

New genera of Alleculinae (Coleoptera: Tenebrionidae: Alleculinae: Alleculini) from the Oriental Region XXI - *Sporacula* gen. nov.

Vladimír NOVÁK

Nepasické náměstí 796, CZ-190 14 Praha 9 - Klánovice, Czech Republic
e-mail: alleculinae.vn@centrum.cz

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Abstract. A new genus of Alleculini Laporte, 1840 - *Sporacula* gen. nov. is described and illustrated to include the following new species: *Sporacula emasica* sp. nov. from Malaysia (Borneo Island) and *Sporacula rajaica* sp. nov. from peninsular Malaysia as a type species. New genus *Sporacula* gen. nov. is compared with habitually similar genera *Makicula* Novák, 2012, *Oracula* Novák, 2019 and *Spinecula* Novák, 2019.

INTRODUCTION

A new Alleculine genus *Sporacula* gen. nov. is described with following new species: *Sporacula emasica* sp. nov. from Malaysia (Borneo Island) and *Sporacula rajaica* sp. nov. from peninsular Malaysia as a type species.

Species of *Sporacula* have relative large, *Leptura* - shaped, elongate body distinctly narrowing from base to elytral apex (BL from 14.1 to 16.4 mm, BL/EW in males about 3.3), dorsal surface shiny, space between eyes is narrower than diameter of one eye, protibiae of male have tooth in one third of base of inner part, protarsal claws are large and hollow with many long teeth in upper part and short teeth on the underside of hollow claw. Penultimate tarsomeres are triangular, regularly widened apically. These characters and their combinations (see Table 1) follow to differ new genus and its species from similar genera described earlier by Novák (2012 and 2019a, b) - *Makicula* Novák, 2012 and *Spinecula* Novák, 2019 with tooth in inner side of male protibiae and *Oracula* Novák, 2019 without tooth in inner side of male protibiae.

New genus and new species are described, illustrated (including male genitalia) and compared together and with species of habitually similar genera *Makicula* Novák, 2012, *Oracula* Novák, 2019 and *Spinecula* Novák, 2019.

MATERIAL AND METHODS

Two important morphometric characteristics used for the descriptions of species of the subfamily Alleculinae, the 'ocular index' dorsally (Campbell & Marshall 1964) and 'pronotal index' (Campbell 1965), are used in this paper as well. The ocular index equals $(100 \times \text{minimum dorsal distance between eyes}) / (\text{maximum width of head across eyes})$. The pronotal index is calculated as $(100 \times \text{length of pronotum along midline}) / (\text{width across basal angles of pronotum})$.

'Type material' information is taken from recent locality labels.

In the list of type material, a slash (/) separates data in separate rows.

The following collection code is used:

VNPC private collection of Vladimír Novák, Praha, Czech Republic.

Measurements of body parts and corresponding abbreviations used in text are as follows: AL - total antennae length, BL - maximum body length, EL - maximum elytral length, EW - maximum elytral width, HL - maximum length of head (visible part), HW - maximum width of head, OI - ocular index dorsally, PI - pronotal index dorsally, PL - maximum pronotal length, PW - pronotal width at base, RLA - ratios of relative lengths of antennomeres 1-11 from base to apex (3=1.00), RL/WA - ratios of length / maximum width of antennomeres 1-11 from base to apex, RLT - ratios of relative lengths of tarsomeres 1-5 respectively 1-4 from base to apex (1=1.00).

Measurements were made with Olympus SZ 40 stereoscopic microscope with continuous magnification and with Soft Imaging System AnalySIS. Snapshots were taken by using camera Canon EOS 550 D and Canon Macro Photo Lens MP-E and software Helicon Focus 7.7.5.

TAXONOMY

genus *Sporacula* gen. nov.

(Figs. 4-14)

Type species: *Sporacula rajaica* sp. nov.

