36·5	35·1	0·8
Dorsal-fin origin to caudal-fin origin	54·1	52·3–56·7	54·4	0·9
Per cent of head length (L_H)				
Interorbital width	27·9	27·5–31·9	29·4	1·2
Snout length	24·7	21·8–26·5	24·1	1·1
Orbital diameter	43·8	41·4–48·0	45·0	1·3
Upper-jaw length	37·6	37·5–42·2	39·5	1·0

than remaining lateral cusps; cusp tips slightly curved inwardly on dentary teeth and outwardly on premaxillary teeth (Fig. 2).

Scales cycloid, with few relatively small radii (two to four); circuli most apparent along anterior, dorsal and ventral margins. Lateral line incomplete, extending to vertical through posteromedial portion of pectoral fin, not extending to the pelvic-fin origin; perforated scales of lateral line 6(15), 7*(20) or 8(3); longitudinal scale series including pored scales 30(2), 31(11), 32*(23) or 33(2); scale rows between dorsal-fin origin and lateral line 5*(38); scale rows between lateral line and pelvic-fin origin 4(18) or $4^1/_2$*(20). Predorsal scales 8(1), 9*(33) or 10(4). Scale sheath along anal-fin base 4(17), 5*(18) or 6(3) in a single row. Circumpeduncular scales 13*(26) or 14(12). Axillary scale present, approximately triangular.

Dorsal-fin rays ii,9*(38); first unbranched ray approximately one-half length of second unbranched ray or shorter. Dorsal-fin origin at midbody or slightly anterior to midbody, at or posterior to vertical through pelvic-fin origin. Insertion of posteriormost dorsal-fin ray at vertical through anal-fin origin. First dorsal-fin pterygiophore insertion between the neural spines of the eighth and ninth (3) precaudal vertebrae. Adipose fin present.

Pectoral fin with i,10*(25) or 11(13) rays, normally extending to pelvic-fin origin. Pelvic fin with i,7*(38) rays. Pelvic-fin origin located anterior or just anterior to

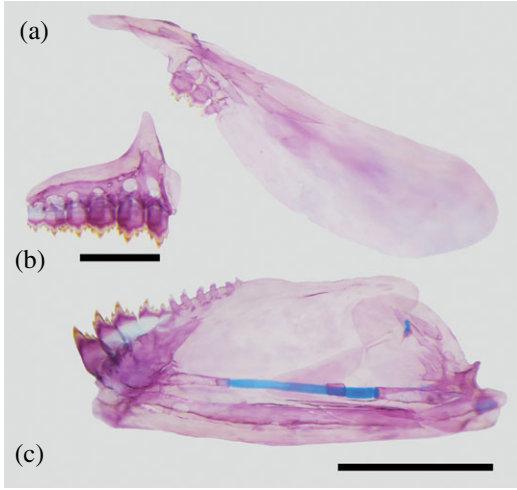

FIG. 2. (a) Maxilla, lateral view, (b) premaxilla, mesial view and (c) dentary lateral view of *Hyphessobrycon pinnistriatus*, paratype, DZSJRP 20599 (same locality as holotype, Fig. 1) 27·1 mm standard length. All left side. Scale bars: (a, c) 1 mm; (b) 0·5 mm.

vertical through dorsal-fin origin. Distalmost tip of longest ray reaching anal-fin origin. Anal-fin rays iii*(38), 20(13), 21*(20), 22(4), or 23(1). Anal fin of males and females lacking bony hooks. Caudal fin forked, lobes slightly rounded, similar in size, with i,8/8,i*(1) or i,9/8,i*(37) rays. Caudal fin naked, scales restricted to its base. Dorsal procurrent caudal-fin rays 10(3) and ventral procurrent caudal-fin rays 7(1) or 8(2).

Branchiostegal rays 4(3). First gill arch with 5(2) or 6(1) gill rakers on epibranchial, 1(3) between epibranchial and ceratobranchial, 9(3) on ceratobranchial and 2(3) on hypobranchial. Numerous denticles on gill rakers distributed along their anterior and posterior margins. Precaudal vertebrae 14(3) and caudal vertebrae 18(2) or 19(1). Total vertebrae 32(2) or 33(1). Supraneurals 3(3), filiforms, some with dorsal portion slightly expanded.

