

Studies on the subgenus *Agraphoderus* Bates of *Blennidus* Motschulsky from Peru: the *jelskii* species–group (Coleoptera, Carabidae, Pterostichini)

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Abstract

Studies on the subgenus Agraphoderus Bates of Blennidus Motschulsky from Peru: the jelskii species–group (Coleoptera, Carabidae, Pterostichini).— Four new species of *Blennidus* subgenus *Agraphoderus* are described from the Andes of Southern Peru: *B. (A.) procerus* n. sp., *B. (A.) abramalagae* n. sp., *B. (A.) etontii* n. sp. and *B. (A.) straneoi* n. sp. Together with *B. (A.) jelskii* (Tschitschérine, 1897), they form a very homogeneous group of probably closely related species (the *jelskii* group), which is distinguished from other members of the subgenus by the distinctive morphology of the aedeagus. A redescription of *B. (A.) jelskii* is given based on the lectotype and paralectotype designated by Straneo & Vereshagina (1991), supplementing Tschitschérine's brief original description. The distribution pattern of the species presently included in the *jelskii* species–group is discussed, emphasizing distinctive traits of stenoendemic species inhabiting restricted geographical areas, and discussing their possible origin by allopatric speciation.

Key words: *Blennidus*, *Agraphoderus*, Peru, Taxonomy, New species.

Resumen

Estudio sobre el subgénero Agraphoderus Bates de Blennidus Motschulsky de Perú: el grupo de especies jelskii (Coleoptera, Carabidae, Pterostichini).— Se describen cuatro especies nuevas de *Blennidus* subgen. *Agraphoderus*, de los Andes al sur de Perú: *B. (A.) procerus* sp. n., *B. (A.) abramalagae* sp. n., *B. (A.) etontii* sp. n. y *B. (A.) straneoi* sp. n. Estas cuatro especies, conjuntamente con *B. (A.) jelskii* (Tschitschérine, 1897), constituyen el grupo de especies *jelskii*, que es muy homogéneo y cuyas especies posiblemente estarían estrechamente emparentadas, diferenciándose de otros miembros de mismo subgénero por la peculiar morfología del edeago. Se realiza una redescipción de *B. (A.) jelskii* tomando como criterio el lectotipo y paralectotipo designados por Straneo & Vereshagina (1991), con la cual se completa la breve descripción original realizada por Tschitschérine. Finalmente, basándonos en el patrón de distribución de las especies del grupo *jelskii*, y enfatizando el rasgo característico de las especies estenoendémicas que habitan áreas geográficas restringidas, se considera que posiblemente se hayan originado por procesos de especiación alopatrica.

Palabras clave: *Blennidus*, *Agraphoderus*, Perú, Taxonomía, Especies nuevas.

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Introduction

The genus *Blennidus* Motschulsky, 1866 at present includes about 120 species (Lorenz, 2005a) distributed in the Andean region of South America, extending from North Colombia to Chile.

Moret (1995) considered the genera/subgenera *Agraphoderus* Bates, 1891, *Ogmopleura* Tschitschérine, 1899, *Sierrobis* Straneo, 1951, *Pachybaris* Straneo, 1953 and *Pseudocynthidia* Straneo, 1953 (formerly separated based on the presence/absence of metathoracic wings as well as of a transverse sulcus on the abdominal sterna IV–VI) as synonyms of the senior name *Blennidus*. He regarded these characters were largely inconsistent, in particular the presence/absence of an abdominal transverse sulcus. This view–point was accepted by Lorenz (2005a).

In a later paper, Moret (2005) used three ‘convenience subgenera’ (*Blennidus* s. str., *Sierrobis* Straneo, 1951 and *Agraphoderus* Bates, 1891) and described a new subgenus (*Jasinskiellus* Moret, 2005). His aim was to keep the lineages of some well characterized species separate, even though these taxa lacked any phyletic value (Moret, in litteris 2011). Among these four subgenera, the subgenus *Agraphoderus* is the richest in species. It includes the micropterous species which usually display a transverse sulcus and/or puncture rows only laterally on abdominal sterna IV–VI, with a gap in the middle. They were formerly attributed to *Ogmopleura* Tschitschérine, 1899. We agree with Moret (1995) on the inconsistency of such characters, as many species in *Agraphoderus* display only very superficial and hardly visible lateral impressions or very tiny punctures. Moreover, high variability can be observed among species which are probably related based on the similarities of their external morphology and, above all, their genitalia. For these reasons, assessment of the phyletic relationships among species within the genus is urgently required. In the meantime, we prefer to retain these ‘convenience taxa’, as the species concerned in this article can all be included in the subgenus *Agraphoderus* sensu Moret (2005).

A total of 34 *Agraphoderus* species are currently recorded from Peru (Straneo, 1993; Allegro, 2010). They display a rather uniform ‘harpaloid’ habitus (Straneo, 1993) and share common and peculiar features such as the enlarged basal half of the aedeagus, just above the insertion of the parameres. Most species have a stumpy, convex body with short appendages; only a few species have a slender and/or depressed body and long appendages (Allegro, 2010). Their habitat and altitudinal distribution are also very similar; they mainly inhabit high altitude Andean grasslands at 3,300–4,800 m a.s.l.

During two stays on the mountains of the Cordillera Blanca, Peru, one in November–December 2005 and the other in June–July 2008, one of the authors (G. Allegro) had the opportunity to collect abundant material of Carabidae. Data concerning some of this material have already been published (Allegro et al., 2008; Allegro, 2010). He explored an area included in the Dept. of Ancash (Provinces of Huaráz, Asunción, Yungay

and Fitzcarrald) where he collected abundant material of the *Blennidus* subgenus *Agraphoderus*. The other author (P. M. Giachino) is in possession of Pterostichine material collected in Peru by M. Etonti. This material includes several specimens that belong to the same genus and subgenus. A few specimens collected by M. Etonti were also deposited in the Mateu Collection at Museo Regionale di Scienze Naturali, Torino, Italia. The study of this material and its comparison with the type material of the Straneo Collection (at Museo Civico di Storia Naturale, Milano, Italia) and the type material described by Tschitschérine (Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia) allowed us to recognise groups of species that can be distinguished by their very homogeneous male genitalia morphology. The study also allowed us to recognise many undescribed species. These groups, which we will consider one at a time in separate articles, seem to be congruent from a geographical point of view, as they include species ranging in clearly delimited areas of the country. The same approach was adopted by Moret (1995), who grouped the Ecuadorian *Blennidus* into eight different species–groups. However, some Peruvian species cannot yet be placed in any defined species–group and only further surveys in the Andean countries will provide material and information for reliable phylogenetic analysis.

This work deals with the species belonging, in our opinion, to the *jelskii* species–group of the genus *Blennidus*, all of them localized in the Andes of Southern Peru. In addition to *Blennidus* (*Agraphoderus*) *jelskii* (Tschitschérine, 1897), this group includes four new species which are described, illustrated and discussed here. *B. (A.) jelskii* is redescribed, as the original description (Tschitschérine, 1897) is incomplete concerning some characters.

Material and methods

We examined material of the genus *Blennidus* from the following Museums and private Collections: MRST. Museo Regionale di Scienze Naturali, Torino, Italia; MSNM. Museo Civico di Storia Naturale, Milano, Italia; BMNH. The Natural History Museum, London, United Kingdom; ZIRA. Zoological Institute Russian Academy of Sciences, St. Petersburg, Russia; CAI. Allegro Collection, Moncalvo, Italia; CCa. Casale Collection, Torino, Italia; CGi. Giachino Collection at Settore Fitosanitario Regionale, Regione Piemonte, Torino, Italia; CMa. Mateu Collection at MRST; CMo. Moret Collection, Toulouse, France; CSc. Sciaky Collection, Milano, Italia; CSo. Solsky Collection at ZIRA; CSt. Straneo Collection at MSNM; CTs. Tschitschérine Collection at ZIRA.

The following acronyms were used for the type material: HT. Holotype; PT, PTT. Paratype(s); LT. Lectotype; PLT. Paralectotype.

