Bryconamericus macarenae n. sp. (Characiformes, Characidae) from the Güejar River, Macarena mountain range, Colombia

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Abstract

Bryconamericus macarenae *n. sp. (Characiformes, Characidae) from the Güejar River, Macarena mountain range, Colombia*.— Based on 174 specimens, using morphometric, meristic and osteological characters, we describe a new species: *Bryconamericus macarenae* from the Güejar River in La Macarena mountain range, Orinoco Basin, Colombia. It differs from congeners in having: an incomplete lateral line (*vs.* complete lateral line in all except *B. delta*) and fewer and less conspicuous perforations in the latero–sensorial canal of the extrascapular bone (*vs.* conspicuous latero–sensorial canal perforation). It has four or fewer unbranched anal-fin rays (*vs.* five or more unbranched anal–fin rays), a short, thickened extrascapular bone without projections from the posterior margin, or with only a reduced apophysis (*vs*. extrascapular long, irregular, bony projections on its margins, and with a large undulated apophysis on its posterior margin). It also differs in live coloration. A key of species of *Bryconamericus* known from the Orinoco Basin and the Catatumbo River is included.

Key words: *Bryconamericus macarenae* n. sp., Tropical, River, Freshwater, Osteology, Teeth.

Resumen

Bryconamericus macarenae *sp. n. (Characiformes, Characidae) del río Güejar, sierra de La Macarana, Colombia*.— Basándonos en 174 especímenes y utilizando características morfométricas, merísticas y osteológicas describimos una nueva especie: *Bryconamericus macarenae*, del río Güejar en la cordillera de La Macarena, cuenca del Orinoco, Colombia. Difiere de sus congéneres por tener: la línea lateral incompleta (comparado con línea lateral completa en todos excepto *B. delta*) y un número menor de perforaciones, y menos conspicuas, en el canal laterosensorial del hueso extraescapular (comparado con una perforación del canal laterosensorial conspicua). Posee cuatro o menos radios no ramificados en las aletas anales (comparado con cinco o más radios no ramificados de las aletas anales), un hueso extraescapular corto y engrosado sin proyecciones desde su margen posterior, o únicamente con una pequeña apófisis (comparado con proyecciones óseas extraescapulares irregulares y largas en sus márgenes, y una gran apófisis ondulada en su margen posterior). También difiere en su coloración en vivo. Se incluye una clave dicotómica de clasificación de las especies de *Bryconamericus*, pobladoras de la cuenca del Orinoco y del río Catatumbo.

Palabras clave: *Bryconamericus macarenae* sp. n., Tropical, Río, Agua dulce, Osteología, Dientes.

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Introduction

Dahl (1960, 1961) gave an early overview of the La Macarena icthyofauna and described several new taxa based on the first modern ichthyological exploration of the region which took place in the 1950s. Myers & Weitzman (1960) described *Brycon whitei*, and Thomerson & Taphorn (1993) described *Rivulus corpulentus* from the same region. Useche et al. (1993) and Bernal Ramirez & Cala (1997) reported on aspects of the biology of *Brycon siebenthalae* and *Mylossoma duriventre* from a tributary of the Rio Guayabero. All these studies, however, were mainly concerned with fishes from the northwestern or southeastern portions of the La Macarena mountain range. Reports on the fishes of the Guapaya and Blanco rivers northeast of the Macarena mountains were lacking until the description of *Creagrutus maculosus* (Román–Valencia et al., 2010).

