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A NEW GENUS AND SPECIES OF CNODALONINI (COLEOPTERA: TENEBRIONIDAE) FROM BORNEO

LUBOŠ PURCHART^{1,*} and ROLAND GRIMM²

¹Mendel University, Department of Forest Ecology, Zemědělská 3, 613 00 Brno,
Czech Republic; e-mail: lubos.purchart@post.cz

²Unterer Sägerweg 74, 75305 Neuenbürg, Germany

*Corresponding author

Abstract.— *Borneosphena fouquei* gen. nov. et. sp. nov. is described from the island of Borneo. The newly discovered genus mostly resembles *Cryptobrachys* Kaszab, 1941, *Cryptostenophanes* Kaszab, 1941, *Falsobates* Kaszab, 1941, *Malaysphena* Bečvář & Purchart, 2008, and *Xantusiella* Kaszab, 1941. A differential diagnosis is presented.



Key words.— Taxonomy, darkling beetles, *Borneosphena fouquei*, East Malaysia, Sabah.

INTRODUCTION

Despite intensive taxonomic work the tenebrionid fauna of Borneo is still poorly investigated. This phenomenon is mostly visualized in high number of species and genera which are constantly being described (e.g. Bremer 1995, 2010, 2011; Schawaller 1998a,b, 2000, 2003, 2008, 2011; Ando 2002, 2003, 2010; Merkl 1999; Ferrer and Moragues 2000; Masumoto 2002; Masumoto and Akita 2007; Grimm 2008, 2009a,b, 2010, 2011a,b,c, 2013, 2014, 2015, 2016; Purchart 2010).

During his visit in the frame of SYNTHESYS program (<http://www.synthesys.info/access/>) in Natural History Museum in London (BMNH), the junior author discovered four specimens of an unknown darkling beetle species which were preliminary labelled by Dr. Zoltán Kaszab as “*Laosocryptobates* sp. n.”. Indeed these specimens at first sight resembled in some extent members of *Laosocryptobates* Pic, 1928, a genus recently synonymised with *Hexarhopalus* Fairmaire, 1891 (see Bečvář & Purchart 2008). *Laosocryptobates tuberculatus* Pic, 1928 (type species of *Laosocryptobates*) was transferred to *Hexarhopalus*, while the remaining five species (*L. clavipes* Kaszab, 1960, *L. parva* Kaszab, 1960, *L. punctipes* Kaszab, 1960, *L. rotundipennis* Kaszab, 1960, and *L. rugosipes*

Kaszab, 1960) were assigned to a newly described *Malaysphena* Bečvář & Purchart, 2008. A thorough examination of the specimens recently found in the BMNH revealed that they do not fit taxonomic concepts of *Laosocryptobates* (= *Hexarhopalus*) nor *Malaysphena* but represent a new genus which can be placed close to the above mentioned genera within the family-group formerly known as Misolampini Lacordaire, 1859 (see Kaszab 1941). However, according to the more recent classification concepts Misolampini is interpreted as a synonym of Cnodalonini Gistel, 1856 (Doyen 1989, Bouchard *et al.* 2005). Since Kaszab’s (1941) work the Misolampini generic concepts have not systematically been studied and badly need revision.

The aim of this paper was to describe the newly discovered species and discuss its systematic position among the family Tenebrionidae.

MATERIAL AND METHODS

Dissection and preparation of female’s internal structures followed Iwan & Kaminski (2016). Photographs were taken using a KEYENCE microscope with VH-Z20R and VH-Z100R lenses at the Faculty of Forestry and Wood Technology (Mendel University in

Brno). Terminology of female internal structures follows Tschinkel & Doyen (1980) and Matthews & Bouchard (2008).

Stated lengths and widths represent the maximum values of the measured parts. Body length is the distance from the clypeus to the elytral apex with head in its natural position. Width of the elytra is the combined maximum width of both elytra.

