New Species of *Trichomycterus* from the Andean Cordillera of Argentina (Siluriformes: Trichomycteridae)

Luis Fernández[1] and Richard P. Vari[2]

***Trichomycterus hualco*, new species, is described from an Andean stream in the Provincia de La Rioja, Argentina. The new species is distinguished from other species of *Trichomycterus* in the combination of the number of odontodes on the opercle and interopercle, the degree of exposure of the odontodes on the interopercle, the form of the premaxillary teeth, the presence of papillae-like structures on the body, the number of vertebrae, the position of the first proximal dorsal-fin pterygiophore, the form of the supraorbital canal within the frontal, the length of the lateral-line canal, and various meristic features.**

***Trichomycterus hualco*, nueva especie, es descripta para un arroyo andino de la Provincia de La Rioja, Argentina. La nueva especie se diferencia de las otras especies del género *Trichomycterus* por una combinación en el número de odontoides del opérculo e interopérculo, el grado de exposición de los odontoides en el interopérculo, la forma de los dientes premaxilares, la presencia de estructuras como papilas sobre el cuerpo, el número de vértebras, la posición del primer pterigióforo de la aleta dorsal, la forma del canal supraorbital dentro del frontal, la longitud del canal de la línea lateral y varios caracteres merísiticos.**

TRICHOMYCTERUS is the most species-rich genus within the subfamily Trichomycterinae, containing over 100 species (de Pinna and Wosiacki, 2003), but is demonstrably nonmonophyletic (de Pinna, 1989, 1998:fig. 10) with relatively little known concerning its intrageneric relationships. Species of the genus are distributed in freshwaters throughout much of South America and southern Central America, from Panama (10°N) to Patagonia (42°S), and within that expanse from the lowlands of the Atlantic Forest to mid-elevation streams of the Andean Cordilleras. *Trichomycterus* occurs in a remarkable diversity of environments including high elevation streams, subterranean drainages, and even an offshore island and warm thermal waters (Durand, 1968; Fernández and Vari, 2000; Fernández and Schaefer, 2005; Fernández and Miranda, 2007).

An accelerating pace of descriptions of new species of *Trichomycterus* in recent decades is an outgrowth of both the increased attention paid to species-level questions in the genus and of the stepped-up pace of sampling of fishes in new regions and habitats within the range of the genus. Ichthyological collecting in the recent years in mid to high elevation localities of western and northern Argentina yielded six species of *Trichomycterus* (pers. obs.), including the species described as new herein. In those regions, the species of *Trichomycterus* are among the few, or sometimes only, fishes occupying water bodies at middle to higher elevations (Fernández and Vari, 2000, 2004), a habitat also inhabited by the species that we formally describe in this paper.

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 (CS) for osteological study were prepared following the procedure of Taylor and Van Dyke (1985) and osteological nomenclature follows Baskin (1973) and de Pinna (1989, 1998). Counts of dorsal- and anal-fin rays follow the methods proposed by de Pinna (1992) and taken from radiographs and CS specimens. Values for the holotype specimen are in brackets. Following de Pinna (1992), the vertebral counts exclude the vertebrae in the Weberian apparatus, with the compound caudal centrum counted as one element. Caudal vertebrae counts follow Fernández and Schaefer (2003). Counts of vertebrae and ribs were taken from radiographs (holotype) and two cleared-and-stained specimens. The numbering system and terminology for laterosensory pores of the head follow Arratia and Huaquin (1995) and Arratia (1998). Counts of lateral-line pores follow the procedure proposed by Schaefer and Aquino (2000). Institutional abbreviations are as listed at http://www.asih.org/codons.pdf with the addition of CBF, Colección Boliviana de Fauna, La Paz, Bolivia; FLBS, Flathead Lake Biological Station, Montana, USA; IADIZA, Instituto Argentino de Investigación de Zonas Áridas, Mendoza, Argentina; MCMI, Museo de Ciencias Naturales, Universidad Nacional de Salta, Salta, Argentina; MNKP, Museo Historia Natural Noel Kempff Mercado, Santa Cruz, Bolivia; MUSM, Museo de Historia Natural de la Universidad Nacional Mayor de San Marcos, Lima, Perú; and UMSS, Universidad Mayor San Simón, Cochabamba, Bolivia.

Trichomycterus hualco, new species

Figure 1, Table 1

Holotype.—FML 2601, 68.7 mm SL, Argentina, Provincia de La Rioja, Departamento San Blas de los Sauces, Río Hualco, 28°35′S, 67°11′W, 2000 m elevation, 7 September 1994, L. Fernández, R. Montero, and G. Scroci.

[1] CONICET, Instituto Fundación Miguel Lillo, Departamento Zoología, División Ictiología, Miguel Lillo 251, 4000 Tucumán, Argentina, and Department of Ichthyology, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024; E-mail: luis1813@yahoo.com.

[2] Division of Fishes, Smithsonian Institution, P.O. Box 37012, National Museum of Natural History, WG-14, MRC-159, Washington, D.C. 20013-7012; E-mail: varir@si.edu. Send reprint requests to this address.

