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A new species of *Bryconamericus* (Characidae: Stevardiinae: Diapomini) from the upper rio Paraná basin, Brazil

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Bryconamericus is the most diverse genus within Stevardiinae, comprising 61 valid species distributed in Cis- and Trans-Andean basins from Panama in Central America to northern Argentina in South America. Three species are known from the upper rio Paraná basin: *B. exodon*, *B. iheringii*, and *B. turiuba*. Herein we describe a new species of *Bryconamericus* from the upper rio Paraná basin inhabiting tributaries of Ivaí, Piquiri, and Tibagi basins, Paraná State, Brazil. The new species differs from its congeners by the presence of unaligned teeth in the outer tooth row of the premaxilla; a single, vertical, dorsally expanded and rounded humeral spot; 36-39 pored scales in the longitudinal series; body depth 31.6-37.9% SL; anal-fin base length 24.8-30.1% SL; number of branched anal-fin rays 19-22, and bony hooks on pelvic- and anal-fin rays of sexually dimorphic males. The new species is syntopic with other Stervadiinae in the upper rio Paraná basin such as *B. iheringii*, *B. turiuba*, *Piabarchus stramineus*, and *Piabina argentea*.

Keywords: Actinopterygii, Characiformes, Geometric Morphometrics, PCA, Taxonomy.

Bryconamericus é o gênero de Stevardiinae mais diverso, com 64 espécies válidas distribuídas nas bacias Cis- e Trans-Andinas, do Panamá na América Central à região norte da Argentina na América do Sul. Dessas espécies, três são conhecidas da bacia do alto rio Paraná: *B. exodon*, *B. iheringii* e *B. turiuba*. Neste trabalho descrevemos uma espécie nova de *Bryconamericus* da bacia do alto rio Paraná, habitando tributários das bacias dos rios Ivaí, Piquiri e Tibagi, Estado do Paraná, Brasil. A espécie nova difere dos seus congêneres pela presença de dentes desalinhados na fileira externa de dentes do pré-maxilar; uma única mancha umeral vertical, expandida e arredondada dorsalmente; 36-39 escamas perfuradas na série longitudinal; altura do corpo 31,6-37,9% CP; base da nadadeira anal 24,8-30,1% CP; 19-22 raios ramificados na nadadeira anal e ganchos ósseos nas nadadeiras pélvica e anal de machos sexualmente dimórficos. A espécie nova é sintópica com outros Stervadiinae na bacia do alto rio Paraná, como *B. iheringii*, *B. turiuba*, *Piabarchus stramineus* e *Piabina argentea*.

Palavras-chave: ACP, Actinopterygii, Characiformes, Morfometria Geométrica, Taxonomia.

Introduction

Bryconamericus Eigenmann, 1907, described in Eigenmann *et al*. (1907), is the most diverse genus within Stevardiinae (*sensu* Thomaz *et al*., 2015), comprising 61 valid species (Thomaz *et al*., 2015; Eschmeyer *et al*., 2017) distributed in Cis- and Trans-Andean basins from Panama in Central America (*e.g., Bryconamericus zeteki* Hildebrand, 1938) to northern Argentina [*e.g*., *Bryconamericus eigenmanni* (Evermann & Kendall, 1906)].

The systematics of *Bryconamericus* has been investigated for decades, as well as its doubtful monophyly within Characidae (Eigenmann, 1927; Fink, 1976; Vari, Géry, 1980; Vari, Siebert, 1990). More recently, morphology and molecular based studies have shown that the genus is certainly polyphyletic (Malabarba, Malabarba, 1994; Malabarba, Kindel, 1995; Malabarba, Weitzman, 2003; Javonillo *et al*., 2010; Mirande, 2010; Oliveira *et al*., 2011). Thomaz *et al*. (2015) presented the most encompassing phylogeny concerning species of *Bryconamericus*, which corroborates the polyphyly of the genus. Notwithstanding, the authors found a clade containing the type-species of the genus, *B. exodon* Eigenmann, 1907, and several species from southern South America: *B. iheringii* (Boulenger, 1887), *B. ikaa* Casciotta, Almirón & Azpelicueta, 2004, *B. lethostigmus* (Gomes, 1947), *B. microcephalus* (Miranda Ribeiro, 1908), *B. patriciae* da Silva, 2004, *B. rubropictus* (Berg, 1901), and *B. uporas* Casciotta, Azpelicueta & Almirón, 2002, and representatives of the species-poor genera *Hypobrycon* Malabarba & Malabarba, 1994, *Nantis* Mirande, Aguilera & Azpelicueta, 2006, and *Odontostoechus* Gomes, 1947, defining a new monophyletic concept of the genus, *Bryconamericus sensu stricto*, that includes all these species. The remaining species previously assigned to *Bryconamericus* placed outside this clade have been provisionally referred to as '*Bryconamericus*'.

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Although *Bryconamericus sensu stricto* lacks a morphological diagnosis from other Stevardiinae, *Bryconamericus* is still diagnosed by a combination of morphological characters proposed by Eigenmann (1927) and updated by Vari, Siebert (1990): premaxilla bearing two series of teeth; inner series bearing four teeth larger than outer series teeth; a single series of teeth in the dentary; few maxillary teeth; caudal fin scaleless; third infraorbital well developed, contacting both ventral and posterior arms of the preopercle; gill rakers arrow-shaped; lateral line completely pored, and the absence of glandular tissue and/or pouch scales in the caudal fin of males.

Sixteen species of *Bryconamericus* are found in the southern region of South America (Eschmeyer *et al*., 2017). Four species were registered in the upper rio Paraná basin (Langeani *et al*., 2007): *B. exodon*, *B. iheringii*, *B. turiuba* Langeani, Lucena, Pedrini & Tarelho-Pereira, 2005, and *B.* (=*Piabarchus*) *stramineus*, with the latter recently removed from *Bryconamericus* (Thomaz *et al.*, 2015). Herein we describe a new species of *Bryconamericus* for the upper rio Paraná basin based on specimens from the rios Ivaí, Piquiri, and Tibagi basins, Paraná State, Brazil.

Material and Methods

Counts and measurements were made preferably on the left side of the specimens following Vari, Siebert (1990) and Azpelicueta, Almirón (2001), except for distance from dorsal-fin origin to anal-fin origin and distance from dorsal-fin origin to pectoral-fin origin, which followed Harold, Vari (1994). Counts of vertebrae, ribs, dentary teeth, tooth cusp number, supraneurals, and procurrent caudal-fin rays were made on cleared and stained specimens (c&s) prepared with an adapted protocol from Taylor, van Dyke (1985). Vertebral count included the four vertebrae forming the Weberian apparatus, and the terminal centrum as single element (Weitzman, Malabarba, 1999). Counts were made under microscope and measurements were taken with a caliper with 0.01 mm precision. In the description, counts are followed by the number of specimens presenting such value between parenthesis, and the value of the holotype followed by an asterisk. Body measurements are presented as percentages of Standard Length (SL) and subunits of the head as percentages of the Head Length (HL). Fish classification follows Eschmeyer *et al*. (2017). Acronyms of institutions follow Sabaj Pérez (2014).

Geometric morphometrics analysis (GM). GM was herein used to address the morphological variation among the new species of *Bryconamericus* and five sympatric species of Stervadiinae: *B. exodon*, *B. iheringii*, *B. turiuba*, *Piabarchus stramineus*, and *Piabina argentea*. Specimens of *B. iheringii* and *P. argentea* from their type-locality basins (Laguna dos Patos and rio São Francisco basins, respectively) were also included in the analysis to encompass intraspecific morphological variation. Lots used in geometric morphometrics analysis are listed as (GM) in the list of type-material and material examined. Individual photographs were taken with 10 Mpixels resolution digital camera. Photograph files were grouped and transformed in *.tps files using TPSUtil V. 1.86 program (Rohlf, 2015). Landmarks were traced with the assistance of TPSDig V.2.2 program (Rohlf, 2015). The landmarks were aligned with procrustes superimposition 2D option of the program PAST (Hammer *et al.*, 2001), and the same program was used for the multivariate canonical variate analysis (MANOVA/CVA option) and principal components analysis (Principal Components option) (Hammer *et al*., 2001). The procrustes superimposition eliminates variations in position, scale, and orientation of landmarks (Klingenberg, 2002), superimposing all individuals, adjusting and centering each configuration between homologous landmarks, and generating a reference configuration. The following landmarks were traced on each specimen: 1) contacting point of anterior tip of dentary with premaxilla; 2) tip of snout; 3) anterior border of snout; 4) posterior tip of maxillary bone; 5) anterior margin of eye; 6) posterior margin of eye; 7) posterior tip of supraoccipital process; 8) contacting point between posterior margin of third and fourth infraorbitals; 9) posterior margin of opercle; 10) pectoral-fin base; 11) dorsal-fin origin; 12) posterior insertion of dorsal fin; 13) adipose-fin origin; 14) posterior insertion of adipose fin; 15) tip of penultimate dorsal procurrent ray; 16) tip of penultimate ventral procurrent ray; 17) posterior insertion of anal fin; 18) anal-fin origin; and 19) pelvic-fin origin.

Results

Bryconamericus coeruleus, new species

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Figs. 1-3

Bryconamericus aff. *iheringii*. -Portela-Castro *et al*., 2008:113-117, figs. 1-4, tab. 1 (cytogenetics; rio Keller, rio Ivaí basin).

Bryconamericus sp. -Frota *et al*., 2016:3, fig. 2A, tab. 1 (listed in fish inventory of the rio Ivaí basin as an endemic species; voucher: NUP 17150).

Holotype. MZUSP 121505, 65.4 mm SL (GM), male, Brazil, Paraná State, Marialva, rio Keller, rio Ivaí basin, 23º38’30.0”S 51º51’32.0”W, 10 Feb 2015, G. C. Deprá.