Exact label data are cited for the type specimens; a double slash (//) divides the data on different labels. All specimens of the newly described species bear one printed red label: 'HOLOTYPE [PARATYPE], *Borneosphena* gen. nov. *fouquei* sp. nov., det. L. Purchart & R. Grimm 2016'.

Specimens of the new genus and species were compared with type and non-type material of *Misolampini* deposited in the Natural History Museum Budapest (Hungary) which contains taxa treated by Kaszab (1941).

The material studied is deposited in the following collections:

- BMNH – The Natural History Museum, London, United Kingdom (Maxwell V. L. Barclay);
- CRG – Collection Roland Grimm, Neuenbürg, Germany;
- LPCB – Luboš Purchart collection, Brno, Czech Republic;
- SMNS – Staatliches Museum für Naturkunde, Stuttgart, Germany (Wolfgang Schawaller);
- USNM – United States National Museum, Washington, U.S.A. (Warren Steiner);
- ZSM – Zoologische Staatssammlung, Munich, Germany (Michael Balke).

RESULTS AND DISCUSSION

Borneosphena gen. nov.

(Figs. 1–14)

Type species. *Borneosphena fouquei* sp. nov. (Fig. 1), by monotypy and present designation.

Etymology. The genus name "*Borneosphena*" refers to the island of Borneo, where the genus occurs, with the suffix "-*sphena*" (Greek, "wedge") as used in the related genus *Malaysphena*.

Description. Body ovate, strongly convex, black, mat. Body length: 9.6–12.2 mm; width: 4.8–5.5 mm. Flightless, wingless.

Head bent down, narrower than pronotum widest at level of eyes; without visible membrane between labrum and clypeus; clypeus transverse, with emarginate apical margin, narrowing anteriorly, fronto-clypeal suture well developed, broadly U-shaped; genae strongly developed; eyes vertical, narrowly reniform, ocular groove shallow. Antennae as in Figs. 1 and 2,

long, with eleven antennomeres, last five antennomeres pubescent (Fig. 7), with stellate sensoriae (Fig. 8), forming a loose club. Mentum trapezoidal; terminal maxillary palpomere securiform.

Pronotum transverse, convex, faintly rounded apically, nearly straight narrowed basally, base broadly bordered. Scutellum invisible.

Elytra obovate, with coarse, partly obsolete punctural rows; intervals convex and bumpy with large and highly elevated granules; declivity steep; elytra fused with each other at suture, with no trace of hindwings.

Prosternum narrow; prosternal apophysis steeply inclined anteriorly, almost vertically declivous behind coxae, terminating in a tubercle, with two furrows, apex at top (between coxae) with three abraded tubercles. Mesoventrite narrow (short), narrower than mesocoxae, anterior part with distinct shiny carina; basally terminating in tip. Metaventrite very narrow, much narrower than metacoxae; basally with two dorsally abraded granules.

Abdomen moderately convex; abdominal ventrite I approximately as long as the two following ventrites combined; ventrites II–IV approximately of the same size; ventrite V is the longest, distinctly punctate, laterally and apically with obliterated and shiny margins; membranes visible between last three ventrites. Defensive reservoirs with numerous transverse rings (Fig. 9).

Legs long, slender; femora apically very slightly clavate, profemora apically weakly arcuate, meso- and metafemora straight; protibiae slightly incurved before apex, mesotibiae shallowly arcuate, metatibiae almost straight, thickened in apical quarter, with inner margin weakly excavate before apex; plantar surfaces of basal tarsomeres pubescent.

Aedeagus simple (Figs. 5, 6) inverted. Ovipositor strongly modified, with coxite lobe 1 elongate, para-proct baculi transverse articulating at their extremities with ends of additional baculi which articulate in turn with proctigeral baculi (Figs. 10, 11, 12).

Remarks. The systematic placement of the new genus in the tribe Cnodalonini is supported by the structure of defensive reservoirs, structure of ovipositor, by presence of stellate sensoriae on antennomeres VII–XI and is in accordance with results of Tschinkel & Doyen (1980) and Matthews & Bouchard (2008).