We recognize twenty–two Colombian species of *Bryconamericus* as valid (Román–Valencia, 1998, 2000, 2003a, 2003b, 2003c, 2005; Román–Valencia & Vanegas–Rios, 2009; Román–Valencia et al., 2008a, 20008b, 2009a, 2009b, Román–Valencia et al., submitted). *Bryconamericus peruanus* was shown to be erroneously recorded from Colombia (Román–Valencia et al., submitted). Five species are known from the Orinoco Basin and the adjacent Lake Maracaibo drainage in Colombia: *B. alpha*, *B. cismontanus*, *B. cristiani, B. loisae*, and *B. meridae*; the remaining 17 species of *Bryconamericus* are distributed among the rivers of the Pacific, Caribbean–Guajira, Cauca–Magdalena and Amazon drainages (Román–Valencia, 1998, 2003a, 2003b, 2005; Román–Valencia et al., 2008a, 2008b; Román–Valencia & Vanegas–Rios, 2009). The purpose of this paper is to describe a new species of *Bryconamericus* from near La Macarena mountain in Colombia.

Material and methods

Measurements were taken with digital calipers, recorded to tenths of millimeters and expressed as percentages of standard or head length (table 1). Counts were made using a stereo microscope with a dissection needle to extend the fins. Counts and measurements were taken from the left side of specimens when possible and in general they were taken according to guidelines in Vari & Siebert (1990). An asterisk indicates values for the holotype.

Osteology was studied using cleared and stained specimens (cs) prepared according to techniques outlined in Taylor & Van Dyke (1985) and Song & Parenti (1995); and fin counts were based on cleared and stained individuals due to unavailability of an x–ray facility.

Osteological nomenclature follows Weitzman (1962), Vari (1995), and Ruiz–C. & Román–Valencia (2006). See Román–Valencia 2002, 2003a, 2003b, 2003c, 2005; Román–Valencia et al., 2008a, 2008b, 2009a, 2009b, 2009c for additional lists of comparative material examined of *Bryconamericus*.

Specimens are deposited in The Auburn University Museum Fish Collection, Auburn, Alabama (AUM); the Coleção de Peixes, Departamento de Zoologia e Botânica, Instituto de Biociencias, Letras e Ciências Exactas, Universidade Estadual Paulista–UNESP, Brasil (DZSJRP); the Ichthyology Laboratory at the Universidad del Quindío, Armenia, Colombia (IUQ); the Museum of Zoology, Department of Biological Sciences, Escuela Politécnica Nacional, Quito, Ecuador (MEPN); and the Collection of Ichthyology, Department of Biology, Pontificia Universidad Javeriana, Bogotá, Colombia (MPUJ). We use the abbreviation "m a.s.l." for meters above sea level.

The 21 morphometric characters analyzed in this study (table 1) were evaluated by principal component analysis (PCA) using the Burnaby method to eliminate the influence of size with the PAST program, session 1.81 for Windows (Hammer et. al., 2008).