Colour in alcohol

Overall body colour yellowish to brownish. Head with few scattered chromatophores, more densely concentrated from snout to supraoccipital and on dorsal regions including the premaxilla and dorsal portions of the dentary, maxilla, opercle and fourth to sixth infraorbitals. One humeral spot, approximately round, covering three longitudinal body scales, two transversal scales above the lateral line and one below the lateral line. Dorsal portion of flank above humeral spot with a reticulated pattern comprising a darkened posterior margin of each scale; ventral portion of flank with uniformly distributed chromatophores. Abdominal region yellowish with few chromatophores restricted to posterior margin of each scale. Midlateral body stripe absent with an inconspicuous and narrow line present approximately where epaxial and hypaxial muscles meet. Pectoral, pelvic, dorsal and caudal fins normally hyaline or darkly coloured from sparsely distributed chromatophores. First three dorsal-fin rays with small black chromatophores on inter-radial membranes. Black chromatophores also present along the anal-fin base

FIG. 3. *Hyphessobrycon pinnistriatus*, paratypes: (a) DZSJRP 20599 (same locality as holotype, Fig. 1), 26·2 mm standard length (L_S) and (b) MNRJ 24689, 30·8 mm L_S.

and distal border, forming a narrow stripe. Anal fin with a conspicuous anterior black stripe through the entirety of the second to third branched ray (Figs 1 and 3); anal fin with a black line along its base.

Colour in life

Bodies of living specimens of *H. pinnistriatus* with overall rosaceous colour and no markings aside from an inconspicuous humeral spot and uniformly distributed chromatophores. Head reddish with a more intense concentration of erythrophores around dorsal margin of eyes, infraorbital three to six, preopercle and opercle. Abdomen whitish. Pectoral and pelvic fins hyaline; dorsal, adipose, caudal and anal fin reddish, with some scattered xanthophores. Anal fin with a conspicuous anterior milky-white to darkish stripe (Fig. 4).

Sexual dimorphism

No differences in morphology, colour patterns or presence of bony hooks were observed between males and females of *H. pinnistriatus*. Gill glands (*sensu* Burns & Weitzman, 1996) were not found macroscopically on the first gill arch of any specimens.

Geographical distribution

Hyphessobrycon pinnistriatus is known from the Rio Teles Pires drainages, an affluent of the upper Rio Tapajós, Tapajós–Juruena ecoregion (*sensu* Abell *et al.*, 2008), in Mato Grosso State, Brazil (Fig. 5).

FIG. 4. *Hyphessobrycon pinnistriatus*, live specimen (same locality as holotype), not preserved (*c.* 26·0 mm *standard length*).

Etymology

The species name is a combination of the Latin *pinna*, meaning fin and *striatus*, meaning stripe and is in reference to the black stripe on its anal fin. An adjective in apposition.

Ecological notes

The type locality of *H. pinnistriatus* is a second order stream (*sensu* Strahler, 1957), known as an igarapé, surrounded by secondary forest in regeneration. The bottom of the stream is mainly composed of silt, with litter on the margins and few branches and trunks of a diameter greater than 10 cm. In the pools, there is flocculant sediment that is easily disturbed from submerged litter and macrophytes were found at sites with a little more water flow (Fig. 6). Most individuals of *H. pinnistriatus* were only observed in more lentic environments, swimming in small schools of five to 20 individuals. Individuals were also observed swimming alone and together with other species of Characidae, such as *Moenkhausia phaeonota* Fink 1979 and *Hyphessobrycon heliacus* Moreira, Landim & Costa 2002 near igarapé margins with depth ranging from 20 to 40 cm. Individuals were sometimes also observed foraging among the submerged litter in the igarapé margins (F. G. Cabeceira, pers. obs.). This species has also been found in habitats with faster water, no vegetation and substrata consisting of sand and mud.

