

**Taxonomic status and geographic distribution of
Bryconamericus eigenmanni Evermann & Kendall, 1906
(Characiformes: Characidae)**

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Abstract.—*Bryconamericus eigenmanni* Evermann & Kendall (1906) is re-described on the basis of additional material collected at the type locality, Río Primero, Province of Córdoba, central Argentina. Evidence supporting the validity of *B. eigenmanni* based on morphometric, meristic, and osteological characters is discussed. The geographic distribution of *B. eigenmanni* is analyzed and the species is compared with *Bryconamericus iheringi*, which some authors suggested was conspecific. *Bryconamericus eigenmanni* can be distinguished from *B. iheringi* by the number of maxillary teeth, premaxilla shape, body depth, caudal peduncle length, orbital diameter, and the secondary sexual dimorphism of the pelvic fin of males. The known range of *B. eigenmanni* suggests that it is endemic to endorheic drainage basins of central Argentina.

Resumen.—Se redescrive *Bryconamericus eigenmanni* en base a material adicional colectado en la cuenca de la localidad tipo, Río Primero, Provincia de Córdoba, Argentina central. Se discute evidencia apoyando la validez de *B. eigenmanni* en base a caracteres morfométricos, merísticos y osteológicos. Asimismo, se analiza la distribución geográfica y se compara con *Bryconamericus iheringi*, la cual fue sugerida como coespecífica por algunos autores. *Bryconamericus eigenmanni* puede distinguirse por el número de dientes maxilares, forma del premaxilar, diámetro orbitario, altura del cuerpo, longitud del pedúnculo caudal, y el dimorfismo sexual secundario en la aleta pélvica del macho. El rango de distribución conocido de *B. eigenmanni* sugiere que es endémica de cuencas endorreicas de la región central de Argentina.

The characid *Bryconamericus eigenmanni* (Evermann & Kendall 1906:83) was originally described on the basis of two specimens from the Río Primero, the main tributary of an endorheic drainage basin of the Province of Córdoba, in central Argentina. The taxonomic status of this species has been regarded as unclear by a number of authors primarily because of its close similarity with *B. iheringi*, a species widespread through the Plata basin. This similarity was noted by Eigenmann (1927:379),

although he preferred to recognize the species as distinct, a practice followed by subsequent authors (e.g., Ringuelet et al. 1967: 116, Géry 1977:390). The lack of additional collections of *B. eigenmanni* prevented further analysis of the question. Malabarba & Kindel (1995:684) explicitly noted the need for a statistical comparison of population samples from within the areas of distribution of both nominal species. However, these authors added uncertainty to the identity of *B. eigenmanni* by erroneously citing

its type locality as being within the Río Paraná system, when it is actually a separate drainage.

Bryconamericus eigenmanni, first assigned to *Astyanax* by Evermann & Kendall (1906:83), was transferred to *Bryconamericus* by Eigenmann (1910:434), who had previously proposed the genus (in Eigenmann et al. 1907:139). The current definition of the genus follows Eigenmann (1927), and was summarized by Vari & Siebert (1990:516) and Malabarba & Kindel (1995:679). These authors, among others, pointed out the need for a reconsideration of the monophyly of *Bryconamericus*, including an evaluation of the taxonomic status of the nominal species assigned to the genus. Given those questions, we have focused on the taxonomic identity of the species *B. eigenmanni* as part of a comprehensive revision of the species of the genus *Bryconamericus* in Argentina. We present evidence supporting the distinctiveness of *B. eigenmanni*, redescribe the species, compare it with *B. iheringi*, and discuss its geographic distribution.

Material and Methods

Most of the examined material was collected by members of the Laboratory of Ichthyology of the Institute of Limnology "Dr. Raúl A. Ringuelet" (ILPLA) during field trips to the Province of Córdoba, Argentina, using nets and the ichthyocide Pronoxfish. Measurements were taken using calipers to the nearest 0.05 mm. Caudal-peduncle length was measured from the base of the last anal-fin ray to the last perforated scale of the lateral line. Osteological preparations were made following Dingerkus & Uhler (1977). Meristic data are presented as ranges; the mean is indicated between parentheses when necessary. Counts of gill-rakers on the lower portion of the arch includes the element at the corner between inferior and superior arches. The anal-fin ray count includes the last ray divided to its base as a single element. The lateral-line

count includes the last pored scale. The following abbreviations are used: C & S, cleared and stained; F, females; HL, head length; M, males; *n*, number of specimens; and SL, standard length. Institutional abbreviations used in the listing of material examined follow Leviton et al. (1985). The drainage basins follow the terminology of Mazza (1962).

