

New Species of *Trichomycterus* from Midelevation Localities of Northwestern Argentina (Siluriformes: Trichomycteridae)

LUIS FERNÁNDEZ AND RICHARD P. VARI

Trichomycterus pseudosilvinichthys, new species, is described from midelevation drainages in the Provincia de La Rioja, Argentina. The new species is distinguished from other members of the apparently nonmonophyletic genus *Trichomycterus* by having the insertion of the first proximal dorsal-fin pterygiophore at, or posterior to, vertebra 20 to 22; the presence of the pelvic fin and girdle; a fronto-lachrymal tendon bone with a lateral expansion but an incomplete laterosensory canal segment; the absence of a portion of the supraorbital laterosensory canal running between the frontal and nasal bones with the resultant loss of pore 3; the possession of 17–19 ribs; a first pectoral-fin ray that is not prolonged as a short filament; and the tip of the pelvic fin falling short of the anus.

Trichomycterus pseudosilvinichthys, nueva especie, es descripta para una cuenca de mediana altura de la Provincia de La Rioja, Argentina. La nueva especie se diferencia de los otros miembros del aparentemente género no monofilético *Trichomycterus* por tener la inserción del primer pterigióforo proximal de la aleta dorsal en o posterior a las vértebras 20 a 22; la presencia de la aleta y cintura pélvica; el hueso fronto-lachrymal con una expansión lateral y un segmento del canal incompleto, la ausencia de la porción del canal laterosensorial supraorbital entre los huesos frontal y nasal con la pérdida resultante del poro 3; la posesión de 17 a 19 costillas; el primer radio de la aleta pectoral que no está prolongado como un corto filamento y el extremo de la aleta pélvica próximo al ano.

THE nearly 90 species of the catfish genus *Trichomycterus* inhabit a diversity of habitats ranging from Amazonian lowlands to Andean uplands and occur across broad reaches of South and southern Central America (de Pinna and Wosiacki, 2003). Ichthyological collecting during recent years have yielded a number of species of *Trichomycterus* previously unknown to science from various mid- to high-elevation localities in western Argentina (Fernández, 2000, 2001; Fernández and Vari, 2002; and references therein). In those upland regions the species of *Trichomycterus* are among the few, or sometimes only, fishes occupying water bodies at middle to higher elevations. Collecting efforts in Provincia de La Rioja, western Argentina in midelevation river systems that are severely adversely affected by erosion resulting from mineral ore extraction projects yielded a species of *Trichomycterus* previously unknown to science that we herein formally describe.

MATERIALS AND METHODS

Measurements were taken from the left side of the specimens with digital calipers under a binocular microscope following the methods outlined by Tchernavin (1944) and de Pinna (1992). Cleared-and-counterstained specimens

(C&S) for osteological study were prepared following the procedure of Taylor and Van Dyke (1985). Osteological nomenclature follows Baskin (1973) and de Pinna (1989, 1998), and the numbering system and terminology for laterosensory pores of the head follows Arratia and Huaquin (1995) and Arratia (1998). Counts of dorsal- and anal-fin rays follow the methods proposed by de Pinna (1992). As proposed by de Pinna (1992), the vertebral counts exclude the vertebrae in the Weberian apparatus and the compound caudal centrum is counted as one element. Counts of caudal vertebrae follow Fernández and Schaefer (2003). Institutional abbreviations are as listed in Leviton et al. (1985). Elevations are given in meters above sea level (asl).

Trichomycterus pseudosilvinichthys, n. sp.
Figures 1–2, Table 1

Holotype.—FML 2588, 61.1 mm SL; Argentina, Provincia de La Rioja, Departamento Chilecito, Río Amarillo at Famatina, a small assemblage of houses near Fundación de Oro Santa Florentina (28°55'S, 67°31'W), on east slope of Sierra de Famatina, collected by L. Fernández, R. Montero, and J. Scroci, 8 September 1994.



Fig. 1. *Trichomycterus pseudosilviniichthys*, new species, holotype, FML 2588, 61.1 mm SL, left lateral view.

