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Chrysobrycon guahibo, a new species from the Orinoco River basin, with a distribution expansion of the genus (Teleostei: Characidae)

James A. Vanegas-Ríos*, Alexander Urbano-Bonilla and M. de las M. Azpelicueta***

Chrysobrycon guahibo, new species, is described from some small drainages flowing into the Guaviare River basin, Orinoco River basin, Colombia. This is the first record of the genus in the Orinoco basin. *Chrysobrycon guahibo* is distinguished from all congeners by having fewer maxillary teeth 1–3 (vs. 6–15 in *C. eliasi*, 3–11 in *C. hesperus*, 3–12 in *C. myersi*, and 9–16 in *C. yoliae*), the nasal bone longer than antorbital (vs. nasal as long as or shorter than antorbital), absence of bony lamella between the second and third basibranchials (vs. presence of this lamella), and bony hooks on the 3rd to 7th branched anal-fin rays with discontinuous arrangement, forming two separate series along each ray in mature males (vs. bony hooks with continuous arrangement, forming a single series along rays, except in *C. hesperus*). *Chrysobrycon guahibo* also differs from *C. hesperus* and *C. myersi* by the presence of a terminal lateral-line tube between caudal-fin rays 10 and 11 (vs. absence of this tube), absence of bony lamella between the first and second basibranchials (vs. presence of this lamella), and greater number of neural spines between the posteriormost supraneural and the anteriormost dorsal-fin pterygiophore (4–5 vs. 2–3). An updated identification key for all *Chrysobrycon* species is provided.

Chrysobrycon guahibo, nueva especie, se describe para algunos pequeños drenajes que fluyen hacia la cuenca del río Guaviare, cuenca del río Orinoco, Colombia. Este es el primer registro del género en la cuenca del Orinoco. *Chrysobrycon guahibo* se distingue de todos sus congéneres por poseer un menor número de dientes maxilares 1-3 (vs. 6–15 en *C. eliasi*, 3–11 en *C. hesperus*, 3–12 en *C. myersi* y 9-16 in *C. yoliae*), el nasal más largo que el antorbital (vs. nasal tan largo o más corto que el antorbital), la ausencia de lámina ósea entre el segundo y tercer basibranquiales (vs. presencia de esta lámina) y los ganchos óseos de los radios ramificados anales tercero a séptimo distribuidos de manera discontinua, formando dos series separadas a lo largo de cada radio en los machos adultos (vs. ganchos óseos distribuidos de manera continua, formando una sola serie a lo largo de los radios, excepto en *C. hesperus*). *Chrysobrycon guahibo* también difiere de *C. hesperus* and *C. myersi* por la presencia de un tubo terminal de la línea lateral entre los radios caudales 10 y 11 (vs. ausencia de este tubo), la ausencia de lámina ósea entre el primer y segundo basibranquiales (vs. presencia de esta lámina) y el mayor número de espinas neurales entre el supraneural mas posterior y el pterigióforo mas anterior de la aleta dorsal (4–5 vs. 2–3). Se presenta una clave de identificación actualizada para todas las especies de *Chrysobrycon*.

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Introduction

The Neotropical genus *Chrysobrycon* Weitzman & Menezes, 1998 comprises a small group of superior-mouthed stevardiines characterized by remarkable sexual behaviour and dimorphism in mature males, including internal insemination, bony hooks on fin rays, and a modified terminal caudal peduncle squamation on the lower lobe of the caudal fin (Weitzman & Menezes, 1998; Burns & Weitzman, 2005; Vanegas-Ríos et al., 2011, 2014). The most distinctive sexually dimorphic characteristic of *Chrysobrycon* species is the modified caudal-fin squamation of mature males that consists of a pouch scale and two accessory scales, both forming a broadly open pocket (Vanegas-Ríos et al., 2011, 2014). Weitzman & Menezes (1998) established the genus based on following traits: the pouch scale is relatively small, somewhat elongate, curved, confined to the dorsal region of the pouch opening, and horizontally folded so that its lateral face forms a laterally concave, open pocket; and an additional curved scale situated close to and almost completely against the medial surface of the pouch scale (sometimes this additional scale has its ventral border curved laterally). Four valid species of *Chrysobrycon* have been described with this singular pocket (Böhlke, 1958; Weitzman & Thomerson, 1970; Vanegas-Ríos et al., 2011, 2014): *C. eliasi* Vanegas-Ríos, Azpelicueta & Ortega, 2011, *C. hesperus* (Böhlke, 1958), *C. myersi* Weitzman & Menezes, 1998, and *C. yoliae* Vanegas-Ríos, Azpelicueta & Ortega, 2014.

To date, *Chrysobrycon* was unknown in the Orinoco River basin (Lasso et al., 2004; Maldonado-Ocampo et al., 2008). Recent collecting efforts in the Guaviare River basin (Orinoco basin) revealed some small-sized and superior-mouthed fishes that were initially identified as *Gephyrocharax* Eigenmann, 1912. Further examination of these specimens indicated that are an undescribed species of *Chrysobrycon*, which is described hereunder.

Material and methods

The examined specimens are deposited in the following collections: AI, Asociación Ictiológica La Plata, La Plata; ANSP, Academy of Natural Sciences, Philadelphia; CI-FML, Fundación Miguel Lillo, San Miguel de Tucumán; LACM, Natural History Museum of Los Angeles County, Los Angeles; MUSM, Museo de Historia Natural Javier Prado de la Universidad Nacional Mayor de San Marcos, Lima; MLP, Museo de La Plata, La Plata; MPUJ, Museo Javeriano de Historia Natural Lorenzo Uribe, S. J., Bogotá; and USNM, National Museum of Natural History, Smithsonian Institution, Washington. Counts of the pectoral-, pelvic- and dorsal-fin rays follow Böhlke (1958: 3). Measurements and other counts were taken according to Fink & Weitzman (1974), with the addition of eight measurements: the dorsal-fin base length, anal-fin base length, and anal-fin length by Menezes & Weitzman (1990), and the dorsal-fin to pectoral-fin length, dorsal-fin to adipose-fin length, pectoral-fin to pelvic-fin length, pelvic-fin to anal-fin length, and postorbital head length by Vanegas-Ríos et al. (2013a). Measurements were taken point to point with digital callipers under a stereomicroscope and are expressed as percentages of standard length (SL) or head length (HL) for units of the head. Some studied specimens were measured from digitized photos that were processed using tpsDig 2.17 (Rohlf, 2013). Frequency of a particular character value is presented in parentheses and the holotype value indicated by an asterisk. Juveniles and specimens with broken rays or missing scales were not included in counts (except the number of maxillary teeth that was used as a diagnostic character). Specimens were cleared and counterstained (c&s) following Taylor & Van Dyke (1985). Total vertebral counts were determined in c&s specimens. These include the first preural centrum plus first ural centrum (PU1+U1) counted as one element and all four vertebrae of the Weberian apparatus.