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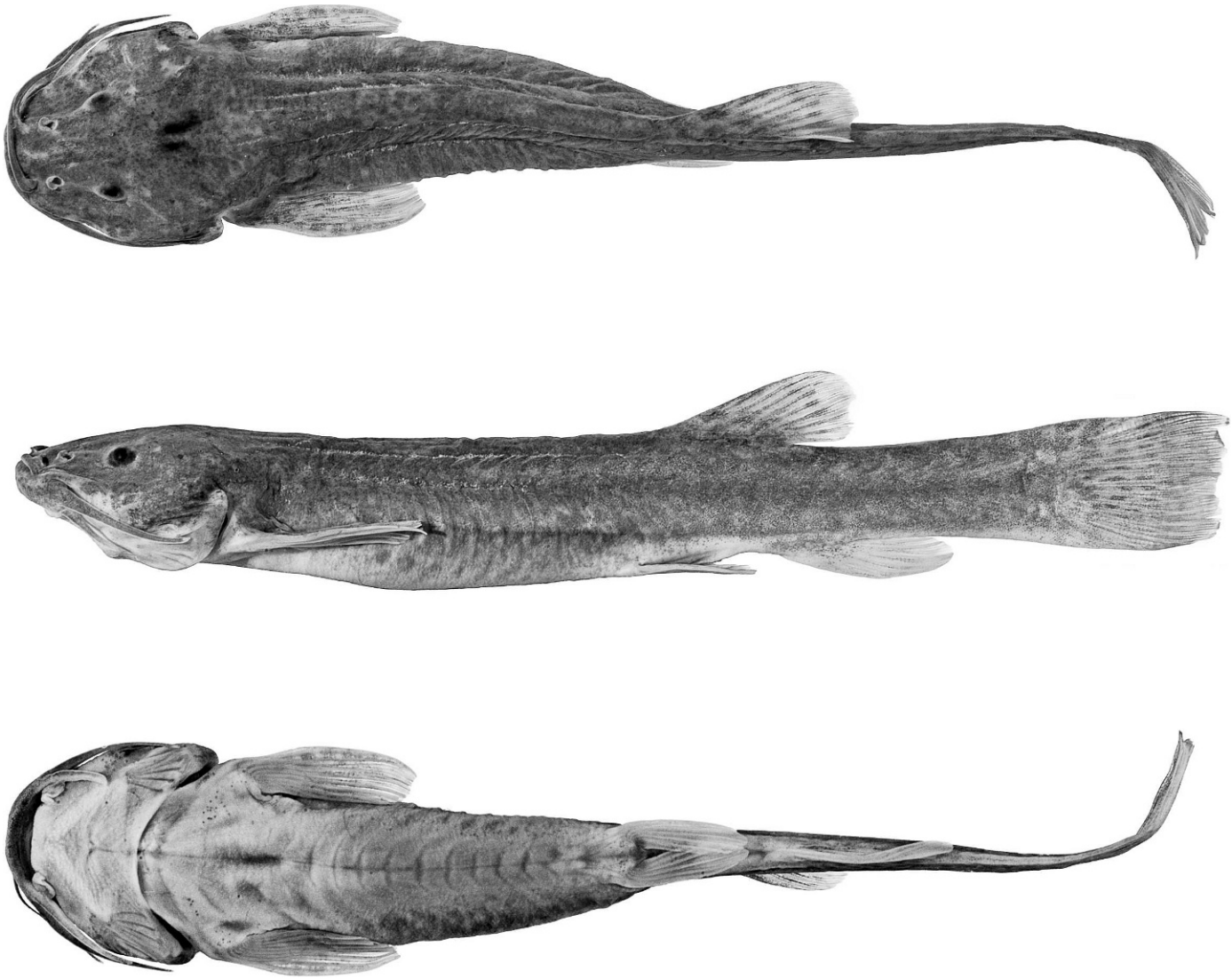

Fig. 1. *Trichomycterus hualco*, new species, holotype, FML 2601, 68.7 mm SL, dorsal, left lateral, and ventral views; Argentina, Provincia de La Rioja, Departamento San Blas de los Sauces, Río Hualco.

Paratypes.—Twenty-five specimens, 24.4–62.5 mm SL, collected with holotype: FML 2602, 20 specimens, 24.4–62.5 mm SL (1 specimen, 51.7 mm SL CS); MCMI 1467, 1 specimen, 46.4 mm SL; USNM 383794, 4 specimens, 52.7–59.6 mm SL (1 specimen, 52.7 mm SL CS).