Description (male). Habitus as in Figs. 5 and 10, body outline (Fig. 4), body large, elongate, shiny, *Leptura*-shaped, dark brown or blackish brown, dorsal surface with setae, fine microgranulation and punctuation. Widest near elytral humeri. Head (Figs. 6 and 11) slightly wider than long, through the eyes wider than anterior margin, narrower than base of pronotum. Dorsal surface with pale setae, fine microgranulation and punctures. Clypeus transverse, half heart shaped, apex excised in middle. Eyes large, transverse, excised, space between eyes distinctly narrower than diameter of one eye, wider than length of antennomere 2. Antenna long and narrow. Dorsal surface with setation, microgranulation and small punctures. Antennomeres 3-10 slightly widened apically. Antennomere 2 shortest, antennomere 4 longest, ultimate antennomere widest near middle. Ultimate palpomere of maxillary palpus widely triangular. Pronotum (Figs. 6 and 11) convex, widest in base, slightly narrower than elytra in humeri. Disk with two small and shallow oblique impressions in base. Dorsal surface with setae, fine microgranulation and dense punctuation. Elytra narrowing apically, elongate, widest near humeri, dorsal surface with setae. Elytral striae with rows of coarse punctures, elytral intervals finely convex, with small punctures and fine microgranulation. Elytral epipleura well-developed, distinctly narrowing to ventrite 1, then relatively narrow and parallel in apical part. Legs long and narrow, dorsal surface with dense setation. Protibiae of male (Figs. 7 and 12) with tooth in one third of in inner part. Penultimate tarsomeres triangular, distinctly widened apically. Pro- and mesotarsomeres 3 and 4 and penultimate metatarsomere widened and lobed. Protarsal claws large and hollow

with many long teeth in upper part and short teeth on the underside. Aedeagus as in Figs. 8, 9 and 13, 14 - apical piece elongate triangular dorsally and beak shaped from dorsal and lateral views.

Female. Body wider than male, protibiae have no tooth, protarsal claws are shorter than in male with less teeth.

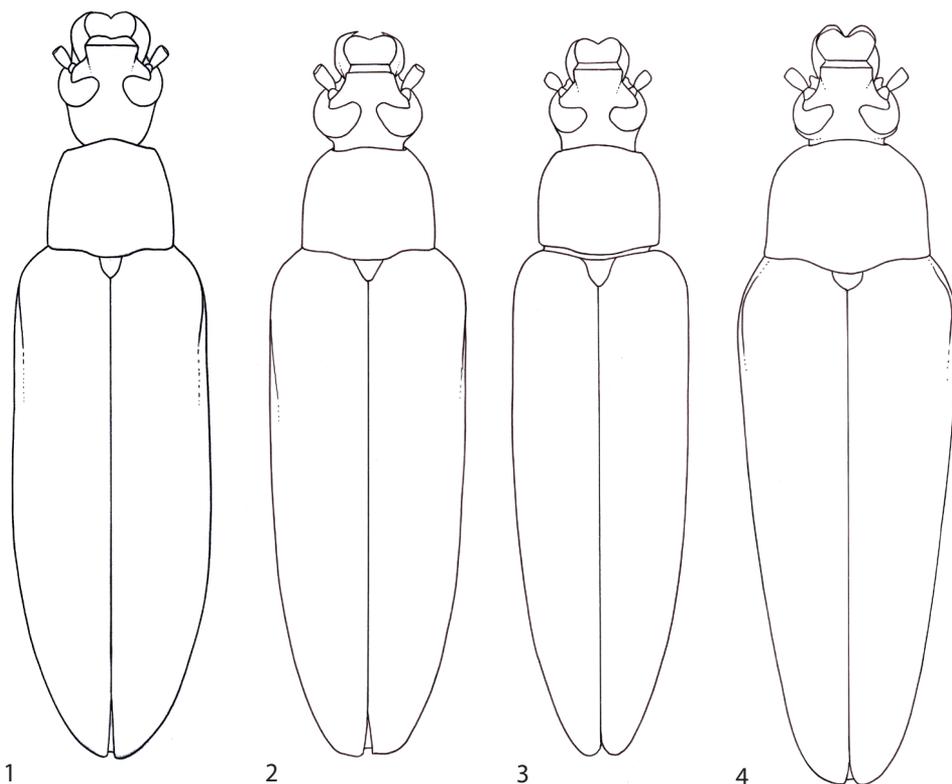
Differential diagnosis. The closest and habitually similar genera are *Makicula* Novák, 2012 and *Spinecula* Novák, 2019 (males with tooth in inner side of protibiae) and *Oracula* Novák, 2019.

