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Taxonomy of the *Cryptopygus* complex. I. *Pauropygus* - a new worldwide littoral genus (Collembola, Isotomidae)

Mikhail Potapov[1,†], Yan Gao[2,‡], Louis Deharveng[3,§]

1 *Moscow State Pedagogical University, Kibalchich str., 6, korp. 5, Moscow, 129164 Russia* **2** *Institute of Plant Physiology & Ecology, Shanghai Institutes for Biological Sciences, Chinese Academy of Sciences, Shanghai 200032, China* **3** *UMR7205 CNRS, Origine, Structure et Evolution de la Biodiversité, Museum National d'Histoire Naturelle, 75005-Paris, France*

† *urn:lsid:zoobank.org:author:F4DE2C5B-EC73-4CD5-9766-BA7728A03C46*
‡ *urn:lsid:zoobank.org:author:8425853B-EC54-4D10-ABF3-933B09E0530E*
§ *urn:lsid:zoobank.org:author:E777E18C-47CB-4967-9634-6F93FD9741A7*

Corresponding author: *Louis Deharveng* (deharven@mnhn.fr)

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Abstract

In this paper, we describe the new genus *Pauropygus* **gen. n.** which includes three minute species, blind and unpigmented, living in interstitial littoral habitats in tropical or subtropical countries. Two of these species are new to science (type species *P. projectus* **sp. n.** from New Caledonia and *P. pacificus* **sp. n.** from China); the third one, originally described in the genus *Cryptopygus* (*C. caussaneli* Thibaud, 1996), has a larger pantropical distribution. We synonymize here *Cryptopygus riebi* Barra, 1997 from South Africa with *Pauropygus caussaneli*. Two paratypes of the Mexican species *Cryptopygus axayacatl* Palacios & Thibaud, 2001 turned also to be *P. caussaneli*, while the holotype and remaining paratypes of this species support its placement in *Proisotomodes*. Among the *Cryptopygus* complex, *Pauropygus* gen. n. is easily recognized by characters of mouthparts (presence of two large projections on pleural fold, basolateral field with 6 chaetae, modified mouthparts) and reduced sensillar chaetotaxy (tergal sensilla 2-3,0-1/0-1,0-1,1-2,1-2,1-3, microsensilla reduced in number: 00/0-100, with sensilla situated in p-row on the abdomen). Small size, absence of eyes and pigment are also shared by all its species. The three species belonging to the genus differ by sensillar chaetotaxy.

Keywords
New genus, modified mouthparts, sensillar chaetotaxy, littoral habitat

Introduction

The species of the subfamily Anurophorinae with furca and two last abdominal segments fused are widely distributed in the world. If special remarkable detail had not been found in such species, they were usually assigned to genera *Isotomina* Börner, 1903 (mostly in Northern Hemisphere) or *Cryptopygus* Willem, 1902 (mostly in Southern Hemisphere). In the course of the development of taxonomy in the family Isotomidae the question of division of these two artificial taxa became important. So far *Isotomina*, *Cryptopygus* and several formally similar genera have been given some discussions and historical reviews (Deharveng 1981; Potapov 2001; Rusek 2002; Deharveng et al. 2005; Potapov et al. 2009, Jordana et al. 2009). Most forms, however, of this so-called "*Cryptopygus* complex" did not find their final generic position and therefore even modern monographs and catalogues continue to use *Cryptopygus* in a wide sense (Fjellberg 2007; Danyi & Traser 2008; Furuno et al. 2000, and others). At convenience, we accept the traditional understanding of the complex - it means Abd.V and VI fused (vs. separated in *Proisotoma* complex). We believe that fusion/separation of Abd.V and VI is really a convenient feature to separate these two large groups of taxa of which the latter one is more common in Northern Hemisphere while the former mostly occupies Southern Hemisphere. In the present paper, we describe a new genus for three species, two of which are new to science and share several remarkable morphological modifications that are probably adaptations to interstitial seashore habitats.

Abbreviations used in the descriptions

AIIIO apical organ of the third antennal segment, Abd. abdominal segment, Ant. antennal segment, Th. thoracic segment, Ti. tibiotarsus, U. unguis, VT ventral tube

Taxonomy

***Pauropygus* gen. n.**
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http://species-id.net/wiki/Pauropygus

Type species: *Pauropygus projectus* sp. n.

Diagnosis. Blind small-sized Anurophorinae with two last abdominal segment fused, modified mouthparts including remarkably modified pleural fold, and first segments of antenna set together on frontal part of head.

Description. Without pigment and eyes, Abd.V and VI fused. Body size small, with primary granulation only. Antennal bases set close together on frontal side of the head, almost touching each other (Figs 1, 2). Sensilla on three first antennal segments thickened. Sensilla of Ant.IV moderately thickened. Maxillary palp simple, with 3 sublobal hairs set together (Fig. 3). Pleural fold with two high projections (Figs 3, 20, 23). Basolateral field of the labium with 6 chaetae (Fig. 20). Labium with three papilla projected forward, number of guards not reduced. Papillate sensilla reduced in size. Labrum swollen in central part, labral chaetae set on wide papilla. Two prelabral chaetae. Maxillary head with four enlarged lamellae, three of them ciliated; claw reduced to small finger-like process, not dentate. Mandible head reduced and thin, molar plate with 2 strong basal teeth. Tergal sensilla on abdomen situated in p-row of chaetae, their number reduced (2-3,0-1/0-1,0-1,1-2,1-2,1-3, depending on species), number of microsensilla 00/100 or 00/000 (Figs 8, 15, 21). Th.I-III without ventral chaetae. Body macrochaetae differentiated. Tibiotarsal tenent chaetae present (1-2-2), not clavate. VT with 4+4 laterodistal chaetae. Tenaculum with 4+4 teeth. Furca slender, manubrium with a pair of chaetae on anterior side, dens with crenulation and wide swelling on posterior side, mucro bidentate.

Name derivation. The name is derived from the Greek suffix –pygus which points to the fusion of the abdominal segments and from the Greek prefix pauro- which refers to the reduced chaetotaxy, particularly reduced number of sensilla on the body.

Representatives. Apart from the type species *Pauropygus projectus* sp. n., the new genus includes *Cryptopygus caussaneli* Thibaud, 1996 and *Pauropygus pacificus* sp. n.

Affinity. The new genus is established mainly due to the unusual position of antennae on head and the strongly modified mouthparts. In mouthparts, the V-shaped pleural folds and the presence of 6 chaetae on basolateral fields of the labium are especially important; these characters were never seen in the family before, except for the latter one that was mentioned for part of the Algerian population of *Isotominella geophila* sensu Jordana et al., 2009; normally, the pleural fold looks like a weak swelling proximal to the maxillary outer lobe, and basolateral field of mouth cone has 5 chaetae in species of the Isotomidae family (Fjellberg 1984, 1999). Other modifications of mouthparts, like swollen labrum, unequal labial papilla, reduced plate of outer lobe of maxilla, are more common features. The sixth chaeta of basolateral field has unclear derivation; since it has weaker socket than the other five, it is probably one of the sublobal hairs which has migrated from the sublobal plate to more posterior area of head and grouped together with basolateral chaetae. Together with two finger-like extensions of pleural folds this chaeta probably makes lateral parts of head more functionally important. The projected position of antennae and modified mouthparts are probably adaptations to an interstitial life between small sand grains on the beach and to feeding on particles suspended in water. Projections on different parts of body are well known among species living in contact with salt water in genera *Archisotoma* Linnaniemi, 1912*, Anuridella* Willem, 1906*, Xenylla* Tullberg, 1869*, Hypogastrura* Bourlet, 1839*, Friesea* Dalla Torre, 1895, and others.

As an unusual feature for the group, the species of the new genus show considerable reduction of sensillar chaetom. In *Pauropygus projectus* sp. n. all medial

sensilla on Th.II-Abd.IV and lateral sensilla on Th.III-Abd.II are lost, while in *P. caussaneli* and *P. pacificus* sp. n. it is the posterior and lateral parts of body that lost sensilla. In spite of differences between number of sensilla on body (2,0/0,0,1,1,3) and (3,1/1,1,2,2,3) among *Pauropygus* species, the general pattern of their distribution and differentiation is kept.

Pauropygus is closely related to *Isotominella* Delamare Deboutteville, 1948 after the redescription of Jordana et al. (2009). The identity of the type specimens of *Isotominella geophila* Delamare Deboutteville, 1948 (Ivory Coast) which were not seen by Jordana and specimens from Algeria on which the redefinition was based remains somewhat doubtful. The two genera share simple maxillary palp, two prelabral chaetae, posterior position of sensilla on tergites, and general appearance of furca. Other shared characters (blindness, absence of foil chaetae, sensillar equipment of antennae, microsensillar set 10/100) are less significant. Apart from the two characters mentioned above, *Pauropygus* sp. n. differs from *Isotominella* in more differentiated tibiotarsal chaetotaxy (presence of tenent and spiny chaetae), shape of PAO (flat and broad vs. oval), number of sublobal hairs and e-guards (3 vs. 2, and 7 vs. 5, respectively). *Isotominella* also has a rather common set of sensilla on body (33/22223) while it is reduced in *Pauropygus.* At last, the new genus is strictly restricted to seashore sands, while *Isotominella geophila* prefers soil. We also examined specimens of *Isotominella geophila* from Algeria kindly provided for us by Jordana and surprisingly concluded that females and males also differ in antennae on head which are positioned almost like in *Pauropygus* in males and set apart in females. The crenulation of basal part of dens was stressed by both Delamare Deboutteville (1948) and Jordana et al. (2009) as one, if not the main diagnostic characters of the genus *Isotominella*. We consider that this character is of low taxonomical value since it strongly depends on mounting of the animal on slide. We have also seen other specimens of *Isotominella* from Eurasia (Ukraine and China). They did not show the dimorphism of Algerian populations and represent at least one more species of the genus. The comparison of *Pauropygus* gen. n. with other genera of the *Cryptopygus* complex is given below.

***Pauropygus projectus* sp. n.**

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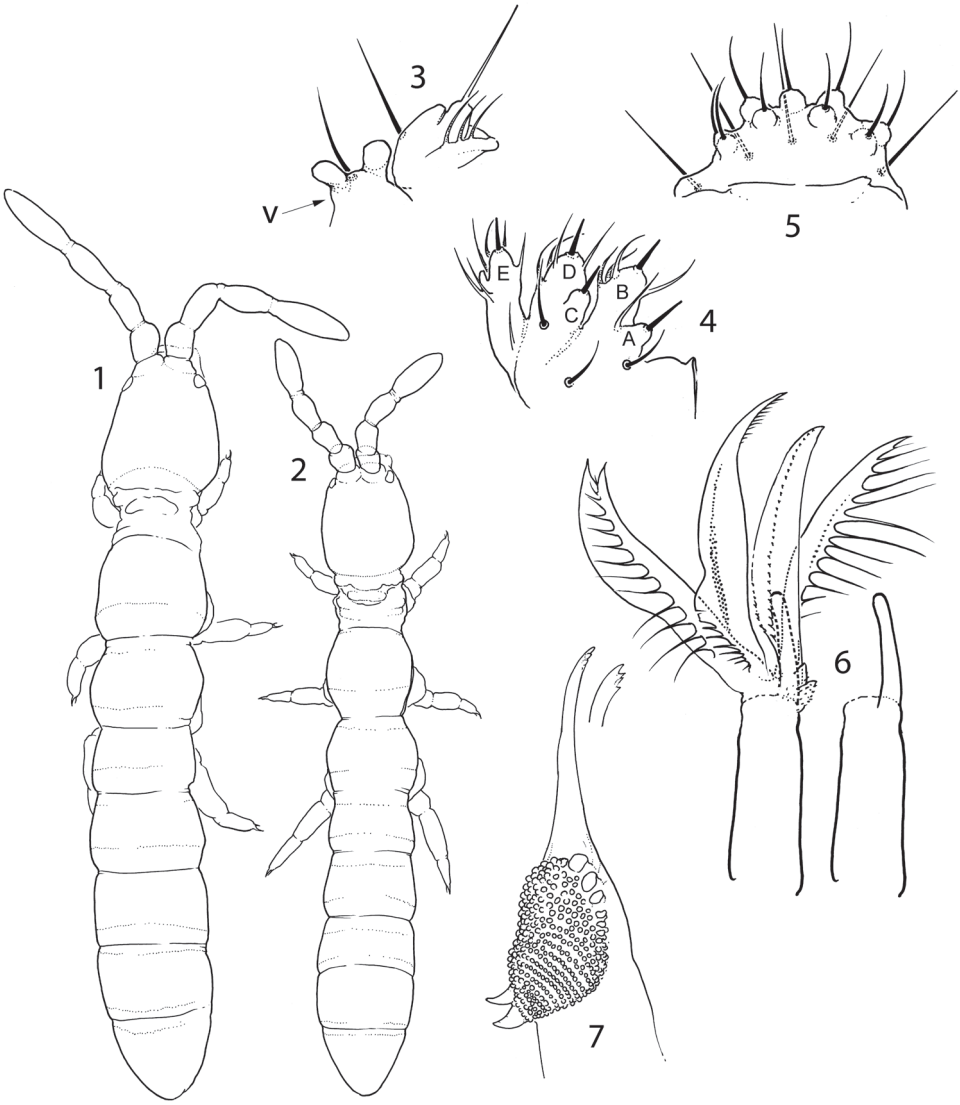
http://species-id.net/wiki/Pauropygus_projectus
Figs 1, 3–14

Material. Holotype female on slide and 13 paratypes (6 on slides, 7 in alcohol): New Caledonia: Iles Loyautés: Ouvéa island: Gossanah: plage de Hoony, collected by flotation from beach sand, 13.11.2000 (sample # NC00-252), leg L. Deharveng & A. Bedos. Coordinates: 166.632°E, -20.4365°S. Material is deposited in Museum National d'Histoire Naturelle, Paris (holotype and 9 paratypes, no male) and in Moscow State Pedagogical University (4 paratypes, including one adult male).

Other material. New Caledonia: Iles Loyautés: Tiga island: Toka village, collected by flotation from beach sand, 31.10.2000 (sample # NC00-145: two on slides;



Figures 1–7. *Pauropygus projectus* sp. n. (**1, 3–7**) and *P. caussaneli* (**2**). **1–2** general habitus (dorsally) **3** maxillary outer lobe and pleural fold (v: v-shaped process.) **4** labial palp **5** labrum **6** maxillary head (on right, basal part and claw shown) **7** mandible.

sample # NC00-146: one on slide), leg L. Deharveng & A. Bedos. Coordinates: 167.795704°E, -21.098038°S.

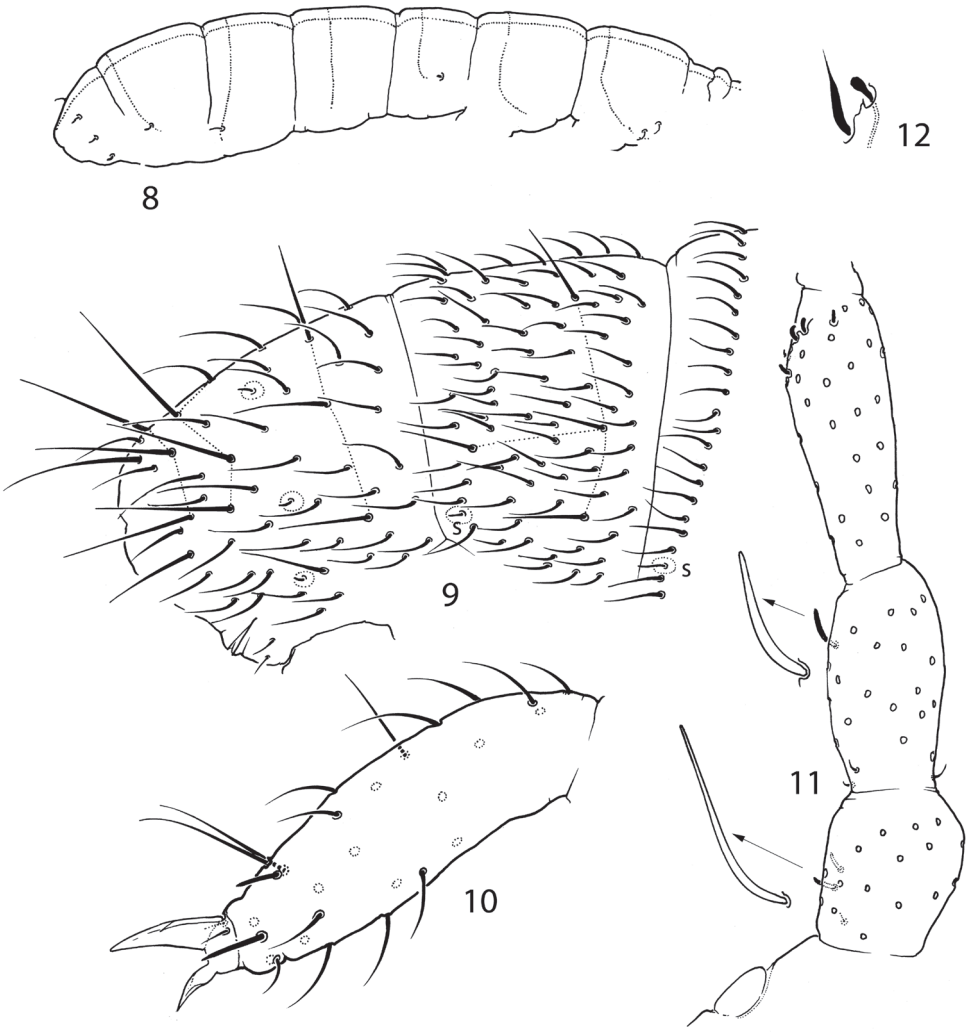
Description. Size 0.5–0.6 mm. White, without eyes. Cuticle with thin hardly visible primary hexagonal granulation ("smooth"). PAO flat, roundish, not constricted, about 1.5 as long as inner edge of U.III and shorter than width of Ant.I (Fig. 11). Sublobal plate of maxillary outer lobe small with 3 hairs grouped together, palp simple.

Pleural fold with one chaeta (as common for the family) and two high projections (Fig. 3). Labral chaetotaxy as 2/554, middle part of labrum swollen, chaetae in two apical rows set on wide papillae, edge of labrum weakly developed (Fig. 5). Labium with 3 proximal, 6 basolateral and 4 basomedian chaetae and a complete set of papillae (A-E) and guards (16). Papillae B, D and E projected considerably forward, papillae A and C partly reduced and fused with B and D, respectively (Fig. 4). Ventral side of head with 6-7+6-7 postlabial chaetae. Ventrolateral chaetae of head and postlabial chaetae delimit an almost unbroken unsetaceous area. Maxillary head elongated, with four well visible enlarged lamellae of which two have long cilia and two have fine serration. Two remaining lamellae possibly as small weakly serrated projections set in a common cluster at base of claw (Fig. 6). Maxillary claw reduced, single-tipped, finger-shaped, with some weak teeth at the head which are visible in lateral view only (not shown on figure). *Pars incisiva* of mandible slender, apically with four weak teeth, basal part of *pars molaris* with two strong hooks (Fig. 7).

Ant.I with many chaetae (more than 20), 1 ventro-basal microchaeta (bms; dorsal bms not differentiated), and 2 thick ventral sensilla (s). Ant.II with 3 rather large bms and 1 thick laterodistal s. Ant.III without bms and with 5 distal s of which two inner as thick and short as outer ones. Male antennal "spurs" unknown. Sensilla on Ant.IV weakly differentiated, as common for the family, subapical organite pin-like and small, subapical microsensillum short and curved (Figs 11, 12).

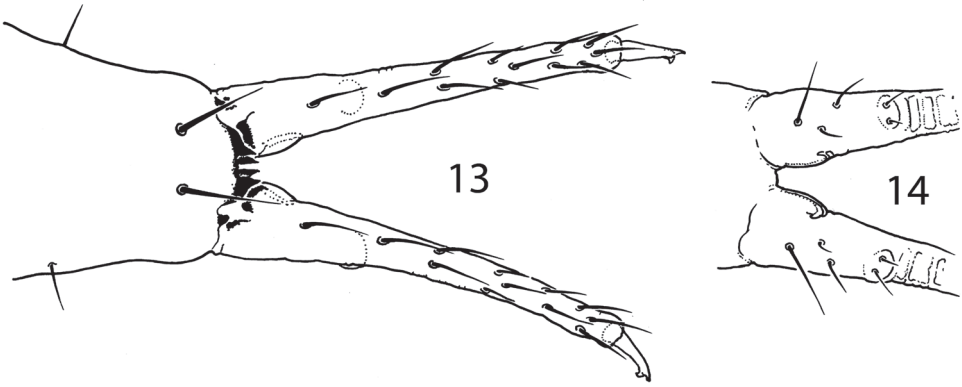
Dorsal axial chaetom of Th.II–Abd.III as 12-13,7-9/5(4),5(4),5(4). Macrochaetae erect, smooth and rather long, more differentiated laterally on Th.II–III and on posterior half of abdomen, with the whole number as 1,1/3,3,3,4 (Th.II-Abd.IV). Medial macrochaetae on Abd.V about 0.4 as long as dens. Sensilla on tergites clearly differentiated, significantly shorter and slightly thinner than ordinary chaetae. Sensillar formula 20/00113 (s), 00/100 (ms) (Fig. 8). Lateral sensilla on Abd.III, IV in posterior position. Sensilla on Th.II and Abd.III much longer than on Abd.V, sensilla on Abd. IV of medium size (Fig. 9).

Unguis of normal shape, without inner tooth, two lateral teeth forming a weak tunica partly covering dorsal edge of unguis (Fig. 10). Upper subcoxa of Leg I-III with 1,1,4 chaetae, lower subcoxa with 1,10,11 (one individual studied). Ti.I-III with basic set of chaetae (21-22, 22-23, 28), T-chaetae absent. Chaetae on tibiotarsi with irregular distribution, outer side with higher number of chaetae than inner side. Chaetae C7 (inner part of tibiotarsi) either lost or migrated laterally. Modification of chaetae x and B5 on Ti.III in males unknown (no males). Distal tibiotarsal tenent chaetae on Ti.I-III (1-2-2) well developed, not clavate, about 1.5 as long as U.III. Each tibiotarsus with one (sometimes two on Leg II) additional tenent chaeta at middle part. Ti.III with two stick-like chaetae (A6, A7) in distal ring. Ti.I,II with similar thickened chaetae but much less developed. One or two inner chaetae of distal ring of Ti.I-III shorter than others. Three chaetae of distal ring A (two tenent chaetae and one nearby) set apart from distal edge of tibiotarsus, unlike other chaetae of the ring (Fig. 10). Pretarsus with two chaetae, inner one shorter. Ventral tube with 4+4 laterodistal and 2 posterior chaetae. Tenaculum with 4+4 teeth and 1 chaeta. Anterior furcal subcoxa with 13–15



Figures 8–12. *Pauropygus projectus* sp. n. **8** sensillar chaetotaxy **9** posterior part of abdomen (s – sensillum) **10** distal half of Leg III **11** PAO and Ant.I-III, dorsal view **12** subapical organite and microchaeta.

chaetae, posterior with 6-7. Furca of medium size. Anterior side of manubrium with a pair of distal chaetae, posterior one with 8+8 chaetae on the main part and 3+3 on the laterobasal lobes (one individual studied). Manubrial thickening with a pair of additional inner teeth. Lateral parts of manubrium with 1+1 chaetae. Dens slender, anteriorly with 12 (more rarely 11) chaetae. Posterior side of dens slightly crenulated in the medial part, with 5 chaetae of which 3 basal and 2 at the medial part (short inner and long outer) set together on wide papillum. Mucro slender with two teeth of which the subapical one is larger, lamellae not differentiated (Figs 13, 14). Ratio of manubrium : dens : mucro = 2.8–3.4 : 4.5–4.6 : 1. Anal lobes without microchaetae.



Figures 13–14. *Pauropygus projectus* sp. n. anterior (**13**) and posterior (**14**, part) sides of furca.

Affinity. *Pauropygus projectus* sp. n. differs from *P. caussaneli* in number of sensilla on body (20/00113 vs. 31/11221, see also the genus affinity section), relative size of inner and outer sensilla in AIIIO (outer ones smaller than inner ones in *P. caussaneli*), number of posterior chaetae on ventral tube (2 vs. 4), serrated chaetae on upper and lower subcoxae (smooth in *P. caussaneli*), more differentiated chaetal equipment of legs. Besides, *P. projectus* sp. n. is larger in size, which may explain higher number of chaetae on Ant.I, parts of legs, axial group of tergites and postlabial area than in *P. caussaneli* (see descriptions for details).

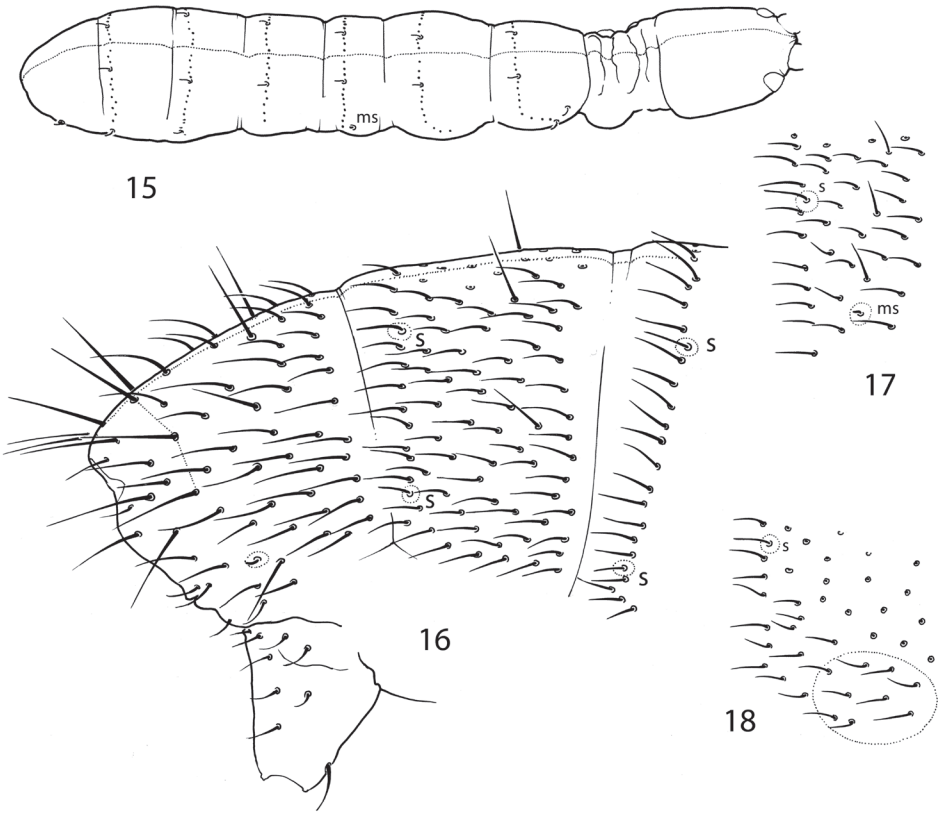
Name derivation. The species has well developed "projections" on the body as: swollen labrum, v-shaped pleural folds, extended labial palp, and antennae projected ahead.

Distribution. Only from Loyalty Islands in New Caledonia.

***Pauropygus caussaneli* (Thibaud, 1996), comb. n.**
http://species-id.net/wiki/Pauropygus_caussaneli

Cryptopygus caussaneli Thibaud, 1996
Cryptopygus riebi Barra, 1997 n.syn.
Figs 2, 15–20

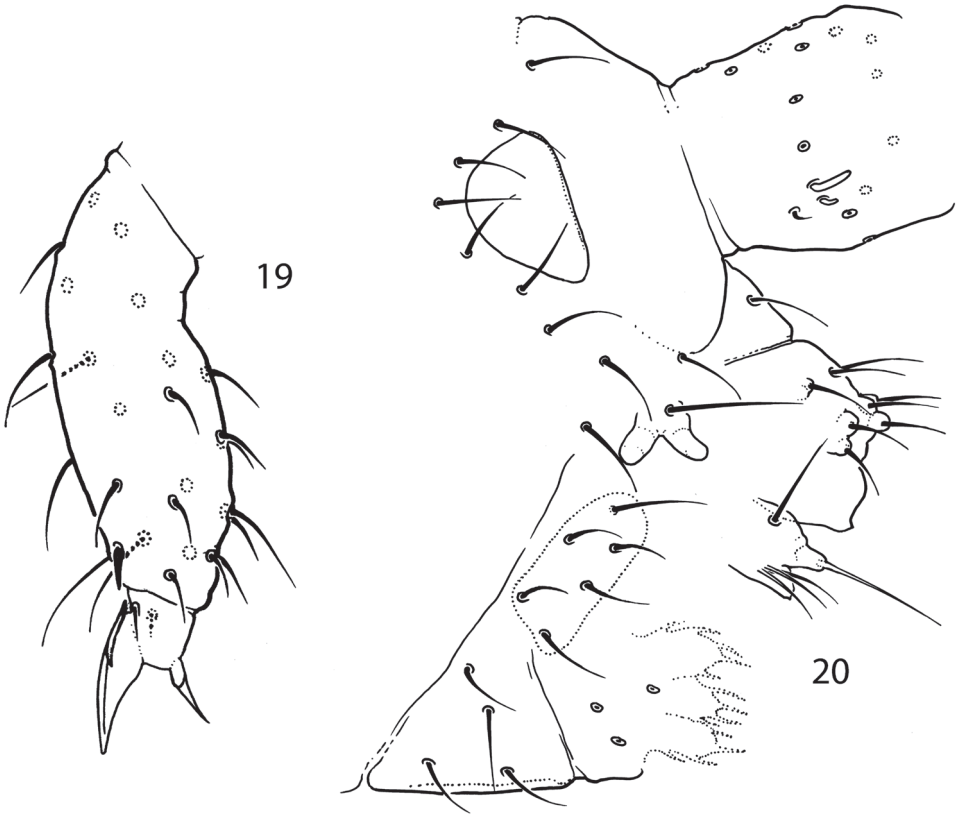
Material. Holotype and paratypes of *Cryptopygus caussaneli*: Mauritania (Aftout-es-Sahel); holotype and paratypes of *Cryptopygus riebi:* South Africa (Sodwana Bay, Natal Province); two paratypes of *Cryptopygus axayacatl* Palacios-Vargas & Thibaud, 2001: Mexico (Guerrero, Acapulco); material of J.-M.Thibaud identified by him as *C. caussaneli* from Senegal, Morocco, Congo, Madagascar, Maurice and Mayotte Islands. More precise labels in the associated publications (Palacios-Vargas & Thibaud, 2001; Thibaud & Ndiaye, 2006; Thibaud & Boumezzough, 2006; Thibaud, 2008). All specimens are kept in the Museum national d'Histoire naturelle of Paris (France).



Figures 15–18. *Pauropygus caussaneli.* **15** sensillar chaetotaxy **16** posterior part of abdomen **17** lateral part of Abd.I **18** lateral part of Th.III. s sensillum, ms microsensillum.

Redescription. White, without eyes. Size up to 0.4 mm. Cuticle smooth. PAO about 1,9 as long as inner edge of U.III and shorter (0.7) than width of Ant.I. Outer (Fig. 20) and inner mouthparts principally as in *P. projectus*. Ventral side of head with 5+5 postlabial chaetae. Ant.I with 14-15 chaetae, 1 ventro-basal microchaeta (bms; dorsal bms not differentiated), and 2 thick ventral sensilla (s), short and long. Ant.II with 3 bms and 1 thick laterodistal s. Ant.III without bms and with 5 distal s of which two inner thicker and longer than outer ones. Male antennal "spurs" present on Ant. II, III and basal part of Ant.IV.

Dorsal axial chaetom of Th.II–Abd.III as 10,6/4,4(3),4(3). Thorax without ventral chaetae. Macrochaetae smooth, with the whole number as 1(2),1(2)/3,3,3,4 (Th.II-Abd.IV). Medial macrochaetae on Th.II-Abd.III hardly differentiated. Medial macrochaetae on Abd.V about 0.4 as long as dens. All sensilla of thorax and medial sensilla of abdomen nearly as long as ordinary chaetae and hardly visible, lateral sensilla on Abd. III-V shorter than ordinary chaetae. Microsensilla short but well visible. Sensillar formula 31/11221 (s), 00/100 (ms) (Fig. 15-18). Sensilla in posterior position. (Fig. 16).



Figures 19–20. *Pauropygus caussaneli*. **19** distal half of Leg III **20** anterior part of head, lateral view (group of basolateral chaetae marked).

Unguis of normal shape, without inner tooth, two broad unequal lateral teeth. Upper subcoxa of Leg I-III with 1,1,4 chaetae, lower subcoxa with 1,6-7,7-8. Ti.I-III with one chaeta lost in basic set (20, 21, >25). Chaetae x and B5 on Ti.III in males unmodified. Distal tibiotarsal tenent chaetae on Ti.I-III (1-2-2) well developed, not clavate, about 1.1-1.2 as long as U.III. Each tibiotarsus with one additional tenent chaeta at middle part. Ti.III with one stick-like chaetae (A7) in distal ring, its shape slightly varies (Fig. 19). Tenent hairs (1,2,2) about 1.1–1.2 as long as U.III (Fig. 19). Pretarsus with two chaetae. Ventral tube with 4+4 laterodistal and 4 posterior chaetae in one transversal row. Tenaculum with 4+4 teeth and 1 chaeta. Anterior furcal subcoxa with 12–15 chaetae, posterior with 6 ones. Manubrium principally as in previous species. Dens slender, anteriorly normally with 11 chaetae. Posterior side of dens slightly crenulated in the medial part, with 5 chaetae of which 3 basal and 2 at the medial part (short inner and long outer) set together on low papillum. Mucro slender with two teeth of unequal size. Ratio of manubrium : dens : mucro = 3.2–3.6 : 4.1–4.3 : 1. Anal lobes without microchaetae.

Affinity. See above for differences with *Pauropygus projectus* sp. n. After our study of type material of *C. riebi* (South Africa) and two paratypes of *C. axayacatl* (Mexico) we concluded that these species only complement the wide distribution area of *P. caussaneli*. Holotype and other paratypes of *C. axayacatl* support its species status, but in the genus *Proisotomodes.*

Distribution. Probably widely distributed on sandy seashores of tropics and subtropics. Recorded from the coast of Indian and Atlantic Oceans (Africa, Central America).