Paratypes.—Twenty-nine specimens, 29.4–66.9 mm SL. All from Argentina, Provincia de La Rioja. FML 2589, 9, 54.5–62.2 mm SL (1, 62.9 mm SL C&S); USNM 374759, 4, 43.5–52.9 mm SL (1, 61.3 mm SL C&S), collected with holotype. FML 2558, 6, 29.4–42.6 mm SL (2, 35.6–41.0 mm SL C&S), Departamento General Lamadrid, near Puerto Alegre (29°26'S, 67°57'W), collected by L. Fernández and R. Montero, September 1994. FML 2595, 2, 36.9–48.8 mm SL; CAS 218432, 1, 49.6 mm SL; FMNH 112974, 1, 52.8 mm SL; Departamento General Lamadrid, near Puerto Alegre (29°26'S, 67°57'S), collected by L. Fernández and R. Montero, September 1994. AMNH 233620, 3, 45.1–54.8 mm SL; Departamento Chilecito, Cuesta de Miranda (29°20'27"S, 67°47'31"W) 1,850 m, collected by M. Archangelsky and F. Cruz, 3 October 1998. MLP 7370, 3, 57.2–66.9 mm SL, Departamento Chilecito, Valle Guanchin (29°11'S, 67°39'W), collected February 1962.

Nontype specimens.—Eighty-seven specimens, 28.9–53.1 mm SL. All from Argentina, Provincia de La Rioja. FML 2103, 34, 39.5–53.1 mm SL, collected with holotype. FML 2116, 53, 28.9–38.8 mm SL, Departamento General Lamadrid, near Puerto Alegre (29°26'S, 67°57'W), collected with FML 2558, part of paratype series.

Diagnosis.—The combination of the presence of the pelvic fins and a pelvic girdle, the possession of a rectangular premaxilla, seven branched dorsal-fin rays, 17–19 ribs, the form of the body and caudal fin, the lack of a very thick, rugose layer of fatty tissue on the body and head, the extension of a portion of the laterosensory canal system through the sphenotic, the reduction of the segment of the portion of the laterosensory canal within the frontal with a loss of a segment of the canal between pores 2 and 6 with the resultant absence of intervening pore, the lack of an extensive perforation of the skin sur-

TABLE 1. MORPHOMETRIC DATA FOR HOLOTYPE AND 29 PARATYPES OF *Trichomycterus pseudosilviniichthys*, NEW SPECIES. Standard length is expressed in millimeters; measurements 1–11 are percentages of standard length; 12 to 17 are percentages of head length.

	Holotypes	Paratypes	
		Range	Mean \pm SD
Standard length	61.06	29.4–66.9	49.3 \pm 10.1
1. Body depth	17.29	10.4–18.0	15.5 \pm 1.9
2. Caudal peduncle length	20.60	17.9–23.4	20.7 \pm 1.3
3. Caudal peduncle depth	9.89	7.5–10.5	9.3 \pm 0.7
4. Predorsal length	66.46	60.1–68.0	65.9 \pm 1.5
5. Preanal length	70.55	67.1–81.8	71.6 \pm 5.6
6. Prepelvic length	56.93	53.5–59.3	56.5 \pm 1.4
7. Dorsal-fin base length	11.04	9.9–12.4	10.7 \pm 0.8
8. Anal-fin base length	7.63	6.8–10.0	8.7 \pm 0.7
9. Head length	17.56	15.8–20.2	17.9 \pm 1.1
10. Head width	15.72	14.4–18.4	16.5 \pm 1.1
11. Head depth	9.14	7.1–11.2	9.5 \pm 0.9
12. Interorbital width	26.12	21.8–33.1	25.1 \pm 2.2
13. Snout length	45.52	41.2–49.1	45.5 \pm 2.0
14. Nasal barbel length	45.34	35.6–67.2	51.6 \pm 9.7
15. Maxillary barbel length	74.07	44.7–90.9	68.6 \pm 12.1
16. Submaxillary barbel length	52.24	34.0–57.7	45.1 \pm 6.3
17. Mouth width	48.88	33.8–47.6	40.6 \pm 3.8