Tukey box plots and regressions were carried out using PAST 2.15 (Hammer et al., 2001) and SigmaPlot 10.0 for Windows (2006, Systat Software, Inc.).

Chrysobrycon guahibo, new species

(Figs. 1, 4)

Holotype. MPUJ 7160, 31.9 mm SL; Colombia: Meta department: Fuente de Oro municipality: Orinoco River basin, Guaviare River basin, Ariari River basin, Caño Abrote; 3°17'39" N 73°32'02" W, 258 m asl (above sea level); A. Urbano-Bonilla &. C. A. Roa-Fuentes, 11 Oct 2011.

Paratypes. All from Colombia: Meta department: Orinoco River basin, Guaviare River basin,

Fig. 1. *Chrysobrycon guahibo*; Colombia: Meta: Fuente de Oro: Orinoco River basin, Guaviare River basin, Ariari River basin, Caño Abrote. **a,** MPUJ 7160, holotype, male, 31.9 mm SL; **b,** CI-FML 6152, paratype, female, 28.7 mm SL.

Ariari River basin: CI-FML 6152, 6, 26.5–33.6 mm SL; MLP 10829, 2 c&s, 30.4–31.3 mm SL; MPUJ 7162, 11, 26.7–29.0 mm SL; Puerto Lleras municipality: Caño Cunimía; 3°11'24" N 73°39'39" W, 268 m asl; A. Urbano-Bonilla &. C. A. Roa-Fuentes, 4 Oct 2011. – MLP 10830, 4, 28.9–31.3 mm SL; MPUJ 7161, 10, 23.0–29.6 mm SL; collected with holotype. – MPUJ 7163, 1, 31.0 mm SL; Puerto Lleras municipality: Caño Cunimía; 3°11'24" N 73°39'39" W, 268 m asl; J. Maldonado-Ocampo, 8 Dic 2013. – MPUJ 7164, 3, 31.0–34.8 mm SL; Puerto Lleras municipality: Caño Cunimía, 3°11'24" N 73°39'39" W, 268 m asl; A. Urbano-Bonilla, 25 Oct 2012. – MPUJ 7165, 6, 28.7– 35.3 mm SL; San Juan de Arama municipality, Caño Casa Roja; 3°22'25" N 73°52'13" W, 448 m asl; J. Maldonado-Ocampo, 7 Oct 2013. – MPUJ 7166, 8, 31.3–36.6 mm SL; Vista Hermosa municipality: Caño Uricacha; 3°16'56" N 73°36'45" W, 270 m asl; J. Maldonado-Ocampo, 8 Dic 2013. – MPUJ 7167, 10, 29.0–35.2 mm SL; Fuente de Oro municipality: Caño Abrote; 3°17'39" N 73°32'02" W, 258 m asl; J. Maldonado-Ocampo, 8 Dic 2013. – MPUJ 7168, 2, 43.5–44.6 mm SL; Vista Hermosa municipality: Caño Guapaya; 3°2'59" N 73°49'17" W, 285 m asl; J. Maldonado-Ocampo, 7 Dic 2013.

Diagnosis. *Chrysobrycon guahibo* differs from its congeners by having fewer maxillary teeth (1–3 vs. 6–15 in *C. eliasi*, 3–11 in *C. hesperus*, 3–12 in *C. myersi*, and 9–16 in *C. yoliae*), the nasal bone

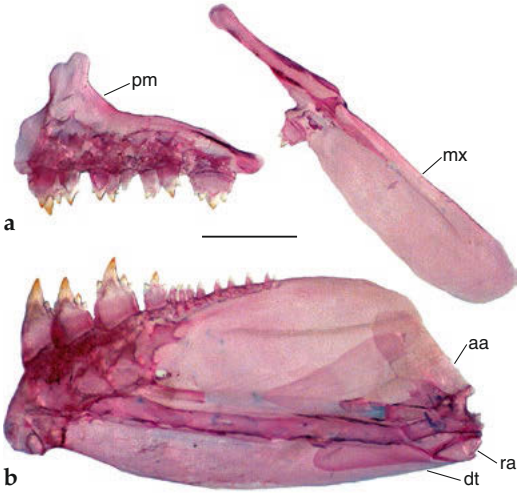

Fig. 2. *Chrysobrycon guahibo*, MLP 10829, 31.3 mm SL; lateral view of jaws, left side: **a,** premaxilla (pm) and maxilla (mx); **b,** dentary (dt), anguloarticular (aa), and retroarticular bones (ra). Scale bar: 1 mm.

longer than the antorbital (vs. nasal as long as or shorter than antorbital), absence of bony lamella between the second and third basibranchials (vs. presence of this lamella), and bony hooks on the 3rd to 7th branched anal-fin rays with discontinuous arrangement, forming two separate series along each ray in mature males (vs. bony hooks with continuous arrangement, forming single series along rays, except in *C. hesperus*). *Chrysobrycon guahibo* is also distinguished from *C. eliasi*, *C. myersi* and *C. yoliae* by the posterior margin of the ventral process of the quadrate not reaching the vertical through posterior margin of symplectic (vs. reaching the vertical through posterior margin of symplectic, except in *C. eliasi*) and the possession of teeth on the third pharyngobranchial (vs. absence of those teeth, except in *C. yoliae*). *Chrysobrycon guahibo* differs from *C. hesperus* and *C. myersi* by the presence of a terminal lateral-line tube between caudal-fin rays 10 and 11 (vs. absence of this tube), absence of bony lamella between the first and second basibranchials (vs. presence of this lamella), and greater number of neural spines between the posteriormost supraneural and the anteriormost dorsal-fin pterygiophore (4–5 vs. 2–3). *Chrysobrycon guahibo* is distinguished from *C. myersi* and *C. yoliae* by the body depth at dorsal-fin origin (24–32 % SL vs. 31–42) and dorsal-fin to adipose-fin length (20–26 % SL vs. 27–33). Furthermore, *C. guahibo* differs from *C. myersi* by the snout to dorsal-fin origin length (63–71 % SL vs. 57–63), dorsal-fin to hypural complex length (31–39 % SL vs. 40–47), eye to dorsal-fin origin length (51–58 % SL vs.