Table 1. Main differentiating characters (males).

genus	Body, BL	BL/EW	Penultimate tarsomere	Protarsal claws	Sexual dimorphism	PI
<i>Makicula</i> Novák, 2012	Body outline (Fig. 1); elongate; rather parallel in basal half; dorsal almost matte	3.3-3.8	From middle to apex almost parallel	Short	Male protibia with tooth; almost further differences on legs	78-95
<i>Oracula</i> Novák, 2019	Body outline (Fig. 2); elongate; parallel in basal half; dorsal shiny or semi-matte	3.2-3.9	Regularly widened, triangular	Long	Male protibia without tooth	70-96
<i>Spinecula</i> Novák, 2019	Body outline (Fig. 3); narrow, elongate; rather parallel in basal half; dorsal almost shiny	3.6-4.1	From middle to apex parallel	Short	Male protibia with tooth near middle; no further differences on legs	83-93
<i>Sporacula</i> gen. nov.	Body outline (Fig. 4); elongate; elytra regularly narrowing apically, dorsal shiny	3.3	Regularly widened, triangular	Long	Male protibia with tooth in one third; no further differences on legs	76-82

Etymology. The compound name formed by *Sp-* marked similarity to the genus *Spinecula* Novák, 2019 and the ending - *oracula* marked similarity to the genus *Oracula* Novák, 2019. Gender: feminine.

Distribution. Malaysia.



Figs. 1-4. Body outline (males of type species): 1- *Makicula phoupaneica* Novák, 2012; 2- *Oracula bicolor* Novák, 2019; 3- *Spinecula houaphanica* Novák, 2019; 4- *Sporacula rajaica* sp. nov.

***Sporacula emasica* sp. nov.**

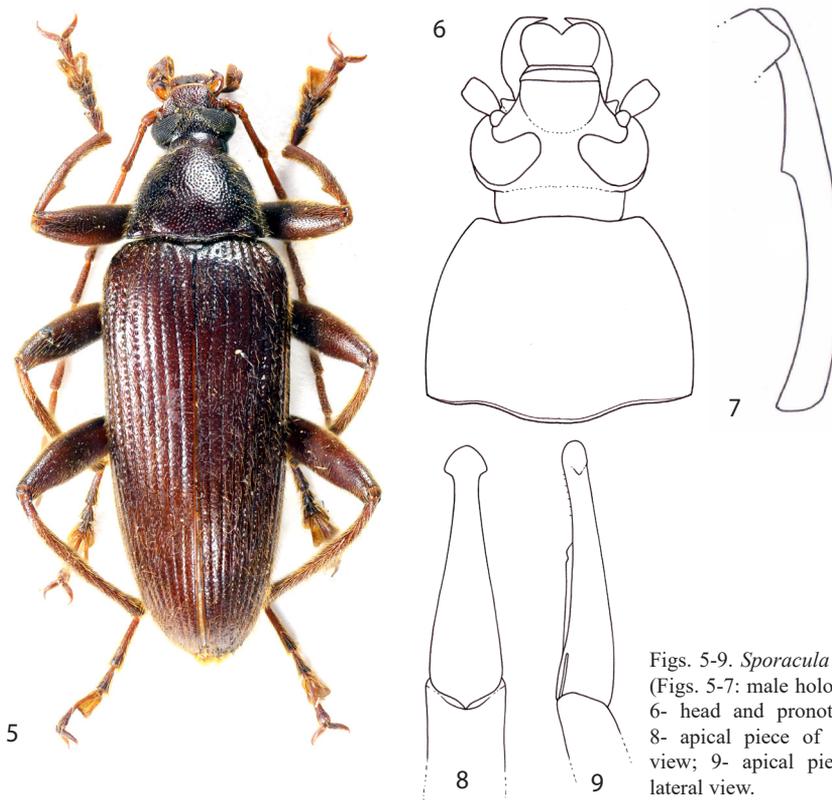
(Figs. 5-9)

Type locality. Malaysia, Borneo Island, Mount Emas.

