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Revision of the Neotropical Genus *Acrobrycon* (Ostariophysi: Characiformes: Characidae) with Description of Two New Species

Dahiana Arcila¹, Richard P. Vari², and Naércio A. Menezes³



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Dahiana Arcila¹, Richard P. Vari², and Naércio A. Menezes³

***Acrobrycon*, a genus of Neotropical freshwater fishes from the western Amazon and northwestern portions of the La Plata basin is revised. The genus is found to include three species, two of which are new to science. *Acrobrycon ipanquianus* is distributed from the western portions of the Río Amazonas through to the northwestern region of the Río de La Plata basin; *A. starnesi*, new species, in the southwestern portion of the Amazon basin in Bolivia; and *A. ortii*, new species, in the northwestern Río de La Plata basin in Argentina. Members of the genus are distinguished from each other on the basis of the depth at the dorsal-fin origin, the horizontal eye diameter, the least interorbital width, and the numbers of perforated lateral-line scales, anal-fin rays, and horizontal scales around the caudal peduncle. The analysis found that *A. tarijae*, described from the Río Lipeo in Bolivia, cannot be distinguished morphologically from *A. ipanquianus*; thus, *A. tarijae* is placed into the synonymy of *A. ipanquianus*.**

En este estudio se revisan los caracidos neotropicales del género *Acrobrycon*. El género incluye tres especies, dos de las cuales son nuevas para la ciencia. *Acrobrycon ipanquianus* se distribuye desde la cuenca oriental del Río Amazonas hasta el noroccidente de la cuenca del Río de La Plata en Argentina; *A. starnesi*, especie nueva, ocurre en la porción suroccidental de la cuenca del Río Amazonas en Bolivia; *A. ortii*, especie nueva, esta restringida al noroccidente de la cuenca del Río de La Plata en Argentina. Los miembros de *Acrobrycon* se diferencian entre sí con base en la profundidad del origen de la aleta dorsal, el diámetro horizontal del ojo, el ancho interorbital, el número de escamas perforadas en la línea lateral, el número de radios en la aleta anal, y el número de escamas horizontales alrededor del pedúnculo caudal. Este análisis indica *Acrobrycon ipanquianus* descrita para el Río Urubamba en Perú y *A. tarijae*, no pueden ser diferenciados morfológicamente y por ende *A. tarijae* se considera un sinónimo de *A. ipanquianus*.

THE genus *Acrobrycon* was proposed by Eigenmann and Pearson (in Pearson, 1924) for a species of moderate-sized characids originally described by Cope (1877) as *Tetragonopterus ipanquianus* based on specimens that originated in the Río Urubamba in the western Amazon. Fowler (1940) subsequently described a second species of *Acrobrycon*, *A. tarijae*, from specimens collected in the Río Lipeo, a tributary of the Río de La Plata in northwestern Argentina. According to the recent literature, *Acrobrycon* is distributed across a major portion of the western Amazon basin in Peru and Bolivia as well as the northwestern region of the Río de La Plata basin in Argentina (Ringuelet et al., 1967; Géry, 1977; Weitzman and Fink, 1985; Burns et al., 1995; Weitzman, 2003; Ortega et al., 2010; Eschmeyer, 2012). *Acrobrycon* together with *Diapoma* and *Planaltina* form the tribe Diapomini (Weitzman et al., 1988). That tribe differs from the remaining taxa in the subfamily Stevardiinae in two attributes of the pheromone organs overlying the basal portions of the caudal fin. Most obvious is the nearly equivalent sizes of the organs in mature males and females contra the sexually dimorphically differently sized organs in the remainder of the Stevardiinae. Secondly, genera of the Diapomini have three or more series of scales immediately ventral to the lateral-line series which forms the dorsal border of the pouch opening. Other genera of the Stevardiinae either lack any such series of scales or have a lesser number of series (Weitzman and Menezes, 1998).

Despite multiple citations of the species of *Acrobrycon* over the decades (Eigenmann and Allen, 1942; Fowler, 1948; Ringuelet et al., 1967; Ortega and Vari, 1986; Weitzman, 2003), neither *A. tarijae* nor *A. ipanquianus* were critically

analyzed post their original descriptions nor has the genus been the subject of an in-depth analysis. Examination of specimens of *Acrobrycon* from the western portions of the Amazon basin and the northwestern region of the Río de La Plata basin revealed a more complex species-level situation than previously suspected. We herein report the discovery of two new species and evaluate the validity of *A. tarijae*.

MATERIALS AND METHODS

Counts and measurements follow the methods outlined by Menezes et al. (2003) and Menezes and Weitzman (2009). Measurements rounded to the nearest 0.1 mm were made with digital calipers. Morphometric data are expressed as percentages of standard length (SL) or percentages of head length (HL) and summarized in Table 1. Specimens were cleared and double stained (CS) for bone and cartilage following the procedure of Taylor and Van Dyke (1985). Anal- and caudal-fin ray counts were in some instances taken from radiographs. Values in parentheses after a count are the number of examined specimens with that count. The values for the holotypes of new species are indicated by an asterisk. Due to the poor condition of the holotype of *Acrobrycon ipanquianus*, it was impossible to get exact values of various meristics. Institutional abbreviations are as listed at <http://www.asih.org/node/204>.

