

# A new caddisfly genus (Trichoptera, Odontoceridae) from Vietnam

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## Abstract

*Cephalopsyche*, a new genus of caddisfly (Trichoptera, Odontoceridae), is described from Vietnam. Two new species are placed in the genus: *C. gorgona* **sp. n.** and *C. nevoissi* **sp. n.** The adult male and female of each species exhibit distinct sexual dimorphism, especially in head morphology. In males, there are hinged, chamber-like structures on the vertex of the head, containing filamentous, columnar tissue when exposed. Descriptions and illustrations of both species are provided.

## Keywords

Caddisfly, Trichoptera, Odontoceridae, new genus, *Cephalopsyche*, new species, Vietnam

## Introduction

The family Odontoceridae is relatively small and is known from all zoogeographical regions. Currently, the family is divided into two subfamilies: Odontocerinae, including 14 genera and Pseudogoerinae, with the monotypic genus *Pseudogoera*; three fossil genera are also known (Table 1). The family contains about 120 extant and fossil spe-

**Table 1.** World genera of Odontoceridae.

Genera by Biogeographic Regions	Number of Species	Distribution
<b>Afrotropical (Ethiopian)</b>		
<i>Leptodermatopteryx</i> Ulmer, 1910	1	Seychelles
<b>Australasian</b>		
<i>Barynema</i> Banks, 1939	2	Australia
<b>Indomalayan (Oriental)</b>		
<i>Inthanopsyche</i> Malicky, 1989	2	SE Asia
<i>Lannapsyche</i> Malicky, 1989	4	SE Asia
<i>Phraeopsyche</i> Malicky & Chantaramongkol (in Malicky et al. 2000)	2	SE Asia
<i>Cephalopsyche</i> new genus	2	Vietnam
<b>Nearctic</b>		
<i>Namamyia</i> Banks, 1905	1	United States
<i>Nerophilus</i> Banks, 1899	1	United States
<i>Parthina</i> Denning, 1954	2	United States
· <i>Phenacopsyche</i> Cockerel, 1909	1	Miocene [United States]
<i>Pseudogoera</i> Carpenter, 1933	1	United States
<b>Neotropical</b>		
<i>Anastomoneura</i> Huamantínco & Nessimian, 2004	1	Brazil
<i>Barypenthus</i> Burmeister, 1839	1	Brazil
<b>Palaeartic</b>		
· <i>Electrocerum</i> Ulmer, 1912	1	Eocene [Baltic amber]
· <i>Electropsilotes</i> Ulmer, 1912	1	Eocene [Baltic amber]
<i>Odontocerum</i> Leach, 1815	3	Europe
<i>Perissoneura</i> McLachlan, 1871	2	Japan
<b>Widespread</b>		
<i>Marilia</i> F Müller, 1880	55	Asia [China, Southeast Asia], Australia, North America, Central America, and South America
<i>Psilotreta</i> Banks, 1899	40	Asia [China, India, Japan, Korea, Nepal, Russian Far East, Southeast Asia] and North America

cies and, except for *Marilia* and *Psilotreta*, most genera are regionally endemic, each containing 1–4 species, and are local in distribution.

During the course of examining material from the American Museum of Natural History, we found adult male and female specimens of two new, related odontocerid species, collected in Malaise traps during the spring of 1999 along the slope of Mt. Ngoc Linh (830–1460 m altitude), Quang Nam Province, Vietnam. These two spe-

cies appear to be separated in part by altitude, but do co-exist or overlap at 950 m elevation. Both species differ substantially from known genera of the family and are here assigned to a new genus, *Cephalopsyche*, in the subfamily Odontocerinae. Primary terms used are according to Schmid (1998). Type material is preserved in alcohol and deposited in the collection of the American Museum of Natural History, New York, NY, USA.

## Taxonomy

### *Cephalopsyche* gen. n.

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Figs 1–6

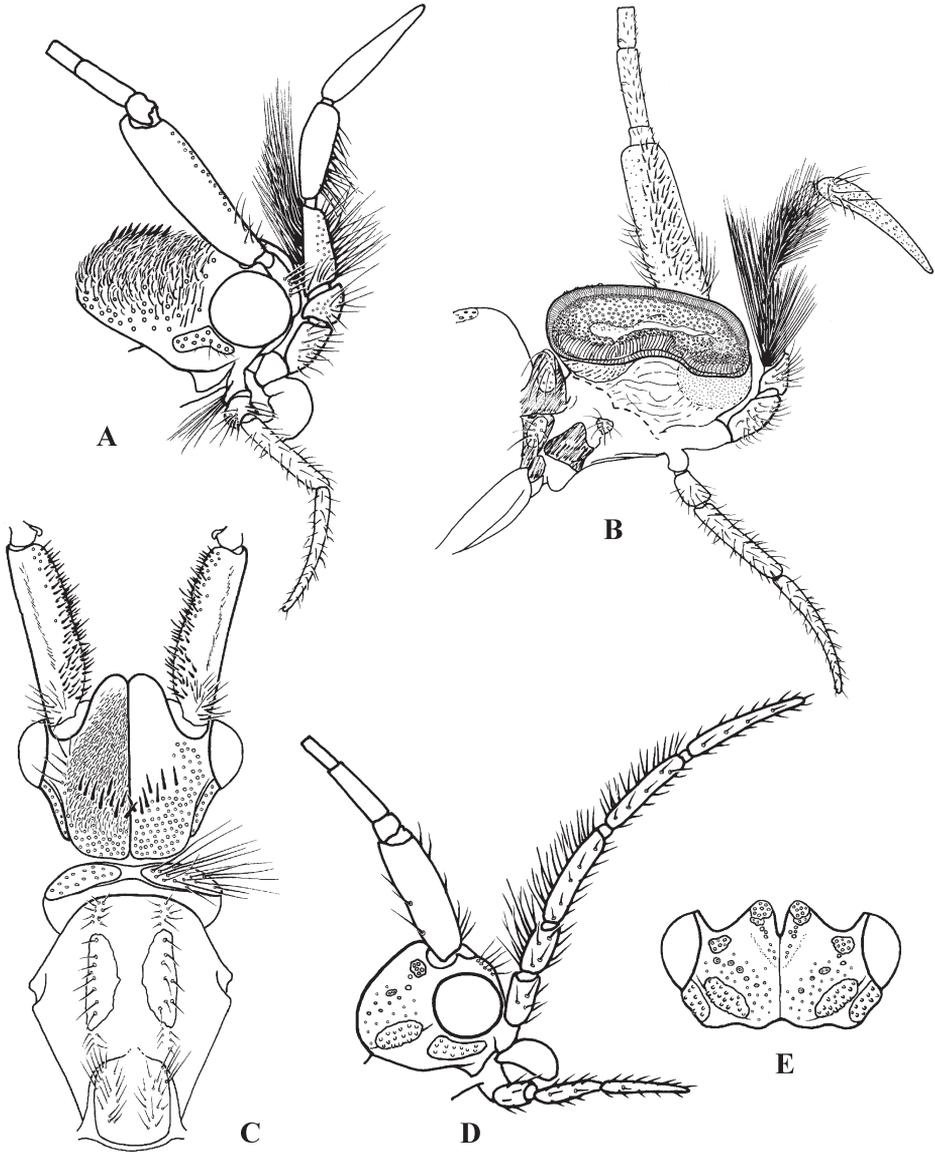
**Type species:** *Cephalopsyche gorgona* sp. n., original designation.

**Other included species:** *C. nevoissi* sp. n.

**Diagnosis.** The new genus is distinguished from all Odontoceridae genera by combined characters of the head, wings, and genitalia. There are a few similarities with *Marilia*, particularly the absence of Cu<sub>2</sub> in forewings of male; also, male of *Cephalopsyche nevoissi* sp. n. bears a brush of long hairs on the anal lobe of the hind wings, typical for *Marilia*. In contrast, the hind wings in *Cephalopsyche* are similar in shape to the forewings, unlike the wider hind wings of *Marilia*, with an enlarged anal area.

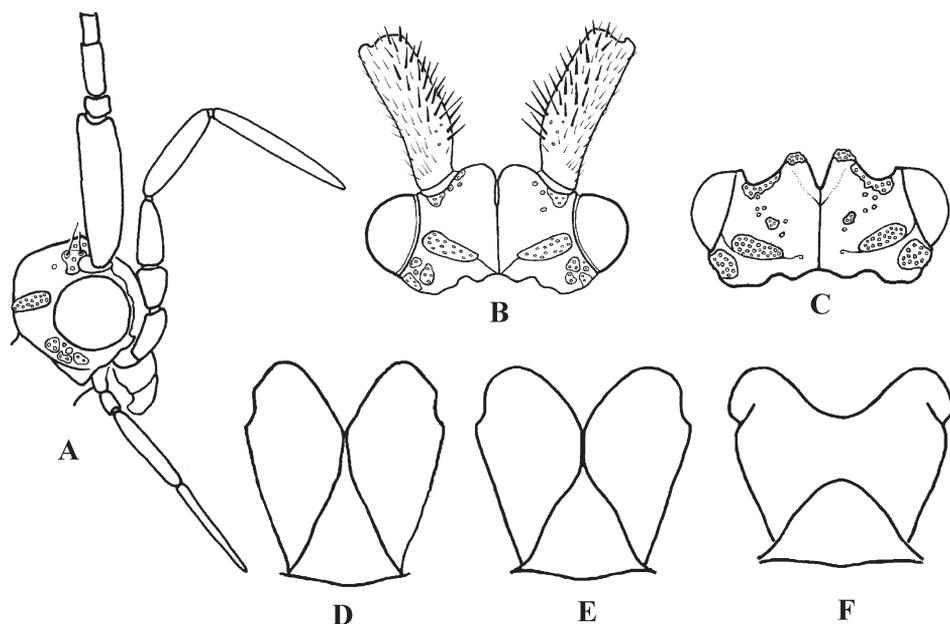
Also, the new genus shares similarities in wing venation with the genera *Lannapsyche* Malicky, 1989 and *Barynema* Banks, 1939, namely the shape of the hind wings, nearly equal in width to forewings, and the presence of a transverse line of anastomosis (cord) in the male forewings. However, the male of *Cephalopsyche* differs by the presence of forks I, II, and V in both wings, versus forks I, II, III, and V in *Lannapsyche* and *Barynema*; also, it differs by fork II petiolate.

Finally, *Cephalopsyche* has several unique characters compared to all genera, including wing venation, specialized head structures, and genitalic features described below. However, based on the general structure of the male genitalia, it most closely resembles *Psilotreta* Banks, 1899. The following diagnosis emphasizes the comparison of these two genera [matching character states for *Psilotreta* in brackets] as a proxy for all other odontocerid genera. This new genus is unique when considering the following characters. Male with a “swollen” or domed head of varying extent [head not modified in this manner]. Scape thickened and longer than head, with spines along dorsomesal surface [subequal to length of head, lacks spines]. Eyes not enlarged, subequal in both sexes [male eyes larger than in female]. In male, fifth segment of maxillary palpi longest, tapered [fifth subequal to fourth or shorter, digitate]. Metathorax scutellum (Fig. 2D) triangular with short base and long, nearly straight sides [equilateral triangular with bent sides (Fig. 2E)]. Both pairs of wings in both sexes elongate and narrow, anal area in hind wings not enlarged [hind wings wider than forewings, anal area in hind wings enlarged]. Forewing crossvein *r* wide, lying near the base of fork I in both sexes, and



**Figure 1.** *Cephalopsyche gorgona* sp. n.: **A** male head, lateral **B** male head, lateral cross-section **C** male head and thorax, dorsal **D** female head, lateral **E** female head, dorsal.

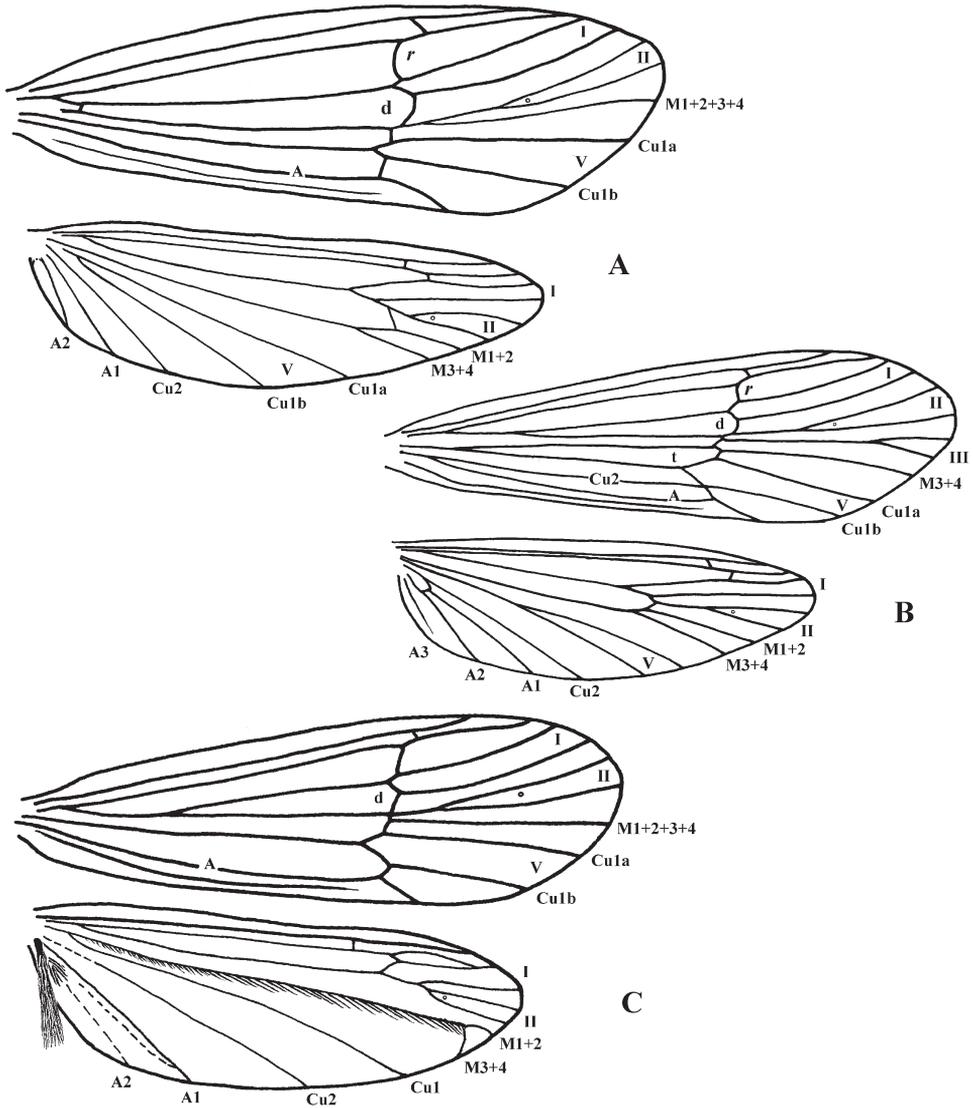
is aligned with other crossveins in a transverse line of anastomosis [crossvein *r* halfway or more from the base of fork I to apical margin of forewing, no line of anastomosis]. Discoidal cell present only in forewings of both sexes [both pairs of wings with discoidal cell]. Discoidal cell long, joined for a very short distance by fork I [this distance much longer]. Cu2 in forewings of male absent [Cu2 present]. Anal cell missing in



**Figure 2.** *Cephalopsyche nevoissi* sp. n.: **A** male head, lateral **B** male head, dorsal **C** female head, dorsal and **D** male metathorax, dorsal. *Psilotreta frigidaria* Mey 1997: **E** – male metathorax, dorsal. *Marilia sumatrana* Ulmer 1951: **F** – male metathorax, dorsal.

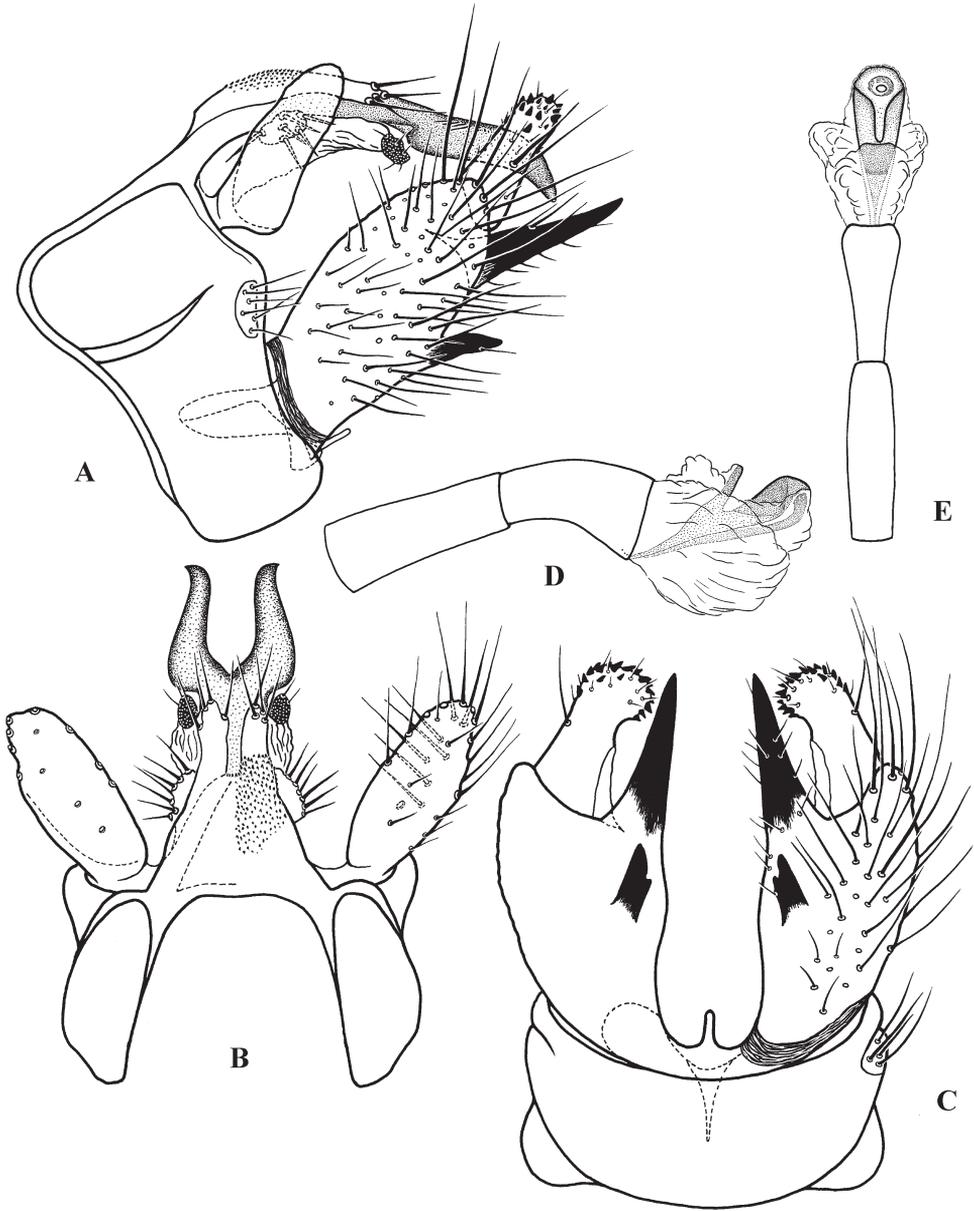
forewings of male [anal cell present]. Intermediate appendages of male genitalia lightly sclerotized with rounded, well sclerotized apical area possessing several setae [stout and sclerotized, in shape of curved or looped spurs]. Basal segment of inferior appendages of male genitalia bear a pair of large, stout spine-like, ventromesal processes [lacks spine-like processes]. Female with mesal plate of sternite IX well defined and more narrow than lateral lobes [sternite IX formed of sclerotized triangular or hemispherical plates, when present, of equal size].