Locality labels of the material examined are quoted in their original form.

Drawings of the genitalia were made using a camera lucida connected to a Leica MZ 12.5 stereo microscope. The habitus drawings are by G. Allegro.

Taxonomy

B. (Agraphoderus) jelskii species-group

Straneo (1993) considered *B. (A.) jelskii* easy to distinguish on account of the basally sinuate sides of the pronotum as he knew of no other Peruvian species with such a character. Probably for this reason, he labelled '*Ogmopleura jelskii*' two specimens from Callanga (ex Staudinger) showing this feature, putting them in his collection together with a paralectotype of *B. jelskii* from the Solsky Collection (ZIRA). It should be noted that in the same paper Straneo wrongly attributed the specimens of the type series to the locality Lima, when they were undoubtedly from Puno (green label handwritten by Jelski specifying 'Puno Peru—Jelski 1870'), as correctly reported in Straneo & Vereshagina (1991). More detailed examination revealed that the specimens from Callanga belonged to an undescribed species with similar external morphology but a different aedeagus (although of similar structure). Moreover, in the material collected by Etonti, we were able to find three further species that had a uniform structure of male genitalia, all from a restricted area of the Cuzco Region. Callanga, the type locality of *Blennidus (Agraphoderus) straneo* n. sp., probably refers not to the town of that name near Lima but to the ancient archaeological site in the Cuzco Dept., from where four of the five species of the *jelskii* group are recorded. This is confirmed by the presence of two further specimens from Callanga (ex Staudinger) in the type series of *Blennidus (Agraphoderus) mesotibialis* (Straneo, 1993) (in CSt), a species which is only recorded from the Cuzco area. This evidence led us to consider the five species we attribute to the *jelskii* species-group as probably strictly related, probably sharing a common ancestor and distributed only, according to present knowledge, in the Southern Andean districts of Peru.

As far as diagnostic characters are concerned, four species show sinuate (or nearly straight) sides at the base of pronotum (*B. (A.) jelskii*, *B. (A.) straneo* n. sp., *B. (A.) procerus* n. sp. and *B. (A.) abramalagae* n. sp.). A fifth species, *B. (A.) etontii* n. sp., in spite of its similarity with the other species of the group on account of structure of male genitalia, displays rounded sides. The elytral striae are equally impressed in all these species. In some cases males possess a faint metallic lustre. Females are distinguished for their markedly dull elytra with strong polygonal microsculpture. The postangular seta of pronotum is always placed at the posterior angle. The mesotibiae of males are not distally swollen or provided with spines; only one species (*B. (A.) etontii* n. sp.) displays preapically swollen male metatibiae. The abdominal sterna IV–VI are usually smooth, showing at most very tiny punctures at the sides; only *B. (A.) jelskii* has a short transverse impression interrupted in the middle, together with a few punctures. Sternum VII has a pair of apical setae in males and two pairs in females. The character which defines this group is the distinct and very homogeneous morphology of the aedeagus: it is slender in

lateral view, sometimes ventrally depressed, distally very thin and flat (not laterally sinuate), and bent downwards but turning up at apex; it also shows a triangular apical blade, that is more or less acutely pointed in the dorsal view. Moreover, the ostium is always large, covering almost the whole dorsal part, and very long, extending to the basal bulb. Such a long ostium is only known in a few other Peruvian *Agraphoderus* species, including *Blennidus (Agraphoderus) aulacostigma* (Tschitschérine, 1897), a taxon with uncertain affinities recorded from Puno. The left paramere is always in discoid in shape, while the right paramere is narrow, curved (almost straight only in *B. (A.) jelskii*) and apically spatulate.

A few specimens of *B. (A.) procerus* sp. n. display flattened eyes. This character had previously been noted by Straneo (1993) relating to *B. (A.) jelskii* (the two examined specimens of *B. (A.) jelskii* from the type series show normally convex eyes). As far as we know, no other *Blennidus* species in other groups have such a character.

The following species are included, in the present status of knowledge, in the *jelskii* group of the genus *Blennidus*: *B. (Agraphoderus) jelskii* (Tschitschérine, 1897); *B. (Agraphoderus) straneo* n. sp.; *B. (Agraphoderus) etontii* n. sp.; *B. (Agraphoderus) procerus* n. sp.; *B. (Agraphoderus) abramalagae* n. sp.

A dichotomous key is provided to make their identification easier. Referring to the key by Straneo (1993), statement #25 should also include *B. (A.) straneo* n. sp., *B. (A.) procerus* n. sp. and *B. (A.) abramalagae* n. sp., in addition to *B. (A.) jelskii*, whereas *B. (A.) etontii* n. sp. should be connected with statement #31.

Blennidus (Agraphoderus) jelskii (Tschitschérine, 1897) (figs. 1, 6, 15, 20)

Feronia jelskii Tschitschérine, 1897: 290.

Feronia jelskii Tschitschérine, 1897: Tschitschérine, 1898: 146 (note).

Ogmopleura jelskii (Tschitschérine, 1897): Straneo & Vereshagina, 1991: 203.

Ogmopleura jelskii (Tschitschérine, 1897): Straneo, 1993: 379.

Blennidus jelskii (Tschitschérine, 1897): Lorenz, 2005a: 262.

Blennidus jelskii (Tschitschérine, 1897): Lorenz, 2005b: 539.

Material examined

LT ♂, Puno, Peru, Jelski 1870 (CSo–ZIRA); PLT ♀, same data as LT (CSt–MSNM).

Type material

In the original description Tschitschérine (1897) described this species based on three specimens (2 ♂♂ and 1 ♀). Curiously, Straneo & Vereshagina (1991) mention four specimens of the type series (3 ♂♂ and 1 ♀), designating a Lectotype (♂) and three Paralectotypes. Finally, Straneo (1993) affirms to have examined three specimens (LT ♂ and 2 PLT with sex not specified) of the type series, quoting a fourth specimen from the original description (?).

Type locality

Puno and Lima, Peru (Tschitschérine 1897). The two examined specimens (LT ♂ and PLT ♀) are labelled 'Puno' by Jelski (handwritten green label), and we

Identification key for the species of the *jelskii* group of the genus *Blennidus* (*Agraphoderus*):

Clave de identificación de las especies del grupo jelskii del género Blennidus (Agraphoderus):

1. Sides of pronotum sinuate at the base or nearly straight; male metatibiae not preapically swollen Sides of pronotum rounded over entire length; male metatibiae preapically swollen (sometimes scarcely evident)	> 2	<i>B. (Agraphoderus) etontii</i> n. sp.
2. Impressed elytral striae with feebly convex intervals in ♂♂. Distinctly pear-shaped elytra. Aedeagus median lobe regularly curved and not depressed ventrally. Species from the Puno area Superficial elytral striae with flat intervals in both sexes. Elytra not pear-shaped. Aedeagus median lobe angulately inserted on the basal bulb and ventrally somewhat depressed. Species from the Cuzco area	> 3	<i>B. (Agraphoderus) jelskii</i> (Tschitschérine, 1897)
3. Relatively larger (8.0–9.0 mm). A faint metallic lustre is usually present in ♂♂. Sides of pronotum markedly sinuate at base. In lateral view, median lobe of aedeagus larger and distally nearly straight Relatively smaller (6.6–8.8 mm). Metallic lustre usually absent. Sides of pronotum weakly sinuate or nearly straight at base. Median lobe of aedeagus smaller and angulately bent downwards in the distal part	> 4	<i>B. (Agraphoderus) abramalagae</i> n. sp.
4. Habitus more slender (length/width of elytra = 1.50–1.57). Elytra less convex, with apical declivity less marked. Aedeagus smaller even in the largest specimens Habitus oval (length/width of elytra = 1.45). Elytra more convex, with marked apical declivity. Aedeagus more slender and larger		<i>B. (Agraphoderus) procerus</i> n. sp. <i>B. (Agraphoderus) straneoi</i> n. sp.

could not locate any material from Lima. According to Straneo & Vereshagina (1991), only the LT ♂ is labelled 'Puno', whilst three other type specimens are generically labelled 'Peru'; these authors mentioned the presence in CSt of two further specimens from Callanga, not belonging to the type series, which are described in this paper as a new species (*B. (A.) straneoi* n. sp.). Straneo (1993) subsequently, and rather surprisingly, attributed the LT and two specimens of the type series to the locality 'Lima', quoting a specimen labelled 'Puno' from the original description. In our opinion, assuming the Southern distribution of the species of the *jelskii* group in the Peruvian Andes and based on the labels by Jelski in the examined material, *B. (A.) jelskii* probably occurs only in the Puno area.