A principal component analysis (PCA) based on morphometric characters was used to differentiate the species of *Acrobrycon*. The PCA was performed on the co-variance matrix of the log-transformed measurements. The values

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Table 1. Morphometric Data for *Acrobrycon ipanquianus* ($n = 112$), *A. starnesi* ($n = 35$), and *A. ortii* ($n = 15$). Standard length (SL) and head length (HL) are expressed in millimeters; measurements 1 to 16 are percentages of SL; 17 to 18 percentages of HL. Range and mean for each species includes value of holotype.

	<i>A. ipanquianus</i>			<i>A. starnesi</i>			<i>A. ortii</i>		
	Holotype	Range	Mean	Holotype	Range	Mean	Holotype	Range	Mean
Standard length (SL, mm)	95.6	26.4–115.0	73.4	62.5	54.5–70.3	59.5	61.3	39.6–60.1	46.3
% SL									
1 Depth at dorsal-fin origin	29.8	49.0–51.2	35.7	33.5	25.8–31.0	28.4	28.6	22.8–37.4	32.3
2 Snout to dorsal-fin origin	49.0	49.6–58.4	53.5	52.3	51.9–56.9	54.9	51.5	52.8–57.1	55.1
3 Snout to pectoral-fin origin	22.1	18.7–25.5	22.8	23.2	22.6–25.0	23.8	21.2	21.9–25.3	23.5
4 Snout to pelvic-fin origin	46.1	42.7–49.2	45.8	46.6	44.6–48.2	46.4	44.8	43.4–47.9	45.3
5 Snout to anal-fin origin	63.2	56.7–66.9	61.6	60.8	60.0–65.5	62.9	60.0	57.6–63.1	60.6
6 Caudal peduncle depth	13.5	11.3–15.3	13.1	12.2	10.1–12.9	11.5	13.4	11.3–13.7	12.4
7 Caudal peduncle length	11.8	8.9–15.0	12.3	13.9	11.8–14.3	13.2	12.1	8.9–14.0	10.9
8 Pectoral-fin length	21.1	18.6–23.7	21.1	21.8	18.3–22.9	20.9	22.0	19.8–23.0	21.6
9 Pelvic-fin length	15.7	12.4–18.0	14.9	15.3	13.3–18.1	14.9	17.3	13.2–17.2	14.7
10 Dorsal-fin base length	11.4	8.6–15.9	12.4	12.0	10.9–13.5	11.9	11.9	11.7–15.3	13.0
11 Dorsal-fin height	23.0	18.6–25.2	21.9	21.6	20.0–25.7	22.9	21.6	19.9–23.8	21.9
12 Anal-fin base length	25.3	19.9–29.4	27.3	27.3	23.1–29.6	25.8	27.7	27.2–30.6	28.9
13 Anal-fin lobe length	18.4	12.5–25.6	15.8	16.0	14.3–20.0	16.1	18.9	13.6–19.4	16.2
14 Eye to dorsal-fin origin	38.4	38.4–49.8	43.9	42.9	39.8–44.7	42.0	41.8	41.0–46.9	44.2
15 Dorsal-fin origin to caudal-fin base	52.6	44.3–56.4	49.0	49.1	47.6–53.2	49.9	46.7	46.2–50.2	47.9
16 Head length	22.1	8.0–28.0	17.6	15.2	12.8–17.2	14.2	14.5	10.3–14.5	11.5
% HL									
17 Horizontal eye diameter	26.7	20.2–29.8	24.9	28.2	30.4–36.5	34.5	27.5	24.9–31.7	27.3
18 Least interorbital width	45.1	29.1–40.2	34.6	51.4	24.6–28.1	28.5	24.6	29.9–37.5	32.4

that were constant or appeared to vary randomly relative to size or sex were excluded from the PCA. The PCA results are based on the depth at the dorsal-fin origin, the distance from the snout to the pelvic-fin origin, the distance from the snout to the anal-fin origin and the distance from the dorsal-fin origin to the caudal-fin base.

***Acrobrycon* Eigenmann and Pearson, 1924**

Type species.—*Tetragonopterus ipanquianus* Cope, 1877, by original description. Gender: Masculine.

Diagnosis.—*Acrobrycon* is diagnosed within the Diapomini by the following combination of characters: teeth present along more than one-half the length of the dentigerous margin of the maxilla (versus the absence of teeth on the maxilla or only a few teeth present on that bone) and the presence of bony hooks on the rays of the caudal fin in mature males (versus hooks absent). It is further distinguished from *Diapoma* in having all scales of the lateral line perforated (versus perforation of the lateral line incomplete), from *Planaltina* by the elongate sperm cell nuclei (versus spherical nuclei; Menezes and Weitzman, 2011) and by the number of scales forming the dorsal border of the caudal pouch 4 to 8 scales (versus 1 to 2; Menezes et al., 2003).