Examined material

Bryconamericus andresoi (see Román–Valencia, 2003c). *B. alpha*, *B. arilepis*, *B. cismontanus*, *B. heteresthes*, *B. iheringi*, *B. lambari*, *B. lassorum*, *B. loisae*, *B. macrophthalmus*, *B. meridae*, *B. multiradiatus*, *B. orinocoense*, *B. orteguasae*, *B. pachacuti*, *B. pectinatus*, *B. phoenicopterus*, *B. plutarcoi*, *B. subtilisform, B. thomasi, B. tolimae*, *B. turiuba*, *B. yokiae* and *Bryconamericus* sp. (see Román–Valencia et al., 2008b). *B. bayano* (see Román–Valencia, 2002). *B. caucanus* (see Román–Valencia et al., 2009b). *B. cristiani* (see Román–Valencia, 1998). *B. dahli* (see Román–Valencia, 2003a) MEPN 8–4074, 14, Ecuador, Esmeraldas, Pistolasa wetland, half hour downstream of Vargas Torres. MEPN 8–4074, 1 cs, 54.5 SL, Ecuador, Esmeraldas, Pistolasa wetland, half hour downstream of Vargas Torres. *Bryconamericus delta,* not *B. gamma* (see Román–Valencia, 2005, 2003a, 2003b; Román–Valencia et al., 2008b). *B. emperador* (see Román–Valencia, 2002). *B. exodon*: DZSJRP 9088, 3 cs, 28.2–34.6 SL. DZSJRP 9088, 12. *B. foncensis* (see Román–Valencia, 2009a, 2009b). *B. galvisi* (see Román–Valencia, 2000). *B. gonzalezoi* (see paratypes, Román–Valencia, 2002). *B. guaytarae* (see Román–Valencia, 2003c). *B. guizae* (see Román–Valencia, 2003c). *B. huilae* (see Román–Valencia, 2003c). *B. ichoensis* (see Román–Valencia, 2000). *B. peruanus* (see Román–Valencia et al., 2008b; Román–Valencia et al., 2009c). *B. scleroparius* (see Román–Valencia 2002; Román–Valencia et al., 2008b). *B. singularis* (see Román–Valencia et al., 2008a, 2008b). *B. terrabensis* (see Román–Valencia, 2002; Román–Valencia et al., 2008b). *B. carlosi* (see Román–Valencia, 2003b; Román–Valencia, 2008b). *B. charalae* (see Román–Valencia, 2005; Román –Valencia et al., 2008b. *B. cinarucoense (*see Román–Valencia et al., 2008a, 2008b). *B. cristiani* Román–Valencia (see Román–Valencia, 1998). *B. hypopterus (*see Román–Valencia, 2003a). *B. terrabensis* (see Román–Valencia, 2002) IUQ 874, 2 cs, 48.0–69.0 SL. IUQ 1586, 2cs, 45.0–48.3 SL. *B. scleroparius*: IUQ 370, IUQ 371, IUQ 372, IUQ 373, IUQ 374, IUQ 459, IUQ 741, 4cs. *B. alpha (*see Román–Valencia, 2003a, 2003b, 2003c), MPUJ 3754. *B. cismontanus (*see Román–Valencia, 2003a). *B. loisae* (see Román–Valencia, 2003a).

Table 1. Morphometry of *Bryconamericus macarenae* n. sp. (n = 171; standard and total length in mm; averages in parentheses).

Tabla 1. Morfometría de Bryconamericus macarenae *sp. n. (n = 171; las longitudes total y estándar se dan en mm; los promedios entre paréntesis).*

	Paratypes	Holotype
Standard length, SL	12.3–43.9 (26.3)	36.2
Total length, TL	23.5–41.1 (30.5)	40.9
Percentages of SL		
Body depth	20.4–29.1 (24.9)	26.0
Snout–dorsal fin distance	49.5–56.2 (52.9)	51.3
Snout–pectoral fin distance	19.8–28.9 (24.9)	26.6
Snout–pelvic fin distance	38.1–58.4 (45.2)	43.4
Dorsal–pectoral fin distance	31.8–42.4 (37.2)	37.8
Snout–anal fin distance	42.6–60.3 (56.8)	56.7
Dorsal fin–hypural distance	45.5–53.8 (49.8)	48.3
Dorsal–anal fin distance	22.0–30.7 (26.5)	26.8
Dorsal–fin length	13.3–27.2 (23.0)	22.1
Pectoral–fin length	14.2–26.6 (20.6)	20.1
Pelvic–fin length	9.7–18.6 (13.8)	14.2
Anal–fin length	13.9–22.3 (17.9)	14.3
Caudal peduncle depth	6.2–11.0 (9.0)	9.8
Caudal peduncle length	7.6–17.9 (11.4)	10.4
Head length	20.7–26.2 (23.6)	23.8
Percentages of HL		
Snout length	18.3–29.6 (23.5)	24.9
Orbital diameter	38.2–59.5 (46.2)	48.6
Postorbital distance	26.5–40.7 (32.1)	31.5
Maxilla length	13.1–41.6 (24.2)	20
Interorbital distance	25.3–45.3 (36.2)	30.6
Upper jaw distance	23.2–37.1 (29.5)	27.7

Bryconamericus macarenae n. sp. (tables 1–2, figs. 1–2)

Holotype
IUQ 2448, male, 36.2 SL, Colombia, Departamento Meta, Vista Hermosa, La Palestina village, Orinoco River Basin, Blanco River drainage, Pringamosal Creek, 500 m from La Palestina School, 3º 03' 15'' N, 73º 49' 54'' W, 282 m a.s.l., 9 I 2009.

