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Akarbatrus gen. nov., an unusual Batrisitae (Coleoptera: Staphylinidae: Pselaphinae) from Sumatra

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Abstract. *Akarbatrus* gen. nov., and *Akarbatrus jelineki* sp. nov. and *A. diversicornis* sp. nov. from Sumatra are described and illustrated.

Key words. Coleoptera, Staphylinidae, Pselaphinae, Batrisitae, taxonomy, new taxa, Indonesia

Introduction

Batrisitae Reitter, 1882, is one of the more diverse supertribes of Pselaphinae, in particular in the tropics and subtropics. The group is likely monophyletic (Chandler 2001, Kurbatov 2007) and includes some 230 genera recognized as valid (Newton & Chandler 1989, and subsequent papers). While the Batrisitae may be readily distinguished from other pselaphines, the relationships of its members are poorly understood and the previously recognized tribes and subtribes appear ill-based (Löbl & Kurbatov 2001).

Males of the Batrisitae often exhibit conspicuous male secondary sexual characters that may affect any part of the body and the appendages. Such characters provide reliable means for species definitions but may obscure relationships because of homoplasy. Complex structures consisting of excavations, carinae and setal patches are usually situated on the head and abdominal tergites. They are rarely situated on the elytra, as in the Afrotropical *Bothriotelus* Jeannel, 1951 (see Leleup 1976a), or on the pronotum, as in the Australian *Tinaroo* Chandler, 2001. Among large collections of the Pselaphinae made during an expedition to Sumatra, two additional species were found that possess a sexually modified pronotum. Both species lack elytral foveae, another character uncommon in humicolous Batrisitae. Hence, in spite of inadequate knowledge of the tropical Batrisitae, both species may be readily recognized as new, representing a group for which a new genus is here established. The new genus is formally placed in Batrisini Reitter, 1882.

Material and methods

The material examined was extracted from sieved samples of leaf and other plant debris in Winkler-Moczarski devices. The dissected and illustrated body parts were cleared in isopropanol and mounted in Canada balsam. The SEM material was coated and the micrographs were made by a scanning microscope Zeiss DSM 940A

The measurements are taken from dry, not dissected specimens. The length of pronotum and elytra is measured along their respective mesal lines, and for the aedeagus its maximal length is given. The numbers of the abdominal segments refer to the exposed segments (e.g., tergite 1 is the morphological 4th tergite and sternite 1 is the morphological 3rd sternite).

Characters stated to be secondary sexual features of males are probably lacking in females, considering analogous sexual dimorphisms in other pselaphines.

Examined specimens are deposited in the collections of the Muséum d'Histoire naturelle, Genève (Switzerland) (=MHNG).

