

Studies on the *Blennidus* Motschulsky subgen. *Agraphoderus* Bates from Peru: the *orbicollis* species group (Coleoptera: Carabidae: Pterostichini)

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Abstract

A new *Blennidus* subgen. *Agraphoderus* species is described from the Andes of Northern Peru (*B. pinguis* sp. n.). It belongs, together with *Blennidus orbicollis* Straneo, 1993 and *Blennidus pseudolaewis* nom. nov. pro *B. laevis* Straneo, 1993 nec Straneo, 1951, to a very homogeneous group of probably closely related species ('*B. orbicollis* species group'), which is distinguished from the others by the peculiar and unusual morphology of the aedeagus.

The distinctive morphological features of these species are illustrated and compared.

Key words: Coleoptera, Carabidae, Pterostichini, *Blennidus* subgen. *Agraphoderus*, Peru, taxonomy, new species, new name

Introduction

As far as we know, 38 *Blennidus* subgen. *Agraphoderus* (sensu MORET 2005) species are recorded from Peru (STRANEO 1993; ALLEGRO 2010; ALLEGRO & GIACHINO 2011), mostly inhabiting the high altitude Andean grasslands at an altitude range of 3300–4800 m a.s.l.

The study of abundant material of *Agraphoderus* collected on the mountains of the Cordillera Blanca, Peru, by one of the Authors (G. Allegro) and of the material collected in Peru by M. Etonti and deposited in the Giachino Collection, as well as of the type material of species described by Straneo (deposited in the Straneo Collection at Museo Civico di Storia Naturale, Milano and in the Mateu Collection at Museo Regionale di Scienze Naturali, Torino) and by Tschitschérine (Zoological Institute Russian Academy of Sciences, St. Petersburg, Russia) is allowing us to point out many undescribed species as well as to recognize the presence of 'groups of species', which can be distinguished by their very homogeneous aedeagal morphology. The same systematic approach was adopted by MORET (1995), who grouped the Ecuadorian *Blennidus* in eight different species groups as an attempt to identify the most relative taxa, generally ranging in clearly delimited Andean areas. On the

contrary, MORET (in litteris 2011) remarked that the arrangement of the genus *Blennidus* Motschulsky in four 'convenience subgenera' (*Blennidus* s. str., *Jasinskiellus* Moret, *Sierrobis* Straneo and *Agraphoderus* Bates) on the base of the presence/absence of metathoracic wings as well as of a transversal sulcus on the abdominal sterna IV–VI (MORET 2005) has no phylogenetic value, due to the inconsistency of such characters. In another paper (ALLEGRO & GIACHINO 2011), the *jelskii* species group was discussed, including five species (with description of four new species) from the Andes of Southern Peru. This second contribution concerns the species belonging, in our opinion, to the *orbicollis* species group, which includes *Blennidus orbicollis* Straneo, 1993, *Blennidus pseudolaewis* nom. nov. pro *B. laevis* Straneo, 1993 nec Straneo, 1951, as well as *Blennidus pinguis* sp. n., which is here described. The habitus and the male genitalia of the two already known species are illustrated too.

At present knowledge, all these species are likely spread only in the Andes of Northern Peru, Dept. of Cajamarca, although the type series of *B. orbicollis*, from the Weyrauch Collection, is only generically labelled 'Peru'.

Materials and Methods

Materials of the genus *Blennidus* obtained from the following Museums and private Collections were examined:

BMNH	The Natural History Museum, London, United Kingdom
MRSN	Museo Regionale di Scienze Naturali, Torino, Italia
MSNM	Museo Civico di Storia Naturale, Milano, Italia
CAI	Allegro Collection, Moncalvo, Italia
CCa	Casale Collection, Torino, Italia
CGi	Giachino Collection, Torino, Italia (at Settore Fitosanitario Regionale, Regione Piemonte)
CMa	Mateu Collection at Museo Regionale di Scienze Naturali, Torino, Italia
CMo	Moret Collection, Toulouse, France
CSt	Straneo Collection at Museo Civico di Storia Naturale, Milano, Italia

