

MISCELLANEOUS PUBLICATION  
OCCASIONAL PAPER NO. 71

# Records of the Zoological Survey of India

A revision of Indian *Psammoecus* Latreille  
(Coleoptera Silvanidae)

by  
T. K. PAL

Issued by the Director  
Zoological Survey of India, Calcutta

RECORDS  
OF THE  
**Zoological Survey of India**

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T. K. PAL

*Zoological Survey of India, Calcutta*



*Edited by the Director, Zoological Survey of India*  
1985

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Published : February, 1985

**PRICE : Inland : Rs. 35.00**

**Foreign : £ 4.25 \$ 7.00**

Printed in India by Saakhhar Mudran, 4, Deshapran Sasmal Road, Calcutta-33  
and Published by the Director, Zoological Survey of India, Calcutta.

*Dedicated to the memory*  
*of my*  
BELOVED FATHER

**RECORDS  
OF THE  
Zoological Survey of India**

MISCELLANEOUS PUBLICATION

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No. 71

1985

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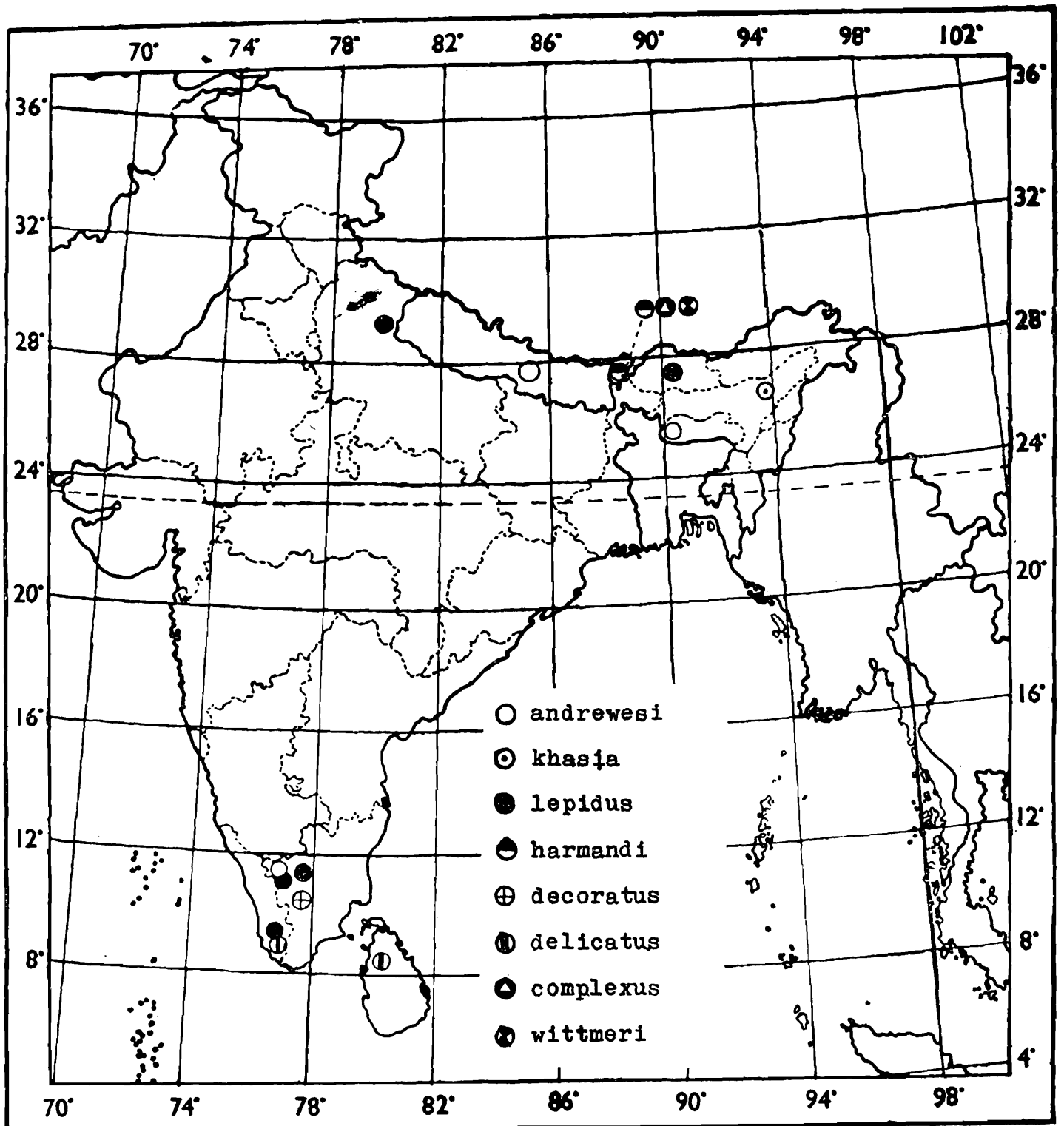
## INTRODUCTION

*Psammoecus* is a large genus composed of relatively small beetles ranging from 2.13 to 3.35 mm. in length. It has a predominantly Oriental distribution and species are usually found living in vegetable debris.

*Historical review* : This genus was erected by Latreille (1829) for the species *Dermestes bipunctatus* (Fabricius) and he placed it in the tribe 'Sagrines' of the family 'Eupodes' Boudier (1834) characterized the genus and Erichson (1846) allocated it to the tribe Brontini of the family Cucujidae. Later, Reitter (1885-86) erected the tribe Psammoecini for the genus, maintaining it in the Cucujidae. Ganglbauer (1899) included Psammoecini under Silvaninae : Cucujidae whereas Reitter (1911) referred it to Cucujini : Cucujidae. Hetschko (1930) in Junk's 'Coleopterorum Catalogus' followed Ganglbauer and listed 73 species under *Psammoecus*, of which *P. andrewesi* Grouvelle (Nilgiri Hills), *P. gratiosus* Grouvelle (Nilgiri Hills), *P. decoratus* Grouvelle (Madura : Tamil Nadu), *P. harmandi* Grouvelle (Darjeeling : West Bengal), *P. impressicollis* Grouvelle (Nilgiri Hills), *P. lepidus* Grouvelle (Madura : Tamil Nadu), *P. nitidus* Grouvelle (Kanara : Karnataka), *P. bellus* Grouvelle (Madura : Tamil Nadu) (see under *nitidus*), and *P. incommodus* (Walker) (see under *trimaculatus*) are recorded from India. Crowson (1955) treated Silvanidae as a distinct family and Psammoecinae as a subfamily of it. Pal and Sengupta (1979) added a new species, *P. wittmeri* from Darjeeling (West Bengal) and Pal (1981) gave diagnostic features of *Psammoecus*, *Telephanus* Erichson and a new genus *Indophanus*. The larva of *Psammoecus* is fully described in this study for the first time.

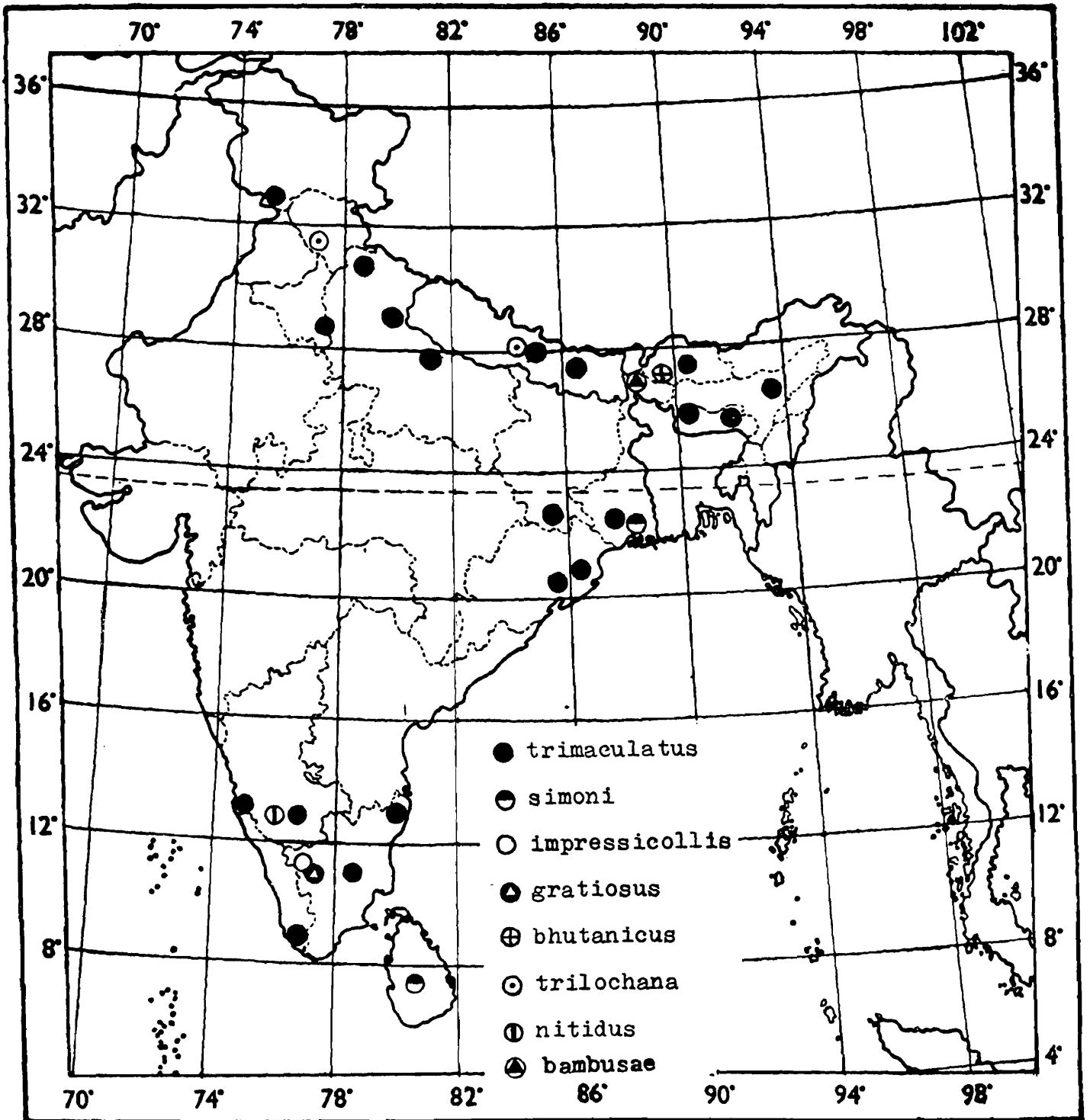
*Habit-habitat* : There is little information on the habits of *Psammoecus*. In this study the major kinds of habitat from which the species of *Psammoecus* have been recorded are : under haystacks, leaf garbage, dry cut grass, bushes, leaves and leaf sheaths, flower (details under *Material examined*).

*Geographical distribution* : Although most of the species of this principally Old World genus are found in the Oriental region it is also represented in Africa, Europe and Australia. In addition to the nine species previously known from India, seven species are included here of which five are new. The species have been collected mainly from



MAP 1

Distribution of 8 Indian species of *Psammoecus* Latreille



**MAP 2**

Distribution of 8 Indian species of *Psammoecus* Latreille

the Himalayas and their foot hills, Gangetic West Bengal, Chhotanagpur plateau and South India including the Nilgiri Hills (Maps 1 and 2). *P. trimaculatus* Motschulsky is the most common and widely distributed species in India. *P. decoratus* Grouvelle, *P. delicatus* Grouvelle, *P. gratiosus* Grouvelle, *P. nitidus* Grouvelle and *P. impressicollis* Grouvelle are recorded only from South India, while *P. andrewesi* Grouvelle and *P. lepidus* Grouvelle are recorded from both North and South India. *P. harmandi* Grouvelle and *P. bambusae* sp. nov. occur in Darjeeling, Himalaya. *P. simoni* Grouvelle, which has a very wide distribution being found from Madagascar to South-East Asian countries, is recorded in India from Gangetic West Bengal. The other species included in the Indian fauna seem to have more restricted distributions.

*Systematic position* : *Psammoecus* belongs to the subfamily Psammoeicinae because it has an indistinguishable antennal club, a frontoclypeal suture, antennal insertions situated dorso-lateral, mandibles with well-developed cavities and tubercles, securiform maxillary and labial palpi, a pair of longitudinal striae on dorsal side of head between eyes, it lacks a curved transverse groove on anterior part of gular region, the elytra has ten rows of striae punctures and is devoid of scutellary striole and the tarsi are strongly lobed. This genus is closely similar to the predominantly New World genus *Telephanus* Erichson from which it can be distinguished by its broadly elongate facies, somewhat moniliform antenna with moderately long scape widest at apex, usually transverse prothorax with lateral margins dentate, distinct longitudinal striae on vertex, single anal vein of wing with no trace of R-m cross vein (Pal, 1981).

#### SYSTEMATIC ACCOUNT

##### Genus *Psammoecus* Latreille

*Psammoechus* Latreille, 1829, in, *Cuv. Regné Anim.* ed. 2, 5 : 135 ; Boudier, 1834, *Anns Soc. ent. Fr.* 3 : 368, t. 7, f. c. ; Nevermann, 1936, *Ent. Bl. Biol. Syst. Käfer* 32 (5) : 195-199.

*Psammoecus* Latreille : Erichson, 1846, *Naturgeschichte der Insekten Deutschlands* 3 : 329, 333 ; Reitter, 1885-86, *Francisque Guillebeau : Tableaux Analytiques Determiner europiens* 1 : 9 ; 1911, *Fauna Germanica* 3 : 47, 48 ; Ganglbauer, 1899, *Die Käfer von Mitteleuropa* 3 : 590 ; Grouvelle, 1908, *Anns Soc. ent. Fr.* 77 : 474. Type-species : *Dermestes bipunctatus* (Fabricius).

*Description* : General appearance (Fig. 1) elongate, slightly ovoid, moderately convex, usually yellowish-brown or reddish-brown and

rarely blackish-brown, sometimes black spots on elytra and few segments of antenna blackish.

*Head* (Fig. 17) transverse, fronto-clypeal suture distinct, front margin of clypeus slightly rounded, eyes usually large and coarsely faceted, temple may or may not extend beneath eye, transverse impressed line on vertex behind eyes present, two lateral longitudinal striae on vertex originating near antennal bases. Tentorium with two longitudinal tentorial arms connected by corpotentorium, post-tentorina present, median tentorial process absent. Antenna moderately long and slender, antennal insertions partly hidden under projection of frons, scape large and broadly elongate, segments 2—11 shorter and subequal, segment 11 somewhat acuminate to apex. Mandible (Fig. 24) about as broad as long, with 3 apical teeth, right mandible with a blunt tooth beneath apical teeth, mola well-developed, a large basal mandibular cavity present and opens dorsally. Maxilla (Fig. 25) with lacinia narrow, elongate and without apical spines; galea short, broad and its apex densely hairy; palpi with segment 2 larger than segment 3, apical segment largest and securiform. Labium (Fig. 26) with mentum somewhat quadrate, palpi with segment 2 short and broad, apical segment longer than segment 2 and its apex broadly rounded. Labrum (Fig. 27) transverse with apical margin slightly concave.

*Prothorax* (Fig 18) usually transverse, usually with a few more or less large denticles on lateral sides, front coxae contiguous, coxal cavities slightly elongate, cavities closed behind externally and internally, prosternal process broad at apex and its apical margin sinuate, sterno-pleural suture extending to lateral margin.

