

**THE SUBSOCIAL WOOD-FEEDING COCKROACH GENUS
SALGANEA STÅL FROM BORNEO, WITH DESCRIPTION
OF A NEW SPECIES (BLABERIDAE: PANESTHIINAE)**

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ABSTRACT. The Bornean species of the subsocial wood-feeding cockroach genus *Salganea* Stål is reviewed. We found nine species, of which *S. nalepae* Maekawa & Matsumoto is described as new and *S. guentheri* Roth is recorded for the first time. The previously unknown female of *S. perssoni* Roth and male of *S. obtusespinosus* Princis are described. A key to the species is presented.

Key words: Blaberidae, Panesthiinae, *Salganea*, new species, Borneo, Oriental Region.

Introduction

The cockroach genus *Salganea* Stål, belonging to the subfamily Panesthiinae of family Blaberidae, is mostly distributed in the Oriental Region and only 1 species occurs in Australia. These species live in rotten logs and feed on wood, and form distinct families (Roth, 1979; Matsumoto, 1987; Nalepa & Bell, 1997). In his revision of *Salganea*, Roth (1979) recorded 7 species from Borneo.

During an ecological and phylogenetical study of Asian Panesthiinae, we have examined about 70 social units of the genus from Borneo. As a result, we recognize 9 species, including those recorded by Roth (1979). One new species, *S. nalepae*, is described and *S. guentheri* Roth is recorded from there for the first time. In addition, we discovered the previously unknown sexes of *S. perssoni* (female) and *S. obtusespinosus* (male), which are described here.

The measurements, indices and special terms used in this paper mostly follow those in Roth (1977; 1979).

Genus *Salganea* Stål

Salganea Stål, 1877: 37. Type species: *Panesthia morio* Burmeister, 1838.

Mylacrina Kirby, 1903: 414. Type-species *Mylacrina wrayi* Kirby, 1903. (Synonymized by Roth, 1977.)

Diagnosis: This genus is distinguished from the other genera of the subfamily Panesthiinae by the following combination of characters: 1) Anteroventral margin of the pronotum simple, without tubercles; 2) laterocaudal

angle of 6th abdominal tergite not produced, or, if spine-like, then directed caudally, rarely obliquely; 3) lateral margin of the 6th abdominal tergite not crenate; 4) hind margin of the 6th abdominal tergite simple, without spines, tubercles, or teeth; 5) laterocaudal angle of the 7th abdominal tergite not directed obliquely upward; 6) lateral margin of the 7th abdominal tergite more or less modified, crenate, crenulate, serrate, serrulate, or undulate; 7) species with fully developed tegmina and wings often have these structures mutilated, leaving only the basal regions.

1. *Salganea aequaliterspinosa* Princis

Salganea aequaliterspinosa Princis, 1951: 5 (female).

Salganea aequaliterspinosa: Princis, 1954: 209 (male and female).

Salganea aequaliterspinosa Princis: Roth, 1979: 45-47.

Diagnosis: Anterior margin of pronotum with a shallow V-shaped excision; pronotal disc with 2 pairs of small bluntly rounded or acute tubercles. Anterolateral corners of all abdominal tergites without round holes. Sixth abdominal tergite not densely setose, and lacking round holes in the anterior corners. Lateral margin of 7th tergite with 2-4 teeth. Hind margin of supra-anal plate with 6-10 strongly deflexed, widely spaced teeth; the teeth slender, longer than broad, with an acute or subacute apex. Anteroventral margin of fore femur with 1-4 spines.

Specimens examined: MALAYSIA: SABAH: Sepilok, 2 adult ♂, 2 adult ♀, 1.x.1996, K. Maekawa; Same locality, 1 adult female, 13 nymphs, 17.ix.1997, C. A. Nalepa; Sabah: Mt. Kinabalu (alt. 1800m), 1 adult ♀, 10.x.1997, T. Kikuta.