Paratypes
All from Colombia, Orinoco River Basin, Guapaya River drainage, Departamento Meta, Vista Hermosa municipality: AUM 50297, 4, 25.9–35.3 SL, La Palestina village, Blanco River drainage, Pringamosal Creek, 500 m north of La Palestina School, 3º03'15"N, 73º 49' 54" W, 282 m a.s.l., 9 I 2009; IUQ 2271, 2, 20.1–33.2 SL, Gúio creek, Palestina–Albania road, 3º 04' 43" N, 73º 48' 25" W, 256 m a.s.l.,10 VII 2008; IUQ 2326, 7, 22.1–33.6 SL, 1 km north from Guapaya creek on road to Playa Rica, 3º 05' 04" N, 73º 50' 39" W, 204 m a.s.l., 9 VII 2008; IUQ 2435, 12, 12.3–40.7 SL, creek 1 km north of Las Brisas, 3º 02' 55" N, 73º 49' 10" W, 278 m a.s.l., 10 VII 2008; IUQ 2437, 2 cs, 31.6–32.1 SL, creek 1 km north of Las Brisas, 3º 02' 55" N, 73º 49' 10" W, 278 m a.s.l., 10 VII 2008; IUQ 2441, 5, 32.4–33.8 SL, Maraco creek on Palestina–Albania road, 3º 05' 07" N, 73º 48' 49" W, 290 m a.s.l., 10 VII 2008; IUQ 2440,12, 15.8–43.8 SL, Buenos Aires village, Salas Creek, 3º 07' 48" N, 73º 51' 21" W, 316 m a.s.l., 8 VII 2008; IUQ 2442, 32, 19.2–29.5 SL, Luciana creek on Puerto Lucas–Palestina

Table 2. Physicochemical variables in habitat of *Bryconamericus macarenae* n. sp., Orinoco Basin, Colombia. Localities: 1. Caño Guio; 2. Caño near Caño Guapaya; 3. 1 km from Las Brisas; 4. Caño Maraco; 5. Caño Luciana; 6. Caño 2 km from Las Brisas; 7. Caño Acacias; 8. Caño Pringamozal; 9. Caño Irique: Substrate: Dd. Detritus and decomposing organic material; Rd. Rocks and detritus; Rs. Rocks and sand.

Tabla 2. Variables fisicoquímicas en el hábitat de Bryconamericus macarenae *sp. n., cuenca del Orinoco, Colombia. (Para las abreviaturas, ver arriba.)*

	Locality								
	1	2	3	4	5	6	7	8	9
m a.s.l.	256	304	278	290	253	264	259	282	381
Water temperature (°C)	24.5	26.2	24.5	24.9	24.6	24.9	24.6	24.4	25
Air temperature (°C)	26.9	28	25.2	26.3	24.9	25.8	27	25.8	27.6
Dissolved oxygen (mg/l)	5.4	4.0	5.7	5.3	6.5	5.5	7.1	7	5.3
Oxygen saturation (%)	65.1	50.5	68.5	65.4	79	67.1	89.7	84	67.8
pH	7.9	6.3	7.3	7.1	7.3	7.2	7.4	7.6	6.1
Width (m)	2-5	1-2	2-3	3-4	3-4	2-4	3-4	1-3	5-6
Depth (m)	1	0.5	1-3	1-2	1-2	0.5-1	1-2	1-1.5	1
Color	brown	brown	brown	brown	clear	clear	clear	clear	clear
Substrate	Dd	Dd	Dd	Dd	Rd	Rs	Rd	Rd	Rd