face by ampullary organs, the termination of the first pectoral-fin ray at the margin of the fin, details of the pigmentation on the body and fins, and the overall body size of *T. pseudosilvichthys* separates that species from all other known members of the subfamily Trichomycterinae. *Trichomycterus pseudosilvichthys* further differs from all congeners from southern South America, with the exception of *Trichomycterus areolatus*, *Trichomycterus catamarcensis*, *Trichomycterus chiltoni*, *Trichomycterus vittatus*, and *Trichomycterus yuska*, in having the insertion of the first proximal dorsal-fin pterygiophore located at, or posterior to, the neural spine of vertebrae 20 to 22 (vs inserting posterior to vertebra 15 to 19). *Trichomycterus pseudosilvichthys* can be distinguished from *T. areolatus* by the presence of a fronto-lachrymal tendon bone (the supra-orbital of Arratia, 1998) with a lateral expansion and an incomplete supraorbital laterosensory canal segment in that bone with the consequent loss of pore 3 (vs a fronto-lachrymal tendon bone without a lateral expansion but incorporating a complete laterosensory canal segment), from *T. catamarcensis* by the presence of the pelvic fin and girdle (versus the absence of both structures), from *T. chiltoni* by the presence of a lateral expansion on the fronto-lachrymal tendon bone and the possession of 17–19 ribs (vs the absence of a lateral expansion and the presence of 10–15 ribs), from *T. vittatus* in having the first pectoral-fin ray terminating at the margin of the fin and in having the tip of the pelvic fin falling short of the anus (vs having the first pectoral fin ray prolonged as a short distal filament and having the tip of the pelvic fin reaching to the anus), and from *T. yuska* in having the first pectoral-fin ray terminating at the margin of the fin (versus having the first pectoral fin ray prolonged as a short distal filament). In addition to the internal features listed above, *T. pseudosilvichthys* further differs from the syntopic *T. corduwensis* in having the pelvic fin falling short of the anal opening (vs reaching the rear of the opening) and in the possession of 1 or 2 pores on the anterior most portion of the lateral line (vs 3 or 4 pores).

Description.—Descriptive morphometric features for holotype and paratypes of *T. pseudosilvichthys* provided in Table 1. Body elongate, approximately cylindrical but slightly compressed transversely in trunk region, gradually and progressively becoming more compressed transversely toward caudal fin. Dorsal and ventral profiles of trunk region ranging from nearly straight to slightly convex or concave. Caudal peduncle smoothly continuous with dorsal and

ventral profiles of trunk. Small papilla-like structures present on body. Specimens originating in Río Amarillo at Puerto Alegre and Cuesta Miranda with distinctly larger amounts of subcutaneous fat on head and body than present in other populations samples of species. Urogenital opening closer to anal-fin origin than to pelvic-fin insertion.

Head dorsoventrally flattened and obtusely pointed in profile. Head profile in dorsal view rectangular. Eyes located on dorsal surface of head but visible in both lateral and dorsal views. Eyes ovoid and slightly anteroposteriorly elongate. Skin covering eye thin, transparent, and separate from surface of eyeball, with eyes readily visible.

Anterior nostril slightly smaller than posterior nostril and surrounded by fleshy integument flap medially and by base of nasal barbel laterally. Anterior margin of posterior nostril bordered by flap of thin skin.

Infraorbital canal incomplete (Fig. 2). Anterior segment absent with loss of infraorbital pores 1 and 3. Posterior portion of infraorbital canal situated posterior to rim of orbit and arising from temporal canal running within sphenotic. Posterior portion of infraorbital canal with infraorbital pores 10 and 11. Supraorbital laterosensory canal segment incomplete with short anterior nasal canal separated from reduced portion of canal located in posterior portion of frontal by distance approximately equal to horizontal length of lateral ethmoid, and with only several pores (pore 3 absent). Epiphyseal branch of supraorbital canal discontinuous with pair of median pores posterior to eye. Preoperculo-mandibular canal represented by reduced preopercular canal with one pore on surface of skin. Postotic canal with pterotic branch (sensu Schaefer and Aquino, 2000) present at junction of pterotic and posttemporal-supracleithrum. Laterosensory canal along mid-lateral portion of trunk reduced, without ossified tubules and limited to pores 11 and 12 of anterior most portion of lateral line.