Differential diagnosis

Among the Peruvian *Agraphoderus*, only four species display sinuate (or nearly straight) sides at the base of pronotum: *B. (A.) jelskii*, *B. (A.) abramalagae* n.

sp., *B. (A.) straneoi* n. sp. and *B. (A.) procerus* n. sp. In comparison with the other species, *B. (A.) jelskii* is distinguished by more deeply impressed elytral striae, more convex intervals, especially in ♂♂, and distinctly pear-shaped elytra. Moreover, the median lobe of the aedeagus of *B. (A.) jelskii* is nearly cylindrical, regularly curved and not ventrally depressed.

Re-description

Habitus as in fig. 1. Overall length of the LT ♂ 7.7 mm (PLT ♀ 7.8 mm). Dorsal surface dark brown, dull (♀) or moderately shiny (♂) with marked polygonal microsculpture, much more evident on elytra. Antennae, legs and mouth parts reddish-brown. Brachypterous.

Head moderately large, eyes convex, temples as long as 1/3 of eyes. Clypeus bisetose; labrum transverse, 6-setose. Frontal impressions short and superficial. Frons between eyes smooth and shiny, with sparse tiny punctures. Terminal labial

palpomere with very thin and sparse hairs; penultimate palpomere bisetose, with a short apical seta. Median tooth of mentum prominent and moderately excavate at apex. Antennae short, hardly reaching the base of pronotum, with antennomeres 4–10 only a little longer than wide.

Pronotum decidedly wider than long (width/length = 1.33). Microsculpture evident only at sides, disk smooth and shiny, with regular tiny punctures on the whole surface. One basal impression on each side, superficial, linear and impunctate. Mid longitudinal line well impressed between anterior and posterior submarginal sulci, which are scarcely evident. Lateral margins narrowly bordered on overall length, rounded and markedly sinuate in basal 3rd. Anterior and posterior margins not beaded. Front angles scarcely prominent; hind angles right (fig. 7). Two lateral setae on each side, one at hind angles and one at about $\frac{3}{4}$ from base. Prosternal process glabrous, cuneate and not margined at apex.

Elytra oval elongate (length from basal margin to apex/width = ♂ 1.49, ♀ 1.51), pear-shaped and moderately convex on disk. Shoulders obtuse, without denticles. Scutellar stria usually evident between striae 1 and 2. No setigerous punctures near base. Sides rounded and sinuate near apex; lateral border narrow. Usually three setae on each elytra, the 1st at basal 5th and in the 3rd interval or on 3rd stria, the following adjoining the 2nd stria. Striae smooth or weakly punctate, superficial but evident to apex, all equally impressed but more impressed in males than in females. Intervals flat (♀) or hardly convex (♂); 2nd interval wider than 1st and as wide as 3rd.

Metepisterna short, slightly longer than wide. Abdominal sterna IV–VI glabrous except for the pair of central setae; a short transverse impression together with sparse, hardly visible punctures are present at each side.

Legs stout. Mesotibiae crenulate at the external edge; male mesotibiae and metatibiae distally not swollen and without inner spines or denticles. Metatrochanters less than half length of femora. 5th tarsomeres with one pair of setae above and three pairs beneath. Male protarsomeres 1–3 triangular and strongly dilated. Metatarsomeres 1–4 externally furrowed.

Aedeagus (fig. 15) slender (length 1.95 mm), with enlarged basal bulb and median lobe long, almost cylindrical and in lateral view regularly rounded, distally very thin and bent downwards, but turning up at apex; the apical blade is, in dorsal view, triangular and bluntly pointed (fig. 20). Ostium in dorsal position, large and very long, extended to the basal bulb. Right paramere almost straight.

Distribution and habitat

The only known specimens of *B. (A.) jelskii* are the type series described by Tschitschérine (1997). According to the above considerations this material probably originates from the Puno area. Nothing is known of the environmental conditions of the sites inhabited by this species or its ecology.

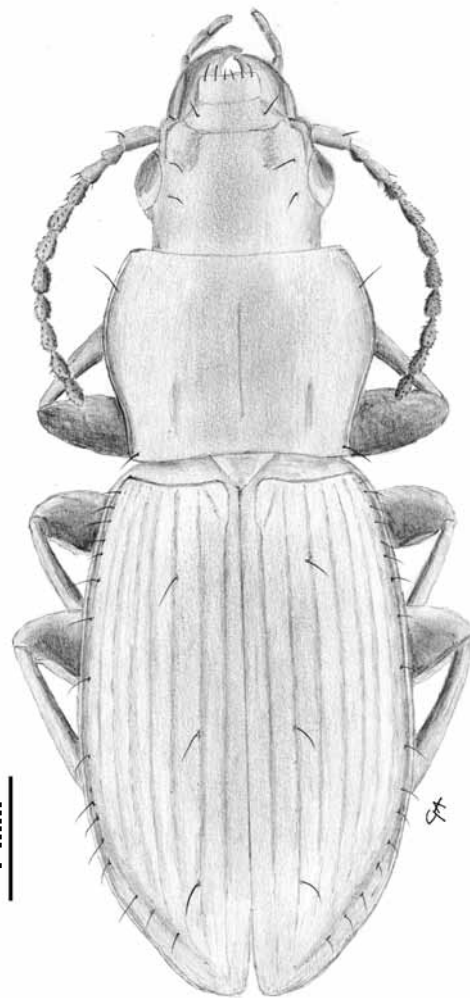


Fig. 1. *B. (Agraphoderus) jelskii* (Tschitschérine, 1897).

Fig. 1. *B. (Agraphoderus) jelskii* (Tschitschérine, 1897).

Blennidus (Agraphoderus) procerus n. sp. (figs. 2, 7, 11–14, 17, 22, 32)

Type locality

Peru, Cuzco, Abra Lares, m 4400.

Type material

HT ♂, Peru, Cuzco, Abra Lares, m 4400, 2 II 1994, M. Etonti leg. (CGi). PTT: 23 ♂♂ 13 ♀♀, same data as HT (CAI, CCa, CGi, CMo, MSNM, BMNH); 3 ♂♂ 2 ♀♀, Peru, Accha Alta, Abra Lares, Calca/Cuzco, m 4450, 29 XII 1999, M. Etonti legit (CMA).

Etymology

The specific epithet refers to the slender, oval elongate habitus.

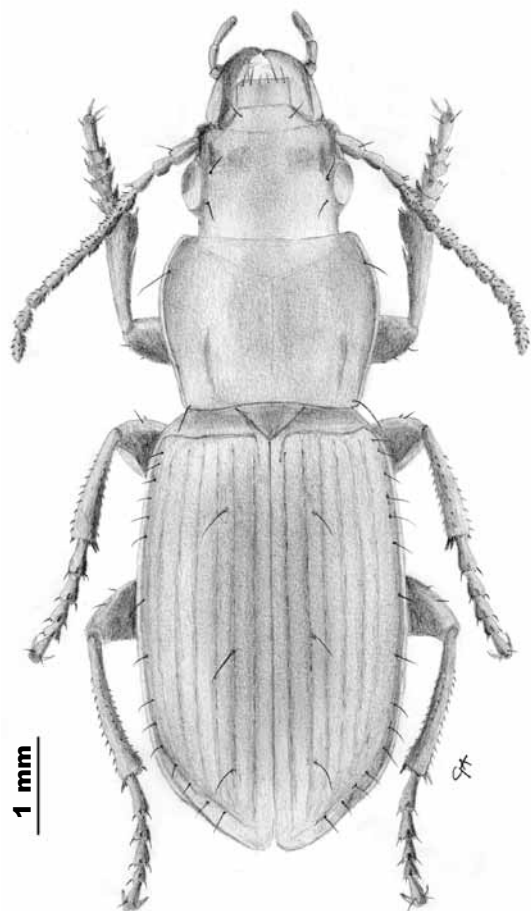


Fig. 2. *B. (Agraphoderus) procerus* n. sp.