Taxonomy

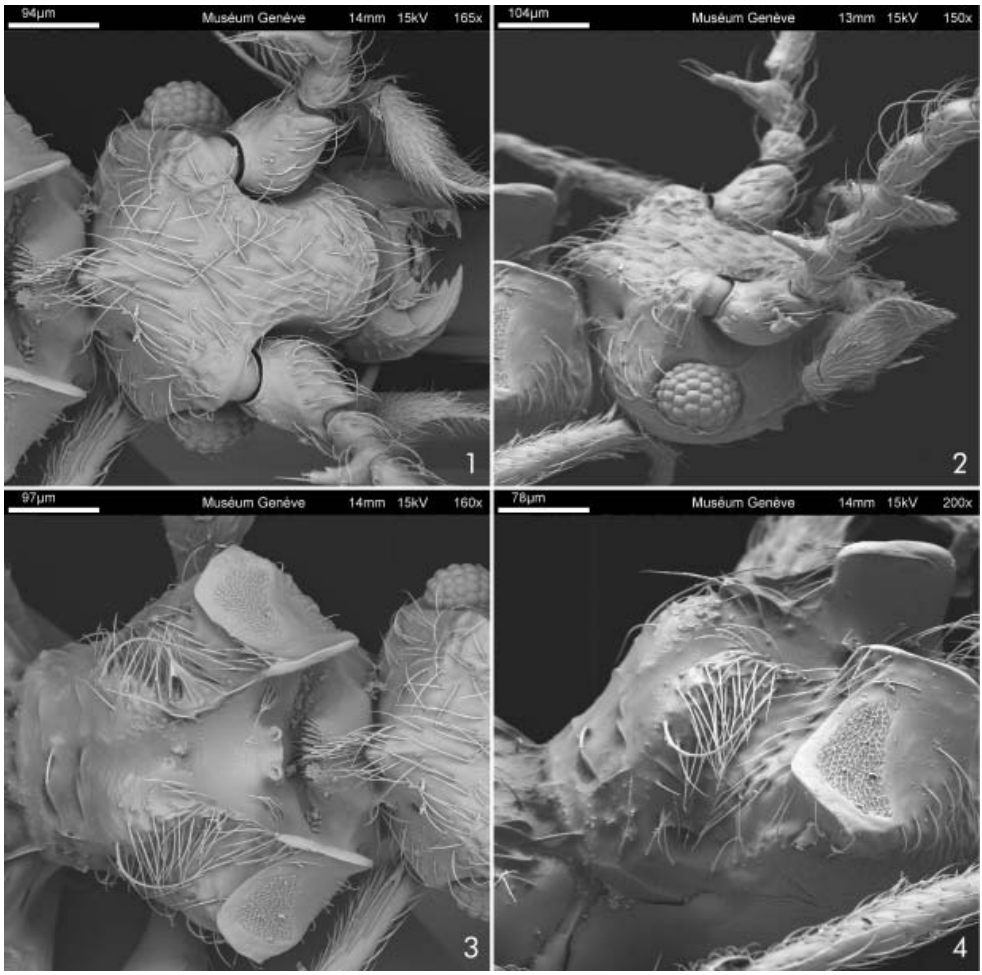
Akarbatrus gen. nov.

(Figs 1–10)

Type species. *Akarbatrus jelineki* sp. nov.

Diagnosis. Head rounded triangular. Eyes situated in posterior half of head. Antenna long, club loosely 3-segmented, ultimate segment conspicuously long. Pronotum lacking tubercles, spines and antebasal foveae, with antebasal stria and pair of laterobasal foveae. Elytra lacking foveae and dorsal striae. Marginal elytral striae present. Abdomen moderately narrowed apically, with rounded apex. Abdominal tergite 1 slightly longer than tergites 2 or 3, with lateral margins rounded. Legs long. Male pronotum excavated. Aedeagus elongate, with loose, weakly attached associated sclerite and long paramere, median lobe moderately flattened, with dorsal membrane and apophyses.

Description. Length 1.35–1.75 mm. Head rounded triangular. U-shaped vertexal sulcus present or absent. Vertexal foveae small. Eyes convex, not emarginate, situated in posterior half of head. Gular carina faint. Gular foveae in a common, fovea-like depression. Maxillary palpus lacking obvious sexual characters, with segment 3 about as long as wide and segment 4 narrowed toward base and apex, with a shallow impression. Antenna 11-segmented, long, with thick scape and loosely 3-segmented club, ultimate antennomere conspicuously elongate. Pronotum with pair of laterobasal foveae, lacking tubercles and spines, with mesal depression. Elytra lacking basal and laterobasal foveae, lacking discal striae, with marginal striae on elytral flanks, with or without lateroapical cleft. Prosternum with pair of simple lateral foveae. Lateral metasternal foveae touching mid-line, about as large as anterolateral metasternal foveae. Abdomen moderately narrowed and rounded apically. Tergite 1 lacking basal sulcus, with pair of basal foveae, angular laterobasally, rounded lateroapically, with only inner marginal carinae apparent. Following tergites lacking marginal carinae. Sternite 2 with two pairs of basal foveae.



Figs. 1–4. *Akarbatrus jelineki* gen. nov. et sp. nov., SEM micrographs. 1–2 – head (1 – dorsal view; 2 – lateral view); 3–4 – pronotum (3 – dorsal view; 4 – lateral view).