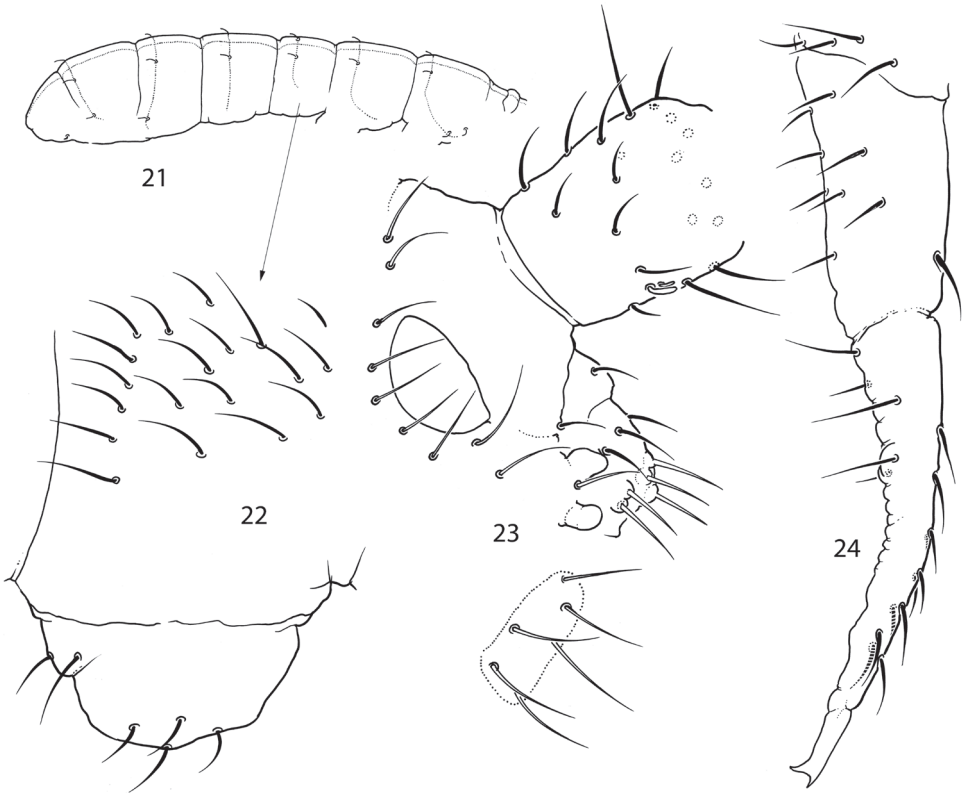
***Pauropygus pacificus* sp. n.**
urn:lsid:zoobank.org:act:AA6C41A0-CEAE-4961-B9EB-CC8AAB3B813C
http://species-id.net/wiki/Pauropygus_pacificus
Figs 21–24

Material. Holotype: China, Shandong Province, Yantey City, sea coast near Tuchengzi Hills, sandy beach, collected by flotation of thin sand under sparse vegetation on dunes, 22.04.2011, leg. Huang C.-W., Luan Y., and Potapov M.B.; 3 paratypes: at the same place; 2 paratypes: China, Hainan, western coast, nearby Changhua town and ca 5 km NE from the town, in both locations by flotation of sand with plant roots in dunes of sea coast, leg. Bu Y., Huang C.-W., Kuznetsova N.A., Potapov M.B. 06.04.2011. Material is deposited in Institute of Plant Physiology & Ecology, Shanghai (holotype and two paratypes) and in Moscow State Pedagogical University (three paratypes).

Description. Size about 0.4 mm. White, without eyes. Cuticle smooth. PAO about 1.7 as long as inner edge of U.III and somewhat shorter (0.8-0.9) than width of Ant.I. Outer (Fig. 23) and inner mouthparts principally as in *P. caussaneli*. Ventral side of head with 5+5 postlabial chaetae. Ant.I with about 18 chaetae, 1 ventro-basal (bms) microchaeta (dorsal bms not differentiated), and 2 thick ventral sensilla (s), short and long. Ant.II with 3 bms and 1 thick laterodistal s. Ant.III without bms and with 5 distal s of which two inner thicker and longer than outer ones. Male antennal "spurs" present.

Thorax without ventral chaetae. Dorsal macrochaetae smooth, weakly differentiated, as 3,3,3,4 on Abd.I-IV. Medial macrochaetae on Abd.V about 0.4 as long as dens. All sensilla of thorax and medial sensilla of abdomen nearly as long as ordinary chaetae and hardly visible, lateral sensilla on Abd.III-V shorter than ordinary chaetae. Microsensilla absent. Sensillar formula 31/11221 (s), 00/000 (ms) (Fig. 21). Sensilla in posterior position. Microsensilla on Abd.I absent (Fig.22).

Unguis of normal shape, without inner tooth, two broad unequal lateral teeth. Upper subcoxa of Leg I-III with 1,1,4 chaetae, lower subcoxa with 1,6-7,7-8. Ti.I–III with 20, 21, >25 chaetae. Distal tibiotarsal tenent chaetae on Ti.I–III (1-2-2) well developed, not clavate, about 1.1-1.2 as long as U.III. Each tibiotarsus with one additional tenent chaeta at middle part. Ti.III with one stick-like chaetae (A7) in distal ring. Tenent hairs (1,2,2) slightly longer than U.III. Pretarsus with two chaetae.



Figures 21–24. *Pauropygus pacificus* sp. n. **21** sensillar chaetotaxy **22** lateral part of Abd.I **23** anterior part of head, lateral view (group of basolateral chaetae marked, outer maxillary lobe and labial palp not shown) **24** furca, lateral view.

Ventral tube with 4+4 laterodistal and 4 posterior chaetae in one transversal row. Tenaculum with 4+4 teeth and 1 chaeta. Anterior furcal subcoxa with 12-14 chaetae, posterior with 6 ones (rarely 5). Manubrium principally as in previous species. Dens slender, anteriorly with 10-12 chaetae. Posterior side of dens slightly crenulated in the medial part, with 5 chaetae of which 3 basal and 2 at the medial part (short inner and long outer) set together on low papillum. Mucro slender with two teeth of unequal size (Fig. 24). Ratio of manubrium : dens : mucro = 3.7–3.8 : 4.0–5.0 : 1. Anal lobes without microchaetae.

Affinity. The complete absence of microsensilla on body of *Pauropygus pacificus* sp. n. is the second reported case among Isotomidae (so far only known in *Proisotoma minima*). This peculiarity remains the only difference between *P. pacificus* sp. n. and *P. caussaneli*. Taking into consideration also the different distribution ranges of these species we prefer to consider them as two independent species.

Name derivation. The species is probably distributed in the sands all over the Pacific coast of China.

Distribution. Known from two distant localities on Pacific coast of China.

Taxonomical remarks on genera similar to *Pauropygus*

Examination of numerous species of the *Cryptopygus* complex revealed that six genera of this complex share the posterior position of sensilla on the three first abdominal segments. Like in other taxa of Isotomidae, as for instance in *Proisotoma* complex (Potapov et al., 2006) and in species groups of *Folsomia* (Grow & Christiansen, 1976; Deharveng, 1979), the position of medial sensilla on abdominal tergites (within or well in front of posterior row of chaetae) is taxonomically very relevant at supraspecific level. The posterior position of sensilla is shared by several genera of the *Cryptopygus* complex and not necessarily indicates close relationships, but rather might be a result of convergent evolution. It is for instance the case in the genus *Micrisotoma* Bellinger, 1952 which also belongs to *Cryptopygus* complex and shows relationships with *Hemisotoma* Bagnall, 1949 in which sensilla are in mid-tergal position (type species *Isotomina thermophila*).

To figure out the relation between these genera, we propose below a key to the genera of the *Cryptopygus* complex with posterior position of sensilla on three first abdominal segments. *Pauropygus projectus* sp. n. lost posterior sensilla and can be identified by pleural fold; the loss of mentioned sensilla is probably shared with several species of *Arlea* but descriptions do not give information on these characters. The position of the odd genus *Appendisotoma* is not fully decided: six species studied by us (*A. abiskoensis* (Agrell), *A. bisetosa* Martynova (types), *A. sibirica* Stebaeva (types), and three species from Far East Russia and North America) have 11 apical chaetae on tibiotarsi while other four (*A. stebayevae* (Grinbergs), *A. montana* (Martynova), *A. juliannae* (Traser et al.), and one species from Kazakhstan) show common set for the subfamily (7 chaetae). We include the genus *Appendisotoma* in the key since it formally matches the diagnosis of *Cryptopygus* complex.

Key to genera of *Cryptopygus* complex with sensilla in posterior position on body tergites

1 At least 6+6 ommatidia on head. Sensilla on abdomen subequal, Abd.I - III and Abd.IV often with more than 3 and 4 sensilla on each side, respectively (Figs 25–26). Usually dark coloured ..... ***Appendisotoma* Stach, 1947**

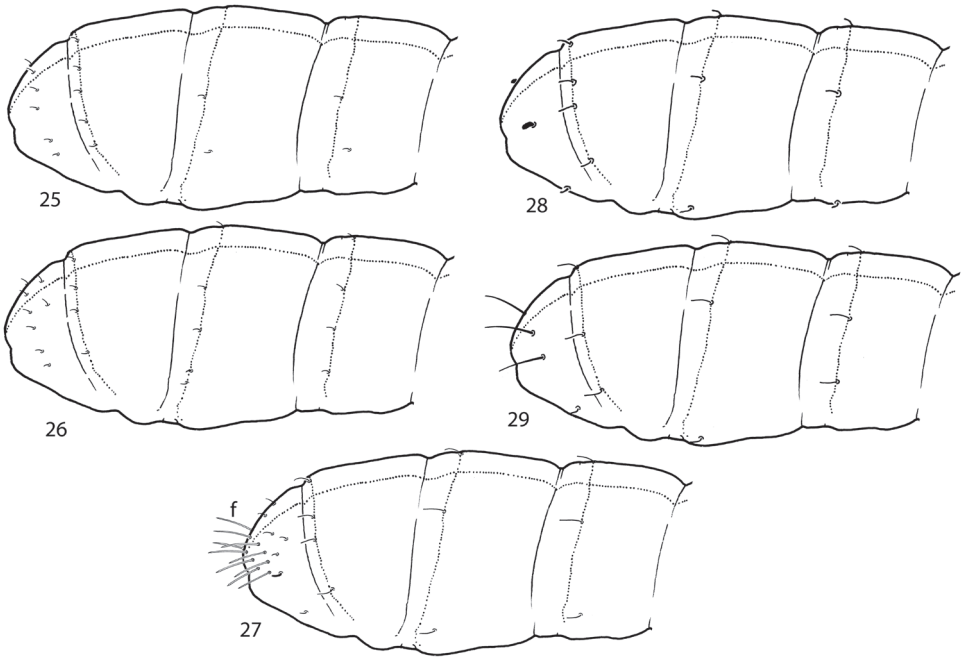
– Usually blind, at most 2+2 ommatidia on head. Sensilla at the end of abdomen differentiated, Abd.I - III with no more than 2 sensilla on each side (Figs 27–29). White **2**

2 Mucro falciform ..... ***Arlea* Womersley, 1939**

– Mucro bidentate **3**

3 PAO complex, with lobes. Well-marked cylindrical foil-chaetae at the end of abdomen. Anterior medial sensilla on Abd.V present (Fig. 27) .... ***Micrisotoma* Bellinger, 1952**

– PAO simple. Without foil-chaetae at the end of abdomen. Anterior medial sensilla on Abd.V absent (Figs 8, 28, 29) **4**



Figures 25–29. Sensillar chaetotaxy of genera of *Cryptopygus* complex with abdominal sensilla in posterior position. **25** *Appendisotoma bisetosa* Martynova, 1969 **26** *A. abiskoensis* (Agrell, 1939) **27** *Micrisotoma achromata* Bellinger, 1952 **28** *Proisotomodes bipunctatus* (Axelson, 1903) **29** *Isotominella geophila* Delamare Deboutteville, 1948. f foil chaetae.

4 Pleural fold on mouth cone with two finger-like processes (Fig. 20) .... ***Pauropygus*** **gen. n.**

– Pleural fold without such processes **5**

5 Abd.IV with 3 sensilla on each side. Dorsal part of Abd.V with a pair of leaf-like sensilla (Fig. 28) ..... ***Proisotomodes*** **Bagnall, 1949**

– Abd.IV with 2 sensilla on each side. Dorsal part of Abd.V with two pairs of long and slender sensilla (Fig. 29) ..... ***Isotominella*** **Delamare Deboutteville, 1948**

The key is based on examination of three species of *Pauropygus*, four of *Proisotomodes* (one undescribed), two of *Isotominella* (one undescribed), eight of *Appendisotoma* (two undescribed), and one of *Micrisotoma*.

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A study on the Neotropical Anthaxiini (Coleoptera, Buprestidae, Buprestinae)

Svatopluk Bílý[1,†]

1 *Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Entomology, Kamýcká 1176, Praha 6 – Suchdol, CZ-165 21, Czech Republic*

† *urn:lsid:zoobank.org:author:D4606D6C-F314-4781-AD51-C7FCB6F6003B*

Corresponding author: *Svatopluk Bílý* (svatopluk_bily@nm.cz)

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Abstract

Revision of the Neotropical genera of the subtribe Anthaxiina Gory & Laporte, 1839 (Coleoptera, Buprestidae, Buprestinae, Anthaxiini). Five new genera are described: *Anthaxita* **gen. n.**, *Charlesina* **gen. n.**, *Cobosina* **gen. n.**, *Marikia* **gen. n.** and *Sanchezia* **gen. n.** Genus *Agrilaxia* Kerremans, 1903 is divided into two subgenera: *Agrilaxia* and *Costiptera* **subgen. n.** and the genus *Bilyaxia* Hołyński, 1989 is divided into three subgenera: *Bilyaxia*, *Paraguayetta* **subgen. n.** and *Tomasia* **subgen. n.** One new species is described: *Anthaxita peruviana* **sp. n.**, and two informal species-groups are suggested within *Agrilaxia* (*Costiptera* **subgen. n.**): *Agrilaxia* (*Costiptera*) *modesta* (Kerremans, 1897) species-group and *A.* (*C.*) *occidentalis* (Kerremans, 1900) species-group. Lectotype is designated for *Agrilaxia mrazi* Obenberger, 1932. A key of all genera/subgenera is provided and all treated taxa are illustrated.

Keywords

Taxonomy, Coleoptera, Buprestidae, Buprestinae, Anthaxiini, Anthaxiina, new genera, new subgenera, new species, new combinations, lectotype designation, key, Neotropical region

Introduction

During a recent study on the Neotropical genus *Agrilaxia* Kerremans, 1903 (Bílý & Brûlé, in press) I have found some taxonomic problems concerning also the related Neotropical genera of the tribe Anthaxiini Gory & Laporte, 1839. Some time ago I suggested a new concept of this group (Bílý 2004) which was also followed by Bellamy (2008). After separating off several genera to the subtribe Curidina Hołyński, 1989 (Bílý 2004), the subtribe Anthaxiina Gory & Laporte, 1839 contained only 10 genera: *Afragrilaxia* Bílý & Bellamy, 1999, *Agrilaxia* Kerremans, 1903, *Anthaxia* Eschscholtz, 1829, *Bilyaxia* Hołyński, 1989, *Brachanthaxia* Théry, 1930, *Brachelytrium* Obenberger, 1923, *Brasilaxia* Théry, 1935, *Chalcogenia* Saunders, 1871, *Paracuris* Obenberger, 1923 and *Tetragonoschema* Thomson, 1857. After upgrading the subgenus *Bilyaxia* to genus level (Bílý 2004) and after the definition of the genera *Ctenoderus* Germain, 1856, *Cylindrophora* Solier, 1849 and *Romanophora* Bílý, 2004 and the transfer of these genera to the subtribe Curidina (Bílý 2004), some species of *Anthaxia* subgen. *Cylindrophora* sensu Cobos, 1956 and 1975 were automatically and formally transferred to the genus *Bilyaxia.* The final, 11th genus was added to Anthaxiini after the revision of *Tetragonoschema* by the upgrading of the subgenus *Anilaroides* Théry, 1934 to genus level (Bílý, 2012). The situation is clarified in the present paper.

As mentioned above, only 11 genera remain in the subtribe Anthaxiina, 6 of them belonging to the Neotropical fauna: *Agrilaxia*, *Anilaroides, Bilyaxia*, *Brasilaxia, Paracuris* and *Tetragonoschema.* The genera *Brasilaxia* and *Paracuris* are monotypic taxa without the taxonomic problems, the genus *Agrilaxia* was revised by Cobos (1972) and the genera *Anilaroides* and *Tetragonoschema* by Bílý (2012). Since all species of *Anthaxia* subgen. *Cylindrophora* sensu Cobos, 1956, 1972 and 1975 (except for those which were transferred to the different genera of Curidina) were formally attributed to *Bilyaxia* (Bílý, 2004), the genus became rather heterogenous containing the following species: *Bilyaxia auronotata* (Bílý, 1978), *B. bruchiana* (Obenberger, 1928), *B. bucki* (Cobos, 1956), *B. cinctipennis* (Kerremans, 1913), *B. concinna* (Mannerheim, 1837), *B. cordillerae* (Obenbeger, 1928), *B. cupriceps* (Fairmaire & Germain, 1858), *B. descarpentriesi* (Cobos, 1956), *B. emmanueli* (Cobos, 1972), *B. macullicollis* (Kerremans, 1887), *B. mariae* (Cobos, 1956), *B. mrazi* (Obenberger, 1932), *B. obscurata* (Reed, 1873), *B. rubricollis* (Moore, 1981) and *B. willineri* (Cobos, 1972). The enigmatic species, *Anthaxia paulseni* Fairmaire & Germain, 1860 most probably does not belong to Anthaxiini; the type is probably lost and according to the very brief description, this species looks like some species of Acmaeoderini Kerremans, 1893 (Cobos, 1956). Last but not least, also the large genus *Agrilaxia* had to be split to two subgenera and some species were transferred to *Bilyaxia.*

Material and methods

The morphological terms specific for the Neotropical Anthaxiini follow Cobos (1972) and Bílý and Brûlé (in press).

A Canon D-550 digital camera with the Canon MP-E65 mm f/2.8 1-5× macro lens was used to capture the colour images.

Data from locality labels are cited „verbatim“ with my comments in [square brackets], individual labels are indicated by a double slash („//“); p= printed, h= handwritten.

ISNB Institut Royal des Sciences Naturelles, Brussels, Belgium
MFCB Museum Frey, Basel, Switzerland
MNCN Museo Nacional de Ciencias Naturales, Madrid, Spain
NMPC National Museum, Prague, Czech Republic
USNM United States National Museum of Natural History, Smithsonian Institution, Washington D.C., U.S.A.
ZIN Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia

Results

The Neotropical Anthaxiini differ by some characters from the Old World representatives of the tribe and some of them are, without any doubt, of Gondwanian origin (see also Cobos, 1958). Some morphological features are characteristic only of the Neotropical species, e.g. the "agriloid" pronotal carina and subhumeral, elytral carina (Fig. 23 in Bílý & Brûlé, in press), simply ocellate pronotal sculpture, usually asetose body (with some exceptions in *Agrilaxia*, *Tetragonoschema* and in *Sanchezia* gen. n.), and usually simply spindle-shaped male genitalia without the lateral serrations of the median lobe (except for some species of *Tetragonoschema* with spines on parameres). Other typical characters of the Neotropical Anthaxiini are the prolonged scutellum which is usually distinctly longer than wide (Figs 31, 32), unarmed male metatibiae, brush-like row of dense bristles on inner margin of protibiae (Fig. 33) and the form of prosternum in some *Agrilaxia* and *Bilyaxia* (Fig. 34); the specific morphological characters of the genus *Agrilaxia* are discussed in Cobos (1972) and Bílý & Brûlé (in press).

Key separating the genera of the Neotropical Anthaxiina

1 Body flat, Lycid-like; antennae robust, antennomeres 3–10 triangular to trapezoidal, pedicel triangular; frons and ventral surface with rather long, white pubescence; elytral epipleura wide, enlarged posteriorly, reaching elytral apex; elytra flat, without transverse, basal depression; prescutellar pit missing; lateroposterior pronotal depressions very wide, deep, reaching anterior fourth of pronotum; humeral swellings small, not projecting beyond outline of elytra; larger species (5.7–7.0 mm); Fig. 5; Argentina, Brasil..... ***Sanchezia* gen. n.**

– Body moderately or strongly convex, *Anthaxia* or *Agrilus*-like (e.g. Figs 19–25) or flat, wide, with shortened, uneven elytra (e.g. Figs 26–28); antennae

not conspicuously enlarged, antennomeres 4–10 triangular to trapezoidal, pedicel suboval or subcylindrical; lateroposterior pronotal depressions missing or well defined, shallow or deep but never reaching anterior pronotal fourth; basal, transverse, elytral depression well defined; humeral swellings well defined, usually projecting beyond outline of elytra **2**

2 Body moderately or strongly convex, (e.g. Figs 19–25); entire body asetose (except for a few species of *Agrilaxia* and *Tetragonoschema* with ventral pubescence); elytral epipleura narrower, often nearly missing, never wide or enlarged posteriorly; prescutellar pit well defined, sometimes deeply punctiform; basal, transverse elytral depression complete, reaching scutellum; elytra glabrous or with more or less defined longitudinal costae..... **3**

– Body flattened or weakly convex, elytra usually short, uneven, with wide, flat depressions, 1.1–2.3 times as long as wide (Figs 26–28); at least frons and ventral surface with white pubescence (often also pronotum and elytra with short pubescence); apex of each elytron widely, regularly rounded; elytral epipleura wide, subparallel, reaching elytral suture; anal ventrite situated vertically or nearly vertically; entire anal tergite (pygidium) clearly visible from above; sculpture of basal portion of elytra the same as that on pronotum **13**

3 Body prolonged, *Agrilus*-like (Figs 19–25); pronotum more than 1.4 times as wide as long; elytra usually more than 2.5 times as long as wide (except for *Agrilaxia* subgenus *Costiptera* subgen. n. – see below); posterior margin of pronotum (usually hidden under base of elytra) straight, only exceptionally serrate; lateroposterior pronotal depressions usually well defined; prescutellar pit and basal, pronotal tubercles on both sides of pit mostly well defined; anal ventrite and tergite sometimes sharply serrate or with needle-like spines ... **12**

– Body not prolonged, more or less *Anthaxia*-like (Figs 10–18); pronotum 1.5–2.0 times as wide as long; elytra less than 2.5 times as long as wide; anal tergite usually simply rounded without conspicuous serrations; lateroposterior pronotal depressions missing or weakly defined; prescutellar pit and basal, pronotal tubercles usually missing or only weakly defined..... **4**

4 Body wedge shaped; frons deeply, widely, longitudinally grooved; pronotum regularly narrowing anteriorly, without lateroposterior depressions and "agriloid" carina; pronotal sculpture consisting of very dense, small, deep, sometimes nearly punctiform, polygonal cells; elytra with 3 complete longitudinal costae and well defined, strongly elevated subhumeral carina, reaching elytral apex; 6.2–7.0 mm; Fig. 16; Brasil ..... ***Brasilaxia*** Théry, 1935

– Body not wedge shaped, more or less *Anthaxia*-like; frons convex, flat or moderately depressed; pronotal margins subparallel or rounded, maximum pronotal width at anterior third or at midlength; lateroposterior pronotal depressions and "agriloid" carina well defined or missing; pronotal sculpture consisting of fine polygonal cells (usually with lustrous or shagreened bottom) or very fine, transverse rugae; elytra without longitudinal costae, rarely

with 2–3 weakly defined, longitudinal elevations; subhumeral carina weakly defined, sometimes almost missing **5**

5 Body unicoloured, bronze; pronotum more or less convex, lateroposterior depressions and "agriloid" carina missing or almost indistinct; pronotal sculpture very fine, consisting of subtle polygonal cells with microsculptured bottom or by almost indistinct transverse rugae or transversely widened, poorly visible cells; suture between abdominal ventrites 1–2 very weakly defined or invisible; elytra covering entire abdomen **6**

– Body multicoloured, rarely entire body golden green; pronotum with black, medial, usually wide stripe reaching both anterior and posterior margins or with two longitudinal stripes; lateroposterior, pronotal depressions wide, "agriloid" carina well defined; pronotal sculpture consisting of well defined polygonal cells; suture between abdominal ventrites 1–2 well defined; elytra somewhat shortened, anal tergite (pygidium) visible from above or elytra conspicuously shortened, posterior 3 tergites not covered by elytra **9**

6 Frons strongly convex; clypeus very short, transverse, with straight anterior margin; pronotum convex, "agriloid" carina and lateroposterior pronotal depressions very weakly defined; pronotal sculpture consisting of well defined polygonal cells with shagreened bottom; elytral apices widely, regularly rounded; elytral epipleura very narrow but reaching nearly apex of elytra; subhumeral carina almost indistinct, elytral sculpture relatively rough consisting of simple punctures and fine rugae; 4.2–4.4 mm; Fig. 3; Argentina, Brasil ..... ***Cobosina* gen. n.**

– Frons flat or widely grooved; clypeus trapezoidal, slightly emarginate anteriorly; pronotum weakly convex or flattened with wide, shallow lateroposterior depressions or depressions missing; pronotal sculpture poorly visible, consisting of weakly defined polygonal cells or pronotum without clearly defined sculpture; elytral apices narrowly rounded, sometimes almost caudiform; elytral epipleura narrow, reduced, reaching at most posterior third of elytral margins; subhumeral carina usually well defined; elytral sculpture very fine **7**

7 Frons with wide, medial groove; pronotum flat with wide, shallow lateroposterior depressions, without distinct sculpture, matt; elytra 2.3 times as long as wide; subhumeral carina well defined, long, reaching apical portion of elytra; elytral sculpture consisting of fine microsculpture and very small, lustrous grains; 6.2 mm; Fig. 2; Brasil ..... ***Charlesina* gen. n.**

– Frons flat or very slightly convex; pronotum moderately convex, without lateroposterior depressions; pronotal sculpture consisting of very fine, weakly defined, polygonal cells; elytra 1.8–2.0 times as long as wide; elytral sculpture consisting of fine punctures and transverse rugae **8**

8 Posterior pronotal angles obtuse, lateral carina reaching only posterior third of lateral margin; prosternal process subparallel; posterior margin of pronotum (covered by elytral base) serrate; terminal antennomere slightly longer

than wide; body matt, ventral surface with rather long, sparse, white pubescence; 5.4 mm; Fig. 1; Peru ..... ***Anthaxita* gen. n.**

– Posterior pronotal angles rectangular, lateral carina reaching pronotal midlength; prosternal process slightly widened behind procoxae; posterior margin of pronotum (covered by elytral base) straight; terminal antennomere 2.5 times longer than wide; body lustrous, ventral surface asetose; 4.0–5.5 mm; Fig. 4; Ecuador ..... ***Marikia* gen. n.**

9 Elytra shortened, last 3 tergites clearly visible from above (but usually covered by hind wings); pronotum 1.5 times as wide as long, with very rough, ocellate sculpture; elytral sculpture consisting of rather large, sparse grains, each elytron with 2–3 more or less defined, longitudinal costae; both anal ventrite and tergite with roughly serrate posterior margins; subhumeral carina reduced, short, weakly defined; 8.0–9.0 mm; Figs 17, 18; Argentina, Bolivia ..... ***Paracuris* Obenberger, 1923**

– Elytra slightly shortened, only anal tergite (pygidium) visible from above; pronotum 1.6–2.3 times as wide as long with fine, polygonal cells (usually rougher along lateral margin); elytra without longitudinal costae or exceptionally with 2–3 fine, obsolete costae; elytral sculpture consisting of fine punctures and short transverse rugae or tiny, lustrous grains on microsculptured backround; only anal ventrite with serrate (sometimes very finely) posterior margin; subhumeral carina well defined, long **10**

10 Body wide, flat or moderately convex; frons flat or slightly depressed; pronotum 2.0–2.3 times as wide as long; lateroposterior depressions wide, shallow or completely missing; pronotum sometimes with weak, medial, longitudinal groove; elytra 1.8–2.0 times as long as wide, without any traces of longitudinal costae **11**

– Body prolonged, subcylindrical; frons convex; pronotum 1.6–1.7 times as wide as long; lateroposterior depressions wide, rather deep; elytra 2.4 times as long as wide with subhumeral carina nearly reaching elytral apex; elytra smooth or with more or less defined, longitudinal costae; 3.2–5.0 mm; Figs 13–15; Argentina, Uruguay ..... ***Bilyaxia* (*Tomasia* subgen. n.)**

11 Frons flat, very slightly convex or finely grooved; pronotal sculpture consisting of well defined, polygonal cells; lateroposterior depressions shallow, wide, more or less fusing to each other or nearly indistinct; subhumeral carina well defined but not sharp; prescutellar pit missing; prosternum flat of slightly convex; antennomeres 5–10 as wide as long; smaller species (3.7–6.5 mm); Figs 10, 11; Chile ..... ***Bilyaxia* (subgen. *Bilyaxia*)**

– Frons rather deeply grooved; pronotum densely shagreened with rather indistinct, poorly defined, polygonal sculpture; lateroposterior depressions missing; subhumeral carina long, elevated, reaching elytral apex; prescutellar pit deep; antennomeres 5–10 distinctly wider than long; prosternum transversely grooved just behind anterior margin which is elevated, forming transverse

lamina perpendicular to prosternal plate (like in Fig. 34e); larger species (7.5 mm); Fig. 12; Paraguay ..... ***Bilyaxia* (*Paraguayetta* subgen. n.)**

12 Body strongly prolonged, *Agrilus*-like, elytra more than 2.5 times as long as wide; subhumeral carina shorter, reaching elytral midlength, sometimes very short, exceptionally missing; elytra smooth or with more or less defined, flat, longitudinal costae; prescutellar pit and basal, pronotal tubercles on both sides of pit usually well defined; "agriloid" carina exceptionally missing; anal ventrite (sometimes also tergite) finely to strongly serrate; uni- to multicoloured species; 3.6–10.0 mm; Fig. 19–25; from U.S.A. to Patagonia..... .....***Agrilaxia* (subgen. *Agrilaxia*)**

– Body strongly wedge shaped, not very elongate; elytra less than 2.5 times as long as wide; subhumeral carina strongly defined, reaching elytral apex; elytra with 2–3 well defined, longitudinal costae; prescutellar pit shallow, basal pronotal tubercles on both sides of pit weak to missing; "agriloid" carina very well defined, reaching anterior third of pronotum; anal ventrite finely serrate, anal tergite usually without lateral serrations; entirely green-bronze or blue-bronze species; 5.0–7.2 mm; Fig. 7–9; Argentina, Brasil..... .....***Agrilaxia* (*Costiptera* subgen. n.)**

13 Body elongate, more *Anthaxia*-like; elytra 1.9–2.3 times as long as wide, covering entire abdomen including pygidium, regularly, weakly convex or slightly depressed behind scutellum; anal ventrite more or less horizontal; elytral epipleura narrower, not reaching elytral suture; elytra with conspicuous mirror-effect along posterior half of suture (as in *Anilara* Saunders, 1868); Fig. 26; Brasil .....***Anilaroides* Théry, 1934**

– Body conspicuously shortened, sometimes nearly as wide as long (Figs 27–28); elytra 1.1–1.4 times as long as wide, usually strongly uneven with several wide, deep depressions; entire pygidium visible from above, anal ventrite nearly vertical; elytral epipleura wide, reaching or nearly reaching elytral suture; elytra without distinct mirror-effect.....**14**

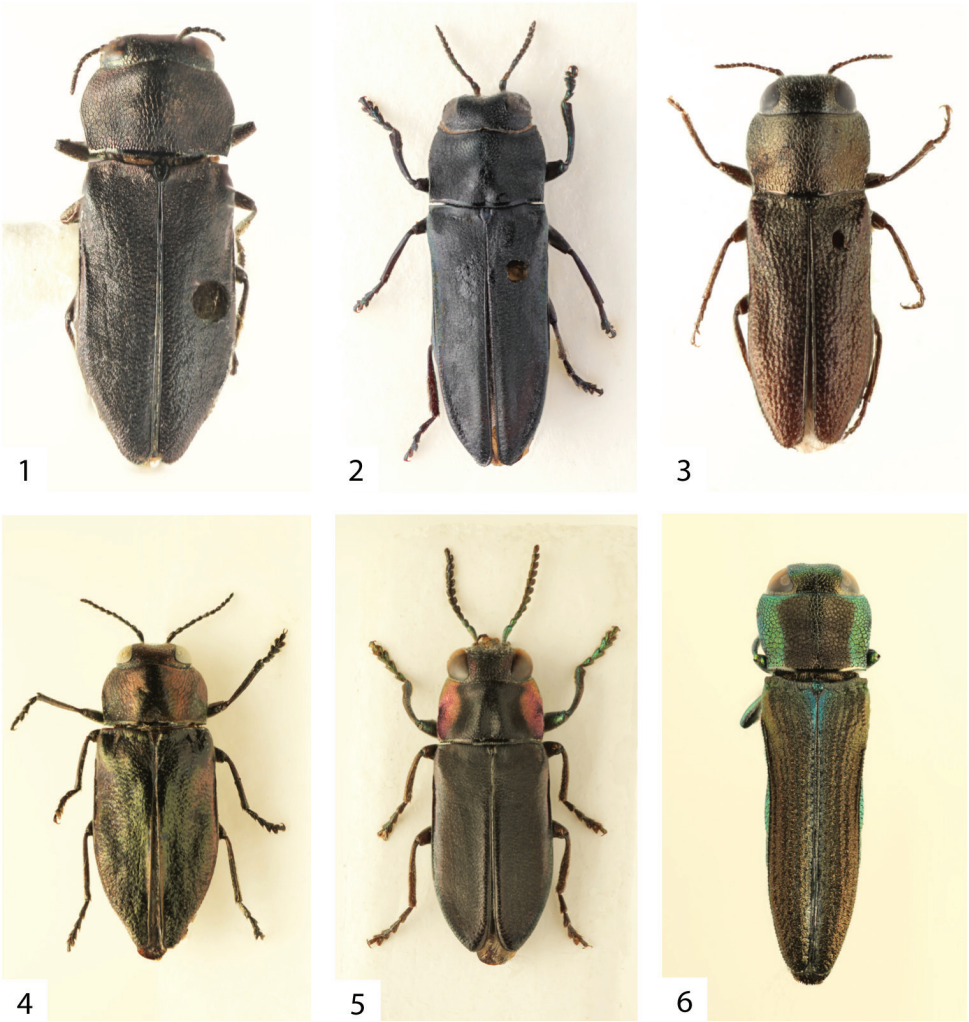
14 Body black, bronze or multicoloured, shortened (sometimes nearly as wide as long) species; elytra usually very short, flat, conspicuously uneven with one common, medial depression and with deep lateral and preapical depressions; frons usually deeply impressed with projecting prominences above antennal insertions, rarely frons convex; pronotum less convex, transverse, usually with well defined lateroposterior depressions; antennae and tarsi black; Fig. 27; from Mexico to Argentina.....***Tetragonoschema* subgen. *Tetragonoschema* Thomson, 1857**

– Body dark bronze, subcylindrical; elytra completely or partly red-bronze; elytra convex, without lateral and preapical depressions only with flat, medial, triangular depression at anterior elytral third; frons convex with weak postclypeal depression; pronotum regularly, rather strongly convex; antennae and tarsi reddish-brown; Fig. 28 southern Argentina .... ***Tetragonoschema* subgen. *Patagoschema* Bílý, 2012**

***Anthaxita* gen. n.**
urn:lsid:zoobank.org:act:D7D526F5-4A92-405A-B6F9-84569DA5FE84
http://species-id.net/wiki/Anthaxita
Figs 1, 32

Type-species. *Anthaxita peruviana* gen. n., sp. n. by present designation.

Description. Medium-sized (5.4 mm), dark, with silky lustre, *Anthaxia*-like, subparallel (Fig. 1); dorsal surface asetose, ventral surface with sparse, white, recumbent pubescence.



Figures 1–6. 1 *Anthaxita peruviana*, sp. n., female holotype, 5.4 mm **2** *Charlesina mrazi mrazi* (Obenberger, 1932), male lectotype, 6.2 mm **3** *Cobosina willineri* (Cobos, 1972), male, 4.4 mm (Brasil, Catamarca) **4** *Marikia descarpentriesi* (Cobos, 1956), male, 4.9 mm (Ecuador, Pichincha) **5** *Sanchezia bucki* (Cobos, 1956), 7.0 mm (male holotype of *Cylindrophora kafkai* Bílý, 1996) **6** *Agrilaxia* (*A.*) *flavimana* (Gory, 1841), male, 3.8 mm (USA, Arizona).

