

## Description of four new species of genus *Trechisibus* Motschoulsky, 1862 from Peru

(Coleoptera, Carabidae)

Pedro Delgado & Ildefonso Ruiz-Tapiador

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Four new species, belonging to genus *Trechisibus* Motschoulsky, 1862 are described from southeastern Peru: *T. silviae* sp. nov., *T. elisae* sp. nov., *T. jorgeluisi* sp. nov. and *T. bravoii* sp. nov. Their affinities and differences respect to other, previously known, species of the genus from the surroundings of Lake Titicaca are discussed.

Pedro Delgado, Universidad Politécnica de Madrid, Avda. Puerta de Hierro N° 4, 28040 Madrid, Spain; and Estación Experimental Agraria Illpa del Instituto Nacional de Innovación Agraria, Rinconada de Salcedo s/n, Puno, Peru; e-mail: pdelgado@inia.gob.pe

Ildefonso Ruiz-Tapiador, Universidad Politécnica de Madrid, Departamento de Ingeniería Agroforestal, Escuela Técnica Superior de Ingeniería Agronómica, Alimentaria y de Biosistemas, Avda. Puerta de Hierro N° 4, 28040 Madrid, Spain; e-mail: ildefonso.ruiztapiador@upm.es

### Introduction

*Trechisibus* Motschoulsky, 1862 is, within tribe Trechini, the genus with a greater number of species in South America. A recent revision of the genus has inventoried 134 species (Delgado & Ruiz-Tapiador 2014), with 11 species added since then (Allegro & Giachino 2016, 2017, Delgado & Ruiz-Tapiador 2016, Ruiz-Tapiador & Delgado 2016), lead to a total of 145 species. So far, 26 of them are known from the surroundings of Lake Titicaca (Table 1, Fig. 1).

The taxonomic organization of the group still involves serious troubles despite previous description efforts by numerous researchers (Dejean 1831, Brullé 1842, Solier 1849, Germain 1855, Putzeys 1870, Fairmaire 1885, Jeannel 1927, 1930, 1937, 1954, 1958, 1961, 1962, Andrewes 1931, Schweiger 1958, 1959, Bonniard de Saludo 1970a,b, Uéno 1971, 1972, 1974, 1976, Mateu 1972, 1978, 1979, 2000, Mateu & Nègre 1972, Casale 1978, Mateu & Bellès 1981, Etonti & Mateu 1992, 1996, 1998, 1999, 2000, 2002, Deuve

2001, 2002, 2006, Mateu & Etonti 2002, 2006, Etonti 2003, Roig-Juñent & Sallenave 2005, Trezzi 2005, 2007, 2011, Allegro et al. 2008, Guzzetti 2012, Allegro & Giachino 2016, Delgado & Ruiz-Tapiador 2016, Ruiz-Tapiador & Delgado 2016).

Among them, the problem of the probable unawareness of so many species of the group yet to discover stands out, due to the lack of adequate fieldworks in their distribution range and thus the scarcity of available specimens, making it highly difficult to have a correct assessment of the inter- and intrapopulation variability (Delgado & Ruiz-Tapiador 2014).

The several attempts to the systematics of the group (Mateu & Nègre 1972, Avon 2007, Allegro et al. 2008) are the result of the different emphasis that each author has given to the different diagnostic traits. Hence, the importance of the chaetotaxy of the elytral disc, highlighted by Mateu & Nègre (1972), have been discussed by other authors (Avon 2007, Allegro et al. 2008, Delgado & Ruiz-Tapiador 2014)

that advocate for a greater influence of the morphology of aedeagus in the resolution of the systematics of the genus.

All in all, as a way to make progress toward solving these taxonomic issues, it is heavily needed to continue with descriptive work of new taxa, given that they show clear features that do not increase the existing confusion and improve the knowledge on the variability of this complex genus.

### Material and methods

From 2016 to 2018, several expeditions to the mountain ranges that define and limit the Peruvian Plateau in the departments of Puno, Cusco and Moquegua were conducted. As a result, numerous specimens were collected, under stones, in altitudes ranging between 4075 m and 5105 m that led to the identification of four new species.

The study and data gathering of the external morphology were done with an Olympus SZX12 microscope. The measurements considered in this work are: BL, body length, from the apical margin of labrum to the apex of the elytra; WH, width of head, at the level of the first orbital setae LH, length of head, from the

apical margin of labrum to the base of the cephalic capsule TLA, total length of the antenna WP, maximum width of pronotum LP, length of pronotum from the base to the apex along the midline WE, maximum width of elytra LE, length of elytra, from the apex of scutellum to the apex of elytra.

Aedeagi of males, after being extracted through traditional procedures, were mounted in DMHF resin and studied with a Kyowa UNILUX-12 microscope with a camera lucida attached as support to elaborate the corresponding illustrations.

### Abbreviations

CIRT	Coll. Ildefonso Ruiz-Tapiador, Madrid, Spain
CPD	Coll. Pedro Delgado, Puno, Peru
LEEEIP	Laboratorio de Entomología de la Estación Experimental Illpa, Peru
MHNLP	Museo de Historia Natural de Lima, Peru
MNCNM	Museo Nacional de Ciencias Naturales de Madrid, Spain
NHMB	Natural History Museum of Berlin, Germany
NMNHP	French National Museum of Natural History, Paris, France
OUMNH	Oxford University Museum of Natural History, United Kingdom