Differential diagnosis. *Akarbatrus* gen. nov. may be distinguished from most members of the supertribe Batrisitae by the elytra lacking foveae. The absence of elytral foveae is shared with several members of the temperate edaphic or cavernicolous 'Amauropini', and a few subtropical and tropical taxa, such as *Amblybatrisus* Chandler, 2001, *Batrisoconnus* Leleup, 1975, *Batrisopsis* Raffray, 1894, *Jochmansiella* Leleup, 1976, *Megabatrus* Löbl, 1979, *Mnia* Newton & Chandler, 1989, *Mossman* Chandler, 2001, *Ophelius* Raffray, 1904, and *Procheilophorus* Leleup, 1981 (see also Leleup 1975, 1976b, 1981; Löbl 1973, 1979; Raffray 1894, 1908).

Akarbatrus is unique within the Batrisitae in having both reduced elytral foveae and sexually modified male pronotum. Thus, the combination of these two features provides means for a reliable identification of the new genus. *Akarbatrus* and *Mossman* are similar in their body shape and share long appendages, pronota without spines, presence of laterobasal pronotal foveae while other pronotal foveae are absent, abdominal tergites 1 lacking basal sulci and possessing only one pair of basal foveae and one pair of inner marginal carinae, and elongate and complex aedeagus with a long paramere. *Akarbatrus* may be readily distinguished from *Mossman* also by the apically moderately narrowed and rounded abdomen, while the abdomen is conical in *Mossman*. In addition, *Akarbatrus* differs from *Mossman* by the eyes situated in the basal half of the head and the pronotum lacking tubercles. The remaining genera listed above are not linked by any synapomorphy and each of them except members of the 'Amauropini' appears to be isolated within the supertribe Batrisitae (see CHANDLER 2001; LELEUP 1976b; LÖBL 1973, 1979; RAFFRAY 1894, 1908).

Etymology. The name is derived from the Indonesian word Akar, meaning root, and combined with an arbitrary abbreviation of *Batrisus* Aubé, 1833, the type genus of the Batrisitae. Gender masculine.

Distribution. Indonesia: Sumatra.

Comments. All 12 specimens of *Akarbatrus* gen. nov. collected are males. This is possibly due to differences in phenology (females may appear later than males).

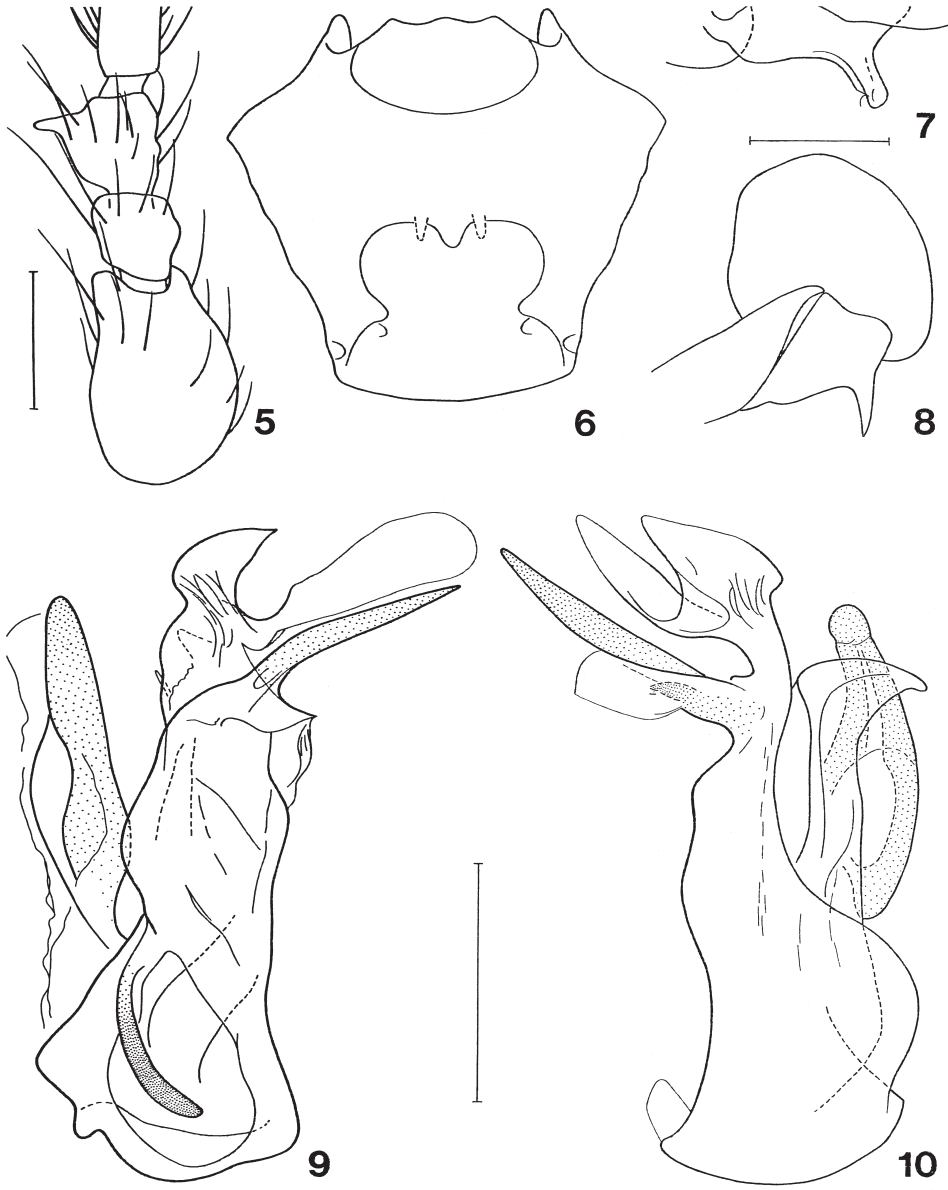
Akarbatrus jelineki sp. nov.