Differential diagnosis. Using Kaszab's (1941) key for *Misolampini* the new genus does not completely fit any of the characters used to distinguish genera treated. However, in general appearance, *Borneosphena* gen. nov. mostly resembles the genera *Falsobates* Kaszab, 1941, *Malaysphena* Bečvář & Purchart, 2008, *Xantusiella* Kaszab, 1941, *Cryptostenophanes* Kaszab, 1941, and *Cryptobrachys* Kaszab, 1941.

Borneosphena gen. nov. is most similar to *Falsobates* due to obovate elytra with bumpy intervals and

large and highly elevated granules; invisible scutellum; convex pronotum with coarsely punctured dorsal surface; well developed, broadly U-shaped frontoclypeal suture; transverse clypeus, with emarginate apical margin; similar shape of prosternal apophysis and mesoventrite with distinct shiny carina in its anterior part. The two genera differ as follows: large granules on elytral interstriae shiny in *Falsobates*, matt in *Borneosphena* gen. nov.; last 4 pubescent antennomeres forming a loose club with 3 penultimate antennomeres distinctly transverse and ultimate antennomere nearly squared in *Falsobates* while in *Borneosphena* gen. nov. last 5 pubescent antennomeres forming loose club with 3 penultimate antennomeres longer than wide and ultimate antennomere distinctly longer than wide; ocular groove deep in *Falsobates* while the ocular groove is shallow in *Borneosphena* gen. nov.; outer margin of all tibiae with distinct groove, with pro- and metatibiae strongly curved in both males and females of *Falsobates* while the groove is absent in *Borneosphena* gen. nov. with pro- and metatibiae straight in both sexes; posterior part of metaventrite with two large granules in *Borneosphena* gen. nov. which are absent in *Falsobates*.

The genus *Cryptobrachys* differs from *Borneosphena* gen. nov. by 3 penultimate antennomeres transverse, anterior margin of clypeus straight, apical part of mesoventrite without carina, pronotum rather globular, scutellum visible, prosternal apophysis not pointed (without spike), elytra without granules.

The genus *Cryptostenophanes* differs from *Borneosphena* gen. nov. by visible scutellum, straight anterior margin of clypeus, ocular groove deep, pronotum nearly cylindrical, prosternal apophysis not pointed (without spike), elytra without granules, outer margin of tibiae with shallow but distinct groove, clypeal suture weakly developed.

The genus *Malaysphena* can be distinguished as follows: femora claviform, pronotum with shiny granules, anterior margin of clypeus straight, clypeal suture W-shaped, prosternal apophysis in lateral view slightly depressed behind coxae and not pointed, scutellum present.