Secondary sexual dimorphism.—Bony hooks are present on the anal-, pelvic-, and caudal-fin rays of mature males of the species of *Acrobrycon* but absent in mature females.

Distribution.—Examined samples of *Acrobrycon* originated in the drainage systems of the western and southwestern portions of the Amazon basin in Peru and Bolivia, the

northwestern region of the Río de La Plata basin, and the endorheic Río Dulce-Sali system of northwestern Argentina.

***Acrobrycon ipanquianus* (Cope, 1877)**

Figure 1, Table 1

Tetragonopterus ipanquianus, Cope, 1877:44 [Type locality: Río Urubamba, Peru. Type: ANSP 21114].—Böhlke, 1984:49 [report of holotype and paratype depository].

Astyanax ipanquianus, Fowler, 1906:337, fig. 25 [Río Urubamba, Peru; shift in generic assignment].

Hemibrycon ipanquianus, Eigenmann, 1910:432 [Río Ucayale (=Ucayali), Peru; in listing of species, name misspelled; shift in generic assignment].

Hemibrycon ipanquianus, Eigenmann, 1921:pl. 69, figs. 1–2; pl. 85, fig. 1 [Río Urubamba, Peru; only name and figure].

Acrobrycon ipanquianus, Eigenmann and Pearson, in Pearson, 1924:44 [Espia, Bolivia; shift in generic assignment].—Eigenmann, 1927:416 [eastern slopes of Andes in Peru and Bolivia].—Eigenmann and Allen, 1942:218 [Río Urubamba, Peru, to northern Bolivia].—Fowler, 1945:147–148 [Río Urubamba, Peru, and drainages of Amazon, Bolivia].—Fowler, 1948:33, fig. 23 [Amazonian portions of Peru, Bolivia].—Ortega and Vari, 1986:7 [Peru, Amazon].—Ortega, 1992:43 [Peru, occurrence in rivers above 1000 m].—Weitzman, 2003:223 [Río Urubamba basin in Río Ucayali drainage].—Ortega et al., 2010:34 [drainages of Río Amazonas, Peru].

Acrobrycon tarijae, Fowler, 1940:50, figs. 5–6 [Type locality: Río Lipeo, branch of Río Bermejo, Department of Tarija, Bolivia. New synonym. Holotype: ANSP 68775].—Fowler, 1948:34, fig. 24 [Río Paraguay, Bolivia].—Böhlke, 1984:55 [Río Lipeo, branch of Río Bermejo, Department of Tarija, Bolivia].—Ringuelet et al., 1967:156 [Argentina: basin of



Fig. 1. *Acrobrycon ipanquianus*, CAS 39059, 65 mm SL, Peru, Río Urubamba, Torontoi.

Río Bermejo, Salta; Río Lipeo and Río Dorado; basin of Río Pilcomayo, Formosa; basin of Sali, Tucuman, Leales, and Trancas].—Weitzman, 2003:223 [southern Bolivia, Tarija; northern Argentina, Salta and Jujuy].

Diagnosis.—*Acrobrycon ipanquianus* is distinguished from *A. starnesi* by the number of perforated lateral-line scales (51 to 60 versus 61 to 66), the number of horizontal scales rows around the caudal peduncle (19 to 21 versus 22 to 26), the depth of the body at the dorsal-fin origin (49.0–51.2% of SL versus 25.8–31.0%), the horizontal diameter of the eye (20.2–29.8% of HL versus 30.4–36.5%), and the interorbital width (29.1–40.2% of HL versus 24.6–29.8%). *Acrobrycon ipanquianus* can be distinguished from *A. ortii* in the number of branched anal-fin rays (23 to 27 versus 19 to 21), the body depth at the dorsal-fin origin (49.0–51.2% SL versus 22.8–37.4%), the depth at the dorsal-fin origin relative to the horizontal eye diameter (390–820% versus 260–380%), the horizontal eye diameter relative to the interorbital width (100–180% versus 80–90%), and the caudal-peduncle length relative to the body depth at the dorsal-fin origin (240–440% versus 160–230%).

Description.—Body elongate. Greatest body depth located slightly anterior of dorsal-fin origin and greatest body width at anterior limit of pectoral-fin insertion. Dorsal profile of body convex from tip of snout to dorsal-fin origin, slightly depressed along nape, nearly straight along dorsal-fin base and slightly concave along caudal peduncle. Dorsal-fin origin located nearer to caudal fin base than to tip of snout. Ventral profile of body more convex than dorsal profile of body. Body profile convex from tip of lower jaw to anal-fin origin and then straight along anal-fin base to origin of procurrent caudal-fin rays. Snout rounded in lateral view. Mouth terminal. Mouth gape inclined posteroventrally. Maxilla extending posteriorly beyond vertical through anterior margin of orbit but falling short of vertical through posterior border of pupil. Posteroventral border of maxilla convex and posterior margin concave.