Paratypes. Brazil, Paraná State, upper rio Paraná basin. DZSJRP 21084, 2, 37.7-45.9 mm SL (GM), same data of the holotype. MZUEL 4941, 1, 71.3 mm SL, Londrina, District of Guaravera, middle rio Taquara, tributary of rio Tibagi, 23º34’39.7”S 51º09’57.2”W, 11 Oct 2007, R. L. T. Ruiz & W. Galves. MZUEL 4950, 1, 68.3 mm SL (GM), Londrina, District of Guaravera, middle rio Taquara, tributary of rio

Tibagi, 23º34'39.7"S 51º09'57.2"W, 11 Oct 2007, R. L. T. Ruiz & W. Galves. MZUEL 14979, 4, 57.4-60.4 mm SL (GM), Novo Itacolomi, rio Itacolomi, tributary of rio Ivaí, 23º43'55.6"S 51º32'29.9"W, 25 Mar 2013, A. C. Hoffmann. MZUEL 17097, 11, 44.6-61.0 mm SL (1 c&s, 49.2 mm SL), Londrina, rio Taquara, 23°34'39.7"S 51°09'57.2"W, 23 Nov 2006, W. Galvez and others. NUP 3091, 8, 53.5-66.5 mm SL, Marialva, rio Keller, rio Ivaí basin, *ca*. 23º30'00.0"S 52º00'00.0"W, 15 Jun 1996, A. L. de B. Portela Castro. NUP 3092, 8, 58.5-68.9 mm SL, Marialva, rio Keller, rio Ivaí basin, *ca*. 23º30'00.0" S 52º00'00.0" W, 15 Jun 1997, A. L. de B. Portela Castro. NUP 4536, 4, 48.7-60.9 mm SL [2, 49.3-60.9 mm SL (GM)], Nova Tebas, rio Muquilão, tributary of rio Ivaí, 24º24'33.0"S 52º02'39.0"W, 20 Mar 2006, C. H. Zawadzki. NUP 4551, 3, 47.8-62.9 mm SL (2, 50.7-62.9 mm SL), Iretama, rio Formoso, tributary of rio Ivaí, 24º19'04.0"S 52º07'02.0"W, 25 Jul 2006, C. H. Zawadzki. NUP 5923, 1, 61.5 mm SL (GM), Nova Laranjeiras, rio Piquiri, 24º20'19.0"S 52º36'05.0"W, 17 May 2008, W. P. Margarido. NUP 10706, 20, 55.4-68.1 mm SL [7, 55.0-67.8 mm SL (GM); 3 c&s 54.6-59.9 mm SL], Marialva, rio Keller, rio Ivaí basin, 23º38'30.0"S 51º51'33.0"W, 1 Jan 1900, Nupelia. NUP 11681, 4, 60.6-68.4 mm SL [2, 61.0-66.3 mm SL (GM)], Marialva, rio Keller, rio Ivaí basin, 23º38'05.0"S 51º50'50.0"W, 10 Jun 2009, E. L. C. Avancini. NUP 15814, 11, 46.5-65.1 mm SL [3, 53.6-61.9 mm SL (GM)], Prudentópolis, rio Barra Grande, rio Ivaí basin, 25º04'55.0"S 51º10'35.0"W, 20 Jan 2014, W. J. da Graça. NUP 16376, 11, 16.4-59.4 mm SL [2, 22.1-59.4 mm SL (GM)], Cândido de Abreu, Lageadão stream, tributary of rio Ubazinho, 24º32'27.0"S 51º20'10.0"W, 5 Apr 2014, G. C. Deprá. NUP 16398, 48, 21.3-54.3 mm SL [5, 22.2-54.3 mm SL (GM)], Cândido de Abreu, rio Maria Flora, tributary of rio Ubazinho, 24º36'33.0"S 51º15'32.0"W, 5 Apr 2014, G. C. Deprá. NUP 17135, 11, 20.5-63.6 mm SL [4, 40.8-63.6 mm SL (GM), 2 c&s 40.8-46.8 mm SL], Marialva, rio Keller, rio Ivaí basin, 23º38'30.0"S 51º51'32.0"W, 25 Aug 2014, G. C. Deprá. NUP 17150, 18, 25.0-65.9 mm SL [3, 41.1-65.9 mm SL (GM)], Marialva, rio Keller, rio Ivaí basin, 23º38'30.0"S 51º51'32.0"W, 10 Feb 2015, G. C. Deprá.

Diagnosis. *Bryconamericus coeruleus* is distinguished from all congeners by the following morphological characters: presence of unaligned teeth in the outer premaxillary tooth row (*vs*. outer tooth row absent in *B. lethostigmus*; outer tooth row series aligned in *B. agna* Azpelicueta & Almirón, 2001, *B. andresoi* Román-Valencia, 2003a, *B. arilepis* Román-Valencia, Vanegas-Ríos & Ruiz-C., 2008, *B. carlosi* Román-Valencia, 2003b, *B. ecai*, *B. eigenmanni* (Evermann & Kendall, 1906), *B. guizae* Román-Valencia, 2003a, *B. huilae* Román-Valencia, 2003a, *B. hyphesson* Eigenmann, 1909, *B. iheringii*, *B. ikaa*, *B. lambari* Malabarba & Kindel, 1995, *B. leptorhynchus* (da Silva & Malabarba, 1996), *B. macrophthalmus* Román-Valencia, 2003c, *B. maromba* (Malabarba & Malabarba, 1994), *B. ornaticeps* Bizerril & Perez-Neto, 1995, *B. patriciae*, *B. poi* (Almirón, Casciotta, Azpelicueta & Cione, 2001), *B. pyahu* Azpelicueta, Casciotta & Almirón, 2003, *B. rubropictus*; *B. singularis* Román-Valencia, Taphorn & Ruiz-C., 2008, *B. subtilisform* Román-Valencia, 2003c, *B. sylvicola* Braga, 1998, *B. tenuis* Bizerril & Auraujo, 1992, *B. tolimae* Eigenmann, 1913, *B. uporas*, *B. ytu* Almirón, Azpelicueta & Casciotta, 2004); a single humeral spot, vertically elongated, expanded and rounded dorsally (*vs*. two humeral spots in *Bryconamericus ecai*, *B. eigenmanni*, and *B. ikaa*; a single not dorsally expanded humeral spot in *B. andresoi*, *B. caldasi* Román-Valencia, Ruiz-C., Taphorn & García-Alzate, 2014, *B. carlosi*, *B. charalae* Román-Valencia, 2005, *B. cismontanus* Eigenmann, 1914, *B. diaphanus* (Cope, 1878), *B. foncensis* Román-Valencia, Vanegas-Ríos & Ruiz-C., 2009, *B. guyanensis* Zarske, Le Bail & Géry, 2010, *B. huilae*, *B. ichoensis* Román-Valencia, 2000, *B. iheringii*, *B. indefessus* (Mirande, Aguilera & Azpelicueta, 2004), *B. lassorum* Román-Valencia, 2002, *B. macarenae* Román-Valencia, García-Alzate, Ruiz-C. & Taphorn, 2010, *B. macrophthalmus*, *B. mennii* Miquelarena, Protogino, Filiberto & López, 2002, *B. motatanensis* Schultz, 1944, *B. orinocoense* Román-Valencia, 2003c, *B. pectinatus* Vari & Siebert, 1990, *B. pinnavittatus* Dagosta & Netto-Ferreira, 2015, *B. singularis*, *B. subtilisform*, *B. tenuis*, *B. tolimae*, *B. turiuba*, *B. yokiae* Román-Valencia, 2003d, and *B. ytu*; and faint or absent humeral spot in *B. alfredae* Eigenmann, 1927, *B. bolivianus* Pearson, 1924, *B. exodon*, *B. grosvenori* Eigenmann, 1927, *B. multiradiatus* Dahl, 1960, *B. novae* Eigenmann & Henn, 1914, *B. oroensis* Román-Valencia, Ruiz-C., Taphorn & García-A., 2013, *B. pachacuti* Eigenmann, 1927, *B. patriciae*, *B. zeteki* Hildebrand, 1938); 19-22 branched anal-fin rays (*vs*. 33-38 in *B. bucayensis* Román-Valencia, Ruiz-C., Taphorn & García-A., 2013, 27-31 in *B. caucanus* Eigenmann, 1913, 18 in *B. megalepis* Fowler, 1941, 13-15 in *B. microcephalus*, 25-26 in *B. osgoodi* Eigenmann & Allen, 1942, 23-26 in *B. phoenicopterus* (Cope, 1872); and 5 scale rows between the lateral line and the dorsal-fin origin (*vs*. 6-8 in *B. zamorensis* Román-Valencia, Ruiz-C., Taphorn & García-A., 2013).

Description. Morphometric data presented in Tab. 1. Small sized, largest specimen presenting 71.3 mm SL. Body laterally compressed. Body deepest point at dorsal-fin origin. Dorsal profile of head convex from tip of snout to vertical through posterior limit of nostril, slightly concave to straight from that point to tip of supraoccipital spine. Dorsal profile of body convex along predorsal region, straight to slightly convex along dorsal-fin base and from terminus of dorsal-fin base to adipose fin, and straight to slightly concave along caudal peduncle. Ventral profile of head strongly convex from tip of ventral lip to pelvic-fin insertion, slightly convex from that point to anal-fin origin, straight along anal-fin base, and straight to slightly concave along caudal peduncle (Fig. 1).

Fig. 1. *Bryconamericus coeruleus*, new species, holotype, MZUSP 121505, 65.4 mm SL, male, rio Keller, rio Ivaí basin, Marialva, Paraná State, Brazil.

Tab. 1. Morphometric data for holotype and 29 paratypes of *Bryconamericus coeruleus*. Minimum (Min) and maximum (Max) variations include values of the holotype. SD = standard deviation.