*Meso-metathorax* (Fig 20): Mesocoxae contiguous, cavities open outwardly, lateral margins of mesosternal process slightly constricted across posterior two-thirds, sternal fitting between mesocoxae with a single knob. Metasterum transverse, median impressed line indistinct, hind coxae well separated. Metendosternite simple and represented by two apophyses.

*Wing and Elytra*: Wing (Fig. 23) with single anal vein, and devoid of radial cell, anal cell and subcubital fleck. Elytra somewhat ovoid, side margins almost uniformly rounded, each elytron (Fig. 22) with ten rows of strial punctures and sometimes a row of large

glandular punctures along lateral margin, without scutellary striole, epipleura (see Fig. 16) narrowed to region slightly before apex.

*Legs* (Fig. 19) moderately long and slender, trochanters short and simple, femora slightly swollen towards middle, tibiae not broadened at apex and with a circlet of apical spurs; tarsal formula 5-5-5 in both sexes, tarsal segments 1-3 with elongate lobes below, segment 4 shortest and claws simple.

*Abdomen* (Fig. 21) slightly elongate; ventrite 1 longest, intercoxal process broad and its apical margin broadly pointed, femoral lines indistinct; ventrites 2-5 subequal. Aedeagus (Fig. 29) with median lobe broad and narrowed towards apex, median strut long and its apex somewhat broadened; parameres well-developed, elongated, more or less slender, with a few long apical and many short setae. Ovipositor (Fig. 28) with well-developed paraprocts, valvifers, coxites and long styli attached on outer margin of apex of coxites.

*Larva*: See description of *Psammoecus trimaculatus* Motschulsky at the end of this study,

*Sexual dimorphism*: Absent.

#### Key to the species of *Psammoecus* from India

- |  |     |     |   |
|--|-----|-----|---|
| 1. Elytra distinctly narrowed behind middle and subacuminate at apex; antenna unicolourous   | ... | ... | 2 |
| — Elytra narrowed behind middle and rounded at apex; some of apical segments of antenna blackish or darker than basal segments   | ... | ... | 3 |
| 2. Blackish, linear, longitudinal spots present on each elytron; head across eyes distinctly narrower than prothorax across anterior margin (c. 1.0 : 1.4); lateral margin of prothorax and elytra distinctly explanate, six large glandular punctures along lateral margin of elytra (Fig. 1) | ... | ... |   |
| — One small, rounded, blackish spot on posterior half of each elytron; head across eyes about as wide as prothorax across anterior margin (c. 1.00 : 1.09); lateral margin of prothorax not explanate and that   |     |     |   |

*andrewesi* Grouvelle

- of elytra finely explanate, about thirteen large glandular punctures along lateral margin of elytra (Fig. 2) ... *khasia* sp. nov.
3. Teeth on lateral margin of prothorax minute, indistinct, either broader than long or about as broad as long (Fig. 3) ... 4
- At least some of teeth on lateral margin of prothorax elongate, either large or small but distinct (Figs. 6, 12, 15) ... 6
4. None of antennal segments blackish, segments 7—10 slightly more reddish than other segments; each elytron with two lighter spots on a blackish background; no depression on lateral sides of pronotum, lateral margins more or less abruptly narrowed behind middle (Fig. 3) ... *decoratus* Grouvelle
- At least two segments of antenna blackish; elytral pattern different and blackish spots limited to apical half; lateral sides of pronotum more or less depressed, lateral margins gradually narrowed behind middle (Figs. 4, 5) ... 5
5. Apical part of antennal segment 7 and segments 8—10 blackish; head and prothorax blackish and elytra reddish-brown; lateral margin of prothorax slightly wavy and sinuate before posterior angle (Fig. 4) ... *lepidus* Grouvelle
- Antennal segments 9 and 10 blackish; head, prothorax and elytra yellowish-brown; lateral margin of prothorax rounded to posterior angle (Fig. 5) ... *harmandi* Grouvelle
6. Antennal segments 10 and 11 yellowish-white; prothorax markedly transverse, pronotum strongly depressed in front of prothoracic base and lateral margin widely explanate; teeth on lateral margin of prothorax markedly long and narrow, some being about four times as long as broad (Figs. 6, 7) ... 7
- Antennal segment 10 more or less blackish and segment 11 yellowish-white; prothorax not markedly transverse (Figs. 8, 15), pronotum not strongly depressed in front of prothoracic base and lateral margin not widely explanate; teeth on lateral margin of prothorax variable, not markedly long and maximum three times as long as broad ... 8

7. Eyes large and about half as long as head, all antennal segments distinctly elongate, scape at least three times longer than wide; scape, pedicel, apical half of antennal segment 6 and segments 7—9 blackish; apex of prothoracic teeth somewhat blunt; elytral interstices about as wide as strial punctures, lateral margin of elytra without any large glandular punctures; body covered with short, fine pubescence (Fig. 6) ... *delicatus* Grouvelle
- Eyes smaller and about one-third as long as head, antennal segments 1 (scape) to 8 and segment 11 more or less elongate, segments 9 and 10 slightly transverse, scape about two times as long as wide; scape and pedicel yellowish, apical part of segment 7 and segments 8 and 9 blackish; apex of long prothoracic teeth pointed; elytral innerstices narrower than strial punctures, seven large glandular punctures along lateral margin of elytra; body covered with long, semierect and dense pubescence (Fig. 7) ... *complexus* sp. nov.
8. Antennal segments 9 and 10 more or less blackish ... 9
- Antennal segments 7—10 blackish ... 11
9. Elytra with a transverse blackish spot near apex and two rounded spots near middle, rounded spots bearing extensions which connect with transverse spots, two spots present near humeral angles (Fig. 8) ... *wittmeri* Pal and Sengupta
- Elytra without any transverse blackish spot ... 10
10. Antennal segments 9 and 10 slightly darker than preceding segments and not distinctly blackish, segment 10 slightly elongate; eyes large and slightly less than half as long as head; a rounded, indistinct, blackish spot on each elytron near middle, interstices on each elytron at least as wide as strial punctures in anterior half and wider than them in posterior half; no depression on lateral sides of pronotum; species yellowish-brown (Fig. 9) ... *bhutanicus* sp. nov.
- Antennal segments 9 and 10 distinctly blackish, segment 10 transverse; eyes small and about one-third as long as head; a

- somewhat transverse, distinct, blackish spot on each elytron near middle and with extension along suture, interstices on each elytron distinctly narrower than striae punctures; lateral sides of pronotum slightly depressed; species yellowish-brown to blackish-brown (Fig. 10) ... *trilochana* sp. nov.
11. Elytral pattern of four light regions, two on each side; antennal segments 7–10 distinctly and segment 6 slightly blackish (Figs. 11, 12) ... 12
- Elytra without pattern of four light regions; antennal segments 7–10 blackish and apical part of segment 6 also blackish in cases (Figs. 13, 14, 15) ... 13
12. Two transverse light areas on each elytron, two well marked transverse blackish spots near humeral angles; antennal segments 7–10 about as broad as long or slightly transverse; dorsal surface convex, clypeus unicolorous (Fig. 11) ... *simoni* Grouvelle
- Two longitudinal light areas on each elytron, without distinct blackish humeral spots; antennal segments distinctly elongate; dorsal surface subdepressed; apical part of clypeus blackish (Fig. 12) ... *bambusae* sp. nov.
13. A transverse blackish spot present on apical part of elytra; teeth on lateral margin of prothorax small and subequal; no transverse or lateral depression on pronotum (Fig. 13) ... *gratiosus* Grouvelle
- Without transverse blackish spot on elytra; teeth on lateral margin of prothorax not subequal, some obviously longer and more prominent than others; a transverse depression on pronotum in front of prothoracic base and lateral depressions sometimes present (Figs. 14, 15) ... 14
14. Lateral margin of pronotum widely explanate (Fig. 14) ... *nitidus* Grouvelle
- Lateral margin of pronotum not explanate (Fig. 15) ... 15
15. Without longitudinal sutural spot on elytra, prothorax markedly transverse (1.0 : 1.8) and transverse depression on pronotum in front of prothoracic base prominent, some of teeth on lateral margin of prothorax longer than twice their width ... *impressicollis* Grouvelle

- With longitudinal sutural spot on elytra, prothorax less transverse (1.00 : 1.5—1.6) and transverse depression on pronotum in front of prothoracic base indistinct, teeth on lateral margin of prothorax hardly twice longer than wide (Fig. 15) ...

*trimaculatus* Motschulsky

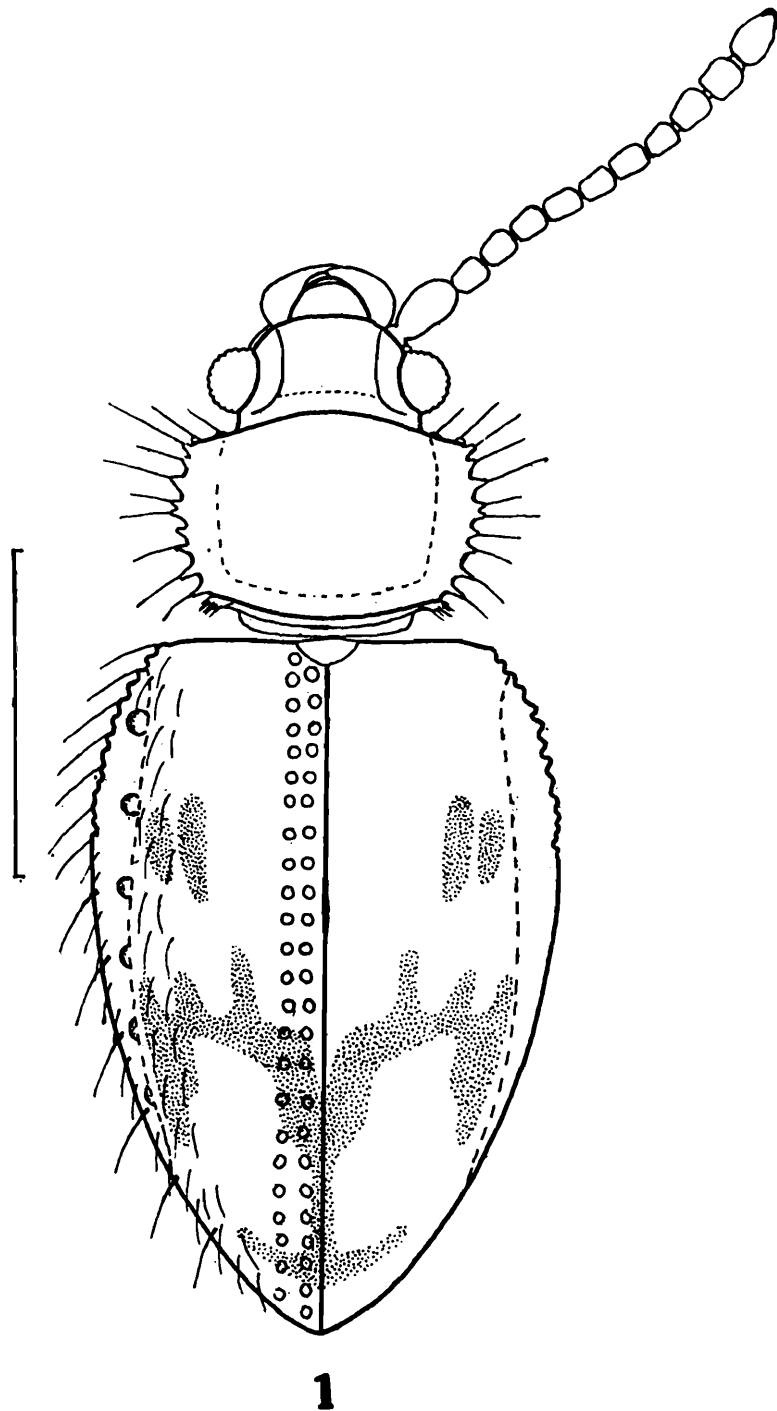
### ***Psammoecus andrewesi* Grouvelle**

*Psammoecus andrewesi* Grouvelle, 1908, *Annls Soc. ent. Fr.* 77 : 476, 486 (Type-loc. : Nilgiri Hills, India ; Type deposition—British Museum Nat. Hist., London ; Type not examined but author's specimens compared with types by T. Sengupta)

This is a characteristic species which can be recognised by its elytra. They are distinctly narrowed behind middle, subacuminate to the apex, bearing a pattern of blackish, linear, longitudinal spots and six large glandular punctures situated along their lateral margins. In addition both elytra and prothorax have their lateral margins distinctly explanate.

General appearance (Fig. 1) elongate, oval, moderately convex, yellowish-brown, blackish linear spots on elytra, antennae unicolourous, body covered with moderately long and semierect pubescence.

*Head* : Exposed part of head wider than long, eyes moderately large and coarsely faceted, length of eye shorter than half of length of head, temple short and not flattened beneath eye, longitudinal striae on vertex well-marked and connected by a transverse stria posteriorly ; puncturation on vertex coarse and dense, clypeus more or less smooth ; setae projected forward. Antenna long and slender, scape large and about one and a half times as long as broad ; segments 2—10 shorter, subequal and more or less elongate ; segment 11 elongate and acuminate to apex. *Prothorax* transverse, convex, width across anterior margin wider than head across eyes, anterior margin rounded and slightly sinuate on either side, maximum width at anterior one-third and slightly narrower posteriorly, laterally rather explanate, lateral margin rounded and with a few moderately large and distinct teeth, anterior and posterior angles obtuse and bearing teeth, puncturation on pronotum coarse and dense as on vertex of head, setae on pronotal disc projecting forward those at sides directed outward. *Scutellum* subtriangular, transverse, more or less smooth. *Elytra* more than one and a half times as long as broad, ovoid, widest beyond middle and subacuminate at apex, strial punctures deep and



1. *Psammoecus andrewesi* Grouvelle, Dorsal view (scale = 1mm.)

large, interstices on anterior half slightly narrower than width of punctures, rather broad and well-marked longitudinal depression along lateral margin, six large glandular punctures along innerpart of lateral margin, lateral margin serrated in anterior half; setae moderately long and directed posteriorly, lateral margin with longer and almost erect setae; blackish, linear, mainly longitudinal spots on each elytron forming a pattern and a longitudinal sutural spot present near apex.

*Measurements*: Total length 2.60—3.35 mm., width of head across eyes 0.66—0.73 mm., length of antenna 1.17—1.46 mm., width of prothorax across middle 0.75—0.92 mm., length of elytra 1.76—2.13 mm. and width across middle 1.11—1.36 mm.

*Material examined*: 3 ex. INDIA : MEGHALAYA, Garo Hills, 1 ex., 19.v.1976, W. Wittmer & C. Baroni ; TAMIL NADU, Nilgiri, 71 Km. E. Coonoor, 1350 m., 1 ex., 19.xi.1972, Besuchet Löbl Mussard ; NEPAL : Kathmandu, Gokaruban, 1 ex., 12.vi.1976, W. Wittmer & C. Baroni.