Distribution: Malaysia: Sabah, Sarawak, Malaya; Singapore; Indonesia: Kalimantan, Sumatra, Belitung Island.

2. *Salganea guentheri* Roth

Salganea guentheri Roth, 1979: 44-45 (male and female).

Diagnosis: Anterior margin of pronotum with a shallow V-shaped excision; pronotal disc with 2 pairs of small, bluntly rounded or acute tubercles. Sixth abdominal tergite not densely setose. Seventh abdominal tergite not densely setose, at most with some scattered setae. Anterolateral corners of 6th and 7th abdominal tergites with small to large holes. Hind margin of supra-anal plate with 7-11 teeth. Anteroventral margin of fore femur with 0-3 spines.

Specimens examined: MALAYSIA: SABAH: Gunun Emas, 1 adult ♂, 2 adult ♀, 7 nymphs, 20-29.ix.1997, M. Kon.

Distribution: Malaysia: Sabah (new record), Malaya; Indonesia: Sumatra, Nias Island.

Remarks: There is no significant morphological difference between the specimens from Borneo and from other localities.

3. *Salganea hebardi* Roth

Salganea hebardi Roth, 1979: 87-88 (male).

Diagnosis: Anterior margin of pronotum entire; pronotal disc with a pair of tubercles. Anterolateral corners of all abdominal tergites without round holes. Sixth abdominal tergite with rounded laterocaudal angle; surface not pubescent. Seventh abdominal tergite not pubescent, hind margin broadly concave. Hind margin of supraanal plate arcuate, subentire; lateral angles small and obtuse. Anteroventral margin of fore femur with a minute distal spine.

Distribution: Malaysia: Sabah.

Remarks: Known only from the holotype.

4. *Salganea inaequaliterspinosa* Hanitsch

Salganea inaequaliterspinosa Hanitsch, 1933: 332 (male and female).

Salganea inaequaliterspinosa Hanitsch: Roth, 1979: 84-85.

Diagnosis: Anterior margin of pronotum entire or faintly concave, not incrassate. Abdominal tergites 3 to 7 with round holes. Lateral margin of 7th abdominal tergite usually with 2 teeth, caudal angle small, spine-like. Hind margin of supraanal plate with 11 or 12 large teeth of 2 distinct sizes. Anteroventral margin of fore femur without spines.

Specimens examined: MALAYSIA: SABAH: Poring, 1 adult ♀, 28.ix.1996, T. Matsumoto; Sabah: Mt. Kinabalu, 20 adult ♂, 26 adult ♀, 165 nymphs, 9-11.ix.1997, C. A. Nalepa, M. Machida, T. Matsumoto & K. Maekawa; Sabah: Trus Madi (alt. 1440-1540m), 5 adult ♂, 4 adult ♀, 30 nymphs, 16-17.ix.1997, T. Matsumoto & K. Maekawa; Sabah: Gunun Emas (alt. 1400-1600m), 5 adult ♂, 4 adult ♀, 10 nymphs, 14-25.ix.1997, M. Kon.

Distribution: Malaysia: Sabah, Sarawak.

Remarks: This species is found from the lowlands to the mountainous region (1600m) of Borneo (Sabah and Sarawak).

5. *Salganea morio* (Burmeister)

Panesthia morio Burmeister, 1838: 513 (male).

Salganea morio (Burmeister): Kirby, 1904: 200.

Panesthia regina Saussure, 1863: 167. (Synonymized by Roth, 1979.)

Salganea regina (Saussure): Kirby, 1904: 200; Princis, 1965: 320.

Panesthia conica Walker, 1868: 23 (female). (Synonymized by Roth, 1979.)

Diagnosis: Anterior margin of pronotum with a broad V-shaped excision; pronotal disc with 4 tubercles. Anterolateral corners of all abdominal tergites without round holes. Sixth abdominal tergite not densely setose, at most with some scattered setae; anterolateral corners not densely setose. Hind margin of 7th abdominal tergite densely setose, and without holes; lateral margin crenate with 2-5 rounded teeth. Hind margin of supraanal plate with 11-14 uniformly spaced, obtuse, almost equal-sized, teeth. Anteroventral margin of fore femur with 1-4 spines.