Table 1. Morphometric data of *Chrysobrycon guahibo* from various drainages flowing into Guaviare River basin, Orinoco basin, Colombia. Identification of males based on presence of bony hooks on fins and/or pouch scale on lower caudal-fin lobe. Range, mean, and standard deviation (SD) of males including values of holotype. N = number of specimens measured.

		paratypes							
		males				females and unsexed juveniles			
	holotype	range	mean	SD	n	range	mean	SD	n
Standard length (mm)	31.9	26.7–44.6	31.7	4.5	24	23.0–36.6	30.1	30.1	40
Percentages of standard length									
Depth at dorsal-fin origin	31	26–31	29.2	1.6	24	24–32	28.5	28.5	40
Snout to dorsal-fin origin	69	63–71	66.9	1.8	24	64–71	67.1	67.1	38
Snout to pectoral-fin origin	29	25–29	27.1	1.0	24	22–30	26.8	26.8	38
Snout to pelvic-fin origin	46	43–50	46.2	1.6	24	44–49	46.4	46.4	37
Snout to anal-fin origin	61	59–65	61.6	1.6	24	57–63	61.2	61.2	38
Dorsal-fin to pectoral-fin length	48	45–50	47.8	1.5	24	44–51	48.0	48.0	38
Dorsal-fin to adipose-fin length	22	21–26	23.0	1.2	24	20–25	22.7	22.7	40
Dorsal-fin to hypural complex length	32	31–39	35.1	1.8	24	31–38	35.1	35.1	40
Eye to dorsal-fin origin	56	52–57	54.9	1.5	24	51–58	54.9	54.9	39
Pectoral-fin to pelvic-fin length	18	17–23	19.5	1.7	24	17–23	20.2	20.2	37
Pelvic-fin to anal-fin length	15	14–19	16.6	1.2	24	14–19	16.4	16.4	37
Dorsal-fin length	19	17–21	18.8	1.2	24	16–21	18.5	18.5	38
Dorsal-fin base length	9	8–10	9.2	0.5	24	7–11	9.1	9.1	37
Pectoral-fin length	30	28–31	29.3	0.7	24	24–32	28.8	28.8	38
Pelvic-fin length	17	14–19	16.9	1.4	24	12–16	15.0	15.0	36
Anal-fin length	19	16–23	18.9	1.5	24	16–21	18.9	18.9	39
Anal-fin base length	31	29–34	30.9	1.1	24	29–34	30.7	30.7	40
Caudal peduncle depth	12	10–12	11.0	0.6	24	9–11	10.1	10.1	40
Caudal peduncle length	12	10–15	13.1	1.4	24	9–17	12.7	12.7	39
Bony head length	26	23–26	24.5	0.8	24	21–26	24.1	24.1	39
Percentages of head length									
Snout length	30	24–33	29.0	2.8	24	25–34	28.8	28.8	39
Horizontal eye length	35	29–37	33.6	2.1	24	30–38	34.1	34.1	39
Postorbital head length	40	35–45	40.5	2.6	24	36–46	40.4	40.4	39
Least interorbital width	37	33–43	37.0	2.2	19	33–42	36.6	36.6	27
Upper jaw length	42	40–47	43.3	2.0	24	39–48	43.8	43.8	37

46–49), upper jaw length (39–48 % HL vs. 49–55), number of vertebrae located anterior to the first proximal pterygiophore (19 vs. 15), and number of circumpeduncular scales (14–16 vs. 17–19). *Chrysobrycon guahibo* differs from *C. yoliae* by having a lesser dorsal-fin base length (7–11 % SL vs. 12–14) and fewer dentary teeth (9–14 vs. 20–26).

Description. Morphometric data in Table 1. Largest male 44.6 mm SL, largest female 36.6 mm SL. Body laterally compressed, with maximum depth at vertical through area between pelvic- and anal-fin origins (Fig. 1). Dorsal profile of body straight over head, convex from posterior end of supraoccipital area to dorsal-fin origin, straight and slanting ventrally from first dorsal-fin ray to caudal peduncle. Dorsal profile of caudal peduncle straight. Ventral profile of body convex from tip of snout to pelvic-fin origin, straight or slightly convex between pelvic- and anal-fin origins, straight and slanting dorsally from anal-fin origin to caudal peduncle. Ventral profile of caudal peduncle straight or slightly concave. Head with anterior region acute. Frontal fontanel absent. Epiphyseal branch of supraorbital canal absent. Anterior nostril rounded, separated by one skin fold from posterior one; posterior opening larger. Two pit organs developed in grooves of head; anterior groove rounded, located between nasal bone and nostril; posterior groove extended along frontal, covered with rows of neuromasts.

Dorsal-fin rays ii (47), 8* (44) or 9 (3). Nine proximal pterygiophores in dorsal fin (2 c&s). Dorsal-fin origin located at vertical between anal-fin rays 8 to 12. Adipose fin located at vertical of posteriormost anal-fin ray. Anal-fin rays iv (47) or v* (17), 23 (1), 24 (3), 25* (12), 26 (19), 27 (17), 28 (9) or 29 (3). Twenty-eight to twenty-nine proximal pterygiophores in anal fin (2 c&s). Anal-fin origin situated in posterior half of body, always anterior to vertical through dorsal-fin origin. Pectoral-fin rays i (47), 8 (1), 9* (21), 10 (20) or 11 (2), its posterior tip reaching one-half to three-quarters of pelvic-fin length (Fig. 1). Pelvic-fin rays i (47), 6 (6) or 7* (41). Pelvic-fin origin slightly anterior to half of body. Caudal fin forked with 10/9 principal rays in all specimens.