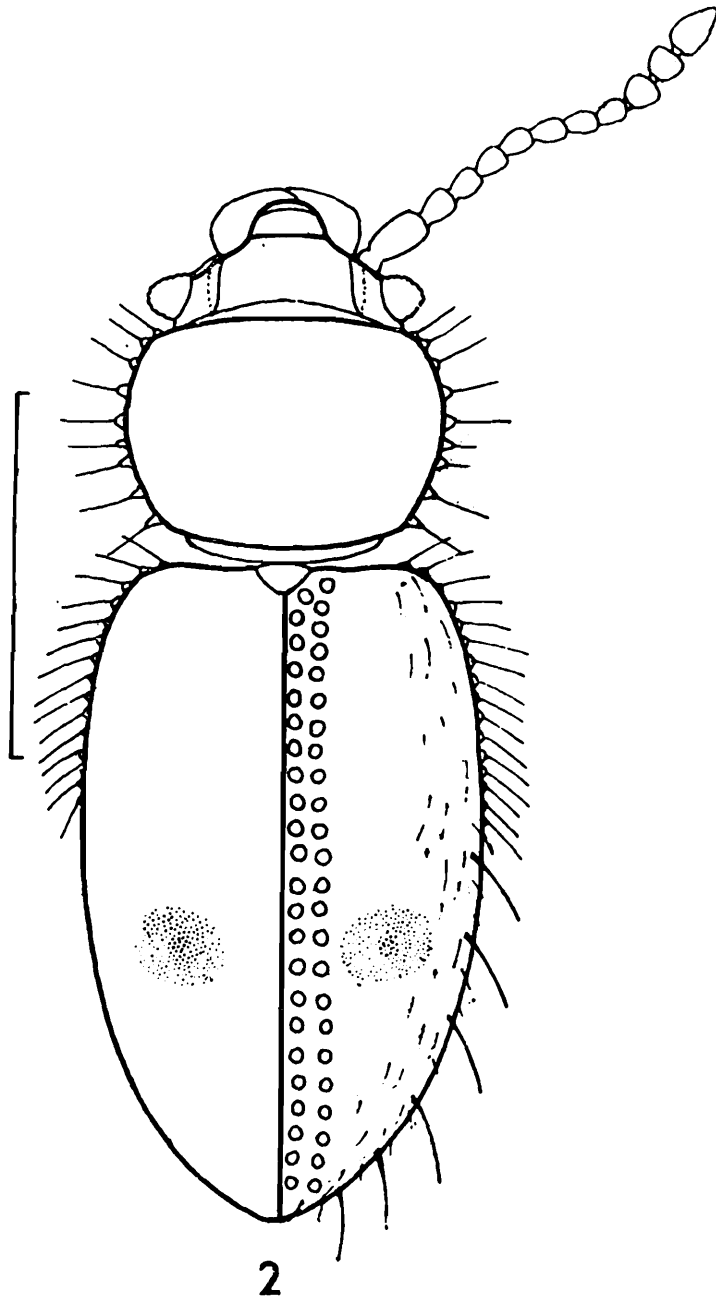
*Distribution*: INDIA : Meghalaya, Tamil Nadu ; NEPAL. Grouvelle (1908) described this species from Tamil Nadu ; Pal and Sengupta (1979) recorded it from Meghalaya and Nepal.

#### ***Psammoecus khasia* sp. nov**

This species resembles *P. andrewesi* Grouvelle from which it can be separated by its elytra without linear, longitudinal spots, having only two small rounded black spots on the posterior half, head across eyes about as wide as prothorax across anterior margin, and thirteen large glandular punctures along the lateral margin of elytra. The latter character distinguishes this species from other known members of the Indian fauna.

General appearance (Fig. 2) elongate, oval, moderately convex, slightly shining, reddish-brown, two blackish spots on elytra, antennae unicolorous, body covered with long and semierect pubescence.

*Head*: Exposed part of head wider than long, eyes moderately large and coarsely faceted, length of eye about one-third of length of head, temple short and not flattened beneath eye, longitudinal striae on vertex long, well-marked and connected posteriorly by a transverse stria ; puncturation on vertex coarse and dense, punctures slightly elongate, clypeus more or less smooth ; setae projecting forward. Antenna long and slender, scape moderately large and shorter than two times as long as broad ; segments 2—8 shorter, subequal and elongate ; segments 9—11 slightly wider, segments 9 and 10 about as long as broad and segment 11 elongate and acuminate to apex. *Prothorax* transverse, convex, maximum width near middle, across anterior margin about as wide as head across eyes, anterior



2. *Psammoecus khasia* sp. nov., Dorsal view (Scale=1 mm.)

margin slightly rounded, lateral margin rounded and with nine small teeth, teeth about as broad as long, anterior and posterior angles obtuse; puncturation on pronotum coarse and dense, punctures somewhat rounded; setae on pronotal disc projecting towards middle line those at sides projecting outward. *Scutellum* subtriangular, clearly transverse and more or less smooth. *Elytra* more than one and a half times as long as broad, ovoid and widest near middle, narrowed behind middle and subacuminate to apex, striae punctures large, interstices narrower than width of punctures, lateral margin

slightly explanate and with thirteen large glandular punctures, setae long and directed posteriorly, lateral margin with longer and erect setae, one rounded blackish spot on posterior half of each elytron.

*Measurements of holotype* : Total length 2.55 mm., width of head across eyes 0.75 mm., length of antenna 1.17 mm., width of prothorax across middle 0.88 mm., length of elytra 1.76 mm. and width across middle 1.10 mm.

*Holotype* : 1 ex., INDIA : ASSAM, Kaziranga, Mikir Hills, 14.xi.1974, T. Sengupta, white flower of medulla tree (*Boga medulla*) (Z.S.I. Reg. No. 9449/H4A, in Zoological Survey of India, Calcutta).

*Distribution* : INDIA : Assam.

### ***Psammoecus decoratus* Grouvelle**

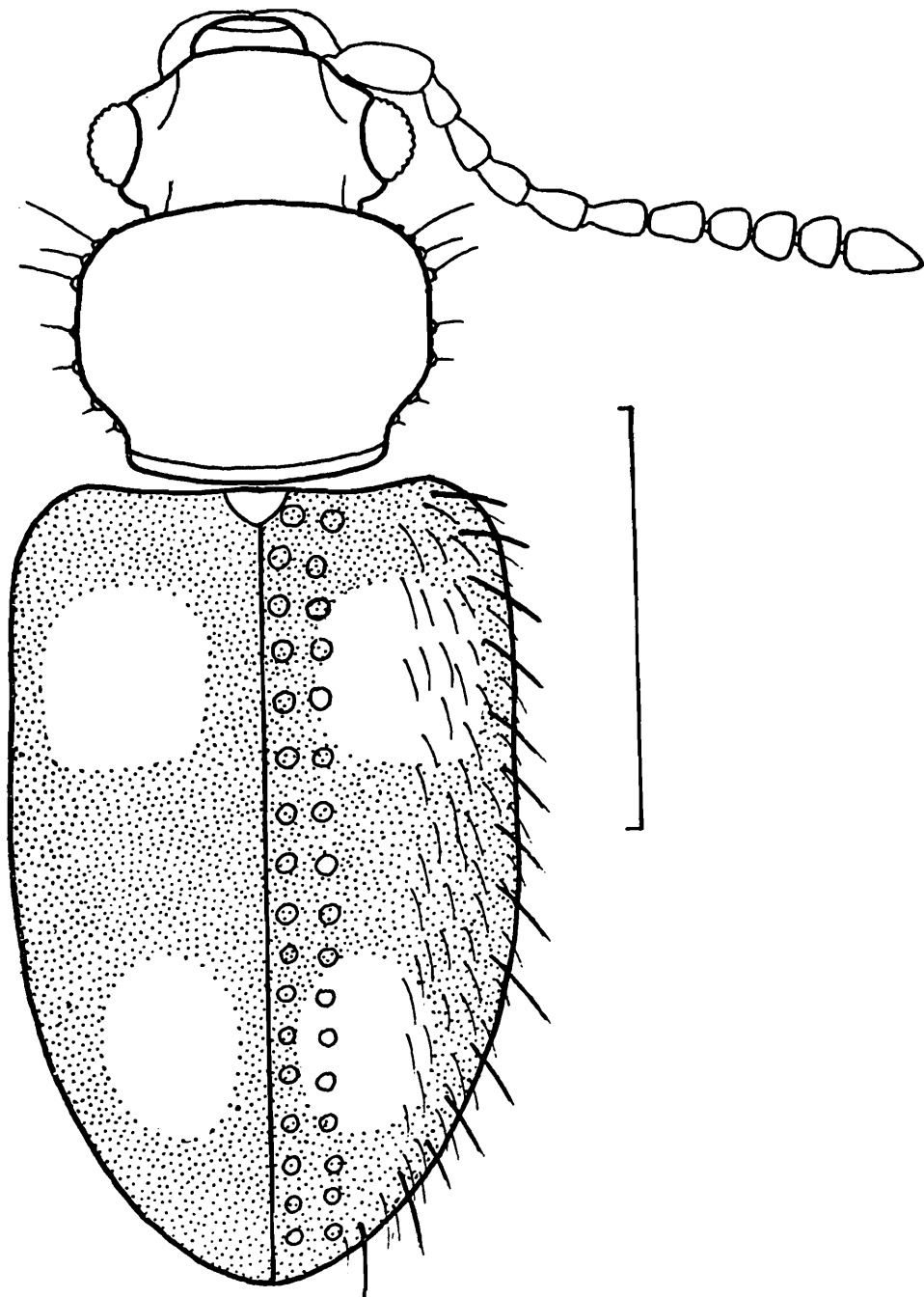
*Psammoecus decoratus* Grouvelle, 1919, *Mem. Ent.* 2 : 29 (Type-loc. : Shembagnaur, Madura District, India ; Type deposition — Museum National d' Historie Naturelle, Paris ; Type examined).

This species can be recognised by its lack of blackish antennal segments although segments 7—10 more reddish than the others, combined with slightly transverse, uniformly convex prothorax with minute and indistinct prothoracic teeth, and the two somewhat rounded unpigmented areas on each elytron.

General appearance (Fig. 3) elongate, oval, moderately convex, slightly shining, reddish-brown, four light areas on blackish elytra, antennal segments 7—10 more reddish than other segments, body covered with moderately long and semierect pubescence.

*Head* : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye about half as long as head, temple short and slightly flattened beneath eye, longitudinal striae on vertex short and superficial ; puncturation on vertex coarse and dense, clypeus more or less smooth ; setae projecting forward. Antenna long and slender, scape large and slightly longer than two times as long as broad ; segments 2—7 shorter, subequal and elongate ; segments 8—10 slightly wider than preceding segments, segment 8 about as long as broad, segments 9 and 10 slightly transverse, segment

11 elongate and acuminate to apex, scape to segment 6 reddish-brown, segments 7—10 more reddish than those preceding segments, segment 11 yellowish. *Prothorax* slightly transverse, convex, maximum width near middle, across anterior margin about as wide as head across eyes, anterior margin rounded, lateral margins more or less parallel for anterior two-thirds then somewhat abruptly narrowed and slightly sinuate near posterior angle, lateral margin with six more or less

**3**

3. *Psammoecus decoratus* Grouvelle, Dorsal view (scale = 1 mm.)

visible minute teeth which are broader than long, anterior and posterior angles obtuse ; puncturation on pronotum coarse and dense, slightly coarser than on vertex of head ; setae on pronotal disc projecting towards middle line and at sides projecting outward. *Scutellum* subtriangular, slightly transverse and smooth. *Elytra* more than one and a half times as long as broad, ovoid and widest near middle, striae punctures moderately large and rounded, interstices about as wide as a puncture in anterior half and narrower posteriorly, setae moderately long and directed posteriorly, lateral margins with long and almost erect setae ; two more or less rounded unpigmented areas on each elytron formed by three transverse blackish bands on elytra, a humeral, a medial one and an apical band connected along suture and laterally.

*Measurements of the 'Type'* : Total length 3.00 mm., width of head across eyes 0.76 mm., length of antenna 1.50 mm., width of prothorax across middle 0.82 mm., length of elytra 1.85 mm. and width across middle 1.17 mm.

*Material examined* : 1 ex. 'Type', INDIA : TAMIL NADU, Madura District, Shembagnaur, 'Samboangau' written on the label (in Museum d' Histoire Naturelle, Paris).

*Distribution* : INDIA : Tamil Nadu.

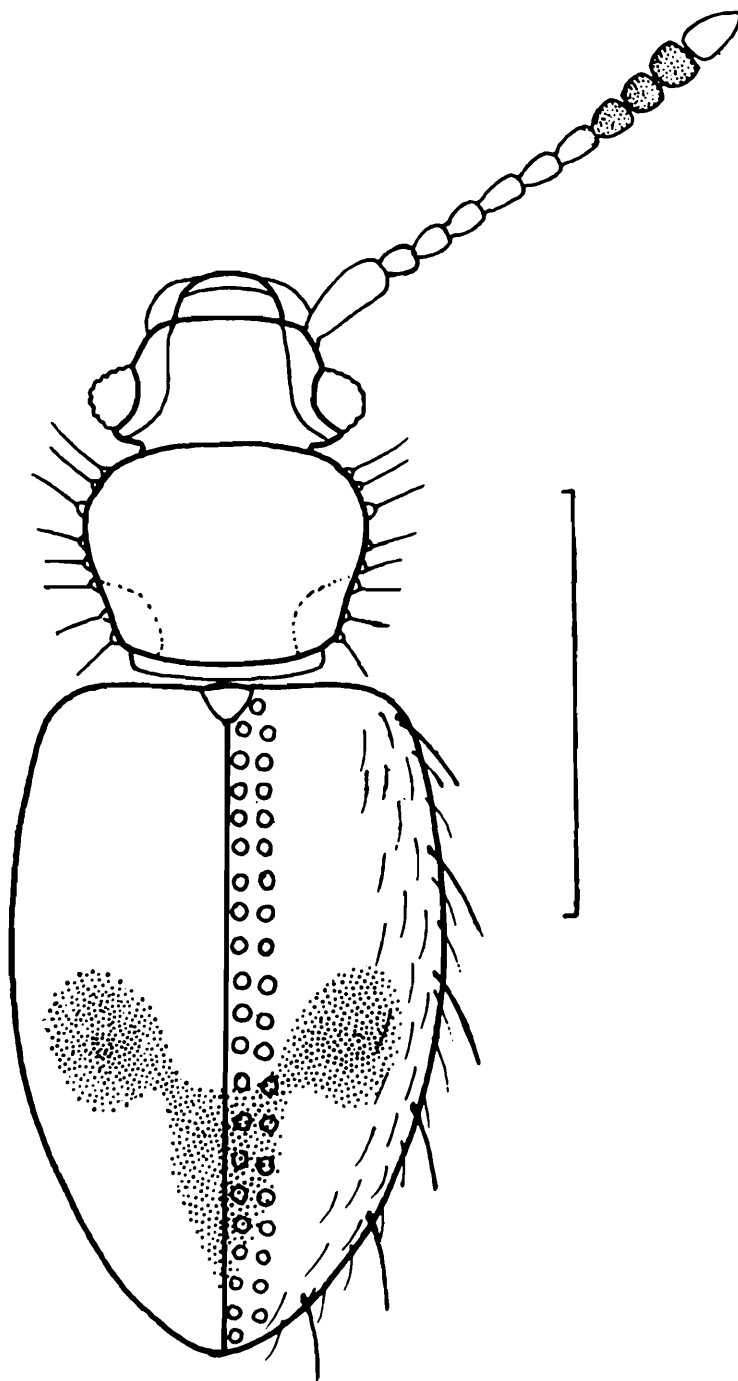
### ***Psammoecus lepidus* Grouvelle**

*Psammoecus lepidus* Grouvelle, 1908, *Annls Soc. ent. Fr.* 77 : 483, 488 (Type-loc. : Shembagnaur, Madura District, India ; Type deposition — Museum National d' Histoire Naturelle, Paris ; Type examined).