Diagnosis.—*Trichomycterus hualco* is distinguished from its congeners, with the exception of *T. areolatus*, by the combination of relatively low number of odontodes on the opercle that are apparent in cleared-and-stained specimens (one to 14 versus 16 or more, respectively) and on the interopercle (two to 20 versus 28 to 40, respectively) and by the extent of development of the integument on the interopercle (integument thin and not enveloping odontodes on the interopercle in all examined specimens versus integument thick with odontodes embedded in integument other than in smaller individuals). *Trichomycterus hualco* differs from *T. areolatus* by the number of total vertebrae (33 or 34 versus 37 to 39 [Arratia and Chang, 1975], respectively), the area of insertion of the first proximal dorsal-fin pterygiophore (posterior to neural spine of vertebra 16 or 17 versus vertebrae 20 to 22 [Fernández and Vari, 2004], respectively), supraorbital canal segment and pore So3 (continuous, with pore So3 absent versus discontinuous with pore So3 present, respectively), and the papillae-like structures on the body (present versus absent, respectively). *Trichomycterus hualco* is further distinguished from all congeners, with the exception of *T. corduvensis* from Argentina and *T. therma* and *T. tiraquae* from Bolivia, by the combination of the possession of elongate premaxillary teeth with the distal portion of each tooth flattened and slightly expanded, the presence of papillae-like structures on the body, the continuous supraorbital canal within the frontal with the presence of a segment between pores So2 and So6 (but with pore So3 missing), and the long lateral-line canal with four pores. *Trichomycterus hualco* further differs from *T. corduvensis* in the caudal peduncle depth (8.4–11.3% SL versus 11.9–13.2% SL, respectively), from *T. tiraquae* in the width of the head (19.1–21.8% SL versus 17.4–19.0% SL, respectively) and nearly completely in the distance from the tip of the snout to the insertion of the pelvic fin (57.4–61.9% SL versus 56.6–57.6% SL, respective-

Table 1. Morphometric Data for Holotype and 11 Paratypes of *Trichomycterus hualco*, New Species. Standard length is expressed in millimeters; measurements 1 to 11 are percentages of standard length; 12 to 17 are percentages of head length. Range includes all specimens.

		Type series		
	Holotype	Range	Mean	SD
Standard length	68.7	39.0–68.7	51.9	7.2
1. Body depth	12.7	11.9–18.0	14.5	2.0
2. Caudal peduncle length	19.8	18.2–23.8	21.1	1.6
3. Caudal peduncle depth	8.4	8.4–11.3	10.1	1.0
4. Predorsal length	62.6	62.4–67.5	64.0	1.6
5. Preanal length	73.6	70.4–75.0	72.8	1.4
6. Prepelvic length	59.2	57.4–61.9	59.3	1.3
7. Dorsal-fin base length	10.8	10.4–13.5	11.9	0.9
8. Anal-fin base length	7.9	7.2–9.6	8.1	0.7
9. Head length	19.8	19.8–22.6	21.2	0.7
10. Head width	19.8	19.1–21.8	20.3	0.9
11. Head depth	12.1	10.7–12.9	12.1	0.7
12. Interorbital width	33.1	26.0–33.1	29.4	2.0
13. Snout length	50.1	46.4–52.0	48.5	1.8
14. Nasal barbel length	62.2	34.4–70.4	54.3	8.6
15. Maxillary barbel length	68.2	49.0–78.7	68.8	8.2
16. Rictal barbel length	48.5	36.1–50.6	45.0	4.8
17. Mouth width	46.8	42.2–48.2	44.8	2.0

ly), and from *T. therma* in the degree of development of the transverse skin on the ventral surface of the head (not thickened versus distinctly thickened, respectively).

Description.—Morphometrics for holotype and paratypes of *Trichomycterus hualco* presented in Table 1. Body elongate, approximately cylindrical overall anteriorly, but then becoming distinctly compressed transversely along dorsal portion of body in trunk region; gradually and progressively becoming more compressed transversely across entire vertical extent of body toward caudal fin. Dorsal and ventral profiles of trunk region ranging from nearly straight to slightly convex. Caudal peduncle smoothly continuous with dorsal and ventral profiles of trunk. Papillae-like structures present on body. Urogenital opening closer to anal-fin origin than to pelvic-fin insertion and covered by adpressed pelvic fins.

Head broadly rounded anteriorly and distinctly wider posteriorly in dorsal view. Eye located on dorsal surface of head but visible in both dorsal and lateral views. Eye ovoid and slightly anteroposteriorly elongate. Skin covering eye thin, transparent, and separate from surface of eyeball.

Anterior nostril slightly smaller than posterior nostril and bordered medially by fleshy flap and laterally by base of nasal barbel. Flap and base of barbel continuous and forming short tube. Anterior margin of posterior nostril bordered by flap of thin skin.

Infraorbital canal incomplete, with segment between pores Io3 and Io10 absent. 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 Io10 and Io11 present. Supraorbital canal segment continuous, with pores So1, So2, and So6 present (pore So3 absent [see Arratia, 1998:fig. 5a–b]). Postotic canal with two pores, with pterotic branch (*sensu* Schaefer and Aquino, 2000) present at junction of pterotic and posttemporo-supracleithrum (Schaefer and Aquino, 2000:fig. 3a, for illustration of this condition in *T. tiraquae*). Laterosensory canal along mid-lateral portion of trunk not reduced, with four pores on anteriormost portion of lateral line, and with one to three distinctly separated and variably ossified tubules.