**Table 1.** List of the species of genus *Trechisibus* described from the surroundings of Lake Titicaca.

Species	Department	Country
<i>T. aphukapienesis</i> Ruiz-Tapiador & Delgado, 2016	Puno	Peru
<i>T. aymara</i> Trezzi, 2005	La Paz	Bolivia
<i>T. ayrtoni</i> Guzzetti, 2012	La Paz	Bolivia
<i>T. bohorquezae</i> Etonti & Mateu, 1992	Cuzco	Peru
<i>T. bolivarianus</i> Trezzi, 2011	La Paz	Bolivia
<i>T. chucurensis</i> Trezzi, 2007	Arequipa	Peru
<i>T. cuzcoensis</i> Etonti & Mateu, 1996	Cuzco	Peru
<i>T. delestali</i> Delgado & Ruiz-Tapiador, 2016	Puno	Peru
<i>T. dimaioi</i> Casale, 1978	La Paz	Bolivia
<i>T. forsteri</i> (Schweiger, 1958)	La Paz	Bolivia
<i>T. franzi</i> Mateu & Nègre, 1972	Cuzco	Peru
<i>T. gigas</i> Trezzi, 2007	Cuzco	Peru
<i>T. guzzettii</i> Trezzi, 2011	La Paz	Bolivia
<i>T. laresensis</i> Etonti & Mateu, 1996	Cuzco	Peru
<i>T. macrocephalus</i> Jeannel, 1930	La Paz	Bolivia
<i>T. maucanensis</i> Mateu & Etonti, 2002	Cuzco	Peru
<i>T. minutus</i> Etonti & Mateu, 1996	Cuzco	Peru
<i>T. nicki</i> Schweiger, 1959	Cuzco	Peru
<i>T. orophilus</i> Mateu & Etonti, 2002	Cuzco	Peru
<i>T. peruvianus</i> Jeannel, 1927	Cuzco	Peru
<i>T. pygmaeus</i> Jeannel, 1930	La Paz	Bolivia
<i>T. schmidtii</i> Ueno, 1971	Cuzco	Peru
<i>T. theresiae</i> Etonti & Mateu, 1996	Cuzco	Peru
<i>T. ukupachensis</i> Trezzi, 2007	Cuzco	Peru
<i>T. veneroi</i> Etonti & Mateu, 1992	Cuzco	Peru
<i>T. wardi</i> Etonti, 2003	La Paz	Bolivia

### Taxonomy

#### *Trechisibus silvoiae* sp. nov.

Figs 2, 6a

**Type locality.** Peru, Puno, Cordillera Carabaya, Ticani Oriental, 4434 m, 14°29'43" S 69°40'47" W.

**Type series.** Holotype ♂, Peru, Puno, Cordillera Carabaya, Ticani Oriental, 4434 m, 14°29'43" S 69°40'47" W, 24.X.2017, leg. P. Delgado (MHNLP). – Paratypes: 2 ♂♂, 5 ♀♀, same data as the holotype (1 ♂, 2 ♀♀ (CPD); 1 ♂ (CIRT); 3 ♀♀ (LEEEIP)).

**Diagnosis.** A large sized species of *Trechisibus*, dark brown coloration, with testaceous antennae and limbs (Fig. 2).

**Etymology.** The species is dedicated to Silvia Margarita Delgado Sosa, as a sign of gratitude for her affinity and talent.

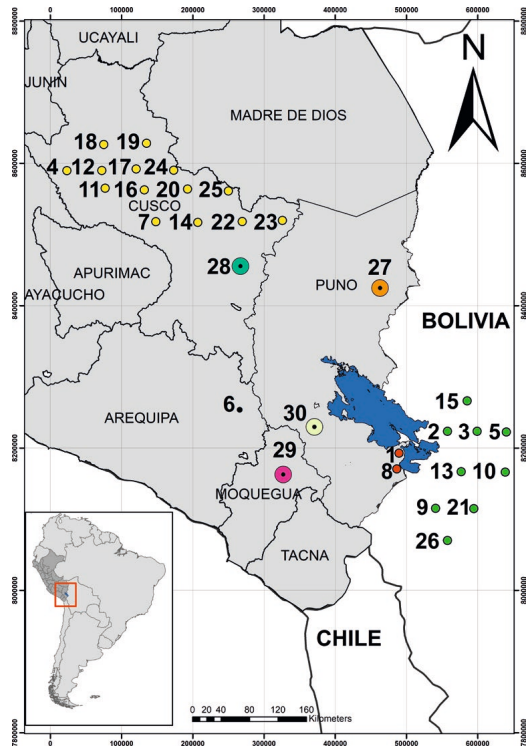
### Description

Metathoracic wings absent. Large size for the genus (BL = 5.1 mm). Dark brown coloration, almost black, shiny. Mandibles, antennae and oral appendages paler, testaceous.

Head wider than long (HW/HL = 0.79). Big eyes, strongly convex, protruding, shorter than the temples. Deep supraorbital sulci. Epistoma with two pairs of setae. Microsculpture clearly visible in the base and near the eyes.

Transverse pronotum (PW/PL = 1.62), very convex. Maximum width at the first third of the length, behind the anterior seta. Posterior seta slightly before the posterior angles. Posterior margin substraight, as wide as the anterior margin. Lateral margins regularly curved, not sinuous near the posterior angles, which are obtuse. Median sulcus clearly visible. Basal foveae large and shallow, rounded. Distinct isodiametric microsculpture in the lateral margins, in the base and inside the foveae; absent in disc, which is smooth.

Elytra ovoid and long, convex, moderately curved. Relatively narrow as a whole (EW/EL = 0.62) they reach maximum width near half of their length. Rounded shoulders. Striae very shallow, moderately marked in the inner area and barely visible in the rest of the surface. Two discal pores, the anterior one located in the first third of the elytral length, over the third stria; the second one located approximately in the half of the length. Isodiametric microsculpture clearly visible and extended through all the surface.



**Fig. 1.** Distribution of the species of genus *Trechisibus* in the surroundings of Lake Titicaca. 1, *T. aphukapiensis*; 2, *T. ayмара*; 3, *T. ayrtoni*; 4, *T. bohorquezae*; 5, *T. bolivarianus*; 6, *T. chucurensis*; 7, *T. cuzcoensis*; 8, *T. delestali*; 9, *T. dimaioi*; 10, *T. forsteri*; 11, *T. franzi*; 12, *T. gigas*; 13, *T. guzzettii*; 14, *T. laresensis*; 15, *T. macrocephalus*; 16, *T. maucauensis*; 17, *T. minutus*; 18, *T. nicki*; 19, *T. orophilus*; 20, *T. peruvianus*; 21, *T. pygmaeus*; 22, *T. schmidtii*; 23, *T. theresiae*; 24, *T. ukupachensis*; 25, *T. veneroi*; 26, *T. wardi*; 27, *T. silvoiae* sp. nov.; 28, *T. jorgeluisi* sp. nov.; 29, *T. elisae* sp. nov.; 30, *T. bravoii* sp. nov.