This species is similar and apparently closely related to *P. harmandi* Grouvelle. It may be distinguished by the colour of the antennal segments (see below) and the form of the prothorax which has lateral margins slightly sinuate before posterior angles.

General appearance (Fig 4) elongate, oval, moderately convex, slightly shining, head and prothorax usually blackish-brown, elytra yellowish-brown with blackish spots, antennal segments 8 to 10 plus apical part of 7 blackish, body covered with moderately long and semierect pubescence.

*Head*: Exposed part of head wider than long, eyes large and coarsely faceted, length of eye about one-third as long as head, temple short and slightly flattened beneath eye, longitudinal striae on vertex long and distinct; puncturation on vertex coarse and dense, clypeus more or less smooth; setae projecting forward. Antenna long and slender, scape large and about three times as long as broad; segments 2—7 shorter, subequal and elongate, segments 8—10 slightly



4

4. *Psammoecus lapidus* Grouvelle, Dorsal view (scale = 1 mm.)

wider, segment 8 slightly elongate, segment 9 about as long as broad and segment 10 slightly transverse, segment 11 elongate and acuminate to apex; scape to segment 7 yellowish-brown, segments 8–10 and apical part of segment 7 blackish, segment 11 yellowish. *Prothorax* about as long as broad or slightly transverse, convex, maximum width near anterior margin and narrowed posteriorly, width across anterior margin slightly wider than head across eyes, anterior margin rounded, lateral margin rounded and slightly sinuate before posterior angle; teeth on lateral margin minute, indistinct and usually broader than long; anterior and posterior angles obtuse; puncturation on pronotum coarse and dense, and slightly coarser than that on vertex of head, setae on pronotal disc projecting towards middle and at sides projecting outward. *Scutellum* subtriangular, about as broad as long and more or less smooth. *Elytra* slightly more than one and a half times as long as broad, ovoid and widest near middle, striae punctures large, interstices narrower than punctures, setae moderately long and directed posteriorly, lateral margin with long and almost erect setae; a more or less rounded blackish spot on posterior half of each elytron, a longitudinal sutural spot more or less distinct and narrowed posteriorly, rounded spot sometimes connected with the longitudinal spot. Aedeagus (Fig. 31) with median lobe broad, abruptly narrowed and rather broadly pointed at apex; parameres long and slender, each paramere with a few long apical setae and some short setae on its surface.

*Measurements*: Total length 2.26–2.85 mm., width of head across eyes 0.61–0.69 mm., length of antenna 1.23–1.39 mm., width of prothorax across middle 0.64–0.76 mm., length of elytra 1.47–1.97 mm. and width across middle 1.00–1.25 mm.

*Material examined*: 81 ex. 'Type', 1 ex., INDIA: TAMIL NADU, Madura, Shembagnaur (in Museum National d' Histoire Naturelle, Paris), UTTAR PRADESH, Bhowali, 35 km. from Kathgodam, 1736 m., 1 ex., 14.x.1976, T. Sengupta, *Crysanthemum* sp. (flower); Chambal, 1 ex., 19.x.1976, T. Sengupta, haystack; KERALA, Cardamom H., Multapaltipres Munnar, 1700 m., 1 ex., 24.xi.1972, Besuchet-Löbl-Mussard; TAMIL NADU, Palni H., Berijam Lake, 2150 m., 56 ex., 14.xi.1972, Besuchet Löbl Mussard; Kodaikanal, 2100 m., 14 ex., Besuchet-Löbl-Mussard; 10 km. N—0 Kodaikanal, 2150 m., 6 ex., 15.xi.1972, Besuchet-Löbl-Mussard; BHUTAN:

Chimakothi, 1900—2300 m., 1 ex., 22.v., Nat. Hist. Mus. Basel—Bhutan Expedition 1972.

*Distribution* : INDIA : Uttar Pradesh, Kerala, Tamil Nadu ; BHUTAN. So far this species is recorded from Tamil Nadu ; Pal and Sengupta (1979) recorded it from Bhutan and in the present study this species is recorded from Kerala and Uttar Pradesh for the first time.

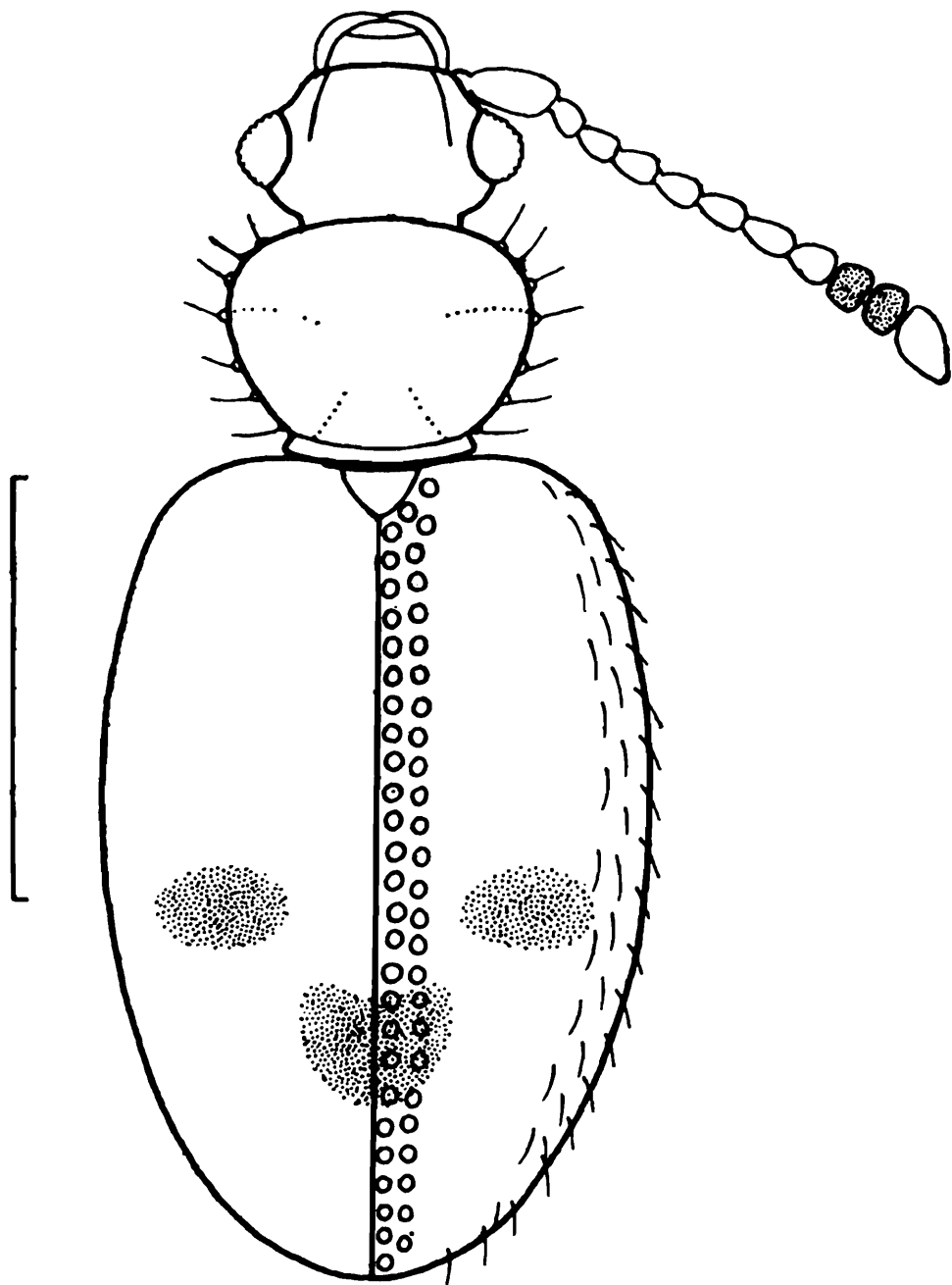
### ***Psammoecus harmandi* Grouvelle**

*Psammoecus harmandi* Grouvelle, 1912, *Bull. Mus. Paris* 28 : 413 (Type-loc. : Darjeeling, India ; Type deposition—Museum National d' Histoire Naturelle, Paris ; Type examined).

This species can be recognised by the combination of prothoracic characters, teeth minute, sides more or less depressed, lateral margins rounded and narrowed behind middle ; and the blackish antennal segments 9 and 10 (see *lepidus* above).

General appearance (Fig. 5) elongate, oval, moderately convex, slightly shining, yellowish to reddish-brown, blackish spots on elytra, antennal segments 9 and 10 blackish, body covered with moderately long and semierect pubescence.

*Head* : Exposed part of head wider than long, eyes large and coarsely faceted, length of eye shorter than half that of head, temple moderately long and slightly flattened beneath eye, longitudinal striae on vertex extending about half way across head, not strongly impressed ; puncturation on vertex coarse and dense, clypeus more or less smooth ; setae projecting forward. Antenna long and slender, scape moderately large and about two times as long as broad, pedicel short and elongated, segments 3—7 longer than pedicel and subequal ; segments 8—11 slightly wider than segment 7, segment 8 slightly elongate, segment 9 about as broad as long, segment 10 slightly transverse and segment 11 slightly acuminate to apex ; scape to segment 8 yellowish-brown, segments 9 and 10 blackish, segment 11 yellowish. *Prothorax* transverse, convex, across anterior margin about as wide as head across eyes, anterior margin rounded, lateral margin slightly rounded and with six minute teeth, anterior and posterior angles obtuse ; puncturation on pronotum coarse, dense and almost similar to that on vertex of head, setae on pronotal disc



5

5. *Psammoecus harmandi* Grouvelle, Dorsal view (scale=1 mm.)

projecting towards middle line and on lateral sides projecting outward. *Scutellum* subtriangular, transverse and more or less smooth. *Elytra* about one and a half times as long as broad, ovoid and widest near middle, striae moderately large and rounded, interstices narrower than punctures, pubescence long and almost erect, one more or less rounded blackish spot on each elytron near middle and a somewhat rounded blackish sutural spot behind them. *Aedeagus* (Fig. 32) with median lobe broad, gradually narrowed and slightly

constricted before apex ; parameres rather short, broadly elongate, each paramere with two long setae near apex and a few short setae plus small glandular 'punctures' on the surface.

*Measurements* : Total length 2.85—3.08 mm., width of head across eyes 0.36—0.41 mm., length of antenna 1.41—1.55 mm., width of prothorax across middle 0.67—0.83 mm, length of elytra 1.83—2.02 mm. and width across middle 1.17—1.33 mm.

*Material examined* : 4ex., 1ex., 'Type' labelled : MUSEUM PARIS, DARJEELING, Harmand 1890 [printed rectangular] *Psammoecus trimaculatus* Mots., A. Grouvelle det. 1903 (not Grouvelle's handwriting) TYPE (printed, rectangular, red), *Psammoecus Harmandi* Ty. Grouv. (Grouvelle's handwriting) (in Museum National d' Histoire Naturelle, Paris) ; INDIA : WEST BENGAL, Darjeeling District, Jhepi, 37 km. from Ghoombhanjang, 1 ex., 3.v.1976, T K. Pal, under garbage of *Cryptomaria japonica* leaf ; SIKKIM Gangtok, 1 ex., 24.iv. 1976, T K. Pal, under garbage of *Cryptomaria japonica* leaf ; NEPAL : Kathmandu, 1 ex., 29.iii.1972, T Sengupta, haystack.

*Distribution* : INDIA : West Bengal (Darjeeling District), Sikkim ; NEPAL. This species is record from Sikkim and Nepal for the first time.

#### ***Psammoecus delicatus* Grouvelle**

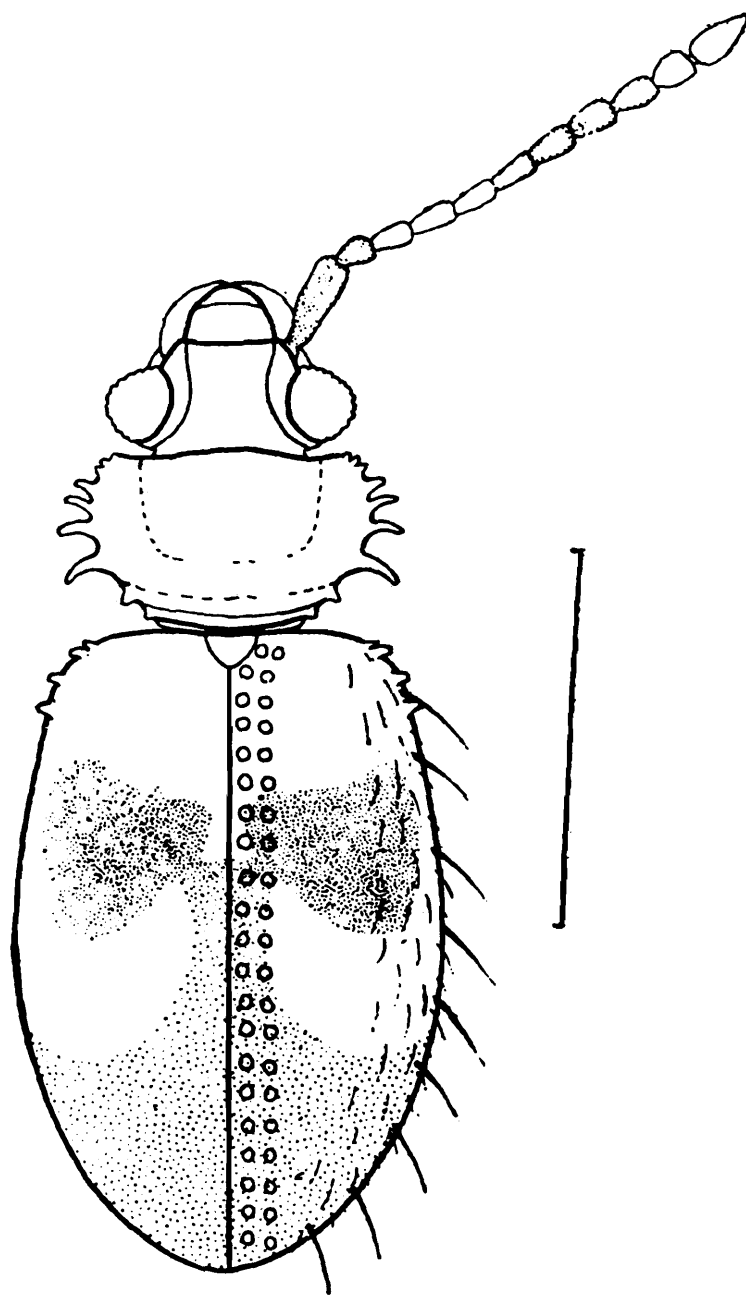
*Psammoecus delicatus* : Grouvelle, 1908, *Annls Soc. ent. Fr.* 77 : 477 (Type-loc. : Sri Lanka ; Type deposition — Museum National d' Historie Naturelle, Paris ; Type examined).

This species is very similar to *P. complexus* sp. nov. but can be distinguished by eye and antennal characters (see under *complexus*).