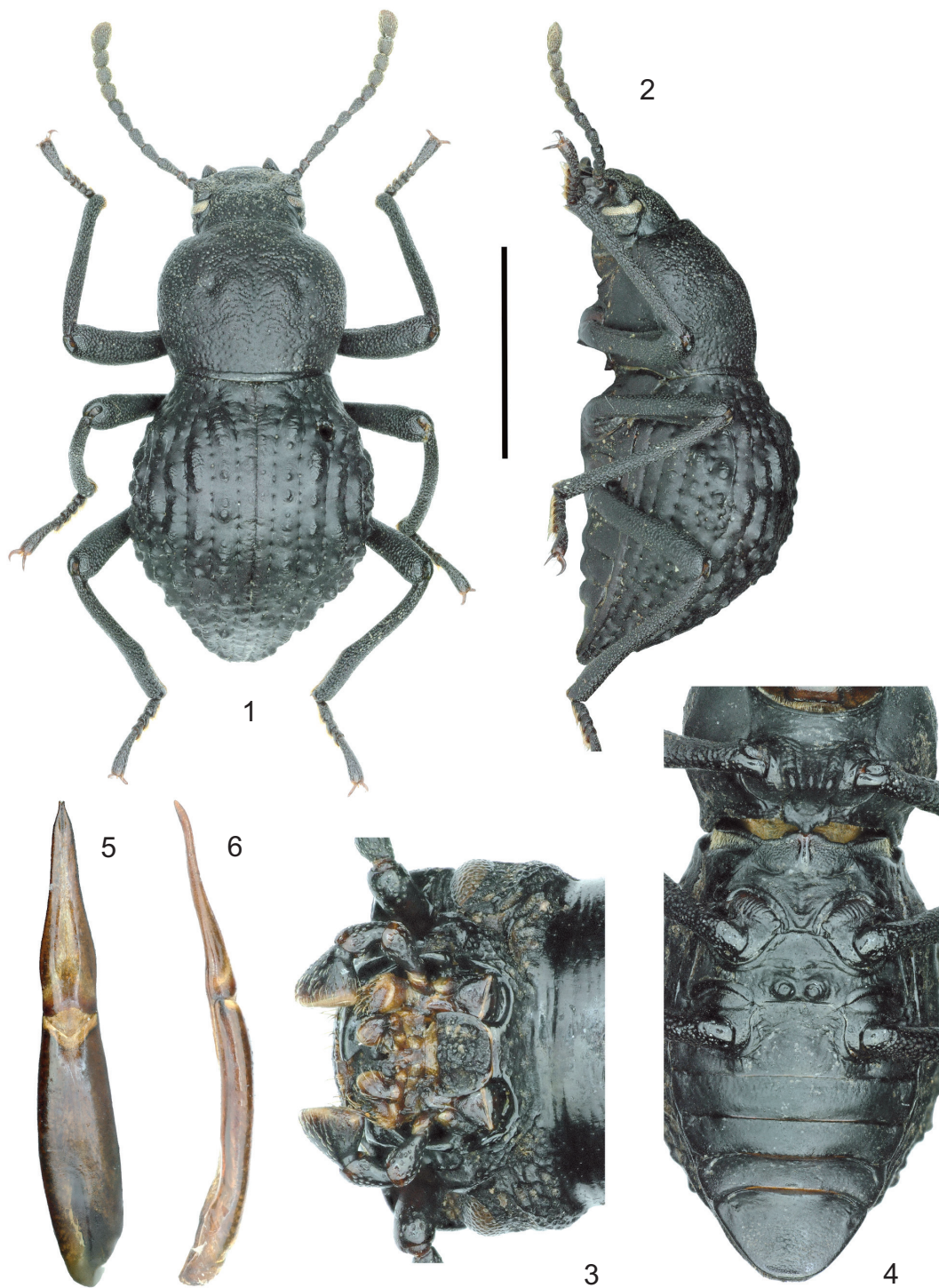
The genus *Xantusiella* differs from *Borneosphena* gen. nov. by shiny granules on elytra, genae strongly raised above level of epistome, pronotum with granules, last 4 apical antennomeres strongly transverse, scutellum present, anterior margin of clypeus straight, clypeal suture not developed.

Borneosphena fouquei sp. nov.