Type material. Holotype (♂): Malaysia-Borneo / 21 3 - 20 4 1996 / GUNUNG EMAS 1700m / lgt J Kadlec, (VNPC). Paratypes: (1 ♂, 2 ♀♀): same data as holotype, (VNPC). The types are provided with a printed red label: 'Sporacula / emasica sp. nov. / HOLOTYPUS [or PARATYPUS] / V. Novák det. 2023'.

Description of holotype. Habitus as in Fig. 5, body large, narrow, elongate, *Leptura* - shaped, shiny, from pale brown to dark brown, dorsal surface with pale setae, punctuation and microgranulation, BL 14.11 mm. Widest near elytral humeri; BL/EW 3.32.

Head (Fig. 6) approximately as long as wide, through the eyes slightly wider than anterior margin, narrower than base of pronotum. Dorsal surface semi-matte with long, pale setae, fine microgranulation and dense punctures. Posterior part dark brown, anterior part dark



Figs. 5-9. *Sporacula emasica* sp. nov. (Figs. 5-7: male holotype); 5- habitus; 6- head and pronotum; 7- protibia; 8- apical piece of aedeagus, dorsal view; 9- apical piece of aedeagus, lateral view.

reddish brown. Clypeus transverse, half heart shaped, reddish brown with long, pale setae, shallow punctures and fine microgranulation, pale reddish brown apex excised in middle. Mandibles pale reddish brown, glabrous, shiny. HW 1.96 mm; HW/PW 0.61; HL (visible part) 2.00 mm. Eyes very large, transverse, excised, space between eyes narrow, distinctly narrower than diameter of one eye, wider than length of antennomere 2 and narrower than length of antennomere 1; OI equal to 21.18.

Antenna. Long, antennomeres narrow (AL 10.10 mm, exceeding two thirds body length - AL/BL 0.72). Dorsal surface with pale setation, microgranulation and small punctures. Antennomeres 1-4 pale reddish brown, slightly shiny, antennomeres 5-11 brown, rather matte, antennomeres 3-10 finely widened apically. Antennomere 2 shortest, antennomere 4 longest, antennomeres 4-11 longer than antennomere 3. Ultimate antennomere widest near middle.

RLA(1-11): 0.44 : 0.21 : 1.00 : 1.20 : 1.04 : 1.10 : 1.01 : 1.06 : 1.00 : 1.03 : 1.04.

RL/WA(1-11): 1.85 : 1.16 : 5.35 : 6.42 : 5.58 : 5.89 : 5.64 : 6.13 : 6.04 : 6.50 : 6.55.

Maxillary palpus brown, rather matte, with pale setae, fine microgranulation and small, sparse punctures. Palpomeres 2 and 3 distinctly narrowest at base and widest at pale brown apex, ultimate palpomere pale brown, widely triangular.

Pronotum (Fig. 6) brown, shiny, slightly convex, widest in base, slightly narrower than elytra in humeri. Disk with two small and shallow oblique impressions near base and one larger, shallow impression against scutellum. Dorsal surface with sparse and long, pale setae, denser near lateral margins, dense, smaller punctures and very fine microgranulation. PL 2.43 mm; PW 3.19 mm; PI equal to 76.18. Border lines very narrow, margins conspicuous from dorsal view only in the middle of anterior margin not clearly distinct. Base bisinuate, anterior margin slightly arcuate in middle, excised near angles, anterior and posterior angles distinct, obtuse.