General appearance (Fig. 6) elongate, oval, moderately convex, slightly shining, yellowish to reddish-brown, blackish spots on elytra ; antennal scape, pedicel, apical part of segment 6 and segment 7—9 blackish.

*Head* : Exposed part of head wider than long, eyes large and coarsely faceted, eye shorter than half of length of head, temple short and slightly flattened beneath eye, longitudinal striae on vertex well-marked and extending to back of head beyond eye ; puncturation on vertex coarse, dense, clypeus more or less smooth ; setae

projecting forward. Antenna long and slender, scape large and about three times as long as wide, pedicel short and elongate, segments 3—7 longer than pedicel and subequal, segments 8—11 slightly wider than segment 7 and elongate, segment 11 acuminate to apex; scape, pedicel, apical part of segment 6 and segments 7—9 blackish.



6

6. *Psammoecus delicatus* Grouvelle, Dorsal view (scale = 1 mm.)

*Prothorax* transverse, convex, across anterior margin about as wide as head across eyes, anterior margin sinuate, lateral margin outwardly curved and with nine teeth of variable size, teeth gradually becoming longer towards posterior side and attain its maximum length above

penultimate tooth, longest tooth about four times as long as wide, all teeth somewhat blunt at apex; anterior and posterior angles obtuse bearing teeth, lateral margin of pronotum widely explanate and transverse prebasal impression prominent, puncturation on pronotum coarse and dense and slightly coarser than that on vertex of head, pubescence on pronotal disc scanty. *Scutellum* subtriangular, transverse and more or less smooth. *Elytra* more than one and a half times as long as broad, ovid and widest near middle, strial punctures large and round, interstices about as wide as punctures, setae moderately long and directed posteriorly, lateral margin with long and almost erect setae; two transverse blackish areas on elytra, one in anterior half and one at apex, areas connected along suture by longitudinal sutural band.

*Measurements* : Total length 2.41—2.57 mm., width of head across eyes 0.54—0.60 mm., length of antenna 1.38—1.44 mm, width of prothorax across middle (excluding lateral teeth) 0.58—0.66 mm., length of elytra 1.41—1.67 mm. and width across middle 0.97—1.05 mm.

*Material examined* : 4 ex. 1 ex., 'Type', SRI LANKA ('Ceylan, Horn' written on label) (in Museum National d' Histoire Naturelle, Paris), INDIA : Kerla, Cardamon H., Valara Fall, 450—500 m., 1 ex., 25.xi.1972, Besuchet Löbl Mussard; Sri Lanka (Central), Kandy, 600 m., 1 ex., 15.i.1970, Mussard Besuchet Löbl; 1 ex. (particular locality not given), i. 1965, R. Mussard.

*Distribution* : INDIA : Kerala; SRI LANKA.

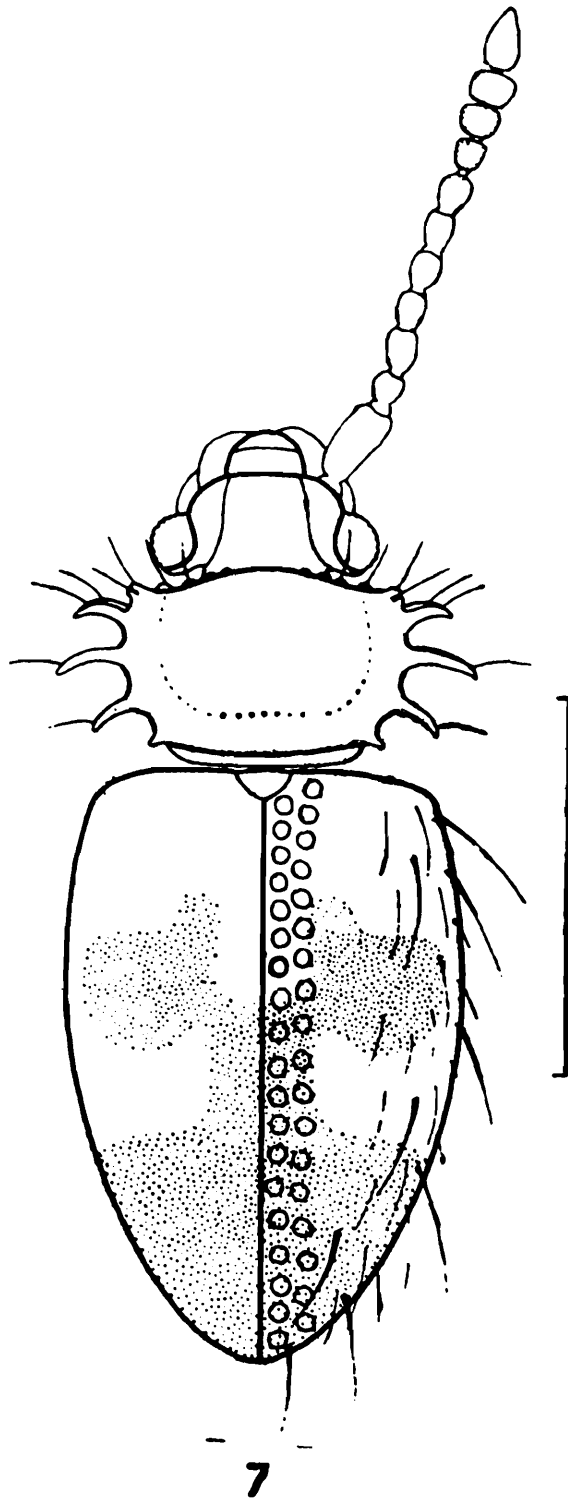
This is the first record of the species from India.

#### ***Psammoecus complexus* sp. nov.**

This species is closely related to *P. delicatus* Grouvelle but can be distinguished by its smaller eyes about one-third as long as head; antennal segments shorter and segments 9 and 10 slightly transverse, scape, pedicel and segment 7 not blackish; prothoracic teeth pointed apically, elytral interstices narrower than strial punctures and the presence of seven large glandular punctures along lateral margin.

General appearance (Fig. 7) elongate, oval, moderately convex, reddish-brown, blackish areas on elytra and antennal segments 8 and 9 slightly blackish, body covered with long and semierect pubescence.

*Head*: Exposed part of head. wider than long, eyes moderately large and coarsely faceted, length of eye shorter than one-third that of head ; temple short, flattened beneath eye and shelf-like ; longitudinal striae distinct, extending to point where temples joins neck ; puncturation on vertex coarse and dense, that on clypeus slightly finer, setae moderately long and directed forward. Antenna long and slender,



7. *Psammoscus complexus* sp. nov., Dorsal view (scale = 1 mm.)

scape moderately large and about two times as long as broad, pedicel short and slightly elongate ; segments 3—7 longer than pedicel, subequal and elongate, segment 8 shorter than segment 7 and slightly elongate, segments 9 and 10 slightly transverse, segment 11 elongate and acuminate to apex, apical part of segment 7 plus segments 8 and 9 blackish. *Prothorax* transverse, convex across anterior margin wider than head across eyes, anterior margin sinuate bearing few small denticles ; lateral margin outwardly curved with four teeth, anterior three long and somewhat pointed apically, longest tooth about four times as long as wide, others approximately three times as long ; lateral margin of pronotum explanate and transverse prebasal impression moderately prominent, puncturation on pronotum coarse and dense, slightly coarser than that on vertex on head, setae on pronotal disc projecting forward and those at sides and on teeth projecting outward. *Scutellum* subtriangular, transverse and more or less smooth. *Elytra* shorter than one and a half times as long as broad, ovoid and widest near middle, striae punctures large and rounded, seven large glandular punctures along lateral margin, interstices narrower than punctures, with moderately long and almost erect setae intermingled with longer setae ; two somewhat blackish areas on each elytron, one in basal half and one covering apical two-fifths, areas connected by a sutural spot.

*Measurements of holotype* : Total length 2.50 mm., width of head across eyes 0.64 mm., length of antenna 1.44 mm., width of prothorax across middle (excluding teeth) 0.76 mm., length of elytra 1.61 mm. and width across middle 1.11 mm.

*Holotype* : 1 ex., INDIA : WEST BENGAL, Darjeeling District, 3 km. S. of Ghum, 12.iv.1967, Gy. Topal, sifted mosses (in Termesztudományi Múzeum, Budapest).

*Distribution* : INDIA : West Bengal (Darjeeling District).

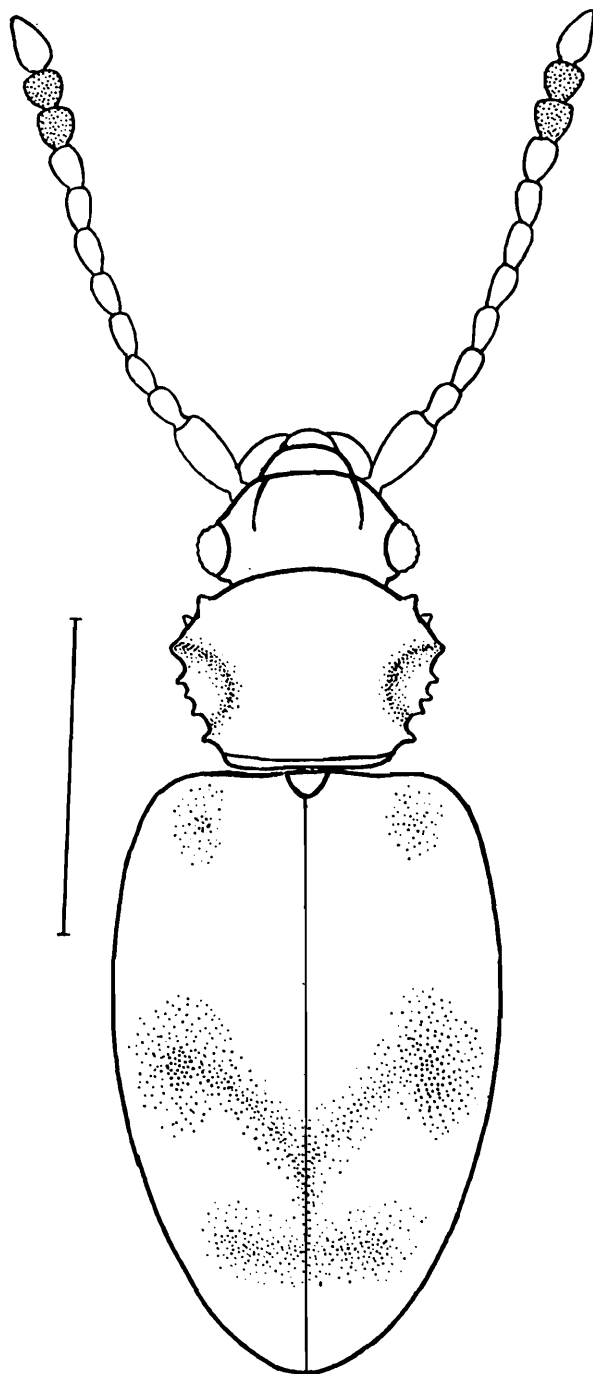
#### ***Psammoecus wittmeri* Pal and Sengupta**

*Psammoecus wittmeri* Pal and Sengupta, *Entomologica Basiliensia* 4 : 76-76 (Type loc. : Darjeeling, India ; Type deposition—Naturhistorischen Museum, Basel ; Type examined).

This species is near *P. gratiosus* Grouvelle but can be distinguished by having only segments 9 and 10 of antenna black, eyes shorter and the characteristic elytral marking (Fig. 8)

General appearance (Fig. 8) elongate, oval moderately convex, slightly shining, reddish-brown, segments 9 and 10 blackish, body covered with moderately long and semierect pubescence.

*Head*: Exposed part of head wider than long, eyes moderately large and coarsely faceted, length of eye one-third that of head, temple short and slightly flattened beneath eye; longitudinal striae on vertex short, extending half way across head; puncturation on vertex coarse and

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8. *Psammoecus wittmeri* Pal and Sengupta, Dorsal view (scale=1 mm.)

dense, clypeus more or less smooth, setae directed forward. Antenna long and slender, scape large and slightly more than twice as long as wide ; segments 2—8 short, subequal and elongate, segments 9 and 10 wider and about as broad as long, segment 11 elongate and acuminate to apex ; segments 1—8 reddish-brown, segments 9 and 10 blackish, segment 11 yellowish. *Prothorax* convex, slightly transverse and narrowed posteriorly, wider across anterior margin than head across eyes, slightly depressed laterally, anterior margin rounded bearing two small teeth on either side, lateral margin almost straight with five small teeth, anterior and posterior angles obtuse, anterior angle with a tooth ; puncturation on pronotum coarse, dense and slightly coarser than that on vertex of head. *Scutellum* subtriangular, transverse and smooth. *Elytra* about one and a half times as long as broad, ovoid and widest near middle, striae punctures deep and large, interstices about as wide as punctures ; two somewhat black spots present near middle with extensions meeting at suture, posterior to these there is a transverse spot and anteriorly two indistinct blackish spots, one near each humeral angle.

*Measurements of holotype* : Total length 2.94 mm., width of head across eyes 0.75 mm., length of antenna 1.61 mm., width of prothorax across middle 0.73 mm., length of elytra 1.91 mm. and width across middle 1.17 mm.

*Material examined* : Holotype ♀, INDIA : WEST BENGAL, Darjeeling District, Lebong, 1800—1900 m., 11.v.1973, W. Wittmer (in Natur historischen Museum, Basel).

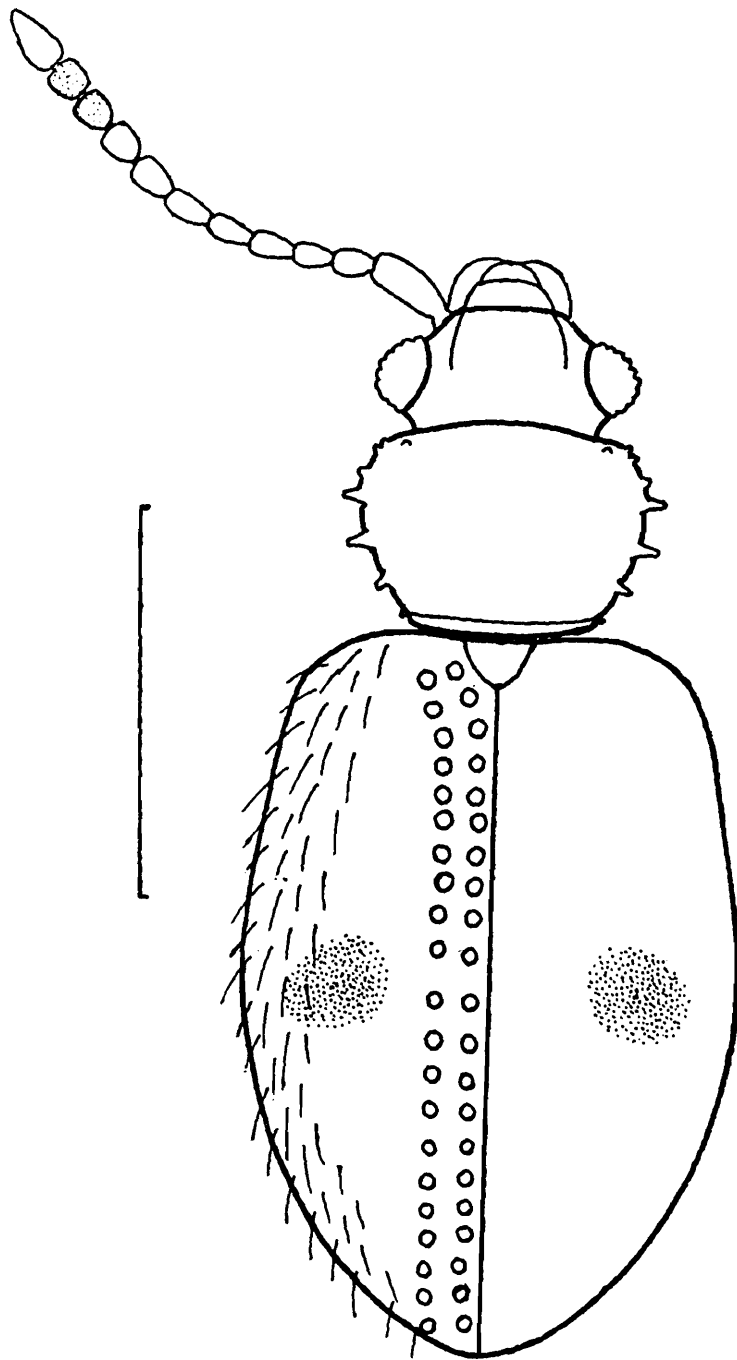
*Distribution* : INDIA : West Bengal (Darjeeling District).

