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Trechisibus apukhapiensis sp. n. (Coleoptera: Carabidae, Trechinae) from southeastern Andean mountains of Peru

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A new species of ground beetle, *Trechisibus (Trechisibiodes) apukhapiensis* sp. n. from the Andean Mountains of southeastern Peru is described based on specimens collected in the Apu Khapia Mountain, 4 462 m. (16º 20' 41'' S, 68º 08' 57'' W), Puno region. This species is externally similar to *T. bohorquezae* and *T. orophilus*, yet differs specifically from them in the male genitalia.

Key words: *Trechisibiodes*, ground beetles, neotropical, Puno.

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INTRODUCTION

Trechisibus Motschulsky, 1863 is a genus with more than 100 known species (Lorenz 2005, Delgado & Ruiz-Tapiador 2014), widely distributed in South America. Twenty five species have been cited in the Andean region that covers the south of Perú and adjacent areas of Bolivia (Casale 1978, Etonti 2003, Etonti & Mateu 1992, 1996, Guzzetti 2012, Jeannel 1927, 1930, 1958, Mateu & Etonti 2002, Mateu & Negre 1972, Schweiger 1958, 1959, Trezzi 2005, 2007, 2011, Uéno 1971). The currently available data indicate that they are, in general, species with very restricted distributions.

The systematics of the genus is still far from being definitively resolved despite several approaches by different authors (Jeannel 1958, 1962, Bonniard de Saludo 1970, Uéno 1971, 1972, Mateu & Negre 1972, Etonti & Mateu 1992, 1996, 1998; Deuve 2002, Lorenz 2005, Avon 2007 and Allegro et al. 2008). There appears to be no consensus about the validity of the traditionally recognized subgenera, and some authors are in favor of restructuring the genus according to species

groups (Mateu & Negre 1972, Allegro et al. 2008, Trezzi 2011).

Following the subgeneric division recognized by traditional systematics there are eight species of subgenus *Trechisibus* s. str. in the area, as well as 14 species of subgenus *Trechisibiodes* Uéno, 1972; two species of *Trechisibiellus* Jeannel, 1962; and one of *Trechisibiorites* Jeannel, 1962.

In this work a new species of subgenus *Trechisibiodes* from the Andean region of southern Peru is described, and the main morphological differences to the other species of the subgenus inhabiting the surrounding area are discussed.

MATERIAL AND METHODS

All specimens were measured using an Olympus SZX12 microscope. Measurements for various body parts are encoded as follows: ABL = apparent body length, from clypeus to apex of elytra; WH = width of head, at level of first orbital setae; WPm = maximal width across pronotum; WPa = width across anterior angles of pronotum; WPp = width across posterior angles of pronotum; LP = length of pronotum from base to apex along midline; WE = width of elytra, along midline; LE = length of the elytra, from apex of scutellum to apex of left elytron. ABL measurements are given in mm; others are presented as seven ratios: mean widths WH/WPm and WPm/WE and body parts WPa/WPp, WPm/WPp, WPm/LP, LE/ABL and WE/ABL. All values are given as mean ± standard deviation.

Dissections of genitalia were made using standard techniques. The drawings of the habitus were made by means of a camera lucida connected to an Olympus SZX12 stereo microscope. The male genitalia were previously deposited in DMHF balsam and drawings were made with a camera lucida connected to a Kyowa UNILUX-12 microscope.

***Trechisibus (Trechisibiodes) apukhapiensis*, new species**

Holotype. Male labeled/ Perś, Puno, montańa Apu Khapia 68º 08' 57'' W, 16º 20' 41'' S, 4 462 m, 19-IX-2012, P. Delgado leg. deposited in National Museum of Natural History in Lima (MNHNL).

Type locality. Perś, Puno Region, Chucuito Province, Pomata District, Apu Khapia Mountain 68ț 08' 57'' W, 16ț 20' 41'' S, 4 462 m.