Distribution: Indonesia: Java, Borneo, New Guinea, the Moluccas.

Remarks: Although we did not collect in Borneo, this species is relatively widely distributed from New Guinea, through Borneo, to Java and the Moluccas.

6. *Salganea nalepae* Maekawa & Matsumoto, sp. nov. (Fig. 1)

Female (holotype): Total body length 21mm; pronotum length x width, 6.2 x 9.2mm; distance between disc tubercles, 1.8mm; tegmen length x width, 2.8 x 2.3mm.

Head sparsely punctulate, vertex not foveolate, exposed. Pronotum convex, anterior margin entire, incrassate, with a subobsolete incision mesally; anterior half depressed, the floor granular, laterally punctate; disc with an indication of a pair of small tubercles. Meso- and metanotum with a few well spaced punctures. Tegmina reduced, lateral, narrow micropterous pads, densely punctate, the rounded apex reaching to the hind margin of the mesonotum. Wings absent.

Abdominal tergites 1-6 hairless, densely punctate, hind margin on T4 with an incision mesally; T7 shallowly punctate and covered with fine silky hairs; lateral margin of T5 grooved, a deeper groove on T6; lateral margin of T7 minutely, shallowly, crenulate, lateral angles acute, directed posteriorly. Supraanal plate with fewer punctation than on T7; hind margin essentially entire; the lateral angles small, rounded, oblique. Abdominal sternites essentially non-setose; S2-S5 punctate, principally laterally; S6 and S7 densely and coarsely punctate, laterally with a small shelf-like ridge under the cercus; hind margin rounded. Cercus conical with slender hairs on the dorsal surface; ventral surface densely hairy. Anteroventral margin of front femur unarmed, without a distal spine; posterior margin with a distal spine.

Head reddish brown; lower half and vertex darker. Pro-, meso- and metanotum reddish brown; posterior and lateral regions lighter than remaining areas. Abdominal tergites 1-5 and supraanal plate reddish brown, darker laterally; T6 and T7 darker.

Male: Unknown.

Nymphs: The large (19mm) male nymphs have with the anterior margin with a mesal incision, and the disc has tubercles. Abdominal tergite 7 and supraanal plate are similar to that in the adult. Colour yellowish brown. Small nymphs are much lighter in colour than larger individuals.

Holotype: ♀, MALAYSIA: SABAH: Trus Madi (alt. 1440m), 16.ix.1997, C. A. Nalepa. Deposited in the Museum of University of Malaysia, Sabah.

Other specimens examined: 7 nymphs, same colony as holotype.

Etymology: The species is named for Dr. Christine A. Nalepa at North Carolina State University, who collected this valuable species.

Remarks: This species resembles to *S. rossi* Roth distributed in Malaysia. However, it is easily distinguished by the nonhirsute 7th abdominal tergite

and the rounded hind margin of the 7th abdominal sternite (subgenital plate). Males are needed to determine the species-group of this species.

7. *Salganea obtusespinosa* Princis (Fig. 2)

Salganea obtusespinosa Princis, 1954: 210 (female).

Salganea obtusespinosa Princis: Roth, 1979: 85-86.

Male (previously unknown): Total body length 25-26.5mm; pronotum length x width, 5.5-5.9mm x 7.6-8.8mm; distance between disc tubercles, 1.6-1.7mm. Anterior margin of pronotum entire, not incrassate; disc with a pair of small tubercles. Anterolateral corners of 5th to 7th abdominal tergites with round holes. Hind margin of supraanal plate with large widely separated, equally spaced, obtuse teeth. Anteroventral margin of fore femur without spines. Sclerotization of genital phallomere L2d bifurcate; R2 well developed, hook-shaped; L1 well developed.