Dorsal-fin rays ii,8 in all specimens. Posterior most dorsal-fin rays unbranched. Adipose fin present. Unbranched anal-fin rays ii or iii; branched rays 23* (31), 24 (14), 25 (43), 26 (13), or 27 (4). Expanded anterior anal-fin lobe in mature males includes all unbranched rays and anterior 6 (99) or 7 (6) branched rays. Anal fin of sexually mature males with bony hooks on first unbranched ray and on anterior 10 (11), 11 (2), or 12 (5) branched rays. One unbranched pectoral-fin ray in all specimens; branched rays 9 (50), 10 (38), or 11* (23). Tip of pelvic fin reaching slightly posterior of anal-fin

origin in mature males, but falling short of that point in all females. Pelvic-fin rays i,6* (108) or i,7 (4). Sexually mature males with bilateral hooks on pelvic-fin rays. Number of hooks per ray varies among individuals with 18 or 19 hooks most common. Sexually mature males with hooks on caudal-fin rays, most often on middle rays.

Scales cycloid, with 4 to 8 radii along exposed field of scale over most of body and 14 to 17 radii on scales bordering pouch opening. Lateral line completely pored with 51 (6), 52 (13), 53 (6), 54 (11), 55 (13), 56 (21), 57 (7), 58 (8), or 60 (1) scales. Predorsal scales 19 (2), 20 (9), 21 (7), 22 (1), 23 (4), 24 (1), 25 (5), or 26 (3). Horizontal scale rows around caudal peduncle 19* (23), 20 (15), or 21 (8).

Premaxillary teeth in two distinct rows. Larger teeth in each row with five cusps; smaller teeth bearing three cusps, with cusp to each side of central cusp barely apparent. Outer tooth row with 4 or 5 teeth. Inner tooth row with 4 teeth. Maxillary teeth 6 to 11. Anterior teeth on maxilla with 1 or 3 cusps; remaining teeth smaller and with 1 or 2 cusps. Dentary bearing 4 large anterior teeth with 5 cusps; large teeth followed by 6 to 10 smaller teeth with 1 or 3 cusps.

Coloration in alcohol.—Body coloration of examined specimens variable; ranging from overall light tan through dark brown. Pigmentation always darker dorsally with more intense coloration extending ventral of lateral line on both abdomen and caudal peduncle. Boundary between darker pigmentation of dorsal and dorsolateral regions and lighter coloration of ventrolateral and ventral regions relatively distinct. Lighter individuals with darker pigmentation less intense proximate to dorsal midline. Ventrolateral portion of abdomen and ventral part of caudal peduncle silvery in specimens retaining guanine. Faint, vertically elongate, dark blotch present on humeral region. All fins pale overall, with limited dark pigmentation in lightly pigmented individuals. Circumorbital bones and opercle with very few scattered dark chromatophores; silvery sheen in specimens retaining guanine.

Secondary sexual dimorphism.—Hooks present on anal-, pelvic-, and caudal-fin rays of mature males but absent in mature females.

Distribution.—*Acrobrycon ipanquianus* is known from a series of locations along the Andean piedmont of the western and southwestern portions of the Amazon basin in Peru and Bolivia and the northwestern portion of the Río de La Plata basin in Argentina (Fig. 2).

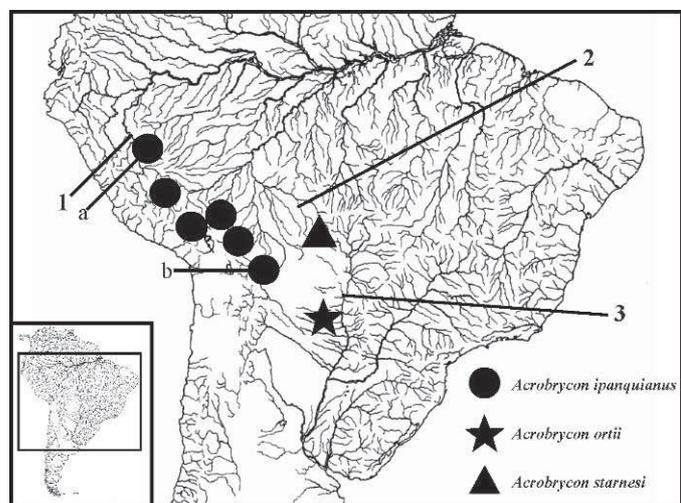


Fig. 2. Map of central portions of South America, showing the distribution of *Acrobrycon ipanquianus*, *A. starnesi*, and *A. ortii*; some symbols represent more than one collecting locality or sample. 1 = Río Ucayali, 2 = Río Mamore, 3 = Río Paraguay; a = type locality of *A. ipanquianus*, b = type locality of *A. tarijiae* (= *A. ipanquianus*).