**Adult.** General color in alcohol yellowish-brown to brown, with vertex darker. Head displays distinct sexual dimorphism in shape and number of setal warts (Figs 1, 2). Frontal warts absent in male but present in female. Vertex of male head swollen or domed, movable, formed as a “chamber” lined with filamentous, columnar tissue. Head of female shorter than wide, anterior margin of vertex convex, with V-shaped mesal notch. Eyes of male and female not enlarged, nearly equal in size. Antennae slightly longer than forewings in both sexes. Scape thickened, slightly longer than head in both sexes, with spines on dorsomesal surface in male. Maxillary palpi 5-segmented and rather long in both sexes. Male maxillary palpi thick, heavily setose, with clusters of long, dense dark setae, mainly on third and fourth segments; second segment shorter than first and third; fourth longer than third; apical segment longest and tapered. Female maxillary palpi thinner but longer than in male, covered evenly with yellow to light brown setae; third, fourth, and fifth segments subequal, longer than first and sec-



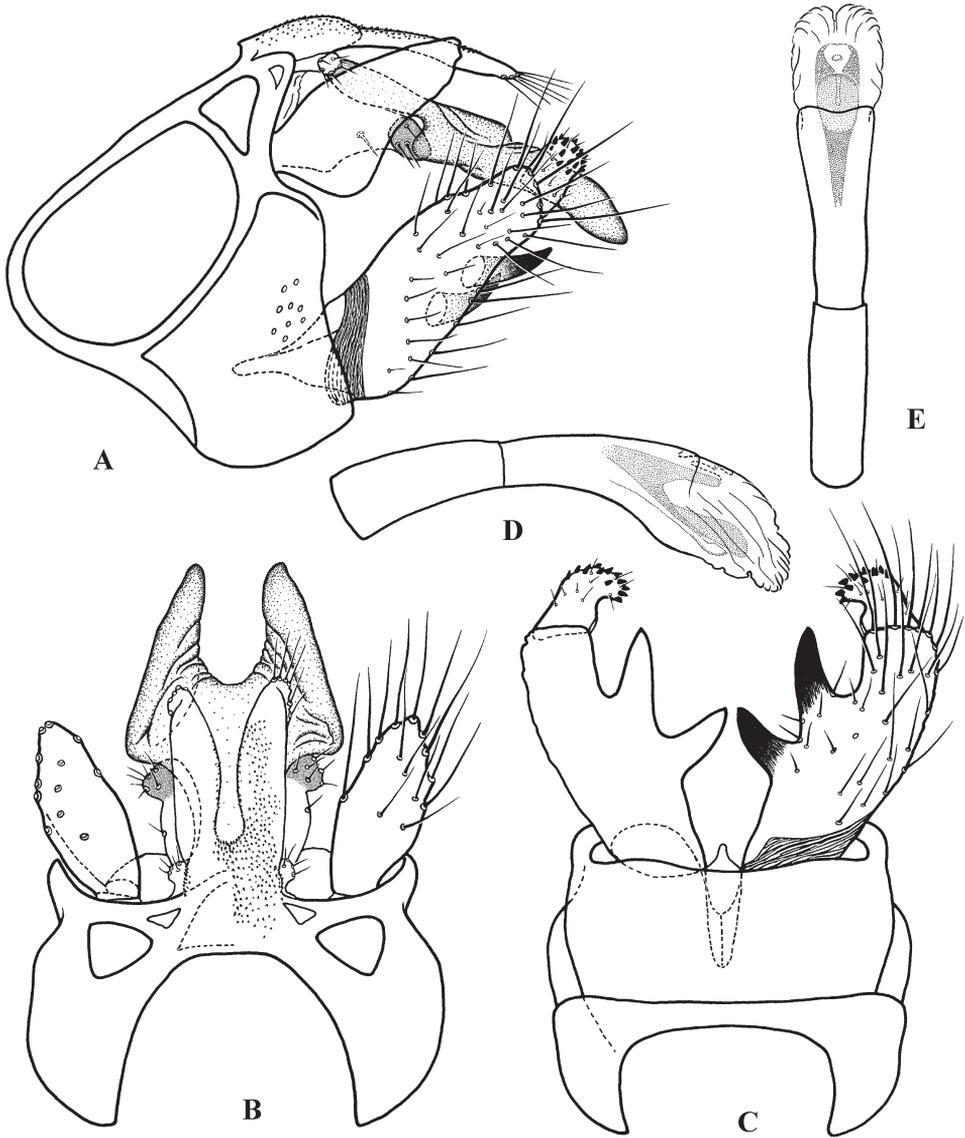
**Figure 3.** Wing venation. *Cephalopsyche gorgona*, sp. n.: **A** male **B** female. *Cephalopsyche nevoissi* sp. n.: **C** – male.

ond segments. Labial palpi 3-segmented in both sexes, longer in male than in female; first segment short, third slightly longer than second and tapered. Prothorax (Fig. 1C) with pair of large, elongate, transverse setal warts, bearing long setae in male, shorter setae in female. Mesothorax of male (Fig. 1C) with pair of large, oblong, longitudinal mesoscutal setal warts; almost twice shorter in female; mesoscutellar wart single. Metathorax scutellum (Fig. 2D) triangular with short base and long, nearly straight sides. Legs long and slender, foreleg shortest, mid leg and hind leg subequal; femur of mid leg



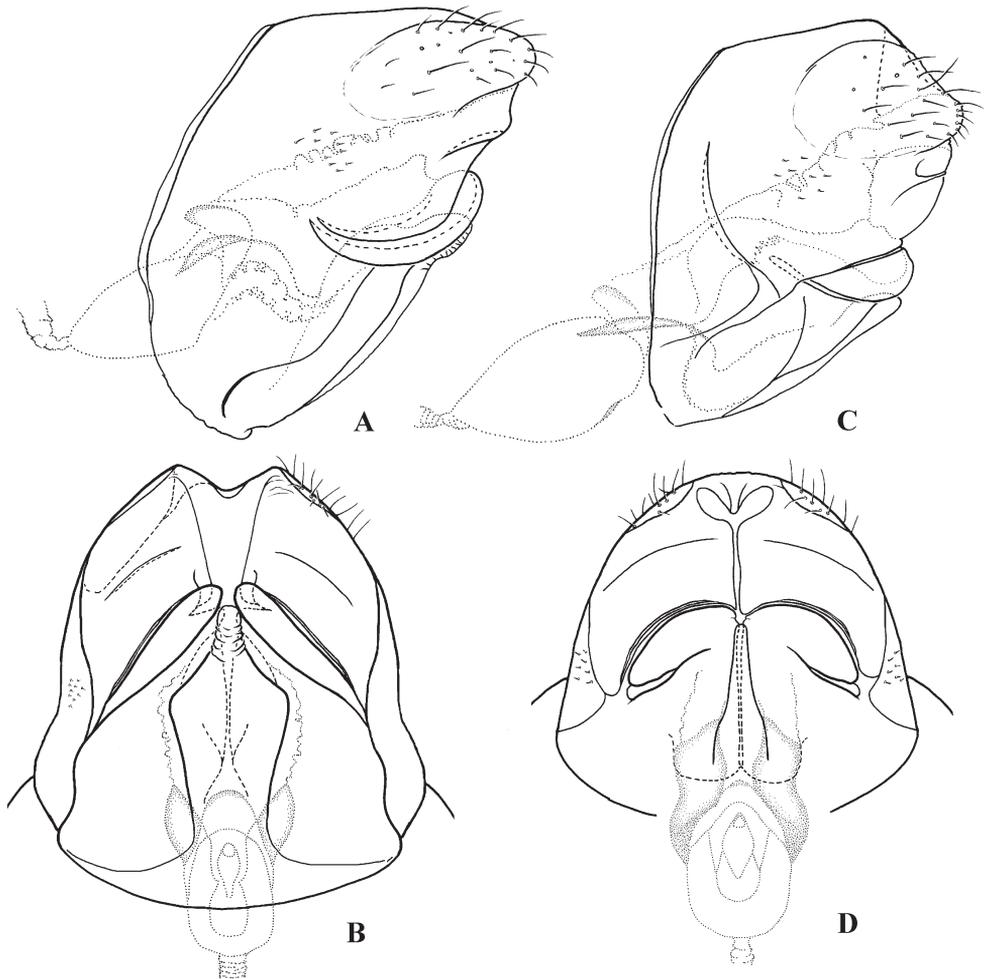
**Figure 4.** *Cephalopsyche gorgona* sp. n., male genitalia: **A** lateral **B** dorsal **C** ventral **D** phallus, lateral **E** phallus, dorsal.

as long as tibia; femur of hind leg nearly twice shorter than tibia. Tibial spur formula 2, 4, 4. Male and female wings elongate (Fig. 3), hind wings slightly narrower than forewings. Forks I, II, and V present in forewings of male, and I, II, III, and V in female; R1 meets wing margin near R2 in both sexes; crossvein *r* lies near base of fork I in



**Figure 5.** *Cephalopsyche neboissi* sp. n., male genitalia: **A** lateral **B** dorsal **C** ventral **D** phallus, lateral **E** phallus, dorsal.

both sexes, and aligned with other crossveins in a transverse line of anastomosis (cord); discoidal cell long, joined for very short distance by fork I; fork II petiolate; M without base (no thyridial cell) in male, represented by single apical branch originating from R4+5; in female M 3-branched, thyridial cell long and narrow; Cu2 absent in male; in female Cu2 ending at Cu1b; anal vein single in both sexes, no anal cell; postanal vein long. Venation of hind wings reduced; forks I, II, and V present in both sexes (fork V secondarily absent in male of *C. neboissi*); discoidal and thyridial cells absent; Sc and



**Figure 6.** Female genitalia: *Cephalopsyche gorgona* sp. n.: **A** lateral **B** ventral; *Cephalopsyche nevoissi* sp. n.: **C** lateral **D** ventral.

R1 run close to each other in female; two anal veins present in male, three in female; sparse long hairs along posterior edge of anal area.

**Male genitalia** (Figs 4, 5): Segment IX stout and extended anteriorly in middle of lateral sides, with distinct setal area located posteriorly just above dorsal edge of inferior appendage. Dorsum of segment IX with paired, parallel lobes directed posterad. Preanal appendages large, elongate, earlike lobes in lateral view; elliptical in dorsal view. Segment X bifurcated, forming horn-like processes, with pair of setal, wart-like lobes located near base. Intermediate appendages lightly sclerotized with rounded, well sclerotized apical area possessing several setae. Basal segment of inferior appendages large, nearly 3 times as long as width at base in lateral view, having two large, stout, heavily sclerotized, spine-like ventromesal processes. Apical segment of inferior ap-

pendages short, straight in lateral view and slightly bent mesad in ventral view; bearing short, stout spines apically. Phallus with phallotheca sclerotized, long and cylindrical, slightly bent ventromesally; endotheca short and membranous; phallotremal sclerite large; parameres absent.

**Female genitalia** (Fig. 6): Sternum VIII rectangular, with a row of setae along posterior margin. Segment IX stout. Sternite IX divided into three plates; mesal plate elongate, lying between lateral plates; each lateral plate forms fold posteriorly, which apparently receives spine-like ventromesal processes of male inferior appendages during copulation. Segment X very small, indistinguishably fused with segment IX. Appendages of segment X (Schmid 1998: 196), or setal warts of segment X (Parker and Wiggins 1987: 5) appressed, ovoid, slightly prominent in lateral view. Vaginal sclerites elongate, slightly sclerotized, and extending into segment VIII.

**Etymology.** The genus name is a combination of the two Greek words: *cephalos* meaning head and *psyche* meaning soul.

**Immature stages.** Unknown.

### *Cephalopsyche gorgona* sp. n.

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Figs 1, 3A–B, 4, 6A–B

**Holotype male: Vietnam:** Quang Nam Province, Ngoc Linh, 1460 m, 15°11.2'N, 108°2.3'E, Malaise trap, March – April 1999, D. Grimaldi, L. Herman, C. Johnson, K. Long, E. Sterling. **Paratypes:** 2 males, 1 female, same data as holotype; 1 male, 2 females, same locality as holotype, 30 March 1999, K. Long, C. Johnson; 1 female, *ibid.*, 950 m, 15°10'N, 108°5'E, Malaise trap, 30 March 1999, K. Long, C. Johnson.

**Diagnosis.** Male of *Cephalopsyche gorgona* differs from that of *C. nevoissi* by the very large head, by the Minoan bull horn-like bifurcation of segment X in dorsal view, and by the unequal size and shape of the ventromesal processes of the inferior appendages. Female of this species can be easily distinguished in sternite IX by the shape of the posterior fold on each lateral plate and by the flask-shaped mesal plate.

**Adult.** Male: forewings – 12.8–13.8 mm long, 4.0–4.4 mm wide; hind wings – 10.1–10.9 mm long, 2.9–3.2 mm wide. Female: forewings – 11.0–11.5 mm long, 3.4–3.5 mm wide; hind wings – 8.2–8.5 mm long, 2.6–2.7 mm wide. General color in alcohol yellow-brown to brown, with vertex darker. Thorax, lower portion of head, and legs of male brown to yellow-brown. Head of male with wart boundaries not distinct, posterior and antennal warts setal areas diffuse, frontal warts absent, posterolateral warts distinct, elongate, and subtending eyes. Head of male longer than wide; vertex heavily sclerotized, dark reddish-brown, abnormally enlarged, or swollen dorsoposteriorly (Fig. 1A–C); covered with dense, pale hairs, oriented mesoanterad, which appear appressed to head surface. Swollen portion of head formed as a “chamber” lined with filamentous, columnar tissue (Fig. 1B); chamber split into two hinged halves along fissure down middle of head oriented with body axis. Row of dark spines (7–11 on each

side of head) forming transverse row across vertex of head. Head of female (Fig. 1D–E) with all setal warts distinct, frontal warts paired, antennal warts small and round, posterior warts elliptical, and posterolateral warts elongate. Male and female forewings elongate (Fig. 3A–B), brownish, with a few vague small lighter spots scattered mostly anteriorly; hind wings slightly narrower and paler. Forewing discoidal cell very long (extremely long in male, starting near base of wing).

**Male genitalia** (Fig. 4): Segment IX stout, extended anteriorly slightly above midline of lateral sides. Dorsum of segment IX finely granular, subtriangular, with parallel lobes protruding posterad; lobes shorter than dorsum, finger-like, lightly sclerotized with a few long setae apically. Preanal appendages elongate, almost as long as maximum lateral width of segment IX, slightly broader subbasally and rounded apically in lateral view; almost oval in dorsal view, bearing scattered long, stout setae ventrally (Fig. 4B). Segment X well-developed, bifurcated, resembling Minoan bull horns, with acute tips pointed posterolaterad in dorsal view and posteroventrad in lateral view; a pair of oval, wart-like lobes located near base of segment X, each bearing 6–7 setae. Intermediate appendages extend slightly beyond lobes of segment IX dorsum, straight in dorsal view and slightly bent posteroventrally in lateral view; lightly sclerotized, each with rounded, well sclerotized apical area, possessing several setae. Basal segment of inferior appendages large, nearly elliptical in lateral view, 3 times as long as wide at base in lateral view, with two heavily sclerotized, spine-like, ventromesal processes; subapical process long, stout, equal in extent to apical segment of inferior appendages; second process short, with subapical notch in ventral view. Apical segment of inferior appendages short, straight in lateral view and slightly bent mesad in ventral view; bearing short, stout spines apically. Phallus with phallosoma sclerotized, long and cylindrical, bent ventromesally; endotheca short and membranous; phallosomal sclerite large; parameres absent.

**Female genitalia** (Fig. 6A–B): Mesal plate of sternite IX large, flask-shaped; each lateral plate of sternite IX forms elongate, diagonal fold posteriorly. In lateral view, segment X long, elongate, near elliptical in shape.

**Distribution.** Known only from the type locality in Quang Nam Province (Vietnam).

**Etymology.** This species was named for the Gorgons, three sisters of Greek mythology (who bore snakes on their heads and turned anyone who stared at them into stone) because of the mass of filamentous, columnar tissue found under the hinged vertex of the head.

***Cephalopsyche neboissi*, sp. n.**

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Figs 2A–D, 3C, 5, 6C–D

**Holotype male: Vietnam:** Quang Nam Province, Ngoc Linh, 830 m, 15°10'N, 108°5'E, Malaise trap, 11–18 March 1999, K. Long, C. Johnson. **Paratypes:** 4 fe-

males, same data as holotype; 6 females, *ibid.*, 950 m, 15°11.2'N, 108°2.3'E, Malaise trap, 16 April 1999, D. Grimaldi, L. Herman, C. Johnson, K. Long, E. Sterling.

**Diagnosis.** Male of *Cephalopsyche nevoissi* differs from that of *C. gorgona* by the smaller size of head, by the triangular shape of bifurcated branches of segment X in dorsal view, and by the subequal size and shape of the ventromesal processes of the inferior appendages. Female of this species can be distinguished in sternite IX by the narrow, diagonal pocket in the middle of each lateral plate and by the club-shaped mesal plate.

**Adult.** Length of forewing: male – 11.6 mm; female – 10.3–11.5 mm. Male teneral, setal warts on head and thorax whitish, wings pale. Female coloration similar to female of *Cephalopsyche gorgona*. Head in both sexes shorter than wide, with frontal slit-shaped mesal notch in male and with V-shaped mesal notch in female. Male vertex of head reddish-brown, slightly swollen or domed and similar in structure to that of *C. gorgona*, but less enlarged. Antennal warts in both sexes small, elongate and subtend antennae; posterior warts elliptical and posterolateral warts elongate. Scapus of male with dorsomesal spines longer than in *C. gorgona*. Forewing venation of male resembles that of *C. gorgona*. Discoidal cell long, but shorter than in type species, situated in middle of wing. Venation of hind wings reduced and shifted to apex; forks I and II very short; fork V absent; M covered with golden bristles and forked near apex; brush of long hairs on anal lobe similar to *Marilia* (Schmid 1980, p. 295, fig. 845); wing membrane at A1 folded to hold brush when wings are at rest. Cluster of short hairs at base of A2. Wing venation of female very similar to *C. gorgona*.

**Male genitalia** (Fig. 5): Segment IX stout, distinctly extended anteriorly near midline of lateral sides, with light-colored setal area posterolaterally. Dorsum of segment IX short, bilobed posteriorly, finely granular; lobes longer than length of dorsum, sclerotized and blade-like, with a few long setae apically. Preanal appendages large, shorter than maximal width of segment IX, elongate, broad subbasally, evenly tapering apically in lateral view, nearly elliptical in dorsal view. Segment X bifurcated, branches nearly triangular, with apices pointed posterad in dorsal view, and slightly posteroventrad in lateral view; pair of small, rounded setose lobes at base of segment. Intermediate appendage much shorter than lobes of segment IX dorsum, lightly sclerotized, each with rounded, well sclerotized apical area, bearing several setae. Basal segment of inferior appendages large, subrectangular, bearing two heavily sclerotized, horn-like ventromesal processes, similar in size and shape. Apical segment of inferior appendages short, with small, stout apical spines, slightly bent mesad in ventral view. Phallus with phallosome sclerotized, long and cylindrical, slightly bent ventromesally; endotheca short and membranous; phallosomal sclerite large; parameres absent.

**Female genitalia** (Fig. 6C–D): Mesal plate of sternite IX long, club-shaped; each lateral plate of sternite IX forms rounded, folded edge posteriorly, and with narrow, diagonal pocket in middle of plate, presumably to hold one horn-like ventromesal process of male inferior appendages. In lateral view, segment X more rounded in shape.

**Distribution.** Known only from the type locality in Quang Nam Province (Vietnam).

**Etymology.** This species is named after the late Dr. Arturs Neboiss, Victoria Museum, Australia in recognition of his lifetime work on caddisflies.

### Phylogenetic considerations

Monophyly of *Cephalopsyche* is supported by at least seven unique characters, compared with the proxy genus *Psilotreta*, which are identified above in the diagnosis for the genus. Included among these is the suite of characters involved with the movable halves of the vertex of the head, covering a chamber filled with distinct filamentous, columnar tissue, and the basal segment of inferior appendages with a pair of large, stout spine-like, ventromesal processes.

Monophyly of *Psilotreta* initially rested on Parker and Wiggins (1987) statement: "The adult is distinguished by having the separation of R2 and R3 markedly basad of the separation of R4 and R5." Unfortunately, this is also true of their stated sister genus *Odontocerum* Leach, 1815 and the genus *Inthanopsyche* Malicky, 1989. Thus, this character cannot be used for establishing monophyly for *Psilotreta*. Similarly, Schmid (1998), provided a character for *Psilotreta*, separating it from *Marilia*, involving the long, narrow discoidal cell of both wings, that is "joined by fork I for long distance." However, this is another way of saying the same thing Parker and Wiggins (1987) said. For either case, the discoidal cell in *Cephalopsyche* is only present in the forewings and is joined by fork I for only a short distance. In order to establish monophyly for *Psilotreta*, we must turn to crossvein *r*, which is half or more distant from fork I and does not form a cord, or transverse line of anastomosis, with the other crossveins and fork bases. In *Cephalopsyche*, crossvein *r* is near the base of fork I and, in the forewings, is part of a cord. Monophyly has not been established for all genera within the family Odontoceridae. This family should be rigorously examined at the generic level to establish clear separation of genera and a sound phylogeny.

Parker and Wiggins (1987) enumerated a number of character states separating the North American species of *Psilotreta* from the Asian species. Interestingly, *Cephalopsyche*, although Asian, shares some characters with the North American species (e.g., absence of parameres). We hypothesize that *Cephalopsyche* arose from the same or a closely related ancestor as *Psilotreta*. Whereas *Psilotreta* became more widespread and modified, *Cephalopsyche* remained in the ancestral range, retaining many plesiomorphic characters, but still evolving some synapomorphies, such as the suite of characters involving the vertex of the head and loss of parameres.

### Discussion

The two hinged halves of the chamber that modifies the dorsal portion of the head suggest some functional role such as pheromone detection, similar to the occipital sclerites present on certain species of Hydroptilidae (Roemhild 1980) and the eversible lobes

on the maxillary palp of some species of *Psilotreta* and *Goera*. Additional investigations will be required to confirm this.

The discovery of this new genus in Vietnam suggests that many more new species, and perhaps new genera, of caddisflies remain undescribed in the region. More thorough collecting, including repeated sampling over entire flight seasons and sampling of all microhabitats, will undoubtedly increase the known diversity of caddisflies from this country.

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# New or little-known species of the genus *Amphimenes* Bates, 1873 (Coleoptera, Carabidae, Lebiinae) from Vietnam

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## Abstract

Twelve new species of the genus *Amphimenes* Bates, 1873 are described from Vietnam: *A. maculatus* **sp. n.**, *A. bidoupensis* **sp. n.**, *A. gracilis* **sp. n.**, *A. montanus* **sp. n.**, *A. giganteus* **sp. n.**, *A. medius* **sp. n.**, *A. minutus* **sp. n.**, *A. rufipes* **sp. n.**, *A. reflexicollis* **sp. n.**, *A. planicollis* **sp. n.**, *A. nitidus* **sp. n.**, and *A. kabakovi* **sp. n.** *Amphimenes rugulipennis* Bates, 1892, **comb. n.**, is transferred from the genus *Brachichila* Chaudoir, 1869 and is redescribed from fresh material. A key to all congeners is provided, these being arranged into five new species-groups. Adults of the *rugulipennis*- and *piceolus*-groups show subcortical habits, while those of the *medius*-, *rufipes*- and *planicollis*- groups are herpetobiotic, resulting in such morphological adaptations as partly reduced eyes, missing wings and adnate elytra.

## Keywords

new species, species group, new combination, *Amphimenes*, *Brachichila*, Vietnam

## Introduction

The genus *Amphimenes* Bates, 1873 is still a poorly-known member of the subtribe Pericalina, Lebiini. It was established for the only, and type, species *A. piceolus* Bates, 1873 from Japan (Bates 1873). Two further congeners, *A. asahinai* Nakane, 1957, and *A. ryukiensis* Habu, 1964, were added from Taiwan and Japan (Ryukyus; Amamiyoshima Is., Kyushu),

respectively, while the genus was revised by Habu (1964, 1967). He reviewed and keyed all these species, and pointed out that the earlier records of *A. piceolus* in Taiwan and Fujian [Fukien], southern China (Jedlička 1940, 1953, 1963) actually belonged to different species. In addition, *A. rugulipennis* (Bates 1892), comb. n., has hitherto been considered as a member of the genus *Brachichila* Chaudoir, 1869, this being corrected here.