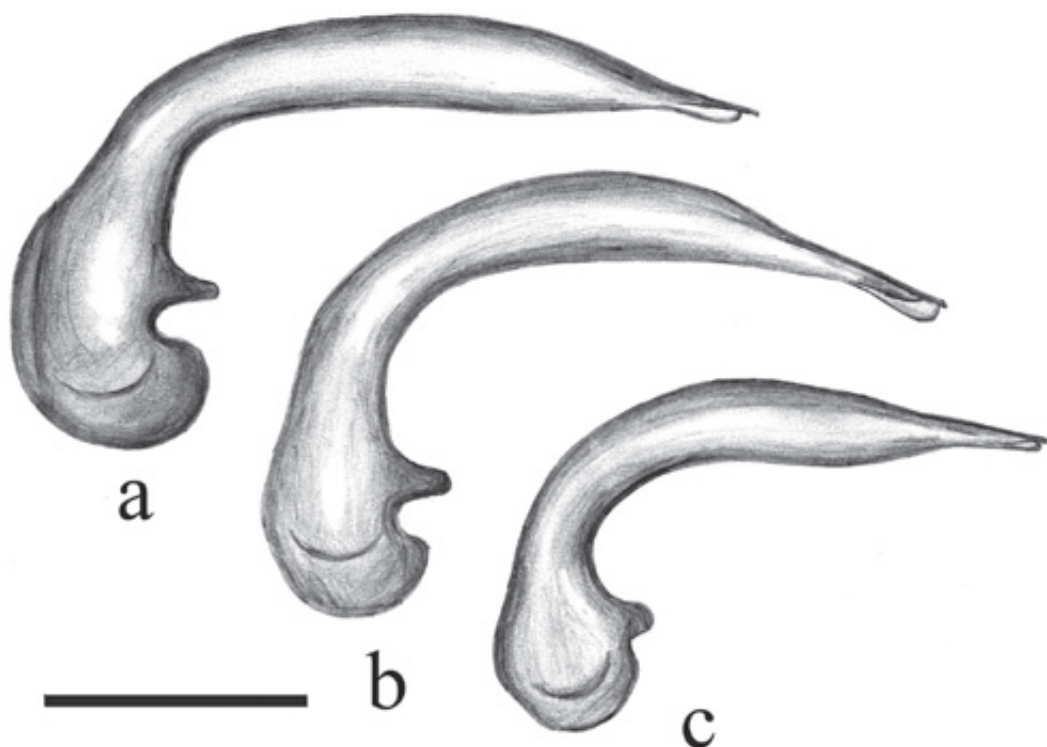


Fig. 1: Median lobe of aedeagus in lateral vision of *Blennidus (Agraphoderus) pinguis* n. sp., *Blennidus orbicollis* (Straneo, 1993) and *Blennidus pseudolaevus* nom. nov. Scale bar: 1 mm.

The following acronyms have been used for the type material:

HT Holotype
PT, PTT Paratype(s)

Locality labels of the examined material are quoted in the original version.

Overall length (L) of specimens was measured from apex of mandibles to tip of elytra.

The drawings of the habitus and of the genitalia were made by means of a camera lucida connected to a Motic SMZ-168 stereo microscope.

Taxonomy

“*Blennidus orbicollis* species group”

In our opinion, the following species should be included, at the present status of knowledge, in the ‘*Blennidus orbicollis* species group’:

Blennidus (Agraphoderus) orbicollis Straneo, 1993

Blennidus (Agraphoderus) pseudolaevus **nom. nov.** pro *B. laevis* Straneo, 1993 nec Straneo, 1951

***Blennidus (Agraphoderus) pinguis* sp. n.**

These species are easy to distinguish from the others belonging to the genus *Blennidus* on account of the peculiar and unusual morphology of male genitalia, decidedly different from those of the already recorded species (figs. 1 and 2). Moreover, they share a uniform habitus with a rather ‘discoidal’ pronotum and a compact, short-oval body (fig. 3).

The character which actually defines this group is the peculiar and very homogeneous morphology of aedeagus, which is long and slender with the median lobe in lateral view nearly straight, swollen at middle and distally very thin, with lateral edges of blade bent downwards (fig. 1); in dorsal view, it appears parallel-sided and regularly arcuate towards left; the apical blade is long and parallel-sided, with rounded and convex apex. The ostium is relatively short and small, restricted to the central part of the median lobe (fig. 2).

Besides the morphology of their aedeagus, the features which distinguish these species from each other are the

Fig. 2: Median lobe of aedeagus in dorsal vision of *Blennidus (Agraphoderus) pinguis* n. sp. (a), *Blennidus orbicollis* (Straneo, 1993) (b) and *Blennidus pseudolaevis* nom. nov. (c). Scale bar: 1 mm.