	Holotype	Min	Max	Mean	SD	N
Standard length	65.5	40.6	71.3	59.5		29
			Percentage of Standard Length			
Depth at dorsal-fin origin	36.0	31.6	37.9	35.5	1.5	29
Snout to dorsal-fin origin	52.7	51.3	54.8	53.1	0.9	29
Snout to pectoral-fin origin	23.3	23.3	27.1	24.6	0.8	29
Snout to pelvic-fin origin	45.3	44.9	48.1	46.6	0.9	29
Snout to anal-fin origin	61.5	59.5	65.7	63.0	1.5	29
Caudal peduncle depth	12.2	10.6	12.2	11.4	0.5	29
Caudal peduncle length	14.1	12.3	15.2	13.4	0.8	29
Pectoral-fin length	21.8	20.6	24.4	22.5	0.9	29
Pelvic-fin length	17.4	13.7	18.3	16.5	0.9	29
Pelvic-fin insertion to anal-fin origin	17.3	14.9	18.8	17.3	0.9	29
Dorsal-fin origin to anal-fin origin	35.6	31.1	38.4	35.0	1.7	29
Dorsal-fin origin to pelvic-fin insertion	35.4	31.1	36.8	34.1	1.6	29
Dorsal-fin origin to pectoral-fin insertion	39.5	36.7	41.9	39.6	1.2	29
Dorsal-fin length	26.5	22.9	28.1	25.7	1.1	27
Dorsal-fin base length	12.9	12.2	14.5	13.0	0.6	29
Anal-fin length	20.1	17.3	20.8	19.2	1.0	29
Anal-fin base length	28.8	24.8	30.1	27.9	1.3	29
Eye to dorsal-fin origin	40.1	37.6	41.3	39.7	1.0	29
Dorsal-fin origin to caudal-fin base	53.1	50.4	55.2	52.6	1.2	29
Head length	23.9	23.9	26.7	25.3	0.5	29
			Percentage of Head Length			
Horizontal eye diameter	38.4	32.4	41.8	36.2	2.1	29
Snout length	29.3	26.6	31.7	29.4	0.9	29
Interorbital width	31.5	29.5	40.5	31.6	2.2	29
Upper jaw length	38.9	34.6	42.3	38.7	1.7	29

Mouth opening subterminal, lower jaw shorter than upper jaw. Premaxillary teeth arranged in two series: inner series with 4*(30) aligned penta- to heptacuspid teeth, decreasing gradually in size laterally; outer series with 4*(22) to 5(8) tri- to pentacuspid teeth. Outer series teeth unaligned. Maxillary teeth 2(10), 3*(14), 4(5), or 5(1), tricuspid, rarely uni- or pentacuspid. 4*(30) large dentary teeth pentacuspid, followed by 2(1), 4(2), 5(2), or 6(1) conical to tricuspid teeth decreasing in size posteriorly (Fig. 2). Branchiostegal rays 4(6); first gill arch with 1(1) or 2(5) rakers on hypobranchial, 6(3) or 7(3) rakers on ceratobranchial, 1(6) raker on intermediate cartilage, and 5(2) or 6(4) rakers on epibranchial.

Scales cycloid, *circulii* restricted to anterior portion of scales, with 2-10 divergent *radii* extending to posterior margin. Longitudinal series with 37(12), 38*(15), or 39(2) pored scales [rarely 35(1)], slightly curved anteriorly. Scales series between longitudinal series and dorsal-fin origin 5*(30). Scales series between longitudinal series and pelvic-fin insertion 3(2), 3.5(15), or 4*(12). Predorsal region with 10(5), 11*(22), or 12(3) scales. Postdorsal region with 10(12), 11*(16), or 12(2) scales. Single scale sheath covering base of anal-fin rays with 7(1), 8(2), 9(10), 10(11), 11(3), or 12*(3). Circumpeduncular scales 13(1) or 14*(29).

Dorsal-fin origin at vertical posterior to pelvic-fin insertion. Dorsal-fin rays ii,8*(29) [rarely ii,9(1)]. First unbranched dorsal-fin ray reaching half of length of second unbranched ray. Adipose-fin origin variably at vertical through base of last three branched anal-fin rays. Pectoral fin not reaching pelvic-fin insertion, with i,11(7) or i,12*(22) [rarely i,13(1)] rays. Pelvic fin almost reaching anal-fin origin, with i,7*(30) rays. Anal-fin origin at vertical posterior to end of dorsal-fin base, with iii*(29) or iv(1), 18(1), 19(4), 20*(14), 21(9), or 22(2) rays. Caudal fin i,19,i* (28) [rarely 18(1) or 20(1) rays]. Caudal-fin lobes with similar size, bearing few scales with same body scale size, covering base of rays until first quarter of their length. Dorsal procurrent caudal-fin rays 12(3), 13(2), or 14(1); ventral procurrent caudal-fin rays 10(2), 11(2), or 12(2).

Supraneurals 5(6). Precaudal vertebrae 17(6), caudal vertebrae 18(1), 19(3) or 21(2); total 35(1), 36(3) or 38(2).

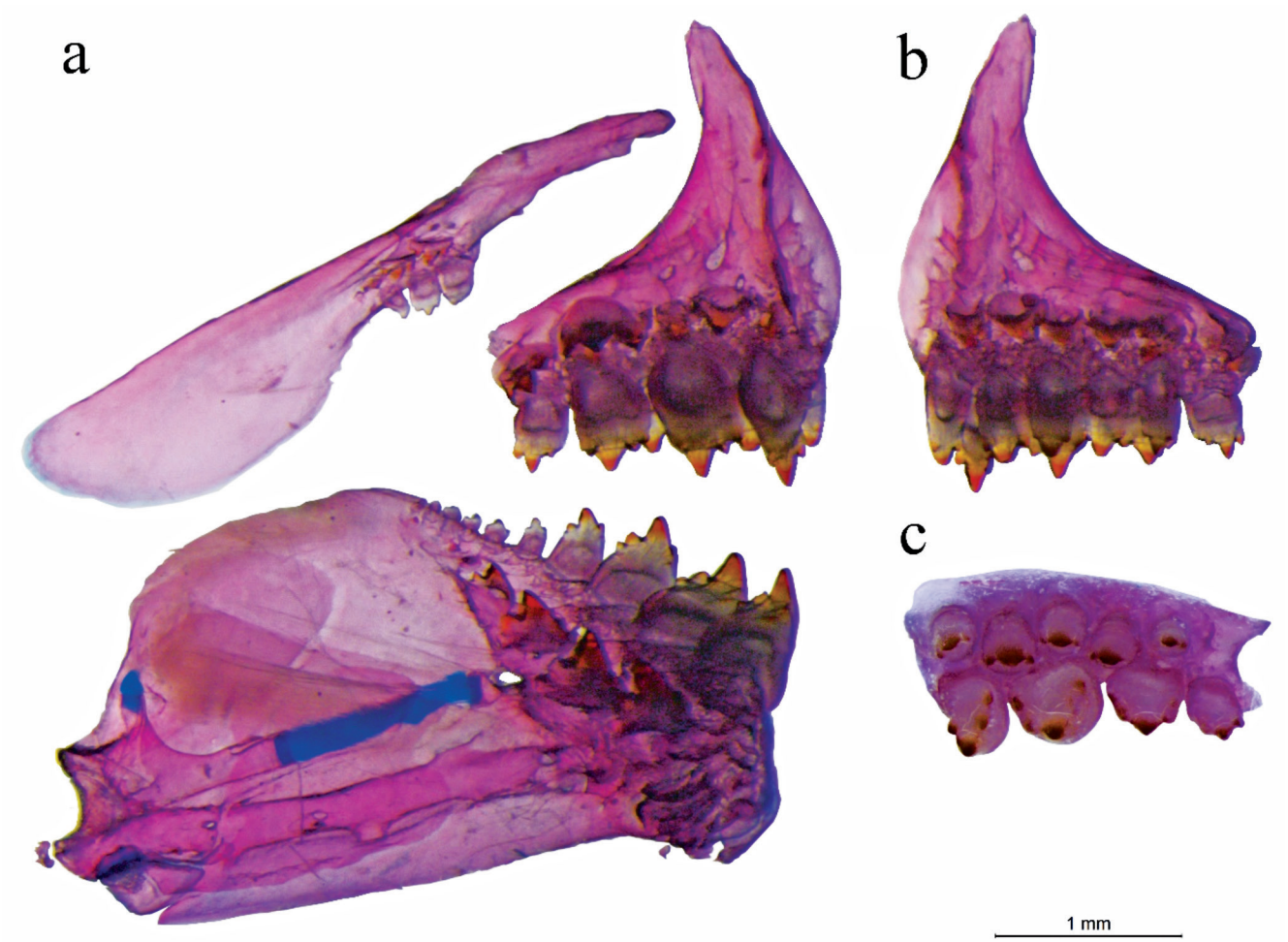

Fig. 2. Left side dentition of *Bryconamericus coeruleus*, paratype, MZUEL 17097, 49.2 mm SL. **a.** Medial view of maxilla, premaxilla and dentary. **b.** Lateral view of premaxilla. **c.** Ventral view of premaxilla showing unaligned outer tooth row with five teeth, and inner tooth row with four teeth.