Elytral apex rounded. Regular umbilicate series and complete apical triangle.

Robust aedeagus (Fig. 6a). Length: 1.52 mm. In lateral view, it is arched dorsally and slightly sinuous ventrally. Apex very short and rounded in the extreme. Basal bulb small, oblique, with sagittal carina well developed. Internal sac with two copulatory pieces, one of them axe-shaped and the other one triangular. Thin parameres, with four setae at their distal end.

**Differential diagnosis.** The aedeagus of *T. silvoiae* sp. nov. is characterized by a singular shape that makes it different from any other taxa of the genus inhabiting the surroundings of Lake Titicaca. The only species with a vague resemblance is *T. maucauensis* Mateu &

Etonti, 2002, however, the general aspect of aedeagus in the latter tend to be bent, the apex is longer and the internal sac presents a single copulatory piece inside, unlike the two pieces observed in *T. silviae* sp. nov.

Differences with the species of *Trechisibus* with undescribed male genitalia is, in this case, easy to corroborate, by comparing the chaetotaxy of the elytral disc. *T. silviae* sp. nov. have two setae in the elytral disc, while *T. gigas* Trezzi, 2007; *T. peruvianus* Jeannel, 1927; *T. pygmaeus* Jeannel, 1930 and *T. ukupachensis* Trezzi, 2007 only have one; and *T. ayrtoni* Guzzetti, 2012 have three.

**Habitat and distribution.** The new species is only known from a single locality in the Carabaya Mountain range. The few specimens collected were found under stones, in a glacier region, with soil formed by mid-sized detritic sediments, moist and with scarce plant cover.

### *Trechisibus elisae* sp. nov.

Figs 3, 6b

**Type locality.** Peru, Moquegua, Cordillera Occidental, Toro Bravo, 4707 m, 16°46'17" S 70°33'05" W.

**Type series.** Holotype ♂, Peru, Moquegua, Cordillera Occidental, Toro Bravo, 4707 m, 16°46'17" S 70°33'05" W, 25.IV.2017, leg. P. Delgado (MHNLP). – Paratypes: 35 ♂♂, 45 ♀♀, same data as the holotype (1 ♂ (MNCNM); 1 ♂ (NMNHP); 3 ♂♂, 3 ♀♀ (MHNLP); 3 ♂♂, 3 ♀♀ (CPD); 3 ♂♂, 3 ♀♀ (CIRT); 24 ♂♂, 36 ♀♀ (LEEEIP)). 40 ♂♂, 23 ♀♀, Perú, Moquegua, Cordillera Occidental, Pampa Chilligua, 4492 m, 16°54'36" S 70°38'55" W, 23.II.2017, leg. P. Delgado, (3 ♂♂, 3 ♀♀ (MHNLP); 1 ♂ (OUMNH); 1 ♂ (ZSM); 3 ♂♂, 3 ♀♀ (CPD); 3 ♂♂, 3 ♀♀ (CIRT); 29 ♂♂, 14 ♀♀ (LEEEIP)).

**Diagnosis.** A medium-sized species of *Trechisibus*, light brown coloration with paler, testaceous antennae and limbs (Fig. 3).

**Etymology.** The new species is named after Elisa Ruiz-Tapiador, by her selfless help and comprehension.

### Description

Metathoracic wings absent. Medium size for the genus (BL=4.65 mm). Light brown coloration with some reddish areas, shiny. Mandibles, antennae and oral appendages paler, testaceous.

Head longer than wide (HW/HL=0.70). Moderately sized eyes, slightly convex, protruding, longer than the temples. Deep supraorbital sulci. Epistoma with two pairs of setae. Microsculpture almost absent, barely visible in the base and near the eyes.

Transverse pronotum (PW/PL=1.35), cordiform, convex. Maximum width at the first third of

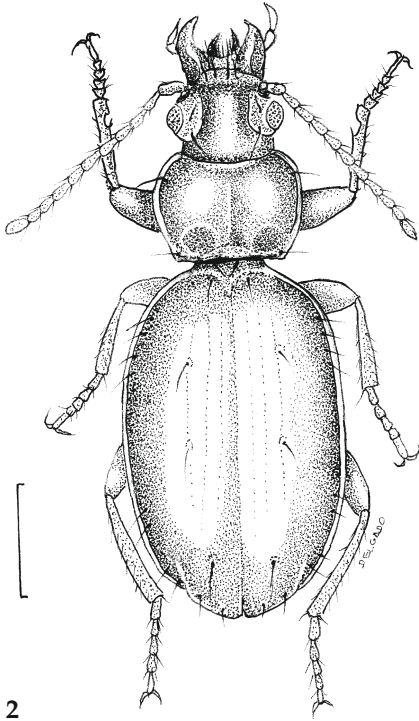
the length, behind the anterior seta. Posterior seta slightly before the posterior angles. Posterior margin slightly notched/V-shaped, as wide as the anterior margin. Lateral margins moderately curved, sinuous near the posterior angles, which are right. Median sulcus clearly visible. Basal foveae large and shallow, rounded. Isodiametric microsculpture very shallow in the lateral margins and the base; absent in disc, which is smooth.

Elytra ovoid and long, convex, with subparallel lateral margins. Relatively narrow as a whole (EW/EL=0.56), reaching maximum width near half of their length. Rounded shoulders. Inner striae clearly visible, reaching the apical region; the outermost are much softer, almost vanished. Two discal pores, the anterior one located in the first third of the elytral length, over the third stria; the second one located approximately in the half of the length. Isodiametric microsculpture clearly visible and extended through all the surface. Elytral apex is moderately and regularly curved. Regular umbilicate series and incomplete apical triangle.