Paratypes (18). Four males with same data as holotype, deposited col. P. Delgado (2) and col. I. Ruiz-Tapiador (2); One male Perś, Puno, montańa Apu Khapia 68º 08' 57' 'W, 16º 20' 41'' S, 4 462 m, 06-IX-2012, P. Delgado leg. deposited in MNHNL (1); two female, Perś, Puno, montańa Apu Khapia 68º 08' 57'' W, 16º 20' 41'' S, 4 462 m, 06-IX-2012, P. Delgado leg. deposited col. P. Delgado (1) y col. I. Ruiz-Tapiador (1). Seven males Perś, Puno, montańa Apu Khapia 68º 08' 57'' W, 16º 20' 41'' S, 4 462 m, 20-XII-2012, P. Delgado leg. deposited in MNHNL (2), col P. Delgado (2) and col I. Ruiz-Tapiador (2); five females, Perś, Puno, montańa Apu Khapia 68º 08' 57'' W, 16º 20' 41'' S, 4 462 m, 20-XII-2012, P. Delgado leg. deposited col. MNHNL (2), P. Delgado (2) and I. Ruiz-Tapiador (1).

Etymology. The new species is named after the type locality, the Apu Khapia Mountain.

Description. Small for the genus (ABL range 2.9–3.2 mm, mean 3.04 ± 0.09 mm, n=19). Sexes of approximately equal size: ABL range of males 2.9–3.2 mm, mean 3.04 ± 0.10 mm, n=12; ABL range of females 3.0–3.1 mm, mean 3.05 ± 0.07 mm, n=7. Habitus (Figure 1) markedly convex, ovoid (WE/ABL 0.35 ± 0.01), head normally proportioned for the genus (WH/WPm 0.82 ± 0.01), pronotum narrow compared to elytra (WPm/WE 0.73 ± 0.04). Body color ranges from reddish brown to dark brown, appendages much lighter, testaceous. Micro-sculpture fine but distinct across dorsal surface of pronotum and most of head. On head

only the vertex lacks micro-sculpture. Elytra with well-developed polygonal micro-sculpture.

Pronotum moderately convex and comparatively strongly transverse (WPm/LP 1.46 ± 0.19), with straight margins, moderately constricted at posterior region (WPm/WPp 1.35 ± 0.06). Anterior angles evident and slightly prominent. Posterior angles slightly obtuse (100–105°). The width between posterior angles is greater than between anterior angles (WPa/WPp 0.82 ± 0.06).

Elytra markedly convex, slightly depressed along suture, of normal length for genus (LE/ABL 0.53 ± 0.01). Micro-sculpture consisting of polygonal meshes, distinct on the whole elytral surface, which is slightly shiny. Shoulders rounded, with angulose humeral border ending at elytral base near the 4th stria. Lateral border of elytra wide and sharply narrowed backwards ending in a slight preapical emargination. Elytral tip broad and rounded. Second to seventh stria vestigial; first stria shallow but evident on the whole length;