Mouth subterminal, with rictus directed posteriorly. Premaxilla rectangular from ventral view, with width of bone greater than maximum dimension of palatine (=autopalatine). Distal portions of teeth in each jaw flattened and slightly expanded. Premaxilla bearing three or four rows of elongate teeth with nine to 11 teeth in outer tooth row and total of 32 to 34 teeth. Dentary with three or four rows of teeth with 11 to 13 teeth in outer row. Lower lip fleshy anteriorly with anterior, and to lesser degree, anteroventral surfaces covered with papillae. Lower lip with prominent lobes along lateral limits; lobes situated medial to base of rictal barbels and covered by papillae. Upper lip fleshy and bearing numerous papillae.

Barbels relatively short and tapering distally, but not thread-like or with distal branching present in some congeners. Tip of maxillary barbel falling short of vertical through anterior limit of patch of opercular odontodes in some specimens, but extending somewhat beyond that point in other individuals. Submaxillary barbel shorter than maxillary barbel and falling short of vertical through anterior limit of opercular patch of odontodes. Nasal barbel reaching posteriorly distinctly beyond posterior border of eye.

Branchiostegal rays six or seven. Interopercular odontode patch elongate, but smaller than that in many congeners. Patch with maximum of two irregular rows of odontodes. Fleshy covering around odontodes on interopercle less developed than in congeners, with teeth more obvious. Interopercle with two to 20 odontodes visible in alcohol specimens and eight to 20 odontodes present in two CS specimens. Opercular odontodes not deeply embedded in fleshy tissue on opercle. Opercular patch of odontodes

somewhat rounded, small and reduced in overall extent relative to condition in many congeners. Patch with one or two rows of odontodes vertically and one to seven odontodes longitudinally. One to 14 odontodes obvious in alcohol specimens and seven to 14 odontodes present in CS specimens.

Dorsal-fin rays 14 to 16 [16], with eight or nine [eight] branched and six to eight [eight] unbranched rays. Distal margin of dorsal fin semicircular in expanded fin. Dorsal-fin origin located distinctly anterior to vertical through anterior limit of vent. First proximal dorsal-fin pterygiophore inserting posterior to neural spine of vertebra 16 or 17 [16]. Anal-fin rays 10 or 11 [11], with five or six [six] branched and five or six [five] unbranched rays. Anal fin relatively elongate, equal in size to, or slightly smaller than, dorsal fin, with distal margin slightly rounded. Anal-fin origin located approximately at vertical through posterior portion of base of dorsal fin or at posterior terminus of fin base. First proximal anal-fin pterygiophore inserting posterior to hemal spine of vertebra 20 or 21 [20]. Dorsal-fin base either terminating at vertical through insertion of anal fin or overlapping anal-fin base for distance of up to two vertebrae. Pectoral-fin rays eight to 10 [10], with lateralmost ray unbranched. Distal margin of pectoral fin slightly convex to straight. First pectoral-fin ray terminating at fin margin without forming distal filament. Pelvic-fin rays five [five], with four [four] branched and one [one] unbranched rays, plus small splint. Second and third pelvic-fin rays longest. Tip of pelvic fin reaching posteriorly past anal opening but falling short of origin of anal fin. Distal margin of caudal fin nearly straight or slightly convex. Principal caudal-fin rays six plus seven. Two or three [three] rays attaching to fused fourth plus fifth hypural and three or four [three] rays attaching to third hypural. Dorsal procurrent caudal-fin rays 14 to 17 [17]. Ventral procurrent caudal-fin rays 13 or 14 [14]. Total vertebrae 33 or 34 [33], with nine or 10 [nine] precaudal and 24 or 25 [24] caudal vertebrae. Ribs on each side of body 13 or 14 [13]. No external obvious sexual dimorphism present in examined population samples.

Color in alcohol.—Head and body with distinct, albeit faint, pattern of marmoration formed by patches of small, dark chromatophores on dorsal and dorsolateral surfaces of head and trunk and all but ventralmost portion of caudal peduncle. Ventral surface of head ranging from hyaline to slightly darkly pigmented. All barbels darkly pigmented at least to some degree. Dorsal, anal, and pectoral fins with irregular, dark pigmentation present on rays and membranes but with pigmentation usually more developed over rays. Variation in intensity of dark pigmentation on dorsal fin of some individuals taking form of indistinct transverse bar. Caudal fin with membranes overall irregularly darker than membranes of dorsal and anal fins. Pectoral fin hyaline to slightly dusky ventrally and with irregular, dark pigmentation dorsally, but with distal portions of dorsal surface of fin less intensely pigmented. Pelvic fin ranging from hyaline to slightly darkly pigmented. Opercular and interopercular odontodes and oral dentition unpigmented.

Ecology and endemicity.—The type locality of *Trichomycterus hualco* is a small, clear water stream that flows down a small rocky canyon into a small pool. The stream and pool range from approximately 0.2 to 0.6 m deep and 1.0 to 1.5 m wide. Both the stream and pool had rock and pebble bottoms and with limited adjoining terrestrial vegetation among the surrounding boulders. The Río Hualco seeps into the soil downstream from the pool and is apparently isolated from adjoining drainages throughout the year. Specimens of *T. hualco* were collected both above and below an approximately three-meter high waterfall within the stream and in the pool, but no individuals of the species were observed in the small outflow stream that drains the pool. Stomachs of two cleared-and-stained specimens of *T. hualco* contained dipteran larvae (Chironomidae and Ceratopogonidae). The diet of autochthonous benthic macroinvertebrates of *T. hualco* is common to that of many congeners. The only other species of fish collected at that site was *T. alterus* (Fernández and Vari, 2002:745).