road, 3º 06' 22" N, 73º 46' 44" W, 253 m a.s.l., 8 I 2009; IUQ 2443, 10, 14.3–34.5 SL., creek 2 km north of Las Brisas, 3º 03' 00" N, 73º 49' 05" W, 264 m a.s.l., 10 VII 2008; IUQ 2444, 2, 35.3–38.1 SL., Acacias creek on Puerto Lucas Vista Hermosa road, 3º 06' 51" N, 73º 45' 44" W, 264 m a.s.l., 10 VII 2008; IUQ 2445, 12, 27.7–39.2 SL, La Palestina village, Pringamosal Creek 1 km north of La Palestina School, 3º 03' 15" N, 73º 49' 54" W, 282 m a.s.l.,10 VII 2009; IUQ 2446, 38, 20.2–26.8 SL, Irique creek on Granada, 3º 33' 26" N, 73º 41' 54" W, 381 m a.s.l., 7 VII. 2008; IUQ 2447, 44, 18.9–36.9 SL. La Palestina village, Pringamosal Creek, Blanco River drainage, creek 500 m north of La Palestina School, 3º 03' 15" N, 73º 49' 54" W, 282 m a.s.l., 9 I 2009. IUQ 2559, 2, 40, 6–42, 2 SL. Buenavista village, Creek on the Las Delicias farm, 3º 07' 02" N, 73º 52' 29" W, 469 m a.s.l., 9 IV 2009. IUQ 2560, 9, 26.5–42.2 SL. Buenavista village, Creek on La Prosperidad farm, 3º 07' 09" N, 73º 52' 23" W, 411 m a.s.l., 9 IV 2009. IUQ 2561, 27, 22.9–47.2 SL. Buenavista village, Creek on Las Delicias farm, 20 m from the house 3º 07' 02" N, 73º 52' 20" W, 409 m a.s.l., 9 IV 2009.

Fig. 1. *Bryconamericus macarenae* n. sp., holotype: IUQ 2448, 36.2 mm SL. male, Vista Hermosa municipality, La Palestina village, Orinoco River basin, Colombia.

Fig. 1. Holotipo de Bryconamericus macarenae *sp. n.: IUQ 2448, 36,2 mm de LE, macho, municipio Vista Hermosa, villa La Palestina, cuenca del Orinoco, Colombia.*