Remarks.—*Acrobrycon tarijiae* was first described by Fowler (1940) who recognized it as closely related to *A. ipanquianus*. That author proposed that *A. tarijiae* differed from *A. ipanquianus* in the more anterior location of the insertion of the anal fin relative to the base of the dorsal fin, the possession of a few additional teeth along the dentigerous margin of the maxilla and the location of the dorsal-fin origin distinctly closer to the base of the caudal fin than to the tip of the snout. Our examination of the type series of the two nominal species and a large series of specimens of the genus from across the distribution of the two forms revealed that neither the putative diagnostic characteristics proposed by Fowler (1940) nor any of the morphometric and meristic characters incorporated in this study served to distinguish the two nominal species. The results of the PCA similarly indicate that the individuals originally described as *A. tarijiae* belong to *A. ipanquianus* (Fig. 3). Mirande (2010) proposed that the form of the articulation of the second and third infraorbitals, a palatine approximately one-half or less the length of the ectopterygoid, the presence of a conspicuous foramen in the palatine, and the presence of bony hooks on the caudal-fin rays of mature males were autapomorphic for *A. tarijiae*. These conditions are, however, also present in the types and/or samples of the genus from the region of the type locality of *A. ipanquianus*. In light of this evidence, we consider *A. tarijiae* to be a synonym of *A. ipanquianus* which is the most widespread member of the genus (Fig. 2).

Material examined.—AMNH 16203, 2, 30–68 mm SL; CAS 45837, 37, 70–106 mm SL, Peru, Río Urubamba, Ollantaytambo Village, Incaic ruins. ANSP 21114, 1, holotype of *Acrobrycon ipanquianus*, 95.6 mm SL; ANSP 21115, 2, paratypes of *A. ipanquianus*, 90.7–96.7 mm SL, upper waters of Urubamba, one source of the Ucayale (=Ucayali), at 11,500 ft. ANSP 68775, 1, holotype of *Acrobrycon tarijiae*, 85.8 mm SL; ANSP 68776, 2, paratypes of *A. tarijiae*, 74.7–77.9 mm SL; ANSP 68778, 33, paratypes of *A. tarijiae*, 34.5–41.4 mm SL; UMMZ 66477, 1, 64 mm SL; UMMZ 203201, 4, 24–45 mm SL, Bolivia, Department of Tarija, Río Lipeo,

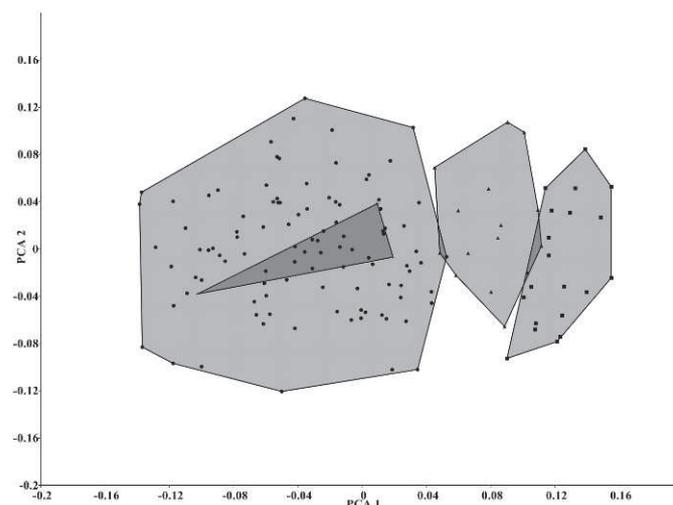


Fig. 3. Principal components analysis of the species of *Acrobrycon*: *A. ipanquianus* (dots and paratypes of *A. tarijiae* crosses), *A. starnesi* (squares), and *A. ortii* (triangles).

branch of Río Bermejo. CAS 39059, 2, 50–108 mm SL; UMMZ 185266, 4, 64–80 mm SL, Peru, San Miguel. CAS 39060, 62, 60–100 mm SL, Peru, Río Urubamba, San Miguel. CAS 45835, 100, 70–120 mm SL, Peru, Río Urubamba, Torontoi. USNM 325995, 3, 34.2–57.9 mm SL, Argentina, Provincia de Salta, Río Metan. USNM 342175, 2, 49.9–50.5 mm SL, Argentina, Department of Trancas, Tucuman, Río Chuscha, La Higuera. USNM 342176, 1, 49.9 mm SL, Argentina, Provincia de Salta, arroyo in Parque Nacional El Rey. USNM 342177, 1, 56.2 mm SL, Argentina, Provincia de Salta Arroyo Los Puestos, Parque Nacional El Rey. USNM 342178, 2, 69.5–69.9 mm SL, Argentina, Provincia de Salta Arroyo Ovejera, Parque Nacional El Rey.

Acrobrycon starnesi, new species

Figure 4, Table 1

Holotype.—CBF 13307 (previously USNM 319277), 62.5 mm SL, Bolivia, Chuquisaca, Río Thyumayu, tributary of Río Azero, by road 30 air km SE of Padilla, 19°34'S, 64°08'W, 28 September 1988, W. Starnes et al.