Among the other members of Oriental Pericalina, *Amphimenes* seems to be especially similar to the genera *Brachichila* and *Dolichoctis* Schmidt-Goebel, 1846, differing well from both chiefly by the combination of a well-developed median tooth on the mentum, a highly characteristic cross-striation on the elytra and some other characters. The adults of at least some winged species (*A. piceolus*) have been known to live under the bark [of dead trees] (Habu 1964, 1967).

During a few recent expeditions of the Russia-Vietnam Tropical Center to Vietnam, I collected eight species of the genus, all of them but *B. rugulipennis* being new. Only three of these new species showed subcortical habits and well-developed wings, while the remaining ones dwelled under or in logs or larger branches on the soil surface and were wingless following their habits. This proved to also be true of four species of five further described here as new, these collected by O. N. Kabakov in Vietnam five decades ago. As a result, all congeners are keyed here, with the Vietnamese species described or redescribed. Taking new characters into account, I also think it advisable now to refine the diagnosis of the genus.

One to 18 specimens per species studied were measured concerning the following parameters: body length from the apex of the mandible to the apex of the abdomen/elytra, head width across eyes (HW), maximum pronotal and elytral widths (PW and EW, respectively), length of pronotum along its mid-line (PL), length (MESL) and width (MESW) measured along the outer and anterior margin of the metepisternum, respectively, length from the basal margin to the apex of the elytra (EL), and distances between the elytral basal margin and the discal setigerous pores (D1, D2 and D3). The indices PW/HW, PW/PL, EL/EW, EW/PW, MESL/[MES]W, as well as D1/EL, D2/EL and D3/EL, were analysed.

Holotypes and paratypes of the species described here are deposited in the Zoological Institute of the Russian Academy of Sciences, St. Petersburg (ZISP), Zoological Museum of the Moscow State University (ZMMU), and the author's reference collection at the A. N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences (SIEE), as indicated hereafter.

## Taxonomy

### The genus *Amphimenes* Bates, 1873

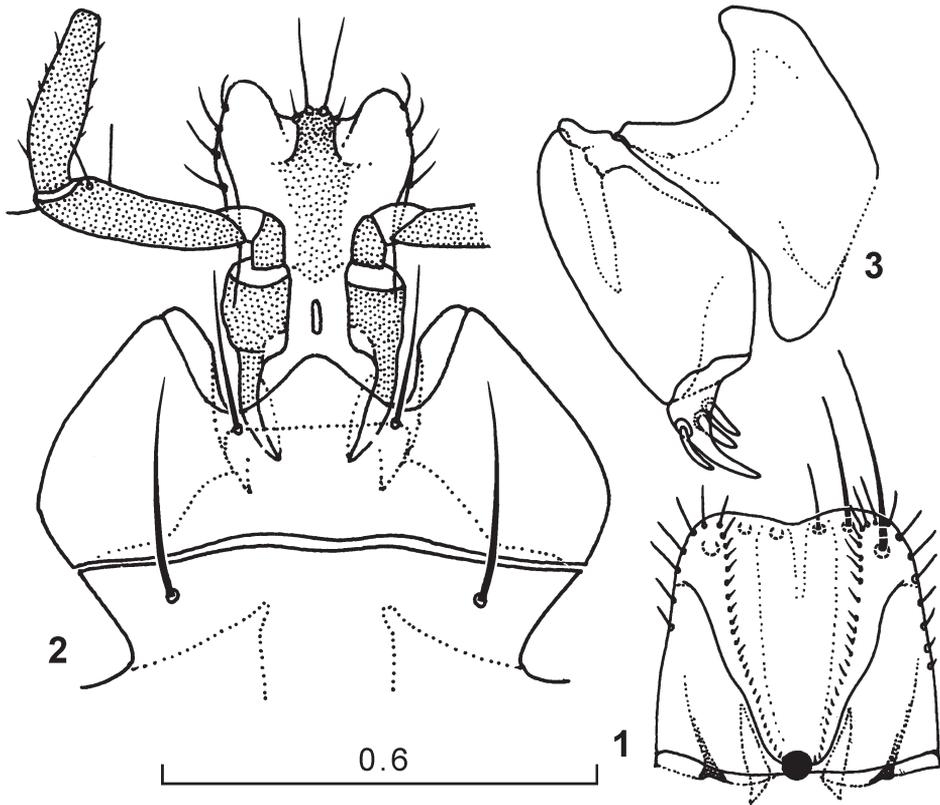
Type-species: *Amphimenes piceolus* Bates, 1873: 322 (Nagasaki, Japan; by monotypy).

**Redescription.** Small- to medium-sized pericaline lebiines, either unicoloured or with a pale pattern composed of two, posthumeral and subapical, rounded, yellow spots on

each elytron, latter spots adjoining suture; reflexed side margins of both pronotum and elytra, antennae, mouthparts, legs, labrum and clypeus usually paler, often contrastingly so. Body glabrous, except for underside microscopically ciliate and pronotum almost indistinctly so in some species. Forebody dorsum dull due to an almost granulate isodiametric microsculpture occupying head, pronotum and scutellum, sometimes somewhat shining because of a weaker microsculpture which, in addition, forms slightly transverse meshes behind pronotal front margin and base. Elytral microsculpture composed of very fine and dense transverse lines or very narrow transverse meshes, anyway contributing to dorsum's iridescence, rarely coarse and isodiametric. All but one congener show a highly characteristic cross-striated sculpture occupying entire disc or, rarely, only elytral base; this cross-striation, combined with microsculpticells or lines, becoming increasingly oblique outwards, resulting in both being conspicuously oblique posterolaterad on intervals 5 to 8.

Eyes varying from large and hemispherical to small and flat. Labrum trapezoidal (Fig. 1), a little narrowing forwards, with front angles rounded; anterior margin slightly sinuate, with six setae of gradually decreasing length inwards. Last maxillary palpomere narrowing apicad, longer than penultimate one. Submentum with a pair of strong setae; another pair situated at base of a large median tooth of mentum, latter rounded apically, about half as long as wide lateral lobes (Fig. 2). Ligula well-developed, sclerotized apically and not so strongly basally, fairly narrow, with two pairs of apical setae, inner much longer than outer; paraglossae membranous, wide, a little longer than ligula, each with four setae over outer margin. Penultimate labial palpomere with two preapical setae drawn together; proximal and distal setae of anterodorsal and anteroventral position, respectively; last labial palpomere subcylindrical, slightly narrowing apicad. Antennae long to short, pubescent from apical half of antennomere 4 onward, some species (*A. medius*, *A. minutus*, *A. rufipes*) showing apical half of antennomere 3 sparsely ciliate along outer margin; 3<sup>rd</sup> antennomere 1.2–2.05 times as long as 2<sup>nd</sup>; 7<sup>th</sup> to 9<sup>th</sup> 1.22–3.34 times as long as wide.

Pronotum rather flat, strongly transverse to about as long as wide, weakly cordate, deeply emarginate anteriorly, with protruding and fairly narrow front angles, rather strongly rounded on sides, somewhat narrowing basad, broadest before middle, *i.e.* level to anterolateral setigerous pore at which side margin often slightly angulate; latter moderately strongly sinuate to straight before posterior angles, these varying from obtuse to almost indistinct due to pronotal base increasingly oblique forward towards posterolateral setigerous pore. Front margin with a very narrow but distinct polished bead; side margin rather strongly explanate-reflexed, narrow anteriorly and gradually broadening basad; basal transverse depression conspicuous to weak, when well-developed, ca 0.15 times as long as pronotum along mid-line, latter varying from deep to superficial; lateral basal foveae weak to indistinct, each usually extended to the middle or anterior third as a very shallow depression running parallel to side margin; disc at middle with a pair of small and shallow paramedian foveae. Base slightly trilobed, with medial part mostly a little surpassing lateral lobes.



**Figures 1–3.** Genus *Amphimenes*, ventral aspect: labrum (1), labium (2), left gonapophyse (3).

Metathorax longer in winged than in wingless species; accordingly, metepisternum much longer than wide ( $MESL/W=1.35-1.73$ ) in the former versus about as long as wide ( $MESL/W=0.78-1.02$ ) in the latter.

Elytra subrectangular to oval, subparallel to rather strongly rounded on sides, with base wide to very narrow and shoulders slightly to completely rounded; apical truncature oblique and slightly sinuate between outer angle of each elytron and its apex, those rounded in all but one species. Striae impunctate, deep throughout, intervals mostly convex. Discal setigerous pores three or two (either  $D1+D3$  or  $D2+D3$ ), adjoining stria 3 ( $D1$ ) or 2 ( $D2, D3$ ). Prescutellary pore present. Preapical setigerous pores (those of 7<sup>th</sup> interval) two, outer (anterior) large, inner (posterior) small. Umbilicate series uninterrupted or divided into two, posthumeral and subapical, groups.

Profemur rather strong. Claws serrate in basal two-thirds. Pretarsus with two or only one, distal, pair of setae beneath.

Aedeagus. Penis mostly rather stout, weakly arcuate, strongly bent to the right just behind basal caeale and often twisted to the right behind the middle, with apical orifice rounded and shifted to the left; apical lamella rather small, of characteristic shape and structure in different species. Microsculpture usually conspicuous, composed of iso-

diametric to slightly longitudinal meshes predominantly developed over left side; right ventral side mostly longitudinally striate in basal half. Parameres moderately strongly reduced, left paramere subrectangular, right one small, rounded apically, with base long, narrow and hooked apically.

Female gonapophyse as in Fig. 3.

Sexual dimorphism: male protarsomeres 1–3 dilated, each with an adhesive pubescence beneath, sternite 6 sometimes slightly desclerotized or weakly emarginate posteriorly, with one, lateral, pair of setae, versus not sinuate and with two pairs of setae in female. Males of two species show basal third of profemur underside furnished with a small tubercle instead of a pointed mesotrochanteral tubercle observed in males of most other congeners.

**Geographic distribution.** The range of the genus extends from Japan (Kyushu and Shikoku) in the north and east to at least southern Vietnam in the south, and Myanmar in the west. Winged congeners are certain to be much more widespread than wingless ones, implying still undescribed species of very local ranges to be discovered in unexplored montane regions of Indochina, Vietnam in particular.

**Habits and habitats.** All congeners inhabit forested areas, both montane and lowland. Original adult habits seem to be strictly subcortical. In southern Vietnam, species with such habits occur under bark (*A. bidoupensis*) or also in chapped bark of standing dead trees (*A. rugulipennis*, *A. maculatus*), never of fallen deadwood or logs. All of them are winged, some flying to light at night. Such soil-dwellers as *A. medius*, *A. minutus*, *A. rufipes* and *A. giganteus* are certain to be derived, being adapted to living in leaf litter or cavities in logs or fallen larger branches. This has resulted in a few morphological adaptations, among them, the hindwings missing, the elytra wide, fused along the suture, with strongly rounded shoulders, while the eyes tending to be reduced to small and flat. The latter contributes much to the head being narrower across the eyes while broader across the neck, all relative to body width. Only *A. giganteus* among the members of the latter ecological group sometimes occurs under bark, while the others have never been observed there. Four species from northern Vietnam show similar morphological adaptations, suggesting herpetobiotic habits as well.

In the Bi Doup – Nui Ba Nature Reserve, three to five species live sympatrically, with up to four soil-dwellers among them occurring syntopically. This seems to also be true for elsewhere in Vietnam north of the Dalat Plateau because more than one species have been recorded from such localities as Tam Dao (*A. reflexicollis*, *A. kabakovi*), Quỳ Châu (*A. gracilis*, *A. planicollis*) or Thai Nguen (*A. gracilis*, *A. nitidus*).

**Generic composition.** The genus currently includes 16 species arranged into five species groups. Of them, two, the *rugulipennis*-group (*A. rugulipennis*, *A. maculatus*) and the *piceolus*-group (*A. piceolus*, *A. riukyuensis*, *A. montanus*, *A. bidoupensis*, *A. gracilis*, perhaps also *A. asahinai*) comprise congeners of subcortical habits. The *medius*-group (*A. giganteus*, *A. medius* and *A. minutus*) and the *planicollis*-group (*A. planicollis*, *A. reflexicollis*, *A. nitidus* and *A. kabakovi*) are established here for soil-dwelling species distinguishable chiefly in a particular formula of the elytral discal chaetome. This is also true of *A. rufipes* which seems to constitute a group of itself.

**Key to species of *Amphimenes***

- 1(2) Elytra without distinct cross-striation but with a coarse isodiametric microsculpture on disc. Body small, 5.0 mm long, unicoloured, with appendages contrastingly paler. Eyes small and flattened. Elytra broadest behind the middle, D2+D3, D2 situated at middle. Wings absent. Antennae very short .....  
.....**9. *A. rufipes* sp. n.**
- 2(1) At least elytral base with a distinct cross-striation, elytral microsculpture composed of strongly transverse meshes or transverse lines not forming distinct meshes. Coloration other than above.
- 3(6) Elytra dark, with a pale spotted pattern (Figs 4, 5). Body appendages yellow, contrastingly paler than body dorsum. D1 (near base, D1/EL = ca 0.15) + D2 (at middle) + D3. Pronotum transverse, 1.51–1.60 times as wide as long. Wings full.
- 4(5) Larger, 6.4–8.2 mm long. Elytral microsculpture composed of fine and very dense transverse lines not forming distinct meshes. Elytral paler spots smaller, anterior spot extended to shoulder while not surpassing the midway between D1 and D2; posterior spot not extending forward beyond the midway between D2 and D3. Male profemur ventrally with a small tubercle in basal third ..... **1. *A. rugulipennis***
- 5(4) Smaller, 5.6–5.9 mm long. Elytral microsculpture consisting of strongly transverse but distinct meshes. Paler spots on elytra larger, anterior spot not extending towards shoulder laterally while surpassing the midway between D1 and D2; posterior spot extending forward beyond the midway between D2 and D3. Male profemur ventrally without tubercle..... **2. *A. maculatus* sp. n.**
- 6(3) Elytra monochromous dark, body appendages mostly darker than above. Discal setigerous pores two, D1+D3 or D2+D3, if three, then D2 situated far behind middle (D2/EL = 0.61–0.76).
- 7(20) D1+D2+D3.
- 8(19) D1 remote from elytral base (D1/EL = ca 0.25). Smaller, under 8.7 mm long, and predominantly winged species, with metepisternum distinctly longer than wide. Eyes either large and hemispherical or only slightly flattened; posterior supraorbital seta situated level to or slightly behind eye back margin.
- 9(12) Elytral microsculpture composed of transverse meshes. Body length 5.8–7.0/5.5–6.8 mm.
- 10(11) Wings full, both metepisternum and elytra longer, ca 1.4–1.5 times as long as wide, latter less strongly rounded on sides (ex Habu, 1964) .....  
.....***A. piceolus* Bates, 1873**
- 11(10) Wings vestigial, metepisterna and elytra shorter, MESL/W=1.07–1.11, EL/EW=1.33; elytra more strongly rounded on sides (ex Habu, 1964) .....  
.....***A. asabinai* Nakane, 1957**
- 12(9) Elytral microsculpture consisting of fine and dense transverse lines not forming meshes. Wings full.

- 13(16) Pronotum subcordate, with sides distinctly sinuate before posterior angles.
- 14(15) On average, larger, 6.7–8.0/7.1–8.3 mm long. Pronotum short and wide, 1.36–1.55 (mean 1.44) times as wide as long. Metepisternum long, 1.55–1.73 times as long as wide. Elytra with moderately dense and deep cross-striation and middle elytral intervals nearly flat behind the middle..... **3. *A. bidouppensis* sp. n.**
- 15(14) On average, smaller, 6.4–7.5 mm long. Pronotum narrower and longer, 1.29–1.43 (mean 1.37) times as wide as long. Metepisternum shorter, 1.35–1.43 times as long as wide. Elytra with very dense and deep cross-striation and intervals more or less convex behind the middle..... **4. *A. gracilis* sp. n.**
- 16(13) Sides of pronotum not or indistinctly sinuate before posterior angles.
- 17(18) Pronotum weakly narrowing basad, broader relative to head (PW/HW=1.49–1.57), with reflexed side margin basally broader than in the following species. Elytra and metepisternum shorter, EL/EW=1.43–1.50, MESL/W=1.38–1.42. Body colour darker, femora infuscate except at apices..... **5. *A. montanus* sp. n.**
- 18(17) Both pronotum and its side margin narrower basad, and PW/HW $\leq$ 1.4. Elytra and metepisternum longer, EL/EW over 1.5, MESL/W over 1.6. Body 6.8–7.5/6.5–7.1 mm long, slightly paler, with legs monochromous reddish-yellow..... ***A. ryukyuensis* Habu, 1964**
- 19(8) D1 close to base (D1/EL = ca 0.13). Large, 8.5–10.6 mm long, and wingless. Metepisterna short. Elytra strongly and regularly rounded on sides and rather strongly sinuate between a pointed acute apex and a protruding outer angle of apical truncature. Pronotum long, 1.18–1.26 (mean 1.22) times as wide as long. Eyes fairly small and distinctly flattened, posterior supraorbital seta situated level to about 1/3 distance between eye back margin and pronotal front margin. Antennae long. Body black ..... **6. *A. giganteus* sp. n.**
- 20(7) Either D1+D3 or D2+D3. Wingless, both metepisternum and elytra short, latter with strongly rounded shoulders and sides.
- 21(24) D1 (near base) + D3. Eyes slightly to strongly reduced.
- 22(23) Larger and stouter, 5.7–7.2 mm long. Eyes less strongly reduced, posterior supraorbital seta situated level to about 1/3 distance between eye back margin and pronotal front margin. Antennae longer, surpassing base of pronotum...  
..... **7. *A. medius* sp. n.**
- 23(22) Smaller and slenderer, 5.3–6.3 mm long. Eyes very small and flat, posterior supraorbital seta situated level to about midway between eye back margin and pronotal front margin. Antennae not reaching pronotal base.....  
..... **8. *A. minutus* sp. n.**
- 24(21) D2+D3. Eyes slightly reduced.
- 25(28) Elytra conspicuously cross-striated throughout, D2 situated mostly behind the middle (D2/EL=0.55–0.67).
- 26(27) Pronotum with sides distinctly sinuate before posterior angles, a moderately wide and impunctate reflexed side margin and an almost straight base, but for posterior angles oblique forward. Body appendages reddish-yellow. Smaller, 5.4–6.6 mm long..... **11. *A. planicollis* sp. n.**

- 27(26) Sides of pronotum indistinctly sinuate before posterior angles, side margin strongly reflexed, very wide basally, finely but distinctly rugulose-punctate; base with lateral lobes oblique posterodistad, thus surpassing its middle part. Femora infusate except at apices. Larger, 8.5 mm long ..... **10. *A. reflexicollis* sp. n.**
- 28(25) Cross-striated sculpture fine and restricted to elytral base only, D2 situated before middle (D2/EL=0.41–0.44). Sides of pronotum not sinuate before posterior angles.
- 29(30) Elytral microsculpture composed of strongly transverse but distinct meshes. Pronotum rather narrow, 1.34 times as wide as long, 1.7 times as narrow as elytra, with posterior angles strongly oblique forward and thus almost indistinct. Eyes reduced in size and somewhat flattened. Body length 6.6 mm ..... **13. *A. kabakovi* sp. n.**
- 30(29) Elytral microsculpture consisting of fine and dense transverse lines not forming meshes. Pronotum broader, 1.54 times as wide as long, 1.57 times as narrow as elytra, with posterior angles only slightly oblique forward. Eyes less reduced. Body larger, 7.5 mm long ..... **12. *A. nitidus* sp. n.**

### The *rugulipennis*-group

Elytra with paler spots; body colour sharply contrasting: dorsum black, body appendages, especially legs, elytral spots, as well as reflexed side margins of both pronotum and elytra reddish yellow. Body stout, with short elytra and strongly transverse pronotum (EL/EW=1.28–1.42, PW/PL=1.51–1.63). Discal setigerous pores on elytra three, both D1 and D2 being in anterior position (D1/EL=0.13–0.16, D2/EL=0.43–0.53).

Setigerous pores of umbilicate series divided into two, widely separated groups, posthumeral and preapical ones. Wings full. Last tarsomere with two, proximal and distal, pairs of ventral setae in all legs. Pronotum sparsely but distinctly ciliate. Antennae moderately long, surpassing pronotal base. Eyes large hemispherical, posterior supraorbital seta situated level to eye back margin; tempora short and abruptly extending into neck. Frontal foveae not deep.

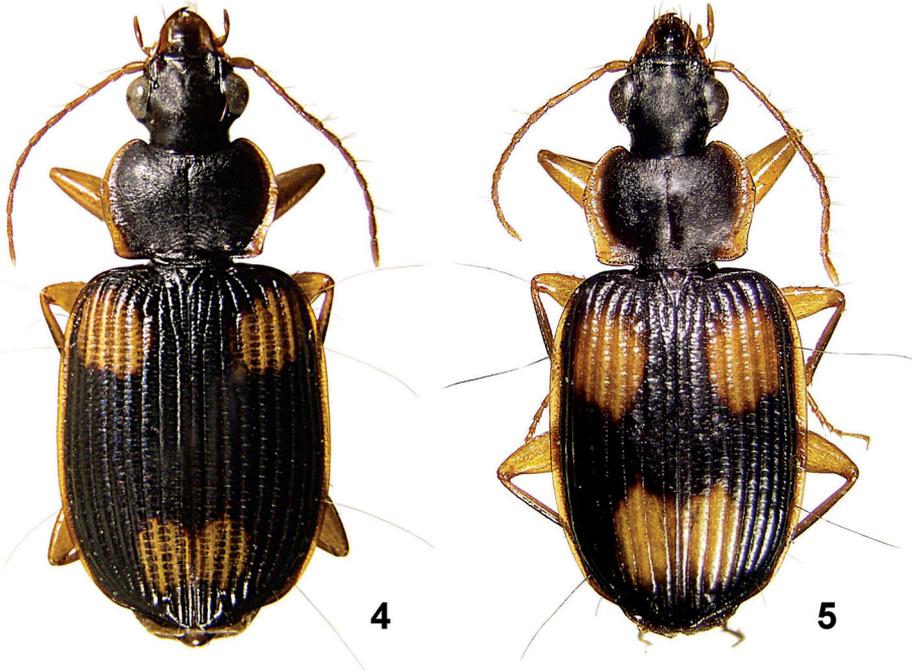
The group includes two species.