Sampling efforts in adjoining drainage systems failed to yield any specimens of *Trichomycterus hualco*, which consequently appears to be endemic to the Río Hualco (sometimes also cited as the Río Gualco). Local inhabitants utilize the Río Hualco as a recreation site and on occasion as a bathing location. These activities put it at risk of ecological alteration, a threat common to many other aquatic habitats within those portions of the Andes and one of particular import for *T. hualco*, given its apparent restriction to that small drainage system.

Distribution.—*Trichomycterus hualco* is only known from the type locality that lies within a region with few drainage systems and a depauperate ichthyofauna. *Trichomycterus hualco* is the third fish species apparently endemic to La Rioja Province, with the others being the congeneric *T. riojanus* and *T. pseudosilvinichthys*. This situation is not surprising because the Trichomycteridae is the only native fish family in this region that straddles the area of contact between the ''Paranaense'' and ''Andean'' ichthyofaunas discussed by previous authors (Ringuelet, 1975; Arratia et al., 1983; Menni, 2004). Members of the Trichomycteridae seem well adapted to the high elevation wetlands, temporary endorrheic or poorly drained basins, and occasional permanent watercourses fed by snow melt of higher elevations (López et al., 2002), all of which are habitats typical of Provincia de La Rioja.

DISCUSSION

Trichomycterus hualco is very similar to *T. corduvensis*, *T. therma*, and *T. tiraquae*, which occur respectively in western Argentina (Fernández, 2001; Fernández and Vari, 2004) and eastern Bolivia (pers. obs.). Differences between *T. hualco* and these three species are detailed in the Diagnosis.

The ichthyofauna of drainage systems within Provincia de La Rioja contains a limited number of trichomycterids. Menni (2004) and Liotta (2005) reported *Trichomycterus riojanus* (as endemic to that province), *T. alterus*, and *Hatcheria macraei*. Fernández and Vari (2004) subsequently described *T. pseudosilvinichthys* from the province. The first author recently collected samples of *Silvinichthys* in La Rioja, thereby extending the range of the genus beyond Salta and Mendoza provinces from which it was reported previously. Comparisons of *T. hualco* with its geographically proximate congeners are appropriate in light of the uncertainty concerning the identity of *T. riojanus* and the externally subtle differences distinguishing *T. hualco* from *T. alterus* and *T. pseudosilvinichthys*.

Berg's (1897) description of *Trichomycterus riojanus* was based solely on the holotype which originated in an ''arroyo

of the Cordillera in [Provincia de] La Rioja'' (our translation; information in brackets ours). The original description of *T. riojanus* is uninformative as to a number of morphological features of import for the discrimination of species within the genus. Furthermore, the holotype (MACN 5175) is in very poor condition, having dried to a significant degree at some point. This situation makes it impossible to confirm the data on some of the features provided in the original description of *T. riojanus*, or to compare unequivocally many of the meristic and morphometric features of the holotype of *T. riojanus* with our samples of *T. hualco*. Nonetheless, the two nominal species distinctly differ in the degree of development of the first ray of the pectoral fin (extending beyond the margin of the fin as a short distal filament in *T. riojanus* versus terminating at the margin of the fin in *T. hualco*), the coloration pattern on the dorsal and dorsolateral surfaces of head and trunk (unspotted versus with marmoration formed by patches of small dark chromatophores, respectively), the number of dorsal-fin rays (two unbranched plus seven branched versus six to eight unbranched plus eight or nine branched, respectively), the number of unbranched anal-fin rays (one versus five or six, respectively), the depth of the caudal peduncle (6.1% SL versus 8.4–11.3% SL, respectively), the distance from the snout to the insertion of the pelvic fin (74.6% SL versus 57.4–61.9% SL, respectively), and the distance from the snout to the origin of the anal fin (78.9% SL versus 70.4–75.0% SL, respectively). Given these trenchant differences, we recognize them as distinct species.

Trichomycterus alterus was described from samples that originated in the same drainage basin as *T. hualco*, and the two species were collected together at the type locality of the latter species. The species differ in the degree of development of the first pectoral-fin ray (extending behind the fin margin as a distinct filament versus terminating at the fin margin without forming a filament, respectively), the form of the premaxilla from ventral view (oval versus rectangular, respectively), the form of the premaxillary teeth (incisiform and distally narrowing versus distally-flattened and slightly expanded, respectively), the form of the caudal peduncle (transversely compressed versus not compressed, respectively), the form of the maxillary barbel (distinctly widened and bulb-like basally versus not widened basally, respectively), the extent of development of the portion of the supraorbital canal in the frontal between pores So2 and So6 (reduced and discontinuous versus fully developed and continuous, respectively), the number of vertebrae (36 to 39 versus 33 or 34, respectively), the number of precaudal vertebrae (three to five versus nine or 10, respectively), the number of principal caudal-fin rays (12 versus 13, respectively), the number of dorsal-fin rays (10 to 13 versus 14 to 16, respectively), the length of the caudal peduncle (24.7–32.0% SL versus 18.2–23.8% SL, respectively), the distance from the snout to the origin of the anal fin (62.0–70.5% SL versus 70.4–75.0% SL, respectively), and the distance from the snout to the insertion of the pelvic fin (47.5–55.6% SL versus 57.4–61.9% SL, respectively).

