THE OCCURRENCE OF TORRIDINCOLIDAE (COLEOPTERA: MYXOPHAGA) IN PARAGUAY AND A WORLD CHECKLIST OF SPECIES

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Abstract.- The occurrence of the beetle family Torridincolidae is reported from Paraguay. Adults, pupae and larvae were collected within the Atlantic Forest ecosystem from the vicinity of waterfalls in the Yvytyruzú Cordillera, Department Guairá. A checklist is given for all Torridincolidae species described to date.

Key words: Torridincolidae, Myxophaga, Paraguay, new records, World checklist.

Resumen.- La ocurrencia de la familia Torridincolidae se divulga de Paraguay. Se colectaron adultos, pupas y larvas en la ecosistema del Bosque Atlántico cerca de saltos de Cordillera del Yvytyruzú, departamento Guairá. Se da una checklist de todas las especies de Torridincolidae actualmente descrito.

Palabras clave: Torridincolidae, Myxophaga, Paraguay, nuevos reportes, checklist mundial.

Torridincolidae, commonly called torrent beetles, is a small, little-known family of aquatic beetles in the Suborder Myxophaga with 37 formally described species in seven genera (Braule-Pinto et al., 2011; Hajek et al., 2011; Vanin, 2011). They are largely restricted to the Southern Hemisphere although some species occur in Japan and China. All stages of the life cycle are aquatic, and most species occur in thin layers of water, especially in fast-flowing habitats such as waterfalls.

The literature on Torridincolidae is largely systematic and was well reviewed by Vanin (2011). Aquatic respiration in adults of most torridincolid species is via a plastron and larvae breathe via segmented trachael gills (Hin-
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Figures 3-4. Salto Pai. 3) upper cascade. 4) Bedrock ledge inhabited by Ytu new species.

ton, 1967; Endrödy-Younga, 1997). The possible occurrence of the family in Paraguay was cited previously by Aguilar (2010) and Jách & Balke (2008), but the specimens were thought to be lost. The location of those specimens is now known and their data are reported below.

Shepard and Aguilar have been surveying the aquatic byrrhid beetles of Paraguay for several years and in 2010 published a preliminary report which included taxonomic keys, geographic distribution and habitat notes for the known taxa. This paper was the first to deal with the aquatic beetle fauna of Paraguay. The torridincolid specimens discussed here were found in February 2011 during their continuing survey work. The collections, including larvae, pupae and adults (Figs. 1–2), represent an undescribed member of the *Ytu zeus* Reichardt species group. The species was collected at two localities by Shepard and Barr, both in the Yvytyruzú Cordillera in Departamento Guairá: Salto Paí, Arroyo Tacuara, 3.7 km SSW of Melgarejo, S25°44.916’ W56°15.231’, elevation 221 m; and Salto Suizo, Arroyo Libertad, 6 km SSE of Melgarejo, S25°46.299’ W56°13.575’, elevation 243 m.

The specimens from Salto Paí were collected in a series of cascades separated by deep plunge pools (Figs. 3–4). The specimens were on massive sandstone outcroppings and were covered by a relatively thin layer of swift water. The specimens from Salto Suizo were collected from the surface of a boulder, below the plunge pool (Fig. 5), over which flowed a thin layer of fast water. All specimens are currently housed at Essig Museum of Entomology, University of California, Berkeley, where they are being studied and described.

These two collections represent the farthest west that members of the *Ytu zeus* species group have been collected in the Atlantic Forest ecosystem. *Ytu brutus* Spangler, another member of the *Ytu zeus* species group, occurs farther west, but in the Brazilian/Bolivian border outside of the Atlantic Forest ecosystem (Spangler, 1980). Because both Paraguayan locations are in remnants of the Interior Atlantic Forest, we expect to find additional populations, and perhaps additional species, when more of this ecosystem is surveyed in Paraguay. The presence of these two populations further bolsters the case for the conservation and protection of this unique, endangered ecosystem, as advocated in Galindo-Leal & Câmara (2003). Over time more and more river systems are threatened by the construction of hydroelectric dams (Fahey and Langhammer, 2003) and by the loss of forests in river basins due to soybean farming.

The four specimens that were thought to be lost are now known to be in the Naturhistorische Museum Wien, in Vienna, Austria. The
collection data is: PARAGUAY: Paraguarí, Sapucay, IV 1994, Ulf Drechsel. They are also members of Ytu (Manfred Jäch, pers. comm.) but they have not yet been examined to determine if they are the same species as the one reported above.

An updated world checklist of the Torridincolidae is provided as follows:

**CHECKLIST OF TORRIDINCOLIDAE OF THE WORLD**

Family: *Torridincolidae* Steffan, 1964: 199


A phylogenetic analysis by Beutel (1998/99) questions the validity of the subfamily Deleveinae, but no taxonomic alternative was proposed.


   = *Delevea kurosawai* Satô, 1982: 279 (original description).
   = *Satonius kurosawai* (Satô, 1982); (Endrödy-Younga (1997: 318) (new combination, redescription);

Beutel (1998: 54) (description of larva); Hayashi (2007: 77) (faunistics, photographs of imago and larva); Hayashi & Kadowaki (2007: 149) (faunistics, photograph of imago); Hayashi (2008: 61) (faunistics, photographs of pupa); Hájek & Fikáček (2008: 662) (adult diagnosis and bionomic and description of the larvae);

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**Figure 5.** Salto Suizo, waterfall and arroyo upstream from boulder where Ytu new species was collected.
Hájek et al. (2011: 56) (faunistics, description of wing polymorphy).


Subfamily: *Torridincolinae* Steffan, 1964 (Endrödy-Younga 1997)
= *Pytopterinae* Abdullah, 1974 (syn. Endrödy-Younga 1997)

Genus: *Claudiella* Reichardt & Vanin, 1976: 212


5. *Iapir trombetensis* (Fonseca, Py-Daniel & Barbosa, 1991): 293 .........................Brazil.

Genus: *Incoltorrida* Steffan, 1973: 634


Genus: *Ytu* Reichardt, 1973: 131


5. *Ytu brutus* Spangler, 1980: 145 .................................................................Brazil.
17. *Ytu reichardti* Vanin, 1978: 1 .................................................................Brazil.
20. *Ytu n. sp. of zeus* species group ........Paraguay.
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LITERATURE


Hayashi, M. & H. Kadowaki. 2007. Records on aquatic Coleoptera from rivers in and around Mt. Daisen, Tottori Prefecture,
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