Female: Essentially similar to male: hind margin of the 7th abdominal sternite rounded.

Specimens examined: MALAYSIA: SABAH: Mt. Kinabalu, 3 adult ♂, 6 adult ♀, 44 nymphs, 9-10.ix.1997, C. A. Nalepa, M. Machida, T. Matsumoto & K. Maekawa; Sabah: Trus Madi (alt. 1540m), 2 adult ♂, 2 adult ♀, 17.ix.1997, C. A. Nalepa; Sabah: Gunum Emas (alt. 1380-1600m), 12 adult ♂, 9 adult ♀, 36 nymphs, 14-25.ix.1997, M. Kon.

Distribution: Malaysia: Sabah, Sarawak.

Remarks: On Borneo, this species is found from the lowland to the mountainous region (1600m). As Roth (1979) suggested, *S. obtusespinosa* appears to be morphologically close to *S. inaequaliterspinosa*. Although the genital phallomere R2 of the latter species has a subapical concavity, that of the former has a round tip.

8. *Salganea perssoni* Roth (Fig. 3)

Salganea perssoni Roth, 1979: 35 (male).

Female (previously unknown): Total body length 49mm; pronotum length x width, 13-14 (11) x 19-21 (17) mm; distance between tubercles of anterior margin of pronotum, 8.0-8.4 (7.3) mm; distance between posterior disc tubercles, 5.6-5.8 (4.8) mm (Parentheses indicate measurements on specimen from Poring). Anterior margin of pronotum slightly indented mesally; disc with 4 tubercles. Sixth and 7th abdominal tergites densely setose; lateral margin of 7th abdominal tergite hardly uneven. Hind margin of supraanal plate with small, well spaced, obtuse teeth. Anteroventral margin of fore femur with 1-4 spines.

Male: Essentially similar to the female: hind margin of the 7th abdominal sternite subtruncate.

Specimens examined: MALAYSIA: SABAH: Poring, 1 adult ♀, 3 nymphs, 28.ix.1996, K. Maekawa; Sabah: Mt. Kinabalu, 1 adult ♀, 9.x.1996, T. Kikuta; Same locality, 2 adult ♂, 11.ix.1997, C. A. Nalepa & K. Maekawa; Same locality, 1 adult ♂, 11.x.1997, T. Kikuta; Sabah: Trus Madi (alt.

1450m), 1 adult ♂, 5 nymphs, 16.ix.1997, K. Maekawa; Trus Madi (alt. 1500m), 2 adult ♂, 3 adult ♀, 30 nymphs, 17.ix.1997, K. Maekawa; Sabah: Gunun Emas (alt. 1400m), 1 adult ♂, 20.ix.1997, M. Kon.

Distribution: Malaysia: Sabah, Sarawak.

Remarks: This species is found from the lowland to the mountainous region (1600m) on Borneo. The adult specimen from Poring is somewhat smaller (see above).

9. *Salganea ternatensis hirsuta* Roth

Salganea ternatensis hirsuta Roth, 1979: 82-83 (male and female).

Diagnosis: Anterior margin of pronotum with a distinct V-shaped excision; pronotal disc with 2 pairs of tubercles. Surfaces of 6th and 7th abdominal tergites densely pubescent. Lateral margin of 7th abdominal tergite feebly crenulate with 3-5 teeth. Hind margin of supraanal plate arcuate, feebly uneven. Anteroventral margin of fore femur without spines.

Distribution: Malaysia: Sarawak; Indonesia: Irian Jaya (Netherlands New Guinea).

Remarks: This subspecies is distributed in Irian Jaya (New Guinea) and Sarawak (Borneo), and the nominotypical subspecies is distributed from the Moluccas, the Biak, to the Philippines.