#### **1. *Amphimenes rugulipennis* (Bates, 1892), comb. n.**

Figs 4, 17, 26, 35

Bates, 1892: 406 (*Brachichila*; Burma).

**Redescription.** Body length 6.4–8.2/6.3–7.7 mm, width 2.7–3.5 mm. Dorsum black, head dark brown to black; reflexed side margins of both pronotum and elytra, legs, mouthparts and antennae reddish yellow. Underside dark brown; gula, prosternum, median part of mesoventrite, metaventrite and abdomen red, with abdominal sternites



**Figures 4–5.** *Amphimenes* spp.: *A. rugulipennis* (4) and *A. maculatus* sp. n. (5).

4–6 darkened laterally as well as 6 in apical half. Epipleura mostly dark, brown to dark brown. Elytron with two, rounded, yellow spots, isolated both from each other and elytral margin. Of them, anterior spot usually larger, occupying intervals 3 to 8, laterally almost extending to shoulder, mostly not surpassing midway between D1 and D2; posterior spot occupying four inner intervals and not extending forward midway between D2 and D3. Left and right posterior spots widely adjoining, thus often merging into a common macula sinuate along suture posteriorly.

3<sup>rd</sup> antennomere 1.58–1.76 (mean 1.65) times as long as 2<sup>nd</sup>, 8<sup>th</sup> 2.0–2.63 (mean 2.26) times as long as wide.

Pronotum 1.51–1.60 (mean 1.56) times as wide as long, 1.40–1.48 (mean 1.44) times as wide as head, fairly strongly rounded laterally, broadest before middle, a little narrowing basad, distinctly but not strongly sinuate before hind angles, latter obtuse due to base increasingly oblique forward at extremities. Anterior margin strongly sinuate between strongly protruding and apically rounded front angles. Base medial part distinctly convex backward, with a narrow reflexed border almost reaching hind angles. Mid-line deep, deeper basad, not adjoining anterior bead and abruptly disappearing before transverse basal depression, latter sublinear and not deep; lateral basal foveae weak; paramedian foveae small and very shallow. Reflexed side margin indistinctly separated from disc convexity by a narrow flat gutter.

Elytra broadly oval, 1.28–1.41 (mean 1.33) times as long as wide, 1.53–1.65 (mean 1.59) times as wide as pronotum, slightly rounded on sides, broadest in poste-

rior third, with base wide, straight and transverse or slightly oblique towards widely rounded shoulders, apical truncature slightly sinuate and apices rounded narrowly and separately each. Elytral striae deep throughout, intervals more or less convex and subequally wide across disc; cross-striation rather fine, especially behind the middle. D1 at front border of anterior paler spot ( $D1/EL=0.12-0.16$ , mean 0.14),  $D2/EL=0.45-0.53$  (mean 0.49), D3 at caudal border of posterior paler spot ( $D3/EL=0.86-0.92$ , mean 0.90). Metepisternum 1.46–1.50 times as long as wide.

Male profemur ventrally with a small but sharp tubercle in basal third.

Penis (Figs 17, 26, 35) regularly arcuate, microsculpture very coarse, apical orifice bilobed due to a strongly sclerotized dorsolateral projection extending to about its middle. Apical lamella small and triangular in lateral view, with a small rounded membranous window on right dorsal side.

**Material.** Two syntypes (Museo Civico di Storia Naturale “Giacomo Doria”, Genova – MSNG), both ♂♂, labelled: “Tenasserim / Thagata / Fea. Apr. 1887” “SYNTYPUS” “Museo Civico di Genova”. The specimen is here designated as lectotype that bears additional labels: “Typus” “*rugulipennis* Bates” “*Brachichila rugulipennis* (es. tip.) Bates” “*Brachichila rugulipennis* Bates” “*Brachichila rugulipennis* Bates, 1892”.

Other material: 10 ♂♂, 4 ♀♀ (SIEE), South **Vietnam**, N[orthernmost part] of Dongnai Province, Nam Cat Tien National Park, 20–26.X. and 21–22.XI.2004 (D Fedorenko); ♀ (ZISP), Vietnam, Nghe An Prov., mountains NE of Cua Rao, 600 m a s l, 1.10.1962 (O N Kabakov); ♀ (ZISP), **Thailand**, Nakhon Prov., Ratchasima, env. of Khao Yai Natn. Park, 500–1000 m a s l, 26.X–4.XI.2000 (A Gorochoch & L Anisyutkin).

**Geographic distribution.** Myanmar, Thailand, southern Vietnam. Probably also Laos and Cambodia.

## 2. *Amphimenes maculatus* Fedorenko, sp. n.

urn:lsid:zoobank.org:act:E3F49490-F191-4939-9319-BD83B98E0A2D

Figs 5, 18, 27, 36

**Description.** Very similar to the preceding species, except as follows: Body smaller, 5.6–5.9/5.3–5.7 mm long, 2.3–2.5 mm wide. Paler side margin of pronotum broader, slightly entering pronotal disc. Underside, on average, darker, with gula same coloured as lateral parts of head; anterior paler spot on elytron about 1/2 spot length distant from base, always surpassing midway between D1 and D2, often reaching or almost reaching D2 level, mostly not extending outwards beyond stria 7; posterior spots usually somewhat angulate, starting midway between D2 and D3, widely adjoining along the suture.

3<sup>rd</sup> antennomere 1.56–1.70 (mean 1.62) times as long as 2<sup>nd</sup>, 8<sup>th</sup> 2.09–2.39 (mean 2.21) times as long as wide. Pronotum 1.53–1.63 (mean 1.57) times as wide as long, 1.43–1.49 (mean 1.46) times as wide as head, more convex, especially so posteriorly; basal border obsolete medially; mid-line deeper, much so basad, adjoining transverse basal depression, latter conspicuously separated from disc convexity. Reflexed side margin adjoining disc convexity directly. Elytra 1.32–1.42 (mean 1.35) times as long as

wide, 1.49–1.54 (mean 1.52) times as wide as pronotum, with base straight and transverse, as well as apices contiguous and transversely truncated at tip. Elytral striae a little deeper, resulting in intervals more convex basally and towards side margin, these 2 to 4 distinctly broader than 5 to 8 at and slightly behind the middle. Cross-striation, especially in basal 1/2 elytra, less regular, being in part transformed into deep transverse punctures. D1/EL=0.13–0.16 (mean 0.15), D2/EL=0.43–0.51 (mean 0.47), D3/EL=0.90–0.97 (mean 0.92). Metepisternum 1.47–1.55 times as long as wide.

Male profemur without ventral tubercle.

Penis (Figs 18, 27, 36) with a very coarse microsculpture and left margin in dorsal view sinuate behind basal third. Apical orifice rounded but for a distinctly sclerotized dorsolateral projection (lobe), latter being much smaller and less strongly sclerotized than in *A. rugulipennis*. Apical lamella rather large, strongly bent upwards and entirely occupied by a membranous window on right dorsal side.

**Material.** Holotype ♂ (ZMMU) labelled: “S[outh] Vietnam, N[orthernmost part of] Dongnai Pr[ovince]. / Nam Cat Tien Nat[ional]. Park / Exped[ition]. [of the] Russ.-Vietnamese / Tropical Centre / 22–23.X.2004 / leg. D. Fedorenko” [typewritten] “HOLOTYPE / ...” [red typewritten]. Paratypes (SIEE), ♂, 4 ♀♀, same data but 21–22. or 28–29.XI.2004, or 18.VI.2005.

**Type locality:** South Vietnam, Dongnai Province, Nam Cat Tien National Park.

**Geographic distribution.** Known from type locality only.

### The *piceolus*-group

Different from the *rugulipennis*-group in the following characters: Body dorsum monochromous dark, except for paler reflexed side margins of both pronotum and elytra; these margins, as well as body appendages, less contrastingly paler. Body slenderer (PW/PL=1.30–1.55; EL/EW=1.39–1.50, being 1.33 in *A. asahinai* only). D1 and D2 being in posterior position (D1/EL=0.22–0.27, D2/EL=0.63–0.72). Wings full in all members but vestigial in *A. asahinai*. Dorsum without traceable cilia. Eyes large and almost hemispherical to slightly reduced and flattened, posterior supraorbital seta situated level to or slightly behind eye back margin.

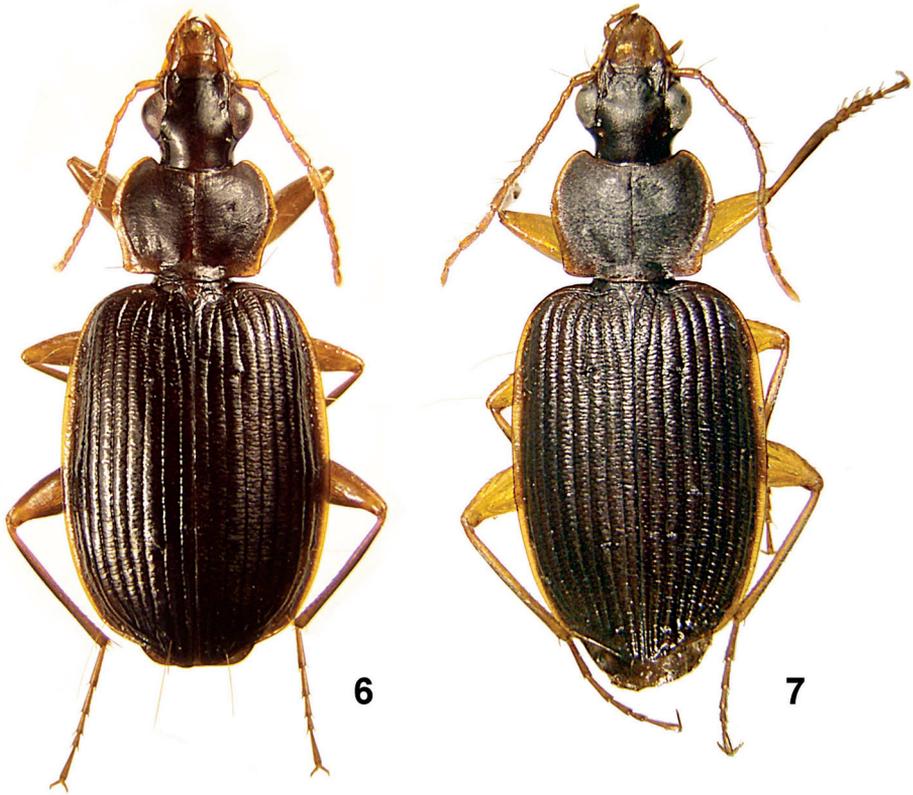
The group includes six species, as follows: *A. piceolus*, *A. asahinai*, *A. ryukyuensis*, *A. bidouensis* sp. n., *A. montanus* sp. n. and *A. gracilis* sp. n.

### 3. *Amphimenes bidouensis* Fedorenko, sp. n.

urn:lsid:zoobank.org:act:16131F3A-74E4-405C-8059-E5C57693BB6B

Figs 6, 19, 28, 37

**Description.** Body length 7.1–8.3/6.7–8.0 mm, width 2.7–3.1 mm. Dorsum black or dark brown, head and pronotum often a little paler, brown to reddish-brown; reflexed side margins of both pronotum and elytra, legs, mouthparts, labrum, clypeus and an-



**Figures 6–7.** *Amphimenes* spp.: *A. bidoupensis* sp. n. (6) and *A. gracilis* sp. n. (7).

tennae red; femora and tibiae often slightly infuscate at middle, especially so ventrally. Underside reddish, abdominal sternites widely darkened along their posterior margins.

Eyes large, tempora short and rather abruptly extending into neck; posterior supraorbital seta situated level to eye back margin. Antennae long and surpassing pronotal base at least by last two joints, 3<sup>rd</sup> antennomere 1.54–1.88 (mean 1.72) times as long as 2<sup>nd</sup>, 8<sup>th</sup> 2.29–2.75 (mean 2.47) and 1.89–2.21 (mean 2.05) times as long as wide in males and females, respectively.

Pronotum 1.36–1.55 (mean 1.44) times as wide as long, 1.38–1.50 (mean 1.43) times as wide as head, similar to that of *A. rugulipennis* but the following characters: less convex, with less distinct basal transverse depression, broadest a little before middle; side margin slightly to rather strongly sinuate before hind angles, latter subrectangular due to base lateral parts sublinear and oblique only before posterolateral setigerous pore. Base medial part distinctly convex backwards, its border very shallow, especially so at middle. Mid-line rather shallow throughout its length, often shortly deeper where adjoining basal transverse depression; latter distinctly to weakly separated from disc convexity; lateral basal foveae weak but usually almost extended to anterior margin as very shallow depressions parallel to side margins. Paramedian foveae mostly shallow but distinct.

Elytra oval, 1.39–1.50 (mean 1.46) times as long as wide, 1.55–1.72 (mean 1.64) times as wide as pronotum, weakly rounded on sides, broadest at about middle; apical truncature slightly sinuate; elytral apices rounded narrowly and separately each. Elytral striae moderately deep throughout, intervals slightly convex in anterior half, inner four intervals almost flat behind the middle and turning back into convex before apex. Disc with a wide but very shallow depression between D2 and stria 6.  $D1/EL=0.22-0.27$  (mean 0.25),  $D2/EL=0.63-0.72$  (mean 0.69),  $D3/EL=0.90-0.94$  (mean 0.92). Metepisternum 1.55–1.67 times as long as wide.

Last tarsomere often with proximal pair of ventral setae rudimentary or absent from some, rarely, all legs. Male profemur without ventral tubercle.

Penis (Figs 19, 28, 37) rather broad, almost straight in ventral view, with a moderately strong microsculpture, a rounded apical orifice and a fairly weak preapical dorso-lateral carina; apical lamella subtriangular, slightly rounded apically, distinctly shifted mesad in ventral view.

**Diagnosis.** Habitually, the present species is very similar to *A. ryukyuensis*, *A. montanus* sp. n. and, especially, *A. gracilis* sp. n. From the former species, it differs chiefly in the combination of the larger and stouter body, namely, shorter elytra, longer pronotum, with sides distinctly sinuate before posterior angles. The latter character, together with the pronotum more strongly narrowing backwards, the narrower reflexed side border of the pronotum, and the longer metepisternum, separates it from *A. montanus*. The larger body and the wider pronotum, combined with the longer metepisternum, as well as certain peculiarities of penial structure, differentiate the present species from *A. gracilis*.

**Material.** Holotype ♂ (ZMMU) labelled: “S[outh] **Vietnam**, Lam Dong Prov. / Bi Doup – Nui Ba Nat[ure]. Res[erve]. / env. Long Lanh / 12°10'44" N 108°40'44" E / h=1400–1600 m [a s l] / 27–28.III.2008 / leg. D. Fedorenko” [typewritten] “HOLOTYPE / ...” [red typewritten]. Paratypes (ZMMU, ZISP, SIEE): ♀, same data; 8 ♂♂, 5 ♀♀, same data but 1–2.IV.2008 or 27–28.IV., or 4.V.2009; 4 ♂♂, 2 ♀♀, same data but at light, 21–23.IV.2008; 29 ♂♂, 18 ♀♀, 12°11'N 108°42'E, ~4 km SSE of Mt Hon Giao, h=1500–1800 m [a s l], 2–3. and 7–8.IV.2008, 5. and 8.V.2009.

Other material: 2 ♂♂, ♀ (ZISP), **Vietnam**, Gia Lai Prov., Ka Bang distr, Krong Pa vill., 1500 m [a s l], 13–30.IX.1997 (N L Orlov); ♂, 2 ♀♀ (ZISP), Kontum Prov., Buonloi, 25.II.1988, 3.XI.1993 and 4.IV.1995 (Gorokhov); ♀ (ZISP), Quang Binh Prov., mountains W of Dong Hoi, “*Rao Te*” [as transcribed from Russian], 27.III.1963 (O N Kabakov).

**Type locality:** Vietnam, Lam Dong Province, Bi Doup – Nui Ba Nature Reserve, 12°10'44" N 108°40'44" E.

**Geographic distribution.** Widespread in montane parts of central Vietnam, from Quang Binh Province in the north to the Dalat Plateau in the south, at ~1400–1750 m a s l.

**Life history.** The species is very common all over its type locality, where it occurs under the exfoliating bark of standing dead trees and, in addition, it flights to light at night.

**Name.** The species name is derived from the species' type locality.

#### 4. *Amphimenes gracilis* Fedorenko, sp. n.

urn:lsid:zoobank.org:act:20B09C47-FD2D-4254-A14F-9449C4E56315

Figs 7, 21, 30, 39

**Description.** Almost identical to the previous species, except for as follows. Body, on average, smaller, 6.4–7.5/6.2–7.3 mm long, 2.6–3.0 mm wide. Legs and antennae paler, reddish-yellow. Cross-striated sculpture denser and coarser, especially so at elytral base. Pronotum narrower, 1.29–1.42 (mean 1.37) times as wide as long, 1.35–1.50 (mean 1.40) times as wide as head. Elytra 1.40–1.50 (mean 1.45) times as long as wide, 1.56–1.72 (mean 1.66) times as wide as pronotum. Elytral striae deeper, inner four intervals more or less convex behind the middle; disc without wide and shallow depression between D2 and stria 6. Metepisternum shorter, 1.35–1.43 times as long as wide.

Penis (Figs 21, 30, 39) similar to those of *A. bidouppensis* and especially *A. montanus* both in shape and structure, but a little more robust, with apical lamella much shorter, as well as dorsolateral carina longer and much stronger, especially so basally where it forms a prominent knob.

**Material.** Holotype ♂ (ZISP) labelled: “N Vietnam 40 km / NE of Thai Nguen 20 XII 1962 / leg. O N Kabakov” [handwritten] “HOLOTYPE/...” [red typewritten]. Paratypes (ZISP, SIEE), ♀, same data but 20 XI 1962 [handwritten]; ♂, 3 ♀♀, mountains 50 km / NE of Thai Nguen 300 m [a s l] / 8.2., 10.3.1963 and 16.12.1962 / Kabakov [handwritten micrographs in Russian]; ♂, ♀, [Nghe An Prov.], mountains SW [of] / Quỳ Châu 200 m [a s l] / 11.1. and 15.2.1963 Kabakov [handwritten micrographs in Russian]; ♂, ♀, S [of] Quỳ Châu ~300 m [a s l] 17.7.1963 / Kabakov [handwritten in Russian].

**Type locality:** North Vietnam, 40 km NE of Thai Nguen.

**Geographic distribution.** Known only from the above two localities. Occurring at lower altitudes (~200–500 m a s l.) than do *A. bidouppensis* or *A. montanus*, also probably being allopatric with both.

#### 5. *Amphimenes montanus* Fedorenko, sp. n.

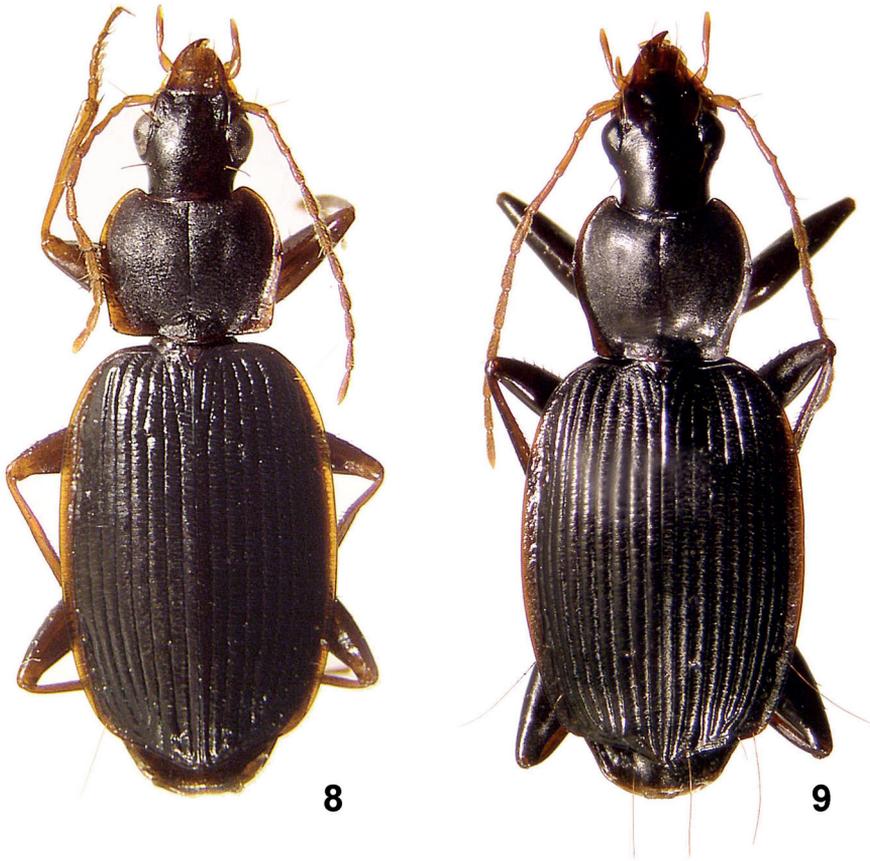
urn:lsid:zoobank.org:act:C04A0BD7-7B94-4B51-BF94-131781AB9516

Figs 8, 20, 29, 38

**Description.** Body length 6.7–7.8/6.5–7.6 mm, width 2.5–3.2 mm. Same coloured as *A. bidouppensis* but a little darker, with femora more strongly infuscate except at apices.