Elytra. Brown, slightly paler than pronotum, narrow, elongate, slightly convex, shiny, widest near humeri. Dorsal surface with pale setae. EL 9.68 mm; EW 4.25 mm; EL/EW 2.28. Elytral striae with rows of coarse punctures, intervals between punctures in rows almost narrower than diameter of punctures. Elytral intervals finely convex, with fine microgranulation and very small punctures.

Scutellum. Brown, transverse, wider than semicircular, with sides darker, shiny, with fine microgranulation and a few shallow punctures.

Elytral epipleura well-developed, brown, with punctures in basal part distinctly narrowing to ventrite 1, then relatively narrow and parallel in apical part with denser pale setation than in basal half.

Legs. Long and narrow, brown or reddish brown, dorsal surface with long, pale setation, small, shallow punctures and fine microgranulation. Protibiae (Fig. 7) with tooth in inner part near one third from base to apex. Penultimate tarsomeres triangular, distinctly widened apically. Pro- and mesotarsomeres 3, 4 and penultimate metatarsomere widened and lobed. RLT: 1.00 : 0.61 : 0.79 : 1.17 : 1.47 (protarsus), 1.00 : 0.29 : 0.43 : 0.63 : 0.53 (mesotarsus), 1.00 : 0.39 : 0.49 : 0.84 (metatarsus).

Protarsal claws large and hollow with long teeth in upper part (both protarsal claws with more than 50 teeth) and short teeth on the underside.

Ventral side of body with pale setae and punctures, prothorax brown, meso- and metaventrite blackish brown. Abdomen blackish brown with dense and long, recumbent, pale setation, dense punctures and fine microgranulation, ultimate ventrite with shallow impression in apex.

Aedeagus (Figs. 8, 9) pale brown, matte. Basal piece rounded laterally and narrowing in dorsal view. Apical piece beak shaped from dorsal and lateral views. Ratio of length of apical piece to length of basal piece in dorsal view 1: 3.17.

Female has body slightly wider than male, protibiae have no tooth, protarsal claws are shorter than in male with only 16 visible teeth.

Measurements of female body. BL 14.85 mm; HL 2.00 mm; HW 2.02 mm; OI 25.00; PL 2.48 mm; PW 3.27 mm; PI 75.84; EL 10.37 mm; EW 4.52 mm; AL(1-11) 9.65 mm; AL/BL(1-11) 0.65; HW/PW 0.62; BL/EW 3.29; EL/EW 2.30.

RLA(1-11): 0.53 : 0.20 : 1.00 : 1.14 : 1.24 : 1.20 : 1.19 : 1.29 : 1.19 : 1.20 : 1.20.

RL/WA(1-11): 1.44 : 0.89 : 3.28 : 4.09 : 4.06 : 4.06 : 4.12 : 6.08 : 4.67 : 4.86 : 4.55.

RLT: 1.00 : 0.61 : 0.79 : 1.17 : 1.47 (protarsus), 1.00 : 0.29 : 0.43 : 0.63 : 0.53 (mesotarsus), 1.00 : 0.39 : 0.49 : 0.84 (metatarsus).

Variability. The type specimens somewhat vary in size; each character is given as its mean value, with full range in parentheses. Males (n= 2). BL 14.45 mm (14.11-14.78 mm); HL 2.01 mm (2.00-2.01 mm); HW 1.99 mm (1.96-2.02 mm); OI 20.88 (20.57-21.18); PL 2.40 mm (2.37-2.43 mm); PW 3.08 mm (2.97-3.19 mm); PI 77.85 (75.84-79.86); EL 10.04 mm (9.68-10.40 mm); EW 4.16 mm (4.06-4.25 mm). Females (n= 2). BL 14.62 mm (14.39-14.85 mm); HL 2.00 mm; HW 2.01 mm (2.00-2.01 mm); OI 24.17 (23.34-25.00); PL 2.44 mm (2.40-2.48 mm); PW 3.26 mm (3.25-3.27 mm); PI 74.87 (73.88-75.84); EL 10.18 mm (9.99-10.37 mm); EW 4.50 mm (4.48-4.52 mm).