DISCUSSION

Non-monophyly of the genus *Hyphessobrycon* is supported by several studies (Malabarba *et al.*, 2012; Carvalho & Malabarba, 2015; Dagosta *et al.*, 2016; Teixeira *et al.*, 2016). Approximately 25 species are included in *Hyphessobrycon sensu stricto*, including the type species *Hyphessobrycon compressus* (Meek 1904). All of these species have black dorsal fins and no black midlateral stripe on the flank

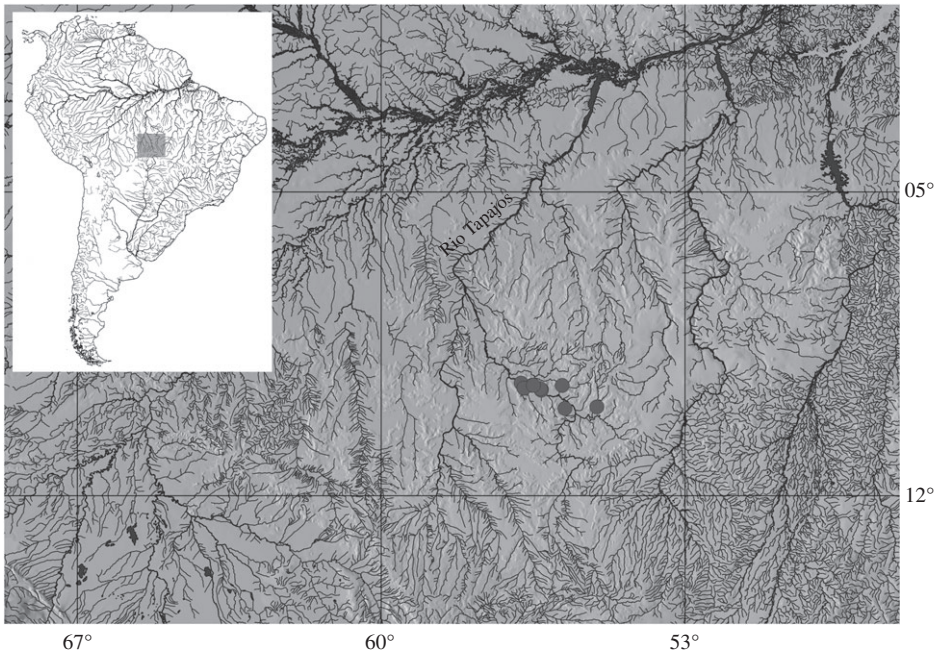

FIG. 5. Distribution of *Hyphessobrycon pinnistriatus* in Rio Teles Pires drainage, Rio Tapajós basin, Brazil. ●, Collection points, some of which may cover multiple collections. Some points may be more than one lot.

(Carvalho & Malabarba, 2015). *Hyphessobrycon pinnistriatus*, however, is not part of this group and its relationship to other members of genus is currently unknown.

A black, oblique stripe on the anterior portion of the anal fin is the most diagnostic characteristic of the new species. This characteristic is generally uncommon among species of Characidae, being found only in *Hemigrammus unilineatus* (Gill 1858) and *Moenkhausia hemigrammoides* Géry 1965 (Fig. 7). *Hyphessobrycon pinnistriatus* clearly differs from both aforementioned species by having a hyaline dorsal fin with a sparse distribution of chromatophores (*v*. black dorsal fin). The oblique band on the body of *H. unilineatus* and *M. hemigrammoides* extends from a point anterodorsal to the urogenital pore to a point just posterior of the first anal-fin rays. In *H. pinnistriatus*, however, the oblique stripe originates from the base of an anal-fin ray, not on the body. *Pristella maxillaris* (Ulrey 1894) and an undescribed species of *Serrapinnus* Malabarba 1998 from the upper Rio Paraná basin (L. R. Malabarba & F. C. Jerep, pers. comm.) also have a black marking on the anterior of the anal fin, but their anterior anal-fin marking has a different condition, with just the distal portion of the rays being black and the marking not extending to the base of the rays.