Eyes prominent to slightly reduced in size and a little flattened; posterior supraorbital seta situated slightly behind eye back margin. Antennae long, 3<sup>rd</sup> antennomere 1.58–1.70 times as long as 2<sup>nd</sup>, 8<sup>th</sup> 2.0–2.22 times as long as wide.

Pronotum 1.30–1.44 times as wide as long, 1.49–1.57 times as wide as head, weakly contracted basad, with side margin almost straight between antero- and posterolateral setigerous pores, hind angles subrectangular but rounded apically. Base medial



**Figures 8–9.** *Amphimenes* spp.: *A. montanus* sp. n. (8) and *A. giganteus* sp. n. (7).

part distinctly convex backwards, with a very shallow border, especially so at middle. Mid-line rather shallow throughout and shortly deeper where adjoining transverse basal depression; latter separated from disc convexity; lateral basal foveae weak. Paramedian foveae shallow but distinct.

Elytra same as in *A. bidouppensis*, 1.43–1.50 times as long as wide, and 1.51–1.55 times as wide as pronotum, with no depression between D2 and stria 6.  $D1/EL=0.22-0.25$ ,  $D2/EL=0.65-0.75$ ,  $D3/EL=0.91-0.95$ . Mesepisternum 1.38–1.42 times as long as wide.

Last tarsomere with two pairs of ventral setae. Male profemur without ventral tubercle.

Penis (Figs 20, 29, 38) similar to that of *A. bidouppensis*, but apical lamella longer, dorsolateral carina less developed basally, and endophallus of different structure.

**Diagnosis.** Distinctive features see under *A. bidouppensis* and in the key.

**Material.** Holotype ♀ (ZISP), labelled: “Vietnam, mountains / at Sa Pa, 1600–2000m [a s l]/ 8.8.1962 Kabakov” “HOLOTYPE/...” [red typewritten]. Paratypes: ♀

(ZISP), same data; ♂ (ZISP), Fansipan Mts. / 2200 m [a s l] 25.5.1963 Kabakov [all labels being handwritten micrographs in Russian]; ♂ (SIEE), “N Vietnam, Lao Cai Prov. / Hoang Lien Son Mt. Ridge / env. Fansipan Mt., Tram Ton / h=1950–2100 [m a s l] / 15–30.VII.2007 / leg. D Fedorenko.

**Type locality:** North Vietnam, Lao Cai Province, env. Sa Pa.

**Geographic distribution.** Known from type locality only.

### The *medius*-group

Either body colour uniform black or side margins of pronotum and elytra slightly paler; femora infuscated to dark brown entirely or except for at extremities; antennae, mouthparts, tarsi and usually also tibiae red. Antennae often slightly infuscated apicad. Eyes conspicuously to strongly reduced, posterior supraorbital setae situated far behind posterior eye margin; tempora long and smoothly extending into neck. Wings completely reduced; metepisternum very short, about as long as wide. Elytra fused along suture, oval, rather strongly rounded on sides, with strongly rounded shoulders. Discal setigerous pores on elytra either three or D1+D3; D1 and, when present, D2 being in anterior and posterior position, respectively (D1/EL=0.10–0.14, D2/EL=0.61–0.76). Setigerous pores of umbilicate series uninterrupted or weakly divided into two, posthumeral and preapical, groups. Last tarsomere mostly with one, distal, pair of ventral setae, otherwise proximal pair rudimentary. Pronotum long, only 1.13–1.29 times as wide as long, non-ciliate; medial part of pronotal base nearly straight; reflexed side margin rather narrow, especially so anteriorly.

Antennae long to very short, not reaching pronotal base. Elytral striae moderately deep throughout, intervals convex. Elytral microsculpture composed of strongly transverse meshes.

The group includes three sympatric and partly syntopic species of soil-dwelling habits.

### 6. *Amphimenes giganteus* Fedorenko, sp. n.

urn:lsid:zoobank.org:act:BD4D1F20-C36F-44AB-9163-F8BDC5F5124B

Figs 9, 22, 31, 40

**Description.** Body length 8.5–10.6/8.3–10.2 mm, width 3.2–4.1 mm. Dorsum black, mouthparts and antennae red, clypeus and labrum mostly brown; reflexed side margin of pronotum dark brown to reddish-brown, that of elytra translucent reddish at the very base only. Gula brownish-red. Tarsi and tibiae, latter all along or apically, as well as all trochanters and procoxa red or brownish-red. Antennae often infuscated toward apex to brownish-red.

Eyes rather small and slightly flattened, a little longer than tempora; these smoothly extending into neck in dorsal view; posterior supraorbital seta situated about 1/3

distance between eye back margin and pronotal front margin. Frontal foveae fairly deep and reaching level to eye front margin. Antennae very long, surpassing pronotal base by last three or more joints, 3<sup>rd</sup> antennomere 1.88–2.05 (mean 1.95) times as long as 2<sup>nd</sup>, 8<sup>th</sup> 2.73–3.36 (mean 3.11) times as long as wide.

Pronotum subcordate, 1.18–1.26 (mean 1.22) times as wide as long, 1.37–1.49 (mean 1.43) times as wide as head, conspicuously sinuate before hind angles, with front angles pointed and approaching neck; hind angles very obtuse and strongly sloping forward. Base medial part weakly convex backward, often almost straight, with a very shallow border not extended to lateral lobes. Disc rather flat, mid-line superficial throughout its length and weakly separated from transverse basal depression, lateral basal foveae weak, each usually almost extended to anterior margin as a very shallow submarginal depression parallel to side margin. Paramedian foveae lengthwise, very shallow to indistinct.

Elytra elliptic, 1.41–1.48 (mean 1.45) times as long as wide, 1.49–1.69 (mean 1.60) times as wide as pronotum, broadest at about middle, with shoulders strongly rounded from nearly indistinct base; apical truncature strongly sinuate between protruding outer angles and a pointed apex; latter entire or divided at the very tip. D1/EL=0.10–0.14 (mean 0.13), D2/EL=0.61–0.76 (mean 0.70), D3/EL=0.90–0.98 (mean 0.94). Three or four inner striae weaker at base, prescutellary stria very weak to obsolete. Metepisternum very short, 0.96–1.0 times as long as wide.

Proximal pair of ventral setae on last tarsomere rudimentary or absent. Male profemur without ventral tubercle.

Penis (Figs 22, 31, 40) long, narrow, weakly arcuate in lateral view and abruptly curved to the right behind the middle in dorsal view; apical lamella large, long, parallel-sided, widely rounded apically; apical orifice rounded; both ventral striae and microsculpture absent.

**Diagnosis.** The present species is easily recognizable among the other congeners by the combination of the large and wingless body, protruding outer angles of the elytral apical truncature, peculiar formula of discal setae, and other characters specified above.

**Material.** Holotype ♂ (ZMMU) labelled: “S[outh] **Vietnam**, Lam Dong Prov. / Bi Doup – Nui Ba [Nature] Reserve / env. Long Lanh / 12°07'N 108°39'44" E / Bi Doup Mt., N. slope / h=1700–1900 m [a s l] / 12.IV.2008 / leg. D Fedorenko” [type-written] “HOLOTYPE/...” [red typewritten]. Paratypes (ZISP, SIEE), 9 ♂♂, 9 ♀♀, same data but: 10. and 16.IV.2008, 3. and 6.V.2009; 12°11'N 108°42'E, 4 km SSE of Hon Giao Mt., h=1500–1700 m [a s l], 2–3.IV.2008 and 29.IV.2009; 12°10'44" N 108°40'44" E, h=1400–1600 m [a s l], 30.III–21 (Fedorenko).

**Type locality:** Vietnam, Lam Dong Province, Bi Doup Mt, 12°07'N 108°39'44" E.

**Geographic distribution.** Known from type locality only.

**Life history.** The species is common all over its type locality, where it occurs under fallen deadwood or in its larger open cavities; it has occasionally been found under the exfoliating bark of standing dead trees, sometimes together with *A. bidoupensis*.

**7. *Amphimenes medius* Fedorenko, sp. n.**

urn:lsid:zoobank.org:act:EC986E90-E692-4AB5-B330-01420B047325

Figs 10, 23, 32, 41

**Description.** Body length 5.7–7.2/5.5–7.0 mm, width 2.2–2.9 mm. Same coloured as *A. giganteus*, but a little paler: dorsum black, more rarely dark brown, often with head and pronotum a little paler; clypeus and labrum brown or reddish-brown; mouthparts, antennae and legs red; underside and femora, latter except at extremities, infuscated to dark brown; reflexed side margin of pronotum brownish-red; gula reddish, epipleura brownish.

Eyes rather small and flattened, a little longer than tempora; these smoothly extending into neck in dorsal view; posterior supraorbital seta situated level to about 1/3 distance between eye back margin and pronotal front margin. Frontal foveae shallow. Antennae moderately long, surpassing pronotal base by approximately last joint only, 3<sup>rd</sup> antennomere 1.40–1.58 (mean 1.47) times as long as 2<sup>nd</sup>, 8<sup>th</sup> 1.89–2.09 (mean 1.97) and 1.86–1.98 (mean 1.91) times as long as wide in males and females, respectively.

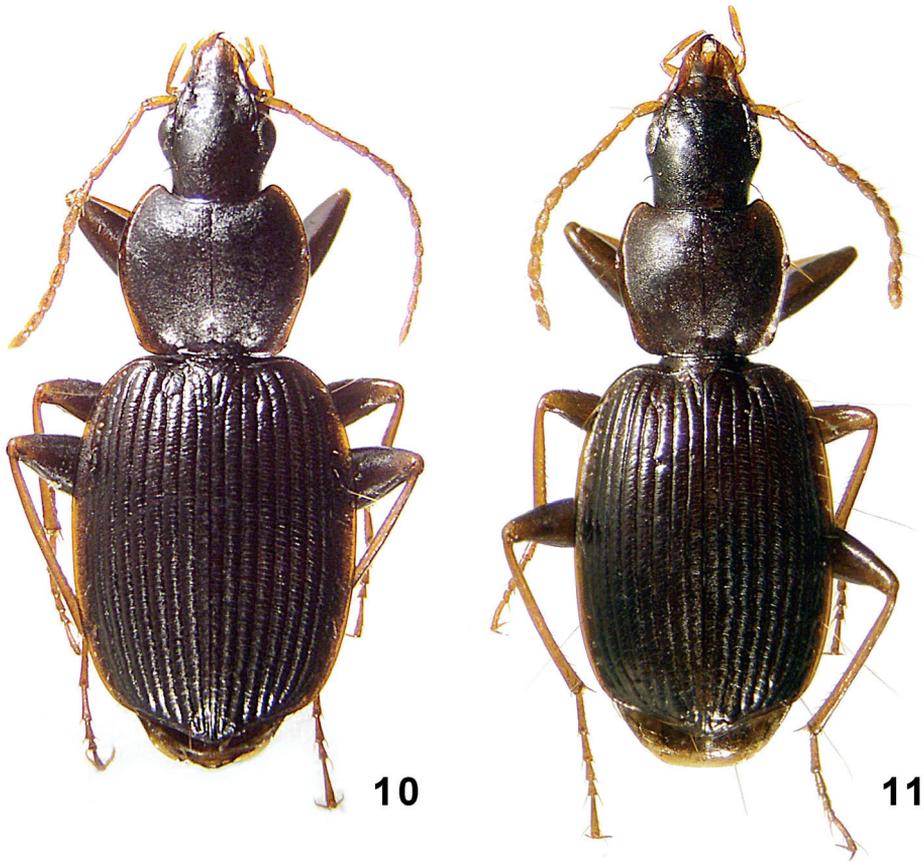
Pronotum 1.18–1.29 (mean 1.24) times as wide as long, 1.52–1.71 (mean 1.63) times as wide as head, with front angles protruding but slightly rounded apically and remote from neck; reflexed side margin narrow, especially so anteriorly, indistinctly sinuate or straight before hind angles. Base medial part weakly convex backwards, as wide as lateral lobes, these surpassing medial part and rather strongly rounded so that hind angles almost indistinct; basal border shallow and disappearing at about middle of lateral lobe. Mid-line superficial, not or hardly deeper basad, shortly deeper where adjoining basal transverse depression, latter very short, weakly to distinctly separated from a very convex disc, lateral basal foveae weak, without forward extensions along side margin. Paramedian foveae mostly indistinct.

Elytra widely oval, 1.35–1.41 (mean 1.37) times as long as wide, 1.43–1.54 (mean 1.50) times as wide as pronotum, rather strongly to (sometimes) poorly rounded on sides, broadest at about middle, with shoulders strongly rounded starting from a straight and wide base; apical truncature hardly sinuate between a rounded outer angle and a pointed apex. Discal setigerous pores two: D1/EL=0.10–0.14 (mean 0.12), D3/EL=0.91–0.95 (mean 0.93). Two or three inner striae weaker at base. Metepisternum very short, 0.86–0.89 as long as wide.

Last tarsomere with distal pair of ventral setae only. Basal third of male profemur with a distinct but wide and obtuse ventral tubercle.

Penis (Figs 23, 32, 41) triangular in ventral view, strongly twisted to the right before apex, resulting in apical orifice of almost ventral position; apical lamella large subtriangular, with a rounded tip.

**Diagnosis.** Easily recognizable chiefly by the combination of the medium-sized body, D1+D3 formula of discal setae, absent wings, etc. It differs well from *A. minutus* in the stouter body, less strongly reduced eyes and longer antennae.



**Figures 10–11.** *Amphimenes* spp.: *A. medius* sp. n. (10) and *A. minutus* sp. n. (11).

**Material.** Holotype ♂ (ZMMU) labelled: “S[outh] Vietnam, Lam Dong Prov. / Bi Doup – Nui Ba [Nature] Reserve / env. Long Lanh / 12°10'44" N 108°40'44" E / h=1400–1600 m [a s l], 14–15.IV.2008 / leg. D Fedorenko” [typewritten] “HOLOTYPE/...” [red typewritten]. Paratypes (ZMMU, ZISP, SIEE), 20 ♂♂, 5 ♀♀: same data but different dates between 31.III. and 18.IV.2008, 7.V.2009; 12°11'N 108°42'E, 4 km SSE of Hon Giao Mt., h=1500–1700 m [a s l], 8.V.2009; 12°07'N 108°39'44" E, Bi Doup Mt., N. slope, h=1700–1900 m [a s l], 16.IV.2008, 3., 6. or 9.V.2009 (Fedorenko).

**Type locality:** Vietnam, Lam Dong Province, Bi Doup – Nui Ba Nature Reserve, 12°10'44" N 108°40'44" E.

**Geographic distribution.** Known from type locality only.

**Life history.** Showing the same habits as *A. giganteus*, but never occurring under bark. The species also penetrates into rotten wood where (on Mt Bi Doup) it has been taken together with *A. minutus*.

**8. *Amphimenes minutus* Fedorenko, sp. n.**

urn:lsid:zoobank.org:act:3D264770-BEDF-4258-BE9E-58E9BBB5443D

Fig. 11

**Description.** Similar to the preceding species in many characters, especially body colour. The main differences are as follows:

Body small, 5.3–6.3/5.1–6.0 mm long, 2.0–2.2 mm wide. Eyes very small and flat, about as long as tempora; these very smoothly extending into neck in dorsal view; posterior supraorbital seta situated level to about midway between eye back margin and pronotal front margin. Antennae short, not reaching pronotal base; 3<sup>rd</sup> antennomere 1.38–1.45 times as long as 2<sup>nd</sup>, 8<sup>th</sup> 1.63–1.76 times as long as wide. Pronotum longer, 1.13–1.15 times as wide as long, 1.44–1.47 times as wide as head, much less convex in posterior half. Base straight, with medial part wide and almost inseparable from lateral lobes. Mid-line superficial throughout its length, basal transverse depression weakly separated from disc convexity, lateral basal foveae longitudinal and rather distinct, somewhat extended forward as very shallow depressions not reaching level of anterolateral setigerous pore. Paramedian foveae nearly indistinct. Elytra 1.42–1.43 times as long as wide, 1.50–1.55 times as wide as pronotum, with a straight but narrower base; apical truncature a little more strongly sinuate, with a slightly more protruding outer angle. Formula of discal setae seems to be D1+D3, both setae being in anterior and posterior position, respectively: D1/EL=0.12–0.14, D3/EL=0.93–0.95. Yet, two of three specimens of the type series show either an unilateral setigerous pore (“D2”/EL=0.27) situated just posterior to D1 or such an additional pore (“D2”/EL=0.33) on right elytron combined with only one anterior pore of similar position on left elytron (“D1”=0.23). Metepisternum very short, 0.9–0.97 times as long as wide.

**Diagnosis.** The present species is easily recognizable by the combination of the small, slender and wingless body, peculiar formula of discal setae, strongly reduced eyes and short antennae.

**Material.** Holotype ♀ (ZMMU) labelled: “S[outh] Vietnam, Lam Dong Prov. / Bi Doup – Nui Ba Nat[ure]. Res[erve]. / 12°07'N 108°39'44" E / Bi Doup Mt., N. slope / h=1700–1900 m [a s l], 6.V.2009 / leg. D Fedorenko” [typewritten] “HOLOTYPE/...” [red typewritten]. Paratypes (SIEE), 2 ♀♀, same data.

**Type locality:** Vietnam, Lam Dong Province, Bi Doup Mt, 12°07'N 108°39'44" E.

**Geographic distribution.** Type locality only.

**Life history.** The species is rare and has been caught in rotten wood of a log together with *A. medius*.

**The rufipes-group**

This monobasic group is unique first due to the combination of a strong isodiametric microsculpture on the entire dorsum combined with no cross-striation on elytra and a peculiar formula of elytral discal setigerous pores: D2+D3, D2 being in anterior

position (D2/EL=0.47–0.49). Eyes distinctly reduced in size and flattened, posterior supraorbital seta situated level to about 1/3 distance between eye back margin and pronotal front margin. Wings completely reduced; metepisterna slightly longer than wide. Setigerous pores of umbilicate series uninterrupted. Last tarsomere with distal pair of ventral setae only. Antennae very short, shortest in the genus, not reaching pronotal base. Body appendages contrastingly paler than body dorsum.

**9. *Amphimenes rufipes* Fedorenko, sp. n.**

urn:lsid:zoobank.org:act:F8509F62-38C5-4042-9AAD-B3B06282B262

Fig. 12

**Description.** Body length 5.0/4.9 mm, width 2.0 mm. Dark brown, with forehead, reflexed side margins of both pronotum and elytra, suture and base of elytra paler, reddish; mouthparts, antennae and legs reddish-yellow; prosternum, notopleura, meso- and metaventrite, base of abdomen medially and elytral epipleura red.

Eyes rather small and flattened, a little longer than tempora; these smoothly extending into neck in dorsal view, latter broadest among those of other congeners. Frontal foveae very shallow. 3<sup>rd</sup> antennomere 1.2 times as long as 2<sup>nd</sup>, 8<sup>th</sup> 1.22 times as long as wide.

Pronotum 1.24 times as wide as long, 1.42 times as wide as head, rather strongly convex on disc, broadest before middle, distinctly sinuate before hind angles, front angles protruding; reflexed side margin rather narrow, only a little wider basad. Base medial part weakly convex backwards, much broader than lateral lobes, these slightly rounded posteriorly and increasingly oblique forward, resulting in hind angles very obtuse at apices; basal border obsolete over medial part. Mid-line shallow, hardly deeper before a superficial basal depression; lateral basal foveae indistinct, merging into reflexed side margin. Paramedian foveae represented by two pairs of almost indistinct, very small depressions before and behind middle.

Elytra widely oval, 1.36 times as long as wide, 1.36 times as wide as pronotum, rather strongly rounded on sides, broadest in apical third, with base very short and shoulders rounded; apical truncature hardly sinuate between distinct but rounded outer angle and a separately rounded apex of each elytron. D3/EL=0.89–0.93. Elytral intervals slightly convex, 6<sup>th</sup> and 7<sup>th</sup> subcarinate internally in basal half. Metepisternum very short, 0.82 times as long as wide.

**Material.** Holotype ♀ (ZMMU) labelled: “S[outh] **Vietnam**, Lam Dong Prov. / Bi Doup – Nui Ba Nat[ure]. Res[erve]. / 12°07'N 108°39'44" E / Bi Doup Mt., N. slope / h=1700–1900 m [a s l], 6.V.2009, leg. D Fedorenko” [typewritten] “HOLOTYPE/...” [red typewritten].

**Type locality:** Vietnam, Lam Dong Province, Bi Doup Mt, 12°07'N 108°39'44" E.

**Geographic distribution.** Known from type locality only.

**Life history.** The holotype has been taken together with individuals of both previous species.



**Figure 12.** *Amphimenes rufipes* sp. n.

### The *planicollis*-group

Either body coloration uniform black or side margins of pronotum and elytra slightly paler; antennae and mouthparts red or reddish-yellow, either legs reddish-yellow or femora infuscated to dark brown except extremities. Eyes not or only slightly reduced in size and flattened, posterior supraorbital setae situated a little to far behind the level of eye back margin. Wings completely reduced; metepisternum about as long as wide. Elytra fused along suture, oval, rather strongly rounded on sides, with strongly rounded shoulders. Discal setigerous pores on elytra two, D2+D3, D2 situated before ( $D2/EL=0.41-0.45$ ) or behind ( $D2/EL=0.55-0.67$ ) middle. Setigerous pores of umbilicate series uninterrupted or weakly divided into two, posthumeral and preapical, groups. Last tarsomere mostly with distal pair of setae only, otherwise proximal pair rudimentary. Reflexed side margin of pronotum moderately to very wide posteriorly; dorsum with no cilia.

Antennae long or moderately so, surpassing pronotal base. Elytral microsculpture composed of fine and dense transverse lines or strongly transverse meshes. Cross-striation often confined to elytral base only.

The group includes four species. Of them, two, *A. reflexicollis* and *A. planicollis*, resemble and thus might have been immediate derivatives of *A. montanus* and *A. gracilis*, respectively.