Paratypes.—USNM 408405, 29, 43.9–72.5 mm SL, collected with holotype. CBF 13308 (previously USNM 408405, in part), 5, 53.4–66.2 mm SL.

Non-type material.—USNM 305500, 30, 63.4–91.03 mm SL; USNM 408406, 375, 43.9–72.5 mm SL, collected with holotype.

Diagnosis.—*Acrobrycon starnesi* is distinguished from *A. ipanquianus* in the number of perforated lateral-line scales (61 to 66 versus 51 to 60), the number of horizontal scales rows around the caudal peduncle (22 to 26 versus 19 to 21), the depth of the body at the dorsal-fin origin (25.8–31.0% of SL versus 49.0–51.2%), the horizontal diameter of the eye (30.4–36.5% of HL versus 20.2–29.8%), and the interorbital width (24.6–28.1% of HL versus 29.1–40.2%). *Acrobrycon starnesi* is distinguished from *A. ortii* by the number of branched anal-fin rays (22 to 26 versus 19 to 21), the number of perforated lateral-line scales (61 to 66 versus 53 to



Fig. 4. *Acrobrycon starnesi*, new species, USNM 319277, holotype, 62.5 mm SL, Bolivia, Department of Chuquisaca, Río Thyumayu, tributary Río Azero, by road 30 air km SE of Padilla, 19°34'S, 64°08'W.

58), the number of horizontal scales rows around the caudal peduncle (22 to 26 versus 19 to 20), the body depth at the dorsal-fin origin relative to the least interorbital width (70–80% versus 90–120%), the horizontal eye diameter relative to the least interorbital width (70–80% versus 90–110%), and the body depth at dorsal-fin origin relative to the anal-fin base length (100–120% versus 70–90%).

Description.—Body elongate. Greatest body depth located slightly anterior of dorsal-fin origin and greatest width of body at anterior limit of pectoral-fin insertion. Dorsal profile of body convex from tip of snout to dorsal-fin origin, slightly depressed along nape, nearly straight along dorsal-fin base and slightly concave along caudal peduncle. Dorsal-fin origin located nearer to base of caudal fin than to tip of snout. Ventral profile of body more convex than dorsal profile; convex from tip of lower jaw to anal-fin origin and straight along anal-fin base to origin of procurrent caudal-fin rays. Snout rounded. Mouth terminal. Gape inclined posteroventrally. Maxilla extending posteriorly beyond vertical through anterior margin of orbit but falling short of posterior border of pupil. Posteroventral border of maxilla convex and posterior margin concave.

Dorsal-fin rays ii,8 in all specimens. Posterior most dorsal-fin ray unbranched. Adipose fin present. Unbranched anal-fin rays iv or v; branched rays 22* (4), 23 (16), 24 (14), 25 (3), or 26 (4). Anal fin of males with bilateral, well developed, bony hooks on last unbranched ray and anterior 8* (12) or 9 (5) branched rays. Unbranched pectoral-fin rays ii* or iii; branched rays 9 (11)*, 10 (19), or 11 (5). Tip of pectoral fin extending to, or slightly beyond, pelvic-fin origin in mature males; falling short of that point in females of all sizes. Pelvic-fin rays ii,6 in all specimens. Sexually mature males with bilateral hooks present on pelvic-fin rays. Tip of pelvic fin extending slightly beyond anal-fin origin in adult males, barely reaching that point in all females.

Scales cycloid with 4 to 6 radii along exposed field on surface of body and 15 to 18 radii on scales bordering pouch opening. Lateral line completely pored with 61 (4), 62 (8)*, 63 (7), 64 (4), 65 (12), or 66 (3) scales. Predorsal scales 20* (6), 21 (2), 22 (5), 23 (8), or 24 (7). Horizontal scale rows around caudal peduncle 22 (2), 23* (8), 24 (6), or 26 (2).

Premaxillary teeth in two distinct rows. Larger teeth in each row with 3 or 5 cusps; smaller teeth with 3 cusps. Outer tooth row with 5 or 6 teeth. Inner tooth row with 4, rarely 5

teeth (latter count present only in 2 specimens). Maxilla with 3 to 12 teeth. Anterior teeth of maxilla larger than posterior teeth with 1 or 3 cusps; posterior teeth usually with 1 cusp. Dentary bearing 4 large anterior teeth with 5 cusps; large teeth followed by 5 to 9 smaller teeth with 1 or 3 cusps.

Coloration in alcohol.—Body coloration of examined specimens variable; ranging from overall light tan to dark brown. Pigmentation always darker dorsally with darker coloration extending ventral of lateral line onto abdomen and caudal peduncle. Boundary between brown pigmentation of dorsal and dorsolateral regions and lighter coloration of ventrolateral and ventral regions relatively distinct. Lighter colored individuals with pigmentation proximate to middorsal region somewhat lighter. Ventrolateral portion of abdomen and ventral part of caudal peduncle silvery in specimens retaining guanine. Faint, vertically elongate, dark blotch present on humeral region. All fins pale overall, with dark pigments more restricted in lighter individuals. Circumorbital bones and opercle silvery in specimens retaining guanine with very few scattered dark chromatophores.