Type material. HOLOTYPE: male, 'INDONESIA: Sumatra, W. Sum. Lubuksulasih, 30 km E Padang, 1100 m, 8. XI. 1989, Agosti, Löbl, Burckhardt # 7' (MHNG). PARATYPES: 10 males, with the same data as the holotype (MHNG).

Diagnosis. Pronotal, elytral and abdominal pubescence long. Antennomeres 2 and 3 short, antennomere 3 expanded apicodorsally to form narrow process. Middle of vertex raised dorsally, prominent apically, forming a process. Posterior part of vertex vertical, with transverse depression. Pronotal excavation deep, delimited by high, smooth lateral laminae. Centre of pronotal excavation with semi-circular tubercle bearing trichomes and bi-dentate process. Elytra with humeral tubercles. Metathoracic wings fully developed. Aedeagus elongate, with strongly sclerotized subapical apophysis and flat, hook-like apex bearing weakly sclerotized lamina.

Description. Length 1.65–1.75 mm. Body uniformly reddish-brown, appendages lighter than body.

Head (Figs. 1–2) rounded triangular, with eyes 0.42 mm wide, wider than long, densely and coarsely punctate. Frontal lobe gradually inflexed and weakly convex, with rounded anterior margin. Frons hardly depressed between antennal tubercles, lacking foveae, sulcus and carina. Pubescence on frons and in middle of vertex fairly short, recumbent, directed apically. Pubescence behind antennal tubercles long, directed obliquely toward mesal axis. Pubescence near eyes long, curved, directed latero-anteriorly. Antennal fossae lying behind the level of anterior third of mesal head length, open toward eyes. Frontoclypeus narrow, overlapped by frontal lobe. Ocular-mandibular carinae extended to anterior eye margins, not extended along eyes. Vertex sexually modified. Centre of vertex raised and expanded apically



Figs. 5–10. *Akarbatrus jelineki* gen. nov. et sp. nov. 5 – antennomeres 1 to 4, scale bar = 0.1 mm; 6 – pronotum in ventral view, scale bar = 0.2 mm; 7 – mesotrochanter, scale bar = 0.1 mm; 8 – metatrochanter, scale bar = 0.1 mm; 9–10 – aedeagus (9 – ventral view, 10 – lateral view; scale bar = 0.1 mm).

to form a triangular tooth-like process. Posterior part of vertex large, strongly inclined, almost vertical, with transverse, smooth depression, vertexal foveae about at level of posterior eyes margins, situated on inclined surface and hardly visible in dorsal view. Eyes large, prominent, situated in basal third of head length (without neck), not emarginate, multifaceted, facets small. Tempora short, in dorsal view about as long as half of eye length, rounded. Gular area convex, very finely punctate and bearing recumbent pubescence.