**10. *Amphimenes reflexicollis* Fedorenko, sp. n.**

urn:lsid:zoobank.org:act:27D515F2-DE2B-4BF3-AA51-B263715DD9EB

Figs 13, 24, 33, 42

**Description.** Body length 8.5/8.3 mm, width 3.3 mm. Black, with clypeus and labrum reddish-brown, mouthparts, antennae and legs red; femora infuscated to dark brown, except at extremities; reflexed side margins of both pronotum and elytra brownish-red. Underside brown with a little paler elytral epipleura. Head and pronotum with isodiametric granulate microsculpture forming slightly transverse meshes on each side from mid-line of pronotum slightly before and behind the middle of its disc. Elytral microsculpture composed of fine and dense transverse lines, cross-striated sculpture moderately strong and developed throughout.

Eyes moderately convex, tempora rather smoothly extending into neck in dorsal view; posterior supraorbital seta situated slightly behind level of eye back margin. Frontal foveae shallow. Antennae long, surpassing pronotal base at least by last three joints, 3<sup>rd</sup> antennomere 1.9 times as long as 2<sup>nd</sup>, 8<sup>th</sup> 3.2 times as long as wide.

Pronotum rather flat, 1.39 times as wide as long, 1.56 times as wide as head, with front angles protruding, strongly and evenly rounded on sides, broadest about at middle, a little narrowing backwards, indistinctly sinuate before obtuse but very distinct hind angles; reflexed side margin wide, especially so basally; this, as well as lateral gutter distinctly though sparsely punctulate. Base medial part about as wide as lateral lobes, these weakly rounded posteriorly, directed posterodistad and extending beyond medial part; basal border missing. Mid-line moderately deep, slightly deeper at a very shallow transverse basal depression; lateral basal foveae wide, rounded and fairly shallow, each as a shallow depression extending to about middle of pronotum parallel to its side margin. Paramedian foveae longitudinal, shallow, situated before middle.

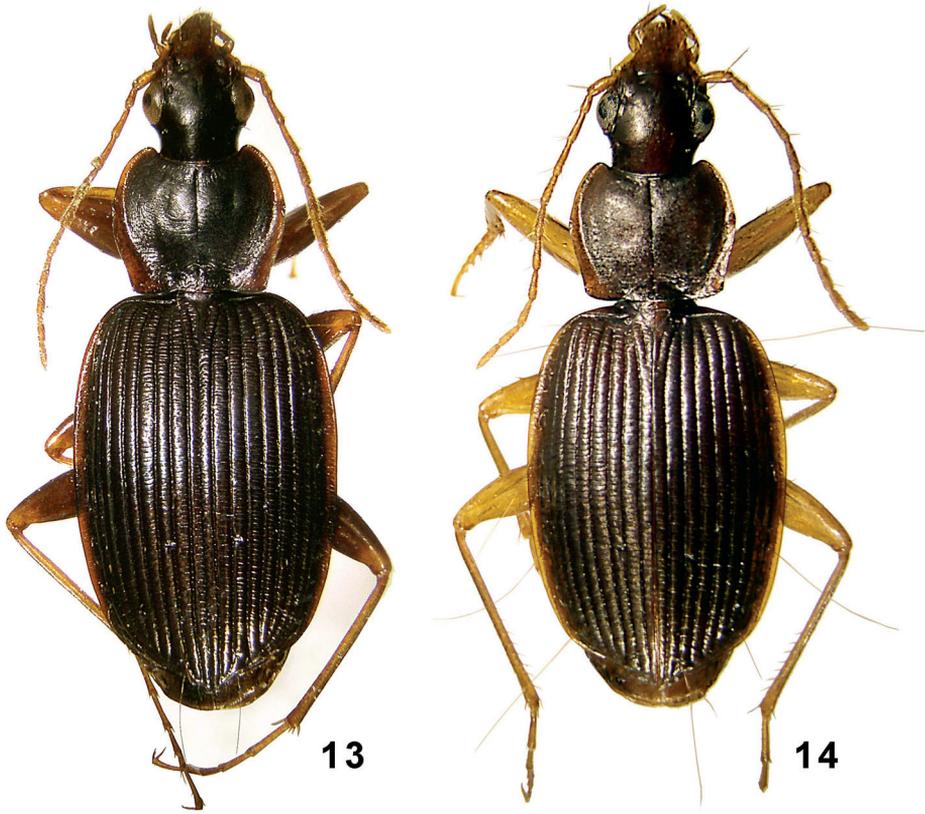
Elytra widely oval and fairly convex, 1.47 times as long as wide, 1.52 times as wide as pronotum, broadest at about middle, with shoulders strongly rounded, apical truncature hardly sinuate between rounded posterolateral angles and very narrowly rounded, and thus almost contiguous, apices. Elytral striae deep, intervals convex. D2/EL=0.63–0.65, D3/EL=0.90–0.92. Setigerous pores of umbilicate series uninterrupted or narrowly interrupted medially. Metepisternum 1.02 times as long as wide.

Last tarsomere with two pairs of ventral setae in hind two leg pairs, but with only apical pair in fore legs. Male mesotrochanter with a weak ventral tubercle looking like a short longitudinal carina.

Penis (Figs 24, 33, 42) in ventral view almost straight and a little swollen in apical third, with apical lamella triangular and rounded at tip.

**Diagnosis.** This species is easily recognizable by the combination of the fairly large body, the D2+D3 formula, the absent wings, the peculiar shape and structure of the pronotum, etc.

**Material.** Holotype ♂ (ZISP) labelled: “**Vietnam**, Tam Dao Resort, 900 m [a s l.] / 1.7.1962 Kabakov” [handwritten micrograph in Russian] “HOLOTYPE/...” [red typewritten].



**Figures 13–14.** *Amphimenes* spp.: *A. reflexicollis* sp. n. (13) and *A. planicollis* sp. n. (14).

**Type locality:** North Vietnam, Vinh Phuc province, Tam Dao.

**Geographic distribution.** Known from type locality only.

**11. *Amphimenes planicollis* Fedorenko, sp. n.**

urn:lsid:zoobank.org:act:299F3A83-4EE1-490B-AADA-64B26FDDC59E

Figs 14, 25, 34, 43

**Description.** Body length 5.4–6.6/5.2–6.6 mm, width 2.2–2.6 mm. Dark brown to black, with clypeus and labrum reddish, mouthparts, antennae and legs reddish-yellow; reflexed side margin of pronotum hardly paler while that of elytra distinctly so, reddish. Head and pronotum dull due to a granulate microsculpture. Elytral microsculpture composed of fine and dense transverse lines, cross-striated sculpture moderately strong and developed throughout.

Eyes slightly reduced in size and a little flattened, but tempora short and smoothly extending into neck in dorsal view; posterior supraorbital seta situated level to about

1/3 distance between eye back margin and pronotal front margin. Frontal foveae shallow. Antennae long, surpassing pronotal base at least by last 2.5 joints, 3<sup>rd</sup> antennomere 1.6–1.8 times as long as 2<sup>nd</sup>, 8<sup>th</sup> 2.5–2.8 times as long as wide.

Pronotum very flat, 1.30–1.41 times as wide as long, 1.40–1.47 times as wide as head, rather strongly rounded on sides, broadest before middle, rather strongly narrowing backwards and mostly conspicuously sinuate before hind angles, with front angles protruding; reflexed side margin moderately wide. Base almost straight, with medial part a little wider than lateral lobes, these somewhat increasingly oblique towards obtuse hind angles; basal border obsolete or absent medially. Mid-line rather shallow, slightly deeper at transverse basal depression, often almost extending to pronotal basal margin due to latter very weak; transverse basal depression angular forward but distinct only laterally where adjoining rather deep basal foveae; these extending forward into very shallow longitudinal depressions running parallel to pronotal side margin and sometimes traceable up to anterior third of pronotum. Paramedian foveae longitudinal and very shallow, ranging between missing to occupying middle third of pronotum length.

Elytra widely oval, 1.42–1.47 times as long as wide, 1.56–1.63 times as wide as pronotum, broadest at about middle, with shoulders strongly rounded, apical truncature hardly sinuate between rounded outer angles and almost contiguous apices. Elytral striae deep, intervals convex. D2/EL=0.55–0.67 (in one specimen, unilaterally 0.43), D3/EL=0.91–0.93. Setigerous pores of umbilicate series uninterrupted or narrowly interrupted medially. Metepisternum 0.8 times as long as wide.

Last tarsomere with two pairs of ventral setae. Male mesotrochanter with a small pointed ventral tubercle.

Penis (Figs 25, 34, 43) bent to the right behind middle (in dorsal view), with apical orifice secondarily extended basad.

**Diagnosis.** This species is easily recognizable by the combination of the small body, the D2+D3 formula, the absent wings, the peculiar shape and structure of the pronotum as specified above.

**Material.** Holotype ♂ (ZISP) labelled: “Centr. Vietnam / S[. of] Quỳ Châu, ~300 m [a s l.] / 17.7.1963 / Kabakov” [handwritten in Russian] “HOLOTYPE/...” [red typewritten]. Paratypes, ♀ (ZISP), same data, but 12.1.1963 [handwritten in Russian]; 2 ♂♂ (ZISP, SIEE), mountains SW of Quỳ Châu, 200 m [a s l.], 15.2.1962; 400 m [a s l.], 13. 2.1963 [handwritten micrographs in Russian].

**Type locality:** Vietnam, Nghe An province, env. Quỳ Châu.

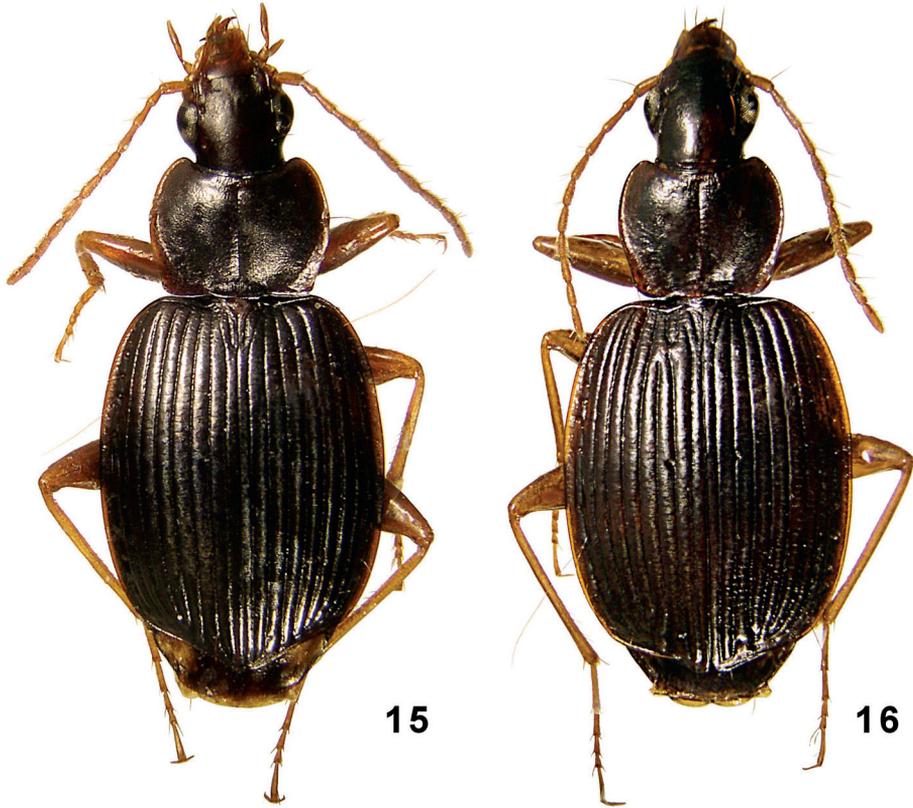
**Geographic distribution.** Type locality only.

## 12. *Amphimenes nitidus* Fedorenko, sp. n.

urn:lsid:zoobank.org:act:38649F9F-6766-4B5D-8C71-0FCA4E33685B

Fig. 15

**Description.** Body length 7.5/7.2 mm, width 3.1 mm. Black, clypeus, labrum, mouthparts, antennae and legs red; femora slightly infuscated at middle; reflexed side

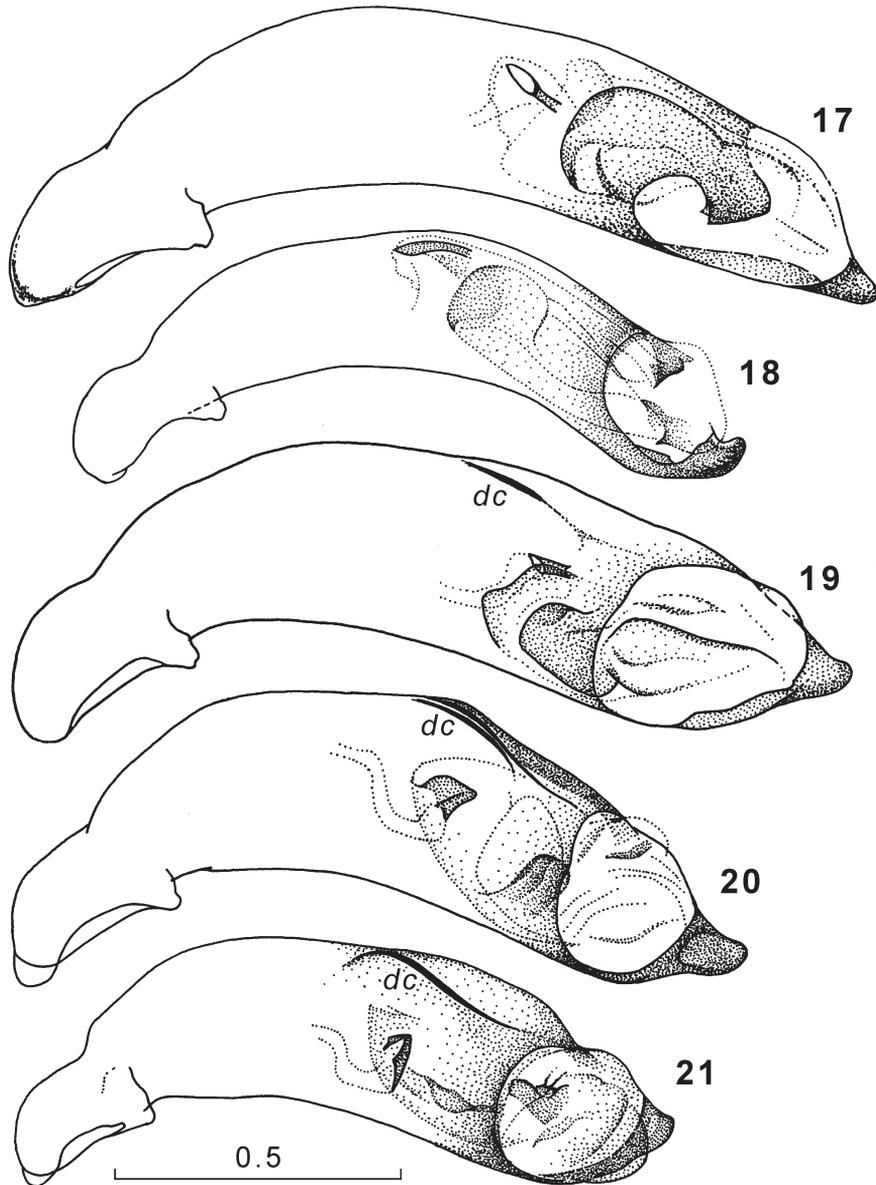


**Figures 15–16.** *Amphimenes* spp.: *A. nitidus* sp. n. (15) and *A. kabakovi* sp. n. (16).

margin of both pronotum and elytra a little paler, reddish-brown. Head and pronotum shining in spite of a coarse isodiametric microsculpture; this transformed into slightly transverse meshes before and again behind middle of disc while weakened on vertex, neck, and over a short distance along pronotal front margin on each side from mid-line. Elytral microsculpture composed of fine and dense transverse lines, cross-striated sculpture very weak and restricted to elytral base only.

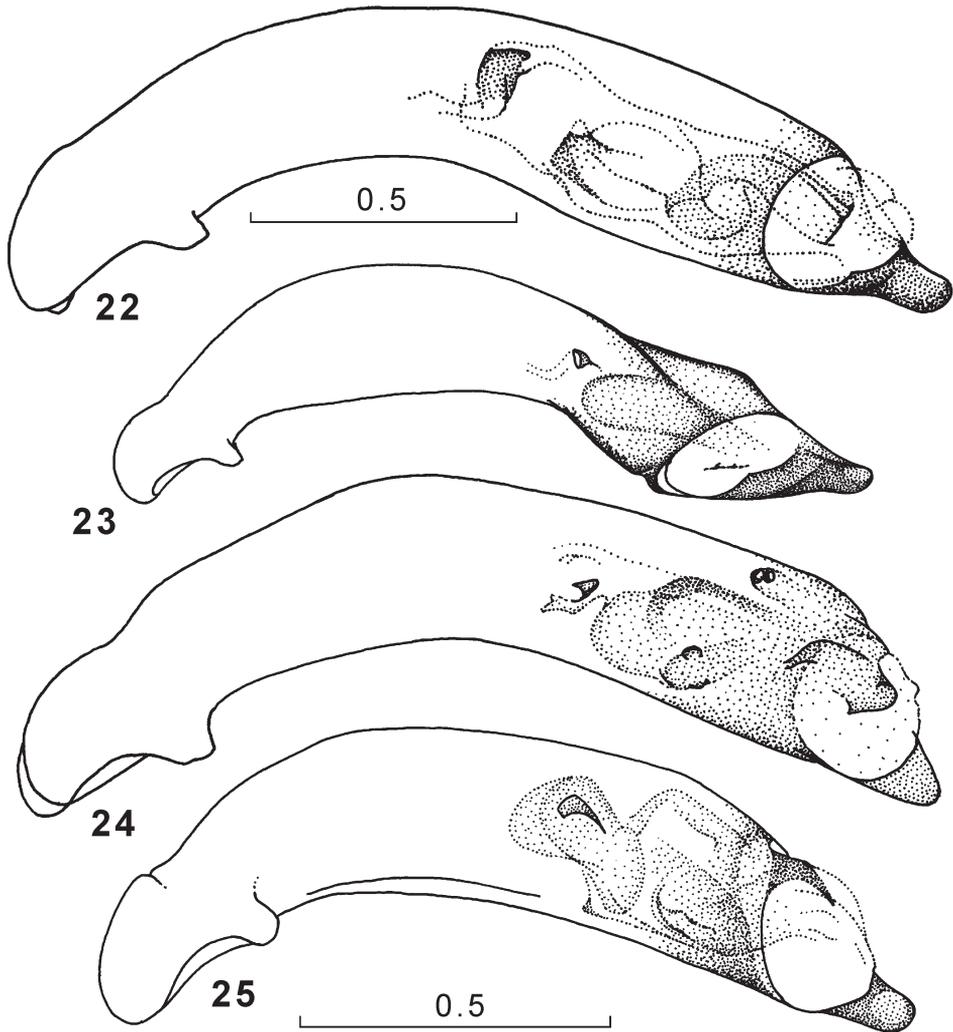
Eyes slightly reduced in size and a little flattened; posterior supraorbital seta situated slightly behind eye back margin. Frontal foveae shallow. Antennae rather long, surpassing pronotal base by last two joints, 3<sup>rd</sup> antennomere 1.5 times as long as 2<sup>nd</sup>, 8<sup>th</sup> 2.3 times as long as wide.

Pronotum rather convex, especially so anteriorly, 1.54 times as wide as long and as much wider than head, with protruding front angles, slightly narrowing basad, evenly but poorly rounded on sides, broadest a little before middle, indistinctly sinuate before hind angles; side border rather widely explanate but hardly reflexed. Base almost straight, narrowly bordered, with medial part and lateral lobes subequally wide, these strongly oblique only at rounded hind angles. Mid-line rather deep throughout its



**Figures 17–21.** Genus *Amphimenes*, penis, left lateral aspect: *A. rugulipennis* (17), *A. maculatus* sp. n. (18), *A. bidoupensis* sp. n. (19), *A. montanus* sp. n. (20), *A. gracilis* sp. n. (21); *dc*, dorsal carina.

length; transverse basal depression rather sharply separated from disc convexity; basal foveae small but deep and extending forward into very wide and increasingly shallow depressions, each running parallel to side margin up to middle of pronotum length. Paramedian foveae small, rounded, deep, situated before middle.