Bryconamericus eigenmanni (Evermann & Kendall, 1906)

Fig. 1a, b

Astyanax eigenmanni Evermann & Kendall, 1906: 83, fig. 1.

Bryconamericus eigenmanni.—Eigenmann, 1910: 434; 1927: 379, pl. 68, fig. 1, pl. 69, fig. 13.—Pozzi, 1945: 255.—Ringuelet & Arámburu, 1962: 29.—Ringuelet et al., 1967: 116.—Ringuelet, 1975: 82.—Géry, 1977: 390.—Malabarba & Kindel, 1995: 684, fig. 3.—Miquelarena & Aquino, 1995: 560.—López et al., 1996: 6.

Material examined (all localities in Argentina unless noted otherwise).—*Bryconamericus eigenmanni*: USNM 55570 (holotype of *Astyanax eigenmanni* Evermann & Kendall, 1906), Río Primero, Córdoba, 1903–1904. J. W. Titcomb. ILPLA 970 (8 ex.), MLP 6-VII-83-22 (8 ex.), second Arroyo Mallín-Tanti, Córdoba. ILPLA 971 (11 ex. + 8 c&s), MLP 6-VII-83-15 (55 ex.), Arroyo Cachimayo, near Tanninga, Córdoba. ILPLA 972 (17 ex.), Bialeto Masé, Río Cosquín, Córdoba. ILPLA 973 (11 ex. + 4 c&s), MLP 6-VII-83-16 (54 ex.), Arroyo Niñanquil, Córdoba. ILPLA 974 (5 ex.), MLP 6-VII-83-20 (26 ex.), stream at camping ground Villa Giardino, Córdoba.

Bryconamericus iheringi: ILPLA 297 (50 ex.), ILPLA 298 (7 ex.), ILPLA 595 (27 ex.), Laguna Chascomús, Buenos Aires. ILPLA 975 (18 ex.), Laguna Cochicó, Buenos Aires. MCP 11481 (3 ex.), Arroio do Ouro, along road between Feliz and Caxias do Sul (RS 452), almost 100 m above bridge, Jacui drainage, Rio Grande do Sul, Brazil. USNM 310959, Arroyo Pelotas at



Fig. 1. *Bryconamericus eigenmanni*, ILPLA 970. Left lateral view. a, female, SL = 61.0 mm; b, male, SL = 50.7 mm. Second Arroyo Mallín-Tanti, Córdoba, Argentina.

bridge crossing, along road between Pelotas and Porto Alegre, near Pelotas, Rio Grande do Sul, Brazil. USNM 310947, Rio Grande do Sul, Brazil. USNM 310979, Arroyo Sarandi, Rio Grande do Sul, Brazil.

Description

Body elongate. Dorsal and ventral profiles slightly convex. Head short and robust; snout deep and rounded, blunt. Caudal peduncle deep and moderately long. Anal-fin origin along vertical line through base of last dorsal-fin ray. Mouth slightly inferior. Maxilla approaching or reaching vertical line through anterior border of eye. Infraorbitals well developed, 6, third largest. Ventral and posterior margins of infraorbitals reaching horizontal and vertical limbs of preopercle.

Posterior border of dorsal, pectoral, and caudal fins gently rounded. Pelvic-fin tip rounded in males, pointed in females. Dorsal-fin rays ii, 7–9, typically 8. Second unbranched and first branched dorsal-fin rays almost equal in length. Tip of adpressed dorsal fin not reaching adipose fin. Adipose fin small. Pectoral-fin rays i, 10–12; these occasionally followed by one or two unbranched rays. Ventral-fin rays i–ii, 6–8,

typically ii, 7. Principal caudal-fin rays 17+2; dorsal caudal-fin procurrent rays 10–12, and ventral procurrent rays 8–10. Anal-fin rays iv, 15–17.