Fig. 2. *B. (Agraphoderus) procerus* sp. n.

Differential diagnosis

Blennidus (Agraphoderus) procerus n. sp. is one of the four Peruvian *Agraphoderus* species with sinuate (or nearly straight) sides at the base of pronotum; this species, however, displays some variability, from sinuate to nearly straight sides (figs. 11–14). It is distinguished from *B. (A.) abramalagae* n. sp. by a more slender habitus and more weakly sinuate sides of pronotum; from *B. (A.) straneoi* n. sp. by a more slender and less convex habitus as well as a smaller aedeagus (the aedeagus is always small even in the largest specimens); from *B. (A.) jelskii* by the more superficial elytral striae, the elytra not pear-shaped and the median lobe of the aedeagus, which is more angulately inserted on the basal bulb, more slender at middle and ventrally depressed.

Description

Habitus as in fig. 2. Overall length of the HT ♂ 7.5 mm (PTT ♂♂ 6.5–8.3, ♀♀ 7.3–8.8 mm). Dorsal surface dark brown, a little paler at base and apex

of pronotum, dull (♀) or moderately shiny (♂) with marked polygonal microsculpture, much more evident on elytra. Antennae, legs and mouth parts reddish-brown. Brachypterous.

Head large, eyes moderately convex, sometimes more or less flattened in both ♂♂ and ♀♀; temples as long as 1/3 of eyes. Clypeus bisetose; labrum transverse, 6-setose. Frontal impressions short and superficial. Frons between eyes smooth and shiny, with sparse tiny punctures. Terminal labial palpomere with thin and sparse hairs; penultimate palpomere bisetose and with a short apical seta. Median tooth of mentum prominent and not excavate at apex. Antennae short, hardly reaching the base of pronotum, with antennomeres 4–10 only a little longer than wide.

Pronotum moderately transverse and very variable in shape (width/length = 1.18–1.33). Microsculpture evident only at sides, nearly absent on disk, with regular and very tiny punctures on the whole surface. In some specimens some lateral transverse wrinkles are evident. One basal impression on each side, superficial, linear and impunctate. Mid longitudinal line superficial, sometimes barely visible; submarginal sulci scarcely evident. Lateral margins narrowly bordered on overall length, weakly sinuate to nearly straight at basal 3rd (figs 7 and 11–14). Anterior margin unbordered, the posterior bordered only at sides. Base sinuate to nearly straight at sides. Front angles very slightly prominent; hind angles from nearly right to obtuse (figs. 7, 11–14). Two lateral setae on each side, one at hind angles and one at about 3/4 from base. Prosternal process glabrous, cuneate and not margined at apex.

Elytra slender, oval elongate (length from basal margin to apex/width = 1.50–1.58), narrow at base and subdepressed on disk (fig. 32). Microsculpture markedly impressed in both sexes. Shoulders obtuse, without denticles. Scutellar stria usually evident between striae 1 and 2. No setigerous punctures near base. Sides rounded and scarcely sinuate near apex; lateral border narrow. Usually 3 setae on each elytra, the 1st often at basal 5th and in the 3rd interval or on 3rd stria (sometimes very close to 2nd stria), the following adjoining the 2nd stria. Striae smooth, superficial but evident to apex, all equally impressed, but more so in males than in females. Intervals flat (♀) or slightly convex (♂); 2nd interval wider than 1st and as wide as or narrower than 3rd.

Metepisterna short, a little longer than wide. Abdominal sterna IV–VI glabrous except for the pair of central setae; no transverse impressions nor punctures are evident at sides.

Legs stout. Mesotibiae crenulate at the external edge; male mesotibiae and metatibiae distally not swollen and without inner spines or denticles. Meta-trochanters shorter than half femora. 5th tarsomeres with one pair of setae above and 2 pairs beneath. Male protarsomeres 1–3 triangular and strongly dilated. Metatarsomeres 1–4 externally not furrowed.

Aedeagus (fig. 17) slender (length 1.85 mm), with median lobe sharply inserted on the large basal bulb, in lateral view slightly curved, distally very

thin and angulately bent downwards, but turning up at apex; in dorsal view, the median lobe is wide at base and the apical blade is triangular and bluntly pointed (fig. 22); a certain degree of variability, especially in the angulation of the apical blade, can be observed within populations even from a single site (figs. 25–30). Ostium in dorsal position, large and very long, extended nearly to the basal bulb. Right paramere curved.

Distribution and habitat

At present *B. (A.) procerus* sp. n. is only known from the type locality, the Abra Lares pass near Cuzco, Southern Peru. At this site (4,400 m a.s.l.), which is characterized by Andean grassland, *B. (A.) procerus* n. sp. was collected together with *B. (A.) mesotibialis* (Etonti legit, in CMA).

Blennidus (Agraphoderus) abramalagae n. sp. (figs. 3, 10, 18, 23)

Type locality

Peru, Cuzco, Abra Malaga, m 4,400.

Type material

HT ♂, Peru, Cuzco, Abra Malaga, m 4400, 20 IV 1990, M. Etonti leg. (CGi). PTT: 2 ♂♂ 3 ♀♀, same data as HT (CGi, CAI); 1 ♀ Cordillera Vilcabamba, Salcantay, m 4200, IV 1992, Divák leg. (CSc).

Etymology

The specific epithet derives from the type locality, the Abra Malaga pass, near Cuzco, as a noun, in the genitive case.

Differential diagnosis

Blennidus (Agraphoderus) abramalagae n. sp. is one of the four Peruvian *Agraphoderus* species with sinuate (or nearly straight) sides at the base of pronotum. It is distinguished from the other species by an on average larger size and relatively wider elytra ($L/W = 1.42\text{--}1.43$); it differs from *B. (A.) procerus* n. sp. and *B. (A.) straneoi* n. sp. by more markedly sinuate sides of pronotum and from *B. (A.) jelskii* by slightly impressed elytral striae and nearly flat intervals in both sexes (more impressed striae and more convex intervals in *B. (A.) jelskii* ♂♂). Moreover, the median lobe of the aedeagus is slender and distally almost straight (angulately bent downwards in *B. (A.) procerus*, *B. (A.) straneoi* and *B. (A.) jelskii*).

Description

Habitus as in fig. 3. Overall length of the HT ♂ 8.7 mm (PTT ♂♂ 8.0–8.1, ♀♀ 8.2–9.0 mm). Dorsal surface dark brown, sometimes with bluish lustre, moderately shiny (♂) or dull (♀) with marked polygonal microsculpture, much more evident on elytra. Antennae, legs and mouth parts reddish–brown. Brachypterous.

Head moderately large, eyes convex in both sexes; temples as long as $1/2.5$ of eyes. Clypeus bisetose, a little excavate at middle; labrum transverse, 6–setose. Frontal impressions superficial and barely visible. Frons between eyes smooth and shiny, with sparse

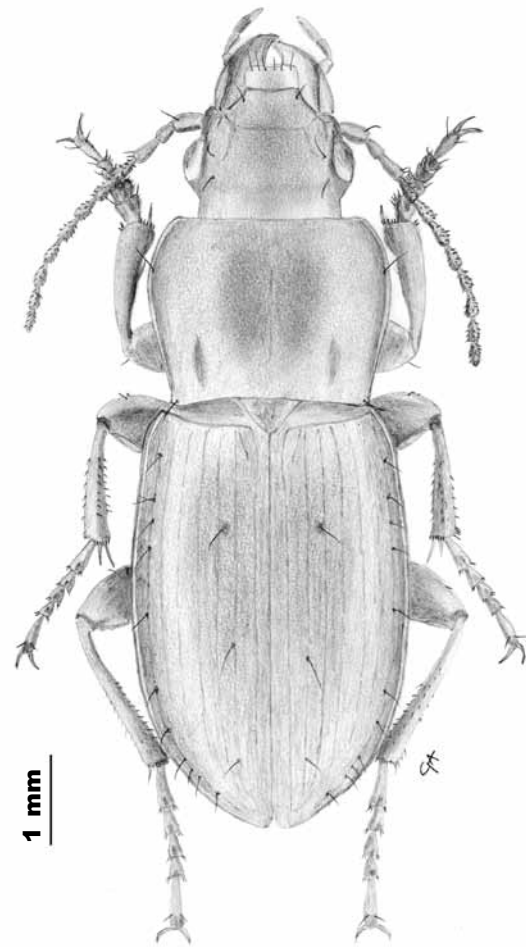


Fig. 3. *B. (Agraphoderus) abramalagae* n. sp.