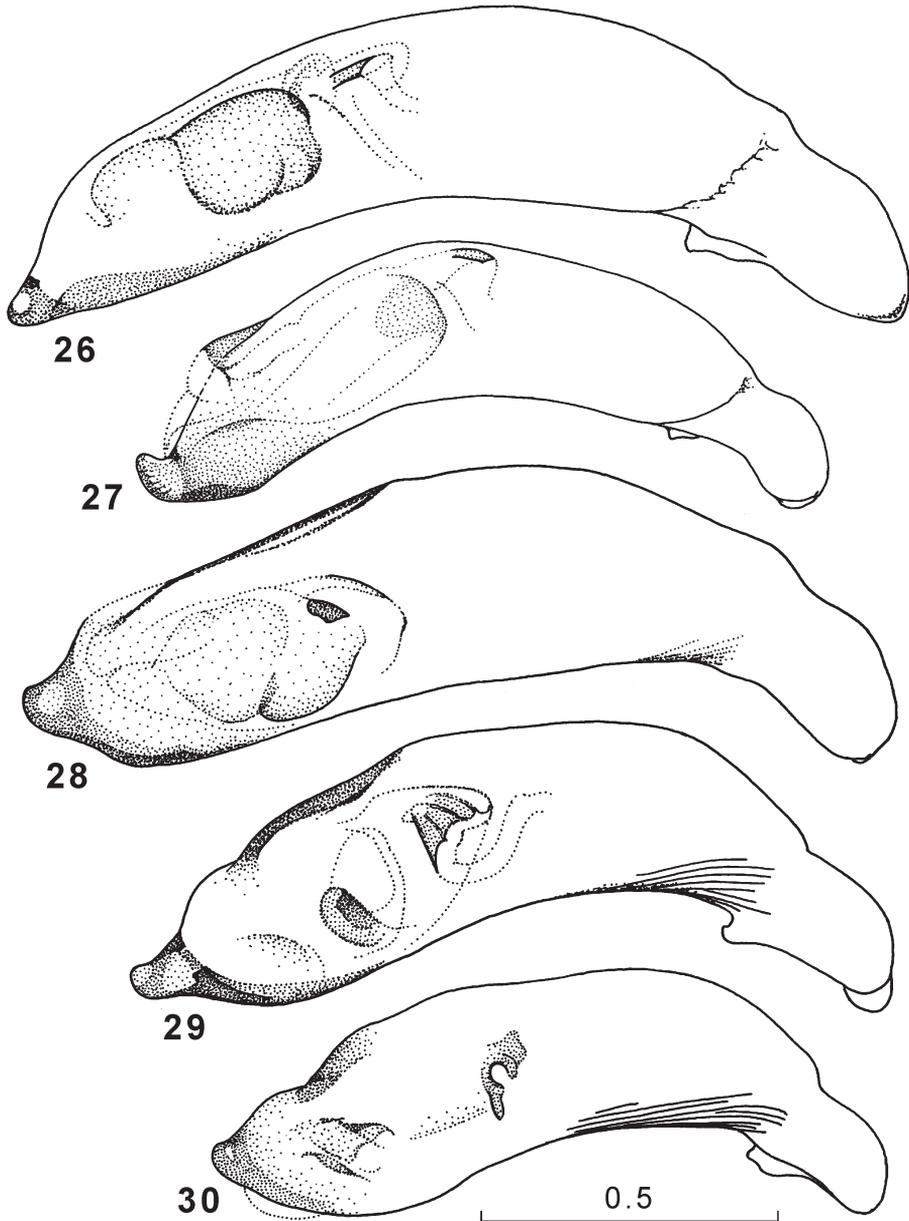


**Figures 22–25.** Genus *Amphimenes*, penis, left lateral aspect: *A. giganteus* sp. n. (22), *A. medius* sp. n. (23), *A. reflexicollis* sp. n. (24), *A. planicollis* sp. n. (25).

Elytra rather flat and widely oval, 1.33 times as long as wide, 1.57 times as wide as pronotum, broadest at about middle, with shoulders strongly rounded, apical truncature hardly sinuate between rounded outer angles and almost contiguous, very narrowly rounded apices. Elytral striae deep and indistinctly crenulate, intervals convex.  $D2/EL=0.41-0.44$ ,  $D3/EL=0.91$ . Umbilicate series of setigerous pores uninterrupted. Metepisternum 0.9 times as long as wide.

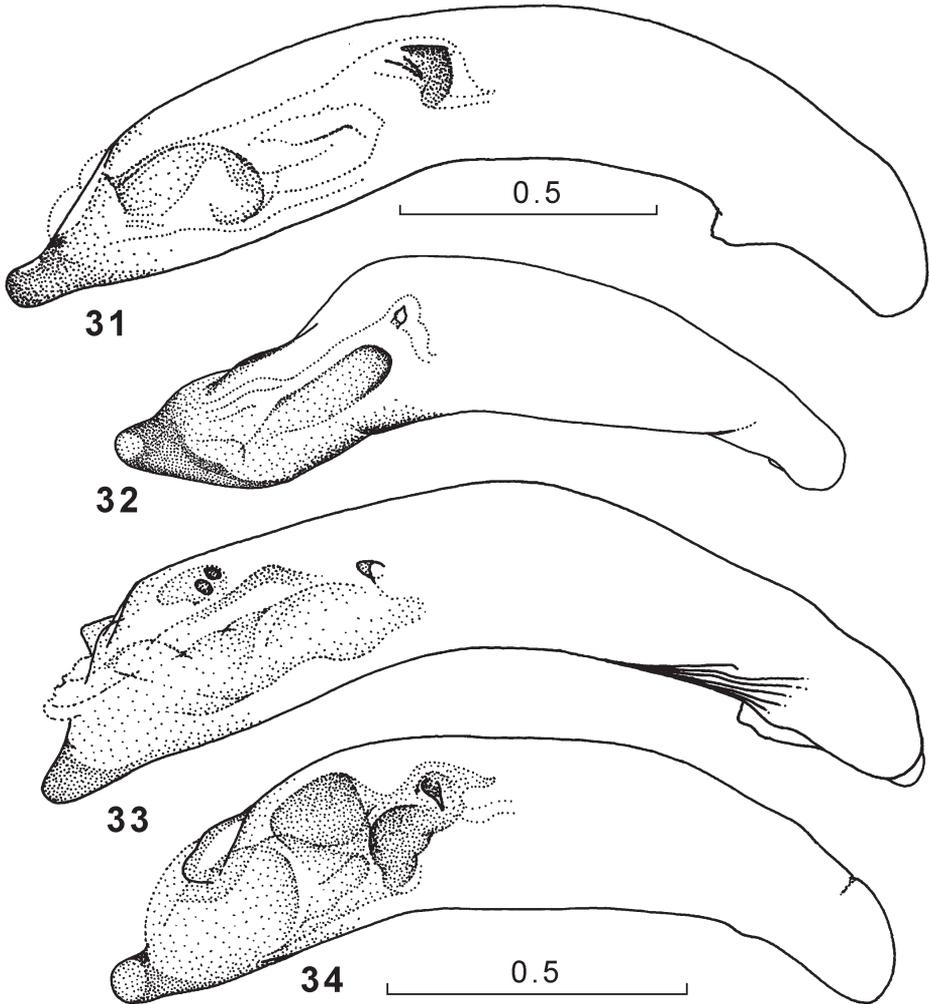
Last tarsomere with distal pair of ventral setae only.

**Diagnosis.** This species is easily recognizable among the others by the combination of the medium-sized body, the  $D2+D3$  formula, with  $D2$  being in anterior position, the missing wings, the almost reduced cross-striated sculpture on the elytra, etc.



**Figures 26–30.** Genus *Amphimenes*, penis, right dorsolateral aspect: *A. rugulipennis* (26), *A. maculatus* sp. n. (27), *A. bidouppensis* sp. n. (28), *A. montanus* sp. n. (29), *A. gracilis* sp. n. (30).

**Material.** Holotype, ♀ (ZISP) labelled: “**Vietnam**, mountains 50 km / NE [of] Thai Nguyen, 800 m [a s l.] / 12.1.1964, Kabakov” [handwritten micrograph in Russian] “HOLOTYPE/...” [red typewritten].



**Figures 31–34.** Genus *Amphimenes*, penis, right dorsolateral aspect: *A. giganteus* sp. n. (31), *A. medius* sp. n. (32), *A. reflexicollis* sp. n. (33), *A. planicollis* sp. n. (34).

**Type locality:** North Vietnam, 50 km NE of Thai Nguen.

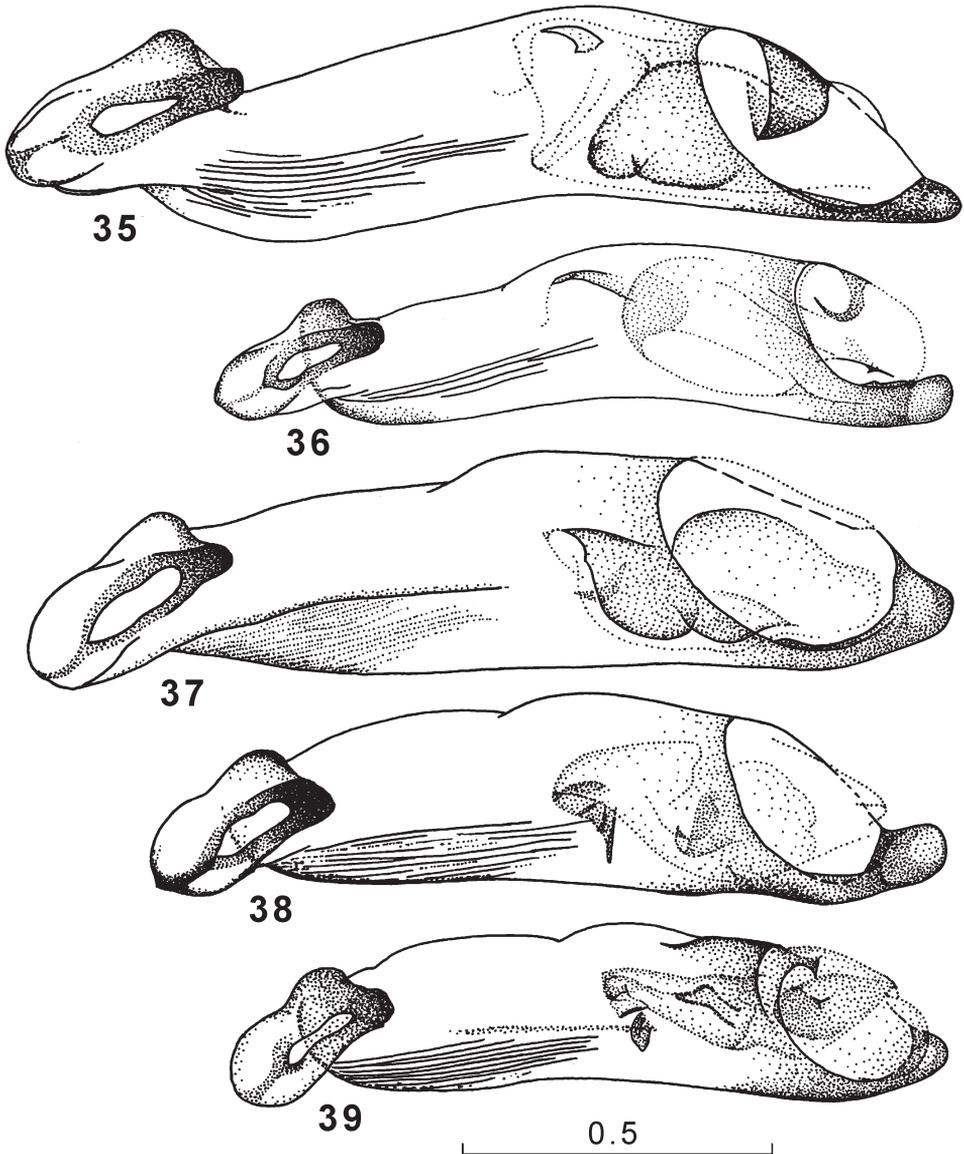
**Geographic distribution.** Known from type locality only.

**13. *Amphimenes kabakovi* Fedorenko, sp. n.**

urn:lsid:zoobank.org:act:8DF0D22F-8C2A-4746-85E3-3539AAE60495

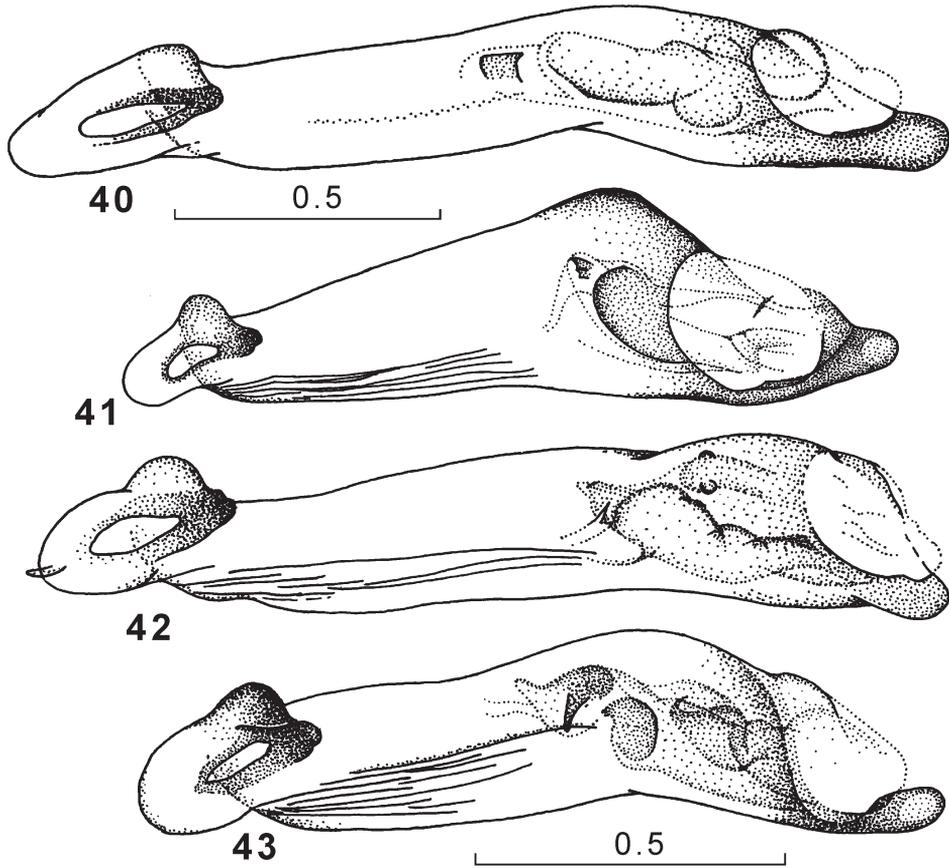
Fig. 16

**Description.** Body length 6.6/6.3 mm, width 2.75 mm. Almost black, pronotum and head dark brown, with clypeus reddish, labrum, mouthparts, antennae and legs



**Figures 35–39.** Genus *Amphimenes*, penis, ventral aspect: *A. rugulipennis* (35), *A. maculatus* sp. n. (36), *A. bidouppensis* sp. n. (37), *A. montanus* sp. n. (38), *A. gracilis* sp. n. (39).

uniform red; reflexed side margin of elytra and pronotum behind the middle reddish. Head and pronotum with a moderately deep isodiametric microsculpture resulting in both, especially pronotum, shining, latter due chiefly to a wide longitudinal band of a much weaker microsculpture occupying middle third of pronotum. Elytral microsculpture composed of strongly transverse but distinct meshes, cross-striated sculpture very weak and restricted to elytral base only.



**Figures 40–43.** Genus *Amphimenes*, penis, ventral aspect: *A. giganteus* sp. n. (40), *A. medius* sp. n. (41), *A. reflexicollis* sp. n. (42), *A. planicollis* sp. n. (43).

Eyes rather strongly reduced in size and flattened; posterior supraorbital seta situated level to about 1/3 distance between eye back margin and pronotal front margin. Frontal foveae shallow. Antennae surpassing pronotal base by last 1.5 joints, 3<sup>rd</sup> antennomere 1.6 times as long as 2<sup>nd</sup>, 8<sup>th</sup> 2.2 times as long as wide.

Pronotum rather flat, 1.34 times as wide as long, 1.46 as wide as head, with protruding front angles, slightly narrowing basad, moderately widely rounded on sides, broadest before middle, indistinctly sinuate before hind angles; reflexed side border narrow, a little wider basad. Base almost straight, medially unbordered, with medial part slightly broader than lateral lobes, these very strongly oblique towards almost indistinct hind angles. Mid-line moderately deep, slightly deeper where adjoining a sharp and deep basal transverse depression; basal foveae fairly deep, weakly extending forward, externally limited by a small and flat tubercle. Paramedian foveae lengthwise, superficial, situated at middle.

Elytra rather flat, widely oval, 1.30 times as long as wide, 1.70 times as wide as pronotum, broadest at about middle, with shoulders strongly rounded, apical truncature slightly sinuate between rounded outer angles and elytral apices, these separate a little, due to their rounded tips. Elytral striae deep, intervals convex.  $D2/EL=0.42-0.44$ ,  $D3/EL=0.91-0.92$ . Umbilicate series of setigerous pores uninterrupted. Metepisternum 0.9 times as long as wide.

Last tarsomere only with distal pair of ventral setae.

**Diagnosis.** Similar to the preceding species, differing well in the smaller body, the peculiar shape of the pronotum, as well as in the meshed microsculpture of the elytra.

**Material.** Holotype, ♀ (ZISP), labelled: “**Vietnam**, NW [of] Mt. Ridge / Tam Dao Son Zuong / 300 m [a s l.] / 20.2.1962 / Kabakov” [handwritten micrograph in Russian] “HOLOTYPE/...” [red typewritten].

**Type locality:** North Vietnam, Tam Dao Son Zuong (Mt. Ridge).

**Geographic distribution.** Known from type locality only.

**Name.** The species is named in the memory of the late O. N. Kabakov, an outstanding geologist and coleopterologist from St. Petersburg, who, in addition, collected the holotype.

## Acknowledgments

I am very grateful to Dr. R. Poggi (MSNG) and B. Kataev (ZISP) for kindly loaning me some material under their care, including syntypes of *Brachichila rugulipennis* in the former case. I also very thankful to all my colleagues from the Russia-Vietnam Tropical Center, both Russian and Vietnamese, who accompanied me during expeditions to Vietnam.

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# The adventive genus *Xantholinus* Dejean (Coleoptera, Staphylinidae, Staphylininae) in North America: new records and a synthesis of distributional data

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## Abstract

New distributional and bionomic data are provided for species of the genus *Xantholinus* in North America. *Xantholinus elegans* (Olivier, 1795) (= *X. jarrigei* Coiffait, 1956) is recorded from North America for the first time, based on specimens collected in Ontario, Canada from 2007–2010. The armature of the internal sac of the aedeagus *in situ* is illustrated to aid in identification. *Xantholinus linearis* (Olivier, 1795), known previously from the Maritime Provinces of Canada and the eastern United States, is newly recorded from Ontario. *Xantholinus longiventris* Heer, 1839 is still only known from western North America. A key is provided to allow recognition of all three species.

## Keywords

exotic, Coleoptera, *Xantholinus elegans*, Xantholinini

## Introduction

The genus *Xantholinus* Dejean (Staphylininae: Xantholinini) is a diverse, mainly Palearctic group and contains several species that prefer open, disturbed areas, where they often dominate the staphylinid assemblage (Daccordi and Zanett 1989; Balog and Marko 2007). These habits have likely facilitated the accidental importation and

subsequent establishment of *Xantholinus* species into North America. Smetana (1982) reported *X. linearis* (Olivier, 1795) from both eastern and western portions of the North America and *X. longiventris* (Olivier, 1795) only from western regions. Since then, several publications have presented either new provincial and state records, or additional locality data for these two species (Smetana 1988, 1990; Majka and Klimaszewski 2008a; Majka et al. 2008).

Recent collections and surveys in Ontario have resulted in the recognition of one additional species in North America and a range extension for *X. linearis*. We here summarize all available data for *Xantholinus* species in North America, present distributional maps, and provide a key for identification of the species known from the continent.

## Material and methods

The aedeagus of *X. elegans* (Olivier, 1795) was prepared for examination as in Smetana (1982) and photographed using an imaging system by Visionary Digital. The specimen photograph of *X. elegans* was taken with the same system. Maps were created using ARC-GIS and Adobe Photoshop software. The institutions (and their abbreviations) from which material was examined are as follows:

- ACPE** Agriculture and Agri-Food Canada, Prince Edward Island, Canada (Christine Noronha)
- CBU** Cape Breton University, Sydney, Nova Scotia, Canada (David B. McCorquodale)
- CGMC** Christopher G. Majka Collection, Halifax, Nova Scotia, Canada (Christopher G. Majka)
- DEBU** University of Guelph, Guelph, Ontario (Stephen Marshall)
- DENH** University of New Hampshire, Durham, New Hampshire, USA (Donald Chandler)
- DHWC** David H. Webster Collection, Kentville, Nova Scotia, Canada (David H. Webster)
- NBM** New Brunswick Museum, Saint John, New Brunswick, Canada (Donald McAlpine)
- NSMC** Nova Scotia Museum, Halifax, Nova Scotia, Canada (Christopher G. Majka)
- NSNR** Nova Scotia Department of Natural Resources, Shubenacadie, Nova Scotia, Canada (Jeffrey Ogden)
- SMU** Saint Mary's University, Halifax, Nova Scotia, Canada (Doug Stongman)
- UMNB** Université de Moncton, Moncton, New Brunswick, Canada (Pauline Durr)

## Results

### *Xantholinus elegans* (Olivier, 1795)

*Staphylinus elegans* Olivier 1795:19; as *Xantholinus elegans*: Smetana in Löbl and Smetana 2004.