Cycloid scales regularly distributed on body. Single row of scales on base of 9 to 12 anterior branched anal-fin rays. Scales present on caudal-fin base. Lateral line complete, 38 to 39 perforated scales. Rows of scales from dorsal-fin origin to lateral line 5–6, and 4.5–5.5 from lateral line to anal-fin origin. Vertebrae 36–38, typically 37. Supraneurals 4–6, typically 5. Gill rakers 7–9+10–12. Morphometric characters presented in Table I.

Teeth.—Maxilla elongate, with 3 to 6 teeth along ventral margin (Fig. 2a). Each tooth typically tricuspidate, though teeth with 1 or 4 cusps also occur. Premaxilla ascending process short and slightly curved (Fig. 2b). Premaxilla with an outer row of 4 or 5 tricuspidate teeth, and an inner row of 4 teeth, with 4 or 5 cusps each. Dentary with 8 to 12 teeth: 3 or 4 larger anterior teeth with 4 or 5 cusps, followed by a series of smaller teeth, usually with 1 or 3 cusps (Fig. 2c).

Color in alcohol.—Ground color light tan. Body and head finely dotted, more con-

Table 1.—Morphometric data of *Bryconamericus eigenmanni* presented as percent of standard length (3–11), distance between origins of pectoral and pelvic fin (12), and head length (13–15) (ILPLA 970; ILPLA 971; ILPLA 973; ILPLA 974) (13 M, 7 F).

Character	Range	\bar{x}	SD	n
1 Standard length	46.0–73.0	59.6	5.8	20
2 Total length	58.0–88.0	72.4	6.9	20
3 Body depth	28.7–33.0	31.1	1.1	20
4 Head length	24.1–27.2	25.7	0.8	20
5 Caudal peduncle length	11.4–15.4	13.2	0.8	20
6 Caudal peduncle length	17.9–23.2	20.2	1.1	19
7 Predorsal distance	47.1–53.1	50.3	2.0	20
8 Prepelvic distance	42.5–49.1	46.4	1.8	20
9 Preanal distance	58.8–68.0	63.2	2.1	20
10 Pectoral-pelvic distance	19.5–26.8	23.6	1.6	20
11 Pelvic-anal distance	15.7–25.8	18.9	2.0	20
12 Pectoral length	73.8–125.2	103.9	13.7	17
13 Orbital diameter	21.9–30.7	27.9	1.9	20
14 Interorbital width	30.3–39.6	35.9	2.4	20
15 Snout	16.2–27.4	22.6	2.6	20

centrated along posterior scale margins forming overall reticulated pattern more evident above trunk midlateral line. Dark pigmentation on head, opercle, supraorbitals, maxilla, and along body dorsal of midline relatively more intense. Vertically elongate dark brown humeral mark between second and fourth lateral-line scales. Midlateral band extends from near vertical line through dorsal-fin origin, along second scale row dorsal to lateral line. Band faint anteriorly and becoming darker posteriorly; covering one-third of caudal peduncle depth below adipose fin, and terminating as triangular spot on caudal-fin base. Paired fins light brown. Dorsal and anal fins dark brown, with distal portions of first rays lighter. Middle rays of caudal fin dark.

Sexual dimorphism.—First to fourth or fifth branched pelvic-fin rays of males curved to form a basket-like structure (Fig. 3a). In females ventral fins almost flat (Fig. 3b). Pectoral and pelvic fins larger in males, where tip of pectoral fin reaches or slightly surpasses pelvic-fin origin. Pelvic fin reaches anal-fin origin. In females tip of both pectoral and pelvic fins separated from pelvic- and anal-fin origins, respectively, by two or more scale rows. Margin of anal fin almost straight in males and slightly con-

cave in females, in which first branched rays relatively longer. Males with bony hooks on pelvic and anal fins. Anal-fin hooks short, curved (Fig. 4a), forming smaller angle relative to ray axis than one formed by longer and more pointed pelvic-fin hooks (Fig. 4b).

Distribution.—Known only from the Province of Córdoba in central Argentina (31°00'S; 65°02'W). It was collected in the endorrheic drainage basins of the Río Primero and the Río Pichanas, to the east and west respectively of the Sierras Grandes.