Differential diagnosis. New species *Sporacula emasica* sp. nov. distinctly differs from similar species *Sporacula rajaica* sp. nov. mainly by dorsal surface brown, by anterior angles of pronotum distinct, by lateral margins of pronotum finely arcuate in basal half, by antennomeres 1-3 and protibiae pale brown, by dorsal surface of mandibles pale reddish brown, shiny with indistinct microgranulation and by anterior margin of pronotum with indistinct border in middle; while *S. rajaica* has dorsal surface dark brown or blackish brown, pronotum has indistinct anterior angles and lateral margins of pronotum are parallel in basal half, antennomeres 1-3 and protibiae are dark brown, dorsal surface of mandibles is dark, rather matte with distinct microgranulation, anterior margin of pronotum has distinct border in middle.

Etymology. Toponymic, named after the type locality Mount Emas (Borneo Island, Malaysia).

Distribution. Malaysia (Sabah, Borneo Island).

***Sporacula rajaica* sp. nov.**

(Figs. 10-14)

Type locality. Malaysia, Kelantan state, road between Kampong Raja and Gua Musang, Ladang Pandrak, 4°63-88'N; 101°45-95' E, 1400-1700 m.

Type material. Holotype (♂): MALASIA, KELANTAN / road between Kampong Raja / and Gua Musang, 1400-1700 m, / (Ladang Pandrak), 1.-28. / iv.2006; 4°63-88'N; 101°45-95' E / Čechovský Petr lgt., (VNPC). Paratypes: (4 ♂♂): same data as holotype, (VNPC); (1 ♂): MALAYSIA W Kelantan, / 60 km N of Tanah Rata, / TANAH KERAJAAN / 12.-30.iv.2007, 1000 m / Petr Čechovský lgt., (VNPC); (2 ♀♀): MALAYSIA West, PAHANG / Cameron Highlands, TANAH / RATA, 3.ii.-19.ii.2005 / P. Čechovský lgt., 1200-1500 m, (VNPC). The types are provided with a printed red label: 'Sporacula / rajaica sp. nov. / HOLOTYPUS [or PARATYPUS] / V. Novák det. 2023'.

Description of holotype. Habitus as in Fig. 10, body outline (Fig. 4), body elongate, narrow, shiny, *Leptura* - shaped, dark brown or blackish brown, dorsal surface with dark and pale setae, fine microgranulation and punctuation, BL 14.92 mm. Widest near elytral humeri; BL/ EW 3.28.

Head (Fig. 11) slightly wider than long, through the eyes wider than anterior margin, narrower than base of pronotum. Dorsal surface dark brown, semi-matte with pale setae, fine

microgranulation and punctures larger and coarser in basal part than in apical half. Clypeus transverse, half heart shaped, semi-matte, dark brown with long, pale setae, microgranulation and punctures. Apex ochre yellow and strongly excised in middle. Mandibles brown, with microgranulation, rather matte. HW 2.14 mm; HW/PW 0.63; HL (visible part) 2.05 mm. Eyes very large, transverse, strongly excised, space between eyes distinctly narrower than diameter of one eye, wider than length of antennomere 2; approximately as wide as length of antennomere 1; OI equal to 24.50.

Antenna. Dark brown, long and narrow (AL 11.66 mm, exceeding three quarters body length - AL/BL 0.78). Dorsal surface with pale setation, microgranulation and small punctures. Antennomeres 1-4 slightly shiny, antennomeres 4-11 rather matte, antennomeres 3-10 slightly widened apically. Antennomere 2 shortest, antennomere 4 longest. Ultimate antennomere widest near middle.

RLA(1-11): 0.48 : 0.18 : 1.00 : 1.28 : 1.08 : 1.05 : 1.11 : 1.06 : 0.99 : 0.99 : 1.04.

RL/WA(1-11): 1.95 : 1.17 : 5.30 : 7.52 : 8.14 : 6.68 : 7.08 : 6.64 : 6.54 : 6.83 : 8.15.