Mouth distinctly subterminal, with rictus directed posteriorly. Premaxilla rectangular with width of bone greater than maximum dimension of palatine. Premaxilla with three or four rows of distally narrowing, incisiform teeth; with seven to 10 teeth in outer tooth row. Dentary with one to four rows of distally narrowing, incisiform teeth; with 10–13 teeth in outer tooth row. Lower lip with prominent fleshy lobes along lateral limits; lobes situated medial to base of rictal barbels. Lower lip fleshy anteriorly, with anterior, and to lesser degree, anteroventral

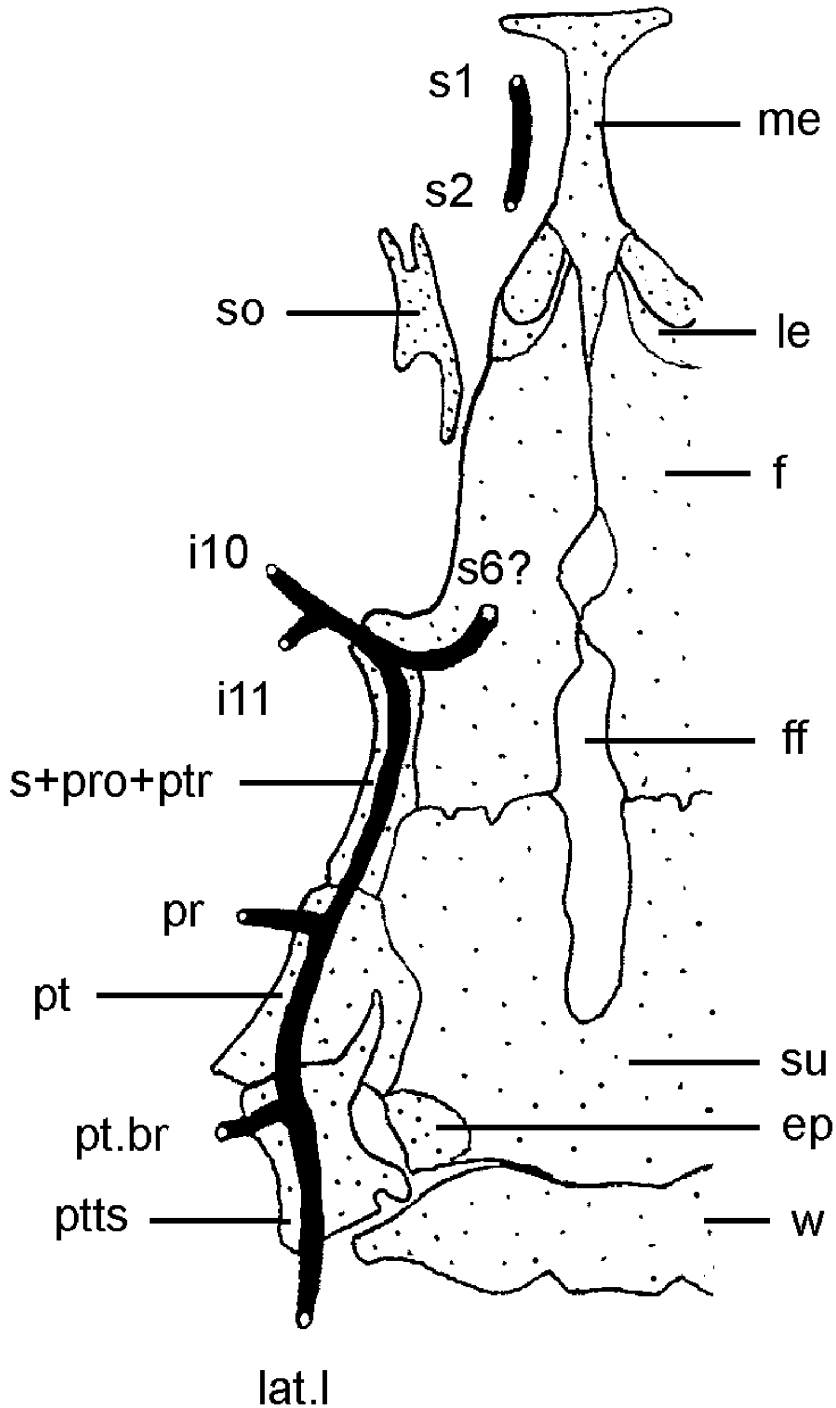


Fig. 2. Dorsal view of the neurocranium and associated structures of *Trichomycterus pseudosilvinichthys* showing laterosensory canal system on left side of head. Abbreviations: ep = epioccipital; f = frontal; ff = frontal fontanelle; i10, 11 = pores 10 and 11 of infraorbital sensory canal; lat. 1 = lateral line; le = lateral ethmoid; me = mesethmoid; pr = preopercular pore; ptt.s = posttemporal-supracleithrum; pt = pterotic; pt. br = pterotic branch of postotic sensory canal; s1, 2, 6 = pores 1, 2, and 6 of supraorbital sensory canal; s + pro + ptr = sphenotic + prootic + pterosphenoid; so = supraorbital; su = supraoccipital; and w = weberian complex and capsule.

tral surfaces covered with papillae. Upper lip fleshy and bearing numerous papillae.

Barbels relatively short and tapering distally but not threadlike or with distal branching present in some congeners. Tips of maxillary barbels extending posteriorly to middle of patch of interopercular odontodes but falling short of pectoral-fin origin. Nasal barbels reaching posteriorly to distinctly beyond posterior border of eye. Submaxillary barbels shorter than maxillary barbels.