Ecology.—Collected in shallow creeks (ca. 0.5 m deep) over sandy to rocky bottom, and in deeper pools (up to 1.5 m deep) of the same streams. Water in these environments has the anion CO_3H^- and the cations Ca^{++} and Na^+ as the most abundant elements (Menni et al. 1984). Following Cabrera's (1976) phytogeographical scheme, the distribution range of *B. eigenmanni* is the "Chaqueño-serrana" area of the "Chaqueño" dominion.

Discussion and Conclusions

The original description provided by Eigenmann & Kendall (1906) does not permit an unequivocal discrimination of *B. eigen-*

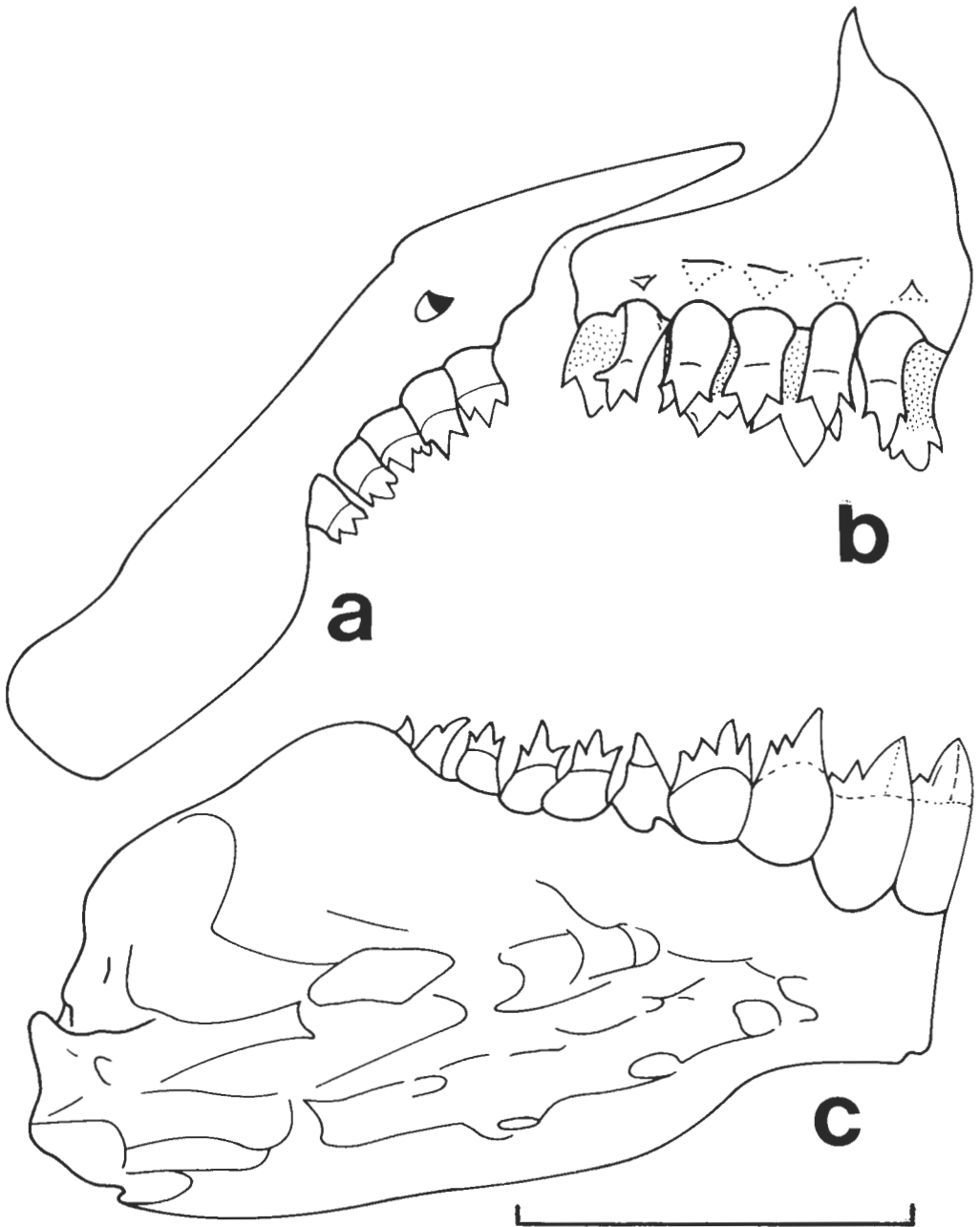


Fig. 2. Jaws of *Bryconamericus eigenmanni*, ILPLA 973. a, maxilla; b, premaxilla; c, dentary. Scale bar: 1 mm.