Maxillary palpus brown, slightly shiny, with long, ochre yellow setae, microgranulation and small punctures. Palpomeres 2 and 3 distinctly narrowest at base and widest at apex, ultimate palpomere widely triangular, slightly shoe shaped with ochre yellow apex.

Pronotum (Fig. 11) dark brown, shiny, convex, widest in base, slightly narrower than elytra in humeri. Disk with two small and shallow oblique impressions in base. Dorsal surface with dark and pale setae, fine microgranulation and dense punctuation. PL 2.40 mm; PW 3.42 mm; PI equal to 82.35. Border lines very narrow, margins conspicuous in dorsal view. Base rounded in middle, apical part of lateral margins and anterior margin arcuate, anterior angles not clearly distinct, posterior angles very finely obtuse.

Elytra. Dark brown, narrowing apically, elongate, slightly convex, shiny, widest near humeri. Dorsal surface with pale and dark setae. EL 10.47 mm; EW 4.55 mm; EL/EW 2.30. Elytral striae with rows of coarse punctures, indistinct in apical part. Elytral intervals finely convex, with very fine microgranulation and small punctures.

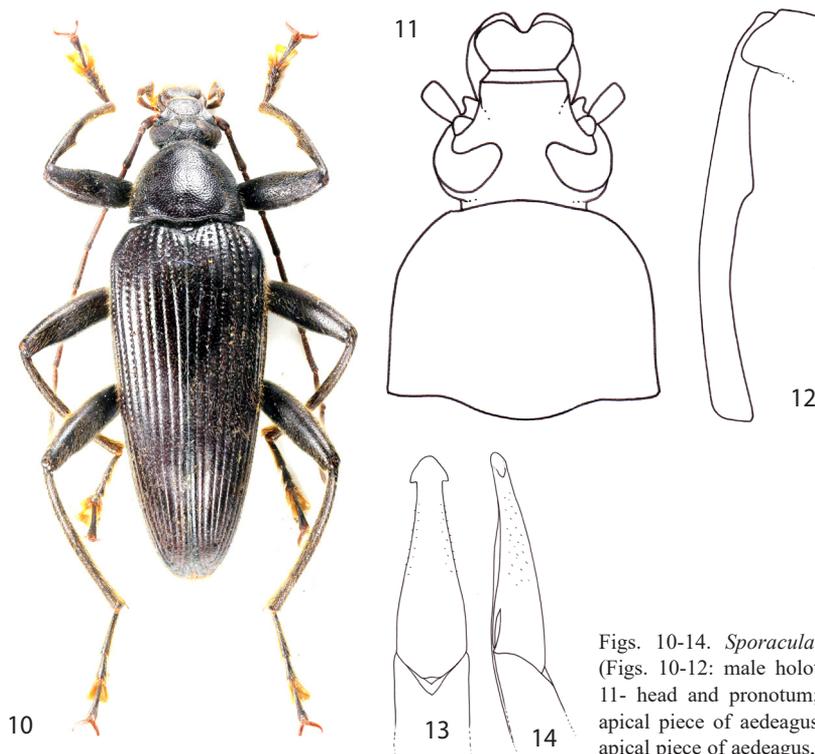
Scutellum. Blackish brown, semi-matte, semi-elliptical, with fine microrugosities and microgranulation and a few small, shallow punctures.

Elytral epipleura well-developed, dark brown, with punctures in basal part distinctly narrowing to ventrite 1, then relatively narrow and parallel, with pale setae in apical part.

Legs. Long and narrow, dark brown, dorsal surface with dense setation, shallow punctures and fine microgranulation. Tibiae with longer setae than in femora, protibia (Fig. 12) with tooth in one third of base in inner part. Penultimate tarsomeres triangular, distinctly widened apically. Pro- and mesotarsomeres 3 and 4 and penultimate metatarsomere ochre yellow, widened and lobed. RLT: 1.00 : 0.61 : 0.87 : 0.95 : 1.59 (protarsus), 1.00 : 0.49 : 0.59 : 0.74 : 1.23 (mesotarsus), 1.00 : 0.44 : 0.48 : 0.80 (metatarsus).