Moenkhausia nigromarginata Costa 1994 [*cf*. Pastana & Dagosta, 2014: Fig. 6(b)] and *Moenkhausia rubra* Pastana & Dagosta 2014 [*cf*. Pastana & Dagosta, 2014: Figs 1, 3(b)] have a concentration of chromatophores in dorsal-fin rays similar to *H. pinnistriatus*. *Hyphessobrycon pinnistriatus* differs from *M. nigromarginata* and *M. rubra* by having an incomplete (*v*. complete) lateral line. Also, *Hyphessobrycon amandae* Géry & Uj 1987 and *Hyphessobrycon pulchripinnis* Ahl 1937 both have a higher concentration of chromatophores on interradial membranes on the dorsal fin, but not as

FIG. 6. Type locality of *Hyphessobrycon pinnistriatus*, Brazil, Mato Grosso State, municipality of Novo Mundo, Parque Estadual Cristalino, igarapé affluent of Rio Cristalino, Rio Teles Pires drainage.

intensely on the rays. *Hyphessobrycon pinnistriatus* differs from *H. amandae* and *H. pulchripinnis* by having a humeral spot (*v*. spot absent).

The rosaceous live coloration of *H. pinnistriatus* is also comparable with that of the rosy-tetra group (*sensu* Weitzman & Palmer, 1997), but the new species is distinguished by having a hyaline dorsal fin, or with scattered chromatophores on the dorsal fin (*v*. black in the rosy-tetra group). *Hemigrammus erythrozonus* Durbin 1909 has a somewhat rosaceous colouration, like *H. pinnistriatus*, but the new species differs from *H. erythrozonus* by having a black oblique band across the second and third anal-fin rays (*v*. anterior anal-fin being hyaline) and heptacusp teeth in the inner row of the premaxilla (*v*. pentacusp teeth on the inner row of the premaxilla).

The following species of *Hemigrammus–Hyphessobrycon* (according to Eschmeyer *et al.*, 2017) are recognized in the Rio Tapajós basin: *Hemigrammus analis* Durbin 1909, *Hemigrammus arua* Lima, Wosiacki & Ramos 2009, *Hemigrammus elegans* (Steindachner 1882), *Hemigrammus orthus* Durbin 1909, *Hemigrammus silimoni* Britski & Lima 2008, *Hemigrammus skolioplatus* Bertaco & Carvalho 2005, *Hyphessobrycon cachimbensis* Travassos 1964, *Hyphessobrycon delimai* Teixeira, Netto-Ferreira, Birindelli & Sousa 2016, *Hyphessobrycon eques* (Steindachner 1882), *Hyphessobrycon heliacus*, *Hyphessobrycon hexastichos* Bertaco & Carvalho 2005, *Hyphessobrycon kayabi* Teixeira, Lima & Zuanon 2014, *Hyphessobrycon melanostichos* Carvalho & Bertaco 2006, *Hyphessobrycon moniliger* Moreira, Lima & Costa 2002, *Hyphessobrycon notidanos* Carvalho & Bertaco 2006, *Hyphessobrycon*

FIG. 7. (a) *Hemigrammus unilineatus cayennensis* (= *Hemigrammus unilineatus*) MHNG 2179.061, holotype, 36·4 mm standard length (L_S) and (b) *Moenkhausia hemigrammoides*, ZMA 104227, holotype, 40·0 mm L_S.

psittacus Dagosta, Marinho, Camelier & Lima 2016, *Hyphessobrycon pulchripinnis*, *Hyphessobrycon scutulatus* Lucena 2003, *Hyphessobrycon vanzolinii* Lima & Flausino 2016, *Hyphessobrycon vilmae* Géry 1966 and *Hyphessobrycon wadai* Marinho, Dagosta, Camelier & Oyakawa 2016. *Hyphessobrycon pinnistriatus* differs from all the aforementioned species by having a black, oblique band across the second and third anal fin rays (*v*. black oblique band absent from anterior anal-fin rays in all other species).