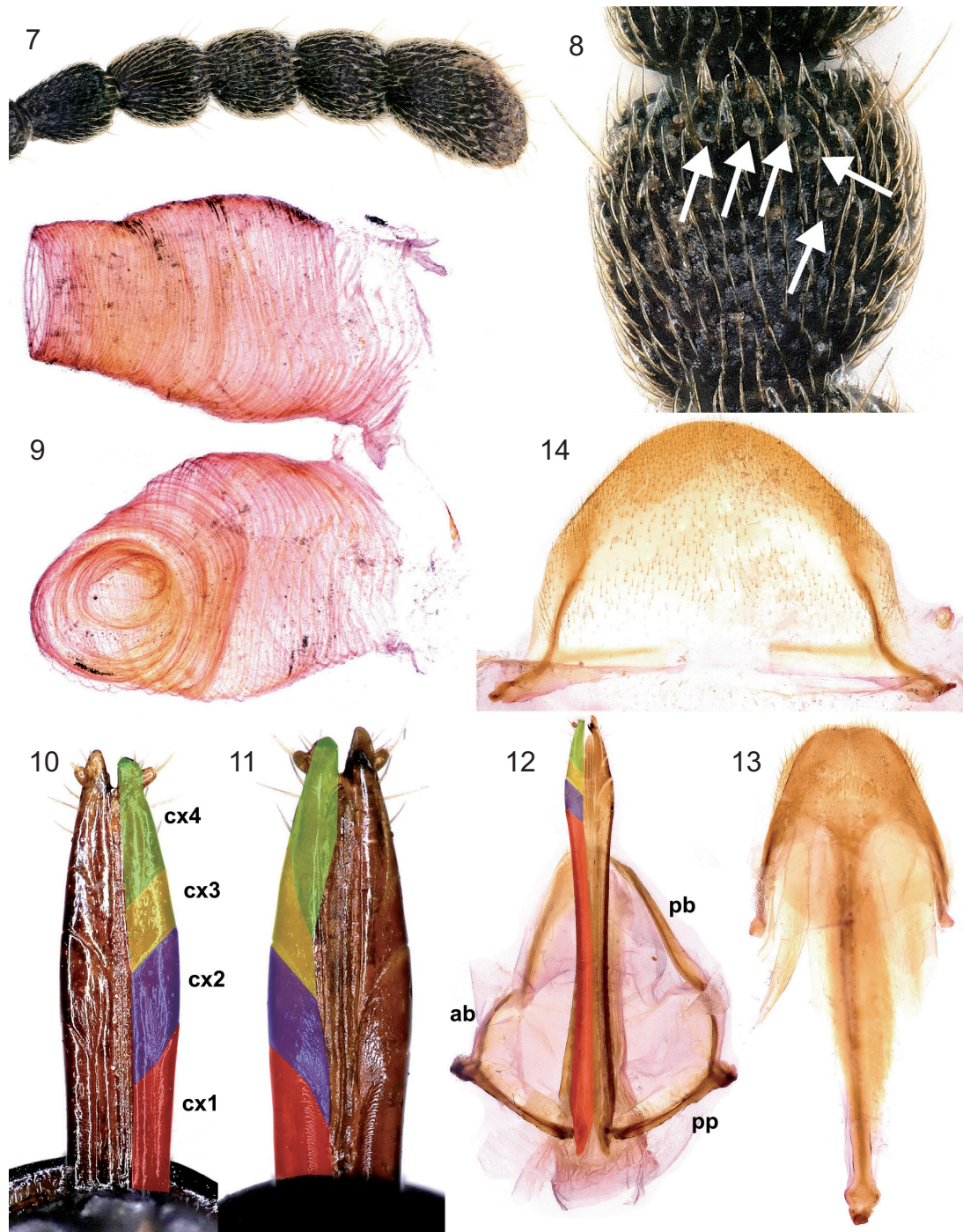
(Figs. 1–14)

Type locality. Malaysia, Borneo, Sabah, Mt. Kinabalu.