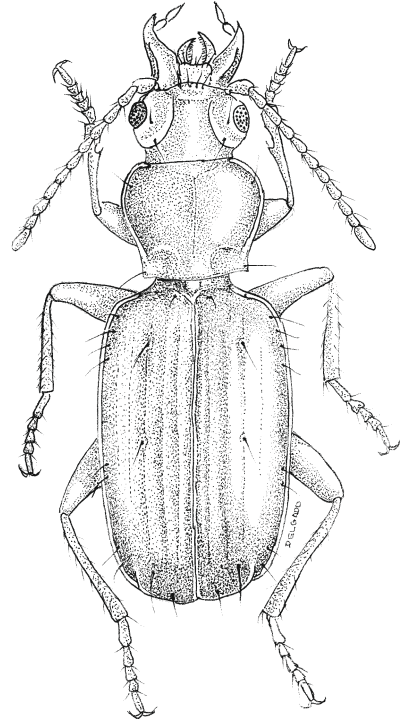
Slender and fragile aedeagus (Fig. 6b). Length: 1.05 mm. In lateral view it is bent, arched dorsally with a slight sinuosity close to the apex; substraight ventrally. Apex long and narrow, with a small stragulation before the distal end, which is rounded. Basal bulb small, vertical, with sagittal carina well developed at the base. Internal sac without copulatory pieces, but an array of thin fibrous structures located distally. Thin parameres, with four setae at their distal end.

**Differential diagnosis.** *T. elisae* sp. nov. belongs to those *Trechisibus* species characterized by a fragile-looking, slender aedeagus, with the apex more or less elongated. In the nearby of the type location, the most similar species are: *T. bohorquezae* Etonti & Mateu, 1992; *T. chucurensis* Trezzi, 2007; *T. delestali* Delgado & Ruiz-Tapiador, 2016; *T. laresensis* Etonti & Mateu, 1996; *T. minutus* Etonti & Mateu, 1996; *T. schmidti* Ueno, 1971; *T. theresiae* Etonti & Mateu, 1996 and *T. wardi* Etonti, 2003.

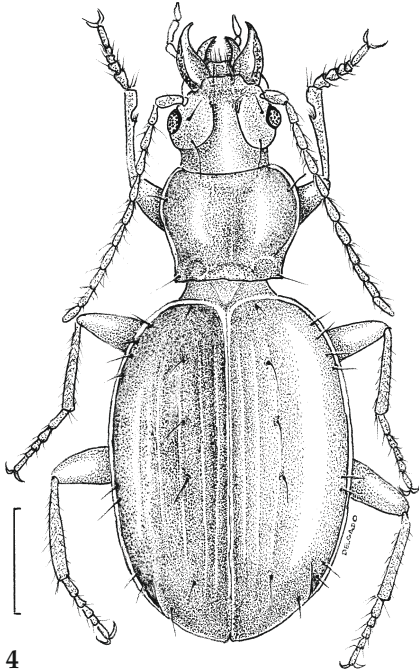
The study of elytral chaetotaxy is a first discriminatory feature. There are two species bearing three discal setae (*T. minutus* Etonti & Mateu, 1996, *T. ayrtoni* Guzzetti, 2012) and a second group formed by all the species with a single discal seta (*T. bohorquezae* Etonti & Mateu, 1992; *T. laresensis* Etonti & Mateu, 1996; *T. schmidti* Ueno, 1971; *T. theresiae* Etonti & Mateu, 1996 and *T. wardi* Etonti, 2003), including those species of which the aedeagus remains undescribed (*T. gigas*, *T. peruvianus*, *T. pygmaeus*, *T. ukupachensis*). *T. elisae* sp. nov. has two discal setae, a feature only shared with *T. delestali* and *T. chucurensis*. In the case of *T. delestali* the general shape of the ventral



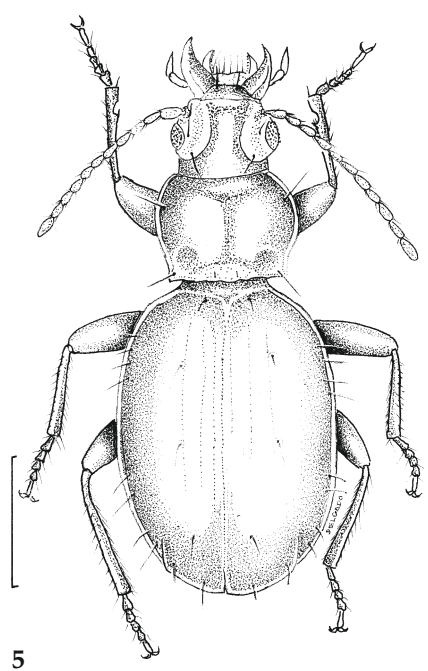
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Fig. 2. *Trechisibus silviae* sp. nov., holotype ♂. Scale bar: 1.0 mm.  
Fig. 3. *Trechisibus elisae* sp. nov., holotype ♂. Scale bar: 1.0 mm.  
Fig. 4. *Trechisibus jorgeluisi* sp. nov., holotype ♂. Scale bar: 1.0 mm.  
Fig. 5. *Trechisibus bravoii* sp. nov., holotype ♂. Scale bar: 1.0 mm.

region of aedeagus shows a very pronounced curve, while in *T. elisae* sp. nov. the aedeagus is bent and substraight. Finally, despite *T. chucurensis* presents certain resemblance in the extreme of the apex, the general shape of aedeagus is shorter and the ventral region is not bent as is *T. elisae* sp. nov.

**Habitat and distribution.** The new species is known from two close areas, located in the Western Mountain range in the south of Peru, where it is abundant. The specimens were collected under stones near the shores of highland wetlands, where vegetation is mainly represented by the predominant “yareta” (*Azorella compacta* Phil.).

*Trechisibus jorgeluisi* sp. nov.