Coloration in alcohol. Overall body coloration pale yellowish to dusk (Fig. 1), occasionally with intense deposition of guanine over infraorbitals, opercular, and gular areas of head, longitudinal dark lateral stripe and abdominal region. Head following same overall coloration of body, darker over dorsal surface, upper jaw components, orbital margin of infraorbitals and opercular apparatus, due to higher concentration of dark chromatophores. Midline dorsal scales from posterior tip of supraoccipital to origin of caudal-fin upper lobe darker than lateral of body due to higher concentration of dark chromatophores. Scales from all series above lateral line with proximal region darkened, due to high concentration of dark chromatophores contrasting to clear hyaline distal margin; resulting in diffuse reticulated pattern. Humeral spot single, vertically elongate, extending from two scale series dorsal to lateral line to one scale series ventral to lateral line. Humeral spot darker and wider dorsal to lateral line, two scales-wide and slightly rounded in that region. Dark lateral longitudinal stripe anteriorly diffuse, variably from region between humeral spot and vertical through dorsal-fin origin to end of caudal peduncle; approximately one-scale deep. Humeral spot and dark lateral stripe occasionally omitted by intense deposition of guanine. Fins mostly hyaline with few scattered dark chromatophores on interradial membranes and along margins of rays. Anal fin and middle caudal-fin rays more densely pigmented than remaining fins.

Coloration in life. Overall body dark chromatophores distribution on head, body and fins as described above. Dorsal region of eye with dark chromatophores, occasionally with red tone (Fig. 3). Overall color of body olive brown to yellow on dorsal region of body; ventral region of body white to light yellow. Lateral of body with silver stripe extending from head to end of caudal peduncle. Body with higher concentration of guanine over infraorbitals, opercular apparatus and ventral region of body. Dorsal and posterior region of body with iridescent blue to greenish tint. Intense orange to red coloration occasionally over proximal region of dorsal and anal fins, also on mid-length of caudal-fin rays. Base of caudal fin lobes yellowish. Distal tip of dorsal and pelvic fins, anterior margin of anal fin, and dorsal, and ventral margins of caudal fin white in some adult specimens (Fig. 3).

Sexual dimorphism. Secondary sexual dimorphism observed on males with or larger than 40.5 mm SL. Sexually mature males with hooks on pelvic- and anal-fin rays. Hooks distributed over first unbranched to 11th branched anal-fin rays; along the posterolateral margin of lepidotrichia in both unbranched and branched regions of rays; one pair of hooks per ray segment. Hooks usually placed over posterior margin of posterior branches, scarcely over posterior margin of anterior branches. All branched pelvic-fin rays bearing one pair of hook per segment, on medial margin of both lateral and medial ray branches. Hooks rarely present on unbranched pelvic-fin ray. Sexually mature males bearing gill-gland on the first branchial arch, formed by fusion of five to 11 most anterior gill filaments.

Geographic distribution. The new species is found in tributaries of the rio Tibagi, rio Piquiri and rio Ivaí basins, all from the upper rio Paraná basin (Fig. 4).

Fig. 3. Coloration in life of *Bryconamericus coeruleus*, paratype, MZUEL 14979, 57.4 mm SL, tributary of rio Ivaí, upper rio Paraná basin, Paraná State, Brazil. Photo: José L. O. Birindelli.

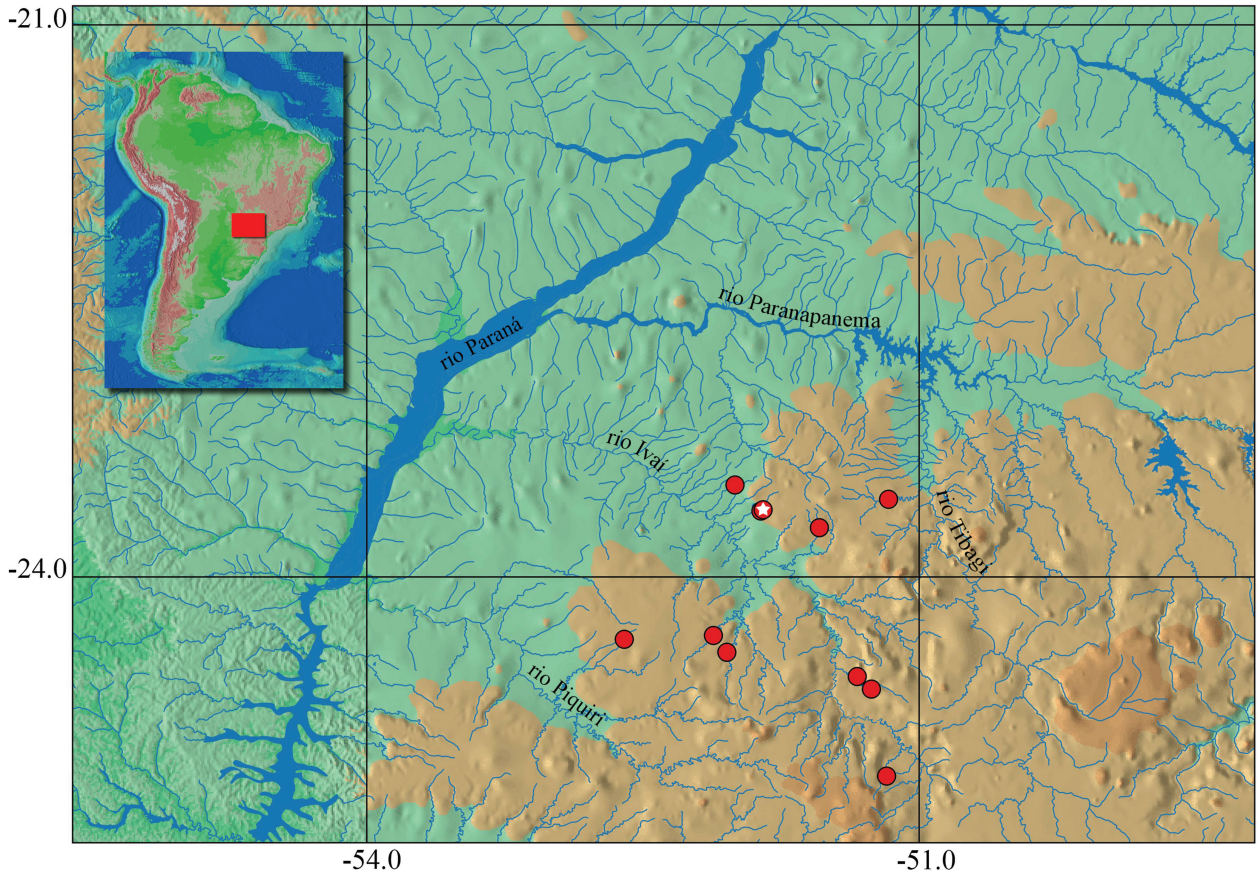

Fig. 4. Northwestern region of the Paraná State showing the geographic distribution of *Bryconamericus coeruleus*. Red dots may represent more than one distribution record. Star indicates the type-locality in the rio Keller, rio Ivaí basin.

Ecological notes. In the rio Taquara basin, *Bryconamericus coeruleus* was collected in small to medium sized streams, with clear water and bottom composed by rocks and sandy areas. Although found in both slow and rapid waters, the species was more frequently found in pools just after rapids, and also close to the vegetation along the river banks. Syntopic species from rio Taquara are listed in Galves *et al*. (2007).

Etymology. The specific name, from the Latin *coeruleus*, is an adjective meaning sky color, in reference to the species bluish iridescence.

Conservation status. Following to the IUCN criteria (IUCN, 2016) and up to date information about *Bryconamericus coeruleus*, the species can be categorized as Least Concern (LC). The known extent of occurrence is restricted to less than 20,000 km^2 (Extent of Occurrence - EOO of approximately 16,592 km^2) in a region with continuing decline of habitat quality due to riparian forest degradation. Furthermore, the species is known to exist at no more than nine locations (rio Barra Grande, rio Formoso, rio Itacolomi, rio Keller, rio Maria Flora, rio Muquilão, rio Piquiri, rio Taquara and rio Ubazinho). However, additional studies on population dynamics might bring more detailed information about the conservation status of the species.

Sympatric species and multivariate morphometric analysis. *Bryconamericus coeruleus* is sympatric to four species of Stervadiinae in its area of occurrence: *B. iheringii*, *B. turiuba*, *Piabina argentea*, and *Piabarchus stramineus*. The geometric morphometrics analysis by mean of CVA evidenced four morphological distinct groups on first (39.1%) and second (30.3%) canonical variates axis (Fig. 5). *Bryconamericus coeruleus* formed a group with *B. iheringii* from Laguna dos Patos basin and from upper rio Paraná. A second grouping was formed by *B. exodon* and *Piabachus stramineus*. *Piabina argentea* from rio São Francisco basin were distinguished from all other species including the *P. argentea* from upper rio Paraná basin, which formed another group with *B. turiuba*, evidencing morphological similarities. These unnatural groupings evidenced convergence of body form among different taxa. In a separate analysis, when comparing *Bryconamericus coeruleus* with *B. iheringii*, the species with most similar body shape among the sympatric species of Stevardiinae, the PCA showed distinction of *Bryconamericus coeruleus* on first axis (Fig. 6).The first axis retained 33.4% of data variation, while the second axis retained 17.7%.