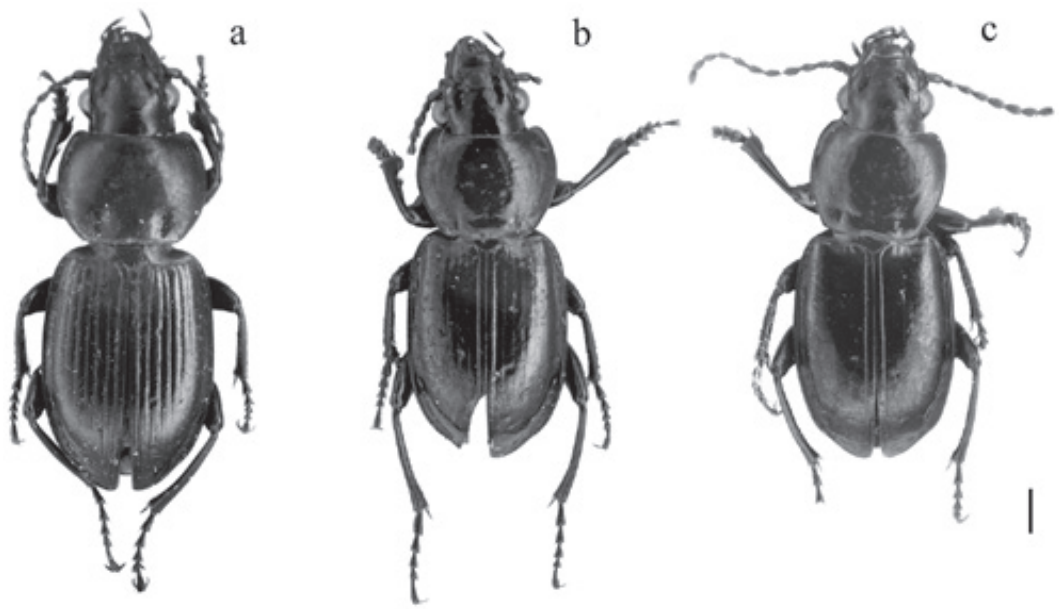
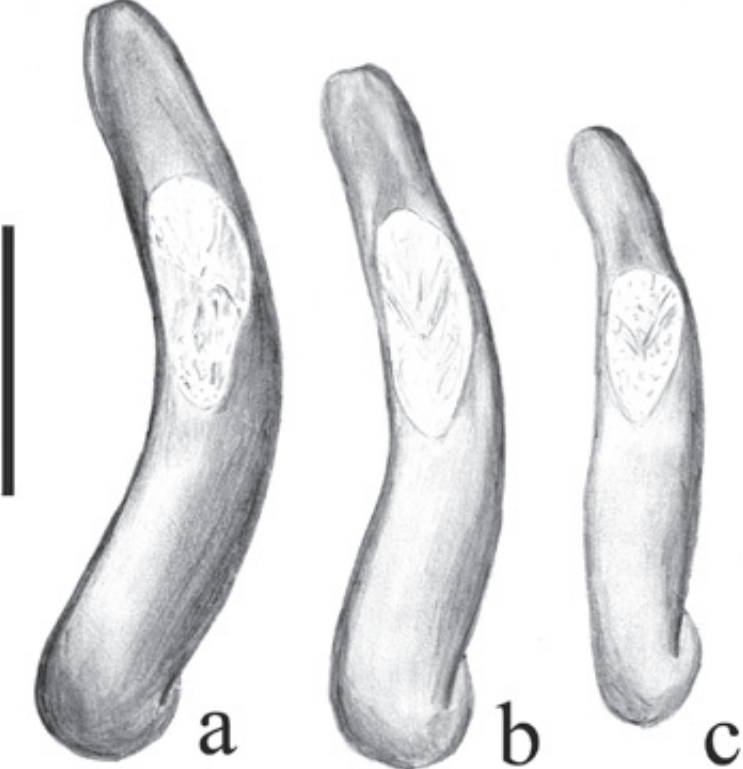


Fig. 3: Habitus of *Blennidus (Agraphoderus) pinguis* n. sp. [HT ♂] (a), *Blennidus orbicollis* (Straneo, 1993) [PT ♂] (b) and *Blennidus pseudolaevis* nom. nov. [HT ♂ of *Ogmopleura laevis* Straneo, 1993 (nec Straneo, 1951)] (c). Scale bar: 1 mm.

size, which is smaller in *B. pseudolaewis* ($L \leq 8$ mm) respect to *B. orbicollis* and *B. pinguis* sp. n. ($L > 8$ mm), and the elytral striae, the 1st to 5th markedly and equally impressed, with moderately convex intervals, in *B. pinguis* sp. n., whereas the 2nd to 5th nearly obsolete in the other species, with flat intervals (tab. 1).