Sexual dimorphism.—Hooks present on anal-, pelvic-, and caudal-fin rays of mature males but absent in mature females.

Distribution.—*Acrobrycon starnesi* is only known from the Río Thyumayu, a tributary the Río Azero, in the western portion of the Amazon basin in Bolivia (Fig. 2).

Remarks.—*Acrobrycon starnesi* is endemic to the western portions of the Amazon basin. This species is very similar to *A. ipanquianus* in its overall head and body form, overall coloration, and meristic values; however, the two species are distinguishable in the features noted in the diagnosis (Fig. 3). Some of the specimens collected with the holotype and paratypes are considered non-types since complete meristic and morphometric information was not taken from that material and portions of it are damaged.

Etymology.—The species name, *starnesi*, is in honor of Wayne C. Starnes of the North Carolina State Museum of Natural History, who collected the type-series of this species along with numerous other specimens of fishes that have proved very useful in this and other studies.



Fig. 5. *Acrobrycon ortii*, new species, USNM 305496, holotype, 61.3 mm SL, Bolivia, Villamontes, Río Pilcomayo, Río Paraguay basin, 21°20'S, 63°37'W.

Acrobrycon ortii, new species

Figure 5, Table 1

Holotype.—CBF 13305 (previously USNM 305496), 61.3 mm SL, Bolivia, Villamontes, Río Pilcomayo, Río Paraguay basin, 21°20'S, 63°37'W, 2 October 1988, W. Starnes.

Paratypes.—USNM 408404, 13, 42.0–61.3 mm SL, collected with holotype; MLP 10317 (previously USNM 408404, in part), 2, 52.9–55.3 mm SL, CBF 13306 (previously USNM 408404, in part), 3, 44.2–46.7 mm SL.

Diagnosis.—*Acrobrycon ortii* is distinguished from *A. ipanquianus* by the number of branched anal-fin rays (19 to 21 versus 23 to 27), the body depth at the dorsal-fin origin (22.8–37.4% of SL versus 49.0–51.2%) and the caudal-peduncle length relative to the body depth at the dorsal-fin origin (160–230% versus 240–440%). *Acrobrycon ortii* differs from *A. starnesi* in the number of branched anal-fin rays (19 to 21 versus 22 to 26), the number of perforated lateral-line scales (53 to 58 versus 61 to 66), the number of horizontal scale rows around the caudal peduncle (19 to 20 versus 22 to 26), the body depth at the dorsal-fin origin relative to the least interorbital width (90–120% versus 70–80%), the body depth at the dorsal-fin origin relative to the anal-fin base length (70–90% versus 100–120%), and the horizontal eye diameter relative to the least interorbital width (90–110% versus 70–80%).

Description.—Body elongate. Greatest body depth located slightly anterior of dorsal-fin origin and greatest width of body at anterior limit of pectoral-fin insertion. Dorsal profile of head and body convex from tip of snout to dorsal-fin origin, slightly depressed along nape, nearly straight along dorsal-fin base and slightly concave along caudal peduncle. Dorsal-fin origin located nearer to base of caudal fin than to tip of snout. Ventral profile of body more convex than dorsal profile; convex from tip of lower jaw to anal-fin origin, straight along anal-fin base to origin of procurrent caudal-fin rays. Snout rounded. Mouth terminal. Gape inclined posteroventrally. Maxilla extending posteriorly beyond vertical through anterior margin of orbit, but falling short of vertical through posterior margin of pupil. Posteroventral border of maxilla convex and posterior margin concave.

Dorsal-fin rays ii,8 in all specimens. Posterior most dorsal-fin ray unbranched. Adipose fin present. Unbranched anal-fin

rays ii or iv; branched rays 19* (9), 20 (4), or 21 (2). Anal fin of males with small bony hooks on last unbranched and first 6 (2) or 7 (1) branched rays. Unbranched pectoral-fin rays i or ii; branched-rays 9 (3), 10* (10), or 11 (2). Tip of pelvic fin extending slightly posterior of anal-fin origin in mature males but falling short of that point in all females. Pelvic-fin rays ii,6 in all specimens. Sexually mature males with bilateral bony hooks on pelvic-fin rays. Sexually mature males bearing hooks on caudal-fin rays, most often on middle and ventral rays.

Scales cycloid, with 4 to 7 radii along exposed field on scales over body and 14 or 15 radii on scales bordering pouch opening. Lateral line completely pored with 53 (1), 54* (2), 55 (2), 56 (3), 57 (2), or 58 (1) scales. Predorsal scales 21 (3), 22* (6), or 23 (4). Horizontal scale rows around caudal peduncle 19* (9) or 20 (5).