Mouth superior, lower jaw projecting slightly anterior to upper jaw. Premaxilla with two rows of teeth (Fig. 2). Outer row with 4 (18), 5* (28) or 6 (1) teeth; usually tricuspid, rarely bicuspid. Inner row with 4* (46) or 5 (1) teeth, symphyseal tooth tri- or tetracuspid, remaining teeth pentacuspid.

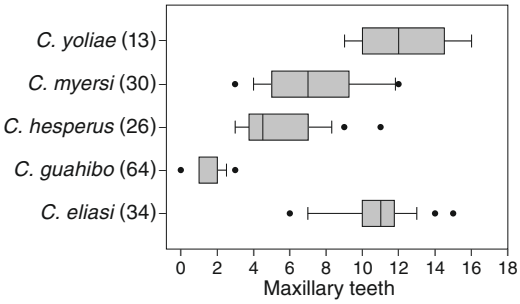

Fig. 3. Tukey box plot showing comparative variation of number of maxillary teeth among *Chrysobrycon* species (see text for details). Number of specimens between parentheses.

Maxilla with 1* (34), 2 (22) or 3 (6) teeth (zero in two juvenile specimens) (Fig. 3); usually tri- or pentacuspid and rarely conical or bicuspid. Ventral margin of maxilla bearing teeth on anteriormost portion of toothed region. Maxilla relatively short, reaching or slightly surpassing vertical through anterior margin of eye, but not reaching vertical crossing anterior border of pupil. Dentary with 8 (8), 9 (6), 10 (8), 11 (10), 12 (6), 13 (5) or 14* (4) teeth, three anteriormost teeth large, pentacuspid (rarely tetracuspid), one median-sized tooth tri- or tetracuspid followed by 4 (4), 5 (6), 6 (8), 7 (10), 8 (6), 9 (5) or 10* (4) smaller conical posterior teeth (Fig. 2b).

Scales cycloid, with several radii along posterior region. Lateral line complete, pored scales 39* (7), 40 (13), 41 (9), 42 (9), 43 (4), 44 (2) or 45 (1). Terminal lateral-line tube present on caudal-fin interradial membrane. Predorsal scales 18* (1), 19 (8), 20 (5), 21 (20), 22 (9), 23 (3) or 24 (1), forming continuous row. Scale rows between dorsal fin and lateral line 5* (16) or 6 (31). Scale rows between lateral line and anal fin 5* (31) or 6 (16). Scale rows between lateral line and pelvic fin 5* (32) or 6 (15). Circumpeduncular scales 14 (12), 15* (30) or 16 (1). One row of 10 (1), 12 (1), 14 (4), 15 (2), 16 (4), 17 (3), 18* (3), 19 (4) or 20 (2) scales forming sheath along anal-fin base. Total number of vertebrae 40 (2 c&s), 16 precaudal and 24 caudal. Gill rakers on dorsal arm of first branchial arch 5 (2), 6* (25) or 7 (7), ventral arm with 11* (17), 12 (14) or 13 (3).

Colour in alcohol. Ground colour pale yellowish in preserved males and females, slightly darker dorsally. Black chromatophores over all body, forming one narrow line along mid-dorsal, sometimes diffuse. Slender black midlateral stripe

Fig. 4. *Chrysobrycon guahibo*; Colombia: Meta: Fuente de Oro: Orinoco River basin, Guaviare River basin, Caño Abrote. Colouration in life of: **a,** male, 33.8 mm SL; **b,** female, 31.0 mm SL. Not preserved.

extending two scale rows above of lateral line scales. Lateral stripe black with diffuse border, extending from region posterior to humeral spot to end of caudal peduncle; few specimens with lateral stripe originating posterior to posterior opercular margin. Brown and black dark chromatophores forming rounded humeral spot, sometimes diffuse, expanding ventrally in some specimens. Brown and black dark chromatophores concentrated on caudal-peduncle region, forming oval or triangular spot, often extending onto caudal-fin rays to varying lengths. Few black chromatophores forming stripes between myomeres only on posterior ventral one-third of body. Dorsal fin mostly hyaline, with scattered black chromatophores arranged along ray lengths. Adipose fin mostly hyaline, with few black chromatophores. Anal fin mostly hyaline, with scattered dark chromatophores over interradial membranes, more concentrated on basal portion of fin. Caudal fin with black chromatophores along rays. Pectoral and pelvic fins mostly hyaline with scarce black chromatophores. Head darker dorsally and yellowish ventrally. Black chromatophores concentrated on premaxilla, anterior half of maxilla, lower jaw near symphysis, and opercle. Most males with chromatophores over infraorbitals (Fig. 1).

Colour in life. Ground colour pale yellow, anterior portion of body iridescent in females and males. Dorsal midline black or grey. Head, jaws, and opercle grey. Black lateral stripe broader and intensely pigmented in males, ending in large spot on caudal peduncle. Black chromatophores sparsely distributed over entire body in males, fewer chromatophores over body of females with similar arrangement. Caudal and dorsal fins yellowish, adipose-fin intense yellow in both females and males. Spot on dorsal margin of fin red (Fig. 4).