Fernández and Vari (2004) recently described *Trichomycterus pseudosilvinichthys* from a site close to the type locality of *T. hualco* in the Provincia de La Rioja. These two species differ in the number of ribs (17 to 19 in *T. pseudosilvinichthys* versus 13 or 14 in *T. hualco*), the number of pores on the laterosensory canal of the trunk (two versus four, respectively), the number of vertebrae (37 to 40 versus 33 or 34, respectively), the number of the dorsal-fin rays (12 or 13 versus 14 to 16, respectively), the degree of development of the portion of the supraorbital canal in the frontal between pores So2 and So6 (reduced and discontinuous versus fully developed and continuous, respectively), the location of the first basal pterygiophore of the dorsal fin (inserting posterior to the neural spine of vertebrae 20 to 22 versus vertebrae 16 or 17, respectively), the form of the teeth (narrowing distally versus distally flattened and somewhat expanded, respectively), the extent of the pelvic fin (tip falling distinctly short of the anal opening versus reaching the anal opening, respectively), and the head width (14.4–18.4% SL versus 19.1–21.8% SL, respectively).

Etymology.—The specific name, *hualco*, is in reference to the type locality, the Río Hualco.

MATERIAL EXAMINED

Bullockia maldonadoi. USNM 167872, 2 paratypes; ANSP 69145, 1 specimen; ANSP 69146 1 specimen, MNHNC 10A, 2 specimens; FML uncat., 1 specimen (CS).
Eremophilus mutisii. AMNH 7072, 1 specimen (CS); MCZ 35809, 1 specimen.
Hatcheria macraei. USNM 1546, 1 syntype; MCZ 8298, 1 syntype; USNM 126664, 1 specimen (CS); FML 1139 1 specimen; MACN 3598, 2 specimens; FML 2073, 1 specimen (CS).
H. patagoniensis. CAS 63844, 2 paratypes; CAS 63842, 1 specimen.
H. titcombi. CAS 28557, holotype.
Rhizosomichthys totae. CAS-SU 37074, 1 paratype (radiograph); USNM 120130, 4 specimens (radiographs); MCZ 35744, 1 paratype.
Silvinichthys bortayro. FML 2590, holotype; FML 2591, 2 paratypes (1 CS); FML 2594, 2 paratypes (1 CS); FLBS 1071A, 1 paratype.
S. mendozensis. IBAUNC 81, 2 paratypes; FML 2100, 5 specimens (CS); IADIZA 42, 3 specimens; MNHNC 21A, 1 specimen.
Trichomycterus aguarague. MNKP 4002, 6 paratypes (1 CS); UMSS 710, 2 specimens.
T. albinotatus. MZUSP 42312, holotype.
T. alternatus. FMNH 58082, holotype.
T. alterus. AMNH 12241, holotype; AMNH 12242, 3 paratypes; FML 2085, 19 specimens (1 CS); FML 2088, 4 specimens (2 CS); FML 2086, 1 specimen; FML 2087, 46 specimens (3 CS); FML 2114, 9 specimens; FML 2118, 3 specimens; FML 2269, 5 specimens; FML 2089, 19 specimens (3 CS); FML 2114, 5 specimens; FML 2115, 17 specimens; FML 2585, 20 specimens; IADIZA 121, 3 specimens; IADIZA 125, 3 specimens; MCMI 1350, 2 specimens; MLP 7891, 2 specimens; MLP 7608, 1 specimen.
T. areolatus. MZUC 3131, 2 specimens (1 CS); USNM 288049, 1 specimen (CS); IBAUNC 75, 2 specimens; UMMZ 215386, 3 specimens; MCZ 98726, 2 specimens; MNHNC uncat., 2 specimens (CS); MZUSP 28303, 1 specimen; ZMH 8402, 1 specimen; ZMH 8403, 1 specimen.
T. arleoi. INHS 28924, 1 specimen.
T. atochae. CAS 64576, holotype (radiographs); USNM 167864, 2 paratypes (radiographs); USNM 301837, 2 specimens (CS).
T. auroguttatus. MZUSP 43341, holotype.
T. bahianus. MZUSP 43340, holotype.