Fig. 3. *B. (Agraphoderus) abramalagae* sp. n.

tiny punctures. Terminal labial palpomere with thin, sparse hairs; penultimate palpomere bisetose and with a short apical seta. Median tooth of mentum prominent and excavate at apex. Antennae short, hardly reaching the base of pronotum, with antennomeres 4–10 only a little longer than wide.

Pronotum transverse (width from basal margin to apex/length = 1.30–1.35). Microsculpture evident only at sides, disk smooth and shiny. One basal impression on each side, superficial, linear and impunctate. Mid longitudinal line superficial, sometimes hardly visible, only impressed between the submarginal sulci, which are barely visible. Lateral margins narrowly bordered on overall length, sinuate at basal 3rd. Anterior margin unbordered, the posterior bordered at sides; base markedly sinuate at sides. Front angles very scarcely prominent; hind angles nearly right or obtuse (fig. 10). Two lateral setae on each side, one at hind angles and one at about $3/4$ from base. Prosternal process glabrous, cuneate and widely margined at apex.

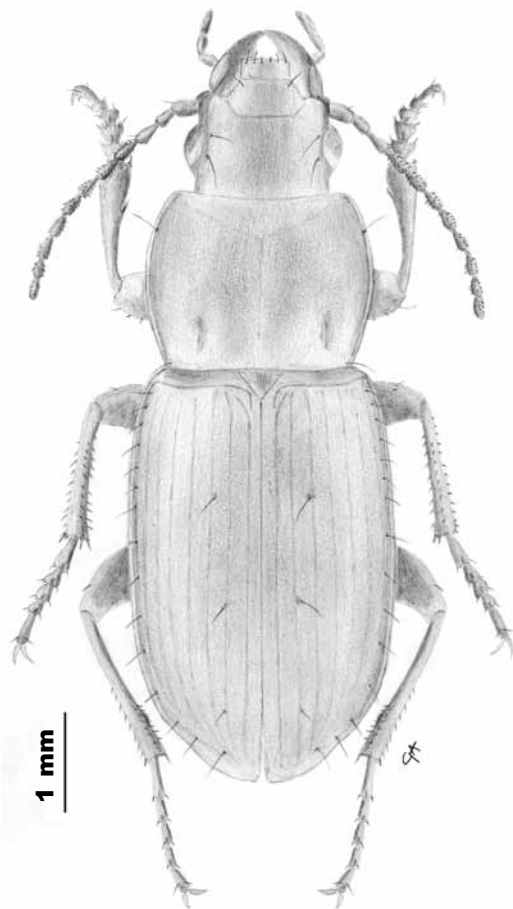


Fig. 4. *B. (Agraphoderus) etontii* n. sp.

Fig. 4. *B. (Agraphoderus) etontii* sp. n.

Elytra oval (length/width = 1.42–1.43), subdepressed on disk. Microsculpture more impressed in ♀♀. Shoulders obtuse, without denticles. Scutellar stria usually evident between striae 1 and 2. No setigerous punctures near base. Sides rounded and scarcely sinuate near apex; lateral keel moderately large. Usually 3 setigerous punctures on each elytron, the 1st foveate at basal 5th and in the 3rd interval, the second just behind middle and adjoining the 2nd stria; the third before apex and on the 2nd stria. Striae smooth, superficial but evident to apex, all equally and weakly impressed in both sexes. Intervals flat in both sexes; 2nd interval wider than 1st and as wide as 3rd.

Metepisterna longer than wide. Abdominal sterna IV–VI glabrous except for the pair of central setae; no transverse impressions or punctures evident at sides.

Legs stout. Mesotibiae crenulate at the external edge; male mesotibiae distally not swollen and without inner spines or denticles. Metatrochanters shorter than half of femora. 5th tarsomeres with

one pair of setae above and two or three pairs beneath. Male protarsomeres 1–3 triangular and strongly dilated. Metatarsomeres 1–4 not furrowed externally.

Aedeagus (fig. 18) slender (length 2.12 mm), with median lobe sharply inserted on the large basal bulb, in lateral view slightly curved, ventrally depressed, distally thin and almost straight, slightly turning up at apex; in dorsal view, the median lobe is wide at base and the apical blade is triangular and bluntly pointed (fig. 23). Ostium in dorsal position, large and very long, extended nearly to the basal bulb. Right paramere curved.

Distribution and habitat

At present *B. (A.) abramalagae* n. sp. is known from the type locality, the Abra Malaga pass near Cuzco, and from Nevado Salcantay, not far from Abra Malaga, in Southern Peru. These sites (4,200–4,400 m a.s.l.) are characterized by Andean grassland.

Blennidus (Agraphoderus) etontii n. sp. (figs. 4, 9, 19, 24)

Type locality

Peru, Lares, Abra Lares, m 4,000.

Type material

HT ♂, Peru, Lares, Abra Lares, m 4000, 28 XII 1998, M. Etonti leg. (CGi). PTT: 1 ♀, same data as HT (CAI); 7 ♂♂ 2 ♀♀, Peru, Pampa Corral, P. Lares–Cuzco, m 200, 26 XII 1999, legit M. Etonti (CAI, CGi, CMA); 2 ♀♀, Peru, Pampa Corral, P. Lares, m 4250, 29 XII 1998, legit M. Etonti; 1 ♀, Peru, Pampa Corral, P. Lares, m 4180, 29 XII 1998, legit M. Etonti (CAI, CGi).

Etymology

We are pleased to dedicate this species to Mirto Etonti, collector of the specimens forming the type series of this species.

Differential diagnosis

Blennidus (Agraphoderus) etontii n. sp. is the only species in the *jelskii* group, as far as we know, with completely rounded sides of pronotum. Moreover, it is the only species with male metatibiae preapically swollen. It is distinguished from the other Peruvian *Agraphoderus* that have rounded sides of the pronotum by the morphology of the median lobe of aedeagus, which suggests its relationship with the species of the *jelskii* group.

Description

Habitus as in fig. 4. Overall length of the HT ♂ 7.7 mm (PTT ♂♂ 7.6–8.3, ♀♀ 7.7–9.3 mm). Dorsal surface dark brown, with elytra a little paler than head and pronotum, moderately shiny (♂) or dull (♀); marked polygonal microsculpture, much more evident on elytra. Antennae, legs and mouth parts reddish–brown. Brachypterous.

Head moderately large, eyes convex in both sexes; temples as long as 1/2.75 of eyes. Clypeus

bisetose, slightly excavate at middle; labrum transverse, 6-setose. Frontal impressions superficial and barely visible. Frons between eyes smooth and shiny, with sparse tiny punctures. Terminal labial palpomere with sparse, thin hairs; penultimate palpomere bisetose and with a short apical seta. Median tooth of mentum prominent and excavate at apex. Antennae short, hardly reaching the base of pronotum, with antennomeres 4–10 only a little longer than wide.