Key to the species of *Salganea* from Borneo (Modified from Roth, 1979)

1. Tegmina micropterous, hind wings absent.6. *nalepae* Maekawa & Matsumoto, sp. nov.
- Tegmina and wings fully developed (macropterous and brachypterous)....2
2. Anteroventral margin of fore femur with 1-4 spines.3
- Anteroventral margin of fore femur without spines.6
3. Sixth and 7th abdominal tergites densely setose; lateral margin of the 7th abdominal segment hardly uneven.8. *perssoni* Roth
- Sixth and 7th abdominal tergites not densely setose; anterolateral corners of 6th and 7th abdominal segments with or without holes.4
4. Anterolateral corners of 6th and 7th abdominal tergites with round holes.2. *guentheri* Roth
- Anterolateral corners of all abdominal tergites without round holes.5
5. Hind margin of supraanal plate with 6-10 strongly deflexed, widely spaced teeth; the teeth slender, longer than broad, with an acute or subacute apex.....1. *aequaliterspinosa* Princis
- Hind margin of supraanal plate with 10-15 teeth (usually more than 10); the teeth triangular, not distinctly longer than broad, and close together.....5. *morio* (Burmeister)
6. Hind margin of supraanal plate entire or at most subentire.7
- Hind margin of supraanal plate with large distinct teeth. .3. *hebaridi* Roth
7. Anterior margin of pronotum entire, disc with a pair of tubercles; surfaces of 6th abdominal segment not pubescent.8

- Anterior margin of pronotum with a distinct V-shaped excision, disc with 2 pairs of tubercles; surfaces of 6th and 7th abdominal segments densely pubescent. 9. *ternatensis hirsuta* Roth
8. Hind margin of supraanal plate with 11 or 12 large teeth of 2 distinct sizes; anterolateral corners of 4th to 7th abdominal tergites with small holes or depressions. 4. *inaequaliterspinosa* Hanitsch
- Hind margin of supraanal plate with large widely separated, equally spaced, obtuse teeth; anterolateral corners of 5th to 7th abdominal tergites with round holes. 7. *obtusospinosa* Princis