The Tapajós–Juruena ecoregion (*sensu* Abell *et al.*, 2008) is a region of high endemism for freshwater fishes [*e.g*. *Hasemania nambiquara* Bertaco & Malabarba 2007 (Bertaco & Malabarba, 2007), *Hemigrammus arua* (Lima *et al.*, 2009: Fig. 5), *Hyphessobrycon hexastichos* (Bertaco & Carvalho, 2005), *H. delimai* (Teixeira *et al.*, 2016), *Knodus dorsomaculatus* Ferreira & Netto-Ferreira 2010 (Ferreira & Netto-Ferreira, 2010: Fig. 3), *Moenkhausia rubra* Pastana & Dagosta, 2014 (Pastana & Dagosta, 2014: Fig. 5) to mention some]. The known distribution of *Hyphessobrycon pinnistriatus*, being also limited to the Tapajós–Juruena ecoregion, reinforces the understanding of this area as a region of high endemism for freshwater fishes.

ADDITIONAL MATERIAL EXAMINED

Hemigrammus erythrozonus: FMNH 53546, holotype, 24·0 mm L_S, Guyana, Mazaruni-Potaro, Erukin Creek, near confluence with lower Potaro River. FMNH

7344, paratypes, 2, 15·2–18·5 mm L_S, same data as FMNH 53546. FMNH 53025, paratypes, 5, 20·7–25·2 mm L_S, same data as FMNH 53546. MCZ 29976, paratypes, 2, 19·3–22·1 mm L_S, same data as FMNH 53546. ZMA 101032, paratype, 1, 16·6 mm L_S, same data as FMNH 53546. *Hemigrammus unilineatus cayennensis*: MHNG 2179.061, holotype, 36·4 mm L_S, French Guiana, crique d′eau douce de l′île de Cayenne. ANSP 94715, paratype, 1 (parched), 26·1 mm L_S, same data as MHNG 2179.061. MHNG 2179.055, paratype, 1, 21·2 mm L_S, French Guiana, crique Blanche, affluent de l'Orapu River, J. Géry. MHNG 2179.063, paratype, 4, 15·1–28·8 mm L_S, same data as MHNG 2179.061. SMF 5385, paratype, 1, 26·2 mm L_S, same as MHNG 2179.061. ZMA 101049, paratype, 1, 19·8 mm L_S, same as MHNG 2179.061. *Moenkhausia hemigrammoides*: ZMA 104227, holotype, 40·0 mm L_S, Suriname, Marowijne, Matoekasi Creek at Weyne, on the road Albina-Moengo.

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References

Abell, R., Thieme, M. L., Revenga, C., Bryer, M., Kottelat, M., Bogutskaya, N., Coad, B., Mandrak, N., Contreras-Balderas, S., Bussing, W., Stiassny, M. L. J., Skelton, P., Allen, G. R., Unmack, P., Naseka, A., Ng, R., Sindorf, N., Robertson, J., Armijo, E., Higgins, J. V., Heibel, T. J., Wikramanayake, E., Olson, D., López, H. L., Reis, R. E., Lundberg, J. G., Sabaj Pérez, M. H. & Petry, P. (2008). Freshwater ecoregions of the world: a new map of biogeographic units for freshwater biodiversity conservation. *BioScience* **58,** 403–414.

Battirola, L. D., Rodrigues, D. J., Barreto, M. R., Carvalho, L. N., Barbosa, F. R., Bonaldo, S. M., Pires, A. F. P., Reis, C., Pires, E. M., Canale, G. R., Carvalho, F., Britto, E. P. J., Noronha, J. C., Battistella, D. A., Cabeceira, F. G., Zaiatz, A. P. S. R. & Cavalheiro, L. (2015). Biodiversidade da Amazônia mato-grossense: pesquisas do Núcleo de Estudos da Biodiversidade da Amazônia Meridional. In *Amazônia: Visão Caleidoscópica* (Dias, M. P. de L., Philippsen, N. I., Straub, S. L. W. & Oliveira, T. P., eds), pp. 451–489. Recife: Pipa Comunicação.