Pronotum transverse (width/length = ♂ 1.30, ♀ 1.34). Microsculpture evident only at sides, disk smooth and shiny. One basal impression on each side, superficial, linear and impunctate. Mid longitudinal line superficial, only impressed between the submarginal sulci, which are barely visible. Lateral margins rounded and narrowly bordered on overall length. Anterior margin unbordered, the posterior bordered at sides; base sinuate at sides. Front angles very scarcely prominent; hind angles obtuse (fig. 9). Two lateral setae on each side, one at hind angles and one about $\frac{3}{4}$ from base. Prosternal process glabrous, cuneate and widely margined at apex.

Elytra oval elongate (length from basal margin to apex/width = 1.47–1.52), moderately convex. Microsculpture more impressed in ♀♀. Shoulders obtuse, without denticles. Scutellar stria superficial and scarcely evident between striae 1 and 2. No setigerous punctures near base. Sides rounded and scarcely sinuate near apex; lateral keel narrow. Usually three setae on each elytron (the HT with four setae on left elytron), the 1st at basal 4th and in the 3rd interval or on 3rd stria, the following adjoining the 2nd stria. Striae smooth, superficial but evident to apex, all equally and weakly impressed in both sexes. Intervals flat in both sexes; 2nd interval wider than 1st and as wide as 3rd.

Metepisterna longer than wide. Abdominal sterna IV–VI glabrous except for the pair of central setae; only a few tiny punctures are hardly visible at sides.

Legs stout. Mesotibiae crenulate at the external edge; male mesotibiae distally not swollen and without inner spines or denticles; male metatibiae preapically moderately swollen. Metatrochanters shorter than half femora. 5th tarsomeres with one pair of setae above and 2 pairs beneath. Male protarsomeres 1–3 triangular and strongly dilated. Metatarsomeres 1–4 externally not furrowed.

Aedeagus (fig. 19) slender (length 2.10 mm), with median lobe sharply inserted on the large basal bulb, in lateral view hardly curved, ventrally depressed, distally thin and slightly bent downwards, turning up at apex; in dorsal view, the median lobe is wide at base and the apical blade is triangular and acutely pointed (fig. 24). Ostium in dorsal position, large and very long, extended nearly to the basal bulb. Right paramere curved.

Distribution and habitat

At present *B. (A.) etontii* n. sp. is only known from the type locality, the Abra Lares pass near Lares, Cuzco Dept., Southern Peru. The collecting site (4,000 m a.s.l.) is characterized by Andean grassland. This species is sympatric but not syntopic

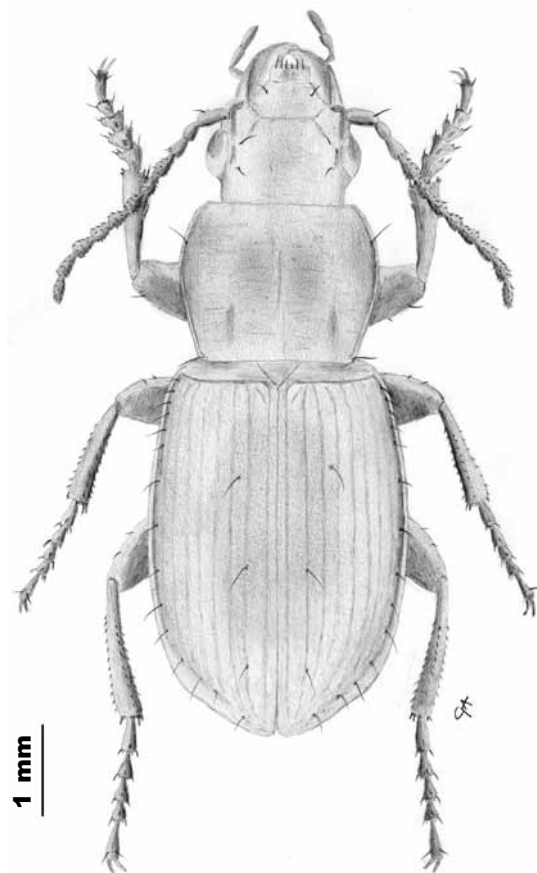


Fig. 5. *B. (Agraphoderus) straneoi* n. sp.

Fig. 5. *B. (Agraphoderus) straneoi* sp. n.

with *B. (A.) procerus* sp. n., which seems to live at a higher altitude (4,400 m a.s.l.); on the contrary, it was collected in syntopy with *B. (A.) mesotibialis* (Etonti legit, in CMA).

Blennidus (Agraphoderus) straneoi n. sp. (figs. 5, 8, 16, 21, 31)

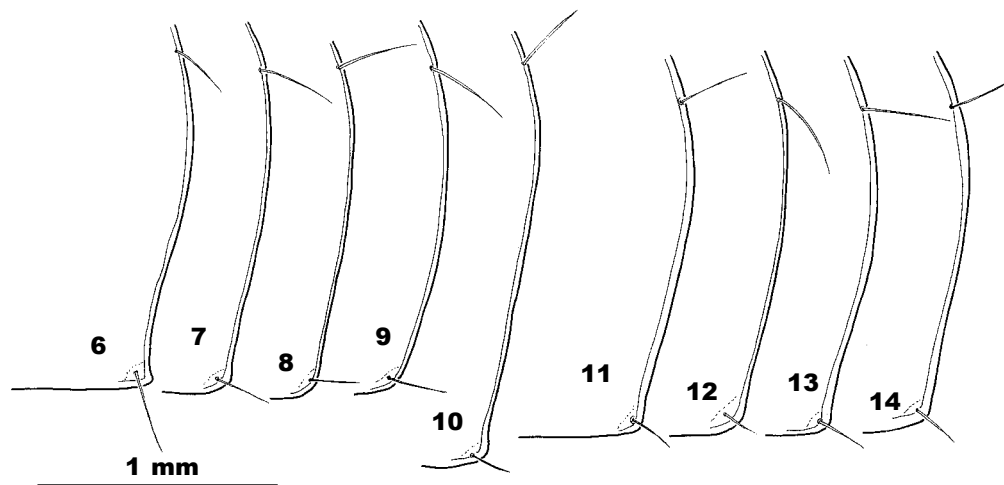
Type locality
Peru, Callanga.

Type material

HT ♂, Peru, Callanga (CSt at MSNM). PTT: 1 ♀, same data as HT (CAI). Note: the two specimens of the type series (ex Staudinger according to Straneo & Vereshagina, 1991) were found in the Straneo Collection, wrongly attributed to *B. (A.) jelskii*.

Etymology

We dedicate this species to the author of the most important study concerning the Peruvian *Agraphoderus*, Stefano L. Straneo, renowned specialist of world Pterostichinae.



Figs. 6–14. Basal angles of the pronotum of *Blennidus* spp.: 6. *B. (A.) jelskii* (Tschitsch.); 7. *B. (A.) procerus* n. sp.; 8. *B. (A.) straneoi* n. sp.; 9. *B. (A.) etontii* n. sp.; 10. *B. (A.) abramalagae* n. sp.; 11–14. Variability in *B. (A.) procerus* n. sp. from the same locality.

Figs. 6–14. Ángulos basales del pronoto de *Blennidus* spp.: 6. *B. (A.) jelskii* (Tschitsch.); 7. *B. (A.) procerus* sp. n.; 8. *B. (A.) straneoi* sp. n.; 9. *B. (A.) etontii* sp. n.; 10. *B. (A.) abramalagae* sp. n.; 11–14. Variabilidad en *B. (A.) procerus* sp. n. de la misma localidad.

Differential diagnosis

Blennidus (Agraphoderus) straneoi n. sp. is one of the four Peruvian *Agraphoderus* species with sinuate (or nearly straight) sides at the base of pronotum. Respect to *B. (A.) abramalagae* n. sp. and *B. (A.) jelskii*, the sides are more weakly sinuate; moreover, *B. (A.) straneoi* n. sp. is distinguished from *B. (A.) jelskii* also by slightly impressed elytral striae and nearly flat intervals in both sexes (more impressed striae and more convex intervals in *B. (A.) jelskii* ♂♂) as well as not pear-shaped elytra. It differs from *B. (A.) procerus* n. sp. by the oval, less slender habitus, by the more convex elytra, with marked apical declivity, and by a larger aedeagus as well (*B. (A.) procerus* n. sp. displays a smaller aedeagus even in the largest specimens).