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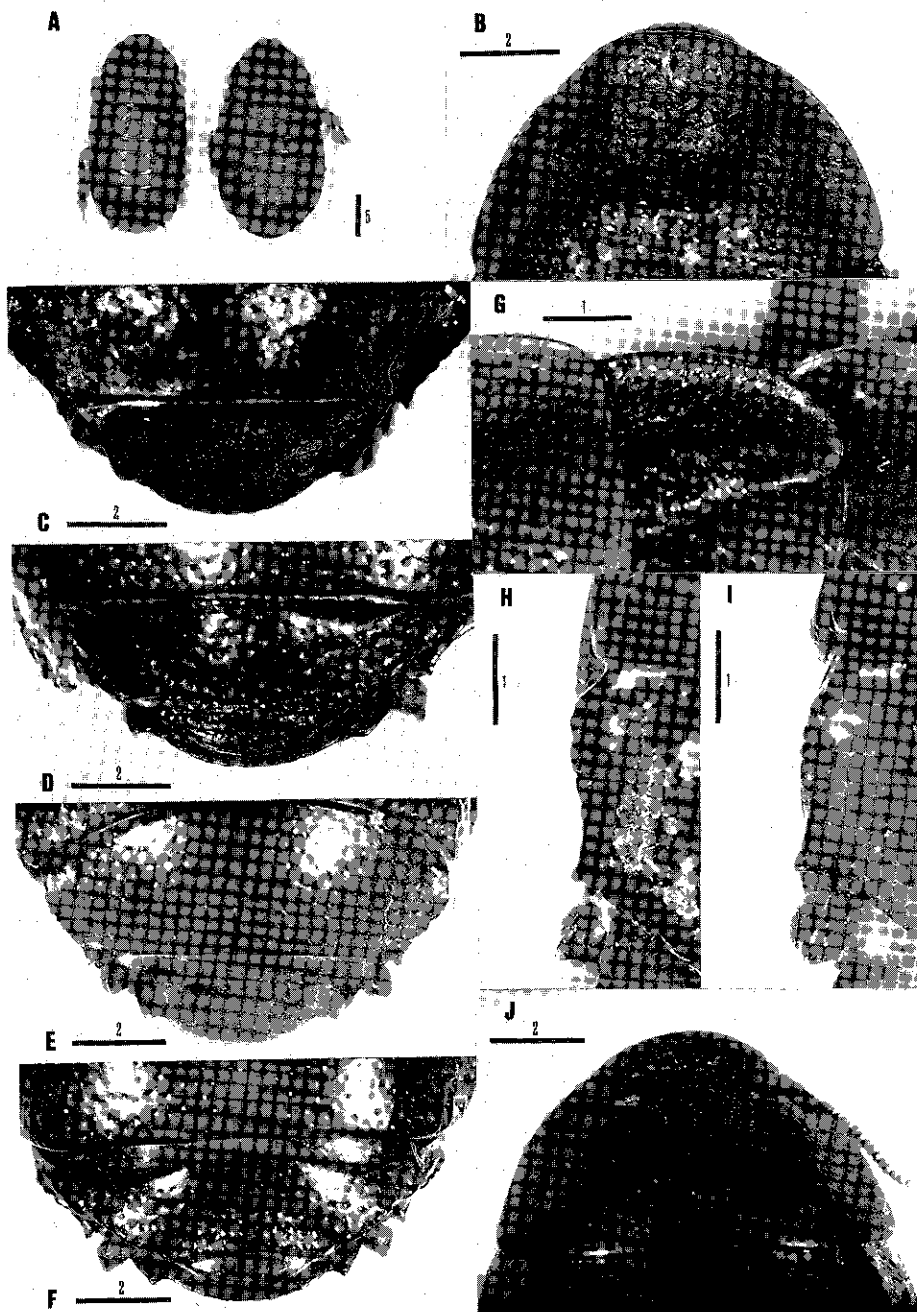


Fig. 1. *Salganea nalepae* Maekawa & Matsumoto, sp. nov. from Trus Madi, Sabah, Malaysia. A, female holotype (right) and male nymph (left), habitus. B-D, G, H, parts of female holotype shown in A: B, pronotum (dorsal); C, supraanal plate; D, abdominal sternite 7; G, tegmen; H, cercus and lateral portion of abdominal tergite 7. E, F, I, J, parts of male nymph shown in A: E, supraanal plate (dorsal); F, abdominal sternite 7; I, cercus and lateral portion of abdominal tergite 7; J, pronotum (dorsal). Scales in millimetres.