Figs 4, 6c

**Type locality.** Peru, Cusco, Cordillera Vilcanota, Nevado Ausangate, 4538 m, 13°53'56" S 71°10'34" W.

**Type series.** Holotype ♂, Peru, Cusco, Cordillera Vilcanota, Nevado Ausangate, 4538 m, 13°53'56" S 71°10'34" W, 14.II.2017, leg. P. Delgado (MHNLP). – Paratypes: 1 ♂, 1 ♀, same data as the holotype (1 ♂ (CPD); 1 ♀ (CIRT)).

**Diagnosis.** A large species of *Trechisibus*, reddish-brown coloration, with paler, testaceous antennae and limbs (Fig. 4).

**Etymology.** The new species is dedicated to Jorge Luis Delgado, researcher of the Andean culture.

**Description**

Metathoracic wings absent. Large for the genus (BL=5.66 mm). Reddish-brown coloration, shiny. Mandibles, antennae and oral appendages paler, reddish.

Head longer than wide (HW/HL=0.79). Moderately sized eyes, convex, protruding, shorter than the temples. Deep supraorbital sulci. Epistoma with a single pair of setae. Isodiametric microsculpture, visible in the entire surface.

Transverse pronotum (PW/PL=1.25), cordiform, convex. Maximum width at the first third of the length, at the level of the anterior seta. Posterior seta slightly before the posterior angles. Posterior margin slightly notched/V-shaped, as wide as the anterior margin. Lateral margins wide, moderately curved, barely sinuous near the posterior angles, which are right and protruding. Median sulcus well marked. Basal foveae relatively small and deep, rounded. Transverse microsculpture of moderate intensity, extended all over the surface of pronotum.

Elytra ovoid, moderately convex and clearly widened in the posterior half. Relatively wide as a

whole (EW/EL=0.78), reaching maximum width near half of their length. Rounded shoulders. Inner striae deep, practically reaching the apical region; the outermost are less marked. Three discal pores, the anterior one located in the first third of the elytral length, over the third stria; the second one located before half the length and the third one posterior to half the total length of elytra. Isodiametric microsculpture extended all over the surface. Elytral apex is moderately and regularly curved. Regular umbilicate series and incomplete apical triangle.

Slender and fragile aedeagus (Fig. 6c). Length: 1.22 mm. In lateral view it is arched dorsally and slightly sinuous ventrally, close to the apex. Apex long, with a markedly “hook shaped” at the extreme, in acute angle with the dorsum of the median lobe, and parabolic appearance ventrally. Basal bulb small, oblique, with a sagittal carina well developed. Internal sac with a single, triangular copulatory piece. Thin parameres, with four setae at their distal end.

**Differential diagnosis.** The presence of more than two discal pores at the elytra is a feature attributed by some authors (Mateu & Nègre 1972, Avon 2007) to the supposed subgenera *Trechisibiellus* Jeannel, 1962 and *Aputrechisibus*, Trezzi, 2007. Beyond the taxonomic considerations discussed in the introduction of this work, it is worth to note that there are only four species in the area surrounding the type locality of the new species showing this feature: *T. minutus* Etonti & Mateu, 1996; *T. guzzettii* Trezzi, 2011; *T. ayrtoni* Guzzetti, 2012 and *T. dubius* Trezzi, 2007. *T. jorgeluisi* sp. nov. is easily differentiated from *T. dubius* because the latter have up to seven discal pores, far more than the three pores observed in *T. jorgeluisi* sp. nov. In the case of other two species the morphology of the apex of aedeagus is very different. In *T. minutus* the extreme of the apex is thin and regular, in *T. guzzettii* is blunt and heading ventrally, while in *T. jorgeluisi* sp. nov. the extreme is hook-shaped. The case of *T. ayrtoni* is more complex given that the aedeagus remains unknown. However, this is a species with subparallel, narrow elytra (EW/EL=0.5), while in *T. jorgeluisi* sp. nov. the elytra are broad (EW/EL=0.78). Moreover, the type localities of both species are in different geographic areas, distant and well differentiated by their topographic and climatic characteristics, with the Carabaya Mountain range as a barrier between them.

**Habitat and distribution.** The new species is only known from a single locality in Vilcanota Mountain range. The specimens were collected under stones in moist soil. The vegetation in the area is scarce and mainly represented by “paja brava” (*Stipa ichu* (Ruiz & Pav.) Kunth) and highland mosses (*Sphagnum* spp.).