Sexual dimorphism. Males differ from females by the presence of bony hooks on the caudal-, pelvic- and anal-fin rays. The caudal fin has 5–25 tiny hooks usually paired (typically more than one pair per segment), anterodorsally oriented, and placed on the dorsal margin of the lower

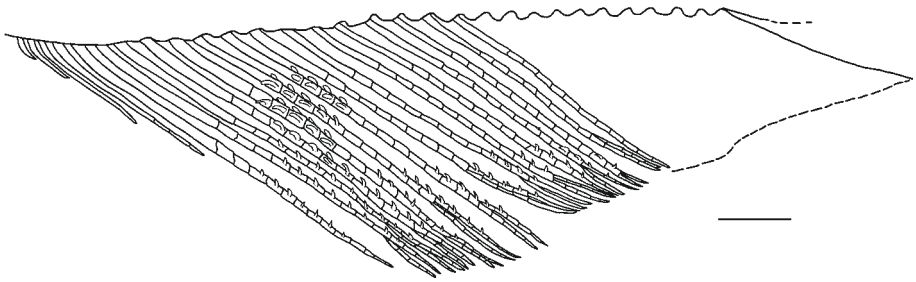

Fig. 5. *Chrysobrycon guahibo*, MLP 10829, male, 30.4 mm SL. Left lateral view of bony hooks on anal-fin rays. Scale bar: 1 mm.

rays 12–17. All pelvic-fin rays bear short slender hooks, positioned anteroventrally along almost the entire length of rays. These hooks are grouped in two pairs per segment, being more numerous on the middle pelvic-fin rays. The anal fin has 1–12 variable-sized hooks distributed in one pair per segment and positioned dorsally or anterodorsally on the posteriormost unbranched ray and anterior branched rays 1–12 (often with two tiny paired hooks on the posteriormost branched ray and several robust hooks mainly on the proximal half of the branched rays). The anal-fin hooks are arranged in two series on the anterior branched rays 3–7: the first series is located on the proximal half of the rays, while the second series is located on the distal half of the rays (Fig. 5). The presence of these two series leaves an area without hooks between the basal and distal portions of each ray. The lower caudal-fin lobe of males has several scales that form a broadly open pouch. This pouch is mainly formed by a single pouch scale plus at least two accessory scales (Fig. 6). The pouch scale is relatively small, somewhat elongate, curved, and weakly horizontally folded so that its lateral face forms a laterally concave, open pouch. The accessory scales are differently located regarding the pouch position: a medial accessory scale is curved, elongate, and located under the lateral face of the pouch scale (partially visible in lateral view); and a lateral accessory scale is large and somewhat elongate posterodorsally, forming part of the laterodorsal region of the pouch. The pouch scale and the lateral accessory scale are independent but in contact, both scales are strongly attached to each other dorsally through a well-developed medial mass of connective tissue. The caudal-fin rays 12–15 and the anterolateral surface of the pouch have a diffuse, apparently glandular tissue.

Males have black chromatophores located along the ventral margin of the preanal region

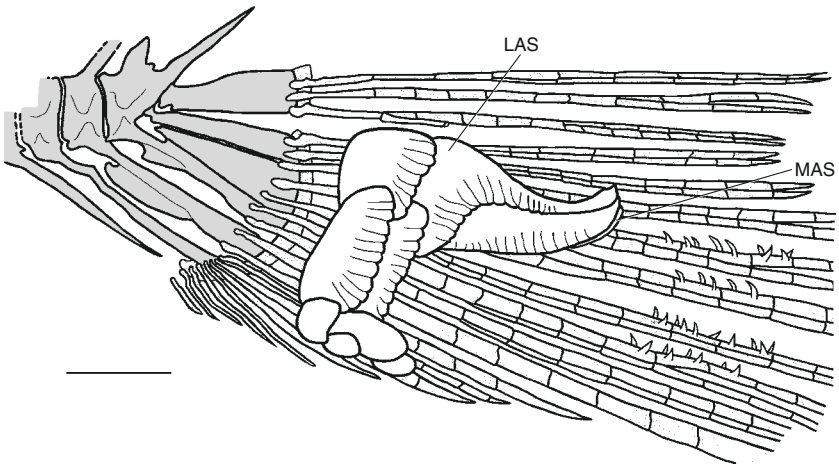

Fig. 6. *Chrysobrycon guahibo*, MLP 10829, male, 30.4 mm SL; left lateral view of lower caudal-fin lobe. Note scales forming pouch in this lobe. **MAS**, medial accessory scale; **LAS,** lateral accessory scale. Scale bar: 1 mm.