The species of the '*B. orbicollis* group' are likely confined to the Andean territories of Northern Peru. In fact, *B. pseudolaewis* and *B. pinguis* sp. n. are recorded from the Dept. of Cajamarca and *B. orbicollis*, in spite of the lack of a precise type locality, probably originates from the same area.

***Blennidus (Agraphoderus) orbicollis* (Straneo, 1993)**

(Figs 1b, 2b, 3b)

Ogmopleura orbicollis Straneo, 1993: 392-393

Blennidus orbicollis (Straneo, 1993): LORENZ 2005a: 263

Blennidus orbicollis (Straneo, 1993): LORENZ 2005b: 709

Examined material: 1 PT ♂ and 1 PT ♀ (Allotype), Peru, Col. Weyrauch (CSt). The type series includes two further specimens (HT ♂ and 1 PT ♀), which were not examined and are deposited in the Collection of the Foundation 'Miguel Lillo', in Tucumán (Argentina).

Distribution: the locality reported on the labels of the examined specimens is generically 'Peru', but considering the restricted distribution area of most *Blennidus* species (Allegro & Giachino, 2011), it is likely that *B.(A.) orbicollis* inhabits the Andes in Northern Peru, similarly to the other species of this group.

***Blennidus (Agraphoderus) pseudolaewis* nom. nov.**

pro *B. laevis* (Straneo, 1993) (nec Straneo, 1951)

(Figs. 1c, 2c, 3c)

Ogmopleura laevis Straneo, 1993 (nec Straneo, 1951): 393-394

Blennidus laevis (Straneo, 1993) (nec Straneo, 1951): LORENZ 2005a: 263

Blennidus laevis (Straneo, 1993) (nec Straneo, 1951): LORENZ 2005b: 722

Examined material: HT ♂, Peru, Dept. Cajamarca, Perulillos, between Celendín and Cajamarca, VIII.1977, X. Bellés legit, and 1 PT ♀ (Allotype), Peru, Dept. Cajamarca, Lagunas, 18.VIII.1977, X. Bellés legit (CSt). No other specimens of this species have been recorded until now.

Distribution: at present knowledge, *B.(A.) pseudolaewis* is exclusively recorded from the Andes of the Dept. of Cajamarca, in Northern Peru.

Note: STRANEO (1951) described *Pachybaris laevis* from Sierra Nevada de Santa Marta (Colombia), later attributing this species to the genus *Sierrobis* (Straneo, 1985). The same Author successively described *Ogmopleura laevis* Straneo, 1993 from the Andes of Peru. As the synonymy of these all genera with *Blennidus* was stated (MORET 1995), *Blennidus laevis* (Straneo, 1993) became a secondary homonym of *Blennidus laevis* (Straneo, 1951) and therefore we propose for it the new name *Blennidus pseudolaewis*.

***Blennidus (Agraphoderus) pinguis* sp. n.**

(Figs 1a, 2a, 3a, 4)

Type locality: Peru, Cajamarca, Michiquillay, m 4050.

Note: probably this locality refers to the village of Minas Michiquillay, 57 Km far from Cajamarca on the route Cajamarca-Celendín, Northern Peru.

Type material. HT ♂, Peru, Cajamarca, Michiquillay, m 4050, 26.II.1994, M. Etonti leg. (CGi at Settore Fitosanitario Regionale, Regione Piemonte). PTT: 10 ♂♂ 8 ♀♀, same data as HT (CAI, CCA, CGi, CMA, CMO, MSNM, BMNH).

Etymology. The specific epithet refers to the stout, convex body.

Differential diagnosis. *B.(A.) pinguis* sp. n. is distinguished from the other species belonging to the '*orbicollis* species group' (*B.(A.) orbicollis* and *B.(A.) pseudolaewis* nom. nov.) by the markedly and equally impressed 1st to 5th elytral striae (the 2nd to 5th nearly obsolete in the other species), the convex elytral intervals (flat in the others), the pronotum more convex at base, the completely rounded or hardly evident posterior angles of pronotum (widely obtuse but evident in the others), the more curved apical median lobe of aedeagus in dorsal view (Table 1).