Premaxillary teeth in two distinct rows. Larger teeth in each row with 5 cusps; smaller teeth bearing 3 cusps with barely apparent cusp on each side of primary cusp. Outer tooth row with 4 or 5 teeth. Inner tooth row usually with 4 teeth (1 specimen with 5 teeth). Maxilla with 4 to 9 teeth. Anterior teeth on maxilla larger with 1 or 3 cusps; smaller posterior teeth with 1 or 2 cusps. Dentary bearing 4 large anterior teeth with five cusps; large teeth followed by 5 to 9 smaller teeth with 1 or 3 cusps.

Coloration in alcohol.—Body coloration of examined specimens ranging from overall light tan to dark brown. Pigmentation in all specimens lighter proximate to middorsal region with dark coloration then extending ventral of lateral line on abdomen and caudal peduncle. Boundary between brown pigmentation of dorsal and dorsolateral regions and lighter coloration of ventrolateral and ventral regions relatively distinct. Ventrolateral portion of abdomen and ventral part of caudal peduncle silvery in specimens retaining guanine. Faint, vertically elongate, dark blotch present on humeral region. All fins pale, with dark pigmentation restricted in lightly colored individuals. Circumorbital bones and opercle silvery with very few scattered dark chromatophores in specimens retaining guanine.

Secondary sexual dimorphism.—Hooks present on anal-, pelvic-, and caudal-fin rays of mature males but absent in mature females. One examined male with hooks present on caudal-fin rays but absent on pectoral and dorsal fins; variation also observed by Mirande (2010).

Distribution.—*Acrobrycon ortii* is known from the northwestern portions of the Río La Plata basin (Fig. 2).

Remarks.—*Acrobrycon ipanquianus* and *A. ortii* are very similar, but *A. ipanquianus* has a consistently deeper body (Table 1, Fig. 3) and a greater number of branched anal-fin rays in both genders than does *A. ortii* (19 to 21 versus 23 to 27) across the examined size range.

Etymology.—The species name, *ortii*, is in honor of Guillermo Ortí of The George Washington University, in recognition of his extensive contributions to our knowledge of the evolution of Neotropical freshwater fishes.

DISCUSSION

Much of the interspecific variation found within *Acrobrycon* in the PCA was along the first two axes which accounted for almost 82% of the accumulated variance. A large proportion (71%) of the first axis was explained by differences in the horizontal eye diameter (0.60), the depth at dorsal-fin origin length (−0.44), caudal peduncle length (0.39), and the least interorbital width (−0.34; Fig. 3). In addition, species of *Acrobrycon* demonstrated variation in the number of perforated lateral-line scales, anal-fin rays, and horizontal scales around the caudal peduncle. The narrow ranges of variation in meristics and morphometrics as well as morphological similarity among the species of *Acrobrycon* complicates specimen identification. A comparable conserved morphology characterizes *Diapoma* and *Planaltina*, the genera most closely related to *Acrobrycon* (Menezes et al., 2003; Menezes and Weitzman, 2011). One explanation for the lack of variation among the species of *Acrobrycon* may be the relatively homogeneous habitats occupied by these species, the moderate-sized geographic distributions of the forms which in two instances are known only from the type localities.

A particularly noteworthy aspect of the distribution of the species of *Acrobrycon* is the distribution of *A. ipanquianus* across the western portion of the Río Amazonas through to the northwestern basin of the Río Paraguay in the Río de La Plata system. Biogeographic analyses have suggested complicated evolutionary scenarios for several genera of ostariphyans in the region (Carvalho and Albert, 2011). Species of the catfish genus *Cetopsis*, for example, show a historical connection between rivers of western Amazonas and the northwestern of the Río de La Plata basin (Vari et al., 2005). Carvalho and Albert (2011) found species of *Gymnotus* from the Río Amazonas to be closely related to species in the Río de La Plata system. These examples and others suggest the possibility of complex patterns of trans-drainage basin relationships in the region. The close phylogenetic relationship of *Acrobrycon* found in upper portions of Andean tributaries with *Diapoma* and *Planaltina*, taxa occurring respectively in lowland southeastern and central areas of South America within the putative monophyletic clade Diapomini as hypothesized by Menezes and Weitzman (2011) indicates that the evolution of *Acrobrycon* may be associated with the rise of the Andes. However, details of phylogeographic patterns might informatively be examined via appropriate molecular analyses.

KEY TO THE SPECIES OF ACROBRYCON

- 1a. 61 to 66 perforated lateral-line scales; 22 to 26 horizontal scales rows around caudal peduncle

Acrobrycon starnesi, new species

western portion of Río Amazonas, Bolivia

- 1b. 51 to 60 perforated lateral-line scales; 19 to 21 horizontal scales rows around caudal peduncle 2
2a. 19 to 22 branched anal-fin rays; body depth at dorsal-fin origin 22.8–37.4% of SL

Acrobrycon ortii, new species

- northwestern region of Río de La Plata basin, Argentina
2b. 23 to 27 branched anal-fin rays; body depth at dorsal-fin origin 49.0–51.2% of SL

Acrobrycon ipanquianus

western and southwestern portions of Río Amazon basin in Peru and Bolivia

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