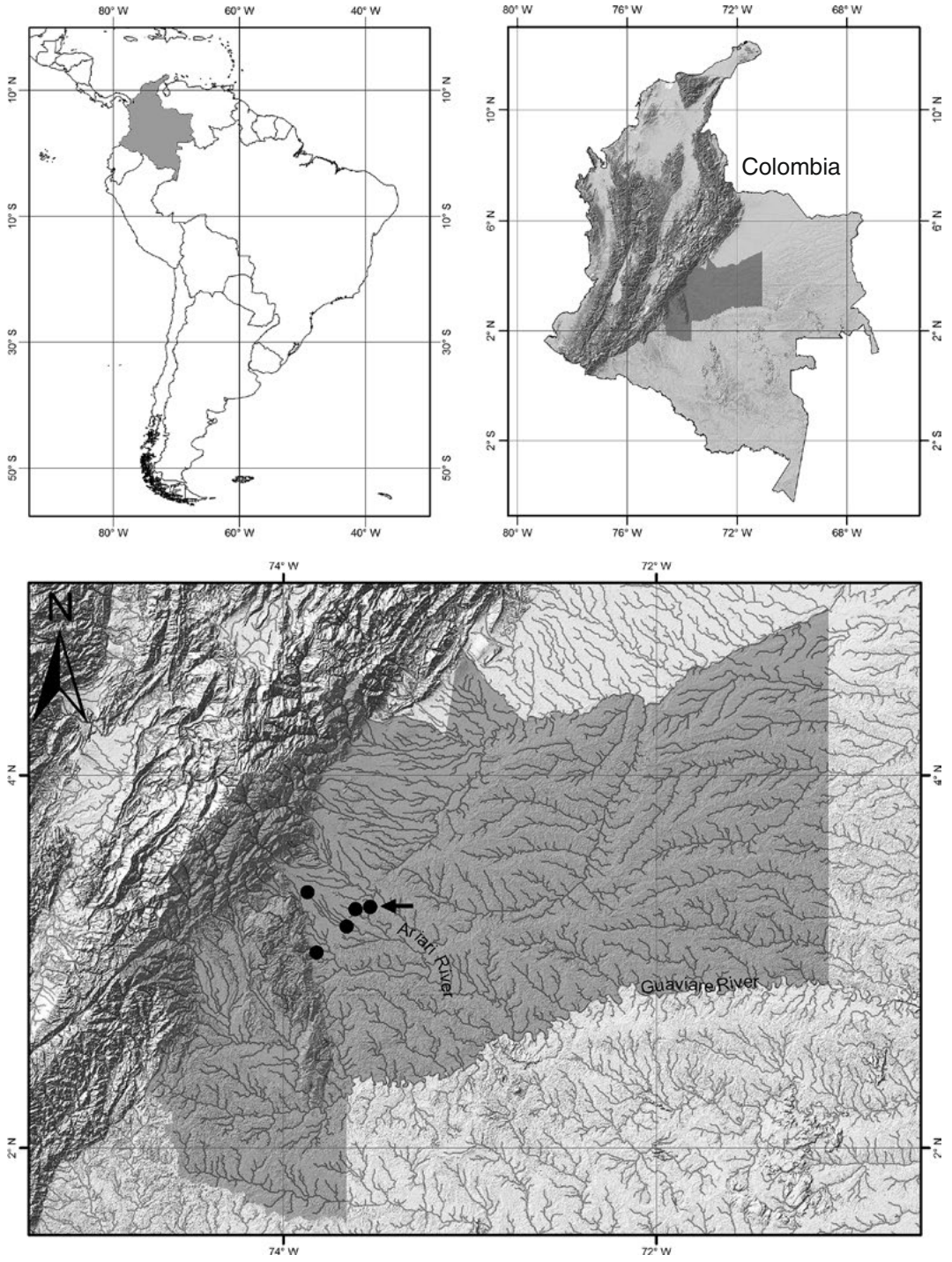

Fig. 7. Geographic distribution of *Chrysobrycon guahibo* (●). Black arrow indicating type locality.

and on the lateral region of body between the urogenital pore and the anal-fin origin. Usually, the body chromatophores are more concentrated in males than in females, but both have similar arrangement patterns (for details see colour sections). The gill gland of males is relatively long, formed by the fusion of the anterior 12 (2), 14 (1), 15 (1), 16 (1), 17* (2), 18 (2), 19 (3), 21 (1) or 24 (1) gill filaments of the ventral arm of the first gill arch. The total number of ventral arm gill filaments is 24 (1), 25 (1), 26 (2), 27* (6), 28 (1), 29 (1), 30 (1) or 31 (1). The gill-gland length ranges between 5 and 11 % SL (mean = 8.3 % SL), 8 % SL*. The comparison of the morphometric data between sexes, especially for the pectoral-fin to pelvic-fin length, pelvic-fin length, and caudal-peduncle depth, showed minor differences along the regression lines (as function of SL). Consequently, the respective plots are not presented.

Distribution. *Chrysobrycon guahibo* is known from several small drainages entering the Guaviare River basin, Orinoco River basin, Colombia (Fig. 7).

Ecological notes. *Chrysobrycon guahibo* occurs in clear and shallow waters (0.5–1.5 m) with substrates composed of sand, gravel, and decaying organic matter and is usually found in shoals near submerged vegetation. The sites where *C. guahibo* was collected are characterized by the following physicochemical parameters: current 0.1–0.5 $m \cdot s^{-1}$, dissolved oxygen 8.0–10.5 $mg \cdot l^{-1}$; water temperature 27.2–28.5 °C, conductivity 6.6–26.1 $S \cdot m^{-1}$, and pH 5.8–9.2. The stomach contents of twelve specimens of *C. guahibo* included a high proportion of aquatic and terrestrial insects [Dryopidae, Chrysomelidae, Diptera, Perlidae (*Anacroneuria* sp.), Elmidae (*Neoelmis* sp.), Lepidoptera, Formicidae] and a low proportion of plant material (seeds and leafy liverworts). *Chrysobrycon guahibo* co-habits with an assortment of other characid species including *Creagrutus taphorni*, *Ctenobrycon spilurus*, *Corynopoma riisei*, *Hemigrammus barrigonae*, *Hyphessobrycon* cf. *metae*, *Moenkhausia oligolepis*, *M. chrysargyrea*, *M. lepidura*, *Poptella compressa*, *Jupiaba* cf. *polylepis*, *Microschemobrycon* sp., *Odontostilbe* sp., *Phenacogaster megalostictus*, and *Tyttocharax metae*.

Etymology. The species name, *guahibo*, is in honour of the Guahibo tribe (or Sikuani), an ethnic group of Amerindians of the Arauca, Guaviare, Meta, Orinoco, and Vichada rivers basins. This tribe is the most populous ethnic group inhabiting the Orinoco floodplains where the new species is known. A noun in apposition.

Key to species of *Chrysobrycon*
(modified from Vanegas-Ríos et al., 2014)

1 – 33–39 branched anal-fin rays; 17–19 circumpeduncular scales; adult males with longer and expanded anal fin and with series of spinelets developed on pelvic-, anal- and caudal-fin rays. ..... *C. myersi*

– 24–32 branched anal-fin rays; 14–16 circumpeduncular scales; adult males with shorter and unexpanded anal fin and lacking spinelets on fin rays. 2

2 – Adult males with a series of minute bony hooks located distally on nearly all branched anal-fin rays (> 80 % of total number of rays); larger specimens (usually > 50 mm SL) with anteriormost maxillary tooth usually pentacuspid (rarely tetracuspid); no terminal lateral-line tube on middle caudal-fin rays.. ..... *C. hesperus*

– Adult males with a series of minute bony hooks located on distal half of anterior branched anal-fin rays 1–12 (≤ 50 % of total number of rays); larger specimens (usually > 30 mm SL in *C. eliasi*; > 35 mm SL in *C. yoliae*, and > 28 mm SL in *C. guahibo*) with anteriormost maxillary tooth usually tricuspid (rarely conical, bicuspid or tetracuspid); terminal lateral-line tube on middle caudal-fin rays present. 3

3 – Maxillary teeth 1–3 (absent in two juvenile specimens); dorsal-fin to hypural complex length 31–37 % SL; dorsal-fin base length 8–10 % SL; bony hooks on 3rd to 7th branched anal-fin rays forming two separate series along each ray in mature males. ..... *C. guahibo*