Branchiostegal rays seven. Interopercular odontode patch anteroposteriorly elongate; with odontodes imbedded in fleshy covering of interopercle; 32–42 odontodes present on patch in four C&S specimens. Opercular patch of odontodes small, rounded, and slightly anteroposteriorly elongate, with odontodes imbedded in fleshy covering of opercle, 7–11 odontodes present on patch in four C&S specimens.

Dorsal-fin rays 12 [12] or 13 [4], with seven branched and five [8] or six [8] unbranched rays. Distal margin of dorsal fin semicircular when fin expanded. Dorsal fin fleshy basally. Dorsal-fin origin located slightly anterior to vertical through anterior limit of vent. First proximal dorsal-fin pterygiophore inserting posterior to vertebra 20 [6], 21 [6], or 22 [3]. Anal-fin rays 11 [7] or 12 [8], with six [7] or seven [8] branched and five unbranched rays. Anal fin relatively elongate, equal in size to, or slightly smaller than, dorsal fin, with distal margin of fin slightly rounded. Anal-fin origin approximately at vertical through middle of base of dorsal fin. Pectoral-fin rays eight, with lateral most ray unbranched. Distal margin of pectoral fin slightly convex. First pectoral-fin ray terminating at fin margin without forming distal filament. Pelvic-fin rays five, plus small splint anterior to first unbranched ray; second and third rays longest. Tip of pelvic fin falling distinctly short of anal opening. First proximal anal-fin pterygiophore inserting posterior to vertebra 23. Distal margin of caudal fin nearly straight but with outer fin rays slightly shorter than middle rays. Principal caudal-fin rays 6 + 6 or 6 + 7. Dorsal procurrent caudal-fin rays 12 [1], 13 [1], 14 [1], or 15 [1] and ventral procurrent caudal-fin rays 12 [2] or 13 [2] in four C&S specimens.

Total vertebrae 37 [1], 38 [1], 39 [1], or 40 [1], with 9 [1], 10 [2], or 11 [1] precaudal and 26 [1], 27 [1], 28 [1], or 29 [1] caudal vertebrae, and 17 [1], 18 [2], or 19 [1] ribs on each side in four C&S specimens.