Neck concealed in dorsal view. Ventral side of neck with microsculpture consisting of transverse striae.

Antennae long, reaching abdominal base. Relative length (basal stalk included) / width of antennomeres as: I 20/15: II 9/8: III 10/8: IV 20/6: V 17/7: VI 15/7: VII 17/8: VIII 12/8: IX 19/9: X 13/9: XI 40/11. Scape swollen, bottle-like (Fig. 5), 1.5 times as long as wide, with apical margins not prominent and lacking apical fovea. Antennomere 3 (Fig. 1) subquadrate, about as long as wide and as third of scape length. Antennomeres 3 and 4 sexually modified. Antennomere 3 moderately larger than 2, strongly asymmetrical, with a large and tapering dorsal process. Antennomere 4 narrow, 3 times as long as wide, subcylindrical, with dorsal side slightly concave, ventral side slightly convex. Antennomeres 5 to 8 subcylindrical, shorter and thicker than 4, antennomeres 6 and 8 smaller than antennomeres 5 and 7. Club loosely 3-segmented, antennomere 9 about as long as and slightly wider than antennomere 7, thickened apically. Antennomere 10 shorter than antennomere 9, antennomere 11 strongly elongate, about as long as combined length of antennomeres 8 to 10 and 4 times as long as wide.

Pronotum (Figs. 3–4) strongly sexually modified, wider than head and wider than long, at widest point twice as wide as at base. Anterior margin prominent, extended over neck, slightly narrower than basal margin. Contours subhexagonal (Fig. 6). Basal margin transverse. Narrow antebasal area uneven, with small, shallow foveiform impressions, lacking foveae. Basal, upper parts of hypomera delimited by short carinae. Laterobasal foveae large, situated below hypomeral ridges. Anteromesal area of disc deeply excavated. External sides of excavation raised to form two high, sharply delimited ridges. Inner surface of ridges glabrous. Outer surface of ridges glabrous on anterior surface and near upper and lower margins, reticulate and opaque on remaining surface. Centre of excavation with small bi-dentate ridge and low, semicircular tubercle bearing setal patches. Pronotal disc depressed behind lateral ridges and mesally. Depressions situated behind ridges oblique, coarsely and densely punctate. Mesal depression widened anteriorly, almost impunctate. Pubescence long, curved, rather recumbent, one pair of very admesal macrosetae present.

Elytra convex dorsally, combined moderately wider than long, strongly narrowed toward base. Basal sulcus present, concealed by pronotal base. Lateroapical cleft present. Lateral contours arcuate between humeral tubercles and apical angles, oblique between humeral tubercles and basal angles. Humeral tubercles low. Sutural striae present, partly faint. Punctation consisting of very small, shallow punctures. Pubescence long, erect, pair of macrosetae present on each elytron. Metathoracic wings fully developed.

Metasternum with shallow mesal impression ending apically by deep foveiform impression, convex in admesal area, with arcuate, narrowly notched metacoxal process. Metacoxae moderately separated. Metasternal punctation sparse, pubescence short at middle, long laterally, with a pair of macrosetae.

Mesotrochanters (Fig. 7) each with simple, tooth-like process situated near trochanteral bases. Metatrochanters (Fig. 8) each with two overlapping tooth-like processes, ventral process bearing few very short apical sensilla. Femora and tibiae lacking obvious sexual characters. Dorsal side of tibiae with long, erect setae. Metatibiae with apical tuft of robust setae. Tarsomeres 2 and 3 long, narrow, tarsomere 2 subcylindrical, tarsomere 3 cylindrical. Protarsomeres 2 and 3 subequal in length, tarsomere 2 hardly curved. Mesotarsomere 2 slightly arcuate, shorter than tarsomere 3. Metatarsomes 2 and 3 straight, subequal in length.