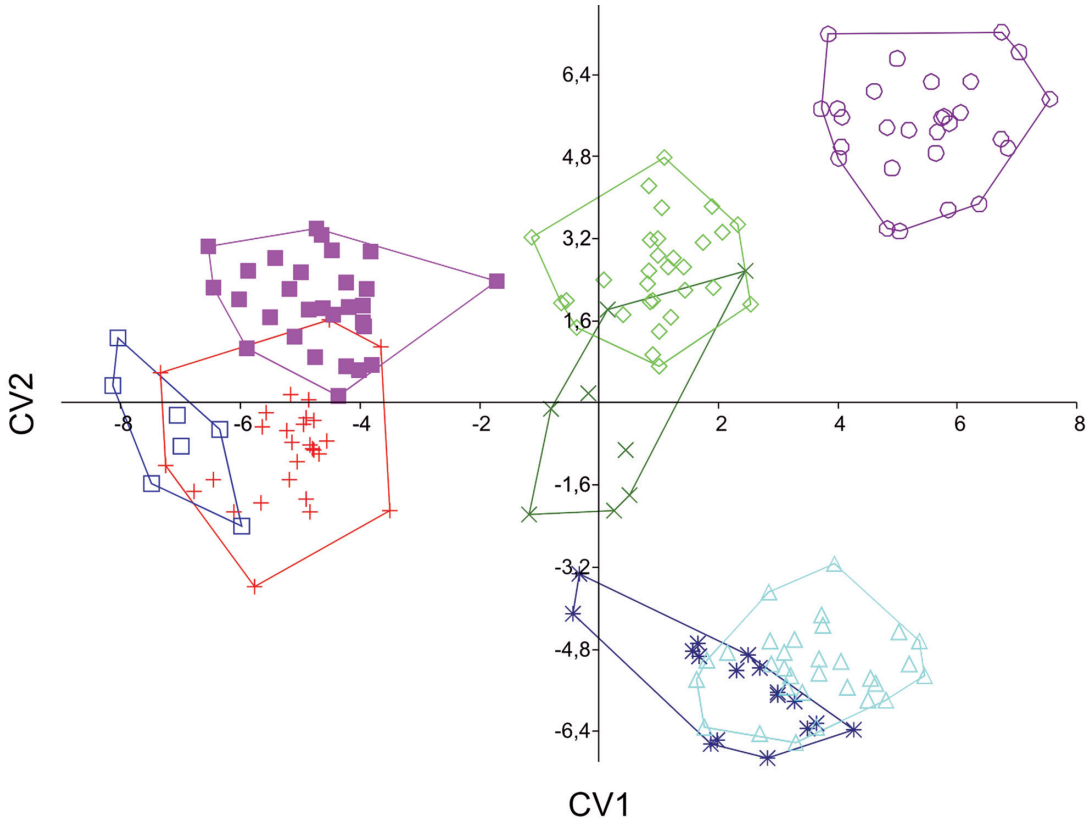

Fig. 5. Scatter diagram of individual scores on canonical variate analysis of combined samples of *Bryconamericus coeruleus* (red crosses, n = 29); *B. exodon* (light blue triangles, n = 31); *B. iheringii* from Laguna dos Patos basin (blue open squares, n = 7); *B. iheringii* upper rio Paraná basin (purple filled squares, n = 29); *B. turiuba* (dark green "x", n = 8); *Piabarchus stramineus* (dark blue asterisks, n = 17); *Piabina argentea* from rio São Francisco basin (purple circles, n = 28); *P. argentea* from upper rio Paraná basin (light green diamonds, n = 30). Wilk´s lambda = 5.96E-06, F = 16.51, P = 2.049E-228.

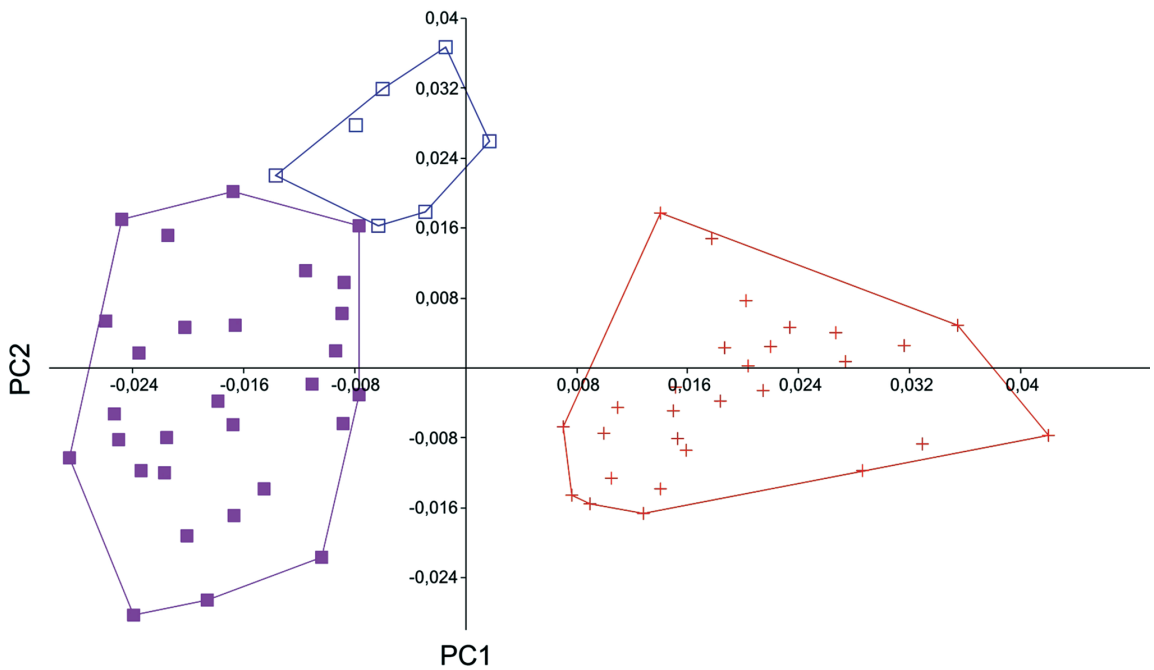

Fig. 6. Scatter diagram of individual scores on PC1 and PC2 of combined samples of *Bryconamericus coeruleus* (red crosses, n = 29), *B. iheringii* from Laguna dos Patos basin (blue open squares, n = 7), and *B. iheringii* from upper rio Paraná basin (purple filled squares, n = 29).

The consensus landmarks of geometric morphometrics evidenced the highest body depth to *Bryconamericus coeruleus* and *B. iheringii*, and the smallest body depth to *Piabina argentea*, that also presented the longest head and longest snout (Fig. 7). The origin of dorsal fin of *Bryconamericus coeruleus* is positioned similarly to *B. iheringii* from upper rio Paraná basin, but the posterior insertion is similar to *B. iheringii* from Laguna dos Patos basin, consequently the new species present a smaller dorsal-fin base length. The location of the pelvic-fin origin in *Bryconamericus coeruleus* is anterior when compared to specimens from both populations of *B. iheringii*. The same is observed in the origin of the anal fin, which is anterior to the vertical line at the end of dorsal-fin base compared to both populations of *B. iheringii* (at same line in *B. iheringii* from upper rio Paraná and posterior in *B. iheringii* from Laguna dos Patos). The body depth is mostly evidenced by the distance from the origin of dorsal fin to the pelvic-fin insertion, and the end of dorsal-fin base to the origin of anal fin. The anal-fin base length in *Bryconamericus coeruleus* is one of the longest among the analyzed species, except to *Piabarchus stramineus*.

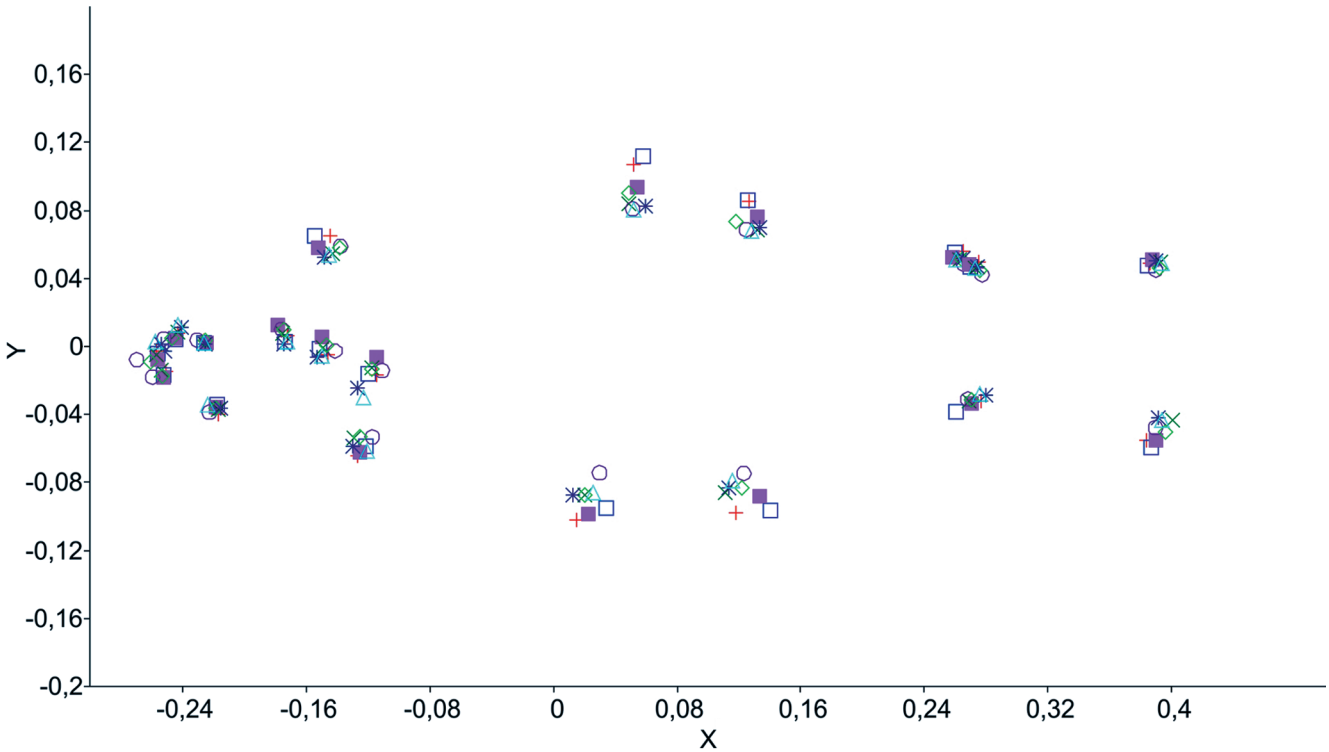

Fig. 7. Plot of consensus landmarks of *Bryconamericus coeruleus* (red crosses, n = 29); *B. iheringii* from Laguna dos Patos basin (blue open squares, n = 7); *B. exodon* (light blue triangles, n = 31); *B. iheringii* from upper rio Paraná basin (purple filled squares, n = 29); *B. turiuba* (dark Green X, n = 8); *Piabarchus stramineus* (dark blue asterisks, n = 17); *Piabina argentea* from São Francisco river basin (purple circles, n = 28); *P. argentea* from upper Paraná river basin (light green diamonds, n = 30).