– Maxillary teeth 6–16; dorsal-fin to hypural complex length 37–42 % SL; dorsal-fin base length 10–13 % SL; bony hooks on 3rd to 7th

branched anal-fin rays forming single, continuous series along each ray in mature males.
..... 4

4 – Dentary teeth 20–26; body depth at dorsal-fin origin 34–42 % SL; dorsal-fin to adipose-fin length 27–29 % SL; dorsal-fin origin situated at vertical between anal-fin rays 5–7; posterior extent of ventral process of quadrate reaching vertical through posterior margin of symplectic.
..... *C. yoliae*

– Dentary teeth 12–19; body depth at dorsal-fin origin 24–34 % SL; dorsal-fin to adipose-fin length 24–27 % SL; dorsal-fin origin situated at vertical between anal-fin rays 8–10; posterior extent of ventral process of quadrate not reaching vertical through posterior margin of symplectic.
..... *C. eliasi*

Discussion

Eleven stevardiine genera with a pouch scale on the lower caudal-fin lobe of adult males have been recorded in cis- and trans-Andean rivers basins of the Neotropical region (Weitzman & Menezes, 1998; Weitzman, 2003; Eschmeyer, 2015): *Argopleura* Eigenmann, 1913, *Corynopoma* Gill, 1858, *Chrysobrycon*, *Gephyrocharax*, *Hysteronotus* Eigenmann, 1911, *Iotabrycon* Roberts, 1973, *Pterobrycon* Eigenmann, 1913, *Ptychocharax* Weitzman, Fink, Machado-Allison & Royero, 1994, *Scopaeocharax* Weitzman & Fink, 1985, *Tyttocharax* Fowler, 1913, and *Xenurobrycon* Myers & Mirande Ribeiro, 1945. The genera *Argopleura* and *Pterobrycon* occur in Andean rivers of Colombia and in Pacific drainages of Costa Rica (Bussing, 1974; Weitzman & Fink, 1985; Weitzman, 2003). *Chrysobrycon*, *Ptychocharax*, and *Scopaeocharax* strictly inhabit in waters of the Amazon River basin (Weitzman & Fink, 1985; Weitzman et al., 1994; Weitzman & Menezes, 1998; Vanegas-Ríos et al., 2014), and only *Corynopoma*, *Gephyrocharax*, and *Tyttocharax* occur in drainages from the Orinoco River basin (Weitzman, 2003; Eschmeyer, 2015). Therefore, *Chrysobrycon guahibo* is the first occurrence of the genus in the Orinoco basin.

Chrysobrycon species occur in piedmont and floodplain freshwater habitats along major portions of the Amazon River basin in Colombia, Ecuador, and Peru (Böhlke, 1958; Weitzman & Thomerson, 1970; Vanegas-Ríos et al., 2011, 2013b, 2014). The distributional range of *Chrysobrycon* extends from the Putumayo and Napo rivers basins across the Marañon-Ucayali rivers basins to the Manuripe-Madre de Dios rivers basins. The record of *Chrysobrycon guahibo* extends to the north the geographic range of the genus in the cis-Andean basins of South America.

The most distinctive character of *C. guahibo* is the lower number of maxillary teeth (Fig. 3: 1–3, mode 1), always restricted to the uppermost portion of the toothed margin of maxilla. In contrast, the Amazonian species of *Chrysobrycon* have a higher number of maxillary teeth (3–16, mode 11), which usually are located along most of the toothed margin of the bone. Vanegas-Ríos et al. (2011) reported two maxillary teeth for three juvenile specimens of *C. hesperus* (25.5–27.0 mm SL), but this number is due to the small size of the individuals (compared with adults specimens > 35 mm SL). *Chrysobrycon guahibo* is also distinguished from its congeners by some characteristics of the neurocranium and branchial skeleton and differs morphometrically from *C. myersi* and *C. yoliae* (see diagnosis). We could not detect morphometric differences between *C. guahibo*, *C. eliasi* and *C. hesperus*, although the body shape of *C. guahibo* strongly resembles that of *C. eliasi*, especially in the depth and length of the body, more than any congener.

Chrysobrycon species show interspecific differences in the humeral and peduncular spots patterns that are apparent in alcohol-preserved specimens; however, these traits have intraspecific variations (i. e., distribution and concentration of chromatophores). To confirm these differences, which may be useful to distinguish species, it would be necessary to examine large series of live specimens of all *Chrysobrycon* species.

Comparative material. *Chrysobrycon eliasi*: all from Peru: Madre de Dios department: Tambopata: MUSM 39970, holotype, 34.3 mm SL; Madre de Dios basin, Loboyoc creek; 12°27'07" S 69°7'43" W, 210 m asl. – MLP 10831 (before AI 287), 3 paratypes, 33.0–43.5 mm SL (2 c&s); Manuripe River basin, creek at km 50; 12°11'21" S 69°6'57" W, 248 m asl. – CI-FML 6153 (before AI 288), 2 paratypes, 37.3–37.6 mm SL; Manuripe River basin, Yarinal creek, 12°3'06" S 69°4'50" W, 250 m asl. – MUSM 39971, 14, 26.1–40.8 mm SL; collected with holotype. – MUSM 39972, 8 paratypes, 28.0–43.2 mm SL; Manuripe basin, creek at km 50; 12°11'21" S 69°6'57" W, 248 m asl.

– MUSM 39973, 2 paratypes, 36.11–37.63 mm SL; Madre de Dios River basin, Loboyoc creek; 12°27'21"S 69°7' 42"W, 225 m asl. – MUSM 39974, 3 paratypes, 29.3–41.2 mm SL; San Antonio, Heath River basin, San Antonio creek; 12°41'03"S 68°43'09"W, 193 m asl.