Abdomen with five exposed tergites, weakly and gradually narrowed apically. Tergite 1 horizontal, with single pair of basal foveae situated close to lateral margin. Tergites 2 to 4 lacking sharply defined lateral margins. Tergite 1 about 1.5 times as long as tergite 2, tergites 2 and 3 similar, slightly inflexed, tergite 4 almost as long as tergite 1, strongly inflexed, tergite 5 almost vertical. Abdominal punctation and pubescence similar to that on elytra, setae about as long as length of tergite 2, tergites 1 to 4 each with two pairs of macrosetae. Sternite 1 in middle weakly convex and moderately longer than sternite 2. Sternites 2 to 4 flattened in middle. Sternites 2 and 3 in middle equally long, each slightly longer than sternite 4.

Aedeagus (Figs. 9–10) 0.30 mm long, moderately flattened. Paramere strongly sclerotized, gradually narrowed apically, with obtuse tip. Median lobe and parameres loosely connected by membranes. Median lobe with one subapical, strongly sclerotized, stylet-like apophysis, apex flattened, hook-like, bearing wide and weakly sclerotized lamina. Diaphragm present. Basal part of internal sac associated with basal spine, extruded part of internal sac membranous.

Variation. The variation in the total body length from 1.65 to 1.75 mm may be in part an artifact produced while mounting the specimens. Pronotal length: 0.40–0.41 mm, pronotal width 0.47–0.50 mm, elytral length 0.56–0.58 mm, combined elytral width 0.58–0.63 mm.

Differential diagnosis. See under *Akarbatrus diversicornis* sp. nov.

Habitat. An evergreen secondary forest on a steep slope.

Etymology. This species is dedicated to Josef Jelínek, Prague, in a friendship covering half a century.

Akarbatrus diversicornis sp. nov.

Type material. Holotype: male, 'INDONESIA: Sumatra, W. Sum., Padangpajar, 600m, 17.xi.1989, Agosti, Löbl, Burckhardt # 20' (MHNG).

Diagnosis. Pronotal, elytral and abdominal pubescence long. Antennomeres 2 and 3 long, antennomere 8 extended apicolaterally to form a process. Head with U-shaped sulcus. Vertex not raised and not modified, with visible foveae in dorsal view. Pronotal excavation deep and smooth, not delimited by ridges, without setal patches and processes. Elytra without humeral tubercles, sutural striae completely reduced. Aedeagus lacking apophyses.

Description. Length 1.35 mm. Body uniformly reddish brown, appendages lighter than body.

Head rounded triangular, with eyes 0.35 mm wide, wider than long, densely and coarsely punctate except on and between antennal tubercles. Frontal lobe strongly inflexed and weakly convex, with rounded anterior margin and Y-shaped carina. Frons depressed between antennal tubercles, lacking foveae. Pubescence on frons fairly short, recumbent, directed forward.

Pubescence behind level of antennal tubercles very short, directed apically. Pubescence near eyes long, curved, directed latero-anteriorly. Antennal fossae reaching level of median third of head length, open toward eyes. Frontoclypeus narrow, overlapped by frontal lobe. Ocular-mandibular carinae extended to anterior eye margins, not extended along eyes. Vertex not modified sexually, flattened, with mesal carina extended from neck to level of anterior eye margins. Vertexal foveae situated dorsally, about at level of eye centres, interval between them about twice as large as interval between fovea and lateral head margin. U-shaped sulcus shallow, faint anteriorly. Posterior part of vertex vertical and narrow. Eyes fairly small, prominent, situated in basal half of head length (without neck), not emarginate, multifaceted, facets small. Tempora arcuate, long, in dorsal view longer than eyes. Gular area convex, very finely punctate and bearing recumbent pubescence.

Neck narrowly exposed in dorsal view. Ventral side of neck with microsculpture consisting of transverse striae.

Antennae long, reaching behind abdominal tergite 1. Relative length (basal stalk included) / width of antennomeres as: I 14/9: II 12/6.5: III 14/6: IV 14/6: V 17/6: VI 16/6: VII 18/7: VIII 17/10: IX 15/7: X 13/8: XI 33/10. Scape cylindrical, about 1.5 times as long as wide, with apical margins slightly prominent, lacking apical fovea. Antennomere 2 to 6 subcylindrical. Antennomere 7 slightly curved and slightly thickened apically. Antennomere 8 sexually modified, asymmetrical, slightly curved, thickened apically, outer apical angle prominent laterally, forming sharp tooth bearing long setae. Club loosely 3-segmented, antennomere 9 distinctly shorter than antennomeres 8 or 7, as wide as antennomere 7. Antennomeres 9 and 10 widest at their respective middle. Antennomere 10 shorter and slightly narrower than antennomere 9. Antennomere 11 subcylindrical in basal half, tapering apically, somewhat longer than combined length of antennomeres 9 and 10, about 3.3 times as long as wide.