Head large, as wide as anterior pronotal margin; frons flat, vertex almost 3 times as wide as width of eye; antennae very short reaching anterior third of pronotal margins when laid alongside; clypeus short, transverse, anterior margin weakly emarginate.

Pronotum regularly convex, lateroposterior depressions and "agriloid" carina missing; lateral pronotal carina short, reaching posterior third of pronotal margin; posterior pronotal margin (covered by elytral base) serrate; posterior pronotal angles obtuse-angled; prescutellar pit and basal tubercles missing; pronotal sculpture very fine, homogeneous, consisting of very fine polygonal cells. Scutellum cordiform, 1.5 times as long as wide (Fig. 32), resembling the scutellum of the click-beetles of the subfamily Cardiophorinae.

Elytra about twice as long as wide, subparallel at anterior two thirds, regularly tapering at posterior third; elytral apices narrowly rounded, very finely serrate; elytral epipleura very narrow, narrowing posteriorly, reaching posterior fourth of elytral margin; subhumeral carina well defined; humeral swellings small; basal, elytral, transverse depression of elytra deep, narrow, reaching scutellum but interrupted by small tubercle near humeri; elytral sculpture very fine, homogeneous.

Ventral surface lustrous, metepisterna with patch of cream-white pubescence; prosternum weakly convex, anterior margin straight; prosternal process flat, slightly tapering posteriorly, not widened behind procoxae. Suture between abdominal ventrites 1–2 missing; anal tergite concave, posterior margin obtusely rounded, not serrate; anal ventrite slightly convex with obtusely rounded and finely serrate posterior margin. Legs short, stout, tarsi much shorter then tibiae. Tarsal claws strongly curved, robust, slightly enlarged at base.

Etymology. The genus name *Anthaxita* gen. n. (feminine) indicates the strong similarity to the genus *Anthaxia*.

Differential diagnosis. Except for the characters mentioned in the key, the genus *Anthaxita* gen. n. differs from other Neotropical genera of Anthaxiina by the combination of the following characters: pubescence of ventral surface, very wide vertex, very fine sculpture of pronotum and elytra, serrate posterior margin of pronotum, shortened elytral epipleura, missing suture between abdominal ventrites 1–2, short lateral pronotal carina, posteriorly acuminate prosternal process, concave anal tergite (pygidium), narrowly attenuate elytral apex and by the absence of the "agriloid" carina, lateroposterior pronotal depressions, and prescutellar pit. The male is unknown.

Distribution. Peru.

Note. Among all Neotropical Anthaxiini, the genus *Anthaxita* gen. n. is most similar to the Holoarctic species of *Anthaxia*, particularly to the subgenus *Melanthaxia* Rikhter, 1949.

***Anthaxita peruviana* gen. n., sp. n.**
urn:lsid:zoobank.org:act:747B17D7-F025-4D40-AA44-3936D628F55D
http://species-id.net/wiki/Anthaxita_peruviana
Figs 1, 32

Type locality. Peru, Cusco.

Type specimen studied. Holotype (female, NMPC): "Pérou (Cusco) Gay 59–49".

Diagnosis. Medium-sized (5.4 mm), black-bronze, matt with silky lustre (Fig. 1); clypeus and anterior portion of frons with weak, violet lustre; ventral surface lustrous, black-violet; entire dorsal surface asetose, ventral surface with rather long, sparse, recumbent white pubescence, metepisterna covered with cream-white tomentum.

Description of female holotype. Head wide, large, as wide as width of anterior pronotal margin; clypeus twice as wide as long, separated from frons by shallow, transverse impression, anterior margin widely, shallowly emarginate; frons flat with two shallow, rounded depressions above antennal insertions; vertex flat, 2.8 times as wide as width of eye; eyes relatively small, elliptical, not projecting beyond outline of head; antennae very short, finely serrate from fourth antennomere; scape pyriform, slightly flattened, 3.5 times as long as wide; pedicel suboval, 1.5 times as long as wide; third antennomere weakly triangular, 1.5 times as long as wide; antennomere 4 sharply triangular, 1.3 times as long as wide; antennomeres 5–10 trapezoidal, 1.3 times as wide as long, terminal antennomere rhomboid, somewhat longer than wide; sculpture of head consisting of small, fine, very dense polygonal cells with microsculptured bottoms.

Pronotum almost regularly convex, 2.2 times as wide as long, slightly flattened at posterior angles; anterior margin deeply biarcuate, medial lobe large, strongly projecting forward, posterior margin nearly straight; lateral margins regularly, widely rounded, posterior angles obtuse-angled; prescutellar pit and "agriloid" carina missing; sculpture consisting of very fine, small, polygonal cells, nearly indistinct on pronotal disc. Scutellum (Fig. 31) 1.3 times as long as wide, cordiform, flat, lustrous, microsculptured.

Elytra 2.2 times as long as wide, regularly convex, subparallel, regularly tapering at posterior third; humeral swellings slightly projecting beyond outline of elytra; each elytron narrowly rounded apically, with quite indistinct serrations; subhumeral carina well defined, flat, reaching apical third of lateral margins; elytral epipleura narrow, not very well defined, becoming narrower posteriorly, reaching posterior fifth of elytral margins; elytral sculpture very fine, consisting of tiny, transverse, zig-zag rugae which are much denser on humeral portion of elytra than that on disc.

Ventral surface lustrous, finely ocellate, anal ventrite widely triangular, apically subtruncate, finely serrate laterally. Legs short, stout, all tibiae straight, unmodified; tarsi short, tarsomeres 1–4 rather wide with well defined, ventral, adhesive pads; all tarsi much shorter than corresponding tibiae. Tarsal claws robust, strongly hook-shaped, slightly enlarged at base.

Sexual dimorphism. Male unknown.

Measurements. Length: 5.4 mm; width: 2.0 mm.

Etymology. *Anthaxita peruviana* sp. n. is named after the country of origin (Peru).

Differential diagnosis. All differential characters are given in the description of the genus.

Distribution. Peru**.**

Note. The holotype was originally pinned, so the right elytron and corresponding portion of the abdomen are somewhat damaged (see Fig. 1).

***Charlesina* gen. n.**
urn:lsid:zoobank.org:act:EB52AC1B-1536-44D7-8ED1-A38250C9CDB0
http://species-id.net/wiki/Charlesina
Figs 2, 31

Type species. *Agrilaxia mrazi mrazi* Obenberger, 1932 by present designation.

Description. Medium-sized (5.5 mm), black, elongate, matt, entirely asetose; lateral margins of elytra with green tinge.

Head as wide as anterior pronotal margin; clypeus narrow, trapezoidal, anterior margin deeply emarginate; frons widely grooved; vertex flat, twice as wide as width of eye; eyes broad elliptical, not projecting beyond outline of head; antennae short and robust, scarcely reaching midlength of lateral pronotal margins when laid alongside; scape broad pyriform, twice as long as wide; pedicel subcylindrical, 1.4 times as long as wide; third antennomere short, 1.2 times as long as wide; antennomeres 4-10 short, trapezoidal, nearly twice as wide as long; terminal antennomere rhomboid, 1.5 times as wide as long; sculpture of head consisting of fine, simple, sparse punctures on frons and weakly defined, dense cells on vertex.

Pronotum twice as wide as long, with wide, deep lateroposterior depressions, without distinct sculpture; lateral margins weakly S-shaped, posterior angles right angled; "agriloid" carina well defined, rather sharp, as long as lateral pronotal carina; basal tubercles weakly defined, prescutellar pit small, deep, well defined. Scutellum small, cordiform (Fig. 31), flat, twice as long as wide, resembling the scutellum of the click-beetles of the subfamily Cardiophorinae.

Elytra elongate, 2.3 times as long as wide, widely sphenoidal with shallow, longitudinal depression at posterior fourth; humeral swellings small but well defined, basal, transverse depression deep, reaching scutellum; elytral epipleura strongly reduced, very narrow, not reaching apex of elytra; subhumeral carina well defined, reaching apical portion of elytra; elytral sculpture consisting of fine microsculpture and very small, lustrous grains. Anal ventrite with fine but sharp, lateral serrations; all tarsi distinctly widened; tarsal claws simple, strongly hook-shaped.

Aedeagus (Figs 130, 131 in Cobos 1972) long, slender, spindle-shaped, setiferous part of parameres very short, median lobe pointed apically.

Etymology. The new genus *Charlesina* gen. n. (feminine) is dedicated to my friend and colleague, Charles Bellamy (Sacramento, California), one of the best world specialists in the taxonomy of Buprestidae, with my warm thanks for his life long cooperation.

Differential diagnosis. The monotypic genus *Charlesina* gen. n. strongly differs from other Neotropical Anthaxiina except for the genus *Sanchezia* gen. n. Both genera share some general characters like black, flattened body without distinct sculpture of dorsal surface, widened, robust antennae and tarsi, well defined lateroposterior pronotal depressions and "agriloid" carina. The genus *Charlesina* gen. n. strongly differs from the genus *Sanchezia* gen. n. by the deeply grooved frons, well defined humeral swellings and basal, transverse, elytral depression, by the narrow,

reduced elytral epipleura, long, well defined subhumeral carina and by the entirely asetose body.

Species included. *C. mrazi* (Obenberger, 1932).

Distribution. Argentina, Brasil.

Note. Also this genus can be included among the Lycid immitating Buprestids (see *Sanchezia* gen. n. below).

***Charlesina mrazi mrazi* (Obenberger, 1932), comb. n.**
http://species-id.net/wiki/Charlesina_mrazi_mrazi
Figs 2, 31; Figs 130, 131 in Cobos 1972

Agrilaxia mrazi Obenberger, 1932: 144. Type locality: Brasil.
Agrilaxia mrazi: Blackwelder, 1944: 314 (checklist).
Anthaxia (*Agrilaxia*) *mrazi* Cobos, 1972: 203 (revision, key).
Anthaxia (*Cylindrophora*) *mrazi*: Bílý, 1997: 29, 94 (catalogue).
Cylindrophora mrazi: Bellamy, 2008: 1298 (catalogue).

Type specimen studied. Syntype (♂, NMPC): "Brazil, Rio, Itatiaya[h]//Typus[p]// Mus. Nat. Pragae Inv. 22638[p]//*Agrilaxia mrázi* m. Type, Det. Dr. Obenberger[h+p]"; since the number of syntypes is unknown and to avoid any confussion in the future I designate hereby this specimen as the lectotype.

Further specimen studied. *Anthaxia* (*Agrilaxia*) *mrazi* ssp. *cyaneobscura* Cobos, 1972: holotype by monotypy (♂, MNCN): "Vila Oliva, Rio Grande do Sul, P. Buck[p]// *Anthaxia* (*Agrilaxia*) *mrazi cyaneobscura* ssp. n.[h] Dr. A. Cobod det.[p] ".

Aedeagus (Figs 130, 131 in Cobos 1972) spindle-shaped, setiferous portion of parameres very short, both parameres and median lobe sharply pointed apically.

Length: 5.8 mm; width: 1.7 mm.

Distribution. Brasil (Rio de Janeiro, Rio Grande do Sul).

Note. The locality data given in the description (Obenberger, 1932) slightly differ from those on the syntype (see above); although the number of syntypes is unknown, there is no doubt that the species was described from this specimen which is hereby designated as the lectotype (see above).

Cobos (1972), although treated this species in the genus *Anthaxia* subgen. *Agrilaxia*, noticed that this species should be probably treated in the genus *Cylindrophora*. This opinion was accepted by Bílý (1997) and Bellamy (2008). After the re-definition of the monotypic genus *Cylindrophora* (*C. maulica*) Molina, 1782)) and its transfer to the subtribe Curidina (Bílý, 2004), *Agrilaxia mrazi* (together with several other species of the former *Cylindrophora*) was formally attributed to the genus *Bilyaxia*. This act was overlooked by Bellamy (2008) who still treated *Charlesina mrazi* in the genus *Cylindrophora* sensu Cobos, 1956 and 1972.

Cobos (1972) described *Anthaxia* (*Agrilaxia*) *mrazi* ssp. *cyaneobscura* Cobos, 1972 on a single male from south-eastern Brasil (Rio Grande do Sul). This subspecies differs

from *C. mrazi mrazi* only slightly by its colouration and by the more robust aedeagus (Figs 130, 131 in Cobos 1972). More specimens are needed to resolve the taxonomic status of this subspecies.

***Cobosina* gen. n.**
urn:lsid:zoobank.org:act:CC52C856-8F7F-4DF8-8796-93B4206EAC98
http://species-id.net/wiki/Cobosina
Figs 3, 30

Type species. *Anthaxia* (*Cylindrophora*) *willineri* Cobos, 1972 by present designation.

Description. Small (4.25 mm), subcylindrical, rather convex, subparallel, entirely asetose.

Head small, mouth parts small, only slightly visible, partly retracted into head; frontoclypeal portion of head rathed reduced, clypeus very short, widely transverse, with straight anterior margin; frons strongly convex; vertex about twice as wide as width of eye; eyes rather large, elliptical, not projecting beyond outline of head; antennae very short, reaching anterior third of pronotal margins when laid alongside; antennomeres 4–11 obtusely triangular to trapezoidal, wider than long.

Pronotum strongly convex, lateral margins without lateral carina; lateroposterior depressions almost indistinct, "agriloid" carina very short, flat; prosternum with very narrow, transverse groove just behind anterior margin; prosternal proceess flat, short, nearly triangular, not widened behind procoxae. Scutellum small, longer than wide.

Elytra moderately convex, with small humeral swellings; basal transverse depression wide, nearly reaching scutellum; elytral apices separately, widely rounded, with very fine apical serrations; posthumeral carina short, flat, weakly defined, reaching only level of metacoxae; elytral epipleura very narrow, scarcely visible, reaching posterior fourth of elytra.

Anal ventrite wider than long, slightly truncate apically, with very fine, lateral serrations; legs simple, male metatibiae not modified; tarsal claws thin, simple, as long as half of terminal tarsomere; aedeagus (Fig. 30) very short, widely spindle-shaped, with the maximum width at the posterior third of the parameres, which are sharply pointed; medial lobe wide, pointed apically, without lateral serrations.

Etymology. The genus *Cobosina* gen. n. (feminine) is named in honour of my late colleague and well-known specialist in the taxonomy of the Neotropical Buprestidae, Prof Antonio Cobos Sánchez (Almería, Spain).

Differential diagnosis. Although the genus *Cobosina* gen. n. resembles very much some European species of the genus *Anthaxia* (see below) it shares some principal characters with the Neotropical Anthaxiini: completely asetose body (only a few species of *Anthaxia* from south-eastern Asia are entirely asetose), prolonged scutellum which is longer than wide, narrow and shortened elytral epipleura, "agriloid" carina, posthumeral carina (the latter two rather reduced), obtusely rounded elytral apex and simple, spindle-shaped aedeagus.

The genus *Cobosina* gen. n. differs from other genera of the Neotropical Anthaxiina by the small, non-prognathous mouth parts which are partly retracted into the head,

reduced, very short clypeus which is not separate from the frons (most of the Neotropical Anthaxiina are more or less prognathous), by the asetose protibiae (very often with the brush-like, stiff, pale setae on inner margin of protibiae in other Anthaxiina, namely *Agrilaxia* – Fig. 33) and last but not least by the clearly *Anthaxia*-like appearance.

Distribution. Argentina, Brasil.

***Cobosina willineri* (Cobos, 1972), comb. n.**
http://species-id.net/wiki/Cobosina_willineri
Figs 3, 30

Anthaxia (*Cylindrophora*) *willineri* Cobos, 1972: 224. Type locality: Argentina, Valle Fértil, Prov. San Juan.
Anthaxia (*Bilyaxia*) *willineri*: Bílý 1997: 39, 128 (catalogue); Bellamy 2008: 1497 (catalogue).

Type specimen studied. Holotype by monotypy (♀, MNCN): "[Argentina]Valle Fértil, San Juan, Rvdo. P. G. Williner coll., 5-6.xi.1970[p]".

Further specimen studied. "Brasil, Catamarca, 6 km N Belém, 1240 m[h]**"** (1 ♂**,** NMPC).

Note. The species was formally attributed to the genus *Bilyaxia* by Bílý (2004). Already in the original description (Cobos, 1972) noted that this species is an extraordinary and isolated element of the Neotropical Anthaxiini being very similar to the European species of the *Anthaxia* (*Anthaxia*) *funerula* Illiger, 1803 species-group. After having studied the holotype and further, male specimen of this species from NMPC I found that *A.* (*B.*) *willineri* ought to be removed from *Bilyaxia,* and a new genus should be proposed for this species.

I failed to find any difference between the sexes and also no significant variability since only two specimens were available for study.

Length: 4.2–4.4 mm; width: 1.4–1.5 mm.

Distribution. Argentina (Prov. San Juan); Brasil (Prov.Catamarca), new country record.

***Marikia* gen. n.**
urn:lsid:zoobank.org:act:0F360354-DDAE-4677-ACAA-6654DA61B4A6
http://species-id.net/wiki/Marikia
Fig. 4; Figs 76, 77 in Cobos 1956

Type species. *Anthaxia* (*Cylindrophora*) *descarpentriesi* Cobos, 1956 by present designation.

Description. Medium-sized (4.0–5.5 mm), flat, black, lustrous, entirely asetose.

Head as wide as anterior pronotal margin; clypeus broadly trapezoidal, anterior margin finely emarginate; frons flat to weakly depressed, vertex flat, 2.5 times as wide as

width of eye; eyes reniform to elliptical, not projecting beyond outline of head; antennae filiform, slightly overlapping midlength of lateral pronotal margins when laid alongside; pedicel as wide as scape, 1.5 times as long as wide; antennomeres 4–10 sharply triangular to trapezoidal, terminal antennomere prolonged, 2.5 times as long as wide.

Pronotum moderately convex, 2.4 times as wide as long, posterior angles obtuse-angled; lateroposterior depressions small, shallow, situated at posterior corners of pronotum; "agriloid" carina sharp, reaching midlength of lateral margins, very close to the lateral pronotal carina; pronotal sculpture consisting of very fine, almost indistinct, transversely widened cells and rugae; basal tubercles missing, prescutellar pit wide but shallow. Scutellum small, triangular, weakly depressed, microsculptured, slightly longer than wide.

Elytra 2.2 times as long as wide, weakly convex, somewhat uneven, parallel-sided at anterior two thirds, nearly regularly tapering at posterior third; apices narrowly rounded, very slightly caudiform, without distinct serrations; humeral swellings well defined, transverse basal depression deep, wide, reaching scutellum, interrupted by lustrous tubercle near humeri; elytral epipleura narrowing posteriorly, reaching apical third of elytral margins; subhumeral carina indistinct; elytral sculpture consisting of simple punctures and short, irregular, transverse rugae; elytral suture strongly elevated in posterior half.

Suture between ventrites 1 and 2 missing; anal ventrite widely rounded, with fine lateral serrations, anal tergite truncate without distinct serrations. Prosternum flat, prosternal process slightly enlarged behind procoxae. Legs long, unmodified, tarsi somewhat widened. Tarsal claws simple, slender, moderately curved.

Aedeagus (Figs 76, 77 in Cobos 1956) short, widely spindle-shaped, median lobe pointed apically.

Etymology. The genus *Marikia* gen. n. (feminine) is named in the honour of my life long friend and colleague Mark (Marik) G. Volkovitsh (St. Petersburg, Russia) with many thanks for his help, cooperation and hospitality during my stays in St. Petersburg.

Differential diagnosis. The genus *Marikia* gen. n. somewhat resembles by its dark colouration, flattened body and narrowly acuminate elytra some small species of the tribe Melanophilini Bedel, 1921. Among the Neotropical Anthaxiina it is most similar to the genus *Anthaxita* gen. n. from which it differs (except for the characters given in the key) by the lustrous and flat, entirely asetose body, narrow clypeus, longer and slender antennae, indistinct pronotal sculpture, long, sharp "agriloid" carina, triangular scutellum, posteriorly widened prosternal process, uneven and somewhat caudiform elytra, strongly elevated elytral suture and by the rudimental subhumeral carina.

Distribution. Ecuador.

***Marikia descarpentriesi* (Cobos, 1956), comb. n.**
http://species-id.net/wiki/Marikia_descarpentriesi
Fig. 4; Figs 76, 77 in Cobos 1956

Anthaxia (*Cylindrophora*) *descarpentriesi* Cobos, 1956: 154. Type locality: Ecuador, Quito.
Anthaxia (Cylindrophora) descarpentriesi: Cobos 1990: 53 (note, new records);

Anthaxia (Bilyaxia) descarpentriesi: Bílý 1997: 20, 65 (catalogue);
Bilyaxia descarpentriesi: Bellamy 2008: 1496 (catalogue).

Type specimens studied. Holotype (male, MNHN): "Quito, Equateur, Benoit, i.1932[h]"; allotype (female, MNHN): "Puembo, Equateur, Benoit, 20.ii.1931[h]".

Further specimens studied. ECUADOR: "Pichincha-Quito, 23.vi.1985, Gustavo Morejón[p]" (1 male, 1 female, MNCN); "Pichincha, Alluriquin, 6.v.1948, F. Grazo leg.[h]" (1 male, NMPC).

No difference between both sexes were observed and also no variability in the colouration apparent.

Aedeagus (Figs 76, 77 in Cobos 1956) very short, widely spindle-shaped, median lobe simply pointed apically.

Length: 4.0–5.5 mm; width: 1.7–2.0 mm.

Distribution. Ecuador.

Note. Terminal antennomere unusually long, 2.5 times longer than wide which is rather strange character within Anthaxiini.

Sanchezia gen. n.

urn:lsid:zoobank.org:act:1E18DD6B-BB25-4E5A-B1AC-4224EA031247
http://species-id.net/wiki/Sanchezia
Fig. 5; Fig. 2 in Bílý 1996

Type species. *Anthaxia* (*Cylindrophora*) *bucki* Cobos, 1956 by present designation.

Description. Rather large (5.7–7.0 mm), flat, Lycid-like, matt; antennae and legs robust; dorsal surface asetose, frons and ventral surface with sparse but rather long, white pubescence, prosternum with lanuginose pubescence.

Head wider than anterior pronotal margin, eyes large, elliptical, projecting beyond outline of head; clypeus short, wide, anterior margin straight; frons flat with small, rounded cells with tiny central grains (central portion of frons with rather sparse cells), vertex flat, 1.6 times as wide as width of eye, with fine, transverse rugae; antennae reaching posterior fourth of lateral, pronotal margins when laid alongside; pedicel triangular, antennomeres 3–10 widely triangular to trapezoidal, much wider than long.

Pronotum tapering anteriorly, 2.2 times as wide as long, with fine, medial, longitudinal depression and large, deep lateroposterior depressions reaching anterior fourth of pronotum; "agriloid" carina well defined, long, reaching beyond midlength of lateral margins; prescutellar pit missing; pronotal sculpture consisting of very fine, rather indistinct and transversely widened, polygonal cells without central grains. Scutellum very small, triangular, 1.5 times as long as wide.

Elytra flat, 1.8–1.9 times as long as wide, narrowly, separately rounded apically; humeral swellings small, not projecting beyond outline of elytra, basal, transverse depression missing; elytral epipleura wide, enlarged posteriorly, reaching elytral suture;

subhumeral carina missing; elytral sculpture consisting of fine microsculpture and tiny, sparse, lustrous grains.

Ventral surface lustrous, abdominal ventrites with fine horse-shoe-shaped punctures; prosternum weakly convex, densely, transversely rugate, prosternal process enlarged beyond procoxae; anal ventrite truncate, sharply serrate, anal tergite spatulate, unarmed. Legs robust, protibiae slightly curved with inner, preapical, brush-like row of dense, pale bristles (denser in males – like in Fig. 33); both meso- and metatibiae finely, obtusely serrate on inner margin; tarsal claws thin, hook-shaped.

Aedeagus (Fig. 2 in Bílý 1996) subparallel, strongly sclerotised, parameres sharply pointed apically; median lobe apically obtusely pointed.

Etymology. The genus *Sanchezia* gen. n. (feminine) is named in the honour of my late colleague Prof Antonio Cobos Sánchez (Almería, Spain), the well-known specialist in the taxonomy of the Neotropical Buprestidae.

Differential diagnosis. The genus *Sanchezia* gen. n. is quite unmistakable, characteristic genus which is somewhat similar to the genus *Charlesina* gen. n. (see above). It differs from other taxa of the Neotropical Anthaxiini by the rather non-Buprestid appearence, very fine, nearly velvet texture of dorsal surface, robust antennae with antennomere 3 triangularly enlarged, very wide elytral epipleura and other characters mentioned in the key.

Distribution. Argentina, Brasil.

***Sanchezia bucki* (Cobos, 1956), comb. n.**
http://species-id.net/wiki/Sanchezia_bucki
Fig. 5; Fig. 2 in Bílý 1996

Anthaxia (*Cylindrophora*) *bucki* Cobos, 1956: 162. Type locality: Brasil, Porto Alegre.
Anthaxia (*Bilyaxia*) *bucki*: Bílý 1997: 16, 54 (catalogue);
Bilyaxia bucki: Bílý 2004: 8 (taxonomy, synonymy); Bellamy 2008: 1495 (catalogue);
Anthaxia (*Cylindrophora*) *kafkai* Bílý, 1996: 28. Type locality: Argentina, Entre Rios, Pronunciamiento.
Anthaxia (*Cylindrophora*) *kafkai*: Bílý 1997: 26, 83 (catalogue); 1999: 236 (catalogue); 2004: 8 (synonym of *bucki*); Bellamy 2008: 1495 (catalogue, as syn. of *bucki*).

Type specimens studied. ***Anthaxia bucki***: Holotype (female, MNCN): "Porto Alegre[h]//*Anthaxia* (*Cylindrophora*) *bucki* sp. n.[h] Dr. A. Cobos det.[p]"; ***Anthaxia kafkai:*** Holotype (male, NMPC): "Argentina, Entre Rios, Pronunciamiento, ix.1992[p]".

Further specimen studied. BRASIL: " RS[main road] Canela, 22.ix.1985, leg. G. Scherer[p]" (1 female, NMPC).

No difference was observed between the sexes. It was impossible to study the variability of this species since only one specimen was found in the collections, except for the type specimens.

Length: 5.7–7.0 mm; width: 2.2–2.4 mm.

Distribution. Argentina**,** Brasil.

Note. Also Cobos (1956) stressed in his description the strange appearence of this species and attributed it to *Anthaxia* with strong doubts. *Sanchezia bucki* and *Charlesina mrazi* are further Neotropical species of Buprestidae mimicking Lycidae. As far as I know, there are only some species of the genus *Agrilus* (*A. dilaticornis* Kerremans, 1897 species-group) and Chilean species *Philandia valdiviana* (Philippi & Philippi, 1860) mimicking Lycid beetles.

Agrilaxia Kerremans, 1903

http://species-id.net/wiki/Agrilaxia
Figs 6, 19–25

Type species. *Anthaxia flavimana* Gory, 1841 (subsequent designation: Chamberlin, 1926).

The genus *Agrilaxia* was described by Kerremans (1903) and 19 mostly Neotropical species were included without designation of a type species. *Agrilaxia flavimana* Gory, 1841 was subsequently designated by Chamberlein (1926) as the type species of the genus. Later on, the genus *Agrilaxia* was synonymized by Théry (1930) with *Anthaxia* Eschscholtz, 1829, ressurected again as a valid genus by Obenberger (1930), then finally treated as a subgenus of *Anthaxia* by Cobos (1972); this concept was followed also by Bílý (1984, 1993). Bílý & Bellamy (1999) upgraded *Agrilaxia* again to the generic level which was followed by Bílý (2000, 2004) and Bellamy (2008).

The genus was revised by Cobos (1972) (as a subgenus of *Anthaxia*) who described the most of the Neotropical species. Subsequently several species were described also by Bílý (1984, 1985, 1993), Bílý & Westcott (2005), Cobos (1986) and by Bílý & Brûlé (in press). The morphology and the characters specific to the genus *Agrilaxia* were discussed by Cobos (1972) and Bílý & Brûlé (in press).

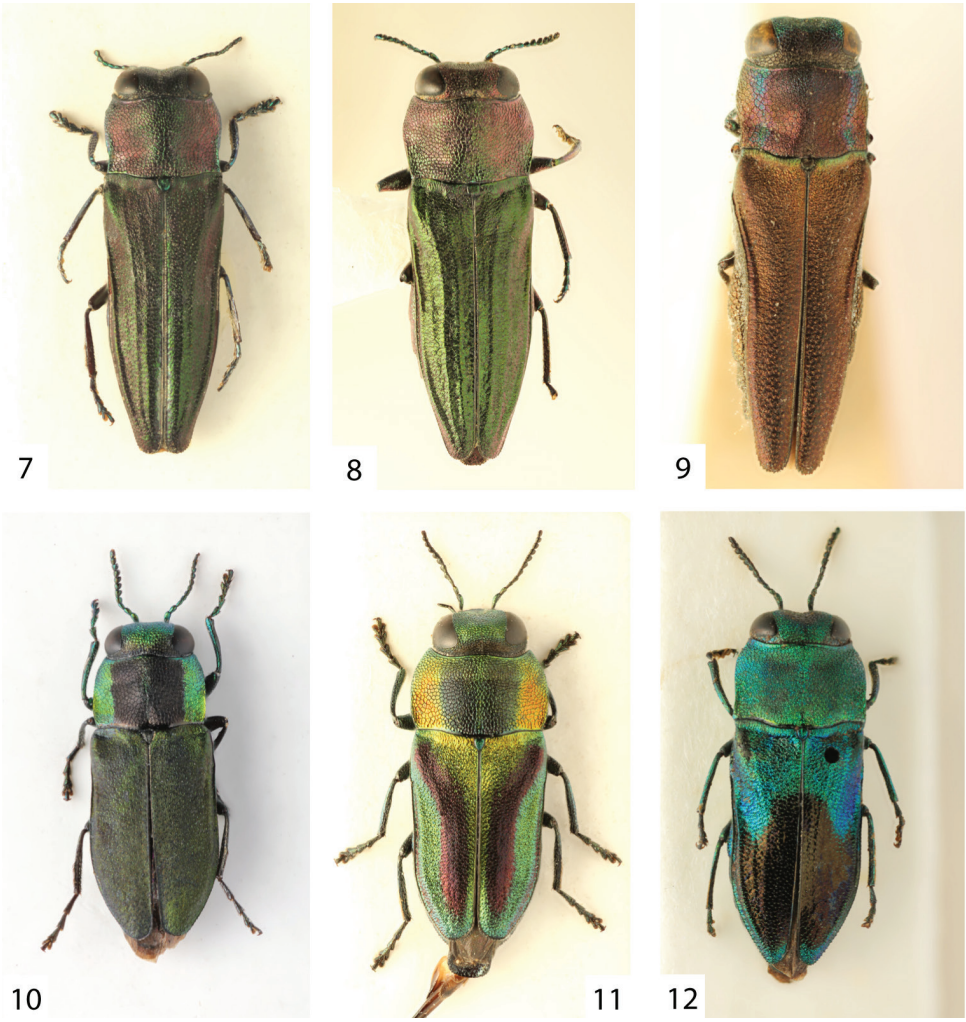
Even after separation of some species as independent genera (see above), the genus remains still rather heterogeneous. I propose that first, the small and rather homogeneous group of species with short, green or violet, wedge shaped body should be split as the separate subgenus *Costiptera* subgen. nov (see below).

Agrilaxia (*Costiptera*) subgen. n.

Figs 7–9

Type species. *Anthaxia occidentalis* Kerremans, 1900 by present designation.

Diagnosis. Body short, wedge shaped, ventral surface with short but distinct, white pubescence, metepisterna and metacoxae often with a patch of white tomentum; dorsal surface green, golden green or violet-green, sometimes pronotum black or violet with two longitudinal, green stripes.



Figures 7–12. 7 *Agrilaxia* (*Costiptera*) *occidentalis* (Kerremans, 1900), male, 5.3 mm (Brasil, Caraça) **8** *A.* (*C.*) *costulipennis* (Cobos, 1972), male, 5.8 mm (Argentina, Entre Rios) **9** *A.* (*C.*) *modesta* (Kerremans, 1897), male, 5.3 mm (Brasil, Jatahy) **10** *Bilyaxia* (*Bilyaxia*) *cupriceps* (Fairmaire & Germain, 1858), male, 4.7 mm (Chile, La Unión) **11** *B.* (*B.*) *obscurata* (Reed, 1873), male, 5.3 mm (Chile, Talca) **12** *B.* (*Paraguayetta*) *mariae* (Cobos, 1956), female, 7.0 mm (holotype of *Anthaxia jacobi* Obenberger, 1958).

Head large, often wider than anterior pronotal margin, weakly prognathous; clypeus short, transverse, anterior margin straight; frons widely, deeply grooved; vertex shallowly depressed, about twice as wide as width of eye; antennae short, rather robust, reaching midlength of lateral pronotal margins when laid alongside; sculpture of frons consisting of small, dense, polygonal cells with small central grains.

Pronotum relatively narrow, convex, 1.8–2.0 times as wide as long, with well defined lateroposterior depressions situated near posterior angles; "agriloid" carina well

defined, short, close to lateral carina; sculpture homogeneous, consisting of small, almost regular, polygonal cells, with or without central grains; prescutellar pit shallow, basal tubercles missing or very weakly defined. Scutellum small, flat, usually longer than wide.

Elytra convex, strongly wedge shaped, about 2.5 times as long as wide, large parts of abdominal ventrites well visible from above; elytra smooth or with 2–3 longitudinal costae; elytral epipleura narrow, nearly reaching elytral apex; basal, transverse depression deep, reaching scutellum, subhumeral carina well defined, long.

Prosternum flat or weakly convex, anterior margin sometimes weakly, narrowly elevated; both anal ventrite and sternite finely serrate.

Etymology. The name of the new subgenus *Costiptera* subgen. n. (feminine) is composed of the Latin substantive "*costa*" (carina, rib) and Greek substantive "*pteron*" (wing) to stress one of the main characters of the subgenus.

Differential diagnosis. The subgenus *Costiptera* subgen. n. differs from the nominate subgenus particularly by shorter, wedge shaped elytra (usually 2.5 times as long as wide), pubescence of the ventral surface and by the set of characters given above and in the key.

Species included. *Agrilaxia* (*Costiptera*) *ambigua* (Cobos, 1972), *A.* (*C.*) *clara* (Kerremans, 1899), *A.* (*C.*) *costulipennis* (Cobos, 1972), *A.* (*C.*) *interposita* (Cobos, 1972), *A.* (*C.*) *modesta* (Kerremans, 1897) and *A.* (*C.*) *occidentalis* (Kerremans, 1900).

Note. Two species groups can be separated within the subgenus. *Agrilaxia* (*Costiptera*) *modesta* (Kerremans, 1897) species-group which is characterised by the smooth elytra, well defined central grains in the fine frontal and pronotal ocellation, shorter, pentagonal scutellum which is as wide as long and by the shorter subhumeral carina reaching only midlength of elytral margins and by the anterior margin of the prosternum bearing a peg-like spine (like in Figs 29, 34f); only *A.* (*C*) *modesta* can be included into this species-group. For the remaining species, the *A.* (*C.*) *occidentalis* (Kerremans, 1900) species-group is suggested which is characterised by the longitudinal elytral costae, frontal and pronotal sculpture without central grains, prolonged scutellum which is 1.5 times longer than wide and by the long, well defined subhumeral carina reaching the elytral apex.