Bertaco, V. A. & Carvalho, T. P. (2005). A new characid fish, *Hyphessobrycon hexastichos* (Characiformes: Characidae) from Chapada dos Parecis, Mato Grosso, Brazil. *Neotropical Ichthyology* **3,** 439–443.

Bertaco, V. A. & Malabarba, L. R. (2007). A new species of *Hasemania* from the upper Rio Tapajós drainage, Brazil (Teleostei: Characiformes: Characidae). *Copeia* **2007,** 350–354.

Buckup, P. A., Britto, M. R., Gomes, J. R., Birindelli, J. L. O., Lima, F. C. T., Maldonado-Ocampo, J. A., Zawadzki, C. H., Carvalho, F. R., Jerep, F. C., Chamon, C. C., Fries, L. C. C., Villa-Verde, L., Camargo, M., Souza-Lima, R., Bartolette, R. & Wingert, J. M. (2011). Inventário da ictiofauna da Ecorregião Aquática Xingu-Tapajós. In *Ecorregião Aquática Xingu-Tapajós* (Castilho, Z. C. & Buckup, P. A., eds), pp. 163–174. Rio de Janeiro: CETEM/MCT.

Burns, J. R. & Weitzman, S. H. (1996). Novel gill-derived gland in the male swordtail characin, *Corynopoma riisei* (Teleostei: Characidae: Glandulocaudinae). *Copeia* **1996,** 627–633.

Cabeceira, F. G., Carvalho, F. R. & Carvalho, L. N. (2015). Peixes de Riachos. In *Biodiversidade do Parque Estadual Cristalino* (Rodrigues, D. de J., Noronha, J. d. C., Vindica, V. F. & Barbosa, F. R., eds), pp. 193–205. Sinop: Áttema Editorial.

Carvalho, F. R. & Langeani, F. (2013). *Hyphessobrycon uaiso*: new characid fish from the Rio Grande, upper Rio Paraná basin, Minas Gerais State (Ostariophysi: Characidae), with a brief comment about some types of *Hyphessobrycon*. *Neotropical Ichthyology* **11,** 525–536.

Carvalho, F. R. & Malabarba, L. R. (2015). Redescription and osteology of *Hyphessobrycon compressus* (Meek) (Teleostei: Characidae), type species of the genus. *Neotropical Ichthyology* **13,** 513–540.

Carvalho, F. R., Bertaco, V. A. & Jerep, F. C. (2010). *Hemigrammus tocantinsi*: a new species from the upper Rio Tocantins basin, central Brazil (Characiformes: Characidae). *Neotropical Ichthyology* **8,** 247–254.

Carvalho, F. R., de Jesus, G. C. & Langeani, F. (2014). Redescription of *Hyphessobrycon flammeus* Myers 1924 (Ostariophysi: Characidae), a threatened species from Brazil. *Neotropical Ichthyology* **12,** 247–256.

Dagosta, F. C. P., Marinho, M. M. F., Camelier, P. & Lima, F. C. T. (2016). A new species of *Hyphessobrycon* (Characiformes: Characidae) from the upper Rio Juruena Basin, Central Brazil, with a redescription of *H. cyanotaenia*. *Copeia* **2016,** 250–259.

Eigenmann, C. H. (1908). Preliminary descriptions of new genera and species of tetragonopterid characins (Zoölogical Results of the Thayer Brazilian Expedition.). *Bulletin of the Museum of Comparative Zoology* **52,** 91–106.

Eigenmann, C. H. (1917). The American Characidae [Part 1]. *Memoirs of the Museum of Comparative Zoology* **43,** 1–102.

Ferreira, K. M. & Netto-Ferreira, A. L. (2010). *Knodus dorsomaculatus* (Characiformes: Characidae), a new species from Teles Pires River, Tapajós River basin, Brazil. *Journal of Fish Biology* **77,** 468–478.

Fink, W. L. & Weitzman, S. H. (1974). The so-called Cheirodontin fishes of Central America with descriptions of two new species (Pisces: Characidae). *Smithsonian Contributions to Zoology* **172,** 1–46.