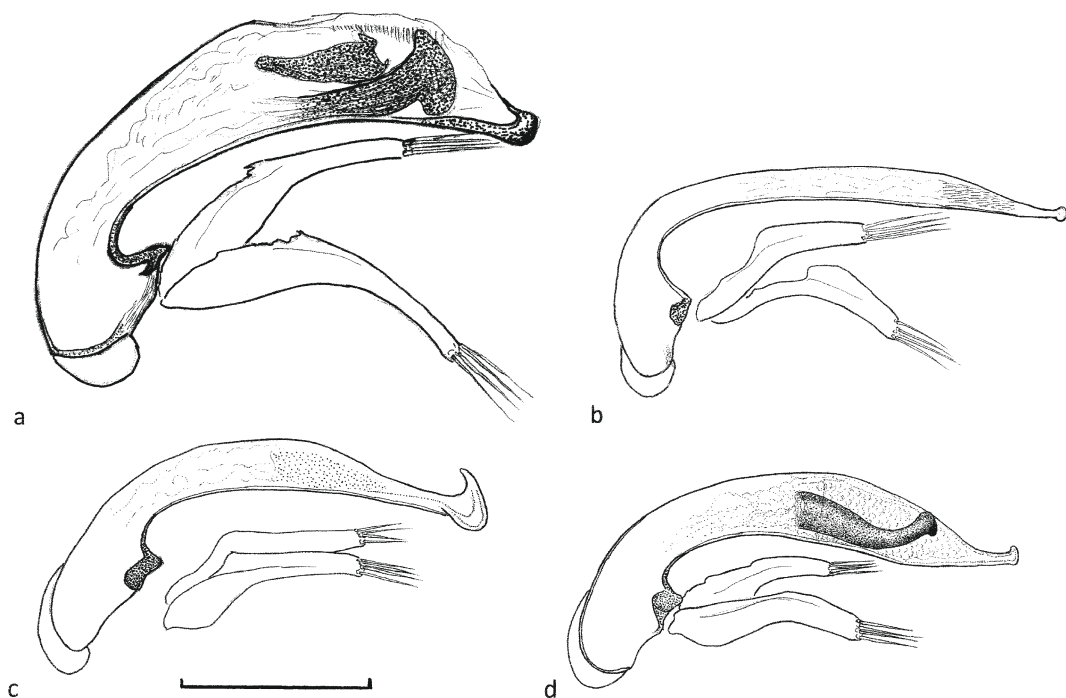


Fig. 6. Male genitalia of *Trechisibus* in lateral view: a. *T. silvoiae* sp. nov.; b. *T. elisae* sp. nov.; c. *T. jorgeluisi* sp. nov.; d. *T. bravoii* sp. nov. Scale bar: 0.5 mm.

***Trechisibus bravoii* sp. nov.**

Figs 5, 6d

**Type locality.** Peru, Puno, Cordillera Carabaya, Ananea Apacheta, 4683 m, 14°43'18" S 69°36'46" W.

**Type series.** Holotype ♂, Peru, Puno, Cordillera Carabaya, Ananea Apacheta, 4683 m, 14°43'18" S 69°36'46" W, 29.XI.2017, leg. P. Delgado (MHNLP). – Paratypes: 4 ♂♂, 1 ♀, same data as the holotype (1 ♂ (MNCNM); 3 ♂, 1 ♀ (CIRT)). 4 ♂♂, 1 ♀, Peru, Puno, Altiplano, Loripongo, 4075 m, 16°14'53" S 70°08'15" W, 03.III.2017, leg. P. Delgado, (4 ♂, 1 ♀ (CIRT)). 2 ♂♂, 1 ♀, Peru, Puno, Cordillera Carabaya, Abra Aricoma, 4857 m, 14°16'57" S 69°46'22" W, 25.X.2017, leg. P. Delgado, (1 ♂ (MNCNM); 1 ♂ (ZSM); 1 ♀ (CPD)). 14 ♂♂, 8 ♀♀, Peru, Puno, Cordillera Carabaya, Rinconada, 5105 m, 14°38'07" S 69°26'37" W, 20.I.2017, leg. P. Delgado, (1 ♂ (OUMNH); 1 ♂ (ZSM); 1 ♂ (CIRT); 6 ♂♂, 4 ♀♀ (CPD); 5 ♂♂, 4 ♀♀ (LEEEIP)). 6 ♂♂, 1 ♀, Peru, Puno, Altiplano, Carr. Puno-Moquegua Km 89, 4490 m, 14°24'31" S 70°19'46" W, 20.I.2017, leg. P. Delgado, (4 ♂ (CIRT); 2 ♂♂, 1 ♀ (LEEEIP)).

**Diagnosis.** A small species of *Trechisibus*, dark brown coloration, with paler, testaceous antennae and limbs (Fig. 5).

**Etymology.** Dedicated to Rosario Bravo Portocarrero, teacher of entomology at Universidad Nacional del Altiplano, Puno, Peru.

**Description**

Metathoracic wings absent. Small size for the genus (BL = 3.97 mm). Dark brown coloration, almost black, shiny. Mandibles, antennae and oral appendages paler, testaceous.

Head longer than wide (HW/HL = 0.87). Big eyes, very convex, protruding, longer than the temples. Deep supraorbital sulci. Epistoma with a single pair of setae. Isodiametric microsculpture restricted to the area of the sulci and the margins of pronotum.

Transverse pronotum (PW/PL = 1.31), cordiform, convex. Maximum width at the first third of the length, approximately at the level of the anterior seta. Posterior seta slightly before the posterior angles. Posterior margin wider than the anterior margin, substraight. Lateral margins regularly curved, sinuous near the posterior angles, which are right and pointy. Median sulcus visible. Basal foveae large, deep and rounded. Isodiametric microsculpture of moderate intensity, extended all over the surface, but less marked in the disc than in the margins.

Elytra ovoid, convex, moderately curved at the sides. Relatively wide as a whole (EW/EL = 0.76), reaching maximum width near half of their length. Rounded shoulders. Inner striae very shallow, barely visible; the outermost are absent. Two discal pores,

the anterior one located in the first third of the elytral length, over the third stria; the second one located before half the total length of elytra. Isodiametric microsculpture extended all over the surface. Elytral apex is moderately curved. Regular umbilicate series and complete apical triangle.

Aedeagus long and narrow (Fig. 6d). Length: 1.17 mm. In lateral view it is arched dorsally with a slight apical sinuosity. The dorsal area is arched until the apical region, where it becomes substraight. Apex short, subtle, dorsally arched and round at the extreme. Basal bulb small, oblique, with a sagittal carina well developed. Internal sac with a large copulatory piece, heavily sclerotized, curved and ending by a round protuberance.

**Differential diagnosis.** The species of *Trechisibus* with the most similar morphologies in aedeagus are: *T. bohorquezae* Etonti & Mateu, 1992; *T. laresensis* Etonti & Mateu, 1996; *T. schmidti* Ueno, 1971, *T. theresiae* Etonti & Mateu, 1996 and *T. wardi* Etonti, 2003. However, all of them possess a single discal seta as occurs in almost every taxa where the aedeagal morphology has not been described yet (*T. gigas*, *T. peruvianus*, *T. pygmaeus*, *T. ukupachensis*), with the exception of *T. ayrtoni*, which possess three. Given that *T. bravoii* sp. nov. has two discal setae in elytra there is no possible doubt. The validity of the new species is further confirmed by the unique aspect of the copulatory piece, which is found in the internal sac of the aedeagus.