Discussion

We consider the generic assignment of the new species as *Bryconamericus* as a necessary, and perhaps provisory, attempt facing the unknown phylogenetic position of *B. coeruleus* in Stevardiinae and the recognition of the unnatural condition of *Bryconamericus lato sensu* (Thomaz *et al*., 2015). We also consider this assignment the most conservative approach in behalf of taxonomic stability (Dagosta, Netto-Ferreira, 2015), since *B. coeruleus* possesses the morphological characters that, in combination, traditionally define the genus (Eigenmann, 1927; Géry, 1977; Vari, Siebert, 1990) and still differentiate this grouping from all allied genera in Stevardiinae. Attempts to include this new species in other genera would require deep changes in the definition and current taxonomy of the Stevardiinae.

Bryconamericus, including *B. coeruleus*, can be distinguished from other genera and higher groups in Stevardiinae by the following combination of characters: presence of two tooth series in the premaxilla (except the presence of one tooth series in *B. lethostigmus*, *vs.* triad of teeth in *Creagrutus* Günther, 1864 and *Piabina* Reinhardt, 1867; and one tooth series in *Monotocheirodon* Eigenmann & Pearson, 1924 and *Othonocheirodus* Myers, 1927); teeth in the outer tooth series smaller than teeth in the inner series (except in *B. leptorhynchus*, *B. maromba*, and *B. poi*, *vs*. teeth in outer tooth series larger than teeth in inner series in *Attonitus* Vari & Ortega, 2000 and *Ceratobranchia* Eigenmann, 1914); few maxillary teeth

restricted to anterior portion of the maxilla (*vs*. teeth along the greater part or along the entire margin of the maxilla in *Acrobrycon* Eigenmann & Pearson, 1924 and *Hemibrycon* Günther, 1864); dentary teeth perpendicular to main axis of the dentary (except in *B. leptorhynchus*, *B. maromba*, and *B. poi*, *vs*. dentary teeth anteriorly directed in *Attonitus*, *Ceratobranchia*, and *Rhinobrycon* Myers, 1944), lateral line scales pored (lateral line scales incompletely pored in *Bryconacidnus* Myers, 1929); caudal fin scaleless (*vs.* caudal fin with scales of different sizes and arrangements in Xenurobryconini, Glandulocaudini, Stevardiini, *Argopleura* Eigenmann, 1913, *Diapoma* Cope, 1894 (in part), *Knodus* Eigenmann, 1911, and *Markiana* Eigenmann, 1903); dorsal-fin origin anterior to vertical through anal-fin origin (*vs*. dorsal-fin origin at same vertical or posterior to vertical through anal-fin origin in *Lepidocharax* Ferreira, Menezes & Quagio-Grassiotto, 2011, and *Piabarchus* Myers, 1928 (in part)); and pelvic-fin rays i,7 (*vs*. i,8 in *Eretmobrycon* Fink, 1976, i,6 in *Diapoma* (in part), and ii,5 rays in *Carlastyanax* Géry, 1972).

The presence of two tooth rows in the premaxilla is the generalized condition observed among the Stevardiinae (Mirande, 2010), with derivate reduction to one tooth row (*e.g.*, *Monotocheirodon*, *Othonocheirodus*, and Xenurobryconini (in part)) and/or derived teeth arrangements (*e.g.*, *Creagrutus* and *Piabina*, see Vari, Harold, 2001) in some groups. The majority of *Bryconamericus* is conservative in presenting two tooth rows in the premaxilla (except one tooth row in *B. lethostigmus*), however there is certain variation in the arrangement of teeth in the outer row. Among the species of *Bryconamericus* the outer premaxillary teeth may be arranged in two distinct conditions: aligned in a shallow convex arch, as observed in *B. iheringii* (FCJ pers. obs.), *B. ikaa* and *B. uporas* (Casciotta *et al*., 2002, 2004) or unaligned, as present in *B. coeruleus*. In the latter condition, the misalignment is due to the anterior displacement of either the tooth vertical axis or the tooth base relative to the arch line. Langeani *et al*. (2005) described the outer teeth in *B. turiuba* as unaligned, "having first and last teeth projecting anteroventrally" without a conspicuous displacement of the unaligned tooth base from the arch line, a condition also present in the type-species of the genus *B. exodon* and herein observed in *B. coeruleus* (Fig. 2). Unaligned teeth is present in all analyzed specimens of *B. coeruleus* regardless of body size (range 16.4-71.3 mm SL), and is not likely influenced by ontogenetic factors or tooth replacement process.

Bony hooks emerging from the fin-ray lepidotrichia in sexually mature males is present in only part of the subunits of Characiformes, but it is commonly observed among characids (Malabarba, Weitzman, 2003). The variability in form, placement and size of the bony hooks has been useful for delimitation of species (Lima, Sousa, 2009; Vieira *et al*., 2016) and recognition of natural lineages within the family (Weitzman, Fink, 1985; Malabarba, 1998; Malabarba, Weitzman, 2003; Menezes, Weitzman, 2009; Mirande, 2010). In Stevardiinae, bony hooks are present in representatives of all tribes (*sensu* Thomaz *et al*., 2015), although not present in all species. Additionally to *Byconamericus coeruleus*, the presence of fin hooks has been documented in the original description of 25 species currently included in *Bryconamericus* (*B. agna*, *B. andresoi*, *B. arilepis*, *B. bucayensis*, *B. caldasi*, *B. carlosi*, *B. ecai*, *B. eigenmanni*, *B. exodon*, *B. foncensis*, *B. guizae*, *B. iheringii*, *B. ikaa*, *B. lambari*, *B. macarenae*, *B. macrophthalmus*, *B. oroensis*, *B. patriciae*, *B. pinnavittatus*, *B. rubropictus*, *B. sylvicola*, *B. uporas*, *B. yokiae*, *B. ytu*, and *B. zamorensis*), and their absence confirmed in six species (*B. guyanensis*, *B. mennii*, *B. pectinatus*, *B. pyahu*, *B. singularis*, and *B. turiuba*). This information is still missing for 30 species currently assigned to *Bryconamericus*, and based on the polyphyletic status of the genus a more encompassing approach would be necessary to understand the evolutionary significance of this character in the Diapomini.

Material examined. All from Brazil. Laguna dos Patos basin. *Bryconamericus iheringii*: MZUEL 4848, 9, 52.8-64.0 mm SL (GM). MZUEL 7972, 1, 51.1 mm SL (GM). MZUEL 9375, 10, 36.4-48.9 mm SL (GM). **Rio Iguaçu basin.** *Bryconamericus ikaa*: MZUEL 14172, 2, 56.5-63.4 mm SL. **Rio Paraguai basin.** *Bryconamericus exodon*: MZUEL 12269, 69, 21.1-47.1 mm SL (GM). **Rio São Francisco basin.** *Piabina argentea*: MZUEL 16447, 52, 22.1-48.3 mm SL (GM). **Upper rio Paraná basin.** *Bryconamericus iheringii*: MZUEL 6387, 30, 39.7-59.6 mm SL (GM). *Bryconamericus turiuba* Langeani, Lucena, Pedrini & Tarelho-Pereira, 2005: DZSJRP 4322, 5 paratypes, 42.8-53.8 mm SL. MZUEL 4634, 1, 55.4 mm SL (GM). MZUEL 13173, 21, 15.6-56.5 mm SL (GM). MZUEL 13177, 1, 43.3 mm SL (GM). *Piabarchus stramineus*: MZUEL 4846, 135, 29.8-45.8 mm SL. MZUEL 11397, 23, 36.7-58.2 mm SL (GM). *Piabina argentea*: MZUEL 4627, 43, 36.6-62.7 mm SL (GM). MZUEL 11652, 13, 32.7-55.8 mm SL.

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References

Almirón AE, Azpelicueta MM, Casciotta, JR. A new species of *Bryconamericus* from the arroya Shangay, río Uruguay basin, Argentina (Teleostei: Characiformes: Characidae). Zool Abh. 2004; 54:3-10.

Almirón AE, Casciotta JR, Azpelicueta MM, Cione AL. A new species of *Hypobrycon* (Characiformes: Characidae) from Uruguay basin in Misiones, Argentina. Neotropica. 2001; 47:33-40.

Azpelicueta MM, Almirón AE. A new species of *Bryconamericus* (Characiformes, Characidae) from Paraná basin in Misiones, Argentina. Rev Suisse Zool. 2001; 108(2):275-81.

Azpelicueta MM, Casciotta JR, Almirón AE. *Bryconamericus pyahu* sp. n. (Characiformes, Characidae), a new species from the río Iguazú basin, in Argentina. Rev Suisse Zool. 2003; 110(3):581-89.

Berg C. Communicaciones ictiológicas. IV. Comun Mus Nac B Aires. 1901; 1(9):293-311.

Bizerril CRSF, Auraujo RMC. Description d'une nouvelle espèce du genre *Bryconamericus* (Characidae, Tetragonopterinae) du Brésil oriental. Rev Fr Aquar Herpét. 1992; 19(3):65-68.

Bizerril CRSF, Perez-Neto PR. Redescription of *Bryconamericus microcephalus* (Ribeiro, 1908) and description of a new species of *Bryconamericus* (Characidae, Tetragonopterinae) from eastern Brazil. Comum Mus Ciênc Tecn PUCRS. 1995; 8:13-25.