Agrilaxia (*Agrilaxia*) Kerremans, 1903

Figs 6, 19–25

Type species. *Anthaxia flavimana* Gory, 1841 (subsequent designation: Chamberlin, 1926).

According to Bellamy (2008), the genus *Agrilaxia* comprises 88 species. After removing of 5 species from *Agrilaxia* to *Bilyaxia* (see below) and after transferring of 5 species into the subgenus *Costiptera* subgen. n., 78 species remain in the subgenus *Agrilaxia* s. str. Quite naturally the subgenus will have to be split into several (or many)

species-groups since several very different morphotypes (e.g. Figs 6, 19–25) can be found within the subgenus - some of them have been suggested by Bílý & Brûlé (in press).

Note. The very special morphological character of the subgenus *Agrilaxia* is the shape of the prosternum (Figs 29, 34a–34f) which is normally flat or slightly convex. In the most species the prosternum is more or less transversely grooved just behind the anterior margin. The "grooving" of the anterior portion of prosternal plate and the relative elevation of the anterior margin of the prosternum which, in the extreme case, forms a sharp, transverse, rolled up ledge which is sometimes transformed into a peg-like, medial spine (Figs 29, 34f).

Bilyaxia Hołyński, 1989

http://species-id.net/wiki/Bilyaxia
Figs 10–15

Type species. *Anthaxia cupriceps* Fairmaire & Germain, 1858 by original designation.

The genus was originally described by Hołyński (1989) as a subgenus of *Anthaxia* and it was upgraded to the genus level by Bílý (2004). According to Bellamy (2008) it contains 18 species but the division to several subgenera is necessary. Three species were transferred to the separate, monotypic genera (*Charlesina* gen. n., *Cobosina* gen. n. and *Marikia* gen. n. – see above), the remaining 15 species is assigned into three subgenera.

Bilyaxia (*Bilyaxia*) s. str.

Figs 10, 11

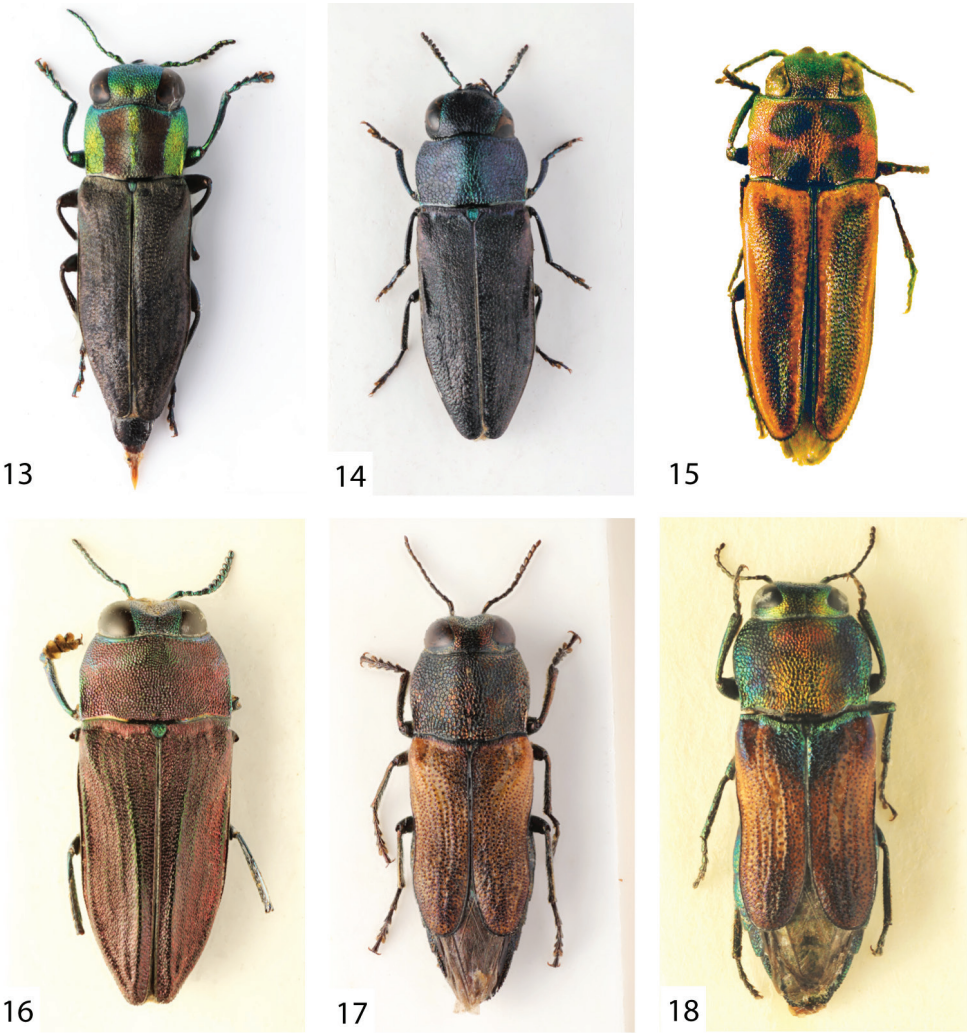
Type species. *Anthaxia cupriceps* Fairmaire & Germain, 1858 by original designation.

Diagnosis. Medium-sized (3.5–6.3 mm), subparallel, moderately convex, *Anthaxia*-like species.

Head large, very often somewhat wider than anterior pronotal margin; frons flat or slightly depressed, vertex 1.3–1.8 times as wide as width of eye; sculpture of head consisting of dense, oval or polygonal cells with or without central grains

Pronotum flattened, lateral margins subparallel or regularly rounded, posterior margin weakly biarcuate or almost straight, lateroposterior depressions usually well defined; "agriloid" carina short, almost parallel with lateral carina; prescutellar pit missing, basal tubercles small or missing. Scutellum small, subcordiform, usually 1.5 times as long as wide, flat.

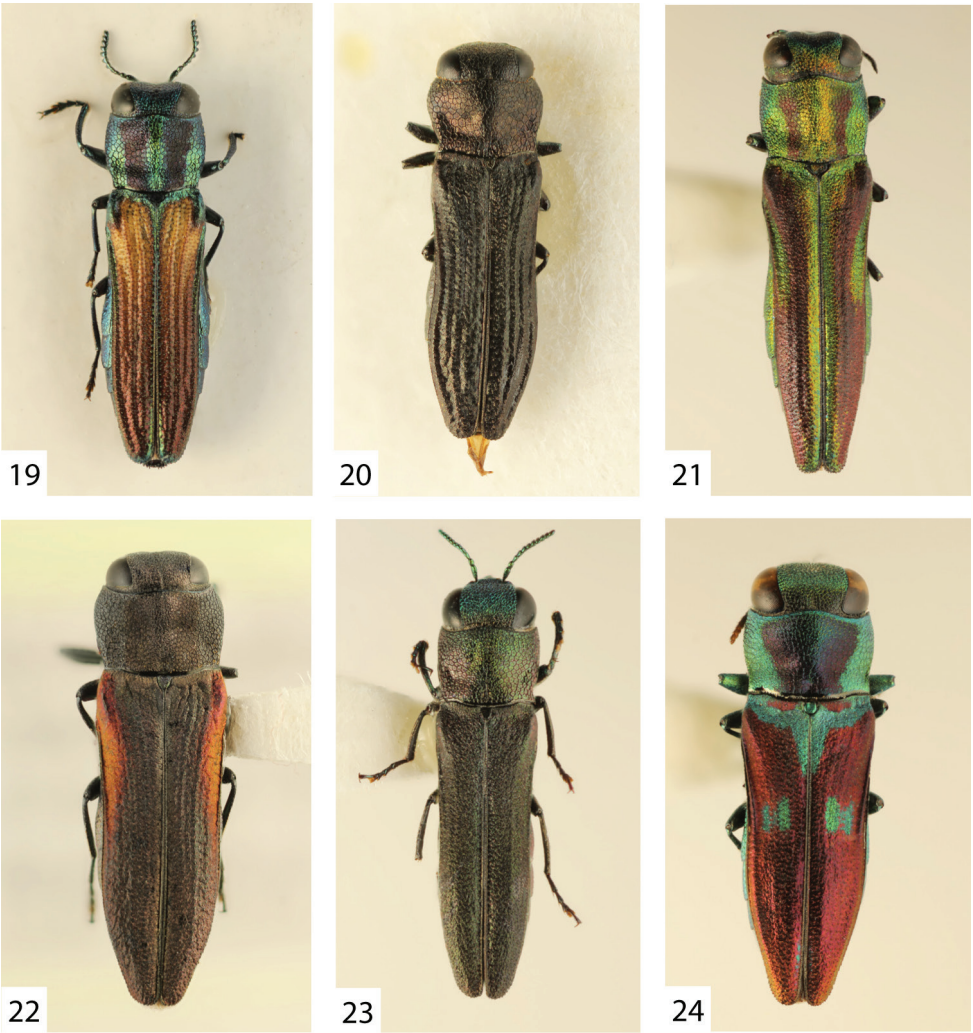
Elytra moderately convex, subparallel, rarely weakly wedge shaped, 1.7–1.8 times as long as wide; humeral swellings well defined, elytral apices widely, obtusely rounded; basal, transverse depression rather deep, reaching or nearly reaching scutellum; elytral epipleura narrow, usually narrowing posteriorly, reaching elytral apex; subhumeral carina rather long, obsolete, not very elevated.



Figures 13–18. 13 *Bilyaxia* (*Tomasia*) *maculicollis* (Kerremans, 1887), female, 4.6 mm (Argentina, Entre Rios) **14** *B.* (*T.*) *lata* (Kerremans, 1903), male, 5.0 mm (Brasil, Rio Grande do Sul) **15** *B.* (*T.*) *cinctipennis* (Kerremans, 1913), male holotype, 7.0 mm **16** *Brasilaxia costifera* (Obenberger, 1913), male, 6.3 mm (Brasil, Curityba) **17** *Paracuris bimaculata bimaculata* (Gory, 1841), male, 7.1 mm (Argentina, Catamarca) **18** the same, female, 7.2 mm (Brasil, Bermejo).

Ventral surface finely ocellate, prosternum flat or weakly convex; anal sternite obtusely rounded or truncate, serrate laterally. Legs moderately long, rather robust, tarsi distinctly widened, almost as long as tibiae.

Differential diagnosis. The subgenus *Bilyaxia* differs from both newly described subgenera by flat, wide, *Anthaxia*-like body, flat or slightly depressed frons, shape of pronotum, obtusely rounded elytral apex, short elytra, distinctly widened tarsi and by the geographical distribution: all species are distributed west of the



Figures 19–24. 19 *Agrilaxia* (*Agrilaxia*) *brunneipennis brunneipennis* (Kerremans, 1900), male, 4.9 mm (Argentina, Cordoba) **20** *A.* (*A.*) *coriacea* (Kerremans, 1887), female, 4.1 mm (Argentina, Misiones) **21** *A.* (*A.*) *kerremansi* (Théry, 1909), female, 6.1 mm (Brasil, Jatahy) **22** *A.* (*A.*) *montana* Bílý & Westcott, 2005, female paratype, 6.7 mm (Mexico, Sta Catarina del Monte) **23** *A.* (*A.*) *funebris* (Kerremans, 1900), male, 4.7 mm (Argentina, Entre Rios) **24** *A.* (*A.*) *alterna* (Kerremans, 1900), female, 5.5 mm (Brasil, Nova Teutonia).

Andes mountains in Chile; only *B.* (*B.*) *auronotata* (Bílý, 1978) is distributed also in Argentina (Neuquén).

Note. *Bilyaxia auronotata* was described from the Argentinian province Neuquén (Lago Lacar). The lake Lacar lies at the Chilean border at the lowest spot of this part of the Andean range; here is the only "gate" where the Buprestid species can pass through the Andes. *B. auronotata* was rather frequently collected also in the opposite side in Chile (prov. Villarica).

The distribution of the genus *Bilyaxia* is similar in distribution to the genera *Conognatha* Eschscholtz, 1829 and *Dactylozodes* Chevrolat, 1838, the subgenera of these are also distributed on the opposite sides of the Andes.

Species included. *Bilyaxia* (*B.*) *auronotata* (Bílý, 1978), *B.* (*B.*) *concinna* (Mannerheim, 1837), *B.* (*B.*) *cupriceps* (Fairmaire & Germain, 1858), *B.* (*B*) *cordillerae* (Obenberger, 1928), *B.* (*B.*) *obscurata* (Reed, 1873) and *B.* (*B.*) *rubricollis* (Moore, 1981).

Bilyaxia (*Paraguayetta*) subgen. n.

Fig. 12

Type species: *Anthaxia* (*Cylindrophora*) *mariae* Cobos, 1956 by present designation.

Diagnosis. Rather large (7.0 mm), robust, moderately convex, multicolorous: dorsal surface and legs blue-green with green tinge, pronotum with two, weakly defined black spots, humeri and posterior half of elytra bronze with red lustre, ventral surface blue-green; antennae black with strong green lustre.

Head large, as wide as anterior pronotal margin; clypeus trapezoidal, separated from frons by deep, transverse depression, anterior margin rounded; frons deeply, widely grooved, vertex almost flat, about twice as wide as width of eye; antennae slightly extending beyond midlength of lateral pronotal margins when laid alongside, antennomeres 5-10 widely trapezoidal; sculpture of head consisting of small, oval cells with large, flat central grains which are dense along eyes and very sparse in middle.

Pronotum convex, 2.2 times as wide as long, posterior margin deeply biarcuate; lateral margins slightly S-shaped, posterior angles sharp; "agriloid" carina well defined, reaching posterior third of lateral margins; lateroposterior depressions and basal tubercles weakly defined, prescutellar pit large, deep; sculpture consisting of basal microsculpture and dense, weakly defined polygonal cells without central grains. Scutellum cordiform, somewhat longer than wide, convex.

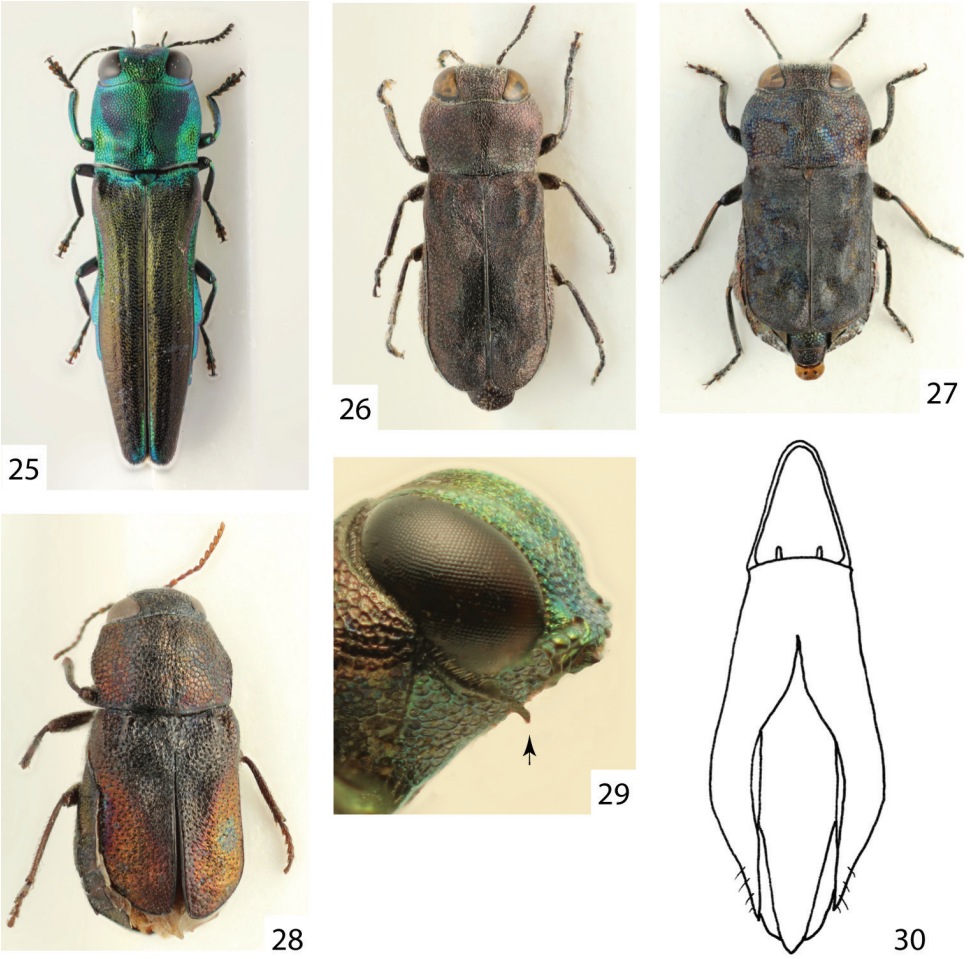
Elytra regularly convex, twice as long as wide, with obtusely rounded apices, not caudiform; humeral swellings small, basal, transverse depression deep, wide, reaching scutellum; elytral epipleura well defined, subparallel, reaching elytral apex; subhumeral carina strongly defined, nearly reaching elytral apex; sculpture consisting of short, transverse, zig-zag rugae.

Ventral surface roughly ocellate, prosternum slightly convex with shallow transverse groove just behind anterior margin which is in this way transformed into fine, transverse, perpendicular ledge (as in Fig. 34e); both anal ventrite and tergite simply rounded, not serrate. Legs moderately long, all tarsi shorter than tibiae; tarsal claws strong, simply hook-shaped.

Male unknown.

Etymology. The subgenus *Paraguayetta* subgen. n. (feminine) is named after the country of the origin (Paraguay).

Differential diagnosis. The subgenus *Paraguayetta* subgen. n. differs from other subgenera of *Bilyaxia* by the large, robust body, anteriorly rounded clypeus, S-shaped



Figures 25–30. 25 *Agrilaxia* (*Agrilaxia*) *claudei* (Cobos, 1972), female, 7.4 mm (French Guayane, Kaw) **26** *Anilaroides brasiliensis* (Kerremans, 1897), male lectotype (Brasil, Bahia) **27** *Tetragonoschema* (*T.*) *undatum* (Steinheil, 1874), female, 4.0 mm (Paraguay, Loma Plata) **28** *T.* (*Patagoschema*) *patagonicum* (Obenberger, 1922), female lectotype, 4.6 mm **29** *A.* (*A.*) *decolorata* (Kerremans, 1899), male, prosternum **30** *Cobosina willineri* (Cobos, 1972), aedeagus.

lateral, pronotal margins, weakly defined lateroposterior pronotal depressions, large and deep prescutellar pit, ledge-shaped anterior prosternal margin (as in Fig. 34e) and by the simple, not serrate anal ventrite.

Species included. *Bilyaxia* (*Paraguayetta*) *mariae* (Cobos, 1956).

Note. Except for the holotype (female, MNCN), only one further specimen was found in the collections: the female holotype of *Brasilaxia jacobi* Obenberger, 1958 which was synonymized with *Anthaxia* (*Cylindrophora*) *mariae* by Cobos (1972). This specimen (female, NMPC) is labelled: "Paraguay, Alto Paraná, Hohenau, H. Jacob[p], Nov. 1931[h]".

***Bilyaxia* (*Tomasia*) subgen. n.**
Figs 13–15

Type species. *Anthaxia maculicollis* Kerremans, 1887 by present designation.

Diagnosis. Small to medium sized (3.3–4.8 mm), slender, subcylindrical species.

Head relatively large, slightly wider or as wide as anterior pronotal margin; clypeus wide, trapezoidal, anterior margin straight or weakly emarginate; frons flat or convex, rarely weakly grooved; vertex flat or weakly convex, 1.8–2.2 times as wide as width of eye; eyes large, reniform, often slightly projecting beyond outline of head; sculpture of head consisting of small, fine, oval or polygonal cells.

Pronotum subcylindrical or lateral margins regularly rounded, 1.8–2.0 times as wide as long (exceptionally lateral margins S-shaped: *B.* (*T.*) *hayeki* (Cobos, 1972)); lateroposterior depressions wide, well defined; "agriloid" carina fine but well defined, usually reaching posterior third of lateral margins; prescutellar pit missing, basal tubercles weakly defined or missing; pronotal sculpture consisting of fine, poorly defined, polygonal cells without central grains and usually also by very fine basal microsculpture. Scutellum small to very small, cordiform, longer than wide.

Elytra regularly convex, smooth or with more or less defined, longitudinal costae, 2.2–2.4 times as long as wide; humeral swellings small but well defined, basal transverse depressions usually wide, deep, rarely shallow but always reaching scutellum; elytral epipleura narrowing posteriorly, reaching elytral apex; each elytron narrowly rounded, sometimes slightly caudiform; subhumeral carina well defined, usually reaching apical portion of elytra, sometimes shortened, scarcely reaching elytral midlength.

Anal ventrite usually simply rounded, finely serrate. Legs slender, long, tarsi not enlarged, distinctly shorter than tibiae; tarsal claws short, slightly curved.

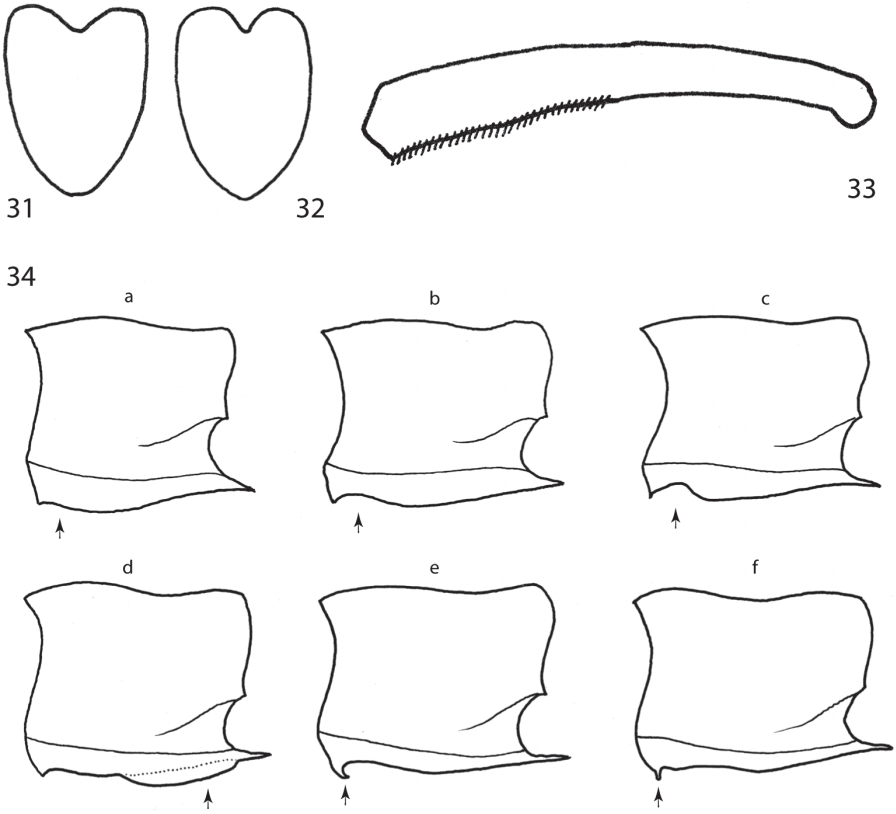
Etymology. The subgenus *Tomasia* subgen. n. (feminine) is named after my friend and colleague Tomás Moore Rodríguez (Santiago, Chile), the well-known specialist in the taxonomy of Chilean Buprestidae.

Species included. *Bilyaxia* (*Tomasia*) *bruchiana* (Obenberger, 1926), *B.* (*T.*) *cinctipennis* (Kerremans, 1913), *B.* (*T.*) *cyaneoviridis* (Kerremans, 1900), *B.* (*T.*) *emmanueli* (Cobos, 1972), *B.* (*T.*) *hayeki* (Cobos, 1972), *B.* (*T.*) *lata* (Kerremans, 1903) and *B.* (*T.*) *macullicollis* (Kerremans, 1887).

Note. *Bilyaxia* (*T.*) *cinctipennis* (Fig. 15) somewhat contradicts the definition of the subgenus by its colouration (black and yellow pattern) and by the widely rounded elytral apices. In 2010 I found in Paraguay (Prov. Presidente Hayes) a specimen with entirely yellow elytra.

***Brasilaxia* Théry, 1935**
http://species-id.net/wiki/Brasilaxia
Fig. 16

Type species. *Brasilaxia morretesi* Théry, 1935 by original designation.



Figures 31–34. 31 *Charlesina mrazi* (Obenberger, 1932), scutellum **32** the same, *Anthaxita peruviana*, sp. n. **33** *Agrilaxia* (*Agrilaxia*) *claudei* (Cobos, 1972), right protibia **34** *Agrilaxia* spp., anterior margin of prosternum (lateral view): (**a**) flat to weakly convex, (**b**) weakly grooved, (**c**) deeply grooved, (**d**) with sternal, longitudinal carina, (**e**) rolled up anterior margin, (**f**) peg-like spine.

The monotypic genus lacks taxonomic problems. The type species was synonymised with *Anthaxia costifera* Obenberger, 1913 by Cobos (1956). A further two species described in the genus *Brasilaxia* (*B. jacobi* Obenberger, 1958 and *B. olavei* Obenberger, 1958) were removed from *Brasilaxia* and synonymised by Cobos (1972) with *Anthaxia* (*Cylindrophora*) *mariae* (*B. jacobi*) – see above, and with *Curis oyarcei* Germain & Kerremans, 1906 (*B. olavei* – currently *Ctenoderus oyarcei* in Curidini).

Species included. *Brasilaxia costifera* (Obenberger, 1913).

Paracuris Obenberger, 1923

http://species-id.net/wiki/Paracuris
Figs 17, 18

Type species. *Curis hemiptera* Burmeister, 1872 by original designation.

This monotypic genus lacks taxonomic problems and has very often been treated as a subgenus of *Anthaxia*, e.g. Bellamy (1985, 2003), Bílý (1997), Cobos (1956, 1986). Bílý (2004) upgraded it to genus which was was accepted by Bellamy (2008).

The type species, *Curis hemiptera*, was synonymized with *Anthaxia bimaculata* Gory, 1841 by Berg (1884) and Cobos (1956) described the subspecies *A.* (*P.*) *bimaculata litigiosa* Cobos, 1956 from Argentina (Rio Colorado, Rio Negro).

Note. The nominotypical subspecies possesses rather strong sexual dichromatism (Figs 17, 18). The female is rather similar to *P. bimaculata litigiosa* and only the different form of the male genitalia (Figs 45–48 in Cobos, 1956) justifies treating the subspecies *litigiosa* as a valid taxon.

Anilaroides Théry, 1934

http://species-id.net/wiki/Anilaroides
Fig. 26

Type species. *Anilara brasiliensis* Kerremans, 1900 by original designation.

The genus was originally described by Théry (1934) as a subgenus of *Tetragonoschema* Thompson, 1857 which was accepted also by Bellamy (2008). The subgenus was subsequently upgraded to a genus by Bílý (2012). The genus *Anilaroides* contains only two very similar species distributed in Brasil and revised by Bílý (2012).

Tetragonoschema Thomson, 1857

http://species-id.net/wiki/Tetragonoschema
Figs 27, 28

Type species. *Tetragonoschema chrysomelinum* Thomson, 1857 (by monotypy; currently junior subjective synonym of *T. quadratum* (Buquet, 1841)).

The genus contains 17 species distributed from Mexico to Patagonia. The genus was quite recently revised by Bílý (2012) and divided into two subgenera.

Tetragonoschema (*Tetragonoschema*) s. str.

Fig. 27

Remarks. The nominotypical subgenus contains 14 black, bronze or multicolorous, shortened (sometimes nearly as wide as long) species; elytra usually very short, flat, conspicuously uneven with one common, medial depression and with deep lateral and preapical depressions; elytral epipleura wide, well-developed, reaching or nearly reaching elytral suture; frons usually deeply impressed with projecting prominences above antennal insertions, rarely frons convex; pronotum weakly convex, transverse, usually

with more or less distinct lateroposterior depressions; antennae and tarsi black; aedeagus spindle-shaped or elongate, parameres very often with lateral hooks or spines. The subgenus is distributed from Mexico to central Argentina.

***Tetragonoschema* (*Patagoschema*) Bílý, 2012**
Fig. 28

Type species. *Tetragonoschema patagonicum* Obenberger, 1922 by original designation.

The subgenus contains 3 dark bronze, subcylindrical species; elytra completely or partly red-bronze, convex, without lateral and preapical depressions only with flat, medial, triangular depression at anterior elytral third; elytral epipleura narrow, not reaching elytral apex; frons convex with weak postclypeal depression; pronotum regularly, rather strongly convex, sometimes with two small, weakly developed, rounded depressions; antennae and tarsi reddish-brown; aedeagus short, spindle-shaped. The subgenus is distributed in southern Argentina (Patagonia).

Note. *Tetragonoschema* (*P.*) *patagonicum* (Fig. 28) is the southernmost distributed species of the genus *Tetragonoschema* (Patagonia, Santa Cruz). The province of Santa Cruz is situated south of latitude 46 where the climatic conditions are rather extreme and *T.* (*P.*) *patagonicum* is most probably one of the southernmost distributed species of the Neotropical Buprestids.

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RESEARCH ARTICLE

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New species and records of *Lobrathium* Mulsant & Rey (Coleoptera, Staphylinidae, Paederinae) from China

Wen-Rong Li[1,†], Mei-Jun Zhao[1,‡], Cong-Chao Dai[1,§], Li-Zhen Li[1,|]

1 *Department of Biology, College of Life and Environmental Sciences, Shanghai Normal University, Shanghai, 200234, P. R. China*

† *urn:lsid:zoobank.org:author:670C3BA4-C6D9-4E20-BA8D-1D44001BEB39*
‡ *urn:lsid:zoobank.org:author:FBE4FA1F-5BCF-405E-98C1-4F86894643EA*
§ *urn:lsid:zoobank.org:author:F296F7D8-8259-4A69-841C-C2F74F0A54E7*
| *urn:lsid:zoobank.org:author:BBACC7AE-9B70-4536-ABBE-54183D2ABD45*

Corresponding author: *Li-Zhen Li* (lizhenli@shnu.edu.cn)

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Abstract

Seven new species of the genus *Lobrathium* Mulsant & Rey from China are described and illustrated: *L. anatinum* Li & Li, **sp. n.** (Guangxi), *L. diaoluoense* Li & Li, **sp. n.** (Hainan), *L. dufui* Li & Li, **sp. n.** (Hubei), *L. lirunyui* Li & Li, **sp. n.** (Guizhou), *L. pengi* Li & Li, **sp. n.** (Guangxi), *L. quyuani* Li & Li, **sp. n.** (Hubei) and *L. uncinatum* Li & Li, **sp. n.** (Qinghai). A recent key to the species of mainland China is modified to accommodate the new species. New locality data are provided for eleven species.

Keywords

Coleoptera, Staphylinidae, Paederinae, *Lobrathium*, China, taxonomy, new species

Introduction

According to a recent revision (Assing 2012), the genus *Lobrathium* Mulsant & Rey, 1878 is represented in China by 43 species (24 species from mainland China and 20 from Taiwan, with *Lobrathium hongkongense* distributed both in mainland China and Taiwan). Later, Li et al. (2013) described four additional species from mainland China:

L. quadrum (Li, Solodovnikov & Zhou 2013), *L. rutilum* (Li, Solodovnikov & Zhou 2013), *L. tortuosum* (Li, Solodovnikov & Zhou 2013) and *L. zonalis* (Li, Solodovnikov & Zhou 2013). Herein, we report seven new species of *Lobrathium* from mainland China and additional locality data for eleven species.

Material and methods

All the material treated in this study is deposited in the Insect Collection of Shanghai Normal University, Shanghai, China (**SNUC**).

Type labels are cited in their original spelling. A slash (/) is used to separate different labels. Type material bears the following type label: 'HOLOTYPE [red] or PARATYPE [yellow], [genus name, species name], sp. n., [authors of the species], det. 2013.

The specimens were killed with ethyl acetate and then dried. Materials were stored in 75% ethanol; genitalia and small parts were embedded in Euparal on plastic slides that were attached to the same pin with the specimens.

Morphological studies were carried out using an Olympus SZX 16 stereoscope. A digital camera Canon EOS 50D with MP-E 65 mm Macro Photo Lens was used for the habitus photos. An Olympus CX21 microscope and a digital camera Canon G9 were used for the photos of small structures. The map was created using MapGis.

The measurements of various body parts are abbreviated as follows: **BL**–length of the body from the labral anterior margin to the anal end; **HL**–length of the head from the anterior margin of the frons to the posterior margin of the head; **HW**–maximum width of the head; **PL**–length of the pronotum along the midline; **PW**–maximum width of the pronotum; **EL**–length of the elytra from the anterior margin to the elytral posterior margin along suture; **EW**–maximum width of the elytra; **AL**–length of the aedeagus from the apex of the ventral process to the base of the aedeagal capsule.