Pronotum strongly sexually modified, slightly wider than head and wider than long, at widest point 1.7 times as wide as at base. Anterior margin truncate, not extended over neck, about as wide as basal margin. Contours pyriform. Basal margin transverse. Narrow antebasal area almost even, without foveiform impressions, lacking foveae. Laterobasal foveae large, situated on vertical, smooth areas concealed in dorsal view. Median area of disc abruptly, deeply excavated. Contours of excavation rounded triangular, narrowed toward pronotal base. Excavation at widest point about 0.16 mm wide, separated by about 0.05 mm from anterior pronotal margin. Narrow basal part of excavation shallower than centre of excavation, parallel-sided, with sharp margins, ending about 0.06 mm in front of basal pronotal margin. Surface of excavation glabrous. Lateral margins of excavation not raised. Pronotal disc raised to form low tubercle at each side of excavation at about mid-length of pronotum. Anterior surface of tubercles obliquely inclined toward shallow transversal impressions and each bearing row of horizontal setae. Mediolateral areas impressed and flattened, sharply delimited except in anterior portions. Discal punctation very fine. Pubescence long, curved, rather recumbent, admesal macrosetae absent. Hypomera convex, distinctly punctate, lacking ridges.

Elytra convex dorsally, combined 0.48 mm wide, as wide as long, strongly narrowed toward base. Basal sulcus and lateroapical cleft absent. Humeral areas weakly angulate, humeral tubercles absent, lateral contours arcuate. Sutural striae absent. Punctation consisting of very small, shallow punctures. Pubescence long, semi-erect, macrosetae absent. Metathoracic wings present.

Metasternum with shallow mesal impression, lacking foveiform impression, convex in admesal area, with arcuate, narrowly notched metacoxal process. Metasternal punctation sparse, even in length, pair of macrosetae present. Metacoxae moderately separated.

Mesotrochanter with narrow apophysis bearing apical seta, situated about in middle of posterior margin. Metatrochanters expanded apically and triangular, with short apical pubescence. Femora and tibiae lacking obvious sexual characters, tibiae lacking marcosetae. Metatibiae with apical tuft of robust setae. Tarsomeres 2 and 3 long, narrow, tarsomeres 2 flattened, tarsomeres 3 subcylindrical. Protarsomeres 2 and 3 subequal in length, tarsomere 2 hardly curved. Meso- and metatarsomeres 2 straight, shorter than tarsomere 3.

Abdomen with five exposed tergites, weakly and gradually narrowed apically. Tergite 1 horizontal, with single pair of basal foveae situated close to lateral margin. Tergites 2 to 4 lacking sharply defined lateral margins. Tergite 1 about 1.5 times as long as tergite 2, tergites 2 and 3 similar, slightly inflexed, tergite 4 almost as long as tergite 1, strongly inflexed, tergite 5 almost vertical. Abdominal punctation and pubescence similar to that on elytra, setae about as long as length of tergite 2, tergites 1 to 4 each with two pairs of macrosetae. Sternite 1 in middle weakly convex and about twice as long as sternite 2. Sternites 2 to 4 flattened in middle. Sternites 2 and 3 in middle equally long, each slightly longer than sternite 4.

Differential diagnosis. This species may be easily distinguished from *A. jelineki* sp. nov. by its unmodified vertex with exposed foveae, long antennomeres 2 and 3, modified antennomere 8, pronotum lacking high ridges, and elytra lacking sutural striae and humeral tubercles.

Habitat. Forest floor, under rotten bamboo.

Etymology. The species epithet refers to the distinctive shape of the antennae.

Comments. The aedeagus of the single available specimen was lost before being mounted on a slide. It was obviously similar in shape to that of *A. jelineki* sp. nov. However, it differed conspicuously by the absence of large apophyses.

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