Type material. HOLOTYPE: ♂ (BMNH): SABAH, Mt. Kinabalu, 1.-5.v.1973, K.M. Guichard [white, printed] // Brit. Mus. 1973-391 [white, printed] // Laosocryptobates sp. n., Dr. Z. Kaszab det., 1978 [white, printed, handwritten]; PARATYPES: 2♂♂ (BMNH), 1♂ (LPCB): B.N. BORNEO, Mt. Kinabalu, Lumu Lumu, 5,500 ft., April 9th 1929, H.M. Pendlebury coll., F.M.S. Museums [pink, printed, handwritten] // Ex F.M.S. Museum, B.M. 1955-354 [white, printed]; 1♀, 1♂ (CRG): Borneo, Malaysia, Sabah, Crocker Range, Gunung Alab, 1350 m, 1.-2.XII.2006, R. Grimm [white, printed]; 1♂ (CRG): Borneo, Malaysia, Sabah, Crocker Range, Gunung Alab, 1400 m, 1.IV.2007, R. Grimm [white, printed]; 1♂ (CRG): Borneo, Malaysia, Sabah, Gunung Alab, 1400 m, 26.II.2014, R. Grimm [white, printed]; 1♂ (CRG): Borneo, Malaysia, Sabah, Crocker Mts., Gunung Emas, 1600 m, 8.V.2005, R. Grimm [white, printed]; 1♂ (CRG): Borneo, Malaysia, Sabah, Crocker Range, Gunung Emas, 1500 m, 28.III.2007, R. Grimm [white, printed]; 1♂ 1♀ (CRG): Borneo, Malaysia, Sabah, Kinabalu NP HQ vic., 1550 m, 18.V.2005, R. Grimm [white, printed]; 1♂, 1♀ (CRG): Borneo, Malaysia, Sabah, Kinabalu NP, HQ vic., 1550 m, 27.III.2007, R. Grimm [white, printed]; 1♂ (CRG): Borneo, Malaysia, Sabah, Mt. Kinabalu NP, HQ vic., 1550 m, 7.-9.I.2010, R. Grimm [white, printed]; 2♂♂ (CRG): Borneo, Malaysia, Sabah, Kinabalu Nat. Park, HQ vic., 1500-1800 m, 25.-28.III.2013, R. Grimm [white, printed]; 2♂♂ (CRG): Borneo, Malaysia, Sabah, Kinabalu Nat. Park, HQ env., 1500-1600 m, 23.-26.III.2015, R. Grimm [white, printed]; 1ex. (ZSM): Borneo, Sabah, Crocker Mts., 500-1900 m, Gunung Emas, 6.-21.V.1995, Ivo Jeniš leg. [white, printed] // coll. H. J. Bremer [yellow, printed] // *Falsobates xanthusi* Kaszab ?, H.J. Bremer det.1992 [white, printed, handwritten] // *Falsobates* sp. n. aff. *xanthusi* Kasz., S. Bečvář det. 1998, cum typo comparavit [white, printed, handwritten]; 1 ex. (SMNS): BORNEO: SABAH, Kinabalu N.P., Headquarters, 1500-1600 m, 11.-15.XI.1996, leg. W. Schawaller [yellow, printed]; 6 ex. (SMNS): SABAH: Crocker Range, Gn. Emas, 6.-18.VI.1996, leg. J. Kodada [yellow, printed]; 2 ex. (SMNS): BORNEO: Sabah, Crocker Range, Gunung Alab, 23.-29.V.1998, leg. Kodada & Ciampor [yellow, printed]; 4 ex. (SMNS): Sabah, Sapulut, 23.VI.1998, leg. Kodada & Ciampor [yellow, printed]; 1 ex. (SMNS): Sabah Crocker Range, Gunung Emas, 1500-1700 m, around km 52 of road Kota Kinabalu Tambunan, 6.-18.VI.1996, 2d [no collector stated], [white, printed]; 1♂ (USNM): MALAYSIA: Sabah, Kinabalu National Park, Headquarters area, el. 1560 m, 5 Sept. 1983, W. E. Steiner & G. F. Hevel [white, printed]; 1♀ (USNM): MALAYSIA: Sabah, Kinabalu National Park, Headquarters area, el. 1560 m, 9 Sept. 1983, W. E. Steiner & G. F. Hevel [white, printed]; 1♂ (USNM): MALAYSIA: Sabah, 25 km N Tambunan, el. 1500 m, 2 Sept. 1983, G. F. Hevel & W. E. Steiner [white, printed].



Figures 1–6. *Borneosphena fouquei* gen. et sp. nov., holotype (1–2); scale bar = 5 mm: (1) habitus, dorsal view; (2) habitus, lateral view; male, paratype: (3–6); (3) head, ventral view; (4) pro- and mesosternum, metaventre and abdominal sternites; (5) aedeagus, dorsal view; (6) aedeagus, lateral view.