Taxonomy

Key to the *Lobrathium* species of mainland China (modified from Assing 2012: 84–86)

1 Elytra with posterior portion partly or completely yellowish or reddish, mostly with yellowish spots, and often with bluish to purple hue **2**

– Elytra uniformly dark-brown to blackish **15a**

2 Elytra with more or less extensive yellowish coloration posteriorly, at least posterior two fifths completely yellowish **2a**

– Elytra less extensively yellowish or reddish posteriorly, usually with more or less defined spots often leaving the lateral and/or posterior margins blackish..... **4**

2a ♂: sternite VI with modified, stout and short black setae (Fig. 18D). Qinghai ..... ***L. uncinatum*** **Li & Li sp. n.**

– ♂: sternite VI without modified, stout and short black setae..... 2b

2b ♂: sternite VII with modified, stout and short black setae (Fig. 8D). Hubei. .....***L. dufui*** **Li & Li sp. n.**

– ♂: sternite VII without modified, stout and short black setae **3**

3 ♂: posterior excision of sternite VIII smaller and less deep; aedeagus 1.1 mm long, with ventral process apically undivided. Shaanxi: Qinling Shan ....***L. schuelkei*** **Assing, 2012**

– ♂: posterior excision of sternite VIII slightly larger and somewhat deeper; aedeagus larger, 1.2–1.3 mm long, ventral process apically with two long processes. Hubei, Beijing, Shanxi.....***L. taureum*** **Assing, 2012**

4 Large species; length of forebody at least 4.9 mm. Pronotum broad, 1.10–1.20 times as long as broad. Elytra 0.90–0.95 times as long as pronotum and without bluish hue. ♂: sternite VII with distinctly modified, short and stout black setae; sternite VIII with conspicuously deep posterior excision, its depth at least approximately half the length of sternite; ventral process of aedeagus ventrally with rasp-like structures **5**

– Smaller species; length of fore body 4.6 mm at most. Pronotum more slender, 1.20–1.35 times as long as broad, only in one species broader (*L. radens*). Elytra often longer than pronotum and often with bluish or purple hue. ♂: sternite VII in most species without strongly modified setae; sternite VIII with less deep posterior excision, except in *L. bispinosum* and *L. tuberosum*.....**5a**

5 Pronotum slightly broader, 1.10–1.15 times as long as broad. ♂: posterior excision of sternite VIII extremely deep, reaching well beyond middle of sternite; aedeagus 1.6 mm long, ventral process with two rasp-like projections and stoutly blade-shaped. Northern Yunnan: Diancang Shan..... .....***L. excisissimum*** **Assing, 2012**

– Pronotum slightly less broad, 1.15–1.20 times as long as broad. ♂: posterior excision of sternite VIII less deep, approximately reaching middle of sternite; aedeagus 1.5 mm long, ventral process with more numerous rasp like projections, somewhat more slender and apically more acute in ventral view. Eastern Guizhou: Leigong Shan .....***L. radens*** **Assing, 2012**

5a ♂: aedeagus 1.70–1.72 mm long, ventral process apically not bifid (Fig. 2C). Guangxi..... ***L. anatinum*** **Li & Li sp. n.**

– ♂: aedeagus 1.35 mm long, ventral process apically bifid..... **6**

6 Elytral spots situated in anterior portion of posterior half of elytra (i.e., at some distance from posterior margin). Dorsal surface of head uneven, with median and lateral impressions. Punctation of head and pronotum extremely dense. Relatively large species; length of fore body 4.4–4.6 mm. Antennae slender. ♂: sternite VII moderately transverse; aedeagus 1.35 mm long, ventral process apically bifid. Western Hubei: Daba Shan, Guizhou, Shaanxi ....***L. ablectum*** **Assing, 2012**

– Elytral spots situated at or near posterior margin of elytra. Dorsal surface of head without distinct impressions. Punctation of head and pronotum less

dense. Smaller species, length of fore body usually 4.0 mm at most, except for *L. spathulatum* (3.7–4.5 mm). Male sexual characters different. A reliable identification of the following species is possible only based on the male sexual characters..... **6a**

6a ♂: bifurcation of the apex of the ventral process of the aedeagus forming an angle of more than 30 degrees in lateral view (Fig. 12B). Guangxi, Shiwanda Shan ..... ***L. pengi* Li & Li sp. n.**

– ♂: bifurcation of the apex of the ventral process of the aedeagus forming an angle of less than 30 degrees in lateral view (Fig. 7B). Hainan .... ***L. diaoluoense* Li & Li sp. n.**

7 Elytra black, without bluish or purple hue, 0.9–1.0 times as long as pronotum..... **8**

– Elytra usually with, rarely without bluish or purple hue, 1.0–1.15 times as long as pronotum..... **12**

8 ♂: sternite VIII with small posterior excision in asymmetric position, posterior margin with tooth-like projection on either side of excision; aedeagus approximately 1.5 mm long, ventral process very long, slender, and apically asymmetric. Widespread: Sichuan, Shaanxi, Hubei, Guizhou.... ***L. tortile* Zheng, 1988**

– ♂: sternite VIII with deep posterior excision in symmetric position; aedeagus of different morphology..... **9**

9 ♂: aedeagus 0.9–1.0 mm long, ventral process long, slender, apically acute, and very thin at base; sternite VIII with very broad and deep posterior excision, on either side of excision with dense pubescence. Central Sichuan: Qingcheng Shan ..... ***L. gladiatum* Zheng, 1988**

– Male sexual characters different..... **10**

10 ♂: sternite VII anteriorly with tubercle; sternite VIII oblong and with U-shaped posterior excision; aedeagus 1.2 mm long and with massive ventral process. Jiangxi ..... ***L. tuberosum* Assing, 2012**

– ♂: sternite VII without tubercle; posterior excision of sternite VIII of different shape; aedeagus longer, at least approximately 1.4 mm long **11**

11 ♂: sternite VII with shallow posterior impression with pubescence; sternite VIII with moderately deep posterior excision and of characteristic chaetotaxy; aedeagus 1.4 mm long and with ventral process of distinctive shape. Northeastern Hubei, Zhejiang..... ***L. demptum* Assing, 2012**

– ♂: sternite VII with more pronounced posterior impression without pubescence; posterior excision of sternite VIII much deeper, broader, and of subtrapezoid shape; aedeagus longer, 1.5 mm long, ventral process with two tooth-like projections ventrally. Southeastern Guizhou, Jiangxi .... ***L. bispinosum* Assing, 2012**

12 Elytra with weak purple hue; posterior spots relatively small, defined, and of circular shape. Pronotum less oblong, approximately 1.2 times as long as broad. ♂: sternite VII moderately transverse and with moderately deep pos-

terior excision; aedeagus 1.0 mm long, ventral process with dorsal carina and apically acute. Northern Yunnan .....***L. retrocarinatum*** **Assing, 2012**

– Elytra usually with bluish hue; posterior spots usually larger and/or of different shape or less defined. Pronotum more oblong, at least approximately 1.25 times as long as broad.♂: sternite VII either with strongly modified short and black setae or without modified setae at all; sternite VIII and aedeagus of different shape **13**

13 ♂: sternite VII with distinctly modified short and stout black setae; sternite VIII with deep U-shaped posterior excision; aedeagus approximately 1.2 mm long, ventral process of distinctive morphology. Sichuan, Shaanxi, Yunnan.. .....***L. hebeatum*** **Zheng, 1988**

– ♂: sternite VII without distinctly modified setae; sternite VIII with less deep and differently shaped posterior excision; aedeagus of different morphology **14**

14 ♂: posterior excision of sternite VII small; aedeagus approximately 1.0 mm long. Widespread and common species: China, Taiwan, southern Japan ....***L. hongkongense*** **Bernhauer, 1931**

– ♂: posterior excision of sternite VII larger and of broadly triangular shape; aedeagus of different shape. Species with more restricted distributions.... 14a

14a ♂: aedeagus ventral process broader, evenly narrowed and acute apically in ventral view (Fig. 13C). Hubei .....***L. quyuani*** **Li & Li sp. n.**

– ♂: aedeagus ventral process of different shape in ventral view **15**

15 ♂: aedeagus of somewhat variable shape and size, 1.3–1.5 mm long, ventral process very slender, apically acute, and weakly asymmetric; sternites VII and VIII as in Figs 4D, E. Widespread in China: Shaanxi, Sichuan, Hubei, Yunnan, Qinghai .....***L. configens*** **Assing, 2012**

– ♂: aedeagus longer, 1.6–1.8 mm long, ventral process distinctly asymmetric and apically distinctly dilated (ventral view); sternites VII and VIII as in Figs 14D, E. Widespread in China: Sichuan, Shaanxi, Shanxi, Hubei, Zhejiang.. .....***L. spathulatum*** **Assing, 2012**

15a Body reddish to reddish-brown; head posterior angles not marked, punctation fine and dense; eyes very small, one third as long as distance from posterior margin of eyes to neck; elytra 1.25 times as wide as pronotum. ♂: aedeagus 1.56 mm long, ventral process of distinctive morphology (Figs 11A–E). Guizhou .....***L. lirunyui*** **Li & Li sp. n.**

– Male characters different.....16

Lobrathium ablectum **Assing**
http://species-id.net/wiki/Lobrathium_ablectum
Figs 1

Lobrathium ablectum Assing, 2012: 106. Type locality: creek valley 8 km NW Muyuping, Daba Shan, Hubei.

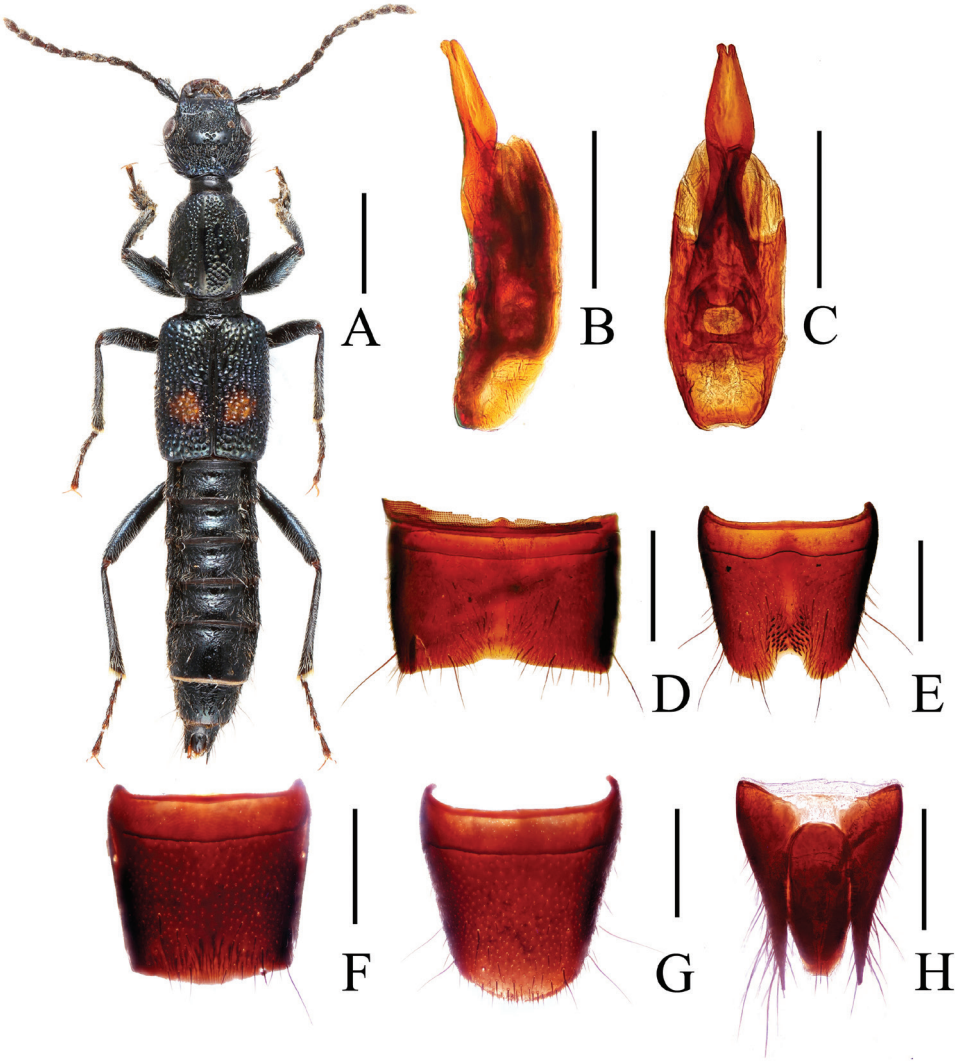

Figure 1. *Lobrathium ablectum*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII **F** female tergite VIII **G** female sternite VIII **H** female tergites IX-X. Scales: **A** 1mm, **B–H** 0.5mm.

Material examined (6 ♂♂, 1 ♀). **China, Shaanxi:** 3 ♂♂, 1 ♀, Hanzhong City, Nanzheng County, Yuanba Town, Liping National F. P., 32°50'N, 106°36'E, 1400–1600 m, 16–VII–2012, Li et al. leg. **Hubei:** 1 ♂,Wufeng County, Houhe National Reserve, 1100 m, 30°04'N, 110°37'E, 30–IV–2004, Li leg. **Guizhou:** 1 ♂, Tongren City, Fanjing Shan, Hu & Tang leg.; 1 ♂, Yanhe County, Wanjia Village, Mayanghe N. R., 900 m, 28°51'N, 108°21'E, 03–X–2007, Zhu leg.

Distribution. The known distribution is confined to the Daba Shan (Assing 2012) and the Wuling Shan in Hubei, Guizhou, and Shaanxi.

***Lobrathium anatinum* Li & Li, sp. n.**
urn:lsid:zoobank.org:act:9D9DA5B9-5138-437B-B2B9-81E536FD2E6E
http://species-id.net/wiki/Lobrathium_anatinum
Figs 2

Type material (2 ♂♂). **Holotype**, ♂: "China, Guangxi, Lingui County, Anjiangping, 1700 m, 25°33'N, 109°55'E, 17–VII–2011, Peng Zhong leg. / Holotype ♂, *Lobrathium anatinum*, sp. n. Li & Li, det. 2013". **Paratype**, ♂: "China, Guangxi, Lingui County, Anjiangping, 1400–1700 m, 25°33'N, 109°56'E, 14–VII–2011, Peng Zhong leg. / Paratype ♂, *Lobrathium anatinum*, sp. n. Li & Li, det. 2013".

Description. Body length 7.28–7.89 mm, length of fore body 3.89–4.0 mm. Habitus as in Fig. 2A. Coloration: body black with distinct bluish hue, middle of elytra with yellowish spot not reaching lateral and posterior margins; legs blackish with paler tarsi, antennae dark brownish to blackish.

Head weakly transverse (HW/HL = 1.10–1.11), widest across eyes; posterior angles broadly rounded; punctation dense and moderately coarse, sparser in median dorsal portion; interstices without microsculpture. Eyes large, more than half as long as distance from posterior margin of eye to neck in dorsal view. Antenna long and slender, 1.96–2.22 mm long.

Pronotum 1.24–1.30 times as long as broad, as wide as head (PW/HW = 1.0), lateral margins convex in dorsal view, punctation similar to that of head, but with impunctate midline, interstices glossy.

Elytra wider than pronotum and nearly as long as pronotum (EL/EW = 0.95–1.0, EW/PW = 1.15–1.3, EL/PL = 0.91–0.94); punctation coarse and dense, arranged in series; interstices without microsculpture. Hind wings apparently present.

Abdomen broader than elytra; punctation fine and dense; posterior margin of tergite VII with palisade fringe.

Male. Sternite VII (Fig. 2D) strongly transverse and with distinct median impression, this impression without pubescence, posterior margin broadly concave; sternite VIII (Fig. 2E) weakly transverse, with long and pronounced postero-median impression, this impression with numerous modified, stout and short black setae, posterior excision moderately broad and moderately deep, on either side of this excision with long dark setae; aedeagus (Figs 2B, C) 1.70–1.72 mm long, ventral process long, flattened, and apically convex in ventral view.

Female. Unknown

Etymology. The specific epithet (Latin, adjective: of a duck) refers to the shape of the ventral process of the aedeagus, which somewhat resembles the mouth of a duckbill.

Comparative notes. This species is close to *L. ablectum* Assing (2012) in sharing a similar shape and chaetotaxy of the sternites VII and VIII. The new species differs from *L. ablectum* by larger body size, and by the longer, apically not bifid ventral process of the aedeagus.

Habitat and distribution. The present species was sifted from wet moss near a cold stream (Fig. 20A) in the Angjiangping National Reserve, Guangxi (Fig. 19), in July.

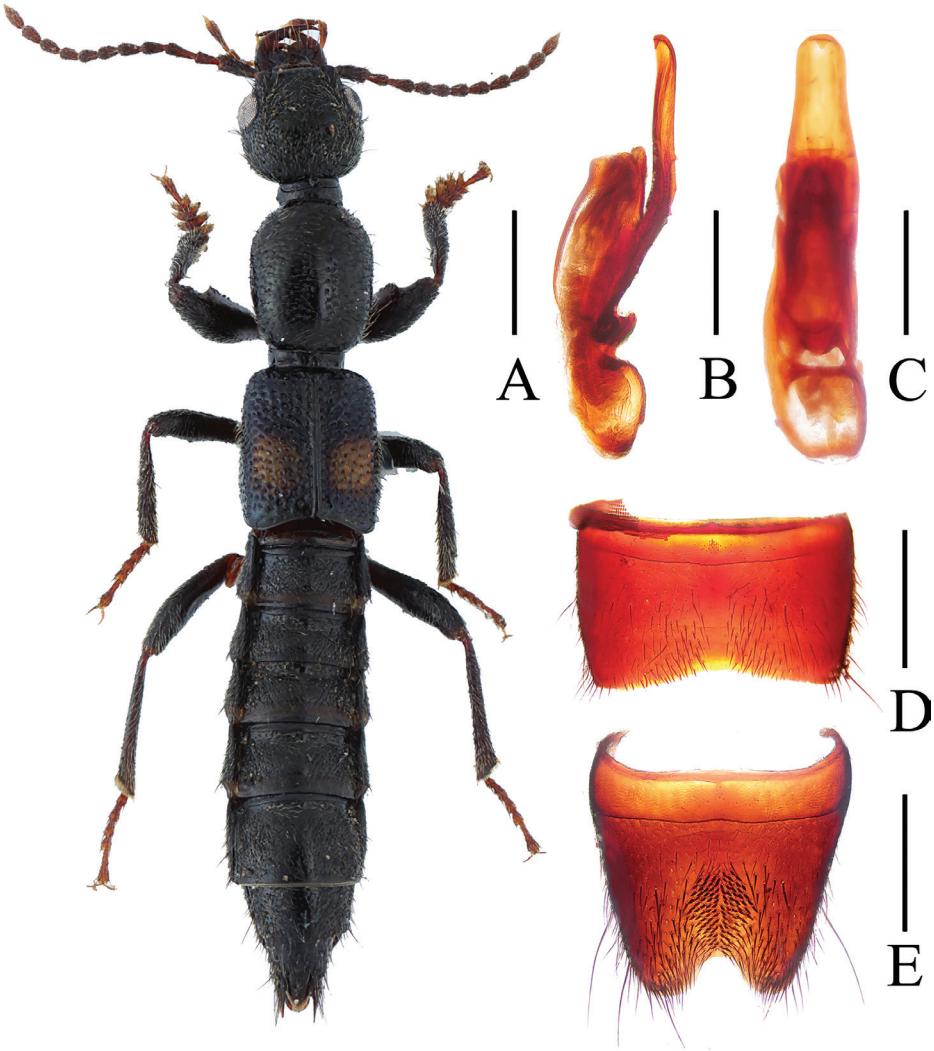

Figure 2. *Lobrathium anatitum*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII. Scales: **A** 1mm, **B**–**E** 0.5mm.

Lobrathium bispinosum **Assing**
http://species-id.net/wiki/Lobrathium_bispinosum
Figs 3

Lobrathium bispinosum Assing, 2012: 97. Type locality: Leigong Shan, 15 km Leishan, Leishan County, Guizhou.

Material examined (1 ♂). **China, Jiangxi:** 1 ♂, Jinggangshan City, Ciping Town, 850 m, 26°29'N, 114°05'E, 18–X–2010, Peng et al. leg.

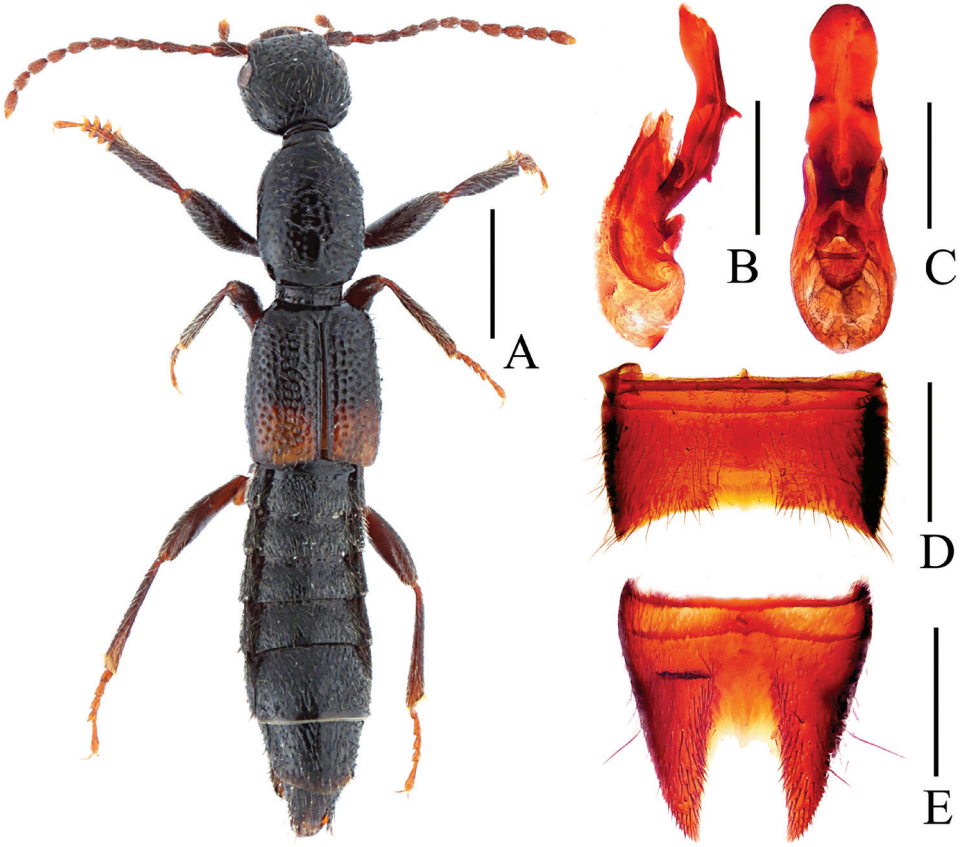

Figure 3. *Lobrathium bisponsum*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII. Scales: **A** 1mm, **B**–**E** 0.5mm.

Distribution. The original description of *L. bispinosum* is based on specimens from Guizhou (Assing 2012). The above record from Jiangxi extends the distributional range eastwards about 700 kilometers.

***Lobrathium configens* Assing**
http://species-id.net/wiki/Lobrathium_configens
Figs 4

Lobrathium configens Assing, 2012: 93. Type locality: 115 km WSW Xi'an, river bank above Houzhenzi, Qinling Shan, Shaanxi.

Material examined (2 ♂♂). **China, Yunnan:** 1 ♂, Hutiaoxia, Jinxing, 1800 m, 27°11'N, 100°06'E, 22–IV–2005, Huang leg. **Qinghai:** 1 ♂, Menda N. R., 2500 m, 35°47'N, 107°48'E, 24–VII–2004, Hu et al. leg.

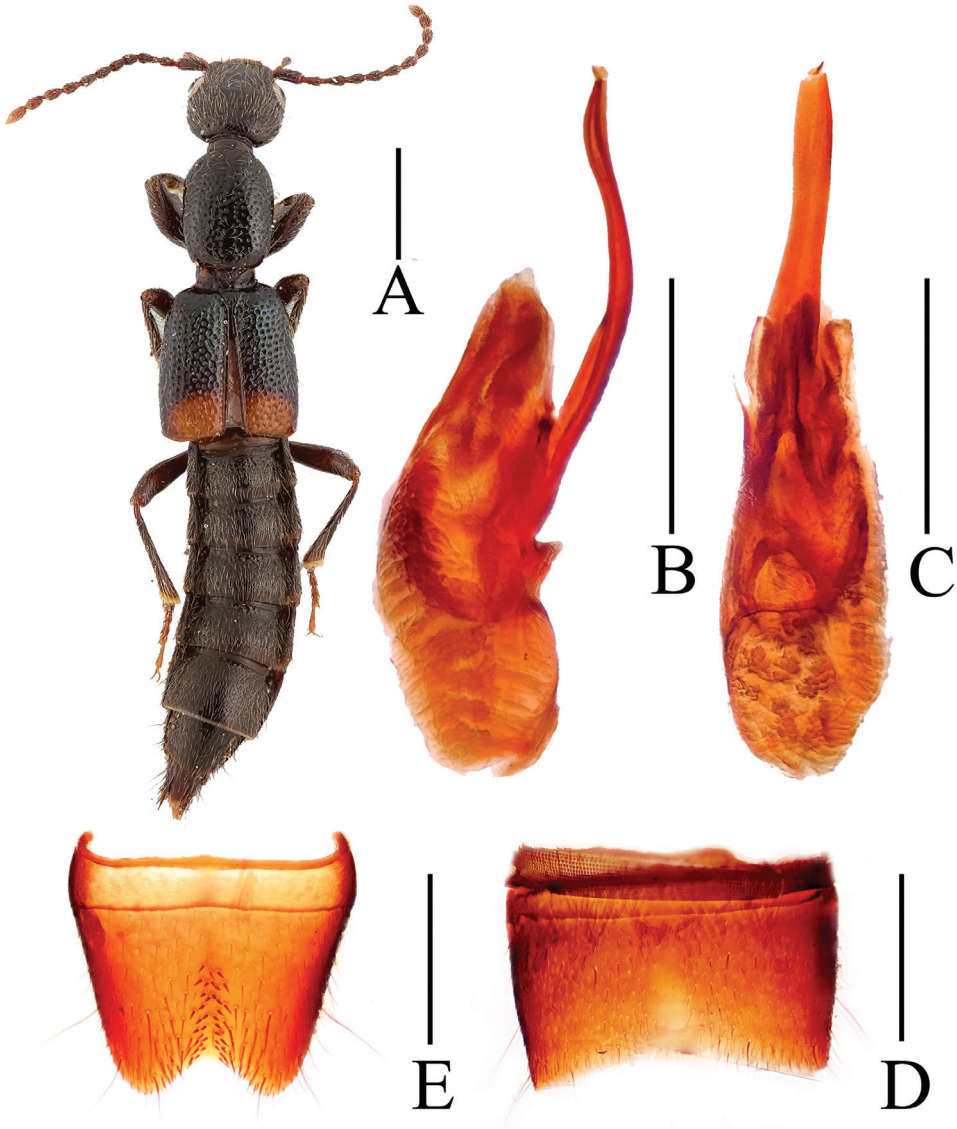

Figure 4. *Lobrathium configens*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII. Scales: **A** 1mm, **B**–**E** 0.5mm.

Distribution. The original description of *L. configens* is based on specimens from Hubei, Sichuan, Yunnan, and Shaanxi (Assing 2012). The above records extend the wide distributional range of *L. configens* southwards by about 1200 kilometers.

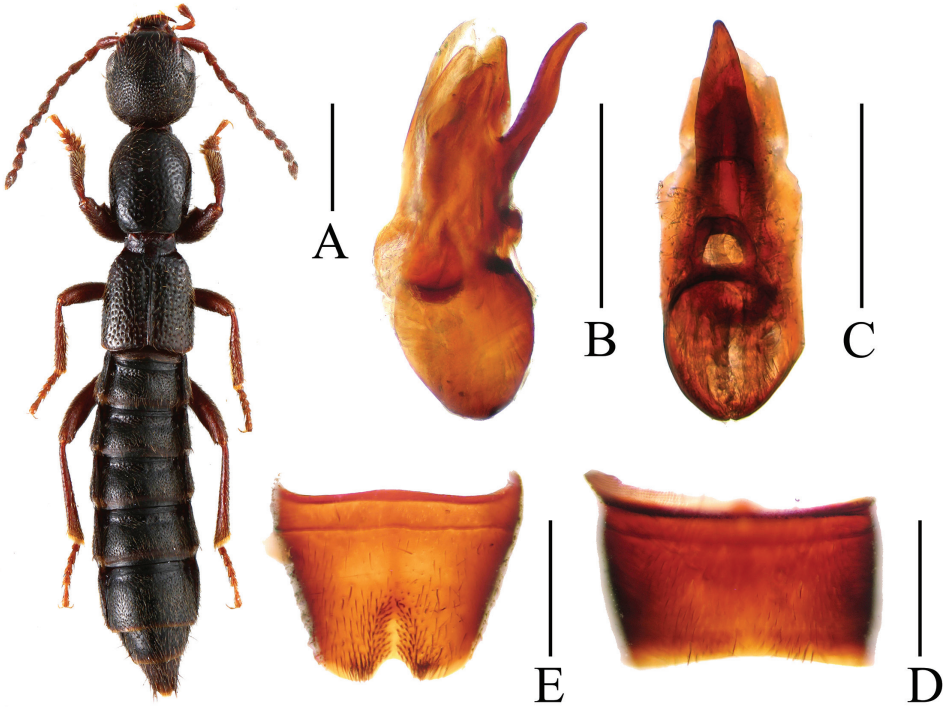

Figure 5. *Lobrathium daxuense*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII. Scales: **A** 1mm, **B–E** 0.5mm.

***Lobrathium daxuense* Assing**
http://species-id.net/wiki/Lobrathium_daxuense
Figs 5

Lobrathium daxuense Assing, 2012: 109. Type locality: Daxue Shan, Sichuan.

Material examined (1 ♂)**. China, Sichuan:** 1 ♂, Tianquan County, Erlang Shan, Yakou 3.6 km, 29°31'N, 102°17'E, 2600–2800m, 11–VII–2012, Peng et al. leg.

Distribution. Sichuan.

***Lobrathium demptum* Assing**
http://species-id.net/wiki/Lobrathium_demptum
Figs 6

Lobrathium demptum Assing, 2012: 97. Type locality: Dabie Shan, Hubei.

Material examined. (47 ♂♂, 49 ♀♀)**. China, Zhejiang:** 17 ♂♂, 12 ♀♀, Anji County, Longwang Shan, 950–1200 m, 25–IV–2006, Shen et al. leg.; 8 ♂♂, 14 ♀♀, Anji

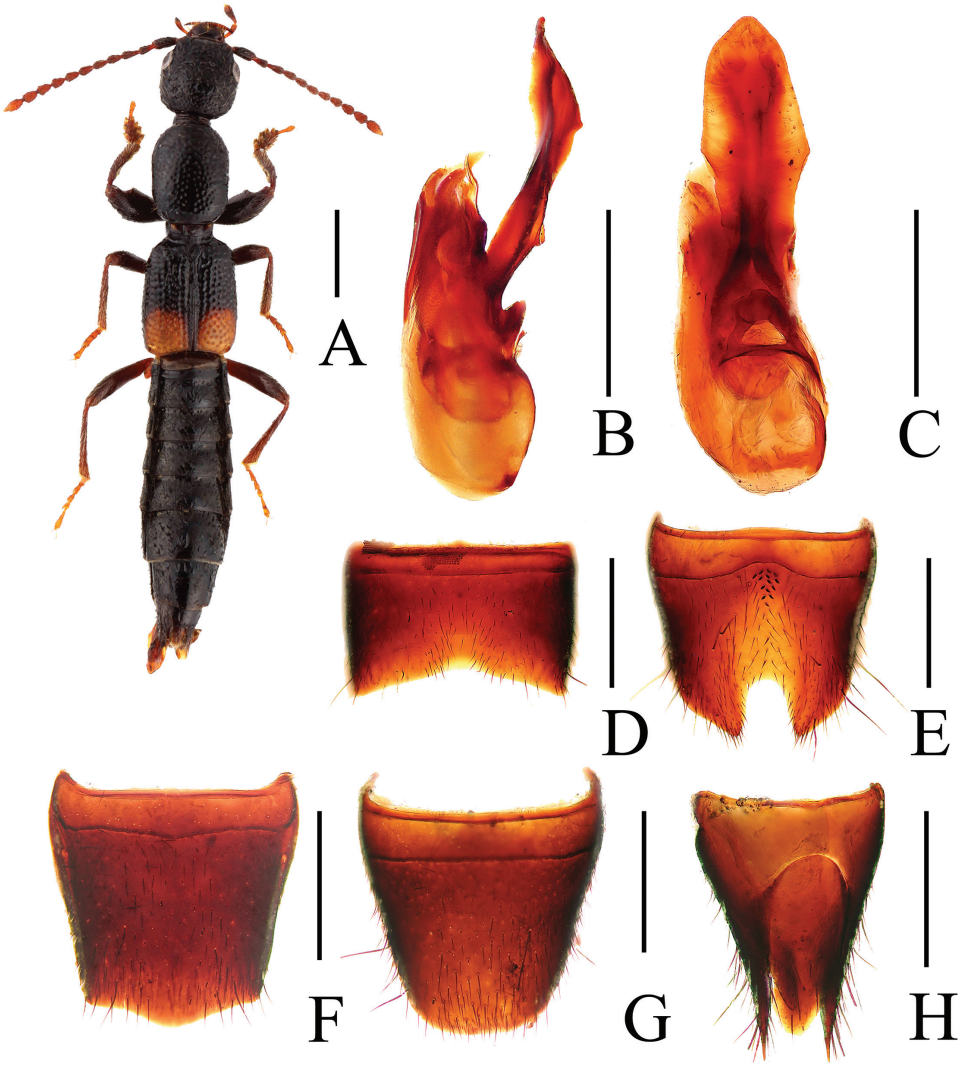

Figure 6. *Lobrathium demptum*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII **F** female tergite VIII **G** female sternite VIII **H** female tergites IX-X. Scales: **A** 1mm, **B**–**H** 0.5mm.

County, Longwang Shan, 950–1200 m, 25–IV–2004, Tang et al. leg.; 2 ♂♂, 1 ♀, Anji County, Longwang Shan, 300–500 m, 23–IV–2004, Zhu leg.; 11 ♂♂, 12 ♀♀, Anji County, Longwang Shan, 03–X–2003, Hu et al. leg.; 8 ♂♂, 8 ♀♀, Lin'an City, East Tianmu Shan, 1050–1150 m, 13–IV–2011, Peng & Zhu leg.; 1 ♂, 2 ♀♀, Tianmu Shan, Gaoling, 800 m, 26–IV–2008, He & Tang leg.

Distribution. The original description of *L. demptum* is based on specimens from the Dabie Shan, Hubei (Assing 2012). The above records from Zhejiang extend the range towards the southeast by about 400 kilometers.

Lobrathium diaoluoense **Li & Li, sp. n.**
urn:lsid:zoobank.org:act:712D3A23-CF9D-454E-864A-48C10F88F56B
http://species-id.net/wiki/Lobrathium_diaoluoense
Figs 7

Type material (10 ♂♂, 16 ♀♀)**. Holotype**, ♂: "China, Hainan, Lingshui County, Diaoluo Shan, 1000 m, 18°43'N, 109°51'E, 24–IV–2012, Peng Zhong & Dai Congchao leg. / Holotype ♂, *Lobrathium diaoluoense*, sp. n., Li & Li, det. 2013". **Paratypes**, 9 ♂♂, 16 ♀♀: same data as holotype.

Description. Body length 4.61–5.95 mm, length of fore body 2.94–3.28 mm. Habitus as in Fig. 7A. Coloration: body black, posterior portion of elytra with yellowish spot reaching posterior and lateral margins; legs with paler tarsi; antennae yellowish.

Head as long as broad or weakly oblong (HL/HW = 1.0–1.09); posterior angles marked; punctation coarse and dense, sparser in median dorsal portion, interstices without microsculpture. Eyes large, more than half as long as distance from posterior margin of eye to neck. Antenna slender, 1.54–1.78 mm long.

Pronotum slender, approximately as wide as head (PL/PW = 1.25–1.31, PW/HW = 0.96–1.0), lateral margins weakly convex in dorsal view; punctation dense and coarse, similar to that of head, median dorsal portion more sparsely punctate or impunctate; interstices without microsculpture and glossy.

Elytra longer and broader than pronotum (EL/EW = 1.09–1.15, EW/PW = 1.24–1.37, EL/PL = 1.11–1.14); humeral angles marked; punctation coarse and dense, interstices without microsculpture and glossy. Hind wings fully developed.

Abdomen distinctly narrower than elytra; punctation fine and dense; posterior margin of tergite VII with palisade fringe; posterior margin of tergite VIII weakly concave, without appreciable sexual dimorphism.

Male. Sternite VII (Fig. 7D) with deep and broad median impression without pubescence, posterior margin broadly and rather strongly concave; sternite VIII oblong, with deep and large U-shaped posterior excision (Fig. 7F), without modified setae, on either side of posterior excision with long dark setae; aedeagus (Figs 7B, C) with ventral process of very distinctive morphology, furcate apically, and this bifurcation forming an angle of less than 30 degrees in lateral view.

Female. Posterior margin of tergite VIII (Fig. 7G) weakly convex; sternite VIII (Fig. 7H) of similar shape as tergite VIII; tergite IX (Fig. 7I) undivided anteriorly; tergite X of subovoid shape.