**Habitat and distribution.** The distribution range of the new species is large within the area considered in this study. It has been collected abundantly, both in the Plateau and in the Carabaya Mountain range, at altitudes between 4075 m and 5105 m it is found under stones, in moist areas close to large boulders or Andean wetlands.

### Observations

The great density of species from genus *Trechisibus* found in the surroundings of Lake Titicaca is noteworthy, yet new taxa continue to appear as the samplings efforts increase. As a result, it is expected that we are still far from knowing the real diversity of this genus in this region, and even further from knowing the specific variation of the genus at continental level.

A revision of the genus becomes urgent before the number of taxa growth to levels even more difficult to manage from a practical point of view. Consequently, further efforts must be made towards the increase of knowledge of the diversity and internal variability

of the group, by describing the new species that are clearly distinct from those already known.

The way to do this task goes through a review of the taxonomic utility of characters that show certain degree of variation, such as the features of the apical triangle or the chaetotaxy of the epistoma, as well as through searching for new discriminatory features.

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### References

- Allegro, G. & Giachino, P. M. 2016. Nine new *Trechisibus* species from Peru and Argentina (Coleoptera: Carabidae: Trechinae). *Zootaxa* 4193 (1): 49–72.
- & Giachino, P. M. 2017. Synonymic notes on Trechini from Argentina (Coleoptera: Carabidae: Trechinae). *Zootaxa* 4238 (4): 593–593.
- , Giachino, P. M. & Sciaky, R. 2008. Notes on some Trechini (Coleoptera Carabidae) of South America with description of new species from Chile, Ecuador and Peru. Pp. 131–171 in: Giachino, P. M. (ed.). Biodiversity of South America, I. Memoirs on Biodiversity 1, Verona, Italy (World Biodiversity Association onlus).
- Andrewes, H. E. 1931. Coleoptera – Carabidae of the Juan Fernández Island. Pp. 629–637 in: Skottsberg, C. (ed.). The natural history of Juan Fernández and Easter Island 3. Uppsala, Sweden (Almqvist & Wiksells Boktryckeri).
- Avon, C. 2007. Nouvelle monographie des Trechinae (Coleoptera Carabidae). IV. Tribu des Homaloderini (2ème série). Genre *Trechisibus*. Les Comptes-Rendus du Laboratoire d'Entomologie Faune Hypogée et Endogée, Nice, 1: 367–600.
- Bonniard de Saludo, P. 1970a. Nouveaux Carabiques du Chili. Bulletin de la Société d'Histoire Naturelle de Toulouse 105: 311–328.
- 1970b. Nuevo *Trechisibus* Mots., para Juan Fernández. Boletín de la Sociedad Biológica de Concepción, Chile, 42: 49–53.