No external obvious sexual dimorphism observed in available population samples. Population samples from Río Amarillo with cysts on

body and fins, perhaps as a consequence of pollution resulting from upstream mining operations.

Color in alcohol.—*Trichomycterus pseudosilvinichthys* demonstrates considerable variation in intensity of dark pigmentation on head and body. Holotype (Fig. 1) and most of paratypes with pattern of distinct, albeit faint, marmoration formed by patches of small, dark chromatophores. Several more lightly pigmented paratypes lack distinct marmoration on head and body. Darkly pigmented specimens with marmorated, dark pigmentation present on dorsal and dorsolateral surfaces of head and trunk and all but ventral most portion of caudal peduncle. Ventral surface of head ranging from lightly pigmented to hyaline. All barbels pigmented at least to some degree; less so in overall less darkly pigmented individuals. Dorsal, anal, and pectoral fins with irregular, dark pigmentation present on rays and membranes. Caudal fin with membranes irregularly darker than membranes of other unpaired fins. Pelvic fin ranging from lightly pigmented to hyaline. Opercular and interopercular odontodes and oral dentition unpigmented even in overall more darkly pigmented individuals.

Relationships.—The derived reduction in the degree of development of the supraorbital canal within the frontal of *T. pseudosilvinichthys* is unique to that species and *T. yuska*, another Argentinean species, among congeners that have been examined osteologically. The common possession of this feature may indicate that these are sister species, but confirmation of that hypothesis requires a broader comparative analysis incorporating information from multiple character systems.

Ecology.—The type locality of *T. pseudosilvinichthys* was a small, clear water stream with a rock and pebble bottom at an elevation of approximately 1800 m. The only other species of fish collected at that site was *T. corduvenensis*.

Distribution.—*Trichomycterus pseudosilvinichthys* is known from various localities in Departamento Chilecito and Departamento General Lamadrid, Provincia de La Rioja, western Argentina.

Etymology.—The specific name, *pseudosilvinichthys*, is in reference to the similarity in the external appearance of the new species and the trichomycterid genus *Silvinichthys*.

Remarks.—*Trichomycterus pseudosilvinichthys* is very similar in terms of external features to the trichomycterid *Silvinichthys mendozensis*, a species that also occurs in western Argentina (Arratia et al. 1978). The two species differ most trenchantly in the presence of a laterosensory canal segment in the sphenotic of *T. pseudosilvinichthys* in contrast to the absence of that canal segment in *Silvinichthys mendozensis*.

Discussion.—Berg (1897) described *Trichomycterus riojanus* based on one specimen from an indefinite locality described as an “arroyo of the Cordillera in [Provincia de] La Rioja” (our translation; addition in square brackets ours). The original description of *T. riojanus* is, unfortunately, uninformative as to a number of taxonomically important morphological features. Furthermore, the holotype (MACN 5175) is now dried and in very poor condition making it impossible to either confirm much of the data presented in the original description of that species, or unequivocally compare the meristic and morphometric features of the holotype of *T. riojanus* with those of *T. pseudosilvinichthys*. Although all known specimens of both *T. riojanus* and *T. pseudosilvinichthys* originated in the Provincia de La Rioja, the two nominal species clearly differ in the proportional length of the pelvic fin (tip of fin reaching posteriorly to the anus in the holotype of *T. riojanus* versus distinctly falling short of that landmark in *T. pseudosilvinichthys*) and in the degree of development of the first ray of the pectoral fin (ray extending beyond the margin of the fin as a short distal filament versus terminating at the margin of the fin, respectively). We consequently recognize them as distinct species.