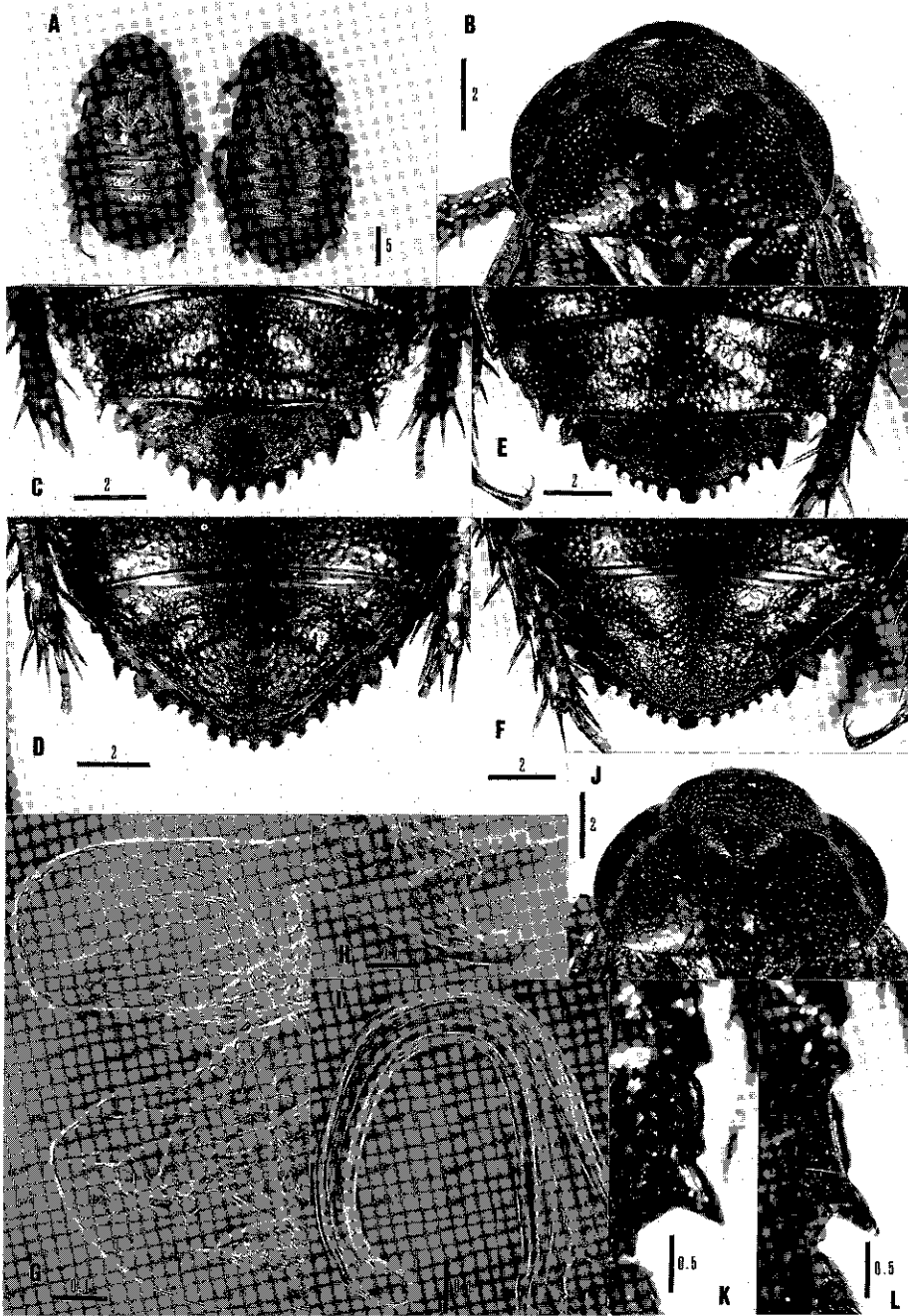


Fig. 2. *Salganea obtusispinosa* Princis, male and female. A, male (right) and female (left) from Gunum Emas, Sabah, Malaysia, habitus, tegmina and wings leaving only basal regions. B-D, G-I, K, parts of male shown in A: B, pronotum (dorsal); C, abdominal tergite 7 and supraanal plate; D, abdominal sternite 7; G-I, genital phallomeres, L1, L2d, and R2 respectively; K, lateral portion of abdominal tergite 7. E, F, J, L, parts of female shown in A: E, abdominal tergite 7 and supraanal plate; F, abdominal sternite 7; J, pronotum (dorsal); L, lateral portion of abdominal tergite 7. Scales in millimetres.