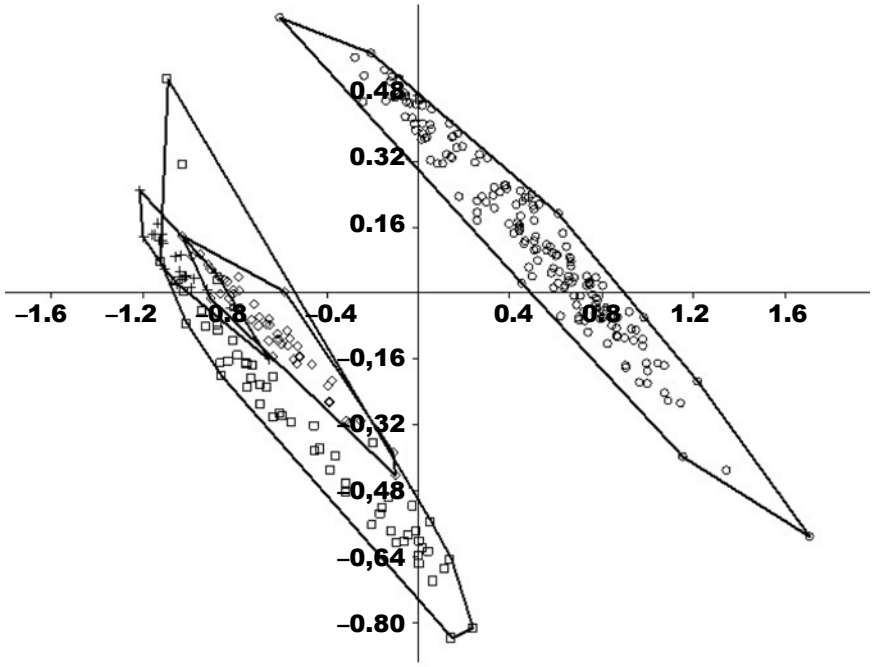

Fig. 2. Representation of the first two principal components (component 1 is the X axis, component 2 is the Y axis) from morphometric data of *Bryconamericus delta* (□), *B. cristiani* (+), *B. alpha* (◊) and *B. macarenae* n. sp. (o).

Fig. 2. Representación de las dos primeras componentes principales (la componente 1 es el eje X, la componente 2 es el eje Y) de los datos morfométricos de Bryconamericus delta *(□),* B. cristiani *(+),* B. alpha *(◊) y* B. macarenae *sp. n. (o).*

Diagnosis

Bryconamericus macarenae differs from all other species of *Bryconamericus* in having an incomplete lateral line (*vs*. complete in all except *B. delta*), four or fewer unbranched anal–fin rays (*vs.* five or more), a short and thickened extrascapular bone which lacks or has only a reduced apophysis on its posterior tip, and only a few perforations by the latero–sensory canal (*vs.* large, irregular extrascapular bone,usually with several bony projections on its margins, with a large, undulated apophysis on its posterior tip, and with conspicuous perforations by the latero–sensory canal). It also differs in its live color pattern (see below). We found the following differences that distinguish this new species from those that occur in the same basin: from *B. alpha* by the number of lateral teeth on the dentary (five or six *vs.* four), from *B. cristiani* by the arrangement of the teeth in the outer premaxillary row (straight line *vs.* zigzag), from *B. cismontanus* and *B. loisae* by the number of branched anal–fin rays 19–25 *vs.* 13–18 and 26–30, respectively).

Description

Body slender and elongate (mean maximum body depth about 25% SL). Area above orbits flat. Dorsal profile of head and body oblique from supraoccipital to dorsal origin and from last dorsal–fin ray to base of caudal fin. Ventral profile of body convex from snout to base of anal fin. Caudal peduncle laterally compressed. Head and snout short, upper jaw longer than lower; mouth terminal, lips soft and flexible, not covering outer row of premaxillary teeth; ventral border of upper jaw straight; posterior edge of maxilla reaching anterior edge of orbit; opening of posterior nostrils vertically ovoid; opening of anterior nostrils with membranous flap.

Premaxillary teeth in two rows. Two teeth of outer row tricuspid with central cusp larger. Internal row with four pentacuspid teeth that diminish gradually in size. Maxilla long, posterior margin straight, with three pentacuspid teeth with central cusp slightly longer. Dentary with four or five large tricuspid teeth with central cusp largest, followed by five or six small conical teeth. Central cusp of all teeth is two to three times longer and broader than remaining cusps.

Scales cycloid, moderately large. Lateral line incomplete, perforated scales 11–41 (17* mean = 29.8, n = 174). Scale rows between dorsal–fin origin and lateral line 5–6 (5*, mean = 5.4, n = 174); scale rows between lateral line and pelvic–fin origin 4–5, usually 4 (5*, mean = 4.5, n = 174). Predorsal scales 10–13, arranged in regular series (12*, mean =11, 7, n = 174).