Ingenito, L. F. S., Lima, F. C. T. & Buckup, P. A. (2013). A new species of *Hyphessobrycon* Durbin (Characiformes: Characidae) from the Rio Juruena basin, central Brazil, with notes on *H. loweae* Costa and Géry. *Neotropical Ichthyology* **11,** 33–44.

Lima, F. C. T., Wosiacki, W. B. & Ramos, C. S. (2009). *Hemigrammus arua*, a new species of characid (Characiformes: Characidae) from the lower Amazon, Brazil. *Neotropical Ichthyology* **7,** 153–160.

Malabarba, L. R., Bertaco, V. A., Carvalho, F. R. & Litz, T. O. (2012). Revalidation of the genus *Ectrepopterus* Fowler (Teleostei: Characiformes), with the redescription of its type species, *E. uruguayensis*. *Zootaxa* **3204,** 47–60.

Mirande, J. M. (2009). Weighted parsimony phylogeny of the family Characidae (Teleostei: Characiformes). *Cladistics* **2009,** 573–613.

Mirande, J. M. (2010). Phylogeny of the family Characidae (Teleostei: Characiformes): from characters to taxonomy. *Neotropical Ichthyology* **8,** 385–568.

Ohara, W. M. & Lima, F. C. T. (2015). *Hyphessobrycon lucenorum* (Characiformes: Characidae), a new species from the Rio Madeira basin, Rondônia State, Brazil. *Zootaxa* **3972,** 562–572.

Pastana, M. N. L. & Dagosta, F. C. P. (2014). *Moenkhausia rubra*, a new species from Rio Juruena, upper Rio Tapajós basin, Brazil (Characiformes: Characidae). *Neotropical Ichthyology* **12,** 389–396.

Reis, R. E. (2013). Conserving the freshwater fishes of South America. *International Zoo Yearbook* **47,** 1–6.

Strahler, A. N. (1957). Quantitative analysis of watershed geomorphology. *Transactions of the American Geophysical Union* **38,** 913–920.

Taylor, W. R. & van Dyke, G. C. (1985). Revised procedures for staining and clearing small fishes and other vertebrates for bone and cartilage study. *Cybium* **9,** 107–119.

Teixeira, T. F., Lima, F. C. T. & Zuanon, J. (2014). A new *Hyphessobrycon* Durbin from the Rio Teles Pires, Rio Tapajós Basin, Mato Grosso State, Brazil (Characiformes: Characidae). *Copeia* **13,** 612–621.

Teixeira, T. F., Netto-Ferreira, A. L., Birindelli, J. L. O. & Sousa, L. M. (2016). Two new species of *Hyphessobrycon* (Characiformes: Characidae) from the headwaters of the Tapajós and Xingu River basins, Pará, Brazil. *Journal of Fish Biology* **88,** 459–476.

Weitzman, S. H. & Palmer, L. (1997). A new species of *Hyphessobrycon* (Teleostei: Characidae) from the Neblina region of Venezuela and Brazil, with comments on the putative "rosy tetra clade". *Ichthyological Exploration of Freshwaters* **7,** 209–242.

Zanata, A. M. & Camelier, P. (2010). *Hyphessobrycon brumado*: a new characid fish (Ostariophysi: Characiformes) from the upper Rio de Contas drainage, Chapada Diamantina, Bahia, Brazil. *Neotropical Ichthyology* **8,** 771–777.

Electronic References

Eschmeyer, W. N., Fricke, R. & van der Laan, R. (Eds) (2017). *Catalog of Fishes: Genera, Species, References*. San Francisco, CA: California Academy of Sciences. Available at http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp/ (last accessed 25 April 2017).

Sabaj Pérez, M. H. (Ed.) (2014). *Standard Symbolic Codes for Institutional Resource Collections in Herpetology And Ichthyology: Version 5.0*. Washington, D.C.: American Society of Ichthyologists and Herpetologists. Available at http://www.asih.org/ (last accessed 18 April 2016).