Figures 7–14. *Borneosphera fouquei* gen. et sp. nov., holotype (7–8): (7) left antenna, antennomeres VII–XI, dorsal view; (8) left antenna, antennomere IX, dorsal view (white arrows showing stellate sensoriae); female, paratype: (9–14); (9) defensive reservoirs; (10) ovipositor (before dissection), dorsal view; (11) ovipositor (before dissection), ventral view; (12) ovipositor (dissected), ventral view; (13) spiculum ventrale, ventral view; (14) tergite VIII. **ab** – additional baculus; **cx1–cx4** – coxite lobe 1–4; **pb** – proctigeral baculus; **pp** – paraproct baculus.

Etymology. Named in memory and honour of the late (1980–2016) colleague, friend and a man of exceptional qualities René Fouquè (Liberec, Czech Republic), specialist in Tenebrionidae.

Description. Ovate, strongly convex, black, mat, body length 9.6–12.2 mm (holotype: 10.8 mm), body width 4.8–5.5 mm (holotype: 5.5 mm) (Figs. 1, 2).

Head widest across middle of eyes and convex temples; somewhat narrower across raised genae, the latter broadly rounded towards clypeo-genal meeting; outline faintly notched between clypeus and frons; anterior border of clypeus shallowly emarginate in the middle. Frons between eyes broad, flat, sloping towards clypeus, clypeus lower than genae and frons; clypeal suture distinct, broadly U-shaped. Dorsal side of frons and basal part of clypeus coarsely punctured, finely punctured behind anterior margin of clypeus. Eyes narrow reniform; supraorbital furrow distinct. Antennae long, bent backwards reaching base of pronotum, antennomeres coarsely punctured; last 5 antennomeres pubescent (Fig. 7), with stellate sensoriae (Fig. 8), forming a loose club; length/width ratio of antennomeres 1 to 11 as 2:1/1:1/6:2.5/2:1/2:1/4.5:1/4.5:3/4:3.5/4:3.5/4.5:3.5/6.5:4. Mentum trapezoidal (Fig. 3), broadly rounded with margins converging towards base, apical margin straight; along midline with elevated bulge, impressed in basal half.

Pronotum strongly convex, widest before middle; faintly rounded apically, nearly straight narrowed basally. Apical margin shallowly bisinuate, basal margin rounded and broadly bordered; apical margin and lateral margins distinctly but finely bordered; in dorsal view lateral borders only seen in basal half and near anterior angles. Anterior angles obtuse, broadly rounded; prosternal angles obtuse. Dorsal surface coarsely punctured; in basal half behind middle, beside longitudinal midline with weak, oblong, basally flattened bump; apico-lateral to bump with weak, round impression. Prosternal apophysis steeply inclined anteriorly, almost vertically declivous behind coxae, terminating in a tubercle, with two furrows; apex at top (between coxae) with three abraded tubercles (Fig. 4).

Elytra obovate, with coarse, partly obsolete rows of punctures; intervals convex and bumpy with, especially basally and laterally, highly elevated granules. Metaventricle basally with two dorsally abraded granules (Fig. 4). Abdominal ventrite 1 shallowly impressed in apical part (Fig. 4). Tergite VIII as in Fig. 14. Spiculum ventrale as in Fig. 13. Defensive reservoirs with numerous transverse rings (Fig. 9).

Legs long, femora and tibiae strongly punctured; femora apically slightly clavate, profemora apically weakly arcuate, meso- and metafemora straight. Pro-tibiae slightly incurved before apex, mesotibiae shallowly arcuate, metatibiae straight, thickened in apical

quarter and weakly excavate before apex. Plantar surfaces of basal tarsomeres pubescent.

Aedeagus as in Figs. 5, 6. Ovipositor strongly modified, with coxite lobe 1 elongate, paraproct baculi transverse articulating at their extremities with ends of additional baculi which articulate in turn with proctigeral baculi (Figs. 10, 11, 12).

Sexual dimorphism. In females the metatibiae are not thickened apically. Other differences not observed.

Distribution. Borneo, Sabah, Crocker Mts.

Habitat and collection circumstances. Specimens of the new species were found in montane primary rain forest only and collected from logs at night or under logs in the day time.

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