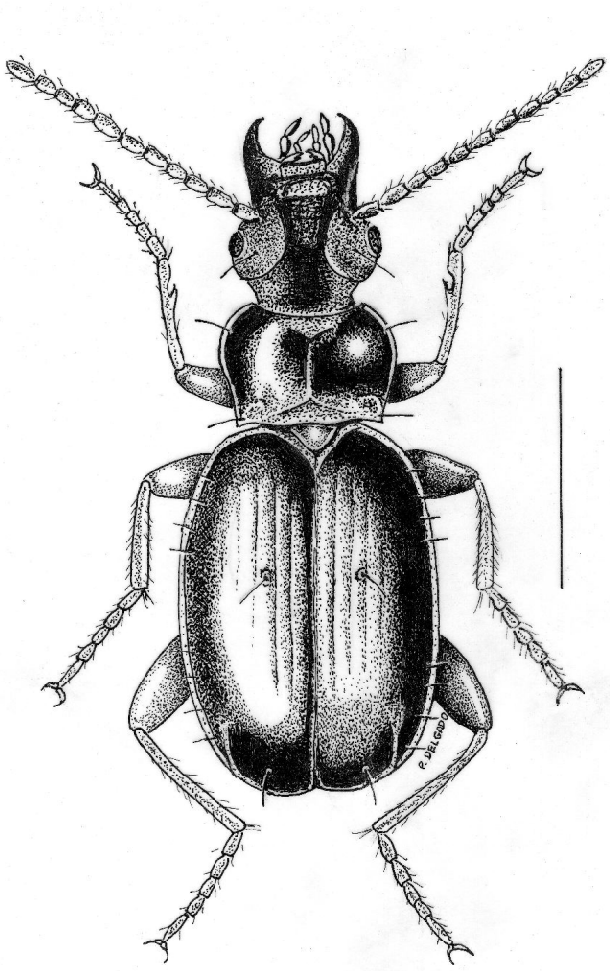

Fig. 1. *Trechisibus (Trechisibiodes) apukhapiensis* sp. n., habitus (scale bar 0.1 mm).

eighth stria deeply impressed on the whole length; apical recurrent striole short, sub-rectilinear, ending at level of seventh stria and with a remarkable apical carina. Chaetotaxy: juxtascutellar pore present; one setiferous dorsal pore on the third stria, at basal fifth and a little behind middle. Preapical pore placed backwards and closer to recurrent striole than to suture.

Aedeagus (Figure 2) moderately sclerotized, small (length 0.70 mm), slender, with basal bulb enlarged; median lobe, in lateral view, regularly tapering from base to apex, little and regularly curved; apex long, relatively slender and strongly

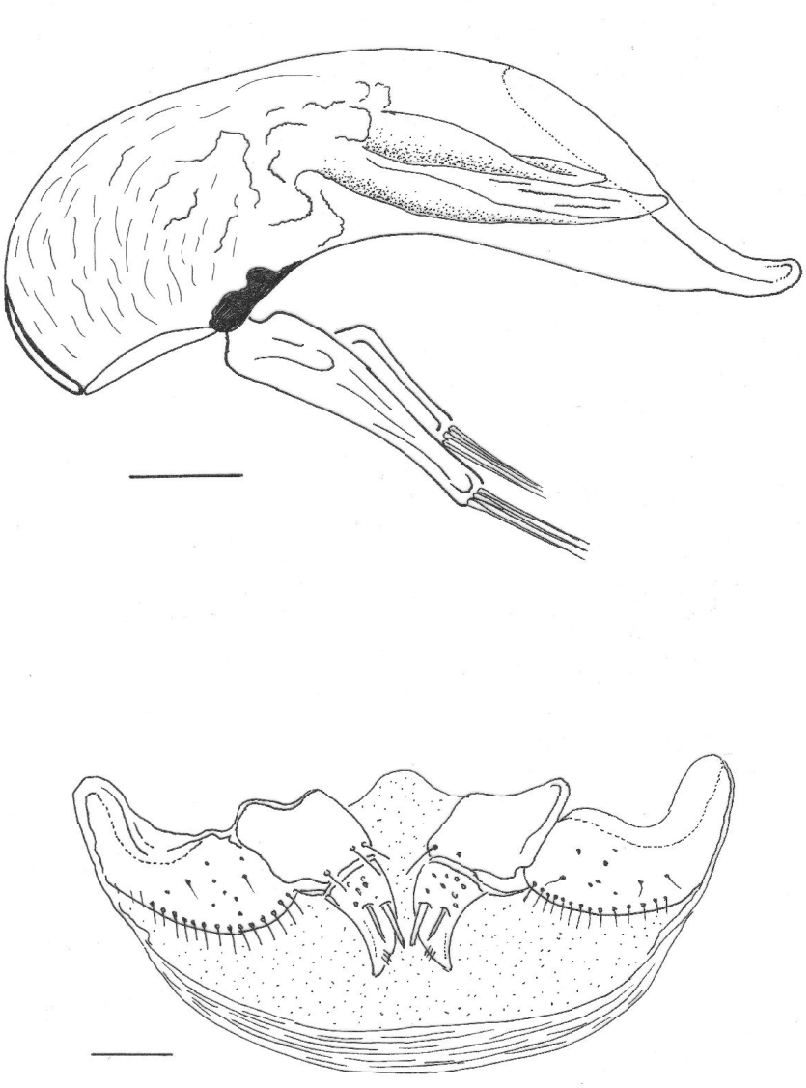

Fig. 2. Male genitalia in lateral view and female genitalia in ventral view (scale bar 0.1 mm).