Etymology. The specific epithet (adjective) is derived from the Diaoluo Shan where the type locality is situated.

Comparative notes. This species is similar to *L. bipeniculatum* Assing (2010) and *L. pengi* Li & Li sp. n. (described below) in sharing similar shapes of the male sternites VII and VIII, and of the aedeagus. It can be separated from *L. bipeniculatum* by the broader median impression of the male sternite VII (Fig. 7D), and by the absence of clusters of long dark setae at the margins of the posterior excision of the male sternite VIII (Fig. 7F). In *L. pengi*, the ventral process of the aedeagus is of different shape, with the apical bifurcation forming an angle of more than 30 degrees in lateral view.

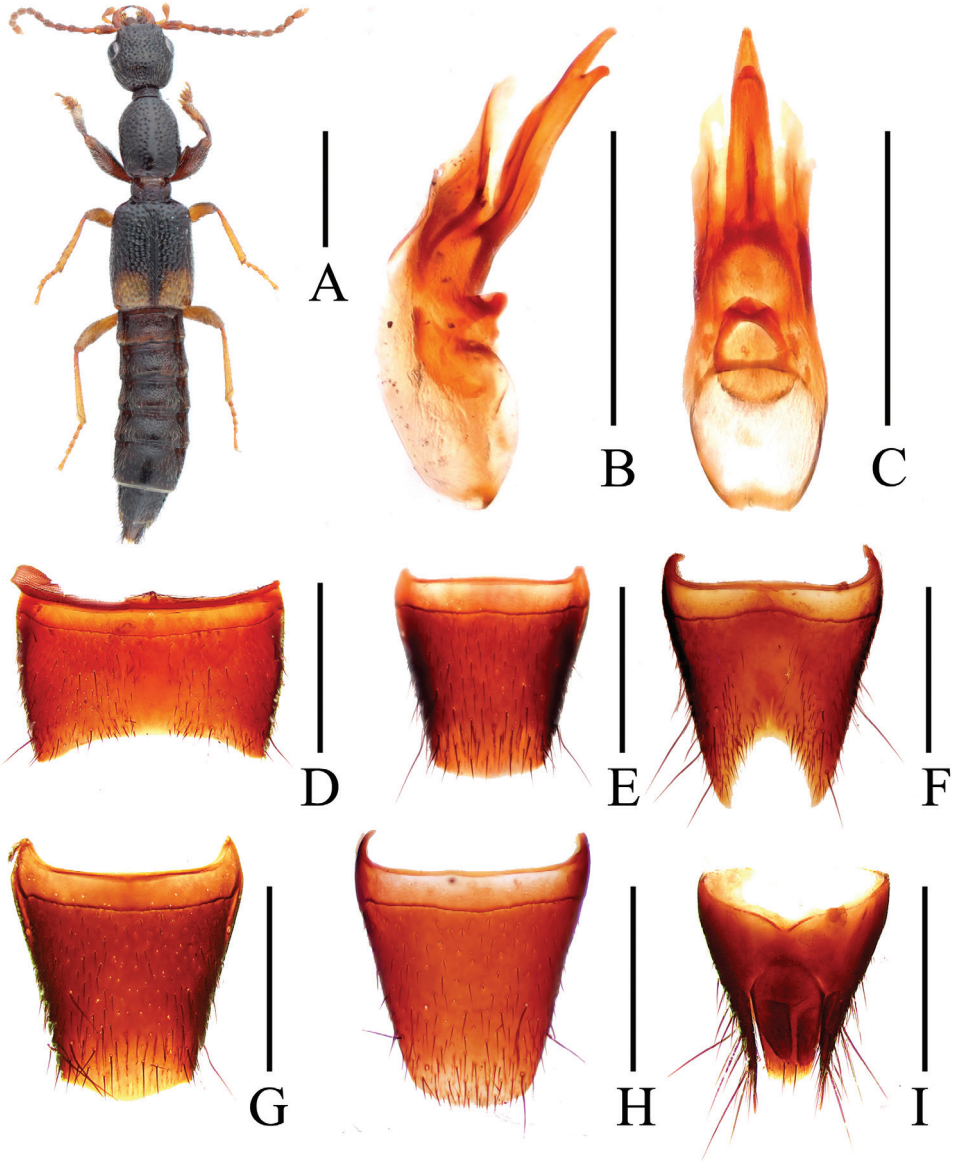

Figure 7. *Lobrathium diaoluoense*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male tergite VIII **F** male sternite VIII **G** female tergite VIII **H** female sternite VIII **I** female tergites IX–X. Scales: **A** 1mm, **B–I** 0.5mm.

Habitat and distribution. The present species was sifted from wet moss on stones alongside a reservoir (red circle in Fig. 20B) in the Diaoluo Shan, Hainan (Fig. 19), in April.

***Lobrathium dufui* Li & Li, sp.n.**
urn:lsid:zoobank.org:act:48A1D1FD-6CAB-4238-8190-6FBB06DAB5B5
http://species-id.net/wiki/Lobrathium_dufui
Figs 8

Type material (1 ♂, 2 ♀♀)**. Holotype**, ♂: "China, Hubei, Wufeng County, Houhe National Reserve, 30–IV–2004, 1100 m, 30°04'N, 110°37'E, Li Li-zhen leg. / Holotype ♂, *Lobrathium dufui*, sp. n. Li & Li, det. 2013". **Paratypes**, 2 ♀♀: same data as holotype.

Description. Body length 5.84–6.89 mm, length of fore body 3.34–3.61 mm. Habitus as in Fig. 8A. Coloration: body black, posterior portion of elytra with oblong yellowish spot of at least 2/5 the length of elytra and reaching posterior margins and lateral margins; legs blackish with slightly paler tibiae and tarsi; antennae brown.

Head weakly transverse (HW/HL = 1.02–1.09), widest at eyes, weakly tapering behind eyes; posterior angles rounded, not marked; punctation coarse and moderately dense, sparser in median dorsal portion and on frons; interstices without microsculpture. Eyes large, more than half the length of postocular region from posterior margin of eyes to neck in dorsal view. Antenna slender, 1.72–2.18 mm long.

Pronotum approximately as wide as head (PL/PW = 1.25–1.31, PW/HW = 0.96–1.10); lateral margins weakly convex in dorsal view; punctation dense and coarse, similar to that of head, but with impunctate midline; interstices without microsculpture and glossy.

Elytra broader than pronotum (EL/EW = 1.02–1.06, EW/PW = 1.21–1.39, EL/PL = 1.01–1.08); humeral angles marked; punctation coarse and dense. Hind wings apparently present.

Abdomen distinctly narrower than elytra; punctation fine and dense; posterior margin of tergite VII with palisade fringe; tergite VIII (Fig. 8F) without appreciable sexual dimorphism, posterior margin broadly convex.

Male. sternite VII (Fig. 8D) transverse and posteriorly with pronounced impression of triangular shape, this impression impunctate in the middle and laterally with a few modified, stout and short black setae, posterior margin broadly and weakly concave; sternite VIII (Fig. 8E) weakly transverse, with deep and broad, U-shaped posterior excision, median impression furnished with numerous modified, stout, short and black setae; aedeagus (Figs 8B, C) with ventral process of very distinctive morphology, apically with fissure and bifid.

Female. Sternite VIII (Fig. 8G) weakly transverse, posteriorly convex; tergite IX (Fig. 8H) undivided anteriorly, anterior margin emarginated in the middle; tergite X of subovoid shape.

Etymology. The species is named after the famous late poet Fu Du, who was born in Hubei.

Comparative notes. This species is similar to *L. uncinatum* Li & Li sp. n. (described below) in external characters, and to *L. hebeatum* Zheng (1988) in sexual characters. It differs from *L. uncinatum* by the shape of the aedeagus and by the absence of

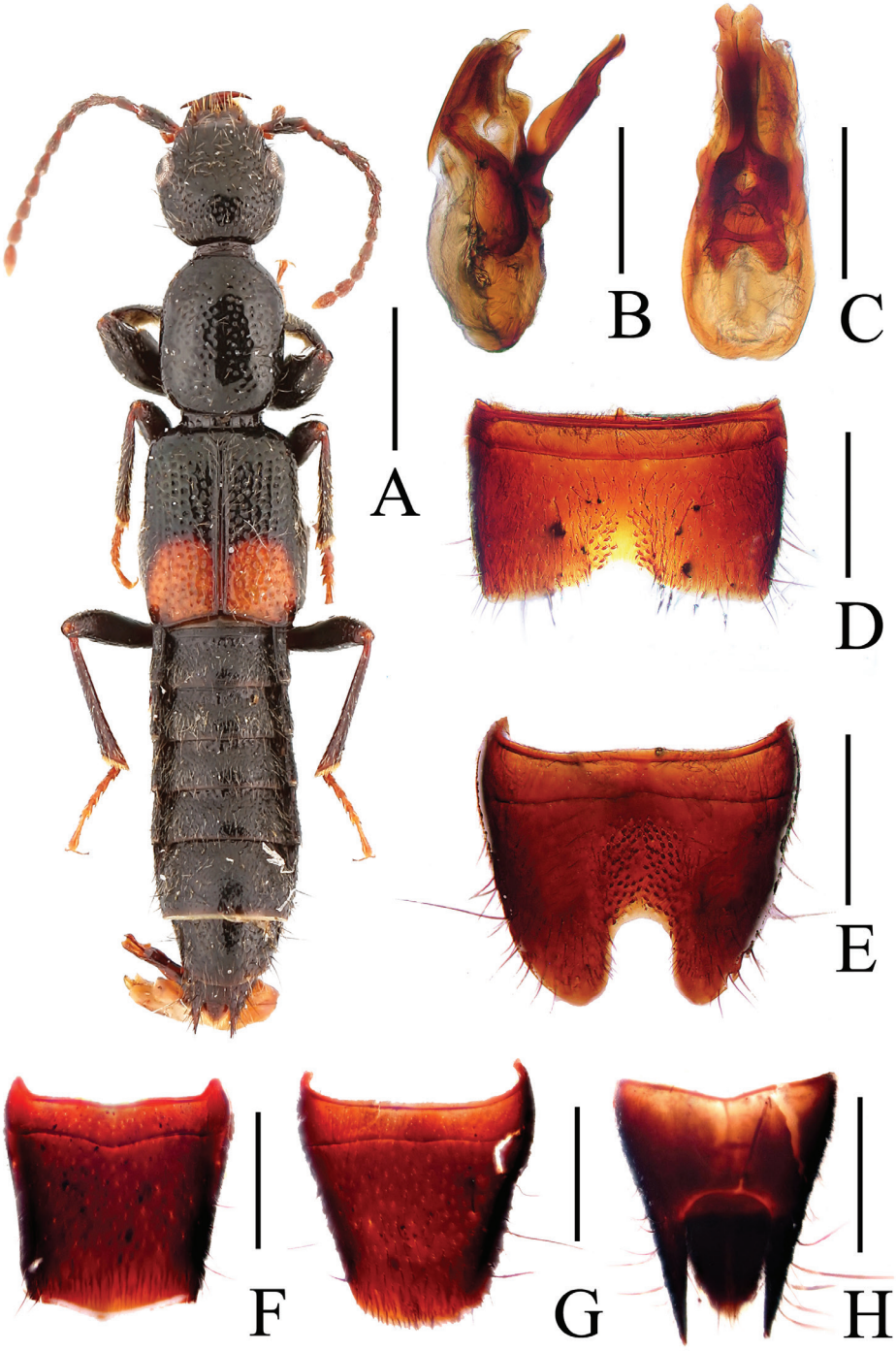

Figure 8. *Lobrathium dufui*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII **F** female tergite VIII **G** female sternite VIII **H** female tergites IX-X. Scales: **A** 1mm, **B**–**H** 0.5mm.

modified setae on the male sternite VI, and from *L. hebeatum* by the shape of the apex of the ventral process of the aedeagus.

Habitat and distribution. The type specimens were sifted from wet moss near a stream (Fig. 20C) in Hubei (Fig. 19).

***Lobrathium hebeatum* Zheng**
http://species-id.net/wiki/Lobrathium_hebeatum
Figs 9

Lobrathium hebeatum Zheng, 1988: 189. Type locality: Emei Shan, Sichuan.
Lobrathium hebeatum Zheng: Assing, 2012: 91. New distribution: Sichuan, Shaanxi, Yunnan.

Material examined (6 ♂♂, 8 ♀♀)**. China, Shaanxi:** 4 ♂♂, 5 ♀♀, Foping N. R., 1400–1800 m, 33°31'N, 107°56'E, 19–VII–2004, Hu et al. leg.; 1 ♂, 1 ♀, Taibai Shan, 1450–1750 m, 34°03'N, 107°53'E – 33°53'N, 107°48'E, 15–VII–2004, Hu & Tang leg. **Sichuan:** 1 ♂, 2 ♀♀, Luding County, Hailuogou, 3000 m, 29°44'N, 102°07'E, 25–VII–2006, Hu & Tang leg.

Distribution. Sichuan, Yunnan, Shaanxi.

***Lobrathium hongkongense* Bernhauer**
http://species-id.net/wiki/Lobrathium_hongkongense
Figs 10

Lathrobium hongkongense Bernhauer1931: 127. Type locality: Hongkong.
Lobrathium sibynium Zheng, 1988: 186. Distribution: Sichuan; Assing, 2012: 86, proposed synonymy. New distribution: Jiangsu, Zhejiang, Hubei, Guangxi, Sichuan, Yunnnan.

Material examined (67 ♂♂, 84 ♀♀)**. China, Fujian:** 1 ♂, 1 ♀, Guihe Village, Meihua Shan, 1200 m, 25°19'N, 116°51'E, 31–V–2007, Huang & Xu leg. **Guizhou:** 1 ♂, 1 ♀, Suiyang County, Kuankuoshui N. R., Baishaogou, 700 m, 28°10'N, 107°16'E, 04–VI–2010, Lu et al. leg. **Yunnan:** 3 ♂♂, 1 ♀, Nabanhe N. R., Chuguohe, Benggang-hani, 1750 m, 28–IV–2009, Hu & Yin leg. **Zhejiang:** 1 ♂, 2 ♀♀, Zhuji City, Dongbai Shan, 200 m, 29°31'N, 120°25'E, 06–V–2012, Zhao leg.; 8 ♂♂, 12 ♀♀, Wuyanling N. R., 700 m, 10–IV–2004, Hu et al. leg.; 7 ♂♂, 13 ♀♀,Wenzhou City, Yandang Shan, 50–350 m, 29–V–2006, Li & Shen leg.; 1 ♂, 1 ♀, Pan'an County, Dapan Shan, 550–800 m, 06–VI–2006, Li & Shen leg.; 25 ♂♂, 22 ♀♀, Baishanzu N.R., 1200–1360 m, 05–V–2004, Hu et al. leg.; 20 ♂♂, 31 ♀♀, Gutian N. R., 5-7–V–2005, Zhu & Li leg.

Comment. For illustrations of the female sexual characters see Figs 10G–H.

Distribution. Widespread species, recorded from Jiangsu, Zhejiang, Fujian, Hubei, Guangxi, Sichuan, Guizhou, and Yunnan.

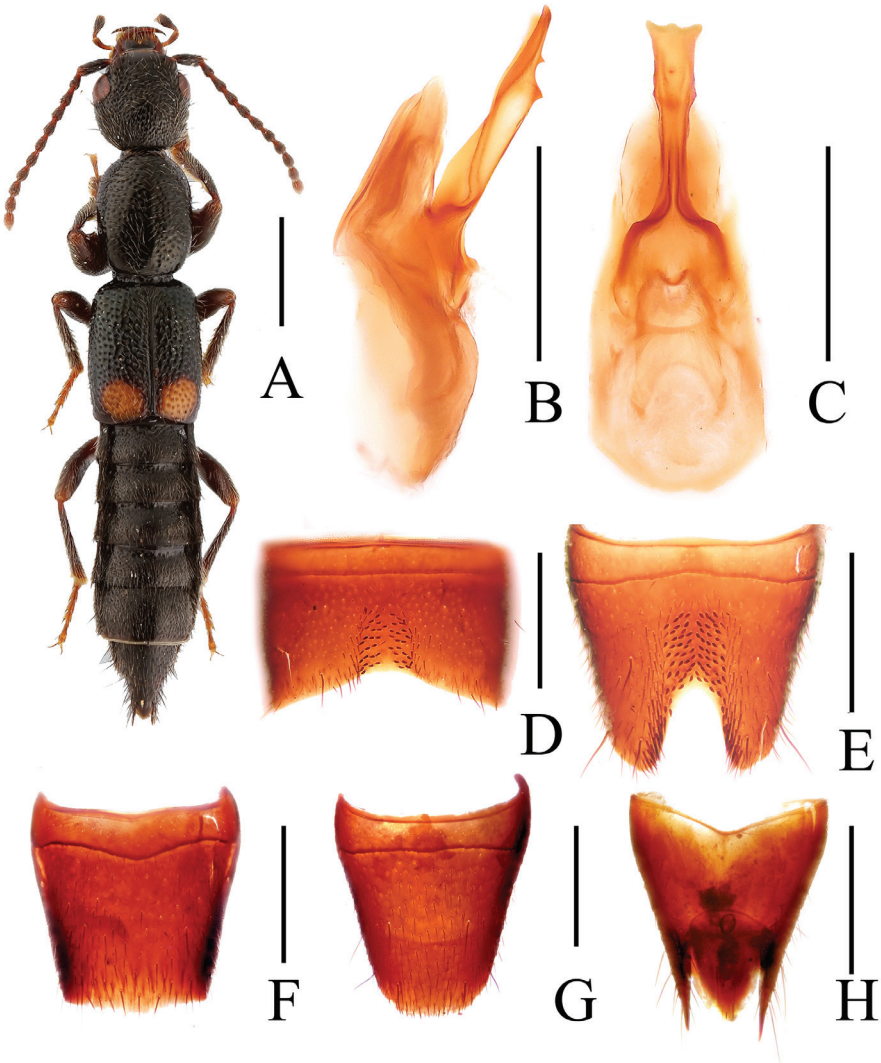

Figure 9. *Lobrathium hebeatum*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII **F** female tergite VIII **G** female sternite VIII **H** female tergites IX-X. Scales: **A** 1mm, **B**–**H** 0.5mm.

Lobrathium lirunyui **Li & Li, sp. n.**
urn:lsid:zoobank.org:act:BD413210-58A8-4AF0-88F7-F159C30D5E3E
http://species-id.net/wiki/Lobrathium_lirunyui
Figs 11

Type material (1 ♂)**. Holotype**, ♂: "China, Guizhou, Zunyi City, Fenghuang Shan, 800 m, 27°41'N, 106°55'E, 19–VI–2012, Li Run-yu leg. / Holotype ♂, *Lobrathium lirunyui*, sp. n. Li & Li, det. 2013".

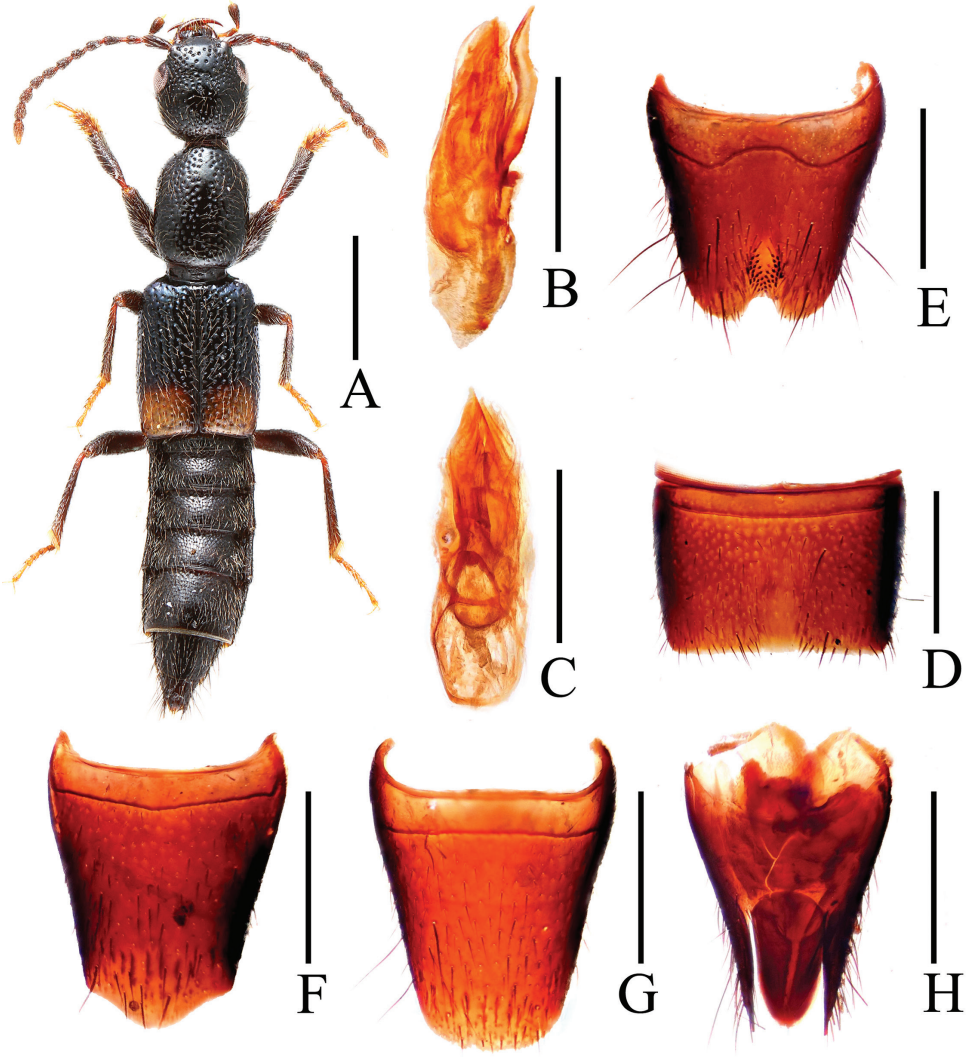

Figure 10. *Lobrathium hongkongense*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII **F** female tergite VIII **G** female sternite VIII **H** female tergites IX–X. Scales: **A** 1mm, **B**–**H** 0.5mm.

Description. Large species, body length 9.40 mm, length of fore body 4.20 mm. Habitus as in Fig. 11A. Body reddish brown, legs reddish with pale-reddish tarsi, antennae reddish to brown.

Head longer than wide (HL/HW = 1.06), widest posteriorly; posterior angles weakly marked; punctation of dorsal surface fine and very dense; interstices without microsculpture. Eyes small, approximately one third the length of distance from posterior margin of eye to neck in dorsal view. Antenna long and slender, 2.50 mm long.

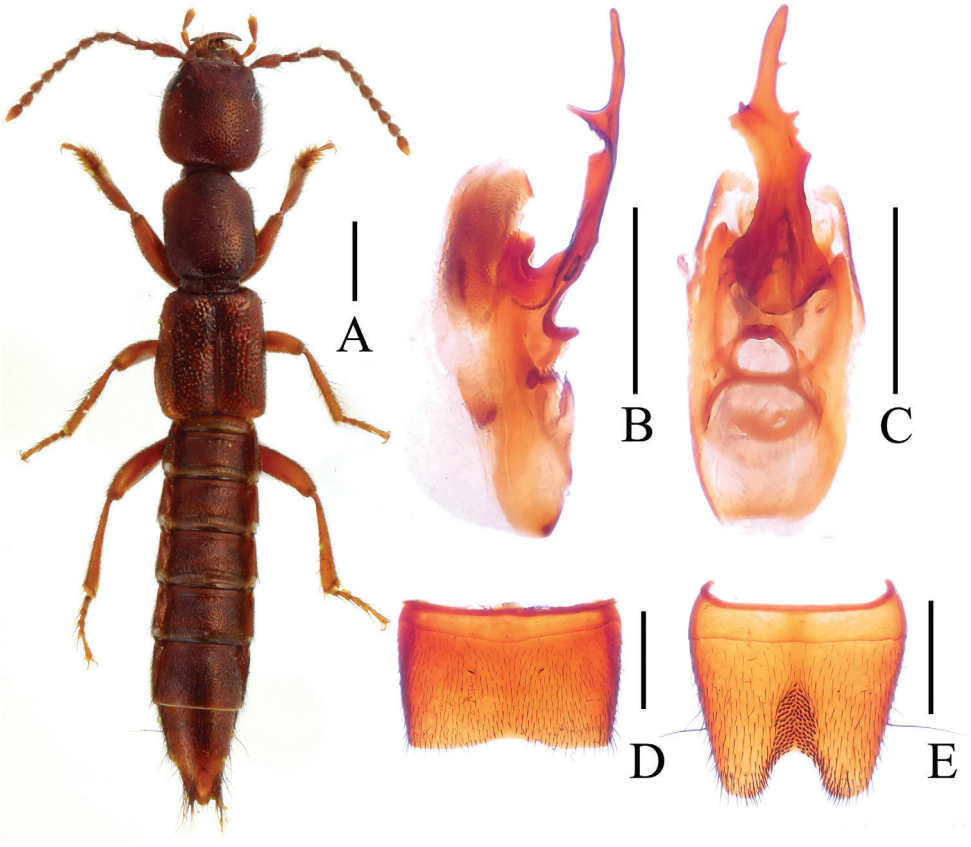

Figure 11. *Lobrathium lirunyui*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII. Scales: **A** 1mm, **B**–**E** 0.5mm.

Pronotum slender (PL/PW = 1.28, PW/HW = 0.90), lateral margins almost straight and subparallel in dorsal view; punctation similar to that of head, but with impunctate midline.

Elytra longer than wide (EL/EW = 1.02, EW/PW = 1.25, EL/PL = 1.08); punctation coarse and dense, arranged in somewhat irregular series; interstices without microsculpture. Hind wings apparently fully developed.

Abdomen distinctly narrower than elytra; punctation fine and dense; posterior margin of tergite VII with palisade fringe.

Male. Sternite VII (Fig. 11D) strongly transverse, and with shallow median impression posteriorly, without modified setae, posterior margin broadly and weakly concave; sternite VIII (Fig. 11E) weakly transverse, with long and extensive posteromedian impression, this impression with numerous modified, stout and short black setae, posterior excision rather broad and U-shaped, on either side of this excision with long dark submarginal setae; aedeagus (Figs 11B, C) 1.56 mm long, with asymmetric ventral process of distinctive shape.

Female. Unknown

Etymology. The species is named after Runyu Li, collector of the holotype.

Comparative notes. This species is readily distinguished from all its congeners by the following character combination: elytra without spot, whole body of brownish coloration; punctation of head fine and dense, eyes very small, one third as long as distance from posterior margin of eye to neck, male sexual characters highly distinctive.

Habitat and distribution. The holotype was sifted in fern vegetation near a wet tree root (Fig. 20D) in the Fenghuang Shan, Guizhou (Fig. 19).

***Lobrathium pengi* Li & Li, sp. n.**
urn:lsid:zoobank.org:act:50DF2D82-E0AD-4B81-996D-BEFC980CD79A
http://species-id.net/wiki/Lobrathium_pengi
Figs 12

Type material (7 ♂♂, 3 ♀♀)**. Holotype**, ♂: "China, Guangxi, Shangsi County, Shiwanda Shan, Forest Park, 300–500 m, 21°54'N, 107°54'E, 25–IV–2011, Peng Zhong & Zhu Jian-qing leg. / Holotype ♂, *Lobrathium pengi*, sp. n. Li & Li, det. 2013". **Paratypes**, 6 ♂♂, 3♀♀**:** same data as holotype.

Description. Body length 6.34–7.34 mm, length of fore body 3.11–3.73 mm. Habitus as in Fig. 12A. Coloration: body black, elytra in posterior 1/3–2/5 with subcircular yellowish spot reaching posterior , but not lateral margins; legs yellowish with forelegs brown to blackish, femora and protibiae and tarsi paler; antennae brown.

Head weakly transverse (HW/HL = 1.02–1.03); posterior angles not marked; punctation coarse and dense, sparser in median dorsal portion, interstices without microsculpture. Eyes large, more than half as long as the distance from posterior margin of eye to neck. Antenna slender, 1.68–1.82 mm long.

Pronotum nearly as wide as head (PL/PW = 1.13–1.33, PW/HW = 0.97–0.98), lateral margins weakly convex in dorsal view; punctation dense and coarse, similar to that of head, but with impunctate midline; interstices without microsculpture and glossy.

Elytra broader than pronotum (EL/EW = 1.0–1.06, EW/PW = 1.35–1.40, EL/PL = 0.98–1.12); humeral angles marked; punctation coarse and dense. Hind wings fully developed.

Abdomen distinctly narrower than elytra; punctation fine and dense; posterior margin of tergite VII with palisade fringe; tergite VIII (Fig. 12F) without appreciable sexual dimorphism, with weakly convex posterior margin.

Male. Sternite VII (Fig. 12D) strongly transverse, posterior impression of triangular shape and impunctate, posterior margin broadly and concave; sternite VIII (Fig. 12E) weakly transverse, without modified setae, posterior excision deep and rather narrow, on either side of this excision with long dark setae; aedeagus (Fig. 12B, C) approximately 1.0 mm long, ventral process of very distinctive morphology, slender and furcate apically, bifurcation forming an angle of more than 30 degrees in lateral view.

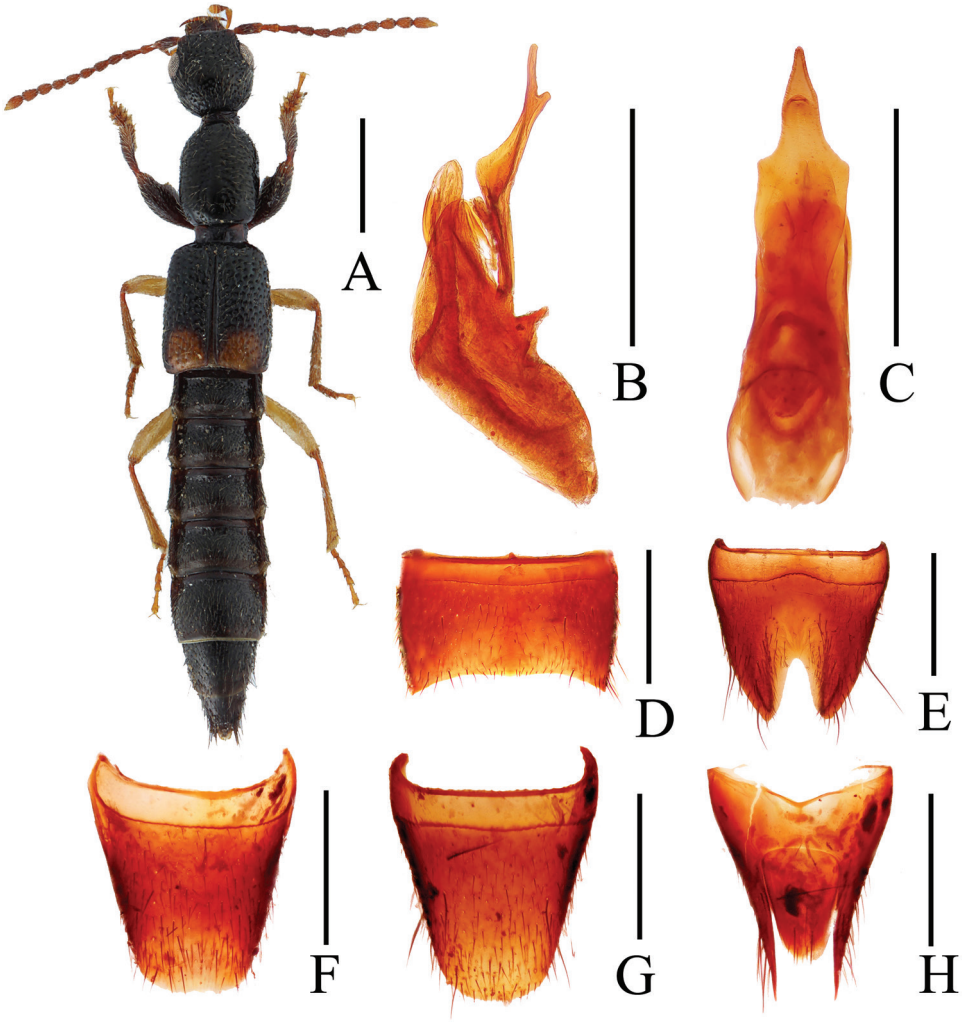

Figure 12. *Lobrathium pengi*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII **F** female tergite VIII **G** female sternite VIII **H** female tergites IX-X. Scales: **A** 1mm, **B**–**H** 0.5mm.

Female. Sternite VIII as in Fig. 12G; tergites IX-X (Fig. 6H) relatively short; tergite IX undivided anteriorly, anterior martin emarginated in the middle; tergite X of subovoid shape.

Etymology. The species is named after Zhong Peng, collector of the type specimens.

Comparative notes. This species is similar to *L. diaoluoense*, from which it is separated by the broader and apically more abruptly narrowed ventral process of the

aedeagus, with the apical bifurcation forming an angle of more than 30 degrees in lateral view.

Habitat and distribution. The specimens were sifted from wet moss along a streamside (Fig. 20E) in the Shiwanda Shan, Guangxi (Fig. 19), in April.

***Lobrathium quyuani* Li & Li, sp. n.**
urn:lsid:zoobank.org:act:B2CB6E5C-8ECB-453C-BB8C-1DA7F5969833
http://species-id.net/wiki/Lobrathium_quyuani
Figs 13

Material (3 ♂♂)**. Holotype**, ♂: "China, Hubei, Wufeng County, Houhe National Reserve, 1100 m, 30°04'N, 110°37'E, 30–IV–2004, Li Li-zhen leg. / Holotype ♂, *Lobrathium quyuani*, sp. n. Li & Li, det. 2013". **Paratypes**, 2 ♂♂: same data as holotype.

Description. Body length 5.78–6.34 mm, length of fore body 3.28–3.56 mm. Habitus as in Fig. 13A. Coloration: body black with bluish hue, elytra with yellowish to reddish spot reaching posterior but not lateral margins; legs blackish with dark-brownish tarsi; antennae dark-brownish.

Head as wide as long (HW/HL = 0.96–1.03), widest at eyes; posterior angles broadly rounded; punctation dense and moderately coarse, sparser in median dorsal portion; interstices without microsculpture. Eyes large, more than half as long as the distance from posterior margin of eye to neck in dorsal view. Antenna slender, 1.72–1.95 mm long.

Pronotum slender (PL/PW = 1.25–1.41, PW/HW= 0.92–1.0), lateral margins weakly convex in dorsal view, with impunctate midline, punctation similar to that of head, but distinctly sparser, interstices glossy.

Elytra longer than broad (EL/EW = 1.0–1.02, EW/PW = 1.24–1.33, EL/PL = 1.0–1.05); punctation coarse and dense, arranged in irregular series; interstices without microsculpture. Hind wings fully developed.

Abdomen narrower than elytra; punctation fine and dense; posterior margin of tergite VII with palisade fringe; posterior margin of tergite VIII strongly convex in the middle.

Male. Sternite VII (Fig. 13D) strongly transverse, posteriorly with pronounced median impression, this impression of somewhat triangular shape, without punctation and pubescence, posterior margin broadly and very weakly concave; sternite VIII (Fig. 3E) weakly transverse, postero-median impression with modified, stout and short black setae, posterior excision deep and moderately broad, on either side of this excision with long dark submarginal setae; aedeagus (Figs 13B, C) 1.36 mm long, with weakly asymmetric and apically acute ventral process.