Description. Habitus as in Figs. 3a and 4. Overall length (L) of the HT ♂ 10.4 mm (PTT ♂♂ 9.2-10.4, ♀♀ 10.0-10.9 mm). Body stout and convex. Dorsal surface dark brown, moderately shiny both in ♂♂ and in ♀♀, with scarcely evident polygonal microsculpture, more evident on elytra. Antennae, legs and mouth parts brown. Brachypterous.

Head large, eyes markedly convex; temples short, as long as 1/3.5 of eyes. Clypeus bisetose, moderately concave at middle, posteriorly limited by a transverse line; labrum transverse, 6-setose. Frontal impressions

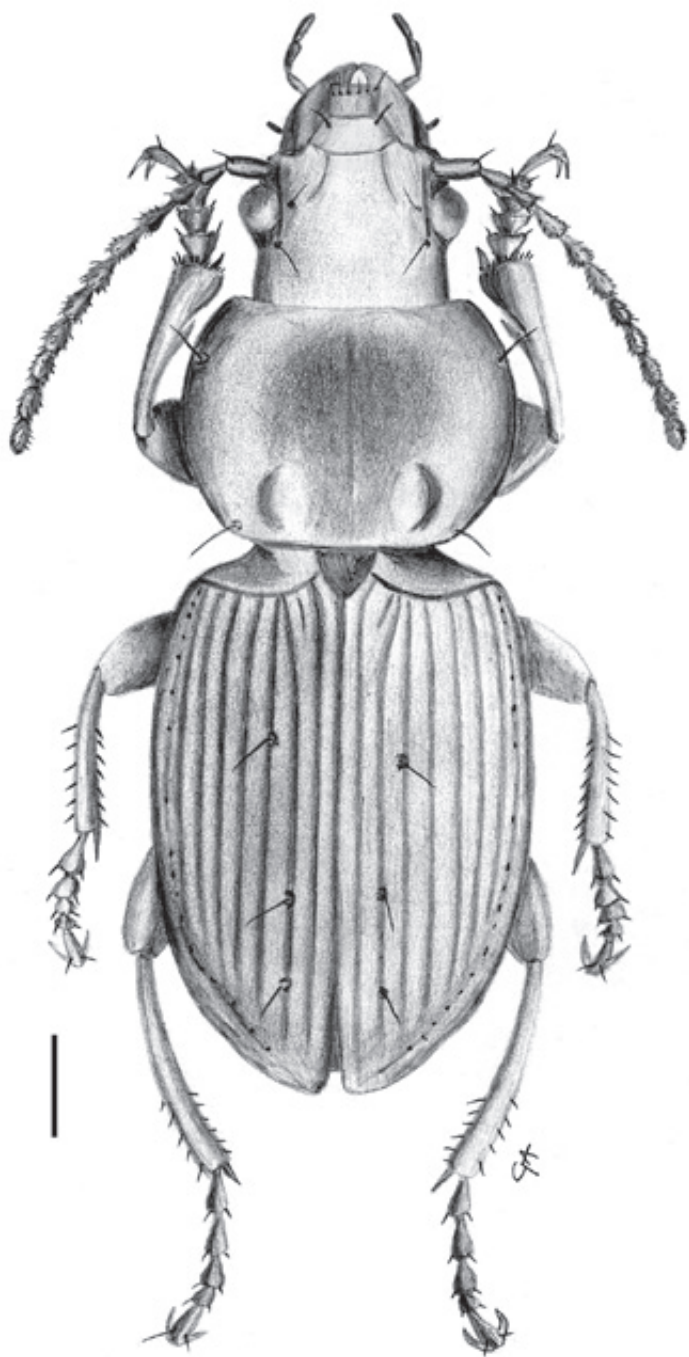


Fig. 4: Habitus of *Blennidus (Agraphoderus) pinguis* n. sp. Scale bar: 1 mm

well impressed and divergent towards eyes. Frons between eyes smooth and shiny, sometimes with a central puncture at middle in ♀♀. Terminal labial palpomere with thin and sparse hairs; penultimate palpomere bisetose and with a short apical seta. Median tooth of mentum prominent and deeply 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=1.4), convex. Microsculpture delicate on the whole surface, nearly absent on disk. One basal impression on each side, short, wide, superficial and impunctate. Mid longitudinal line superficial, hardly visible even between the submarginal sulci. Lateral margins rounded, narrowly bordered on overall length, and delicately sinuate just before the posterior angles. Anterior margin markedly concave, unbordered only at middle; the posterior bordered only at sides. Fore angles prominent; hind angles rounded or widely obtuse. Two lateral setae on each side, one at hind angles (not moved forwards) and one at about ¾ from base. Prosternal process glabrous, rounded and not margined at apex.