manni from congenetics. Eigenmann (1927) noted its close similarity to *B. iheringi*, however, indicating that *B. eigenmanni* differed in having less convex dorsal and ventral body profiles, longer pectoral fins, and wider naked area below the infraorbi-

tals. Ringuélet et al. (1967:116) and Malabarba & Kindel (1995:684) pointed out that neither the meristic nor morphometric values of *B. eigenmanni* clearly differed from those of *B. iheringi*. Malabarba & Kindel (1995) erroneously considered the type lo-

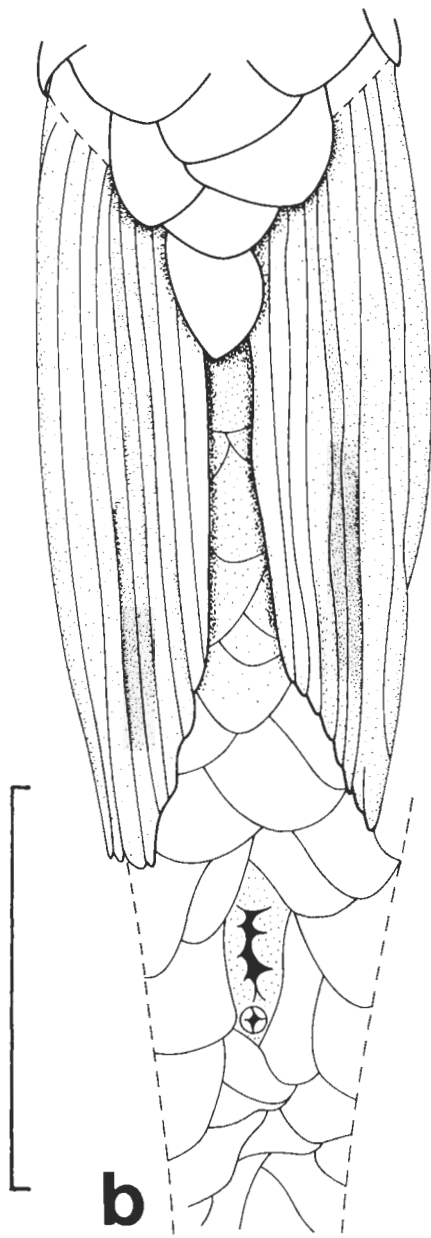
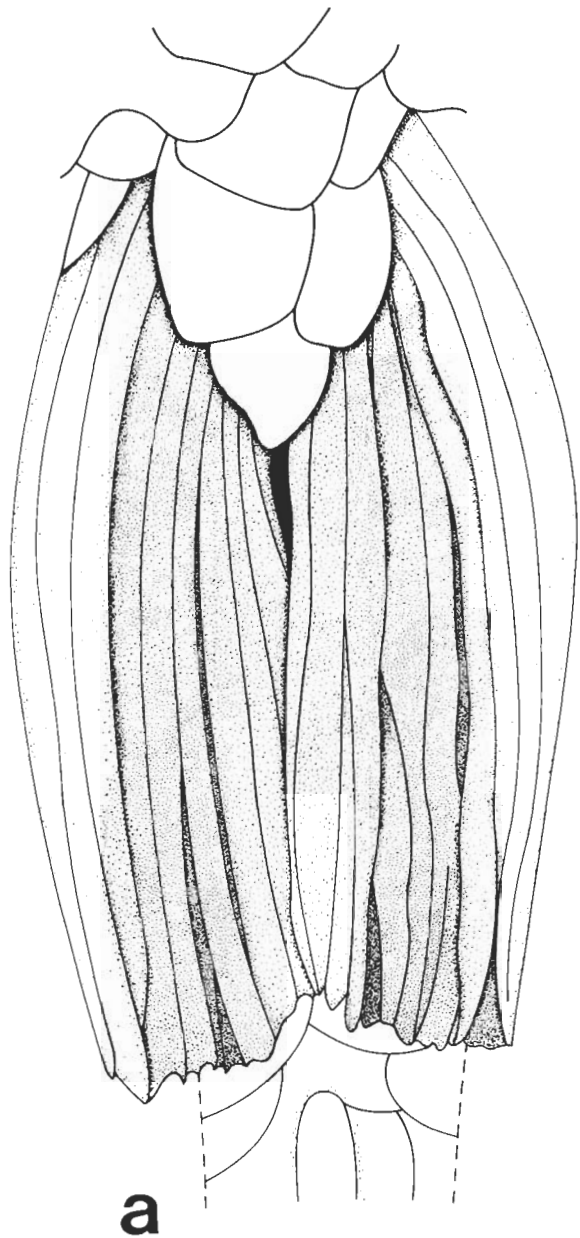