Comparative material.—Includes material cited in Fernández (2000) and Fernández and Vari (2000) with the addition of the following: *Trichomycterus alterus*, FML 2087, 10 (3 C&S); FML 2088, 7 (2 C&S). *Trichomycterus atochae*, CAS 64576, holotype. *Trichomycterus banneau*, FMNH 56025, holotype; FMNH 70014, 2. *Trichomycterus belensis*, FML 2530, holotype, FML 2533, 5 (C&S). *Trichomycterus boylei*, KU 20188, 1. *Trichomycterus caliense*, FMNH 56029, holotype; FMNH 70338, 1. *Trichomycterus catamarcensis*, FML 2507, holotype; FML 2509, 10 (2 C&S). *Trichomycterus chaberti*, ANSP 140068, 1 paratype. *Trichomycterus chapmani*, CAS 58128, 1 paratype. *Trichomycterus chungaraensis*, KU 19218, 2; KU 19392, 2 (C&S). *Trichomycterus dispar*, ANSP 21174, 4. *Trichomycterus duellmai*, KU 20194, 4 (2 C&S). *Trichomycterus eigenmanni*, MCZ 8301, holotype (radiograph). *Trichomycterus fassli*, USNM

302757, 1 (1 C&S). *Trichomycterus gabrieli*, CAS 64583, 1 syntype; SU 36556, 1 syntype. *Trichomycterus immaculatus*, MCZ 8300, 1 syntype (radiograph). *Trichomycterus laucaensis*, KU 19403, 2 (C&S), KU 19404, 1 (C&S). *Trichomycterus maracaiboensis*, AMNH 91133, 1 (C&S). *Trichomycterus nigromaculatus*, UMMZ 187674, 2. *Trichomycterus punctulatus*, FMNH 58672, 1 paratype. *Trichomycterus ramosus*, FML 2070, holotype; FML 2071, 5 paratypes (2 C&S). *T. romeroi*, ANSP 69331, holotype; ANSP 69332, 2 paratypes. *Trichomycterus schmidti*, MACN 5176, 1 syntype; MACN 5174, 2; MACN 4595, 1. *Trichomycterus tiraquae*, ANSP 69126, holotype; UMMZ 204202, 4; AMNH 39740, 2 (C&S). *Trichomycterus vittatus*, ANSP 149683, 3 (1 C&S). *Trichomycterus weyrauchi*, ANSP 71639, holotype. *Trichomycterus yuska*, FML, 2535, holotype; FML 1132, 12 paratypes (2 C&S). *Trichomycterus zornatus*, UMMZ 231757, 4.

ACKNOWLEDGMENTS

The expedition that collected the type series of *Trichomycterus pseudosilvinichthys* was funded by the Fundación Miguel Lillo and Consejo Nacional de Investigación Científica y Técnica. The latter and the Neotropical Lowland Research Program funded the research that was the basis of study. For the loan of specimens and other assistance, we thank S. A. Schaefer, B. Brown, M. Sabaj, D. Catania, M. A. Rogers, A. Bentley, O. T. Oyakawa, and D. Nelson. Access to the holotype of *Trichomycterus riojanus* was provided by L. Braga. S. J. Raredon prepared Figure 1 and radiographs. This paper benefited from the comments and suggestions of S. H. Weitzman and T. A. Munroe.

LITERATURE CITED

- ARRATIA, G. 1998. *Silvinichthys*, a new genus of trichomycterid catfishes from the Argentinian Andes, with redescription of *Trichomycterus nigricans*. *Ichthyol. Explor. Freshwaters* 9:347–370.
- , AND L. HUAQUIN. 1995. Morphology of the lateral line and of the skin of diplomystid and certain primitive loricarioid catfishes and ecological consideration. *Bonn. Zool. Monogr.* 36:1–110.
- , A. CHANG, S. MENU-MARQUE, AND G. ROJAS. 1978. About *Bullockia* gen. nov., *Trichomycterus mendozensis* n. sp. and revision of the family Trichomycteridae (Pisces: Siluriformes). *Stud. Neotrop. Fauna Environ.* 13:157–194.
- BASKIN, J. 1973. Structure and relationships of the Trichomycteridae. Unpubl. Ph.D. diss., City Univ. of New York, New York.
- BERG, C. 1897. Contribución al conocimiento de los peces sudamericanos especialmente de La República