T. banneaui. FMNH 56025, holotype; ANSP 97422, 1 specimen; FMNH 70014, 2 specimens (CS); USNM 121227, 1 (radiograph).
T. barbouri. USNM 120289, 1 paratype; CAS 64578, 1 paratype; FMNH 53946, 3 paratypes; FML 36, 1 specimen (CS); FML 2081, 1 specimen; FML 2082, 1 specimen; FML 1819, 1 specimen; FML 2083, 2 specimens; FML 2080, 2 specimens; MLP 9011, 2 specimens.
T. belensis. FML 2530, holotype; FML 2531, 10 paratypes (2 CS); USNM 364371, 2 paratypes; FML 2533, 5 specimens.
T. bogotense. AMNH 7107, 3 paratypes (1 CS); FMNH 58090, 1 specimen (CS).
T. borellii. IBAUNC 31, 1 specimen; ZMH 12210, 1 specimen.
T. boylei. AMNH 20299, holotype; AMNH 17271, 2 paratypes; KU 20188, 1 specimen; FML 937, 1 specimen; FML 1147, 2 specimens (1 CS); MLP 4970, 2 specimens.
T. brasiliensis. ANSP 170011, 1 specimen (CS); MZUSP 28135, 1 specimen.
T. caliense. FMNH 56029, holotype.
T. castroi. MZUSP 36965, 1 paratype.
T. catamarcensis. FML 2507, holotype; FML 2508, 8 paratypes; USNM 357449, 1 paratype; FML 2509, 13 specimens (2 CS); FML 2510, 14 specimens (3 CS).
T. concolor. MZUSP 43347, holotype.
T. conradi. FMNH 53721, holotype.
T. corduvensis. FML 358, 2 specimens (1 CS); FML 1319, 10 specimens; FML 1237, 6 specimens; FML 1318, 4 specimens; FML 2097, 5 specimens (CS); FML 2816, 4 specimens; FML 2817, 3 specimens; FML 1215, 4 specimens; FML 1796, 4 specimens (2 CS), KU 19267, 5 specimens; MACN 3391, 1 specimen; MCMI 1372, 4 specimens; MLP 5989, 3 specimens; MLP 8223, 8 specimens; MLP 2599, 3 specimens.
T. chaberti. ANSP 140068, 1 paratype; USNM 236426, 2 specimens.
T. chapmani. FMNH 56027, holotype; USNM 79233, 1 paratype; CAS 58128, 1 paratype (radiographs); FMNH 70338, 3 specimens (1 CS).
T. chiltoni. USNM 84350, 2 paratypes (radiograph); KU 19227, 3 specimens (CS); MNHNC 02, 2 specimens.
T. chungaraensis. KU 19218, 2 paratypes; KU 19394, 3 paratypes (CS); KU 19392, 2 specimens (CS).
T. davisi. FMNH 60309, holotype; FMNH 54242, 1 paratype; ILPLA 1071, 1 specimen; FML 2528, 1 specimen; MZUSP 22619, 2 specimens; FMNH 58118, 1 specimen (CS).
T. dispar. ANSP 21174, 4 specimens; ANSP 21355, 3 specimens (CS).
T. dorsotriatum. FMNH 58096, holotype.
T. duellmani. KU 20192, 2 paratypes; KU 20194, 2 paratypes (CS).
T. eigenmanni. MCZ 8301, holotype (radiograph).
T. emanueli. USNM 121223, holotype (radiographs); USNM 121224, 1 paratype; USNM 121225, 1 paratype; USNM 121226, 1 paratype; UMMZ 141936, 2 paratypes (radiograph).
T. fassli. USNM 302757, 1 specimen (CS).
T. florensis. MNRJ 3751, holotype.
T. gabrieli. CAS 64583, 1 syntype (radiograph); CAS-SU 36556, 1 syntype.
T. goeldii. BMNH 1896.7.4.7-8, 2 syntypes.
T. gorgona. ANSP 149946, holotype (radiograph); ICNMHN 10019, 1 paratype (radiograph).
T. guianensis. FMNH 52676, holotype; AMNH 9657, 3 specimens (CS).
T. hasemani. CAS 64584, 1 paratype; USNM 225891, 1 specimen (CS); CAS 77021, 1 specimen (CS).
T. heterodontus. CAS 58139, holotype (radiograph).
T. iheringi. CAS 64585, holotype; CAS 64586 3 paratypes (radiographs).
T. immaculatus. MCZ 8300, 1 syntype (radiograph).
T. itatiaye. MNRJ 792, 1 lectotype.
T. johnsoni. ANSP 53873, holotype; ILPLA 1018, 1 specimen.
T. kneri. ANSP 86691, 2 specimens (radiographs).
T. latidens. CAS 76335, holotype; AMNH 3641 2 specimens (radiographs).
T. latistriatum. FMNH 58449, holotype; FMNH 58499, 1 specimen.
T. laucaensis. KU 19404, 3 paratypes (CS); KU 19403, 2 paratypes (CS); MNHNC 2338, 2 specimens.
T. longibarbatus. MZUSP 43339, holotype.
T. maracaiboensis. USNM 121227, holotype; USNM 121231, 1 paratype; USNM 121228, 1 paratype; MCZ 37240, 2 paratypes (radiographs).
T. megantoni. MUSM 29631, holotype; MUSM 25465, 5 paratypes (1 CS).
T. meridae. USNM 133136, 1 syntype (radiograph); FMNH 94762, 1 specimen (CS); CAS 162521, 1 specimen (CS), UMMZ 145374, 2 (radiographs).
T. mimonha. ANSP 174052, 3 specimens (1 CS).
T. minutus. BMNH 1891.3.16.84–86, 3 syntypes.
T. mondolfi. USNM 120377, 2 paratypes (1 radiograph).
T. motatanensis. USNM 121232, holotype; USNM 121233, 1 paratype.
T. nigromaculatus. UMMZ 187674, 2 specimens.
T. oroyae. MCZ 3955, 4 syntypes; FMNH 41047, 3 specimens (1 CS); ANSP 97868, 2 specimens; FMNH 58569, 2 specimens (CS).
T. paolence. FMNH 58085, holotype; FMNH 58575, 1 paratype; MZUSP 22752, 1 specimen.
T. paquequerense. MNRJ 1159, holotype.
T. pardus. ANSP 21180, 3 syntypes.
T. petri. MNRJ 830, holotype.
T. poeyanus. ANSP 21382, 2 syntypes.
T. pradensis. UF 148993, 2 paratypes.
T. pseudosilvinichthys. FML 2588, holotype; FML 2589, 9 paratypes (1 CS); FML 2103, 34 specimens (1 CS); USNM 374759, 3 paratypes (1 CS).
T. punctulatus. CAS 58119, holotype; FMNH 58672, 1 paratype; FMNH 70279, 1 specimen (CS); FML 1524, 10 specimens (1 CS); FML 1023, 1 specimen (CS); FML 919, 1 specimen (CS).
T. quechuorus. FMNH 88949, 3 specimens (1 CS); AMNH 20351, 2 specimens (1 CS).
T. ramosus. FML 2070, holotype; FML 2071, 9 paratypes (2 CS).
T. regani. CAS 64591, holotype.
T. reinhardti. FMNH 58081, holotype; ANSP 174054, 2 specimens (1 CS).
T. riojanus. MACN 5175, holotype.
T. rivulatus. UMMZ 66324, 2 specimens (CS); MNHNC 03, 1 specimen; MACN 1226, 2 specimens; MNHNC 2347, 2 specimens.
T. roigi. MLP 8538, 5 paratypes; FML 1503, 2 specimens; FML 1016, 1 specimen.
T. romeroi. ANSP 69331, holotype; ANSP 69332, 2 paratypes (1 CS); ANSP 69335, 2 paratypes.
T. santaeritae. FMNH 58577, holotype; FMNH 58573, 1 specimen.
T. stawiarski. MNRJ 9739, holotype.