Protarsal claws large and hollow with long teeth in upper part (both protarsal claws with more than 50 teeth) and short teeth on the underside.

Ventral side of body blackish brown, with very small punctures and pale setae. Abdomen blackish brown with dense and long, recumbent pale setae, small punctures and fine microgranulation.



Figs. 10-14. *Sporacula rajaica* sp. nov. (Figs. 10-12: male holotype): 10- habitus; 11- head and pronotum; 12- protibia; 13- apical piece of aedeagus, dorsal view; 14- apical piece of aedeagus, lateral view.

Aedeagus (Figs. 13, 14) pale brown or brown, shiny. Basal piece rounded laterally. Apical piece elongate triangular dorsally and beak shaped from dorsal and lateral views. Ratio of length of apical piece to length of basal piece in dorsal view 1: 2.83.

Female. Body wider than in male. Protibiae have no tooth, protarsal claws are shorter than in male with only 15 visible teeth.

Measurements of female body. BL 15.57 mm; HL 2.22 mm; HW 2.31 mm; OI 28.04; PL 2.62 mm; PW 3.71 mm; PI 70.74; EL 10.73 mm; EW 5.04 mm; AL(1-11) 10.04 mm; AL/BL(1-11) 0.65; HW/PW 0.62; BL/EW 3.09; EL/EW 2.13.

RLA(1-11): 0.41 : 0.18 : 1.00 : 1.01 : 0.91 : 0.94 : 1.02 : 1.02 : 0.95 : 0.93 : 1.02.

RL/WA(1-11): 1.97 : 0.87 : 3.63 : 4.31 : 3.86 : 3.89 : 5.07 : 5.07 : 4.90 : 5.11 : 6.08.

RLT: 1.00 : 0.37 : 0.45 : 0.67 : 1.36 (protarsus), 1.00 : 0.44 : 0.49 : 0.66 : 1.20 (mesotarsus), 1.00 : 0.37 : 0.36 : 0.70 (metatarsus).

Variability. The type specimens somewhat vary in size; each character is given as its mean value, with full range in parentheses. Males (n= 6). BL 14.94 mm (14.62-15.35 mm); HL 2.01 mm (1.90-2.05 mm); HW 2.09 mm (1.98-2.14 mm); OI 24.68 (20.36-24.63); PL 2.67 mm (2.52-2.80 mm); PW 3.35 mm (3.14-3.43 mm); PI 79.89 (78.01-81.87); EL 10.32 mm

(9.96-10.63 mm); EW 4.56 mm (4.40-4.68 mm). Females (n= 2). BL 15.97 mm (15.57-16.36 mm); HL 2.20 mm (2.17-2.22 mm); HW 2.29 mm (2.26-2.31 mm); OI 30.31 (28.04-32.57); PL 2.68 mm (2.62-2.74 mm); PW 3.74 mm (3.71-3.77 mm); PI 71.71 (70.74-72.68); EL 11.09 mm (10.73-11.45 mm); EW 5.09 mm (5.04-5.14 mm).

Differential diagnosis. New species *Sporacula rajaica* sp. nov. distinctly differs from similar species *Sporacula emasica* sp. nov. mainly by dorsal surface dark brown or blackish brown, by shape of pronotum (indistinct anterior angles and lateral margins in basal half parallel), by antennomeres 1-3 and protibiae dark brown, by dorsal surface of mandibles dark, rather matte with distinct microgranulation, by anterior margin of pronotum with distinct border in middle; while *S. emasica* has dorsal surface brown, anterior angles of pronotum are distinct, lateral margins of pronotum are finely arcuate in basal half, antennomeres 1-3 and protibiae are pale brown, dorsal surface of mandibles is pale reddish brown, shiny with indistinct microgranulation, anterior margin of pronotum has indistinct border in middle.

Etymology. Toponymic, named after the place near of type locality Kampong Raja (Malaysia).

Distribution. Malaysia.

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