#### ***Psammoecus bhutanicus* sp. nov.**

This species resembles *P. trilochana* sp. nov. but can be distinguished by its eyes being distinctly larger (slightly less than half of length of head), antennal segments 9 and 10 not distinctly blackish although slightly darker than preceding segments and its indistinct elytral pattern of two blackish spots, lateral sides of pronotum without any depression and elytral interstices wider.

General appearance (Fig. 9) rather elongate, oval, moderately convex, slightly shining, yellowish-brown, faint blackish spots on elytra and segments 9 and 10 of antenna darker than preceding segments, body covered with moderately long and semierect pubescence.

*Head*: Exposed part of head wider than long, eyes large and coarsely faceted, eye slightly shorter than half of length of head, temple moderately long and slightly flattened beneath eye, longitudinal striae on vertex short and superficial; puncturation on vertex coarse and dense, clypeus more or less smooth; pubescence scanty and directed forward. Antenna long and slender, scape moderately large and about two times as long as broad; segments 2—6 shorter, subequal and



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9. *Psammoecus bhutanicus* sp. nov., Dorsal view (scale = 1 mm.)

elongate ; segments 7—11 slightly wider than segment 6 and more or less elongate, segment 11 acuminate to apex. *Prothorax* transverse, convex and narrowed posteriorly, across anterior margin about as wide as head across eyes, anterior margin slightly rounded and slightly sinuate at sides ; lateral margin outwardly curved bearing six teeth, anterior three small and inconspicuous, posterior three longer and obvious ; anterior and posterior angles obtuse ; puncturation on pronotum coarse and dense and slightly more so than on vertex of head, pubescence on pronotal disc scanty. *Scutellum* subtriangular, transverse and more or less smooth. *Elytra* slightly longer than one and a half times as long as broad, ovoid and widest near middle, strial punctures moderately large and rounded, interstices about as wide as width of punctures in anterior half and wider than punctures in posterior half, with moderately long and semierect setae, a more or less rounded, faint, blackish spot on each elytron near middle.

*Measurements of holotype* : Total length 2.79 mm., width of head across eyes 0.69 mm., length of antenna 1.44 mm., width of prothorax across middle 0.70 mm., length of elytra 1.85 mm. and width across middle 1.23 mm.

*Holotype* : 1 ex., BHUTAN : Phuntsholing, 21. i. 1969, S. K. Mitra, (Z.S.I. Regn. No. 9450/H4A, in Zoological Survey of India, Calcutta)

*Distribution* : BHUTAN.

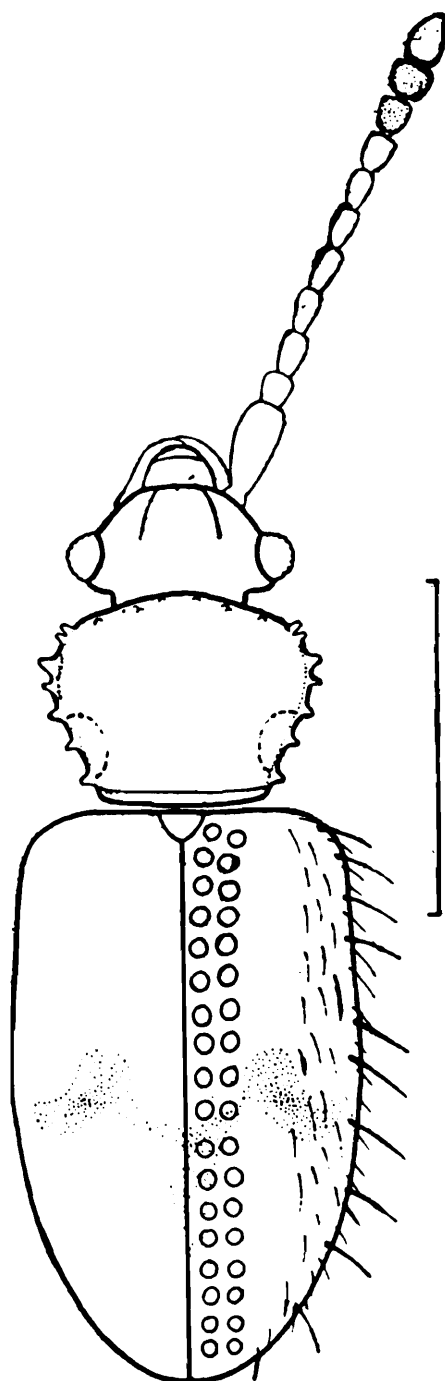
***Psammoecus trilochana* sp. nov.**

This species comes close to *P. graciosus* Grouvelle but can be distinguished from the latter by not having its antennal segments 7 and 8 blackish, by having smaller eyes, prothorax less transverse and its lateral margin slightly sinuate before posterior angle, a transverse blackish spot at the apex of elytra.

General appearance (Fig. 10) elongate, oval, moderately convex, slightly shining, yellowish-brown to blackish-brown, blackish marks on elytra and antennal segments 9 and 10 blackish, body covered with moderately long and semierect pubescence.

*Head* : Exposed part of head wider than long, eyes large and coarsely faceted, eye slightly longer than one-third of length of head,

temple moderately long and slightly flattened beneath eye, longitudinal striae on vertex superficial, extending half way to back of head ; puncturation on vertex coarse and dense, clypeus more or less smooth, setae projecting forward. Antenna long and slender, scape moderately large and slightly more than twice as long as broad, pedicel short and slightly elongate, segments 3—7 subequal and longer than pedicel, segments 8—11 slightly wider than segment 7, segments 8 and 9 slightly elongate, segment 10 about as broad as long, segment 11 elongate and



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10. *Psammoecus trilochana* sp. nov., Dorsal view (scale = 1 mm.)

acuminate to apex ; scape to segment 8 yellowish brown, segments 9 and 10 blackish, segment 11 yellowish. *Prothorax* about as broad as long, convex, across anterior margin about as wide as head across eyes, anterior margin round with a few small denticles ; lateral margin outwardly curved and slightly sinuate at posterior half, bearing six or seven obvious teeth about as broad as long and somewhat blunt, anterior and posterior angles obtuse and bearing teeth ; puncturation on pronotum coarse, dense and almost similar to that on vertex of head ; setae on pronotal disc projecting towards middle line and on lateral sides projecting outward. *Scutellum* subtriangular, transverse and more or less smooth. *Elytra* slightly less than one and a half times as long as broad, ovoid and widest near middle, striae punctures large and round, interstices narrower than punctures, setae moderately long and directed posteriorly, lateral margins with long and almost erect setae, a somewhat oblique blackish spot on each elytron near middle with extension along suture. Aedeagus (Fig. 30) with median lobe broad and rather pointed at apex ; parameres long and slender, each paramere with two long apical setae and numerous short setae along inner margin and on surface.

*Measurements of holotype* : Total length 2.79 mm., width of head across eyes 0.70 mm, length of antenna 1.63 mm., width of prothorax across middle 0.73 mm., length of elytra 1.75 mm. and width across middle 1.10 mm.

*Holotype* ♂, NEPAL : Daman, 31.iii.1972, T. Sengupta, under cut long grass, Aedeagus dissected and mounted on cover slip and pinned with holotype ; *Paratypes* 12 ex., data the same as holotype ; *Paratypes* 3 ex., INDIA : HIMACHAL PRADESH, Simla, Mashobra, 2149 m., 25.vi.1975, T. Sengupta, beat of grass hanging on hills (Z.S.I. Regn. No 9451-9466/H4A, in Zoological Survey of India, Calcutta).

*Distribution* : INDIA : Himachal Pradesh ; NEPAL.

### ***Psammoecus simoni* Grouvelle**

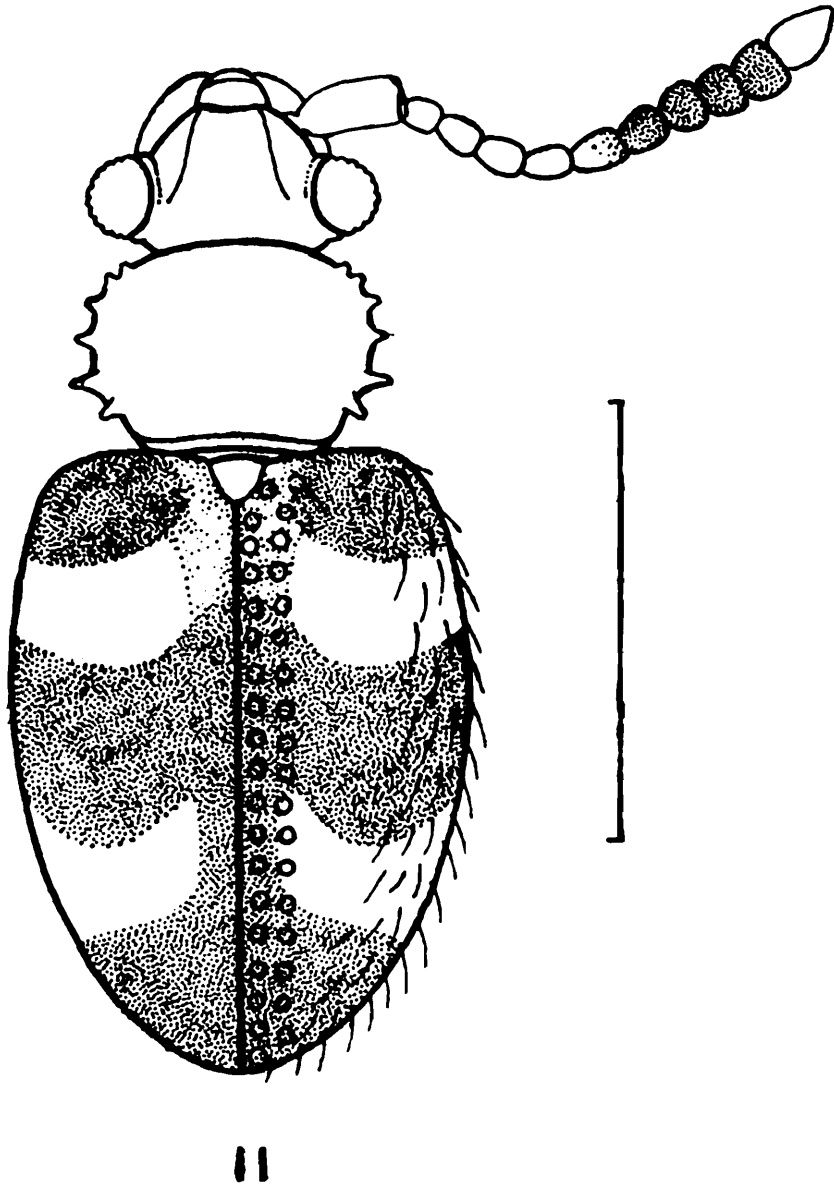
*Psammoecus simonis* Grouvelle, 1892, *Annls Soc. ent. Fr.* 61 : 287 (Type : loc. Philippines ; Type deposition—Museum National d' Histoire Naturelle, Paris Type examined).

*Psammoecus simoni* Grouvelle : Grouvelle, 1908, *Annls Soc. ent. Fr.* 77 : 476, 488.

This is a distinct species which can be immediately recognised by elytral pattern (see figure).

General appearance (Fig. 11) elongate, oval, moderately convex, slightly shining, yellowish-brown with three transverse blackish areas on elytra, antennal segment 6 slightly and segments 7-10 distinctly blackish, body covered with moderately long and semierect pubescence.

*Head*: Exposed part of head wider than long, eyes large and coarsely faceted, eye slightly shorter than half length of head, temple short and slightly flattened beneath eye, longitudinal striae on vertex superficial, reaching to posterior third of head; puncturation on vertex coarse and dense, clypeus more or less smooth; setae projecting forward. Antenna long and slender, scape large and about two times as long as broad, segments 2—6 shorter and subequal; segments 7—11 wider than other funicular segments, segment 7 slightly elongate,



11. *Psammoecus simoni* Grouvelle, Dorsal view (Scale=1 mm.)

segment 8 about as broad as long, segments 9 and 10 slightly transverse, segment 11 elongate and acuminate to apex; scape to segment 5 yellowish-brown, apical half of segment 6 slightly and segments 7—10 distinctly blackish. *Prothorax* transverse, convex, narrowed behind middle, across anterior margin slightly wider than head across eyes, anterior margin rounded, maximum width across fourth teeth from anterior margin, lateral margin curved bearing six more or less distinct teeth, fourth and fifth teeth from anterior margin longer than others, longest teeth longer than wide, apices somewhat blunt; transverse depression on pronotum in front of prothoracic base slightly marked, anterior and posterior angles obtuse. *Scutellum* subtriangular, slightly transverse and more or less smooth. *Elytra* about one and a half times as long as broad, ovoid and widest near middle, striae punctures moderately large and rounded, interstices usually about as wide as striae punctures, setae moderately long and directed posteriorly; two distinct transverse blackish bands near middle and at apex, two smaller areas near humeral angles, bands and to some extent humeral areas connected by longitudinal sutural marks.

*Measurements* : Total length 2.13—2.58 mm., width of head across eyes 0.66—0.67 mm., length of antenna 1.20—1.32 mm., width of prothorax across middle 0.67—0.69 mm., length of elytra 1.47—1.64 mm. and width across middle 1.05—1.10 mm.

*Material examined* : 5 ex. 1 ex., 'Type', PHILIPPINES : Antipolo, E. Simon (in *Museum National d' Histoire Naturelle*, Paris); INDIA : WEST BENGAL, Calcutta, 1 ex., 30.xi.1971, T Sengupta, under dead pista plant beside a pond; 24 Parganas District, S. Salt Lake, 1 ex., 17.i.1967, Gy. Topal, netted at dusk; SRI LANKA. (Central) : Mahaweli Ganga, à 7 miles de Kandy, 450 m., 1 ex., 15.i.1970; Weligma, 1 ex., 1899, W. Horn.