Fig. 3. Sexual dimorphism in ventral-fin shape of *Bryconamericus eigenmanni*. a, male; b, female. Scale bar: 5 mm.

cality of *B. eigenmanni* to be within the río Paraná basin, which implied overlapping geographical ranges between the two species. In actuality the type locality of *B. eigenmanni* is in an endorrheic drainage basin of central Argentina, separate from the Paraná/Plata basin.

The two type specimens of *B. eigenmanni* had been the only source of information on the species, leading to questions about its identity. The examination of more extensive samples of specimens from the type drainage of *B. eigenmanni* allows us to confirm the distinctiveness of the species and

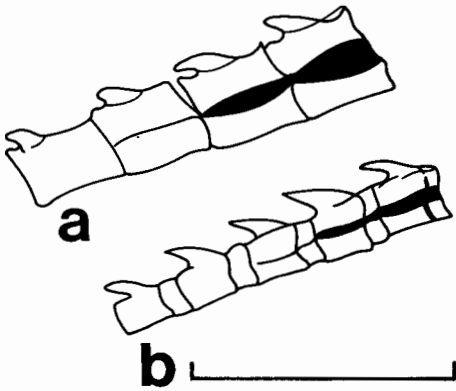


Fig. 4. Bony branched fin ray hooks in males of *Bryconamericus eigenmanni*. Left side, lateral view, tip of ray to the right. a, anal fin; b, ventral fin. Scale bar: 0.5 mm.

its restricted geographic distribution in central Argentina.

Bryconamericus eigenmanni differs from *B. iheringi* by the following combination of characters: higher number of maxilla teeth (3–6 vs. 2–4 in *B. iheringi*) (Fig. 2a) (Miquelarena & Aquino, 1995:567); premaxilla ascending process pointed and slightly curved (Fig. 2b); in *B. iheringi*, it is blunt and strongly curved (Miquelarena 1986: 30–32, Miquelarena & Aquino 1995:567); shallower body depth (28.7–33.0 (31.1) % SL; $n = 20$ vs. 33.7–38.3 (35.9) % SL; $n = 19$); shorter orbital diameter (21.9–30.7 (27.9) % HL; $n = 20$; 31.6–37.9 (34.9); $n = 19$); longer caudal-peduncle length (17.9–23.2 (20) % SL; $n = 19$ vs. 14.2–18.2 (15.9) % SL; $n = 19$); in males of *B. eigenmanni*, the fins are distinctly secondarily sexually dimorphic, with the first to fourth or fifth lateral branched rays curved to form a basket-like structure (Fig. 3a). In males of *B. iheringi*, the pelvic fins are almost flat, the same condition in females of both species.

According to the ichthyogeographical scheme proposed by Ringuet (1975), the range of *B. eigenmanni* falls in the contact zone between the Andean and Paranensean domains, encompassing the so-called Sierras Grandes, which represents the main oro-

graphic system of the region. Based on the similarity in the composition of fish faunas to both slopes of the Sierras Grandes, Menzi et al. (1984:28–29) proposed a demarcation between those domains west to these hills, a hypothesis which is also supported by the distribution range of *B. eigenmanni*.

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