Elytra convex, short oval (length/width=1.4–1.5), subdepressed on disk and with marked apical declivity. Shoulders obtuse, without denticles. Scutellar stria very short and scarcely evident between striae 1 and 2. No setigerous punctures near base. Sides rounded and markedly sinuate near apex; lateral border narrow. Usually 3 setae on each elytra, the 1st at basal 4th and in the 3rd interval or on 3rd stria, the following adjoining the 2nd stria. Striae smooth, the 1st to 5th markedly and equally impressed, evident until apex, the following more superficial or nearly obsolete. Intervals moderately convex; 2nd interval as wide as 1st and narrower than 3rd.

Metepisterna short, a little longer than wide. Abdominal sterna IV–VI glabrous except for the pair of central setae; no transversal impressions nor punctures are evident at sides. Sternum VII with a pair of apical setae in males and 2 pairs in females.

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

Aedeagus long and slender (length 3 mm), with median lobe obtusely inserted on the basal bulb, in lateral view nearly straight, swollen at middle and distally very thin, with lateral edges of the blade bent downwards (fig. 1a); in dorsal view, the median lobe is parallel-sided, markedly and regularly arcuate towards left; apical blade long, parallel-sided, apically rounded and convex. Ostium in dorsal position, relatively short and small (fig. 2a). Left paramere in oval shape, the right one narrow, short and angularly bent at middle.

Distribution and ecology. At present *B.(A.) pinguis* sp. n. is only known from the type locality, the village of Minas Michiquillay, 57 Km far from Cajamarca, Northern Peru. The environment of the site of collection (4050 m a.s.l.) is probably an Andean grassland.

Table 1. Identification key for the *Blennidus* (*Agrophoderus*) species belonging to the ‘orbicollis species group’

1. Elytral striae 1st to 5th all equally impressed, with moderately convex intervals. Pronotum markedly convex even at base, with basal impressions wide and hind angles rounded or hardly evident. Larger size (L = 9.2–10.9 mm) *B. (Agrophoderus) pinguis* sp. n.
 - The 1st elytral stria more impressed than 2nd to 5th, which are more or less obsolete, with flat intervals. Pronotum only slightly convex at base, with linear basal impressions and posterior angles widely obtuse but always evident. Smaller size (L ≤ 9 mm) 2
2. Larger size (L = 8.5–9.0 mm). Body more convex. Umbilicate pores at sides of elytra widely interrupted at middle. Sides of pronotum linear or slightly convex just before hind angles. Sterna IV–VI with a series of evident punctures at sides. Aedeagus in dorsal vision markedly arcuate
 - *B. (Agrophoderus) orbicollis* (Straneo, 1993)
 - Smaller size (L = 7.5–8.0 mm). Body less convex. Umbilicate pores at sides of elytra only a little more sparse at middle. Sides of pronotum slightly sinuate just before hind angles. Sterna IV–VI without evident punctures at sides. Aedeagus in dorsal vision moderately arcuate
 - *B. (Agrophoderus) pseudolaevis* nom. nov.

Discussion

In addition to the *Blennidus* (*Agraphoderus*) species belonging to the 'orbicollis species group', only three others were recorded from Northern Peruvian Andes: *B. bellesi* (Straneo, 1993), *B. crassus* (Straneo, 1993) and *B. negrei* (Straneo, 1993). These ones do not belong, on account of their quite different morphology of male genitalia, to the 'orbicollis species group' and their relationships remain uncertain.

On the contrary, the species of the *orbicollis* group are probably closely related based on the uniform and peculiar aedeagal structure, which is almost unique and easily distinguished among all other *Blennidus* species. Probably this group of species, apparently spread in a restricted geographic area of Northern Peru, represents one of the several clades originated from the intense speciation pulse which involved the subgenus *Agraphoderus* on the Andes during the Pleistocene climatic cycles, when populations remained fragmented and isolated in high-altitude habitats due to the effects of climate and orographic barriers (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).

Basing on these considerations and on account of the scarcity of specific entomological exploration in wide areas of the Peruvian Andean territories, a high number of unknown *Blennidus* taxa are probably still awaiting for discovery and description.

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