Female. Unknown

Etymology. The specific epithet refers to the famous late poet Yuan Qu, who was born in Yichang (Hubei), which is near the type locality.

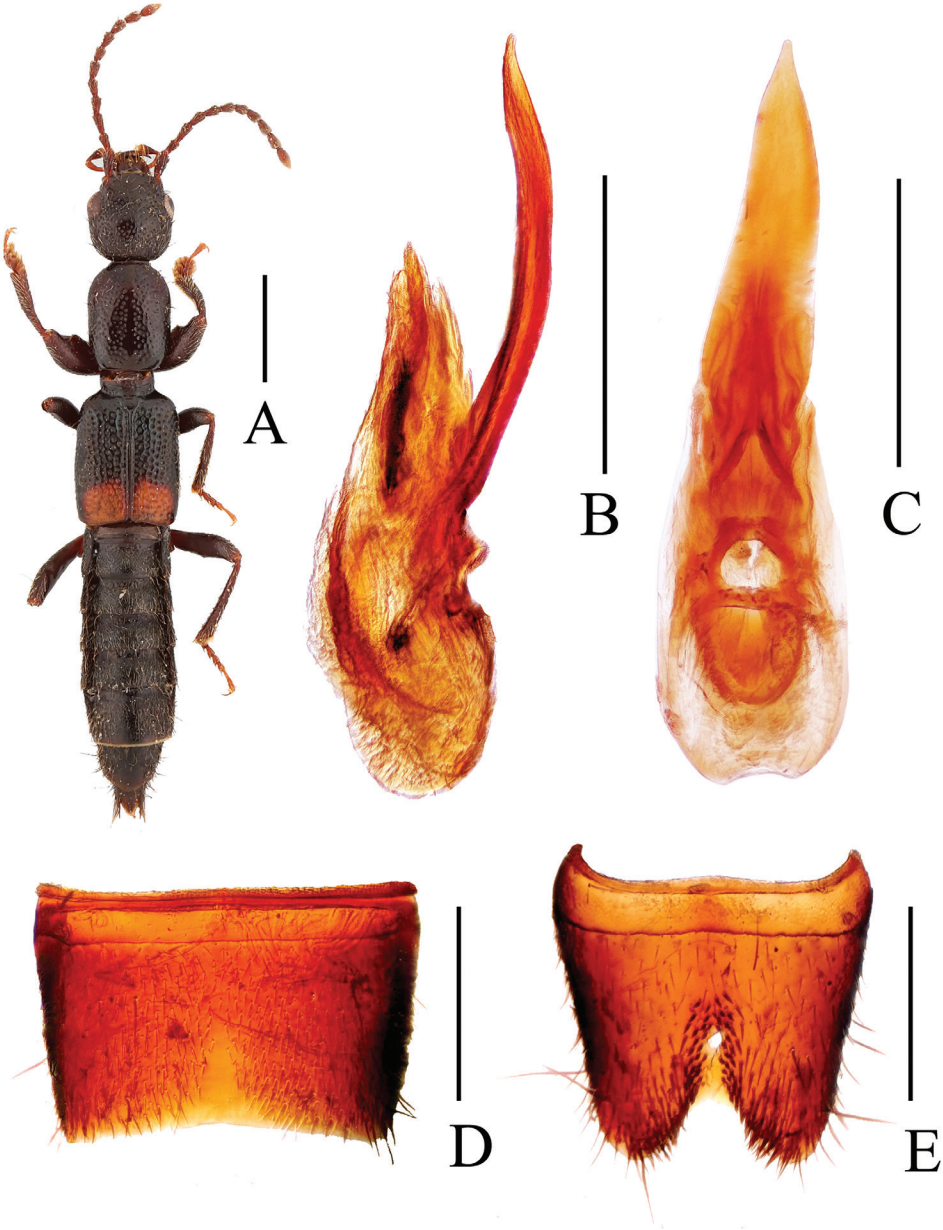

Figure 13. *Lobrathium quyuani*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII. Scales: **A** 1mm, **B**–**E** 0.5mm.

Comparative notes. This species is similar to *L. configens* Assing (2012) and *L. spathulatum* Assing (2012) in external characters. It is distinguished from both by the broader ventral process in ventral view.

Habitat and distribution. The specimens were sifted from wet moss near a stream (Fig. 20C) in the Houhe National Reserve, Hubei (Fig. 19).

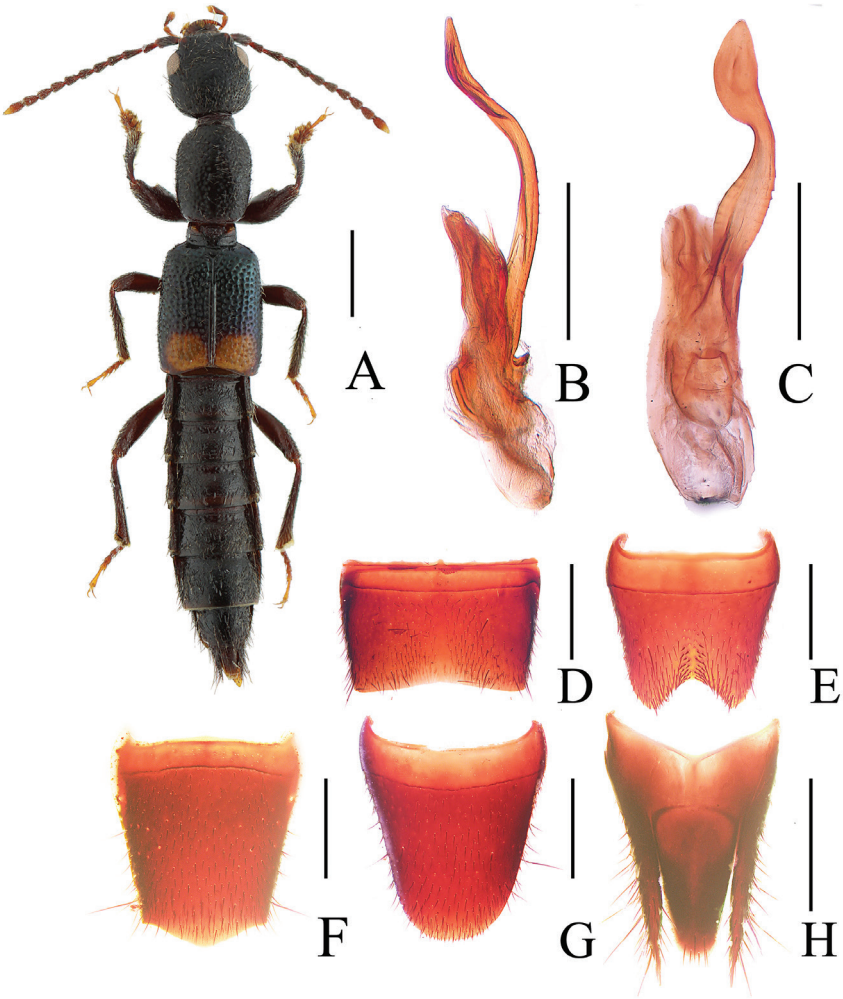

Figure 14. *Lobrathium spathulatum*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII **F** female tergite VIII **G** female sternite VIII **H** female tergites IX-X. Scales: **A** 1mm, **B**–**H** 0.5mm.

Lobrathium spathulatum **Assing**

http://species-id.net/wiki/Lobrathium_spathulatum
Figs 14

Lobrathium spathulatum Assing, 2012: 95. Type locality: Pingwu, Sichuan.

Material examined (2 ♂♂, 2 ♀♀)**. China, Zhejiang:** 1 ♂, 1 ♀, Anji County, Longwang Shan, Pingxi, 1000–1100 m, 09–VI–2012, Hu & Yin leg.; 1 ♂, 1 ♀, Qingliangfeng, 1050–1070 m, 09–V–2005, Zhu & Li leg.

Distribution. Widespread, recorded from Hubei, Shanxi, Zhejiang, Sichuan, and Shaanxi.

***Lobrathium taureum* Assing**
http://species-id.net/wiki/Lobrathium_taureum
Figs 15

Lobrathium taureum Assing, 2012: 100. Type locality: creek valley 8 km NW Muyuping, Daba Shan, Hubei.

Material examined (1 ♂). **China, Shanxi:** 1 ♂, Ningwu County, Ximafang, 1430m, 38°39'N, 112°01'E, 04–IX–2011, Peng leg.

Distribution. Beijing, Hubei, Shanxi.

***Lobrathium tortile* Zheng**
http://species-id.net/wiki/Lobrathium_tortile
Figs 16

Lobrathium tortile Zheng, 1988: 187. Type locality: Kangding, Sichuan.
Lobrathium tortile Zheng: Assing, 2012: 89. New distribution: Hubei, Sichuan, Shaanxi.

Additional material examined (6 ♂♂, 3 ♀♀). **China, Shaanxi:** 1 ♂, Taibai Shan, 1450–1750 m, 34°03'N, 107°53'E – 33°53'N, 107°48'E, 15–VII–2004, Hu & Tang leg.; 3 ♂♂, 2 ♀♀, Zhouzhi County, Houzhenzi, Qinling Shan, West Sangongli Valley, 33°50'N, 107°48'E, 17~19–V–2008, Huang & Xu leg. **Guizhou:** 1 ♂, Suiyang County, Kuankuoshui N. R., Baishaogou, 700 m, 28°10'N, 107°16'E, 03–VI–2010, Lu et al. leg. **Sichuan:** 1 ♂, 1♀, Shimian County, Liziping, 1800 m, 28°59'N, 102°28'E, 16–VII–2012, Dai et al. leg.

Distribution. Sichuan, Shaanxi, Hubei, Guizhou.

***Lobrathium tortuosum* Li et al.**
http://species-id.net/wiki/Lobrathium_tortuosum
Figs 17

Lobrathium tortuosum Li, Solodovnikov & Zhou, 2013: 574. Type locality: Fengyang Shan, Zhejiang.

Material examined (3 ♂♂, 1♀). **China, Zhejiang:** 1 ♂, Qingliangfeng, 1080 m, 08–V–2005, Zhu & Li leg.; 1 ♂, 1 ♀, Longquan City, Fengyang Shan, 1450–1600 m, 22–VII–2006, Shen & Li leg.; 1 ♂, Baishanzu N.R., 1200–1360 m, 05–V–2004, Hu et al. leg.

Distribution. The original description of *L. tortuosum* is based on specimens from the Fengyang Shan, Zhejiang (Li et al., 2013). The above records from Qingliangfeng extend the distributional range about 200 km northwards. The known distribution is confined to the Tianmu Shan and the Donggong Shan in Zhejiang.

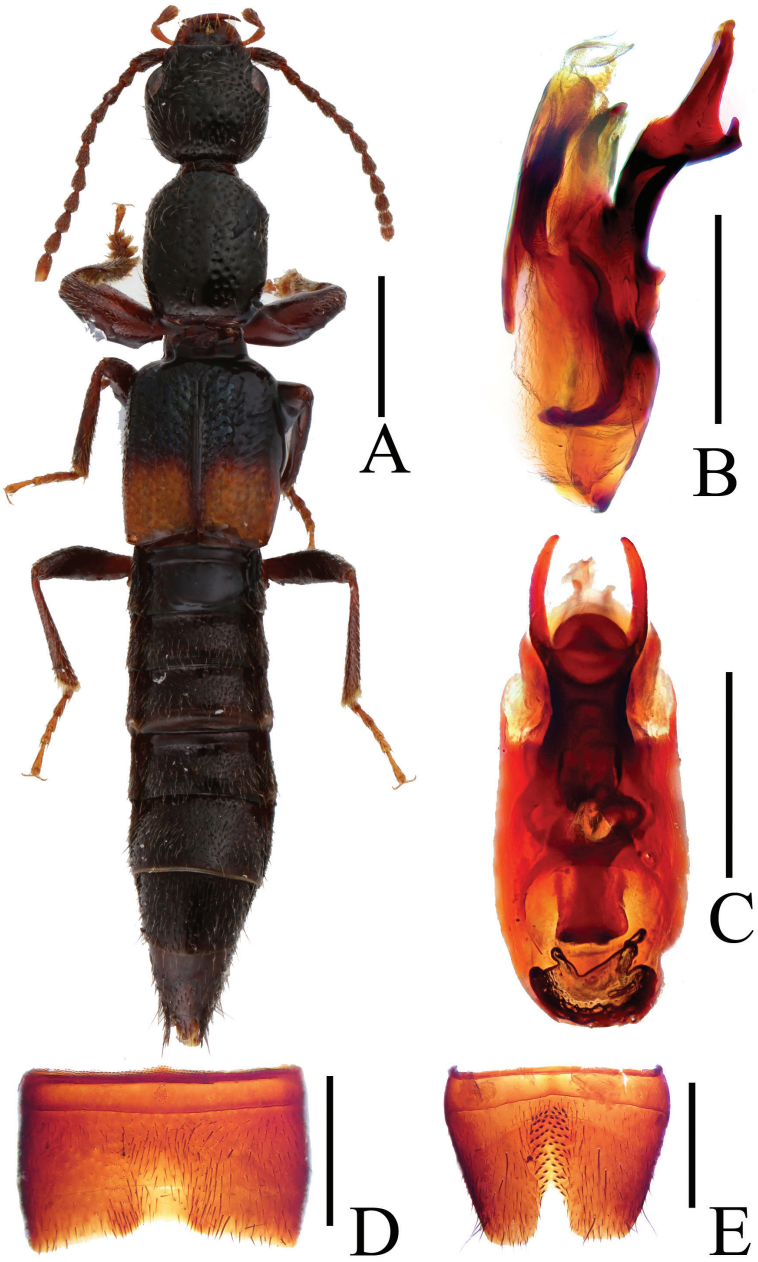

Figure 15. *Lobrathium taureum*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII. Scales: **A** 1mm, **B**–**E** 0.5mm.

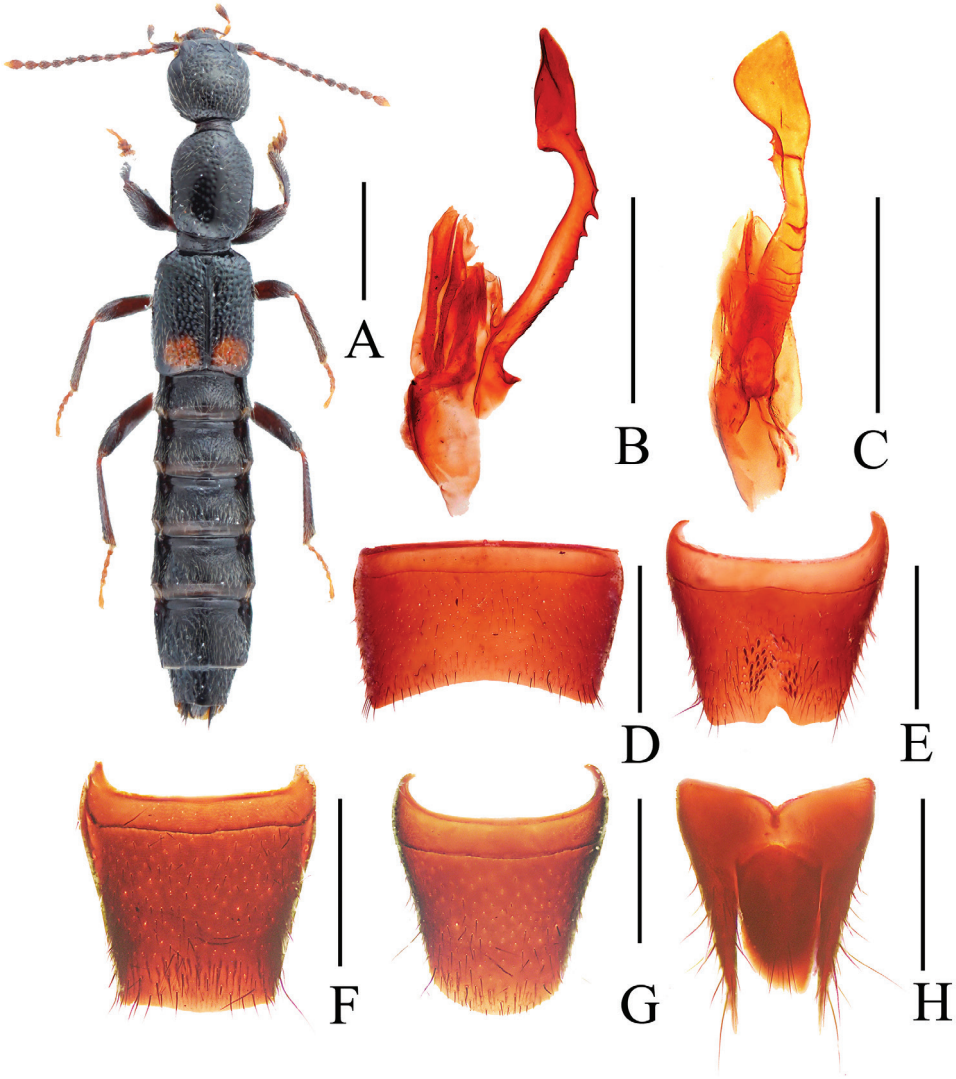

Figure 16. *Lobrathium tortile*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII **F** female tergite VIII **G** female sternite VIII **H** female tergites IX-X. Scales: **A** 1mm, **B–H** 0.5mm.

Lobrathium uncinatum **Li & Li sp. n.**
urn:lsid:zoobank.org:act:A321CDF5-7B72-4699-BB65-C42C5C924BDF
http://species-id.net/wiki/Lobrathium_uncinatum
Figs 18A–F

Type material (1 ♂). **Holotype**, ♂: "China, Qinghai, Xining City, Huzhu County, Beishan National Reserve, 2450 m, 36°56'N, 102°27'E, 28–VII–2004, Tang Liang,

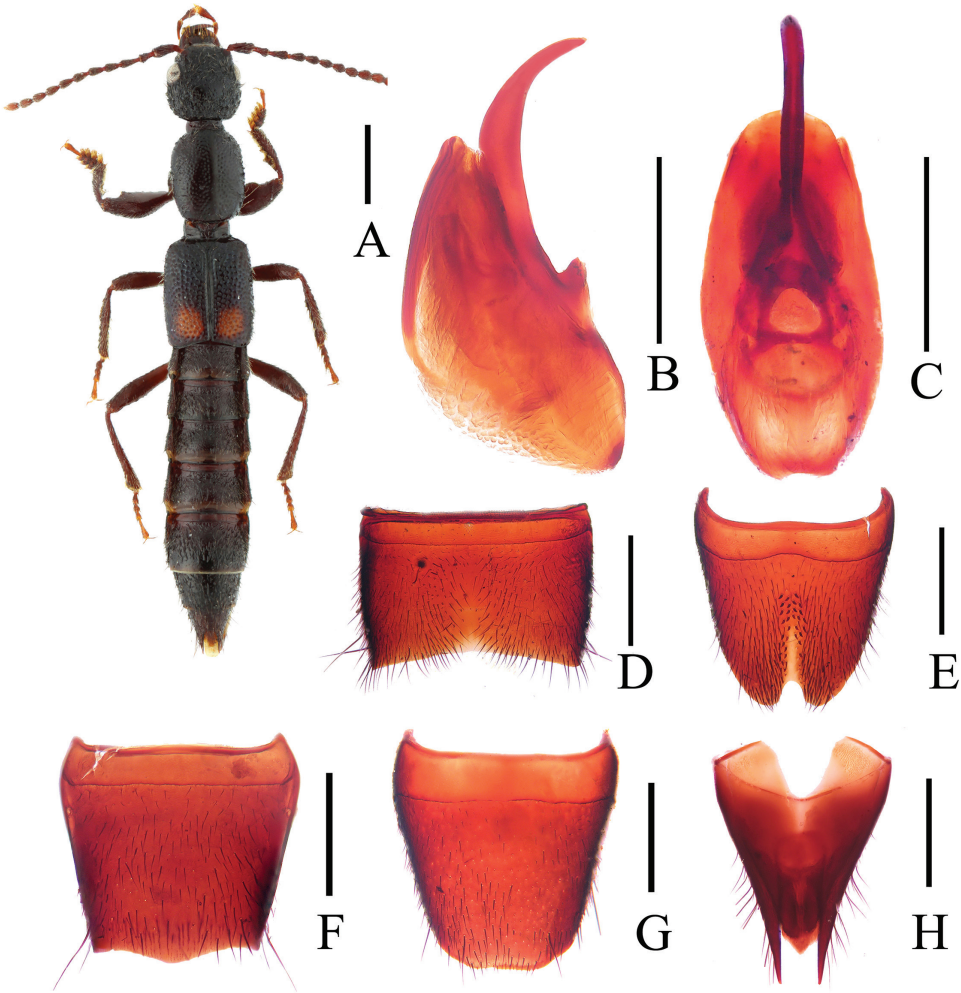

Figure 17. *Lobrathium tortuosum*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VII **E** male sternite VIII **F** female tergite VIII **G** female sternite VIII **H** female tergites IX-X. Scales: **A** 1mm, **B**–**H** 0.5mm.

Hu Jia-yao & Zhu Li-long leg. / Holotype ♂, *Lobrathium uncinatum*, sp. n., Li & Li, det. 2013".

Description. Body length 5.94 mm, length of fore body 3.16 mm. Habitus as in Fig. 18A. Coloration: body black, elytra posteriorly with large yellowish spot reaching posterior and lateral margins; legs reddish with paler tarsi; antennae reddish.

Head transverse (HW/HL = 1.14); posterior angles not marked; punctation coarse and dense, sparser in median dorsal portion, interstices without microsculpture. Eyes large, more than half as long as distance from posterior margin of eye to neck. Antenna slender, 1.92 mm long.

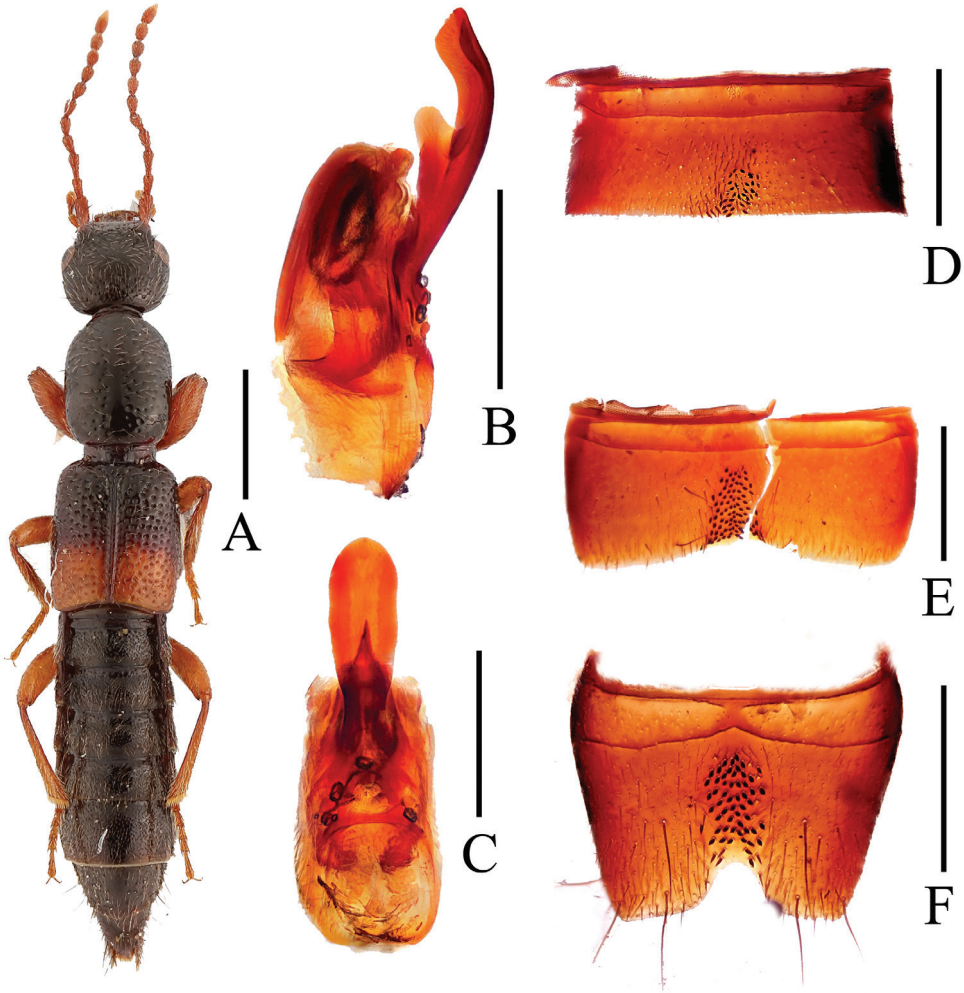

Figure 18. *Lobrathium uncinatum*. **A** habitus **B** aedeagus in lateral view **C** aedeagus in ventral view **D** male sternite VI **E** male tergite VII **F** male sternite VIII. Scales: **A** 1mm, **B–F** 0.5mm.

Pronotum moderately oblong, as wide as head (PL/PW = 1.18, PW/HW = 1.0); lateral margins subparallel in dorsal view; punctation dense and coarse, similar to that of head, but with impunctate midline; interstices without microsculpture and glossy.

Elytra longer than broad, broader than pronotum (EL/EW = 1.0, EW/PW = 1.29, EL/PL = 0.98); humeral angles marked; punctation coarse and dense. Hind wings fully developed.

Abdomen narrower than elytra; punctation fine and dense; posterior margin of tergite VII with palisade fringe.

Male. Sternite VI (Fig. 18D) strongly transverse, postero-medially with modified stout black setae; sternite VII (Fig. 18E) strongly transverse, posteriorly with pro-

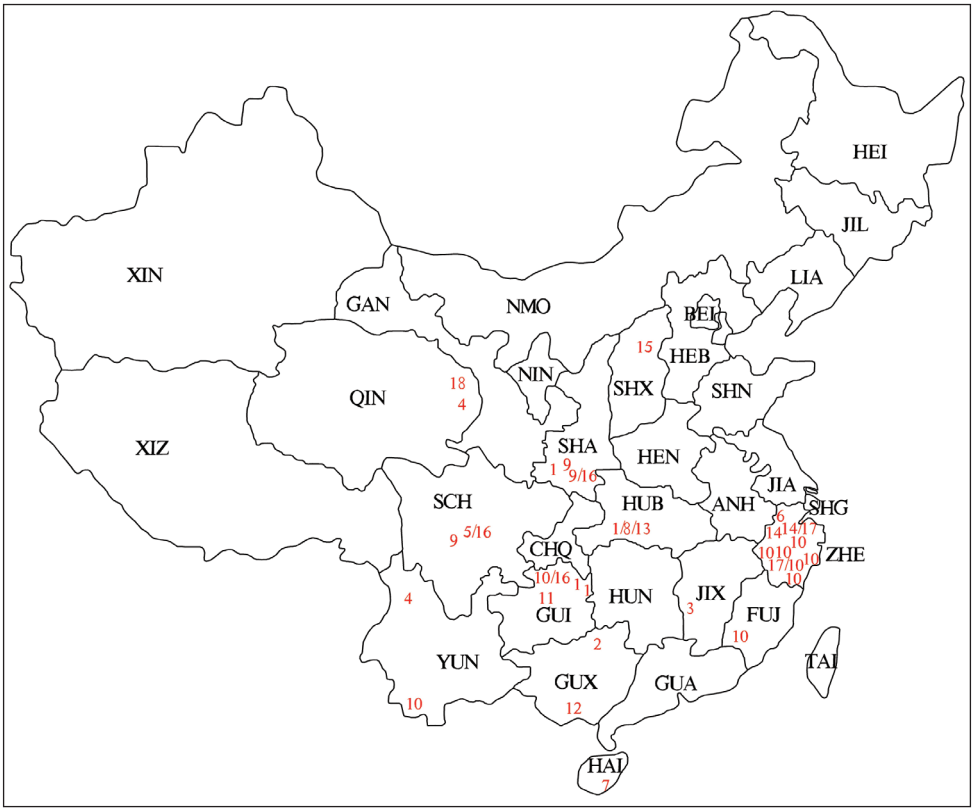

Figure 19. Map of collecting sites. **1** *Lobrathium ablectum* **2** *L. anatitum* **3** *L. bispinosum* **4** *L. configens* **5** *L. daxuense* **6** *L. demptum* **7** *L. diaoluoense* **8** *L. dufui* **9** *L. hebeatum* **10** *L hongkongense* **11** *L. lirunyui* **12** *L. pengi* **13** *L. quyuani* **14** *L. spathulatum* **15** *L. taureum* **16** *L. tortile* **17** *L. tortuosum* **18** *L. uncinatum.* ANH Anhui; BEI Beijing; CHQ Chongqing; FUJ Fujian; GAN Gansu; GUA Guangdong; GUI Guizhou; GUX Guangxi; HAI Hainan; HEB Hebei; HEI Heilongjiang; HEN Henan; HUB Hubei; HUN Hunan; JIA Jiangsu; JIL Jilin; JIX Jiangxi; LIA Liaoning; NIN Ningxia; NMO Nei Mongol; QIN Qinghai; SCH Sichuan; SHA Shaanxi; SHG Shanghai; SHX Shanxi; SHN Shandong; TAI Taiwan; XIN Xinjiang; XIZ Xizang; YUN Yunnan; ZHE Zhejiang.

nounced impression, this impression with numerous modified stout black setae, posterior margin broadly and weakly concave; sternite VIII (Fig. 18F) transverse, posteromedian impression with modified setae like on sternites VI and VII, posteriorly with moderately deep excision; aedeagus (Figs 18B, C) with ventral process of distinctive morphology, near middle with distinct dorsal projection in lateral view.

Female. Unknown

Etymology. The specific epithet (Latin, hooked) refers to the shape of the ventral process of the aedeagus.

Comparative notes. This species can be separated from the externally similar *L. taureum* Assing (2012) and *L. schuelkei* Assing (2012) by the presence of modified se-

Firure 20. Habitat of new species. **A** *Lobrathium anatitum* **B** *L. diaoluoense* **C** *L. dufui; L. quyuani* **D** *L. lirunyui* **E** *L. pengi* **F** *L. uncinatum.*

tae on the male sternites VI and VII (Figs 18D, E) and by the distinctive shape of the ventral process of the aedeagus.

Habitat and distribution. The holotype was sifted from wet moss alongside a river bank (Fig. 20F) in the Meda National Reserve, Qinghai (Fig. 19).

Acknowledgements

We thank Volker Assing (Hannover, Germany) for reviewing this manuscript. Xiao-Yan Li (Beijing, China) provided information on additional species for this study. The research was supported by the National Natural Science Foundation of China (No. 31101659) and Shanghai Normal University (DZL125).

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RESEARCH ARTICLE

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Exocelina baliem sp. n., the only known pond species of New Guinea *Exocelina* Broun, 1886 (Coleoptera, Dytiscidae, Copelatinae)

Helena V. Shaverdo[1,†], Lars Hendrich[2,‡], Michael Balke[3,§]

1 *Naturhistorisches Museum, Burgring 7, A-1010 Vienna, Austria* **2** *Zoologische Staatssammlung München, Münchhausenstraße 21, D-81247 Munich, Germany* **3** *Zoologische Staatssammlung München, Münchhausenstraße 21, D-81247 Munich, Germany and GeoBioCenter, Ludwig-Maximilians-University, Munich, Germany*

† *urn:lsid:zoobank.org:author:262CB5BD-F998-4D4B-A4F4-BFA04806A42E*
‡ *urn:lsid:zoobank.org:author:06907F16-4F27-44BA-953F-513457C85DBF*
§ *urn:lsid:zoobank.org:author:945480F8-C4E7-41F4-A637-7F43CCF84D40*

Corresponding author: *Helena V. Shaverdo* (shaverdo@mail.ru; helena.shaverdo@nhm-wien.ac.at)

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Abstract

Exocelina baliem **sp. n.** is described from the Baliem Valley in the Central Mountain Range of New Guinea (Papua Province, Indonesia). Having striolate elytra, different structure and setation of the male and female genitalia and tarsomeres, and inhabiting swampy ponds, the new species differs from all known New Guinea species, which have smooth elytra and are stream associated. It forms a monophyletic group with the Australian *E. ferruginea* (Sharp, 1882) and New Caledonian *E. inexspectata* Wewalka, Balke & Hendrich, 2010, based on shape of the paramere and structure of the male tarsi. Habitus, protarsomeres, and male and female genitalia are illustrated, comparing some structures with *E. ferruginea* and two New Guinea stream species. We briefly discuss the biogeographic relevance of this discovery.

Keywords

Exocelina, diving beetles, Australasia, New Guinea, New Caledonia, taxonomy, new species, biogeography, phylogeny

Introduction

The Australasian Copelatinae genus *Exocelina* Broun, 1886 (= *Papuadytes* Balke, 1998, see Nilsson and Fery 2006 and Nilsson 2007) is a current taxonomic and molecular phylogenetic research focus (Balke and Bergsten 2003; Balke et al. 2004a, 2004b, 2007; Watts & Humphreys 2009; Wewalka et al. 2010). Here, we continue our study of the highly diverse New Guinea *Exocelina* fauna, with 63 formally described species (Balke 1998, 1999, 2001; Shaverdo et al. 2005, 2012). These species form a morphologically homogenous, monophyletic group associated with streams and rivers (e.g. Balke et al. 2007). In the present paper, we describe a new species, which is morphologically distinct and ecologically different from all other known New Guinea species. The closest related species to the new one occur in Australia and New Caledonia.

Material and methods

Studied specimens are in the following collections:

CLH collection of Lars Hendrich, Munich, Germany (property of NHMW)
NHMW Naturhistorisches Museum Wien, Vienna, Austria (M.A. Jäch)
MNHN Muséum National d'Histoire Naturelle, Paris, France (T. Deuve, A. Mantilleri)
ZSM Zoologische Staatssammlung München, Munich, Germany (M. Balke)

Specimens of the following *Exocelina* species were studied for comparative purposes:

Exocelina australiae (Clark, 1863): 1 male, 1 female "Collect. Plason", "Copelatus nigritulus Shrp. N. H.[?]" [hand written] (NHMW).

E. ferruginea (Sharp, 1882): 1 male, 1 female "Australia / SA: Adelaide Hills, 5 km W Forreston, Mt. Crawford State Forest, Watts Gully, 200m, 22.11.1999, Hendrich & Watts leg. (Loc. 2/140)" (CLH).

E. inexspectata Wewalka, Balke & Hendrich, 2010: holotype (male) "NEW CALEDONIA 12286, 20°25'S, 164°13'E, Nehoue campground, 29 Apr 2005, 10m G.B. Monteith, MV light.", "HOLOTYPUS Exocelina inexpectata sp.n. Wewalka et al. 2008" [red, printed] (MNHN).

E. knoepfchen Shaverdo, Hendrich, Balke, 2012: 1 male "Papua New Guinea: Eastern Highlands, Kainantu, Yoginofi, 1900m, 9.v.1994, 06.21.799S, 145.45.463E, Balke & Sagata (PNG 55)" (ZSM).

E. simplex (Clark, 1863): 2 males, 2 females "South AU, nr. Penola, roadside pools, 37.380928°, 140.837540°, 30–31.10.2001, M. Balke leg." (NHMW).

E. ullrichi (Balke, 1998): 1 male "Papua New Guinea: Eastern Highlands, Hogu, 1 km E Mt. Barola, 1900m, 9.v.2006, 06.17.556S, 145.45.036E, Balke & Sagata (PNG 56)"(ZSM). 1 female "Papua New Guinea: Aiyura, 1787m, 15.i.2003, 06 21 411S, 145 54.340E, K. Sagata (WB5)" (ZSM).