bent downwards. Inner sac with a copulatory piece in the middle part shaped as a long open gutter, bordered by small striated elements. Parameres narrow and long, reaching the apical fourth of the median lobe, each provided with four apical setae.

Distribution. At present *T. apukhapiensis* sp. n. is only known from the type locatity, Apu Khapia Mountain.

Habitat. Beetles were collected under stones laying on rather dry soil, near a lagoon at 4 620 m.a.s.l.n. At this site *T. apukhapiensis* sp. n. was collected in sintopy with other Trechinae.

Differential diagnosis. The new species is included in the subgenus *Trechisibiodes*, based on the presence of only one discal seta on the elytron and on the relative position of the apical seta (Uéno 1972). As stated in the introduction, another 14 species of this subgenus are known to occur in the study area, from which the new species can be clearly differentiated by the features of male and female genitalia, in combination with some external morphological characters.

T. apukhapiensis sp. n. is easily distinguishable from a first group of species composed of *Trechisibus* (*Trechisibiodes*) *veneroi* Etonti & Mateu, 1992; *T. cuzcoensis* Etonti & Mateu, 1996; *T. nicki* Schweiger, 1959; *T. franzi* Mateu & Negre, 1972 and *T. peruvianus* Jeannel, 1927. In this group, as can be observed (Etonti & Mateu 1992, 1996, Jeannel 1927, Mateu & Negre 1972, Schweiger 1959), the apex of the aedeagus, in lateral view, is curved ventrally, as well as the well developed sagital flap at the base of the basal bulb in all these species. In *T. apukhapiensis* sp. n., however, the apex is virtually horizontal and the sagital flap is not developed, and only observable as a small, slightly more chitinized area in an homologous position.

Within a second group of species of *Trechisibiodes* , *T. apukhapiensis* sp. n. resembles several species, except for the presence in those species of the sagital flap at the base of the bulb, a medial lobe (in lateral view) curved dorsally and ending in a hook. Both characters allow differentiating without problems of *T. apukhapiensis* sp. n. from *T. laresensis* Etonti & Mateu, 1996; *T. theresiae* Etonti & Mateu, 1996; *T. schmidti* Uéno, 1971 and *T. wardi* Etonti, 2003 (Etonti 2003, Etonti & Mateu 1996, Uéno 1971).

Among the geographically closest species with known male genitalia, *T. bohorquezae* Etonti & Mateu, 1992 and *T. orophilus* Mateu & Etonti, 2002 are those with an apex more akin to that of *T. apukhapiensis* sp. n. (Etonti & Mateu, 1992, Mateu & Etonti 2002) .

From *T. bohorquezae*, it may be distinguished by the general aspect of the medial lobe of the aedeagus and the narrow, long and sagital flap at the base of the bulb in T. bohorquezae (Etonti & Mateu 1992), as well as by a combination of traits absent in *T. apukhapiensis* sp. n.

T. orophilus is probably the species with an aedeagus more akin to that of *T. apukhapiensis* sp. n.., however, in the case of the latter species the medial lobe of the aedeagus, in lateral view, is strongly bent ventrally, the apex is slightly narrowed and the morphology of the chitinized piece from the internal armature is different (Mateu & Etonti 2002). Additionally, according to the original description of *T. orophilus*, the basal foveae of pronotum are deep, while in *T. apukhapiensis* n. sp. they are very shallow.

There are three species of *Trechisibiodes* in the study area with unknown male genitalia: *T. ukupachensis* Trezzi, 2007; *T. gigas* Trezzi, 2007 and *T. pygmaeus* Jeannel, 1930. In the case of the first two, the morphology of the external female genitalia is characterized in the original descriptions (Trezzi 2007), but not in the latter (Jeannel 1930).