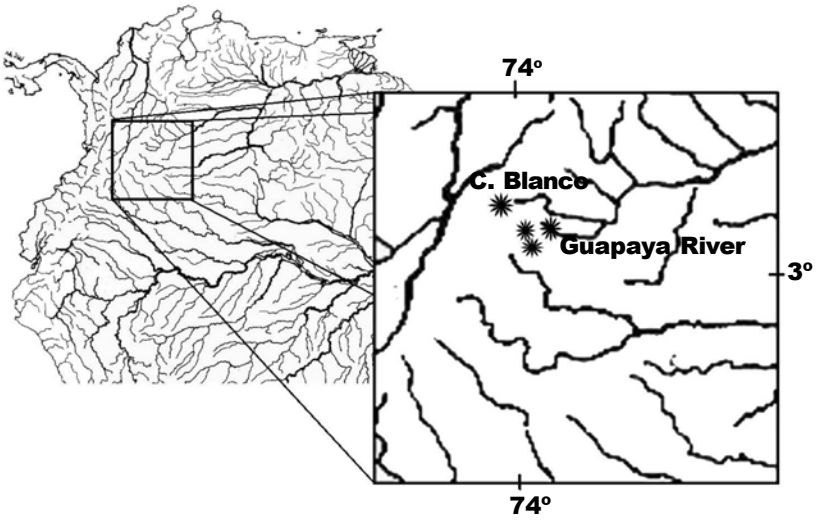

Fig. 3. Map showing the type locality of *Bryconamericus macarenae*.

Fig. 3. Mapa que muestra la localidad tipo de Bryconamericus macarenae.

Dorsal–fin rays iii, 7–8 (iii, 7*, n = 174); first unbranched ray approximately one–half length of second ray, its tip reaching first bifurcation of first branched ray. Dorsal–fin origin posterior to middle of body and posterior to vertical through pelvic–fin origin.

Anal–fin rays iii–iv, 19–25 (iv, 23*, n = 174). Anal–fin origin posterior to vertical through base of last dorsal–fin ray. Pectoral–fin rays ii, 10–11 (10*, n = 174). Pelvic–fin rays ii, 6 (n = 174). Pelvic–fin origin anterior to vertical through dorsal–fin origin. Caudal fin not covered with scales, forked with short pointed lobes, principal caudal rays 1/17/1 (n = 174). Dorsal procurrent rays 12 (n = 3). Ventral procurrent rays 12 (n = 3). Adipose fin present. Total number of vertebra 36–37. Six infraorbitals present, the first thin and narrow, extending between dorsal edge of maxilla and lateral ethmoid, with sensorial canal. Second infraorbital short and wide, covering dorsal part of angulo–articular. Anterior part of second infraorbital overlaying anterior part of first infraorbital and with a foramen that extends towards dorsal margin of first infraorbital. Its posterior margin extends below third infraorbital. Third infraorbital widest and longest, its ventral border in contact with sensorial canal of preopercle. Fourth, fifth and sixth infraorbitals short and narrow, covering posterior margin of hyomandibular.

Supraorbital absent. Five supraneurals present between head and anterior part of dorsal fin, without cartilage on upper and lower edges, and with medial sensorial canal.

Secondary sexual dimorphism

Males have a row of short hooks on the last simple anal–fin ray and on the first to eleventh branched anal–fin rays, each ray with 7–15 hooks, located on the posterior–most branch. There are also 7–12 small hooks on the simple and branched rays of the pelvic fin, located on both branches of the rays, but not extending onto the anterior–most part.

Live colors

Dorsum of body and head and postventral region greenish yellow, with obvious absence of black pigment. Body with blue lateral stripe, produced by presence of iridophores that create a bluish iridescence known as Rayleigh scattering. The iridophores are present on the sides but are restricted to the region of the coelomic cavity, where together with leucophores they produce the whitish coloration of this part of the body. The iridophores extend posteriorly as a lateral stripe to the base of the caudal peduncle. The middle caudal–fin rays are covered by a narrow band of melanophores that forms a slender arc or half–moon shape to make the caudal peduncle spot. There is a small purple spot between the fifth and sixth infraorbitals and the opercle. The opercle has melanophores concentrated on the posterior portion. Humeral spot dark and vertically elongate via disperse pigments. Fins hyaline, but dorsal, anal and caudal fins with disperse melanophores on interradial membranes.