- Brullé, A. 1842. Insectes coléoptères. Pp. 1-156 in Bertrand, P. (ed.). Voyage dans l'Amérique méridionale par Alcide d'Orbigny, exécuté pendant les années 1826-1833. Tome VI, 2<sup>e</sup> Partie. 828 pp., Paris (Librairie de la Société Géologique de France).
- Casale, A. 1978. *Trechisibus dimaioi* n. sp., nouvelle espèce de Bolivie (Col. Carabidae-Trechinae). Entomologica Basiliensia 3: 281-285.
- Dejean, P. F. M. A. 1831. Species général des coléoptères, de la collection de M. le Comte Dejean. Tome cinquième. 883 pp., Paris (Méquignon-Marvis).
- Delgado, P. & Ruiz-Tapiador, I. 2014. Estado actual del conocimiento del género *Trechisibus* Motschulsky, 1862 (Coleoptera, Carabidae). Revista Peruana de Entomología, Lima, Perú, 49(2): 149-159.
- & Ruiz-Tapiador, I. 2016. A new of *Trechisibus* from Peruvian Andes (Coleoptera: Carabidae, Trechinae). Fragmenta Entomologica, Roma, Italy, 48(1): 83-86.
- Deuve, T. 2001. Nouveaux Trechinae des Philippines, du Sikkim, du Népal, de la Chine et de l'Equateur (Coleoptera, Trechidae). Bulletin de la Société Entomologique de France 106(1): 43-50.
- 2002. Nouveaux Trechinae et Bembidiinae de l'Equateur, de la Chine et du Laos (Coleoptera, Trechidae). Revue Française d'Entomologie (N.S.) 24(3): 151-160.
- 2006. Nouveaux Carabidae et Trechinae (Coleoptera Caraboidea). Coléoptères 12(20): 291-304.
- Etonti, M. 2003. Descripción de *Trechisibus* (*Trechisibiodes*) *wardi* n. sp. della Bolivia e del maschio di *Trechisibus* (*Trechisibiodes*) *cyclopterus* Putzeys, 1870, del Cile (Coleoptera: Carabidae: Trechinae). Acta Entomologica Slovenica 11(2): 129-136.
- Etonti, M. & Mateu, J. 1992. Sette nuovi Trechinae del Peru (Coleoptera, Carabidae). Bolletino del Museo Civico di Storia Naturale di Venezia 41: 109-130.
- & Mateu, J. 1996. Nuove specie peruviane del genere *Trechisibus* Motschoulsky, 1863 (Coleoptera, Carabidae, Trechinae). Bolletino del Museo Regionale di Scienze Naturali, Torino, 14(2): 403-420.
- & Mateu, J. 1998. Trechini nuovi o poco noti di Argentina e Cile (Coleoptera, Carabidae, Trechinae). Bolletino del Museo Civico di Storia Naturale di Venezia 48: 65-76.
- & Mateu, J. 1999. Un nuovo *Trechisibus* Motschoulsky, 1863 del sud del Cile (Coleoptera Carabidae Trechinae). Bolletino del Museo Civico di Storia Naturale di Venezia 49: 45-47.
- & Mateu, J. 2000. Nuovi Trechini del Peru settentrionale (Coleoptera: Carabidae: Trechinae). Acta Entomologica Slovenica 8(2): 107-122.
- & Mateu, J. 2002. Due nuove specie di Trechinae del Perú settentrionale (Coleoptera, Carabidae, Trechinae). Atti del Museo Civico di Storia Naturale di Trieste 49: 121-127.
- Fairmaire, M. L. 1885. Liste des Coléopterès recueillis à la Terre de Feu par la mission de la Romanche et description des espèces nouvelles. Annales de la Société Entomologique de France 6(5): 33-62.
- Germain, P. 1855. Descripción de coleópteros de diversas especies que no se hallan en la obra del Señor Gay. Anales de la Universidad de Chile 12: 328-329.
- Guzzetti, M. 2012. Un nuovo *Trechisibus* (s. str.) della Bolivia (Coleoptera, Carabidae, Trechinae). Giornale Italiano di Entomologia 13: 31-34.
- Jeannel, R. 1927. Monographie des Trechinae (deuxième livraison). L'Abeille 33: 1-592.
- 1930. Monographie des Trechinae (4<sup>e</sup> livraison). L'Abeille 34: 59-122.
- 1937. Nouveaux Trechinae de l'Afrique et de l'Amérique du Sud (Coleoptera Carabidae). Bulletin de la Société Entomologique de France 42(7): 99-102.
- 1954. Les Homaloderini de la collection Chaudoir (Coleoptera Trechinae). Revue Française d'Entomologie 21: 1-10.
- 1958. Sur quelques Trechitae de l'Amérique du Sud (Coleoptera). Entomologische Arbeiten aus dem Museum G. Frey 9: 721-737.
- 1961. Sur quelques *Trechisibus* des environs de Punta Arenas (Coleoptera-Trechidae). Revue Française d'Entomologie 28(1): 5-7.
- 1962. Les Trechides de la Paléantarctide Occidentale. Biologie de l'Amérique Australe 1: 527-655.
- Mateu, J. 1972. Nouveaux carabiques néotropicaux. Entomologische Arbeiten aus dem Museum G. Frey 23: 321-330.
- 1978. Más datos sobre los *Trechisibus* Motschoulsky del Perú (Coleoptera Carabidae). Boletín de Entomología Venezolana 1(3): 25-36.
- 1979. Más datos sobre los *Trechisibus* Motschoulsky del Perú (Coleoptera, Carabidae). Nota 2. Miscelánea Zoológica 5: 47-58.
- 2000. Dos nuevos Carabidos Sudamericanos pertenecientes a las Tribus Trechini y Pterostichini (Coleoptera, Carabidae). Nouvelle Revue d'Entomologie 17(1): 5-9.
- & Bellès, X. 1981. Espèces inédites de *Trechisibus* Motsch. récoltées au Pérou. Nouvelle Revue d'Entomologie 11: 39-45.
- & Etonti, M. 2002. Due nuovi specie peruviane del genere *Trechisibus* Motsch., 1863 (Coleoptera, Carabidae, Trechinae). Atti del Museo Civico di Storia Naturale di Trieste 49: 113-119.
- & Etonti, M. 2006. Due nuovi Trechini de Cajamarca (Peru) (Coleoptera, Carabidae). Bolletino del Museo Civico di Storia Naturale di Venezia, Botanica Zoologia 30: 147-150.
- & Nègre, J. 1972. Révision du genre *Trechisibus* Motsch. et genres voisins. Nouvelle Revue d'Entomologie (N.S.) 2(1): 53-72.
- Putzeys, J. 1870. Trechorum oculatorum monographia. Entomologische Zeitung, Stettin, 31(748): 145-201.
- Roig-Juñent, S. & Sallanave, S. 2005. Una nueva especie de *Trechisibus* de la Argentina (Coleoptera: Carabidae). Revista de la Sociedad Entomológica de Argentina 64(3): 87-92.
- Ruiz-Tapiador, I. & Delgado, P. 2016. *Trechisibus apukhapiensis* sp. n. (Coleoptera: Carabidae, Trechinae) from southeastern Andean mountains of Peru. Baltic Journal of Coleopterology 16(2): 97-104.

- Schweiger, H. 1958. Eine neue Gattung des Tribus Aepini aus den bolivianischen Anden (Col. Trechidae). *Opuscula Zoologica*, München, 15: 1-3.
- 1959. Über einige von der Skottsbergexpedition im Antarkto-Archipelago-Gebiet aufgesammelte Kolenopteren. *Arkiv för Zoologi* 12(1): 1-41.
- Solier, A. J. 1849. Orden III. Coleópteros. Pp. 105-380, 415-511 in Gay, C. (ed.). *Historia física y política de Chile*, Zoología, Tomo 4. Paris.
- Trezzi, G. 2005. Un nuovo *Trechisibus* della Bolivia (Coleoptera Carabidae). *Atti della Società Italiana di Scienze Naturali Milano* 146(2): 213-218.
- 2007. Quattro nuove specie di *Trechisibus* e un nuovo genere di Trechini del Peru (Coleoptera, Carabidae, Trechinae). *Bolletino del Museo Civico di Storia Naturale di Verona, Botanica Zoologia* 31: 51-67.
- 2011. Due nuove specie di *Trechisibus* Motschoulsky, 1863 della Bolivia (Coleoptera, Carabidae, Trechinae). *Bolletino del Museo Civico di Storia Naturale di Verona, Botanica Zoologia* 35: 139-146.
- Uéno, S. I. 1971. A new *Trechisibus* (Coleoptera, Trechinae) from Peru. *Annotationes Zoologicae Japonenses* 44(4): 227-232.
- 1972. A new subgenus of *Trechisibus* (Coleoptera, Trechinae) with descriptions of four new species from Peru. *Bulletin of the National Science Museum Tokyo* 15(1): 1-17.
- 1974. A new *Trechisibus* (Coleoptera, Trechinae) from Central Chile. *Kontyú, Tokyo*, 42(2): 133-137.
- 1976. Two new alpine species of the genus *Trechisibus* (Coleoptera, Trechinae) from Peru. *Kontyú, Tokyo*, 44(1): 43-48.