Among the characters separating *T. ukupachensis* from *T. apukhapiensis* sp. n., what stands out is the dorsal surface of the gonocoxites in the former, which has only one spine, while in

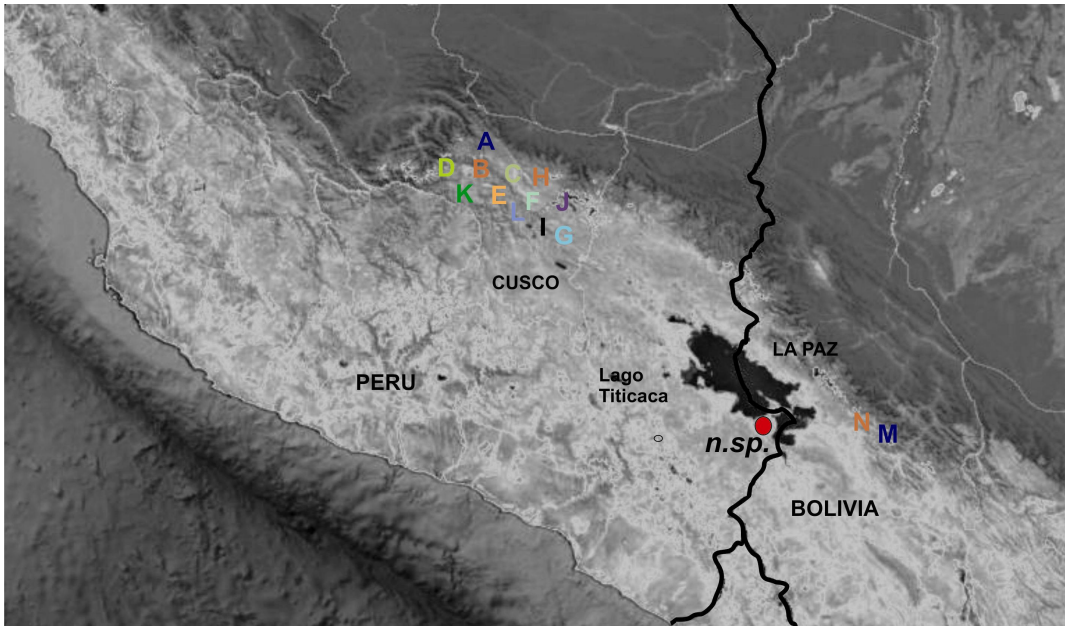

Fig. 3. Location of the Trechisibus species (● = T. apukhapiensis, A= T. bohorquezae, B=T. cuzcoensis, C=T. gigas, D=T. nicki, E=T. theresiae, F=T. franzi, G=T. schmidti, H=T. laresensis, I=T. veneroi, J=T. orophilus, K=T. peruvianus, L= T. ukupachensis, M=T. wardi, N= T. pygmaeus).

the new species two well developed spines are clearly visible. Moreover, *T. ukupachensis* is larger, with 4.8 mm length, while *T. apukhapiensis* sp. n., with 3.01 mm length, thus being one of the smallest species of the subgenus.

T. gigas, is a peculiar species within the subgenus by its exceptionally large size, which is more than twice the length of *T. apukhapiensis* sp. n. But it also differs in the lesser robustness of the spines of the gonocoxite and in the relative position of both spines which in *T. gigas* are stepped, while in *T. apukhapiensis* sp. n., these are practically in parallel.

The difference with *T. pygmaeus* is more problematic, given that the original description is quite succinct and only based on characters associated to the external morphology of the single female holotype. Fortunately both species can be well distinguished since in *T. apukhapiensis* sp. n. the tibiae present a groove in their external face, while in *T. pygmaeus* the description explicitely refers to the lack of this trait.

Biogeographical notes. The discovery of the new species of Trechinae is significant due to the biogeographical position, filling a gap in the knowledge of the distribution of this genus in the south of the Peruvian Andes (Figure 3).

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