**Materials.** All specimens studied are deposited in DEBU

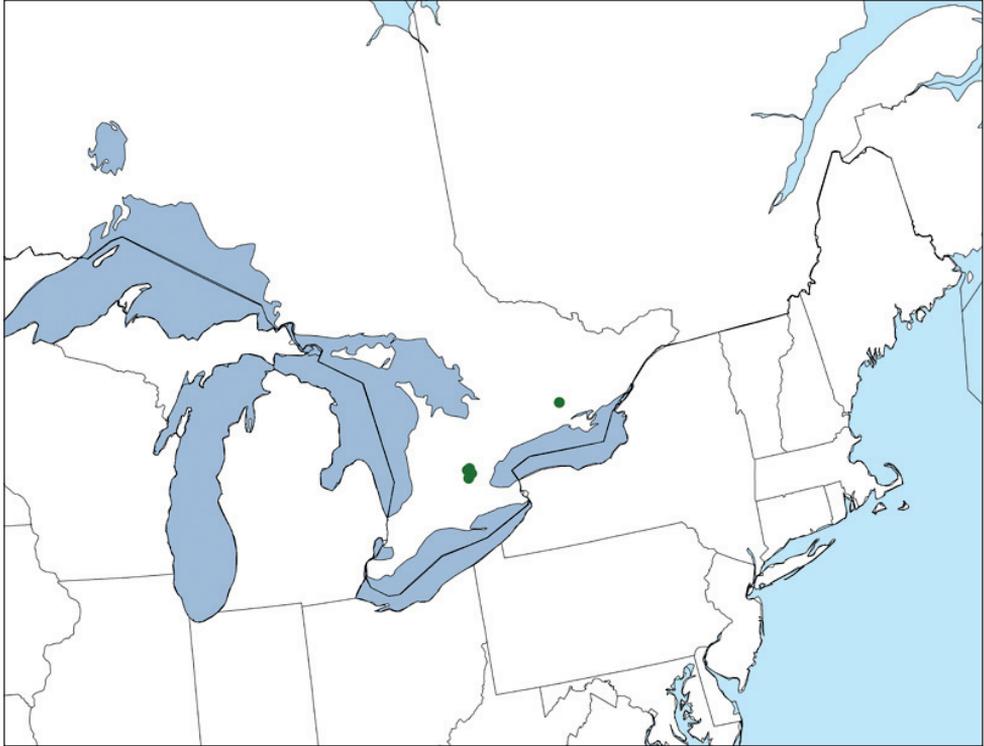
**CANADA: ONTARIO:** *Peterborough County*: 5 Km SW of Marmora, under fresh horse dung, 31-VII-2010, A. Brunke (1). *Waterloo Region*: Blair, Rare Charitable Research Reserve, near Whistlebare Rd., soybean field, pitfall trap, 27-VII-2010, A. Brunke (1); *Wellington County*: Arkell, Arkell Research Station, under loose sod beside canola field, 20-VII-2007, A. Brunke (1); Eramosa, Eramosa Rd. and Wellington Rd. 29, soil in agricultural field, corn in previous year, 8-VI-2010, A. Brunke (1); Eramosa, Eramosa Rd. and Wellington Rd. 29, soybean field, pitfall trap, 13-VII-2010, A. Brunke (1); Eramosa, Eramosa Rd. and Wellington Rd. 29, soybean field, pitfall trap, 10-VIII-2010, A. Brunke (1); Guelph, Gordon St. and Wellington Ave, on sidewalk near dry field, 23-VIII-2008, A. Brunke and D.K.B. Cheung (1); Guelph, Arboretum, woods edge in leaf litter, 11-IX-2008, M. Bergeron, S. Paeiro and D.K.B. Cheung, (1); Guelph, University of Guelph campus, under rocks, 22-VII-2009, C. Ho and S.P.L. Luk, (2); Guelph, Victoria Rd. and Conservation Line, soybean field, pitfall trap, 4-VIII-2009, A. Brunke, (1). Guelph, Stone Rd., heavily disturbed forest edge under rock, coll. as larva 10-IV-2010, emerged 15-V-2010, A. Brunke (1).

*Xantholinus elegans* is newly recorded from North America based on the above specimens collected near Guelph and near Marmora, Ontario, Canada (Fig. 1). Dissected specimens key out to *X. jarrigei* Coiffait in Coiffait (1972), a species synonymized with *X. elegans* (Olivier) by Drugmand (1994). The aedeagus is illustrated in Fig. 2 and those of the other two species were illustrated by Smetana (1982). Most specimens were found in strongly disturbed areas and all individuals were brachypterous. One larva was found under a rock at the edge of a disturbed woodlot in April 10, 2010 and was subsequently reared to an adult on May 15th. The larva was provided with soil from the collection site which included oribatid mites and early-instar *Oniscus asellus*, although the larva was never observed to feed.

### *Xantholinus linearis* (Olivier, 1795)

*Staphylinus linearis* Olivier 1795:19; as *Xantholinus linearis*: Smetana in Löbl and Smetana 2004.

**Materials. CANADA: ONTARIO:** *Huron County*: Auburn, 1km NE of Baseline Rd. and Londesboro Rd., wooded hedgerow, pitfall trap, 23-XI-2009, A. Brunke (1); Au-



**Figure 1.** Distribution of *Xantholinus elegans* in North America.

burn, Hullett-McKillop Rd. nr. Limekiln Rd., soybean field, pitfall trap, 4-VIII-2010, A. Brunke (1); Goderich, Sharpes Creek Line, wooded hedgerow, pitfall trap, 19-X-2009 (1), 16-XI-2009 (1), A. Brunke. *Waterloo Region*: Blair, Dickie Settlement Rd. nr. Whistlebear Golf Club, pitfall trap, soybean field, 15-XI-2009, A. Brunke (1); wooded hedgerow, 10-XI-2009, (1), 24-XI-2009 (15), A. Brunke; Blair: *rare* charitable research reserve, Fountain St. and Limerick Rd., pitfall trap, soybean field, 15-IX-2009, A. Brunke (1), wooded hedgerow, 27-X-2009 (2), 10-XI-2009 (6), 24-XI-2009 (14), A. Brunke; Blair, nr. Whistlebare Rd., soybean field, pitfall trap, 29-VI-2010 (2), 13-VII-2010 (6), 27-VII-2010 (2), A. Brunke; *Wellington County*: Eramosa, Eramosa Rd. and Wellington Rd. 29, agricultural hedgerow, pitfall trap, 18-V-2010, A. Brunke (1); Guelph, University of Guelph, debris under dead hawk, 27-VI-2008, A. Brunke (1), under patio stone, 2-IV-2009, S.P.L. Luk (1), leaf litter in woodlot, 2-IV-2009, A. Brunke (1), on brick wall, 9-XI-2009, S.P.L. Luk (1); Guelph, Victoria Rd. and Conservation Line, wooded hedgerow, pitfall trap, 20-X-2009 (2), 17-XI-2009 (2), A. Brunke.

*Xantholinus linearis* is newly recorded from Ontario based on numerous recent collections from the southern portion of the province. Specimens were collected mainly in agricultural or urban settings in open or forest edge habitat. The earliest Canadian records are from 1949 (in Nova Scotia and Newfoundland) and the earliest North



**Figure 2.** Aedeagus of *Xantholinus elegans*.

American ones are from 1930 (in Washington state) (Majka and Klimaszewski 2008a). The current distribution of *X. linearis* is summarized in Fig. 3.

***Xantholinus longiventris* Heer, 1839**

*Xantholinus longiventris* Heer 1839: 247; *Xantholinus longiventris*: Smetana in Löbl and Smetana 2004.

**Distribution.** The current distribution of *Xantholinus longiventris* is summarized in Fig 4.

**Key to the *Xantholinus* species of North America**

- 1 Body distinctly bicolored: head black, sharply contrasting with red-orange pronotum and elytra (Fig. 5, 6).....***Xantholinus elegans***
- 1' Body not distinctly bicolored: body entirely medium to very dark brown, with the elytra often slightly paler (Fig. 7).....**2**



**Figure 3.** Distribution of *X. linearis* in North America. Distribution incorporates previous records from the literature (Smetana 1982, 1988, 1990; Sikes 2003, Majka and Klimaszewski 2008).

- 2 Pronotum with distinct microsculpture of transverse waves present on most of pronotum; occurring in eastern and western North America.... *X. linearis*
- 2' Pronotum with, at most, fragments of microsculpture on the anterior angles; known only from western North America..... *X. longiventris*

## Discussion

*Xantholinus elegans* is certainly a recent accidental introduction to North America as it was not included in Smetana (1990), and the earliest specimen known is from 2007. In its native range, *X. elegans* is distributed widely in the western Palearctic region and recorded from Austria, Belgium, Bosnia Herzegovina, Czech Republic, France, Great Britain, Germany, Hungary, Ireland, Italy, Luxembourg, The Netherlands, Poland, Slovakia and Spain (Smetana in Löbl and Smetana 2004). In Europe, it prefers sandy soils and is a bivoltine species with most adults collected in spring and late summer (Daccordi and Zanetti 1989; Drugmand 1994). While most North American specimens were found on sandy soil, adults were collected throughout the summer and sparingly in spring and fall. Further collecting should help determine whether this is a collecting



**Figure 4.** Distribution of *X. longiventris* in North America. Distribution incorporates previous records from the literature (Smetana 1982, 1988).

artefact or a shift in seasonality in response to a different geographic area. The majority of specimens have been collected in disturbed habitats and it is unknown if this species will invade habitats with little to no recent human disturbance. It is unclear whether the easternmost record (Marmorata) (Fig. 1) represents an isolated population as a result of human-aided dispersal, or if it indicates an inadequately sampled, broader distribution in southern Ontario.

The method of introduction is unknown but may be related to the importation of plant stock or associated materials as *X. linearis* was intercepted twice in soil with primrose and moss shipments from Europe in the 1930's (Smetana 1982). Other predatory beetles are suspected to have become established via plant stock importation (Spence and Spence 1988). Although exotic staphylinids are typically considered to enter eastern North America via Atlantic Canadian introduction points in Nova Scotia, Newfoundland, and in Massachusetts – many associated with historic shipments of dry ballast material (Smetana 1995; Majka and Klimaszewski 2008b) – examination of recent material from the University of New Hampshire Insect Collection and numerous collections in Maritime Canada have not turned up specimens of this species. It appears that the North American occurrence of *X. elegans* represents an inland introduction, similar to that of the Emerald Ash Borer, which was first detected in



**Figure 5.** *In vivo* habitus of *Xantholinus elegans*, from Guelph, Ontario, Canada. Photo by D.K.B. Cheung.



**Figure 6.** Dorsal habitus of *Xantholinus elegans*.



**Figure 7.** *In vivo* habitus of *Xantholinus linearis*, from Guelph, Ontario, Canada. Photo by Stephen Marshall.

Michigan/southern Ontario in 2002 (Poland et al. 2006). Although *X. elegans* is a brachypterous species (Assing 1993; Drugmand 1994) and is unable to disperse aerially, other beetles introduced to North America were found to disperse readily, despite their brachyptery (Spence and Spence 1988). The availability of suitable, open habitat in eastern North America may provide for the expansion of its range to include regions other than Ontario.

*Xantholinus linearis* was considered to be well-established in both eastern and western North America by Smetana (1982, 1988, 1990) and data presented in this paper demonstrate that it is continuing to expand its range towards the centre of the continent. This species was previously known from British Columbia, Nova Scotia, New Brunswick, Newfoundland and Prince Edward Island in Canada, and California, Idaho, Massachusetts, New Hampshire, Nevada, Oregon, Rhode Island, Utah, and Washington in the United States (Smetana 1982; Smetana 1990; Chandler 2001; Sikes 2003; Majka and Klimaszewski 2008a; Klimaszewski et al. 2010). While it has been known from Atlantic Canada since 1949, it appears to have only recently reached Ontario, as it is missing from collections made prior to 2008. Specimens from Pennsylvania and New York were clearly stated as 'interceptions' by Smetana (1982) and should not be considered as evidence that this species occurs there. Interestingly, recent surveys of open field habitat in both these states have not detected *X. linearis* (Byers et al., 2000). Further survey work is needed to fully delimit the eastern range of this species.

*Xantholinus longiventris* is still known only from the western United States (California, Oregon, Washington) and has not been reported from additional states or any provinces since it was treated in Smetana (1982). In North America, habitat data from specimens suggests that *X. longiventris*, while it often co-occurs with *X. linearis*, prefers a higher level of moisture (in moss, near water etc.) as it has not been collected from drier urbanized places where the latter species is often found. This species' range in North America is probably confined by the Rocky Mountain system and will likely remain stable in the absence of secondary introductions.

Three species of *Xantholinus* are now known to have established themselves in North America via human activity. Of these, at least *X. linearis* is apparently continuing to expand its distribution towards the centre of the continent and may be detected in additional provinces and states in the future. This paper provides a current synthesis of distributional information and facilitates the identification of a previously unrecognized species for the North American fauna. A complete review and identification manual for the entire Xantholinini in eastern North America is currently in preparation.

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# Discovery of the rare genus *Blacometeorus* Tobias, 1976 (Hymenoptera, Braconidae, Blacinae) in the Oriental part of China, with description of a new species

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<sup>‡</sup> [urn:lsid:zoobank.org:author:CDFDF38D9-E9AE-4C8F-99CE-23151D3878F3](https://doi.org/urn:lsid:zoobank.org:author:CDFDF38D9-E9AE-4C8F-99CE-23151D3878F3)

<sup>§</sup> [urn:lsid:zoobank.org:author:0054AC5F-7F6D-4811-A560-90983889C861](https://doi.org/urn:lsid:zoobank.org:author:0054AC5F-7F6D-4811-A560-90983889C861)

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## Abstract

The rare genus *Blacometeorus* Tobias, 1976 (Hymenoptera: Braconidae: Blacinae) is discovered in Yunnan, China, and a new species, *B. sinicus* Chai & Chen, **sp. n.** is described and illustrated. It represents the first record of this genus both for China and Oriental region. A key to genus *Blacometeorus* is updated.

## Keywords

Hymenoptera, Braconidae, Blacinae, *Blacometeorus sinicus*, Oriental, new species

## Introduction

The Blacinae Foerster is a cosmopolitan subfamily of Braconidae (Hymenoptera) with five tribes, 14 genera and 207 species known in the world (Yu et al. 2005). *Blacometeorus* Tobias, 1976 is the only genus of the Blacini with vein r-m of fore wing present (Tobias, 1976; van Achterberg, 1988). Four species of *Blacometeorus* are reported to date, i.e., *B. brevicauda* (Hellén, 1958), *B. intermedius* Tobias, 1976, *B. pusillus* (Hellén, 1958)

and *B. konishii* Belokobylskij, 2000, all from the Palearctic region, but they are rarely collected. Recently a specimen of *Blacometeorus* was discovered in Yunnan, China, representing a new species, *B. sinicus* Chai & Chen, sp. n., which we describe and illustrate. It represents the first record of this genus both for China and Oriental region.

## Materials and methods

The terminology and measurements used follow van Achterberg (1976, 1988). Additional sources for the description of ocelli and tentorial pits are Belokobylskij (2000). The descriptions and measurements were made under the Leica MZ 12.5 and Zeiss Stereo Discovery V8 microscope, and photos taken by a digital camera (Q-Imaging, Micropublisher 3.3 RTV) attached to a Leica MZ APO stereomicroscope (Wetzlar, Germany) using Synoptics Auto-Montage version 5.0 software. Type specimen is deposited in the Parasitic Hymenoptera Collection of the Zhejiang University, Hangzhou, China (ZJUH).

## Taxonomy

### *Blacometeorus sinicus* Chai & Chen, sp. n.

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Figs 1–10

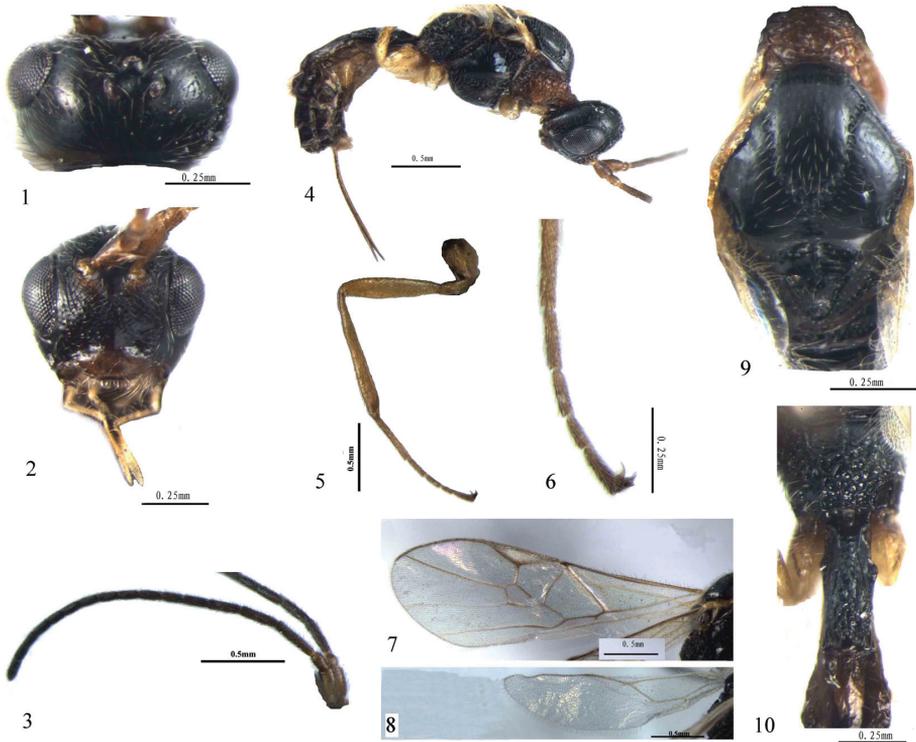
**Female.** Length of body 3.0 mm, of fore wing 2.8 mm.

*Head* (Figs 1–3). Head distinctly and roundly narrowed below eyes; frons and occiput weakly concave; face largely rugose; length of maxillary palp subequal to height of head; POL equal to Od, 0.5 times OOL; Ocelli almost in equilateral triangle; length of eye in dorsal view equal to temple; malar space 1.2 times as long as basal width of mandible; tentorial pits large, distance between pits 1.3 times distance from pit to eye; width of clypeus 2.5 times its median height.

Antenna slender, 17-segmented; scapus twice as long as pedicellus; third segment 1.2 times as long as fourth segment; third, fourth and penultimate segments 4.7, 4.2, and 1.7 times as long as their width, respectively; penultimate segment 0.7 times as long as the apical segment; sixth and seventh segments normal.

*Mesosoma* (Figs 4, 9, 10). Length of mesosoma 1.5 times its height; pronotum largely with rugae; scutellar sulcus deep, rugose, with a distinct medio-longitudinal carina, almost 0.7 times as long as scutellum; scutellum with fine lateral carinae, not protruding dorsally; surface of propodeum largely reticulate-rugose, anteriorly narrowly smooth, its medial area absent.

*Wings* (Figs 7, 8). Fore wing: Length of fore wing 3 times its width; pterostigma narrow, its length 5 times maximum width; first discal cell narrowly truncated; 1-CU1 : 2-CU1 = 6:21. Hind wing: 1r-m 0.9 times 1-M.



**Figures 1–10.** *Blacometeorus sinicus* Chai & Chen, sp. n. ♀, holotype. **1** antenna **2** head, frontal view **3** head, dorsal view **4** mesonotum, dorsal aspect **5** propodeum and metasomal tergite I–II, dorsal aspect **6** fore wing **7** hind wing **8** body, lateral view **9** hind leg **10**, hind tarsus.

*Legs* (Figs 5, 6). Hind coxa with distinct curved dorsal keel; length of femur, tibia, and basitarsus of hind leg 4.6, 8.8 and 9.0 times their width, respectively; hind tarsus 1.1 times as long as hind tibia, its second segment 0.5 times as long as first segment.

*Metasoma* (Figs 4, 10). First tergite long, parallel-sided, with large spiracular tubercles in basal 0.35; first tergite 2.6 times as long as its apical width, largely coarsely reticulate, dorsal carinae distinct in basal half; second tergite weakly sculptured basally; ovipositor sheath 1.7 times as long as first tergite, 0.33 times as long as fore wing.

*Colour*. Dark brown; palpi and legs brownish yellow, but hind coxa, apex of hind tibia and tarsus darkened; tegulae and hypopygium brown; wing membrane subhyaline; pterostigma light brown; veins brown.

**Male**. Unknown.

**Type material**. Holotype, ♀ (ZJUH): China, Yunnan, Baoshan, Lujiangba, Gaoligong Mountain Natural Park, 24°49'44"N, 98°46'04"E, 2181m elev., 11.v.2009, coll. Wang Man-man, no.200904565.

**Diagnosis**. The new species is similar to *B. konishii* Belokobylskij, 2000, but can be separated from the latter by having the parallel-sided first metasomal tergite with big spiracular tubercles in basal 0.35, the second tergite weakly sculptured basally, the

length of ovipositor sheath 0.33 times as long as fore wing, the length of scapus 2 times length of pedicellus, and the vein r-m of fore wing pigmented.

**Biological notes.** Nothing is known about the host of this species.

**Etymology.** From Latin “sinicus” (Chinese), referring to the first discovery in China.

### Key to species of genus *Blacometeorus* Tobias, 1976

- 1 First metasomal tergite distinctly widened apically, its length about 1.5 times (♀) its apical width and extensively sculptured; third antennal segment 3–3.3 (♀) times as long as its width, sixth and seventh segments of ♀ very short; vein 1r-m of hind wing 1.3–1.6 times as long as vein 1-M; ovipositor sheath 0.25–0.29 times as long as fore wing; hind tarsus infuscated; Palearctic: United Kingdom, Czechoslovakia, Finland, Germany, and Russia (including Primorskiy kray) ..... *B. brevicauda* (Hellén)
- First tergite (sub) parallel-sided, its length 1.6–3 times its apical width; if about 1.6 times then only medially sculptured and hind tarsus yellowish; length of third antennal segment 3.8 (♂)-4.7 (♀) times its width, sixth and seventh segments of ♀ less shortened; length of vein 1r-m of hind wing 0.9–1.2 times vein 1-M; length of ovipositor sheath 0.35–0.45 times fore wing (unknown in *intermedius*) ..... 2
- 2 Scapus (without radix) somewhat longer (about 1.2 times) than pedicellus; face completely smooth; first metasomal tergite 1.6–1.9 times (♂) as long as its apical width; scutellum without lateral carinae, somewhat protruding dorsally; Palearctic: Azerbaijan, Czechoslovakia ..... *B. intermedius* Tobias
- Scapus much longer than pedicellus; face with rugae or striation; first tergite 2.2–2.8 times (♀) its apical width; scutellum with fine lateral carinae, not protruding dorsally ..... 3
- 3 Face largely smooth, except some rugae near toruli; distance between hind ocelli much longer than diameter of posterior ocellus; first metasomal tergite short, its length 2.2 times its apical width; Palearctic: United Kingdom, Finland, Hungary ..... *B. pusillus* (Hellén)
- Face punctulate and rugose, with striation partly; distance between hind ocelli equal to diameter of posterior ocellus; first metasomal tergite long, its length 2.6–2.8 times its apical width ..... 4
- 4 First metasomal tergite weakly narrowed apically, with small spiracular tubercles in basal 0.35; second tergite smooth; ovipositor sheath 0.42 times as long as fore wing; scapus 4 times as long as pedicellus; vein r-m of fore wing unpigmented; Palearctic: Japan ..... *B. konishii* Belokobylskij
- First metasomal tergite parallel-sided, with large spiracular tubercles in basal 0.35; second tergite weakly sculptured basally; length of ovipositor sheath 0.33 times as long as fore wing; length of scapus 2 times length of pedicellus; vein r-m of fore wing pigmented; Oriental: China ..... *B. sinicus* sp. n.

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