Boulenger GA. Descriptions of new South-American characinoid fishes. Ann Mag Nat Hist. 1887; 19(111):172-74.

Braga L. Una nueva especie de *Bryconamericus* (Ostariophysi, Characidae) del Río Urugua-i, Argentina. Rev Mus Argent Cienc Nat "Bernardino Rivadavia" Inst Nac Invest Cienc Nat, Ser Zool. 1998; 8(3):21-29.

Casciotta, JR, Almirón AE, Azpelicueta, MM. *Bryconamericus ikaa*, a new species from tributaries of the río Iguazú in Argentina (Characiformes, Characidae). Ichthyol Explor Freshw. 2004; 15(1):61-66.

Casciotta JR, Azpelicueta MM, Almirón AE. *Bryconamericus uporas* sp. n. (Characiformes, Characidae), a new species from the río Uruguay basin, in Argentina. Rev Suisse Zool. 2002; 109(1):155-65.

Cope ED. On the fishes of the Ambyiacu River. Proc Acad Nat Sci Philadelphia. 1872; 23:250-94.

Cope ED. On three new genera of Characinidae. Am Nat. 1894; 28(325):67.

Cope ED. Synopsis of the fishes of the Peruvian Amazon, obtained by Professor Orton during his expeditions of 1873 and 1877. Proc Am Philos Soc. 1878; 17(101):673-701.

Dagosta FCP, Netto-Ferreira AL. New species of *Bryconamericus* Eigenmann (Characiformes: Characidae) from the rio Teles Pires, rio Tapajós basin, central Brazil. Zootaxa. 2015; 3911(3):433-42.

Dahl G. New fresh-water fishes from western Colombia. Caldasia. 1960; 8(39):451-84.

Eigenmann CH. Descriptions of two new tetragonopterid fishes in the British Museum. Ann Mag Nat Hist. 1911; 7(38):215-17.

Eigenmann CH. New genera of South American fresh-water fishes, and new names for old genera. Smithson Misc Collect. 1903; 45:144-48.

Eigenmann CH. Preliminary descriptions of new genera and species of tetragonopterid characins. (Zoölogical Results of the Thayer Brazilian expedition.). Bull Mus Comp Zool. 1908; 52(6):91-106.

Eigenmann CH. Reports on the expedition to British Guiana of the Indiana University and the Carnegie Museum, 1908. Report no. 1. Some new genera and species of fishes from British Guiana. Ann Carnegie Mus. 1909; 6(1):4-54.

Eigenmann CH. Some results from an ichthyological reconnaissance of Colombia, South America. Part II. [Includes 5 separate subtitles]. (Contrib. Zool. Lab. Ind. Univ. No. 131). Indiana Univ Stud. 1913; 18:1-32.

Eigenmann CH. The American Characidae. Mem Mus Comp Zool. 1927; 43(pt 4):311-428.

Eigenmann CH, Allen WR. Fishes of Western South America. I. The intercordilleran and Amazonian lowlands of Peru. II.- The high pampas of Peru, Bolivia, and northern Chile. With a revision of the Peruvian Gymnotidae, and of the genus *Orestias*. Kentucky: University of Kentucky; 1942.

Eigenmann CH, Henn AW. On new species of fishes from Colombia, Ecuador, and Brazil. (Contrib. Zool. Lab. Ind. Univ. No. 140). Indiana Univ Stud. 1914; 24:231-34.

Eigenmann CH, Henn AW, Wilson C. New fishes from western Colombia, Ecuador, and Peru. (Contrib. Zool. Lab. Ind. Univ. No. 133.). Indiana Univ Stud. 1914; 19:1-15.

Eigenmann CH, McAtee WL, Ward DP. On further collections of fishes from Paraguay. Ann Carnegie Mus. 1907; 4(2):110-157.

Eschmeyer WN, Fricke R, van der Laan R, editors. Catalog of fishes: genera, species, references [Internet]. San Francisco: California Academy of Science; 2017 [updated 2017 Apr 28; cited 2017 May 29]. Available from: http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp

Evermann BW, Kendall WC. Notes on a collection of fishes from Argentina, South America, with descriptions of three new species. Proc U S Natl Mus. 1906; 31(1482):67-108.

Ferreira KM, Menezes NA, Quagio-Grassiotto I. A new genus and two new species of Stevardiinae (Characiformes: Characidae) with a hypothesis on their relationships based on morphological and histological data. Neotrop Ichthyol. 2011; 9(2):281-98.

Fink WL. A new genus and species of characid fish from the Bayano River basin, Panamá (Pisces: Cypriniformes). Proc Biol Soc Wash. 1976; 88:331-44.

Fowler HW. A collection of fresh-water fishes obtained in eastern Brazil by Dr. Rodolpho von Ihering. Proc Acad Nat Sci Philadelphia. 1941; 93:123-99.

Fowler HW. Zoological results of the second Bolivian expedition for the Academy of Natural Sciences of Philadelphia, 1936-1937. Part I.--The fishes. Proc Acad Nat Sci Philadelphia. 1940; 92:43-103.

Frota A, Deprá GC, Petenucci LM, Graça WJ. Inventory of the fish fauna from Ivaí River basin, Paraná State, Brazil. Biota Neotrop [e20150151]. 2016; 16(3). Available from: http://dx.doi.org/10.1590/1676-0611-BN-2015-0151

Galves W, Shibatta AO, Jerep FC. Fish, Taquara river basin, northern of the state of Paraná, Brazil. Check List. 2007; 3(3):253-59.

Géry J. Characoids of the world. Neptune City: TFH Publications; 1977.

Géry J. Preliminary description of seven new species and two new genera of characoid fishes from the Upper Rio Meta in Colombia. Tropical Fish Hobbyist. 1964; 13(4):25-32, 41-48.

Géry J. Contribution à l'étude des poissons characoïdes de l'Équateur. Avec une révision du genre *Pseudochalceus* et la description d'une nouveaux genre endémique du Rio Cauca en Colombie. Acta Humboldtiana (Series Geologica, Palaeontologica et Biologica Nr. 2). 1972; 2:1-110.

Gomes AL. A small collection of fishes from Rio Grande do Sul, Brazil. Misc Pubs Univ Michigan Mus Zool. 1947; 67:1-39.

Günther A. Catalogue of the fishes in the British Museum. Catalogue of the Physostomi, containing the families Siluridae, Characinidae, Haplochitonidae, Sternoptychidae, Scopelidae, Stomiatidae in the collection of the British Museum. 1864; 5:1-455.

Hammer Ř, Harper DAT, Ryan PD. PAST: Paleontological statistics software package for education and data analysis. Palaeontol Electronica. 2001; 4(1):1-9.

Harold AS, Vari RP. Systematics of the trans-Andean species of *Creagrutus* (Ostariophysi: Characiformes: Characidae). Smithson Contr Zool. 1994; 551:1-31.

Hildebrand SF. A new catalogue of the fresh-water fishes of Panama. Field Mus Nat Hist Publ, Zoo Ser. 1938; 22(4):219-359.

International Union for Conservation of Nature (IUCN). Standards and Petitions Subcommittee. Guidelines for using the IUCN Red List Categories and Criteria. Version 12 [Internet]. 2016 [updated 2016 Feb]. Available from: http://www.iucnredlist.org/documents/ RedListGuidelines.pdf/

Javonillo R, Malabarba LR, Weitzman SH, Burns JR. Relationships among major lineages of characid fishes (Teleostei: Ostariophysi: Characiformes), based on molecular sequence data. Mol Phylogenet Evol. 2010; 54(2):498-511.

Klingenberg CP. Morphometrics and the role of the phenotype in studies of the evolution of developmental mechanisms. Gene. 2002; 287(1-2):3-10.

Langeani F, Castro RMC, Oyakawa OT, Shibatta OA, Pavanelli CS, Casatti L. Ichthyofauna diversity of the upper rio Paraná: present composition and future perspectives. Biota Neotrop. 2007; 7(3):181-97.

Langeani F, Lucena ZMS, Pedrini JL, Tarelho-Pereira FJ. *Bryconamericus turiuba*, a new species form the upper Rio Paraná system (Ostariophysi: Characiformes). Copeia. 2005; 2005(2):386-92.

Lima FCT, Sousa LM. A new species of *Hemigrammus* from the upper rio Negro basin, Brazil, with comments on the presence and arrangement of anal-fin hooks in *Hemigrammus* and related genera (Ostariophysi: Characiformes: Characidae). Aqua Int J Ichthyol. 2009; 15(3):153-68.

Malabarba LR. Monophyly of the Cheirodontinae, characters and major clades (Ostariophysi, Characidae). In: Malabarba LR, Reis RE, Vari RP, Lucena ZMS, Lucena CAS, editors. Phylogeny and classification of Neotropical fishes. Porto Alegre: Edipucrs: 1998. p.193-234.

Malabarba LR, Kindel A. A new species of the genus *Bryconamericus* Eigenmann, 1907 from southern Brazil (Ostariophysi: Characidae). Proc Biol Soc Wash. 1995; 108(4):679-86.

Malabarba LR, Weitzman SH. Description of a new genus with six new species from Southern Brazil, Uruguay and Argentina, with a discussion of a putative characid clade (Teleostei: Characiformes: Characidae). Comum Mus Ciênc Tecn PUCRS. 2003; 16(1):67-151.

Malabarba MCSL, Malabarba LR. *Hypobrycon maromba*, a new genus and species of characiform fish from the upper rio Uruguai, Brazil (Ostariophysi: Characidae). Ichthyol Explor Freshw. 1994; 5(1):19-24.

Menezes NA, Weitzman SH. Systematics of the Neotropical fish subfamily Glandulocaudinae (Teleostei: Characiformes: Characidae). Neotrop Ichthyol. 2009; 7(3):295-370.

