**Trichomycterus alterus** (Marini, Nichols & La Monte, 1933) and **T. corduvensis** Weyenberg 1877 (Siluriformes: Trichomycteridae): new records from the High Andean Plateau

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**Abstract:** New records of two *Trichomycterus* species are herein added to the existing checklist of catfishes living at elevations above 3,000 m in the Andes of South America. *Trichomycterus alterus* and *T. corduvensis* are recorded at 3,430 m above sea level from the High Andean Plateau (or Puna) in a stream near Antofagasta de la Sierra, Provincia de Catamarca, Argentina. Morphometric and meristic data of examined specimens are included.

**Key words:** catfish; high altitude; Argentina; Catamarca; Central Andes; Puna

The Andean ichthyofauna is minuscule (around 375 spp.) compared to that of the South American lowlands (6,000+ spp.) (Schaefer 2011; Fernandez & Vari 2012; Reis et al. 2016). The depauparate ichthyofauna from above 3,000 m in the Andes consists mainly of 34 species of Trichomycteridae, 22 of which occur on the High Andean Plateau or Puna (Arraya et al. 2009; Fernandez 2013). The Puna of the Central Andes is the second largest and highest plateau on the Earth after the Tibetan Plateau. It is the prominent feature that characterizes the Andean mountain range along the western border of South America (Aramayo et al. 2017). The high-elevation Puna Plateau extends from southwestern Peru through western Bolivia and into Chile and northern Argentina; it has a relatively long dry season (Ramos 1999; Risse et al. 2013; Becker et al. 2015). The Puna includes endorheic drainage such as lakes Titicaca and Poopó, and numerous small high-altitude freshwater lakes and swamps, as well as extensive salars such as Coipasa-Uyuni in Bolivia and Antofalla, Hombre Muerto, and Salinas Grandes in Argentina (Kraemer 1999; Schaefer 2011; Ducea et al. 2013; Fernandez 2013).

According to Arratia et al. (1983), Fernandez (2001), Fernandez & Vari (2002), and Arraya et al. (2009), the highest altitude populations of *Trichomycterus alterus* (Mari-

Figures 1. *Trichomycterus alterus* and *T. corduvensis* from Antofagasta de la Sierra, Catamarca, Argentina. A. *T. alterus*, FACEN 0094, 39.7 mm SL. B. *T. corduvensis* FACEN 0095, 42.8 mm SL from Antofagasta de la Sierra Department, Catamarca, Argentina. Scale bar = 2 mm.

Figure 3. Habitat of *Trichomycterus alterus* and *T. corduvensis* in Antofagasta de la Sierra, Catamarca, Argentina.

Examined material. *Trichomycterus alterus*: FACEN 0094, 6 specimens, 33.2–42.54 mm SL, unnamed stream near to Laguna Colorada, Departamento Antofagasta de la Sierra, Provincia Catamarca, Argentina, 26°01′57.09″S, 067°26′54.51″W, 3,430 m above sea level, 7 July 2016. *T. corduvensis*: FACEN 0095, 9 specimens (1 cleared and stained), 31.6–42.8 mm SL, same data as above. Comparative material: *T. alterus* AMNH 12241, holotype; AMNH 12242, 3 paratypes; FACEN 0088, 1 specimens (cleared and stained); FML 2085, 3 specimens (1 CS); USNM 364373, 3 specimens. *T. corduvensis* FACEN 0081, 4 specimens; FML 2097, 1 specimen (CS); FML 2816, 3 specimens.

Light shading: elevations above 3,000 m; dark shading: elevations above 4,000 m.
The specimens of *T. alterus* (Figure 1A) were recognized by the following combination of characters: caudal peduncle narrow and laterally compressed; dorsal-fin origin unpigmented (Figure 4A); interopercular and opercular odontodes embedded in a thick integument; premaxilla with 2 or 3 rows of teeth; 12 principal caudal-fin rays and distal margin concave; maxillary barbel expanded basally; 6 to 9 branched dorsal-fin rays; 7 or 8 pectoral-fin rays, with small filament; 5 branched anal-fin rays (Fernandez & Vari 2002). Additional features include: supraorbital canal segment discontinuous, with pores s1, s2, s3, and s6 present and laterosensory canal of trunk with 3 pores anteriorly (LF pers. obs.). Morphometric and meristic data is presented in Table 1.

The *T. corduvensis* (Figure 1B) specimens were recognized by the following combination of characters: caudal peduncle smoothly continuous with dorsal and ventral profiles of trunk; maxillary barbel expanded basally; 6 to 9 branched dorsal-fin rays; 7 or 8 pectoral-fin rays, with small filament; 5 branched anal-fin rays (FERNANDEZ & VARI 2002). Additional features include: supraorbital canal segment discontinuous, with pores s1, s2, s3, and s6 present and laterosensory canal of trunk with 3 pores anteriorly (LF pers. obs.). Morphometric and meristic data is presented in Table 2.

*Trichomycterus alterus* and *T. corduvensis* inhabit the Río de la Plata basin, in northwestern and central Argentina and the Amazonas basin, at western of Bolivia (FERNANDEZ 2001; FERNANDEZ & VARI 2002; ARRAYA et al. 2009) (Figure 5). However, they were not collected in high altitudes until now. Several genera of trichomycterid catfishes are endemic to the Andean Cordillera, such as *Silvinichthys* Arratia, 1998 (Argentina), *Hatcheria* Eigenmann, 1909 (Argentina and Chile), *Rhizosomychthys* (Miles, 1942) (Colombia), as well as many undescribed species of *Trichomycterus* Valenciennes, 1832 (FERNANDEZ 2013; FERNANDEZ et al. 2014; REIS et al. 2016). Trichomycterid catfishes are highly specialized for life in uplands along the Andean mountains, and they occur in a remarkable variety of environments, including temporary streams, subterranean drainages, high elevation streams, and warm thermal water (FERNANDEZ & VARI 2012). They generally are equipped with opercular and interopercular odontodes that can be everted to provide friction when these fishes climb waterfalls (ZUANON & SAZIMA 2005; FERNANDEZ 2013). Although some *Trichomycterus* species can occur at altitudes up to about 4,800 m (*T. roigi* Arratia & Menu-Marque, 1984), they become scarce at high elevations (FERNANDEZ 2013).

This is the first record of T. alterus and T. corduvensis at high elevations (3,430 m) and increases to 15 the number of Trichomycterus species known from the High Andean Plateau (Figures 2). In Puna, the overexploitation of natural resources (mainly mining: mountain top valley fill and lithium) and the introduction of exotic fishes (as Rainbow Trout) endangers many species, especially Andean catfishes (FERNANDEZ 2005; FERNANDEZ & VARI 2012; HABIT et al. 2015). Unfortunately, the Argentine government has strong conservation policies directed to the protection of salmonids and catfishes are largely ignored (FERNANDEZ 2005, 2013). On the other hand, it is difficult to provide reliable conservation recommendations for Andean catfishes when data—geographic distributions—are deficient (FERNANDEZ et al. 2014, 2017). Presently, contributions such as these new records are necessary for the establishment of protected areas and promotion of conservation programs in the High Andean Plateau.

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