T. schmidti. MACN 5176, 1 syntype; MACN 4595, 1 syntype; MACN 5174, 2 specimens.
T. septentrionale. FMNH 59522, holotype; FMNH 59195, 1 paratype; UMMZ 145773, 1 paratype (radiograph).
T. spegaziinii. MACN 5173, 1 syntype; MACN 4925, 7 syntypes; BMNH 1898.9.23.1-2, 2 syntypes; FML 2105, 5 specimens (2 CS); MACN 5174, 1 specimen; MLP 8384, 2 specimens; MLP 9008, 5 specimens; MLP 4139, 3 specimens; MLP 9009, 1 specimen; MLP 4934, 3 specimens; MLP 2557, 1 specimen.
T. spilosoma. FMNH 58095, 1 specimen (radiograph).
T. stellatus. FMNH 58101, holotype; CAS 58121, 3 paratypes (radiographs); CAS 64592, 1 paratype (CS).
T. straminius. FMNH 58105, holotype; CAS 58148, 1 paratype; FMNH 58106, 1 specimen (CS).
T. striatus. FMNH 7579, holotype; USNM 78374, 1 paratype; ANSP 104215, 1 specimen (CS); CAS 64593, 1 specimen (radiograph); USNM 305351, 3 specimens (CS).
T. taczanowskii. UMMZ 1815335, 3 specimens.
T. taenia. ANSP 148098, 3 specimens (1 CS).
T. taeniops. ANSP 71638, holotype.
T. tenuis. MUSM 6794, 2 specimens.
T. therma. CBF 8886 holotype; CBF 9099, 3 paratypes (1 CS).
T. tiraquae. ANSP 69126, holotype; ANSP 69127, 2 paratypes; UMMZ 204202, 2 specimens; AMNH 39740, 2 specimens (CS); CBF 8886, 3 specimens (1 CS); MUSM 15476, 3 specimens; UMSS 712, 2 specimens.
T. travassosi. MNRJ 5424, holotype.
T. triguttatus. FMNH 58670, holotype; CAS 64596, 1 paratype (radiograph); FMNH 58671, 1 paratype.
T. vermiculatus. FMNH 58077, holotype; AMNH 9081, 1 specimen; AMNH 9084, 1 specimen (CS).
T. vittatus. ANSP 149682, 3 specimens; ANSP 149683, 3 specimens (1 CS).
T. weyrauchi. ANSP 71639, holotype and 4 paratypes; ANSP 71640, 2 paratypes; ANSP 71642, 2 paratypes.
T. yuska. FML 2535, holotype; AMNH 232397, 1 paratype; FML 1130, 2 specimens; FML 1132, 2 specimens; FML 1133, 1 specimen (CS); FML 1131, 1 specimen.
T. zonatus. FMNH 58573, holotype; UMMZ 231757, 5 specimens; AMNH 9082, 1 specimen.
T. sp. 1. CBF uncat., 4 specimens.
T. sp. 2. CAS 58130, 2 specimens.

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