Description

Habitus as in fig. 5. Overall length of the HT ♂ 7.7 mm (PT ♀ 8.7 mm). Dorsal surface brown, moderately shiny (♂) or dull (♀) with marked polygonal microsculpture, much more evident on elytra. Antennae, legs and mouth parts reddish–brown. Brachypterous.

Head moderately large, eyes convex in both sexes; temples as long as 1/3 of eyes. Clypeus bisetose, moderately concave at middle; labrum transverse, 6–setose. Frontal impressions superficial and directed inward. Frons between eyes smooth and shiny, with sparse very tiny punctures. Terminal labial palpomere with thin and sparse hairs; penultimate palpomere bisetose and with a short apical seta. Median tooth of mentum prominent and

excavate at apex. Antennae short, hardly reaching the base of pronotum, with antennomeres 4–10 only a little longer than wide.

Pronotum transverse (width/length = ♂ 1.25, ♀ 1.35). Microsculpture more evident at sides, where some transverse wrinkles are evident; disk smooth. One basal impression on each side, superficial, linear and impunctate. Mid longitudinal line superficial, only impressed between the submarginal sulci, which are scarcely evident. Lateral margins narrowly bordered on overall length, nearly linear (♂) or weakly sinuate (♀) at basal 3rd. Anterior margin unbordered, the posterior bordered at sides; base sinuate at sides. Front angles scarcely prominent; hind angles obtuse (fig. 8). Two lateral setae on each side, one at hind angles and one at about 4/5 from base. Prosternal process glabrous, cuneate and not margined at apex.

Elytra oval (length from basal margin to apex/width = 1.45 in both sexes), moderately convex on disk with marked apical declivity (fig. 31). Microsculpture more impressed in ♀. Shoulders obtuse, without denticles. Scutellar stria usually evident between striae 1 and 2. No setigerous punctures near base. Sides rounded and scarcely sinuate near apex; lateral keel moderately large. Usually three setae on each elytra, the 1st at basal 5th and in the 3rd interval or on 3rd stria, the following adjoining the 2nd stria. Striae smooth or weakly punctuate (♀), superficial but evident to apex, all equally and slightly impressed in both sexes. Intervals flat in both sexes; 2nd interval wider than 1st and wider than 3rd.



Figs. 15–19. Aedeagus in lateral view of *Blennidus* spp. (holotypes): 15. *B. (A.) jelskii* (Tschitsch.); 16. *B. (A.) straneoi* n. sp.; 17. *B. (A.) procerus* n. sp.; 18. *B. (A.) abramalagae* n. sp.; 19. *B. (A.) etontii* n. sp.

Figs. 15–19. Edeago en vista lateral de *Blennidus* spp. (holotipos): 15. *B. (A.) jelskii* (Tschitsch.); 16. *B. (A.) straneoi* sp. n.; 17. *B. (A.) procerus* sp. n.; 18. *B. (A.) abramalagae* sp. n.; 19. *B. (A.) etontii* sp. n.

Metepisterna longer than wide. Abdominal sterna IV–VI glabrous except for the pair of central setae; no transverse impressions or punctures are evident at sides.

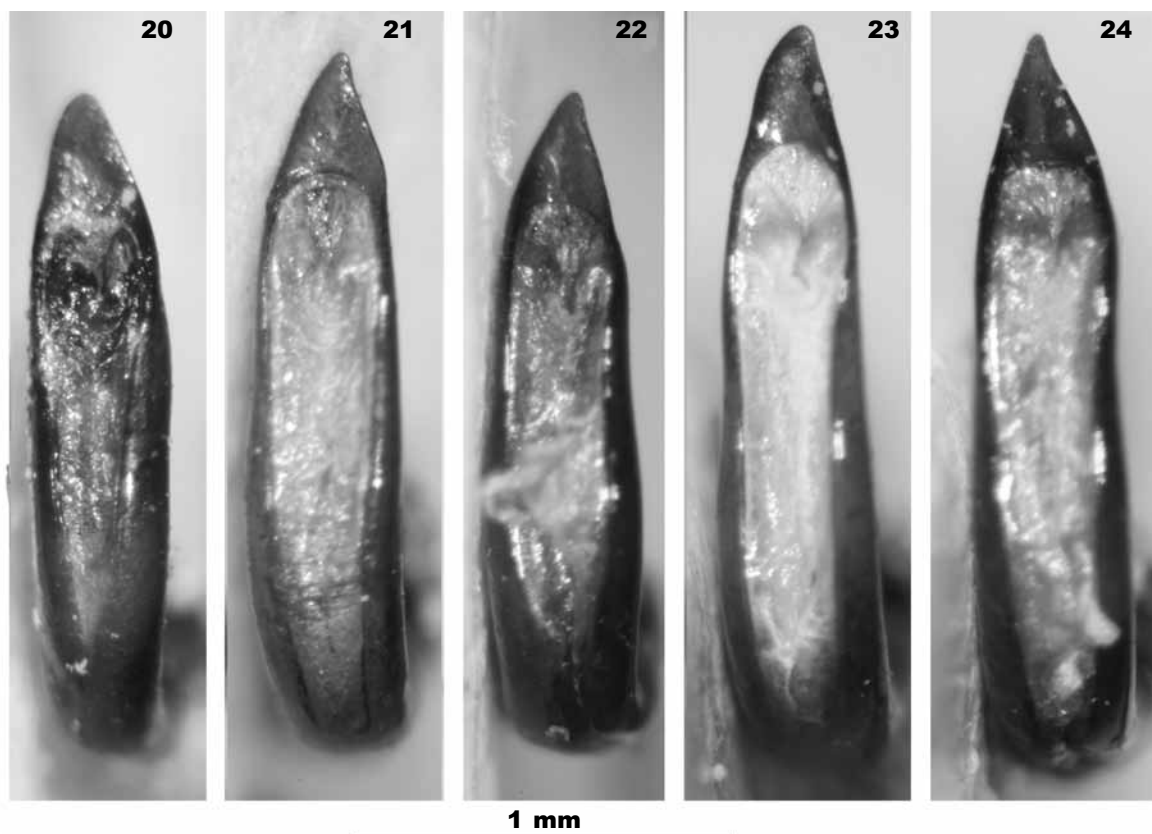
Legs stout. Mesotibiae crenulate at the external edge; male mesotibiae distally not swollen and without inner spines or denticles. Metatrochanters shorter than half femora. 5th tarsomeres with one pair of setae above and two pairs beneath. Male protarsomeres 1–3 triangular and strongly dilated.

Aedeagus (fig. 16) slender (length 2.0 mm), with median lobe roundly inserted on the large basal bulb, in lateral view hardly curved at middle,

thin and ventrally depressed, distally tapering and slightly bent downwards, turning up at apex; in dorsal view, the median lobe is wide at base and the apical blade is triangular and moderately sharply pointed (fig. 21). Ostium in dorsal position, large and very long, extended nearly to the basal bulb. Right paramere curved.

Distribution and habitat

At present *B. (A.) straneoi* sp. n. is only known from the type locality, Callanga. This locality probably refers not to the town near Lima but to the ancient archaeological site in the Cuzco Dept. (Southern



Figs. 20–24. Aedeagus in dorsal view of *Blennidus* spp. (holotypes): 20. *B. (A.) jelskii* (Tschitsch.); 21. *B. (A.) straneoi* n. sp.; 22. *B. (A.) procerus* n. sp.; 23. *B. (A.) abramalagae* n. sp.; 24. *B. (A.) etontii* n. sp.

Figs. 20–24. Edeago en vista dorsal de *Blennidus* spp. (holotipos): 20. *B. (A.) jelskii* (Tschitsch.); 21. *B. (A.) straneoi* sp. n.; 22. *B. (A.) procerus* sp. n.; 23. *B. (A.) abramalagae* sp. n.; 24. *B. (A.) etontii* sp. n.