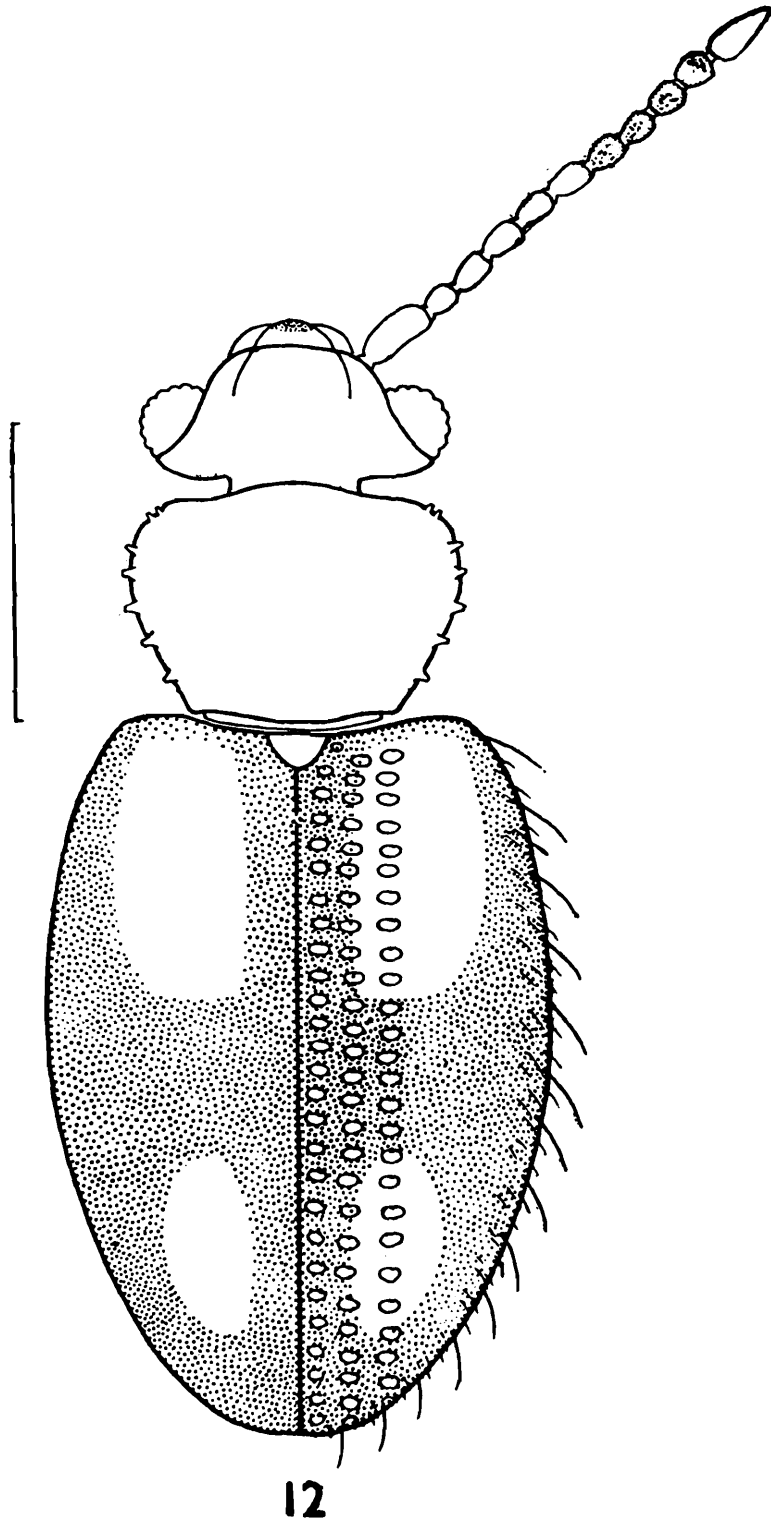
*Distribution* : INDIA : West Bengal; SRI LANKA; MALAYSIA; (Malacca); INDONESIA (Sumatra); PHILIPPINES : Seychelles Is.; MADAGASCAR.

***Psammoecus bambusae* sp. nov.**

This species is apparently closely related to *P. simoni* Grouvelle. The elytral pattern of four longitudinal lighter spots on a blackish background and without humeral spots plus the blackish area on

clypeal margin and subdepressed dorsal surface readily distinguishes this species from *simoni*.

General appearance (Fig. 12) broadly elongate, oval, subdepressed, slightly shining, yellowish-brown with blackish spots on elytra, apical part of clypeus and segments 7—10 of antenna blackish, body covered with long and semierect pubescence.



12. *Psammoecus bambusae* sp. nov., Dorsal view (scale = 1 mm.)

*Head*: Exposed part of head wider than long; eyes large, coarsely faceted and about half as long as head, temple moderately long and slightly flattened beneath eye, neck narrow, longitudinal striae on vertex superficial, about two-fifths as long as head; puncturation on vertex coarse and dense, clypeus more or less smooth and apical margin blackish; setae projecting forward. Antenna long and slender, scape moderately large and slightly more than twice as long as broad, pedicel short and slightly elongate, segments 3—8 subequal and longer than pedicel, segments 9 and 10 slightly wider than preceding segments and less elongate, segment 11 elongate and acuminate to apex; scape to segment 6 yellowish-brown, segments 7—10 blackish, segment 11 yellowish. *Prothorax* distinctly transverse and narrowed posteriorly, slightly convex, anterior margin about as wide as head across eyes and sinuate on either side of middle; lateral margin outwardly curved bearing seven distinct denticles, third to sixth from anterior margin slightly more prominent than others, all about as broad as long; anterior and posterior angles obtuse, puncturation on pronotum slightly denser than on vertex of head. *Scutellum* subtriangular about as broad as long, punctate and pubescent. *Elytra* more than one and a half times as long as broad, ovoid and widest near middle, striae punctures large, interstices narrower than width of punctures, setae long and directed posteriorly; two distinct transverse blackish spots near middle and apex connected by longitudinal sutural and lateral spots, appearing two elongate yellowish areas on anterior and posterior half of blackish elytra. Aedeagus (Fig. 33) with median lobe broadly elongate and rather pointed at apex; parameres long and slender, each paramere with a few long apical setae and a few short on inner margin.

*Measurements of holotype*: Total length 3.65 mm., width of head across eyes 0.90 mm., length of antenna 1.76 mm., width of prothorax across middle 1.60 mm., length of elytra 2.55 mm. and width across middle 1.50 mm.

*Holotype* ♂, INDIA: SIKKIM, Gangtok, 1400 m., 4.iii.1979, S. K. Saha, under sheath of bamboo (*Bambusa aurandaceae*). Aedeagus dissected and mounted on plastic broad and pinned with the holotype; *Paratype* 10 ex., data same as holotype (Z.S.I. Reg. No. 9467-9477/ H4A, in Zoological Survey of India, Calcutta).

*Distribution*: INDIA: Sikkim.

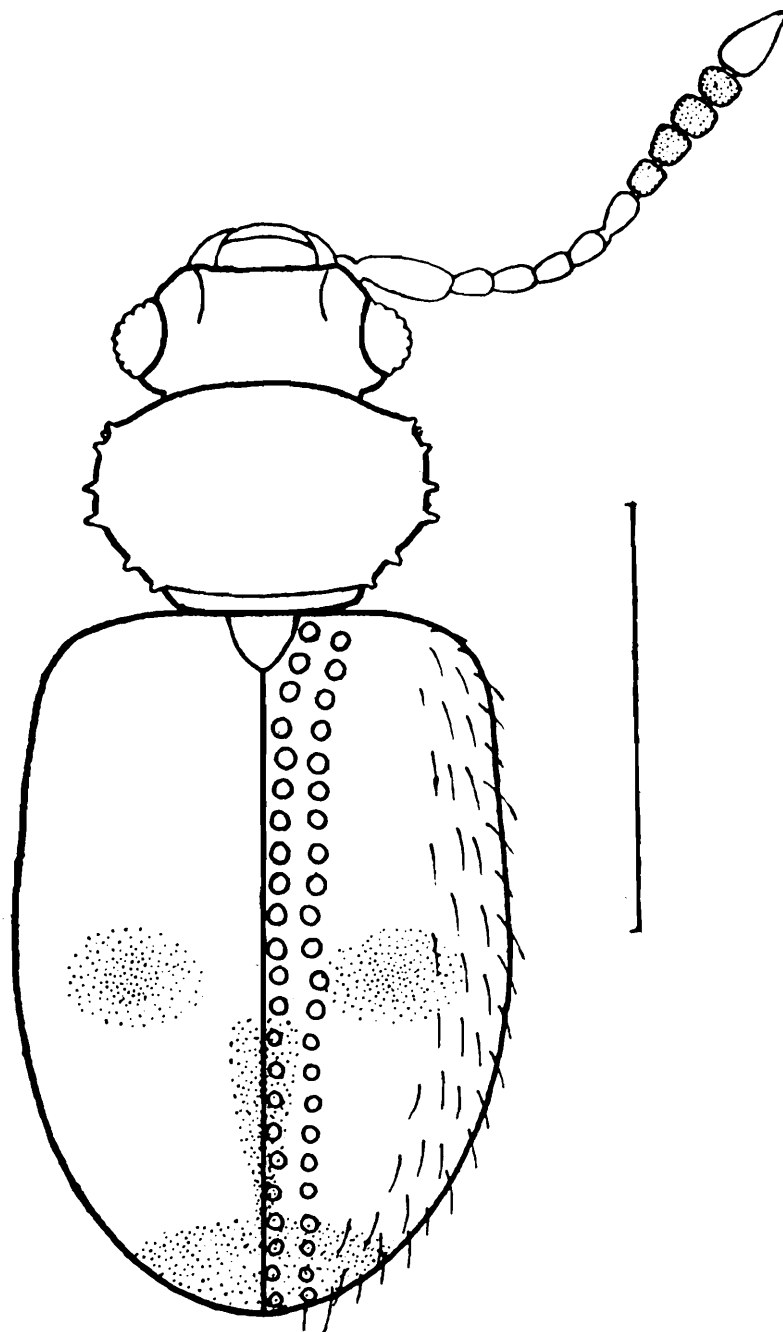
**Psammoecus graciosus** Grouvelle

*Psammoecus graciosus* Grouvelle, 1908, *Annls Soc. ent. Fr.* 77 : 484, 488 (Type-loc. Nilgiri Hills, India ; Type deposition—Museum National d' Histoire Naturelle Paris ; Type examined).

This species can be recognised by its antennal segments 7—10 blackish, prothoracic teeth short and hardly elongate, plus the blackish apex of elytrā distinguishes this from similar species which have an elytral pattern consisting of two medial spots and a sutural one.

General appearance (Fig. 13) elongate, oval, moderately convex, slightly shining, reddish-brown, head and prothorax slightly darker, spots on elytra and antennal segments 7—10 blackish, body covered with moderately long and semierect pubescence.

*Head*: Exposed part of head wider than long, eyes large and coarsely faceted, length of eye about half as long as head, temple short and slightly flattened beneath eye, longitudinal striae on vertex short and superficial ; puncturation on vertex coarse and dense, clypeus more or less smooth ; setae directed forward. Antenna long and slender, scape large and slightly more than twice as long as broad, segments 2—6 shorter, subequal and elongate, segments 7—10 slightly wider, segments 7 and 8 slightly elongate, segments 9 and 10 slightly transverse, segment 11 elongate and acuminate to apex ; scape to segment 6 reddish-brown, segments 7—10 blackish and segment 11 yellowish. *Prothorax* transverse, convex, across anterior margin about as wide as head across eyes, anterior margin rounded and slightly sinuate near either extremity, maximum width in anterior half and narrowed posteriorly ; lateral margin rounded and with six distinct teeth, teeth small and some of them hardly longer than broad, their apices somewhat blunt ; anterior and posterior angles obtuse and with teeth ; puncturation on pronotum coarse, dense and slightly coarser than that of vertex of head ; setae on pronotal disc projecting towards middle line. *Scutellum* subtriangular and about as broad as long and more or less smooth. *Elytra* more than one and a half times as long as broad, ovoid and widest near middle, rows of punctures moderately large, interstices about as wide as punctures, setae moderately long and projecting posteriorly ; four blackish spots present : two more or less rounded spots near middle, a sutural spot posterior to these and a transverse spot at apex.



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13. *Psammoecus gratiosus* Grouvelle, Dorsal view (scale = 1 mm.)

*Measurements of the 'type'*: Total length 2.82 mm., width of head across eyes 0.60 mm., length of antenna 1.35 mm., width of prothorax across middle 0.64 mm., length of elytra 1.58 mm. and width across middle 1.08 mm.

*Material examined*: 1 ex. 'Type', INDIA : TAMIL NADU, Nilgiri Hills, Andrewes (in Museum National d' Histoire Naturelle, Paris).

*Distribution* : INDIA : Tamil Nadu.

### **Psammoecus nitidus** Grouvelle

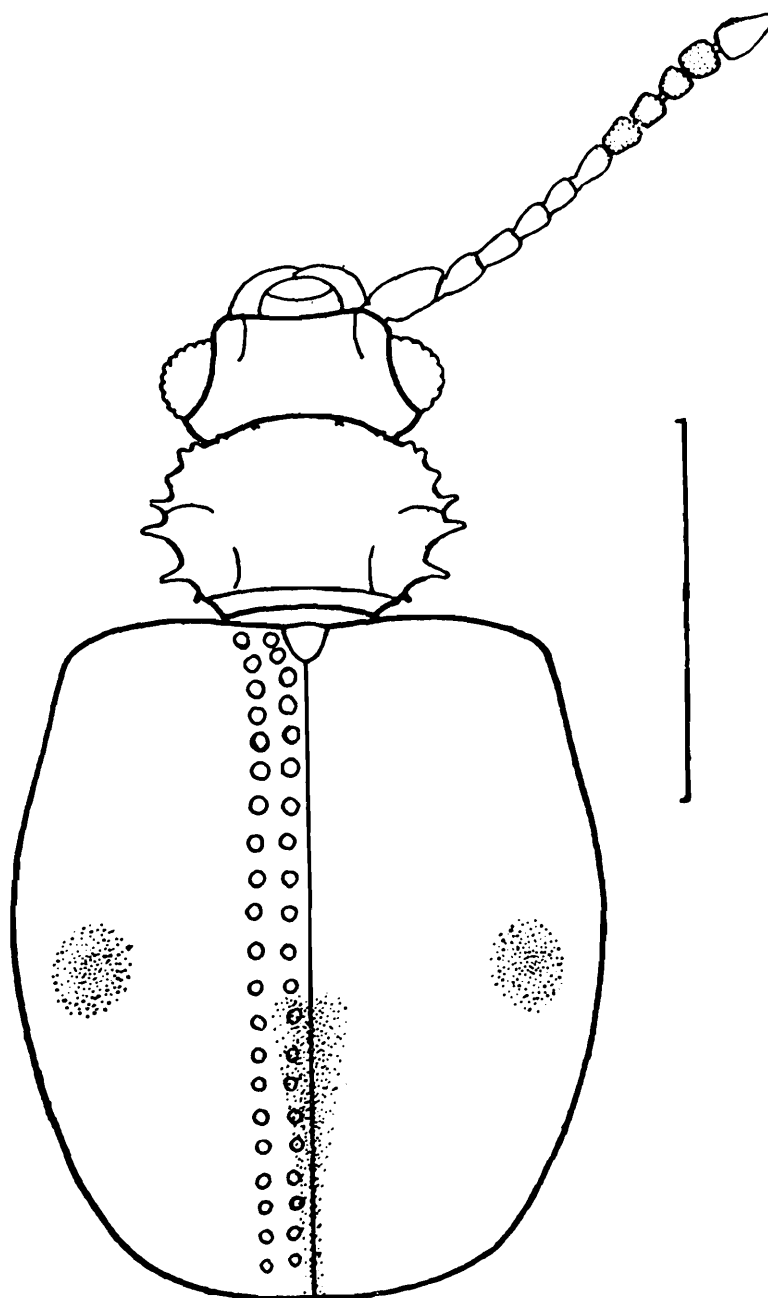
*Psammoecus nitidus* Grouvelle, 1908, *Annls Soc. ent. Fr.* 77 : 479, 487 (Type-loc. : Kanara, India ; Type deposition—Museum National d' Histoire Naturelle, Paris ; Type examined).