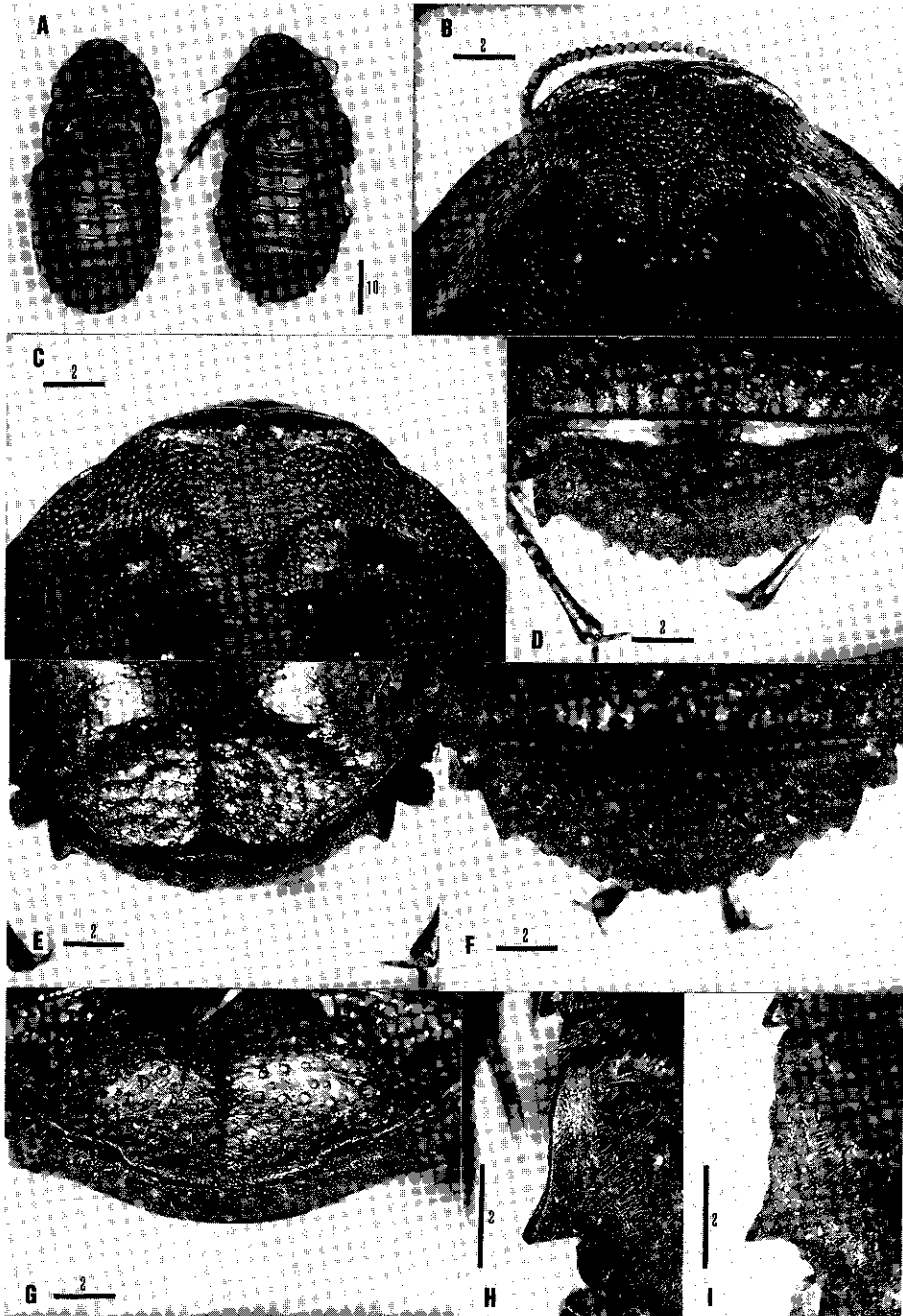


Fig. 3. *Salganea perssoni* Roth, male and female. A, male (right) and female (left) from Trus Madi, Sabah, Malaysia, habitus, tegmina and wings fully developed, reaching 1st tergite. B, D, E, H, parts of male shown in A: B, pronotum (dorsal); D, supraanal plate; E, abdominal sternite 7; H, lateral portion of abdominal tergite 7. C, F, G, I, parts of female shown in A: C, pronotum (dorsal); F, supraanal plate (dorsal); G, abdominal sternite 7; I, lateral portion of abdominal tergite 7. Scales in millimetres.