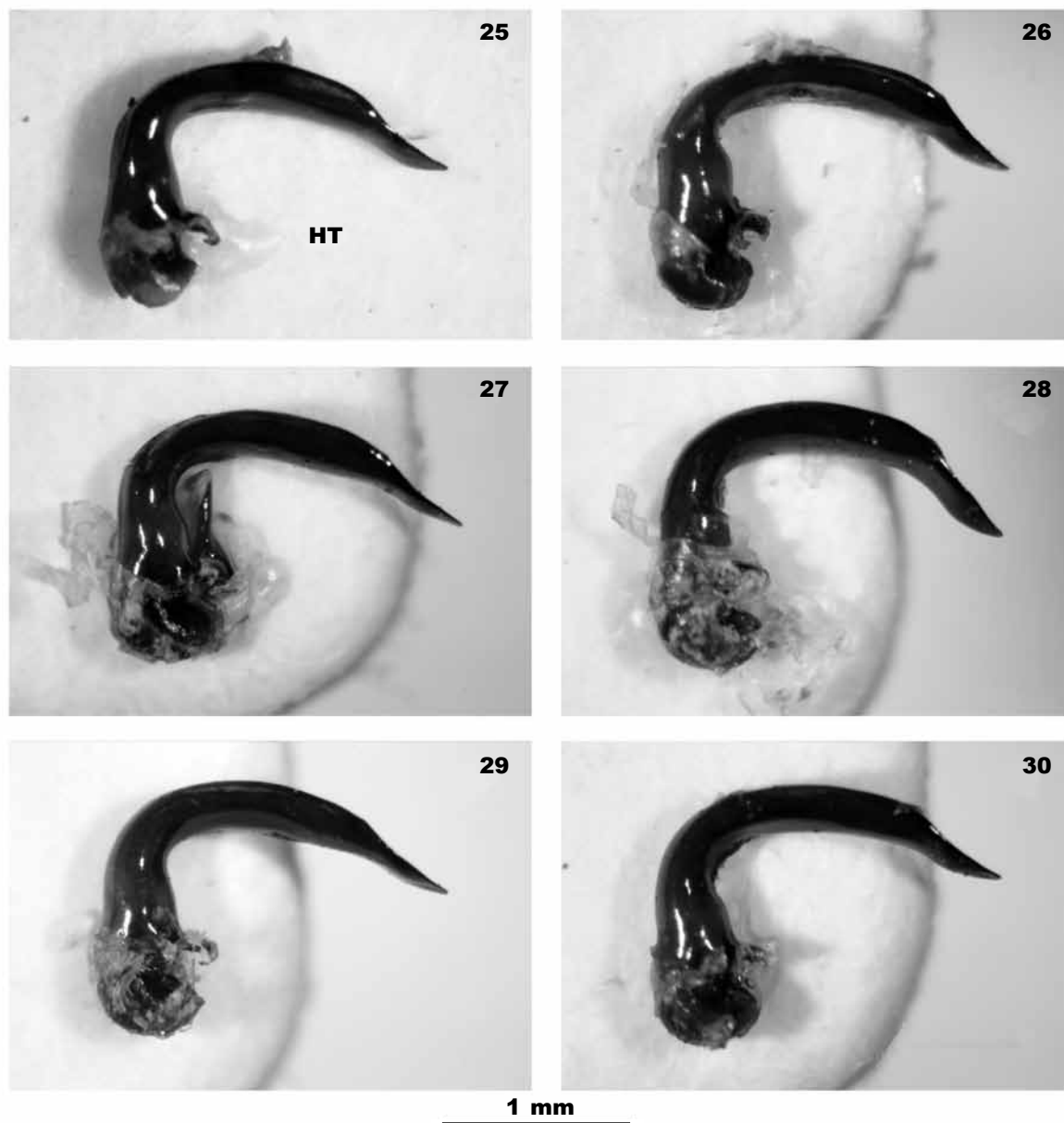
Peru), where four of the five species of the *jelskii* group are found. Also two specimens of *B. (A.) mesotibialis* (ex Staudinger, in CSt) are labelled 'Callanga' and this species is only known from the Cuzco area. Nothing is known of the environment inhabited by this species, nor of its ecology.

Discussion

Straneo (1993) lists only three *Blennidus* (*Agraphoderus*) species from the Southern Peruvian Andes: *B. (A.) mesotibialis* (Straneo, 1993) from an area between Puno and Cuzco, *B. (A.) aulacostigma* (Tschitschérine, 1897) and *B. (A.) jelskii* (Tschitschérine, 1897) from Puno. In this paper we raise this number to seven, as four new species from the Cuzco Dept. are described, all of them with probable affinities with *B. (A.) jelskii*. The affinities of *B. (A.) mesotibialis* and *B. (A.) aulacostigma* remain unclear. Unfortunately, almost nothing is known about the Bolivian *Blennidus* species, which could be southern relatives

of the species belonging to the *jelskii* group. The *Blennidus* species belonging to the *jelskii* group are probably related to one another based on the uniform morphology of male genitalia, which are characterized in lateral view by a thin apex, distally tapering and not sinuate, and in dorsal view by a triangular apical blade as well as a large dorsal ostium. Inside this group, *B. (A.) procerus* n. sp., *B. (A.) abramalagae* n. sp., *B. (A.) etontii* n. sp. and *B. (A.) straneoi* n. sp., all distributed in the Cuzco Dept., are morphologically more similar to each other than to *B. (A.) jelskii*, which is also more isolated from a geographical point of view (Puno).

The apparently separate distribution of the *Blennidus* (*Agraphoderus*) species of the *jelskii* group, each one inhabiting a specific Andean valley or district, suggests that these flightless high-altitude carabids constitute a complex of stenoendemic species living in restricted geographic areas and in narrow altitudinal ranges. They probably originated by allopatric speciation due to the isolating effects of Pleistocene climatic cycles combined with the



Figs. 25–30. Variability of the aedeagus in lateral view of *B. (A.) procerus* n. sp. from the same locality (HT, fig. 25).

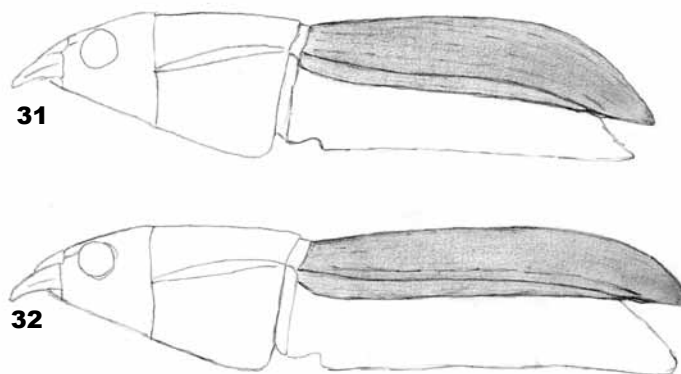
Figs. 25–30. Variabilidad del edeago en vista lateral de *B. (A.) procerus* sp. n. de la misma localidad (HT, fig. 25).

effects of orographic barriers, in particular when a warmer climate shifted the montane biota upwards during the interglacials, causing its fragmentation and isolation (Simpson–Vuilleumier, 1971). The same differentiation processes occurred to other high-altitude Andean carabid genera such as *Trechisibus* and *Oxytrechus* (Allegro et al., 2008; Moret, 2005).

According to our preliminary observations carried out on the *Blennidus* (*Agraphoderus*) populations inhabiting the Cordillera Blanca, many other species

of this genus must be considered as stenoendemics. The data of Straneo (1993) referring to species covering wide geographical ranges need careful reexamination, as they could refer to specimens wrongly attributed to a single species (Allegro & Giachino, unpublished).

Based on these considerations, it is very likely that new surveys in unexplored areas of Andes together with research into other entomological collections will bring to light many more unknown taxa.



Figs. 31–32. Schematic habitus in lateral view of: 31. *B. (A.) straneoi* n. sp.; 32. *B. (A.) procerus* n. sp.
 Figs. 31–32. Esquemas del hábitus en vista lateral de: 31. *B. (A.) straneoi* sp. n.; 32. *B. (A.) procerus* sp. n.

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