Distribution

This species is so far known only from the Güejar River basin in Meta state, Macarena Mountain range, Orinoco system in Colombia (fig. 3).

Habitat

Bryconamericus macarenae was collected along shore over sandy substrates in the mainstream of rivers,

Identification key to the species of *Bryconamericus* from the Orinoco and Lake Maracaibo Basins.

Clave de identificación para las especies de Bryconamericus *de las cuencas del Orinoco y del lago Maracaibo.*

1.	Scales from lateral line to anal–fin base 2–3	*B. meridae*
	Scales from lateral line to anal–fin base 4 or more	2
2.	Lateral line incomplete; premaxilla with two teeth of outer row tricuspid; maxilla with three pentacuspid teeth; anterior part of second infraorbital overlaying anterior part of first infraorbital, and with a foramen that extends towards dorsal margin of the first infraorbital, and its posterior margin extending below third infraorbital	*B. macarenae*
	Lateral line complete; premaxilla with four teeth of outer row bi or tricuspid; maxilla with two to six tri, sexta or heptacuspid teeth; anterior margin of first infraorbital transverse, without a foramen, and does not overlap the posterior part of the first infraorbital, its posterior margin is over the third infraorbital	3
3.	13–18 branched anal–fin rays; maxilla with serrate teeth; fewer than five scales between the lateral line and the dorsal-fin origin	*B. cismontanus*
	24–30 branched anal–fin rays; maxilla without serrate teeth; more than five scales between lateral line and dorsal-fin origin	4
4.	Two or three multicuspid teeth on maxilla; four or fewer smaller lateral teeth present on dentary	*B. alpha*
	More than three teeth present on maxilla, with between one and four cusps; five or more small lateral teeth on dentary	5
5.	Teeth of outer premaxillary row arranged in straight line. Six to eight small lateral teeth present on dentary	*B. loisae*
	Teeth of outer premaxillary row arranged in zigzag. Eight to 11 small lateral teeth present on dentary (behind larger front teeth)	*B. cristiani*

as well as tributaries with flow. The transparency of the tea–colored water is usually moderate to high, pH is usually around neutral (6.07–7.06), oxygen concentration was high, 5.7 mg/l to 7.1 mg/l, as was the percent oxygen, saturation (50.5% to 90.5%) (table 2). The new taxon is sympatric with *B. alpha*, *B. cismontanus* and *B. loisae*.

Etymology

Bryconamericus macarenae is named for the Macarena Mountain range of Colombia, where the type series was collected.

Comments

When describing a new species, it is usually desirable to compare the new taxa with all other known species in the genus. However, when working with extremely large, poorly defined paraphyletic genera such as *Bryconamericus*, *Hyphessobrycon*, *Hemigrammus*, or *Astyanax,* that occur throughout much of Central and South America, this is not feasible, nor in our opinion, necessary because in our hypothesis of phylogenetic relationships, we expect new taxa to be most closely related to those that occur in the same hydrographic basin. As regional systematic studies progress, more complete hypotheses will become possible. In the meantime, regional studies and keys are practical and useful for species identification purposes (Román–Valencia et al., 2008a, 2008b, 2009c, 2009d; Román–Valencia & Arcila–Mesa, 2008; Vari & Harold, 2001).

A principal component analysis including all species failed to reveal significant morphometric differences among them. It was useful however to show (fig. 2) that *Bryconamericus macarenae* differs morphologically from the sympatric species *B. cristiani* and *B. alpha,* and also from *B. delta,* a species that shares the character of an interrupted lateral line, along axis 1 by distance from dorsal fin to the hypurals vs. length of pelvic fins, and along axis 2 by the body

depth, upper jaw length and distance from dorsal to anal–fin origins. The first axis explains 75.73% of total variation, while the first and second combined explain 89.55%.

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