- ca Argentina. *Ann. Mus. Nac. Buenos Aires* 5:263–302
- FERNÁNDEZ, L. 2000. A new species of *Trichomycterus* from northwestern Argentina (Ostariophysi: Trichomycteridae). *Ichthyol. Explor. Freshwaters* 11: 349–354.
- . 2001. Nuevos registros de *Trichomycterus* Valenciennes e *Ituglanis* Costa y Bockmann (Teleostei: Siluriformes) en Argentina, Paraguay y Bolivia. *Neotropica* 47:103–105.
- , AND S. A. SCHAEFER. 2003. A new species of *Trichomycterus* (Siluriformes, Trichomycteridae) from high elevations of Argentina. *Ichthyol. Explor. Freshwaters* 14:353–360.
- , AND R. P. VARI. 2000. A new species of *Trichomycterus* (Teleostei: Siluriformes: Trichomycteridae) lacking a pelvic girdle from the Andes of Argentina. *Copeia* 2000:990–996.
- , AND ———. 2002. A new species of *Trichomycterus* from the Andes of Argentina with a redescription of *Trichomycterus alterus* (Siluriformes: Trichomycteridae). *Ibid.* 2002:739–747.
- LEVITON, A. E., R. H. GIBBS JR., E. HEAL, AND C. E. DAWSON. 1985. Standards in herpetology and ichthyology. Part I. Standard symbolic codes for institutional resource collections in herpetology and ichthyology. *Ibid.* 1985:802–832.
- DE PINNA, M. C. C. 1989. A new sarcoglanidine catfish, phylogeny of its subfamily, and an appraisal of the phyletic status of the Trichomycterinae (Teleostei, Trichomycteridae). *Am. Mus. Novit.* 2950:1–39.
- . 1992. A new subfamily of Trichomycteridae (Teleostei, Siluriformes), lower loricarioid relationships and a discussion on the impact of additional taxa for phylogenetic analysis. *J. Linn. Soc. Zool.* 106:175–229.
- . 1998. Phylogenetic relationships of Neotropical Siluriformes (Teleostei: Ostariophysi); historical overview and synthesis of hypotheses, p. 279–330. *In: Phylogeny and classification of Neotropical fishes*, L. R. Malabarba, R. E. Reis, R. P. Vari, Z. M. S. Lucena, and C. A. S. Lucena (eds.). Edipucrs, Porto Alegre, Rio Grande do Sul, Brazil.
- , AND W. WOSIACKI. 2003. Family Trichomycteridae, p. 270–290. *In: Check list of the freshwater fishes of South and Central America*, R. E. Reis, S. O. Kullander, and C. J. Ferraris Jr. (orgs.). Edipucrs, Porto Alegre, Rio Grande do Sul, Brazil.
- SCHAEFER, S. A., AND A. E. AQUINO. 2000. Postotic laterosensory canal and pterotic branch homology in catfishes. *J. Morph.* 246:212–227.
- TAYLOR, W. R., AND G. C. VAN DYKE. 1985. Revised procedures for staining and clearing small fishes and other vertebrates for bone and cartilage study. *Cybio* 9:107–119.
- TCHERNAVIN, V. 1944. A revision of some Trichomycterinae based on material preserved in the British Museum (Nat. Hist.). *Proc. Zool. Soc. Lond.* 114: 234–275.
- (LF) FUNDACION MIGUEL LILLO, DEPARTAMENTO ZOOLOGÍA, DIVISION ICTIOLOGÍA, MIGUEL LILLO 251, 4000 TUCUMÁN, ARGENTINA; AND (RPV) DIVISION OF FISHES, SMITHSONIAN INSTITUTION, P.O. BOX 37012, NATIONAL MUSEUM OF NATURAL HISTORY, WG-14, MRC-159, WASHINGTON, DC 20013-7012. E-mail: (RPV) vari.richard@nsmnh.si.edu. Send reprint requests to RPV. Submitted: 25 March 2004. Accepted: 11 Aug. 2004. Section editor: J. W. Armbruster.