Miquelarena AM, Protogino LC, Filiberto R, López HL. A new species of *Bryconamericus* (Characiformes: Characidae) from the Cuña-Pirú creek in north-eastern Argentina, with comments on accompanying fishes. Aqua Int J Ichthyol. 2002; 6(2):69-82.

Miranda Ribeiro A. Peixes da Ribeira. Resultados de excursão do Sr. Ricardo Krone, membro correspondente do Museu Nacional do Rio de Janeiro. Kosmos, Rio de Janeiro. 1908; 5(2):5.

Mirande JM. Phylogeny of the family Characidae (Teleostei: Characiformes): from characters to taxonomy. Neotrop Ichthyol. 2010, 8(3):385-568.

Mirande JM, Aguilera G, Azpelicueta MM. A new genus and species of small characid (Ostariophysi, Characidae) from the upper río Bermejo basin, northwestern Argentina. Rev Suisse Zool. 2004; 111(4):715-28.

Mirande JM, Aguilera G, Azpelicueta M. de las M. Nomenclatural note on the genus *Nans* (Ostariophysi, Characidae). Rev Suisse Zool. 2006; 113(2):305.

Myers GS. Descriptions of new South American fresh-water fishes collected by Dr. Carl Ternetz. Bull Mus Comp Zool. 1927; 68(3):107-35.

Myers GS. New fresh-water fishes from Peru, Venezuela, and Brazil. Ann Mag Nat Hist. (Series 10). 1928; 2(7):83-90.

Myers GS. *Rhinobrycon negrensis*, a new genus and species of characid fishes from the Rio Negro, Brazil. Proc Calif Acad Sci (Series 4). 1944; 23(39):587-90.

Oliveira C, Avelino GS, Abe KT, Mariguela TC, Benine RC, Ortí G, Vari RP, Castro RMC. Phylogenetic relationships within the speciose family Characidae (Teleostei: Ostariophysi: Characiformes) based on multilocus analysis and extensive ingroup sampling. BMC Evol Biol. 2011; 11(1):1-25.

Pearson NE. The fishes of the eastern slope of the Andes. I. The fishes of the Rio Beni basin, Bolivia, collected by the Mulford expedition. Indiana Univ Stud. 1924; 11(64):1-83.

Portela-Castro ALB, Julio Jr. HF, dos Santos ICM, Pavanelli CS. Ocurrence of two cytotypes in *Bryconamericus* aff. *iheringii* (Characidae): Karyotype analysis by C- and G-banding and replication bands. Genetica. 2008; 133:113-18.

Reinhardt JT. Om trende, formeentligt ubeskrevne fisk af characinernes eller Karpelaxenes familie. Oversigt over det Kongelige Danske Videnskabernes Selskabs Forhandlinger og dets Medlemmers Arbeider. Copenhagen. 1867; 1866:49-68.

Rohlf FJ. The tps series of software. Hystrix. 2015; 26:1-4.

Román-Valencia C. Descripción de tres nuevas especies de *Bryconamericus* (Pisces: Ostariophysi: Characidae) de Colombia. Mem Fund La Salle Cien Nat. 2003a; 155(2001):31-49.

Román-Valencia C. Descripción de una nueva especie de *Bryconamericus* (Ostariophysi, Characidae) del alto río Suárez, cuenca del Magdalena, Colombia. Mus Reg Sci Nat Boll (Torino). 2001; 18(2):469-76.

Román-Valencia C. Description of a new species of *Bryconamericus* (Teleostei: Characidae) from the Amazon. Boll Mus Regionale Sci Nat Torino. 2003b; 20(2):477-86.

Román-Valencia C. Description of a new species of *Bryconamericus* (Teleostei, Characidae) from the basin of the Golfo de Paria, northeastern Venezuela. Rev Mus Argent Cienc Nat. 2002; 4(2):209-14.

Román-Valencia C. Sinopsis of the species of the genus *Bryconamericus* (Teleostei: Characidae) of Venezuela and north of Ecuador, with the description of a new species for Venezuela. Mem Fund La Salle Cien Nat. 2005; 65(163):27-52.

Román-Valencia C. Three new species of the genus *Bryconamericus* (Teleostei: Characidae) from Venezuela. Dahlia. 2003c; 6:7-15.

Román-Valencia C. Tres nuevas especies de *Bryconamericus* (Ostariophysi: Characidae) de Colombia y diagnóstico del género. Rev Biol Trop. 2000; 48(2/3):449-64.

Román-Valencia C. Una nueva especie de *Bryconamericus* (Pisces: Ostariophysi: Characidae) para el nororiente de Venezuela. Mem Fund La Salle Cien Nat. 2003d; 155(2001):21-30.

Román-Valencia C, García-Alzate C, Ruiz-CC. RI, Taphorn DC. *Bryconamericus macarenae* n. sp. (Characiformes, Characidae) from the Güejar River, Macarena mountain range, Colombia. Anim Biodivers Conserv. 2010; 33(2):195-203.

Román-Valencia C, Ruiz-CC. RI, Taphorn DC, García-Alzate C. A new endemic species of *Bryconamericus* (Characiformes, Characidae) from the Middle Cauca River Basin, Colombia. Anim Biodivers Conserv. 2014; 37(2):107-14.

Román-Valencia C, Ruiz-CC. RI, Taphorn DC, García-Alzate C. Three new species of *Bryconamericus* (Characiformes, Characidae), with keys for species from Ecuador and a discussion on the validity of the genus *Knodus*. Anim Biodivers Conserv. 2013; 36(1):123-39.

Román-Valencia C, Taphorn DC, Ruiz-CC. RI. Two new *Bryconamericus*: *B. cinarucoense* n. sp. and *B. singularis* n. sp. (Characiformes, Characidae) from the Cinaruco River, Orinoco Basin, with keys to all Venezuelan Species. Anim Biodivers Conserv. 2008; 31(1):15-27.

Román-Valencia C, Vanegas-Ríos JA, Ruiz-CC. RI. Especie nueva del género *Bryconamericus* (Teleostei: Characidae) del río Fonce, sistema río Magdalena, Colombia. Rev Mex Biodivers. 2009; 80:455-63.

Román-Valencia C, Vanegas-Ríos JA, Ruiz-CC RI. Una nueva especie de pez del género *Bryconamericus* (Ostariophysi: Characidae) del río Magdalena, con una clave para especies de Colombia. Rev Biol Trop. 2008; 56(4):1749-63.

Sabaj Pérez MH. Standard symbolic codes for institutional resource collections in herpetology and ichthyology Version 6.5. Lawrence: American Society of Ichthyologists and Herpetologists; 2014 [updated 2016 Aug 16; cited 2016 Dec 28]. Availabe from: http://www.asih.org/resources/standard-symbolic-codes-institutional-resource-collections-herpetology-ichthyology

Schultz LP. The fishes of the family Characinidae from Venezuela, with descriptions of seventeen new forms. Proc U S Natl Mus. 1944; 95(3181):235-367.

Silva JFP. Two new species of *Bryconamericus* Eigenmann (Characiformes: Characidae) from southern Brazil. Neotrop Ichthyol. 2004; 2(2):55-60.

Silva JFP, Malabarba LR. Description of a new species of *Hypobrycon* from the upper Rio Uruguai, Brazil (Ostariophysi: Characidae). Comum Mus Ciênc Tecn PUCRS. 1996; 9:45-53.

Taylor WR, van Dyke GC. Revised procedures for staining and cleaning small fishes and other vertebrates for bone and cartilage study. Cybium. 1985; 9:107-119.

Thomaz AT, Arcila D, Ortí G, Malabarba LR. Molecular phylogeny of the subfamily Stevardiinae Gill, 1858 (Characiformes: Characidae): classification and the evolution of reproductive traits. BMC Evolutionary Biology. 2015; 15:146-71.

Vari RP, Géry J. *Cheirodon ortegai*, a new markedly sexually dimorphic cheirodontine (Pisces: Characoidei) from the Rio Ucayali of Peru. Proc Biol Soc Wash. 1980; 93(1):75-92.

Vari RP, Harold AS. Phylogenetic study of the Neotropical fish genera *Creagrutus* Günther and *Piabina* Reinhardt (Teleostei: Ostariophysi: Characiformes), with a revision of the Cis-Andean Species. Smithson Contrib Zool. 2001; 613:1-239.

Vari RP, Ortega H. *Attonitus*, a new genus of sexually dimorphic characiforms (Ostariophysi: Characidae) from western Amazonia; a phylogenetic definition and description of three new species. Ichthyol Explor Freshw. 2000; 11(2):113-40.

Vari RP, Siebert DJ. A new, unusually sexually dimorphic species of *Bryconamericus* (Pisces: Ostariophysi: Characidae) from the Peruvian Amazon. Proc Biol Soc Wash. 1990; 103(3):516-24.

Vieira CS, Bartolette R., Brito MFG. Comparative morphology of bony hooks of the anal and pelvic fin in six neotropical characid fishes (Ostariophysi: Characiformes). Zool Anz. 2016; 260(2016):57-62.

Weitzman SH, Fink SV. Xenurobryconin phylogeny and putative pheromone pumps in Glandulocaudinae fishes (Teleostei: Characidae). Smithson Contrib Zool. 1985; 421:1-119.

Weitzman SH, Malabarba LR. Systematics of *Spintherobolus* (Teleostei: Characidae: Cheirodontinae) from eastern Brazil. Ichthyol Explor Freshw. 1999; 10:1-44.

Zarske A, Le Bail P-Y, Géry J. New and poorly known characiform fishes (Teleostei: Characiformes: Characidae) from French Guyana. A new tetra of the genus *Bryconamericus*. Vertebr Zool. 2010; 60(1):3-10.

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