All specimen data are quoted as they appear on the labels attached to the specimens. Label text is cited using quotation marks. Our red identification labels were attached to the types.

Measurements were taken using a Leica M205C stereomicroscope. The following abbreviations were used: TL (total body length), TL-H (total body length without head), and MW (maximum body width). Drawings were made with the aid of a *camera lucida* attached to a Leica DM 2500 microscope. For detailed study and illustration, protarsi and genitalia were removed and mounted on glass slides with DMHF (dimethyl hydantoin formaldehyde) as temporary preparations. The drawings were scanned and edited, using the software Adobe Illustrator CS5.1.

The terminology to denote the orientation of the genitalia ("ventral" for median lobe and gonocoxae and "dorsal" and "external" for paramere) follows Miller & Nilsson (2003). Administrative divisions of Indonesia follow information from Wikipedia (2013).

Species description

***Exocelina baliem* sp. n.**
urn:lsid:zoobank.org:act:E1B1BD92-F118-4E18-AE45-62FD23EB7A68
http://species-id.net/wiki/Exocelina_baliem
Figs 1–7

Type locality. Indonesia: Papua Province: Jayawijaya Regency, Baliem River Valley, Wamena, 138°56'E, 04°06'S.

Type material. *Holotype*: male "IRIAN JAYA Baliem-Tal Wamena, 1700 m 138°56'E, 04°06'S", "20–27.9.1992 (54A = 57) leg. M. Balke" (NHMW). *Paratypes*: 2 males, 3 females with the same label as the holotype, 1 female additionally with two green labels "DNA", "M.Balke 3268" (NHMW, ZSM). 1 male "W.-Neuguinea/ Baliem Valley Wamena (Ort), 1600m / IR 1&6 31.8 & 6.9.1990 leg: Balke & Hendrich", "Coll. Hendrich Berlin" (CLH). 1 female "IRIAN JAYA, Jayawijaya-Prov., leg. A.Riedel, 1993", "Wamena, Baliem-River, 1700m, 15.X." (ZSM).

Diagnosis. Beetle middle-sized, piceous, with reddish brown head; both sexes matt, dorsal surface with strong dorsal microreticulation and numerous, short strioles; male antennomeres simple; male pro- and mesotarsomeres 1–3 distinctly dilated, male protarsomere 4 modified, with large, thick anterolateral hook-like seta, male protarsomere 5 simple, with relatively long setae and long claws, anterior claw with fine serration ventrally; median lobe with continuous outline in ventral view, ventral sclerite with a strip of sclerotization on right side, proximal part of median lobe striolate; paramere without notch on dorsal side but with a long prolongation of subdistal part; female metatarsi without ventral row of natatorial setae; gonocoxae with prolonged, slightly pointed apices. This is the only New Guinea species of *Exocelina* with a striolate dorsal surface.

Description. *Size and shape*: Beetle middle-sized (TL-H 4.2–4.5 mm, TL 4.7–5.1 mm, MW 2.2–2.3 mm), one female larger (TL-H 4.9 mm, TL 5.5 mm, MW

Figure 1. Habitus of *Exocelina baliem* sp. n., female.

2.4 mm), with elongate habitus, broadest at elytral middle; pronotum relatively long (width of pronotum/length of pronotum ratio 0.4), only slightly trapezoidal, with sides weakly converging forwards, with posterior angles not drawn backwards (Fig. 1). *Coloration*: Head reddish brown, with darker, indistinct, broad, V-shaped median spot and dark brown posteriorly to eyes; pronotum piceous, with anterior margin and anterior angles reddish brown to brown; elytra piceous, sometimes with paler (reddish brown to dark brown) posterolateral sides, apex, and narrow bands along elytral suture; head appendages yellowish to reddish-brown, hind legs darker; ventrally reddish brown, with piceous metaventrite and metacoxal plates.

Surface sculpture: Head with dense, coarse punctures (spaces between punctures 1–3 times size of punctures, diameter of punctures much larger than diameter of cells of microreticulation) on middle, anterior part of head with finer punctation, between and behind eyes with very short but distinct longitudinal strioles, vertex with fine, sparse punctation. Pronotum with numerous short longitudinal strioles, distinctly shorter and sparser on disc, disc also with coarse punctures. Elytra densely covered with numerous short longitudinal strioles, posterior third of elytra with transverse shackle-like strioles, and elytral lateral margins with transverse strioles and coarse punctures. Head, pronotum, and elytra with strongly impressed microreticulation, dorsal surface matt. Metaventrite and metacoxa distinctly microreticulate. Metacoxal plates densely covered with short longitudinal strioles and in anterior part also with transverse wrinkles. Abdominal ventrites with finer microreticulation and fine sparse punctation, more evident at their middle. Ventrites 1–2 with numerous longitudinal striae, ventrites 3–5 with finer, shorter, transverse strioles, and ventrite 6 with long sublongitudinal strioles.

Structures: Pronotum with distinct lateral bead. Base of prosternum and neck of prosternal process with distinct ridge, without anterolateral extensions. Blade of prosternal process lanceolate, relatively broad, convex, with distinct bead and very few fine setae; neck and blade of prosternal process evenly jointed. Abdominal ventrite 6 broadly rounded apically.

Male: Antennomeres simple. Pro- and mesotarsomeres 1–3 distinctly dilated. Protarsomere 4 asymmetrical, its anterior angle expanded with large, thick, strongly curved anterolateral hook-like seta. Protarsomere 5 simple, ventrally with anterior row of 17–18 and posterior row of 4 long setae; pro- and mesotarsal claws long (length of anterior claw/length of protarsus ratio 0.7), posterior protarsal claw evenly curved, with two fine denticles on ventral margin; anterior claw longer, straighter, and slightly broadened, with fine serration ventrally (Figs 2A, 3A). Abdominal ventrite 6 with 20–25 lateral striae on each side. Median lobe with continuous outline, slightly asymmetrical in ventral view; apex of median lobe swollen in lateral view and roundly pointed in ventral view, ventral sclerite with a strip of sclerotization on right side in ventral view, proximal part of median lobe striolate (Figs 5A, 6). Paramere without notch (for comparison, e.g. see Figs 1–4 in Shaverdo et al. 2012) but with a long prolongation on subdistal part of dorsal side (Fig. 4A).

Female: Dorsal microreticulation stronger, abdominal ventrite 6 without or with 1–2 very fine median striae. Metatarsi without ventral row of natatorial setae. Gono-

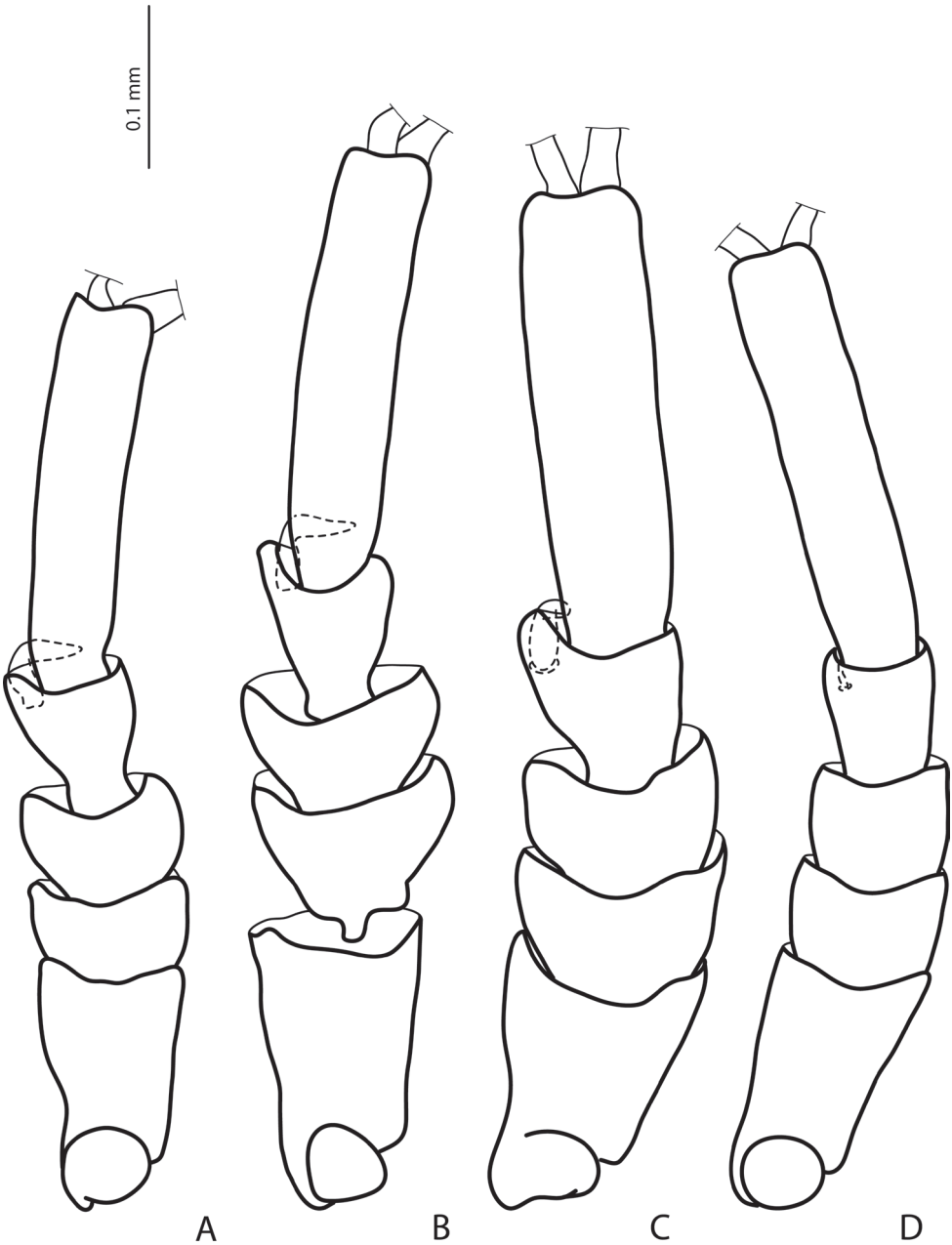

Figure 2. Male protarsomeres 1–5 in dorsal view **A** *Exocelina baliem* sp. n. **B** *E. ferruginea* (Sharp, 1882) **C** *E. ullrichi* (Balke, 1998) **D** *E. knoepfchen* Shaverdo, Hendrich, Balke, 2012.

coxosternites similar to those of *E. vladimiri* Shaverdo, Sagata & Balke, 2005 (see Fig. 17a in Shaverdo et al. 2005). Gonocoxae with prolonged, slightly pointed apices and sparse setation, without setae on inner margin in ventral view (Fig. 7A).

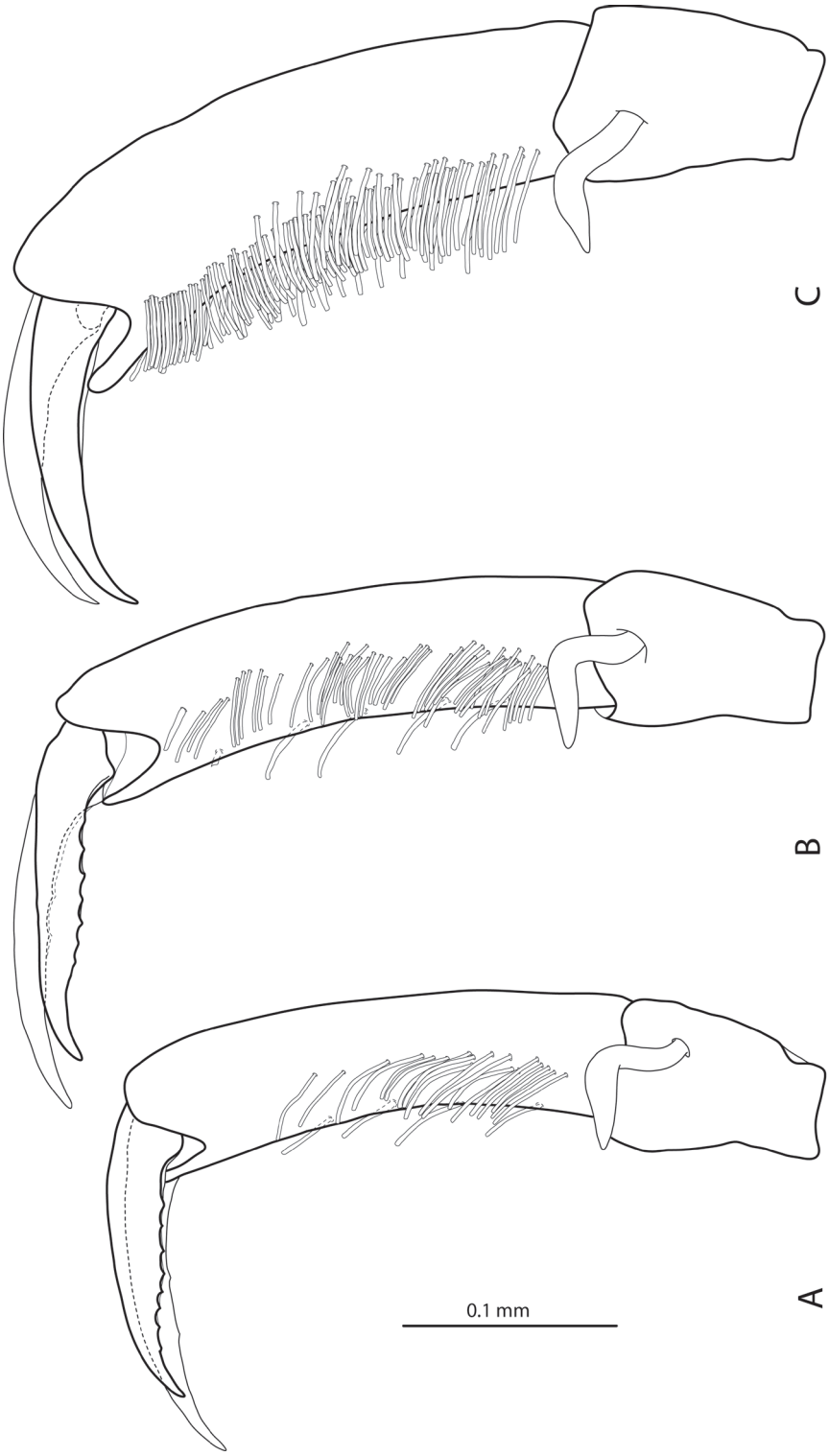

Figure 3. Male protarsomeres 4–5 in lateral view **A** *Exocelina baliem* sp. n. **B** *E. ferruginea* (Sharp, 1882) **C** *E. ullrichi* (Balke, 1998).

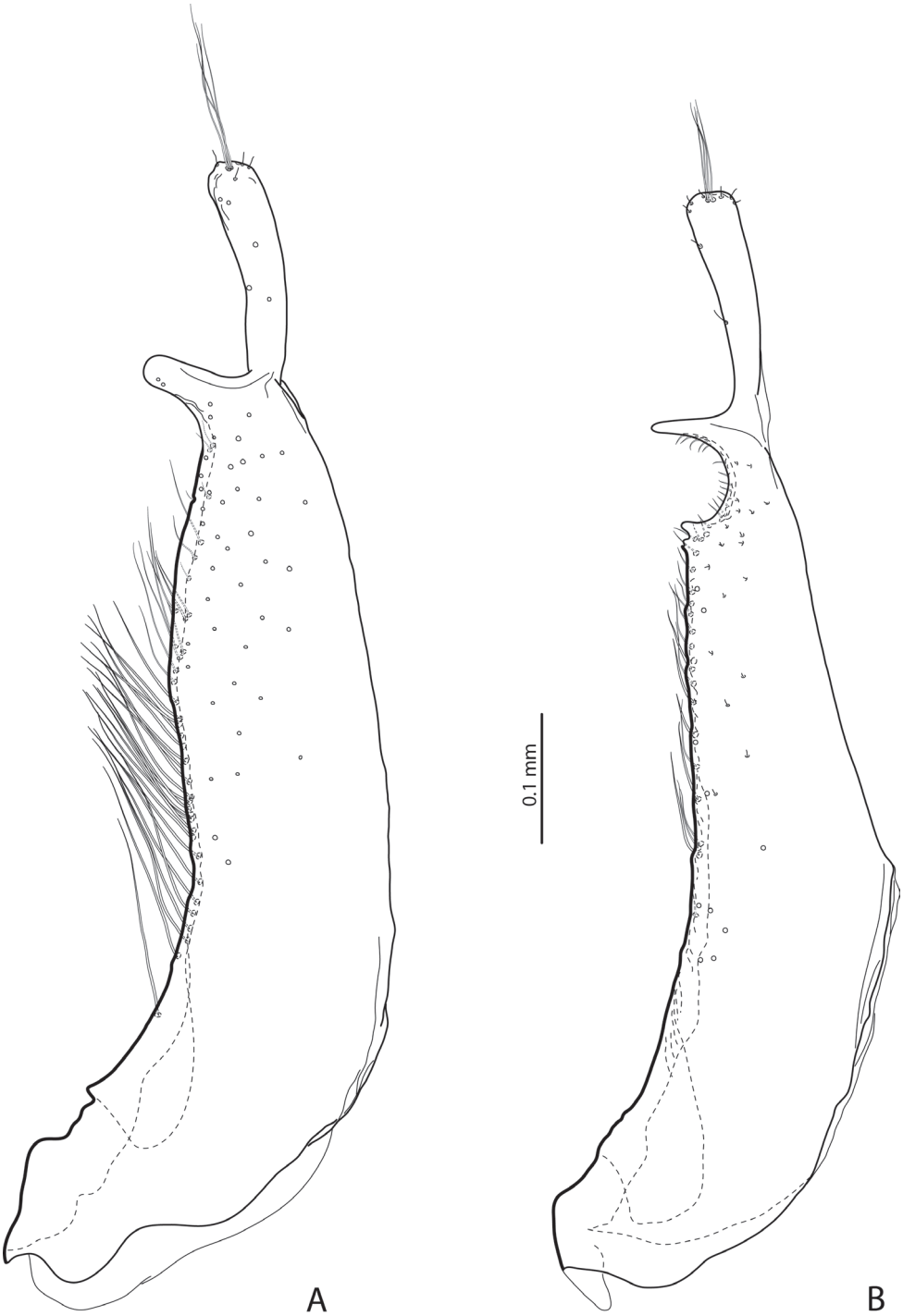

Figure 4. Paramere in external view **A** *Exocelina baliem* sp. n. **B** *E. ferruginea* (Sharp, 1882).

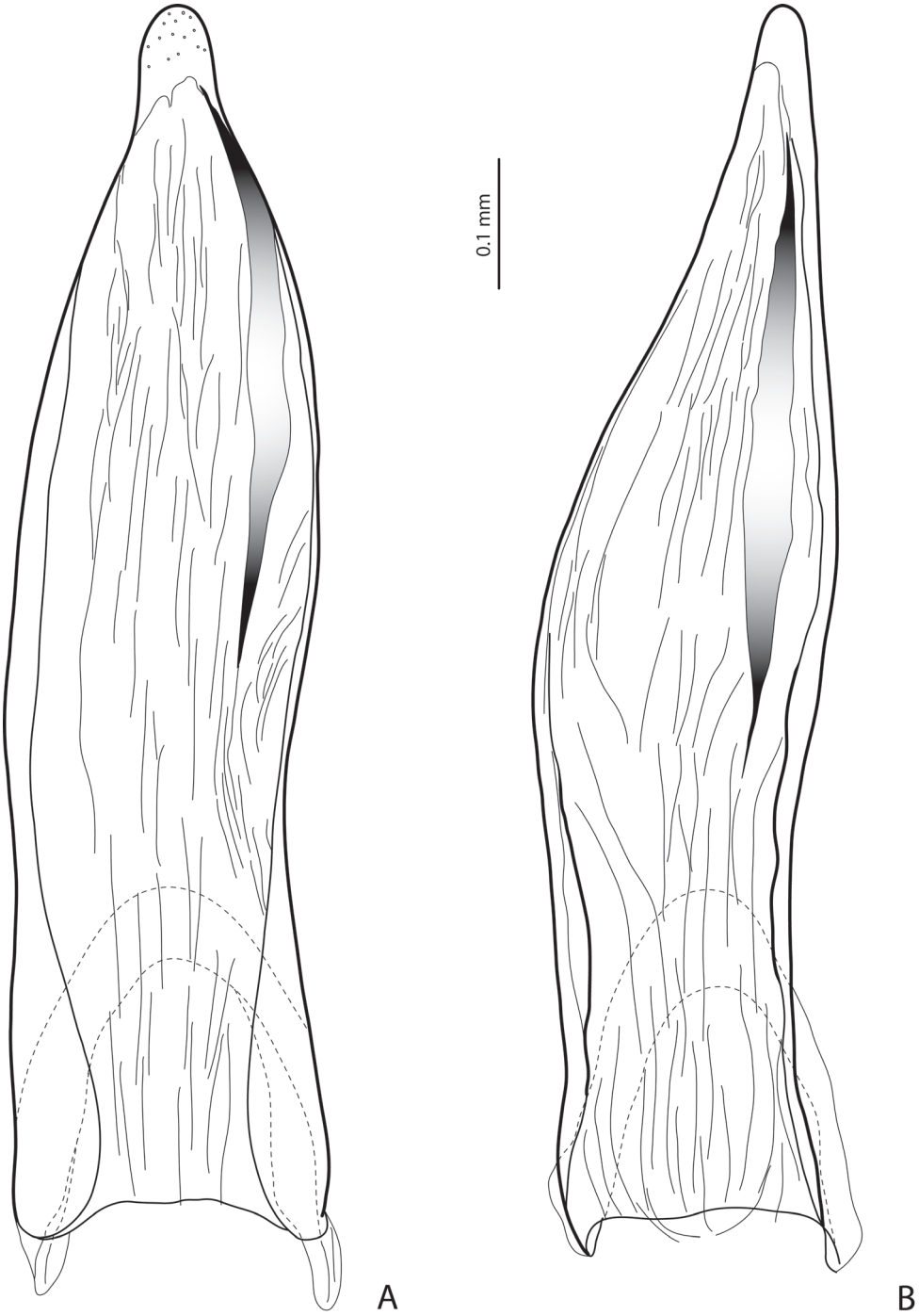

Figure 5. Median lobe in ventral view **A** *Exocelina baliem* sp. n. **B** *E. ferruginea* (Sharp, 1882).

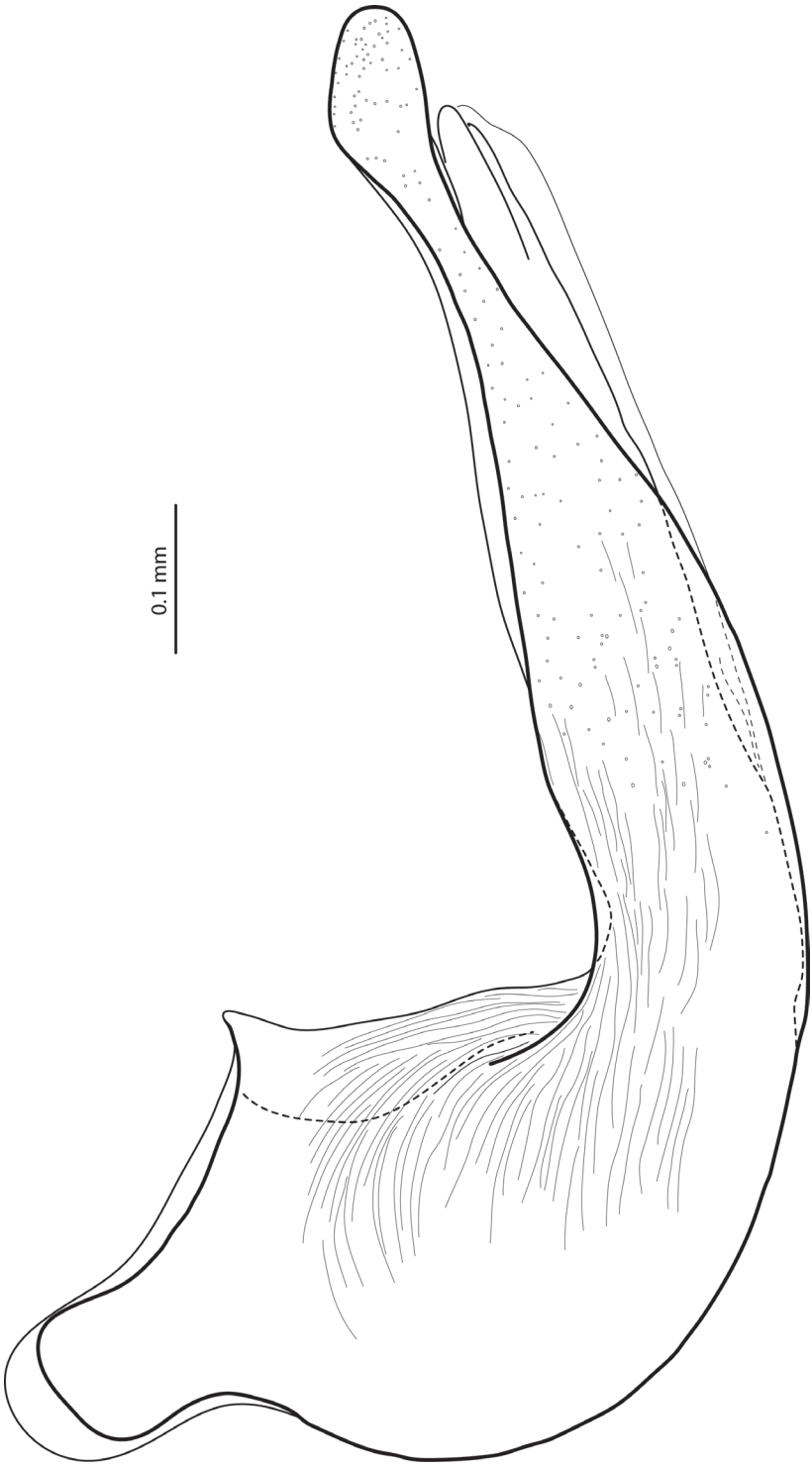

Figure 6. Median lobe in lateral view of *Exocelina baliem* sp. n.

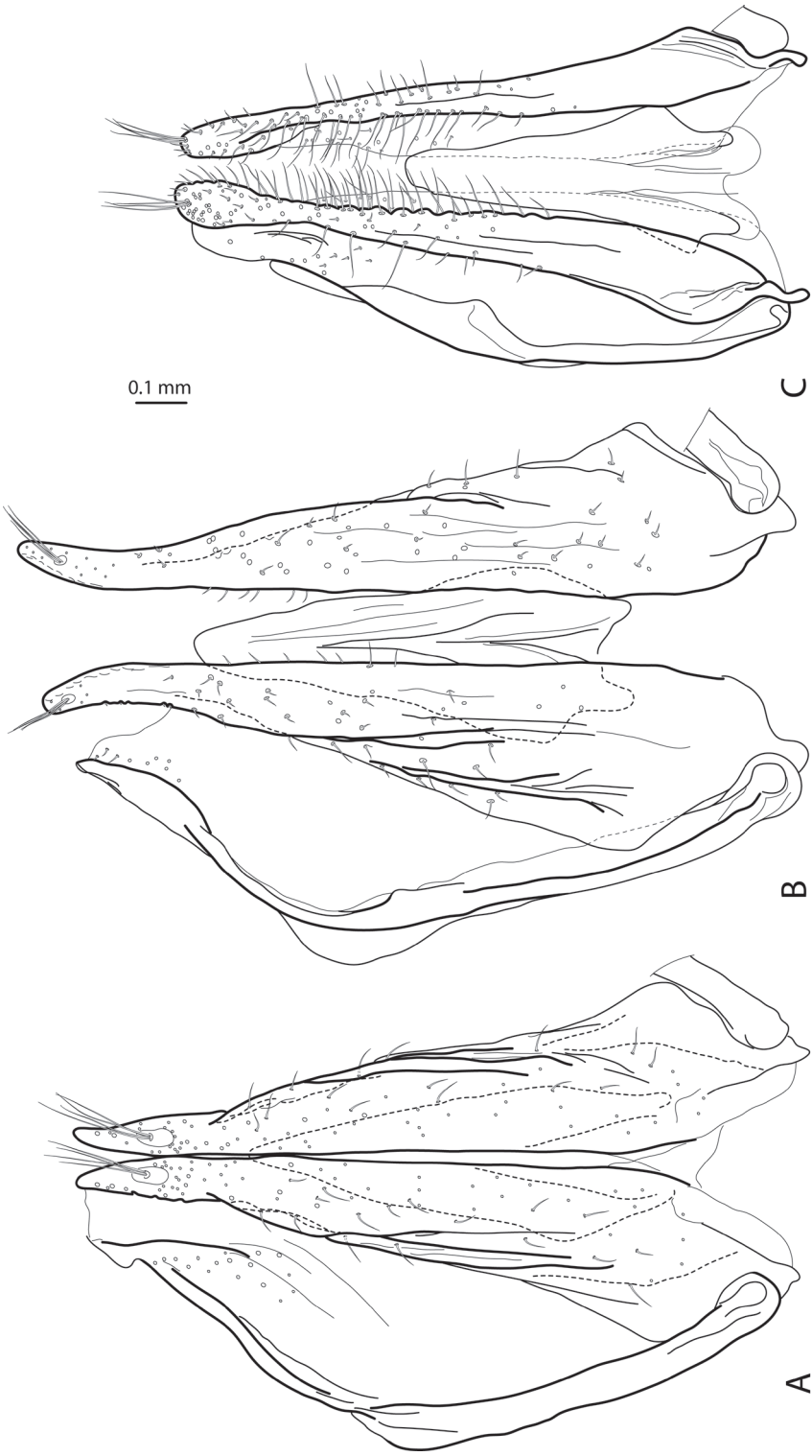

Figure 7. Female genitalia: gonocoxae, laterotergite, and rami in ventral view **A** *Exocelina baliem* sp. n. **B** *E. ferruginea* (Sharp, 1882) **C** *E. ullrichi* (Balke, 1998).

Figure 8. Map of New Guinea showing the type locality (red dot) of *Exocelina baliem* sp. n.

Figure 9. Type locality of *Exocelina baliem* sp. n.

Distribution and habitat. The species is known only from the type locality (Fig. 8).

The species was collected from a small pool in a riverine relic forest close to the Baliem River, approximately 1 km from the runway of Wamena airport (Fig. 9). The beetles were found between roots, leaves, and emergent water plants in the shallow water, at the shady edge of the pond underneath a large tree. One specimen was collected from a tuft of *Phragmites* after the pool had dried up during the rather dry summer in the following year (1993). The new species was associated with the following dytiscids: *Hydrovatus enigmaticus* Biström, 1997, *Hyphydrus dani* Biström, Balke & Hendrich, 1993, *Hydaticus okalehubyi* Balke & Hendrich, 1992, and *Rhantus dani* Balke, 2001. We revisited the area in winter 2011 and found that most ponds were highly eutrophic (as foreseen by Balke 1993), large trees had mostly disappeared, and the species was not found again during a quick survey. We assume that the type locality has been destroyed, but other suitable habitats might exist elsewhere in the vast valley.

Etymology. The species is named after the type locality, the Baliem River Valley. The name is a noun in the nominative singular standing in apposition.

Comparison and discussion

The new species is morphologically similar to the Australian *E. ferruginea* (Sharp, 1882) and the New Caledonian *E. inexspectata* Wewalka, Balke & Hendrich, 2010. It shares with them some characters not found in all other known New Guinea *Exocelina* and listed below.

1) Striolate elytra (Fig. 1); in *E. ferruginea* and *E. inexspectata* elytra without strioles on anterior (basal) 2/3 but with distinct punctures, and in posterior (apical) third with transverse strioles. The striolate dorsal surface of the body is also characteristic for other Australian and New Caledonian species. All other New Guinea species have punctation rather than strioles on elytra.
2) Modification of paramere: prolongation of subdistal part on dorsal side (Figs 4A, 4B). This apomorphic character is observed only in these three species.
3) Presence of a strip of sclerotization on right side of ventral sclerite of median lobe (Figs 5A, 5B). This character is also present in *E. ferruginea*. The holotype of *E. inexspectata* is teneral so this character is not evident, but is characteristic for several other New Caledonian species, e.g. *E. novaecaledoniae* (J. Balfour-Browne, 1939), *E. ouin* Wewalka, Balke & Hendrich, 2010, and *E. jeannae* Wewalka, Balke & Hendrich, 2010.
4) Striolate surface of proximal part of median lobe (Fig 6). It is characteristic of Australian species.
5) Similar modification of pro- and mesotarsus (Figs 2, 3):

- Pro- and mesotarsomeres 1–3 distinctly dilated.
- Protarsomere 4 asymmetrical, with expanded anterior angle where there is a large, strongly curved anterolateral hook-like seta.

Exocelina ullrichi (Balke, 1998) is the only other species from New Guinea, which shares these two characters, see Fig. 29 in Balke (1998).

- Protarsomere 5 simple, ventrally with anterior row of numerous and posterior row of very few long setae. This character is also found in *E. ferruginea* and in *E. inexspectata*.
- Pro- and mesotarsal claws long.
- Anterior claw longer than posterior, straighter, and slightly broadened.
  The above mentioned modifications of pro- and mesotarsus are characteristic of all known Australian species, with some small variations.
- Anterior claw with fine serration ventrally. This character is also observed in *E. ferruginea* and *E. inexspectata*.
- Posterior protarsal claw evenly curved, with two fine denticles on ventral margin. This character is also present in *E. ferruginea*.

6) Female metatarsi without ventral row of natatorial setae. It is characteristic of known Australian species (in *E. australiae* (Clark, 1863) also for males).
7) Shape and setation of gonocoxae: apices not rounded, slightly pointed, setation much sparser (Fig. 7A). The gonocoxae of *E. baliem* are evidently different from those of other New Guinea *Exocelina* species (Fig. 7C and Fig. 17b in Shaverdo et al. 2005) and much more similar to the gonocoxae of *E. ferruginea* (Fig. 7B).

Exocelina baliem sp. n. is unique among known New Guinea *Exocelina* species in its habitat requirements. It inhabits ponds, unlike all other known species of *Exocelina* in New Guinea, which occur in directly stream related stagnant water, such as rockpools, stagnant backflows, marginal puddles and waterholes along stream banks, and at the immediate stream margin. The habitat of *E. baliem* sp. n. is similar to that of the closely related *E. ferruginea.*

Balke et al. (2007) showed that New Guinea *Exocelina* species form a monophyletic group, the result of a single colonization from Australia, and that Australian species, including *E. ferruginea*, form a "basal" paraphyletic series, followed by the other *Exocelina* species. Thus, being closely related to *E. ferruginea*, *E. baliem* sp. n. represents an older colonization from Australia into New Guinea, but without subsequent radiation. This radiation likely occurred more recently, producing the highly diverse clade of morphologically distinct stream species. Also we assume that New Caledonia was colonized three times out of Australia, not twice as suggested by Balke et al. (2007), since the New Caledonian *E. inexspectata* is closely related to *E. baliem* sp. n. and *E. ferruginea*. The species is known only from the holotype collected at light, and it might also be a pond species, whereas all other known New Caledonian species are stream associated.

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