Chrysobrycon hesperus: COLOMBIA: ICNMHN 11002, 1, 39.4 mm SL; Putumayo department: Orito municipality: La Guara creek, Putumayo River basin; approximately 0°36'00"N 76°52'15"W, 344 m asl. ECUADOR: ANSP 75912, 1 paratype, 77.4 mm SL; upper Villano River near Villano, upper Napo River basin; 1°30'S 77°28'W. – ANSP 79513, 1 paratype, 67.4 mm SL; upper Villano River, near Villano, upper Napo River system; 1°30'S 77°28'W. – ANSP 75914, 1 paratype, 63.2 mm SL; Suno River near mouth, tributary upper Napo River; 0°42'S 77°08'W, 300–320 m asl. – ANSP 79159, 2 paratypes, 60.3–76.0 mm SL; Pucuno River, a tributary of Suno River, upper Napo River system; approximately 350 m asl. – USNM 164042, 1 paratype, 70.5 mm SL; Napo-Pastaza provinces: Villano River, upper Curaray, near Villano; 1°30'S 77°28'W, approximately 375 m asl. – USNM 164056, holotype, 72.3 mm SL (radiograph); Napo-Pastaza provinces: Pucuno River, tributary of Suno River, Pucuno, enters of Suno; 0°46'S 77°12'W, approximately 300–350 m asl. – USNM 175124, 1 paratype, 59.1 mm SL (radiograph); Napo-Pastaza provinces: Pucuno River, tributary of Suno River, Pucuno, enters of Suno; 3°46'S 17°12'W. PERU: MUSM 26607, 2, 59.9–66.1 mm SL; Loreto department: Andoas district: upper Amazon basin, Corrientes River basin, Caballo creek; 2°33'41"S 76°13'45"W, 209 m asl. – MUSM 26617, 2, 29.8–33.1 mm SL; Loreto department, upper Amazon basin, Corrientes River, drainage flowing into Huayuri creek; 2°35'51"S 76°13'53"W, 208 m asl. – MUSM 28640, 2, 25.5–27.0 mm SL; Forestal creek, Corrientes River basin; 2°19'14"S 76°10'31"W, 215 m asl. – MUSM 28665, 3, 36.2–54.6 mm SL (1, c&s, 54.6 mm SL); Loreto department: Andoas district: upper Amazon basin, Corrientes River basin, Forestal creek; 2°21'28"S 76°9'25"W, 237 m asl. – MUSM 28682, 3, 41.6–46.1 mm SL; Loreto department: Andoas district: upper Amazon basin, San Carlos creek, flowing into Manchari River; 2°24'35"S 76°06'36"W, 196 m asl. – MUSM 32124, 1, 27.1 mm SL; Loreto department: Andoas district: upper Amazon basin, Corrientes River basin, Platanoyacu River; 3°08'27"S 75°45'09"W, 153 m asl. – MUSM 33159, 2, 29.3–43.9 mm SL; Loreto department: Andoas district: upper Amazon basin, Pastaza River, Carmen creek; 2°22'44"S 76°9'44"W, 216 m asl.

Chrysobrycon myersi: all from Peru: ANSP 112325, 2 paratypes, 30.1–46.1 mm SL; Huanuco department: small creek at northeastern outskirts of Tournavista, tributary of Pachitea River. – ANSP 112326, 3 paratypes, 28.3–32.0 mm SL; Huanuco department: small creek at northeastern outskirts of Tournavista, tributary of Pachitea River. – LACM 37720-4, 3, 34.3–63.8 mm SL; Pasco department: Iscozacin Valley, Pan de Azúcar, stream about 100 yards above entrance into Iscozacin River. – MUSM 12040, 1, 29.7 mm SL; Cusco department, La Convención province: Echarate district: Urubamba basin, Picha River, Cocha Kamariampiveni; approximately 11°36'S 73°05'W, 380 m asl. – MUSM 18908, 2, 42.4–48.6 mm SL; Pasco department: Oxapampa province: Puerto Bermudez district: Pachitea River basin, Atas creek; approximately 10°17'47"S 74°56'11"W, 259 m asl. – MUSM 36068, 1, 31.6 mm SL; Curso department, La Convención province: Echarate district: Urubamba River basin, Parotori River system, Poyiriari River; 12°10'44"S 73°5'06"W, 544 m asl. – MUSM 36084, 3, 37.1–58.7 mm SL; Cusco department: La Convención province: Echarate district: Urubamba basin, Parotori River system, Poyriari River; 12°10'45"S 73°05'18"W, 585 m asl. – MUSM 36109, 2, 32.8–36.3 mm SL; Cusco department: La Convención province: Echarate district: Urubamba River, Parotori River, Poyiriari River, Piriabindeni creek; 12°01'13"S 73°00'24"W, 585 m asl. – MUSM 36125, 3, 29.2–38.6 mm SL; Cusco department: La Convención province: Echarate district: Parotori River basin, Piriabindeni creek; 12°01'19"S 73°04'15"W, 545 m asl. – MUSM 37889, 2, 45.1–51.0 mm SL; Junín department: Satipo province: Mashira district: Tambo River basin, Capirosankari creek; 11°01'25"S 73°33' 36"W, 420 m asl. – MUSM 37933, 3, 58.0–60.8 mm SL; Cusco department: La Convención province: Echarate district: Kinterani, Naca-naca creek; 11°28'09"S 73°18' 02"W, 420 m asl. – MUSM 38671, 3, 50.9–60.7 mm SL (1 c&s, 58.6 mm SL); Junín department: Satipo province: Tambo River basin, Pukakunga creek; 73°28'02"W 11°24'37"S, 587 m asl. – USNM 203697, holotype, 46.5 mm SL; Huanuco department: small stream directly tributary to Pachitea River (itself tributary to Ucayali River) at northeastern outskirt of Tournavista. – USNM 203698, 6 paratypes, 24.9–31.3 mm SL (one radiograph, 31.3 mm SL); collected with holotype.

Chrysobrycon yoliae: MUSM 46140, holotype, 51.6 mm SL; CI-FML 5882, 3 paratypes, 44.8–52.3 mm SL (1 c&s, 44.8 mm SL); MLP 10517, 1 paratype, 48.4 mm SL; MUSM 46141, 8 paratypes, 38.2–51.5 mm SL; Peru: Ucayali department: Coronel Portillo province: Abujao; Yucamia River subsystem, unnamed creek; 8°39'14"S 73°21'17"W, approximately 273 m asl.

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