*Psammoecus bellus* Grouvelle, 1908, *Annls Soc. ent. Fr.* 77 : 485, 488 (Type-loc. : Chambagnor, Madura, Tamil Nadu ; Type deposition—Museum National d' Histoire Naturelle, Paris ; Type examined).

This species can be recognised by its distinctly transverse prothorax with widely explanate lateral margin bearing six prominent teeth, some of teeth more than twice as long as broad, segments 7—10 of antenna plus two rounded and sutural areas on elytra blackish.

General appearance (Fig. 14) elongate, oval, moderately convex, slightly shining, reddish-brown, blackish spots on elytra, apical part of antennal segment 6 plus 7—10 blackish, pubescence scanty.

*Head* : Exposed part of head wider than long, eyes large and coarsely faceted, eye about half as long as head, temple moderately long and slightly flattened beneath eye, longitudinal striae on vertex short and superficial ; puncturation on vertex coarse and dense, clypeus more or less smooth. Antenna long and slender, scape large and about twice as long as broad, segments 2—6 shorter, subequal and elongate, segments 7—10 slightly wider, segments 7 and 8 slightly elongate, segments 9 and 10 almost quadrate, segment 11 elongate and acuminate to apex ; scape to segment 6 reddish-brown, segments 7—10 and apical part of segment 6 blackish, segment 11 reddish-brown. *Prothorax* transverse, convex, across anterior margin about as wide as head across eyes, anterior margin rounded and slightly sinuate on either side of middle, maximum width at position of fourth tooth from anterior margin then narrowed posteriorly, tooth on anterior angle bifid, lateral margin round and with six distinct teeth of which third, fourth and fifth from anterior side distinctly longer, apices of teeth somewhat blunt, longest tooth a little longer than twice its width, anterior and posterior angles obtuse bearing teeth ; puncturation on pronotum coarse, dense and slightly coarser than that on vertex on head. *Scutellum* subtriangular, about as long as broad and more or less smooth. *Elytra* about one and a half times as long as broad, ovoid and widest near middle, strial punctures moderately large, interstics about as



14

14. *Psammoecus nitidus* Grouvelle, Dorsal view (scale=1 mm.).

wide as strial punctures; one more or less rounded spot on each elytron near middle and longitudinal sutural spot slightly posterior to them.

*Measurements of the 'type'*: Total length 2.67 mm., width of head across eyes 0.67 mm., length of antenna 1.48 mm., width of prothorax across middle 0.79 mm, length of elytra 1.64 mm. and width across middle 1.13 mm.

*Material examined*: 2 ex. 'Type' of *Psammoecus nitidus* Grouvelle, 1 ex., INDIA : KARNATAKA ('Kanara' written on label); 'Type' of *Psammoecus bellus* Grouvelle, 1 ex., INDIA : TAMIL NADU, Madura, 'Chambagnor' (in Museum National d' Histoire Naturelle, Paris).

*Remarks*: I have compared the 'type' of *P. bellus* with that of *p. nitidus* and as I cannot find any significant morphological differences between them I am placing *P. bellus* in synonymy with *P. nitidus*.

*Distribution*: INDIA : Karnataka, Tamil Nadu.

### ***Psammoecus impressicollis* Grouvelle**

*Psammoecus impressicollis* Grouvelle, 1980, *Annls Soc. ent. Fr.* 77 : 480, 487 (Type-loc.: Nilgiri Hills, India; Type deposition—Museum National d' Histoire Naturelle, Paris; Type examined).

This species is closely related to *P. trimaculatus* Motschulsky but can be separated because it lacks a longitudinal sutural spot on elytra and has a more transverse pronotum with a distinct depression near the posterior margin.

General appearance elongate, oval, moderately convex, slightly shining, reddish-brown, blackish spots on elytra and antennal segments 7—10 blackish, body covered with moderately long and semierect pubescence (this species is not figured here).

*Head*: Exposed part of head wider than long, eyes large and coarsely faceted, eyes slightly shorter than half of length of head, temple short and slightly flattened beneath eye, longitudinal striae on vertex long and obvious (as in *trimaculatus*); puncturation on vertex coarse and dense, clypeus more or less smooth; setae projecting forward. Antenna long and slender, scape large and about twice as long as broad; segments 2—5 shorter, subequal and elongate, segments 6—10 slightly wider, segment 6 slightly elongate, segment 7 about as broad as long, segments 8—10 more or less transverse, segment 11 elongate and acuminate to apex; scape to segment 6 reddish-brown, segments 7—10 and apical part of 6 blackish, segment 11 reddish-brown. *Prothorax* transverse, convex, across anterior margin about as wide as head across eyes, anterior margin rounded, maximum width at position of fourth tooth from anterior end and then

narrowed posteriorly ; lateral margin more or less rounded and with six distinct teeth, third, fourth and fifth from anterior margin distinctly longer than others and their apices somewhat blunt, longest tooth longer than twice as long as wide, anterior and posterior angles obtuse, transverse depression on pronotum in front of base well-marked, setae on pronotal disc projecting towards middle line. *Scutellum* subtriangular, about as broad as long and more or less smooth. *Elytra* shorter than one and a half time as long as broad, ovoid and widest near middle, striae punctures moderately large, interstices wider than punctures, setae moderately long and directed posteriorly, a more or less rounded spot on each elytron near middle.

*Measurements of the 'Type'* : Total length 2.93 mm., width of head across eyes 0.74 mm., length of antenna 1.45 mm., width of prothorax across middle 0.90 mm., length of elytra 1.89 mm. and width across middle 1.33 mm.

*Material examined* : 1 ex. 'Type', INDIA : TAMIL NADU, Nilgiri Hills (in Museum National d' Historie Naturelle, Paris).

*Distribution* : INDIA : Tamil Nadu.

### ***Psammoecus trimaculatus* Motschuesky**

*Psammoecus trimaculatus* Motschulsky, 1858, *Etud. Ent.* 7 : 45, (Type-loc. : Sri Lanka ; Type deposition—Zoological Museum, Moscow Lomonosov State University ; Types examined) ; Waterhouse, 1876, *Entomologist's mon. Mag.* 13 : 124 ; Reitter, 1879, *Verh. zool.-bot. Ges. Wien* 29 : 509 ; Grouvelle ; 1906, *Annls Soc. ent. Fr.* 75 : 125 ; Grouvelle, 1908 *Annls Soc. ent. Fr.* 77 : 476.

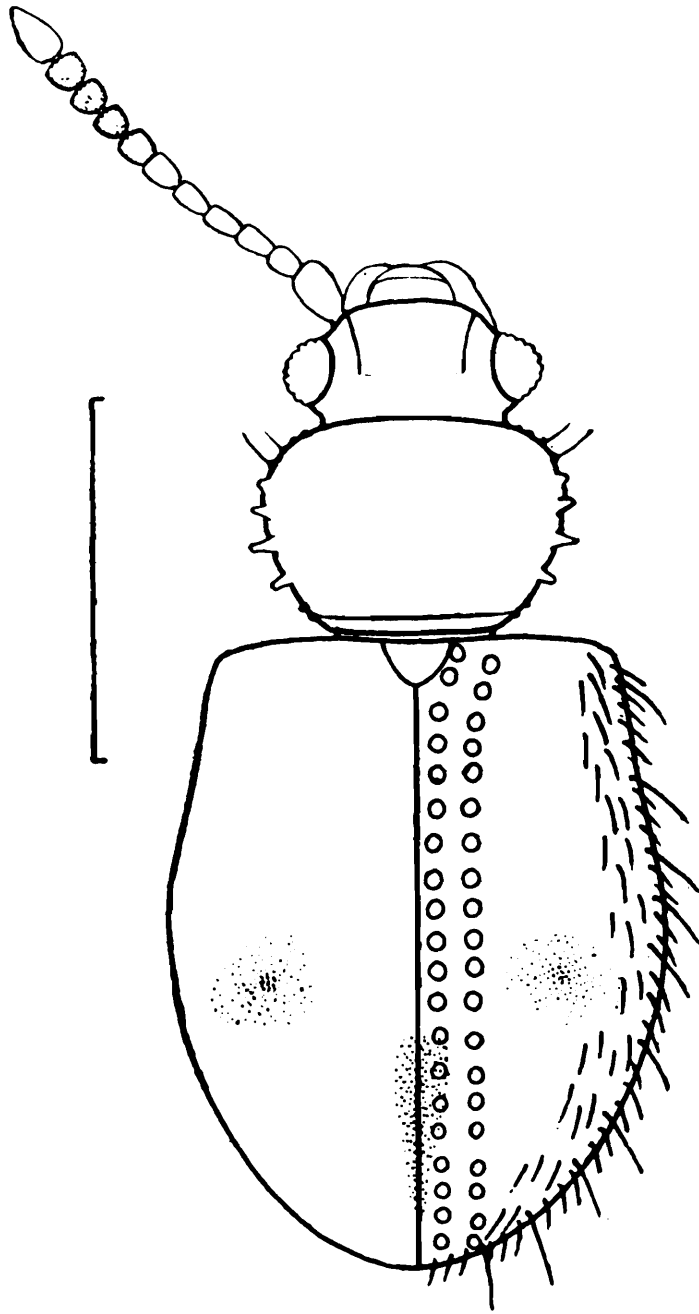
? *Cucujus incommodus* Walker, 1859, *Ann. Mag. nat. Hist.* (3) 3 : 53 (Sri Lanka).

*Telephanus cruciger* Waterhouse, 1876, *Entomologist's mon. Mag.* 13 : 125 (Dorey, New Guinea).

*Psammoecus ypsilon* Blackburn, 1903, *Trans. R. Soc. South Australia* 24 : 155 (North Australia, Queensland) (probable synonym).

*Psammoecus cephalotes* Grouvelle, 1919, *Mem. Ent.* 2 : 20 (New Guinea) (probable synonym).

Motschulsky (1858) described this species from Sri Lanka. Waterhouse (1876) noted that *incommodus* was close to *trimaculatus* and might only be a variety of it. Later, Grouvelle (1908) synonymised ? *Cucujus incommodus* Walker and *Telephanus cruciger* Waterhouse with this species. Hetschko (1930) mentioned *ypsilon* and *cephalotes* in synonymy of *cruciger*. In India, *trimaculatus* is the commonest and most widely distributed species of *Psammoecus*.

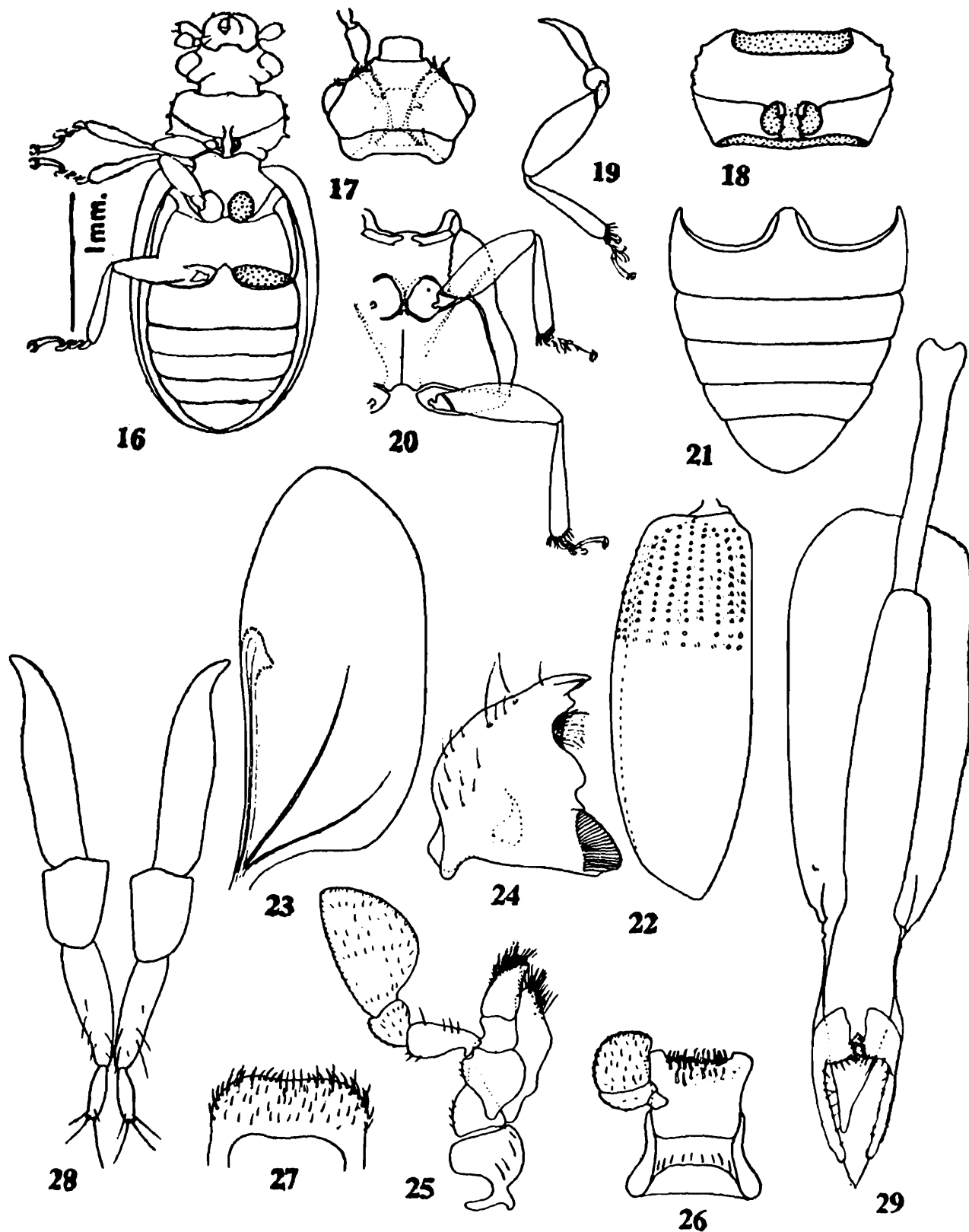


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15. *Psammoecus trimaculatus* Motschulsky, Dorsal view (scale = 1 mm.).

General appearance (Fig. 15) elongate, oval, moderately convex slightly shining, yellowish-brown to reddish-brown, three spot on elytra and antennal segments 7–10 blackish, body covered with moderately long and semierect pubescence.

*Head*: Exposed part of head wider than long, eyes large and coarsely faceted, eye slightly shorter than half of length of head, temple short and slightly flattened beneath eye, longitudinal striae on

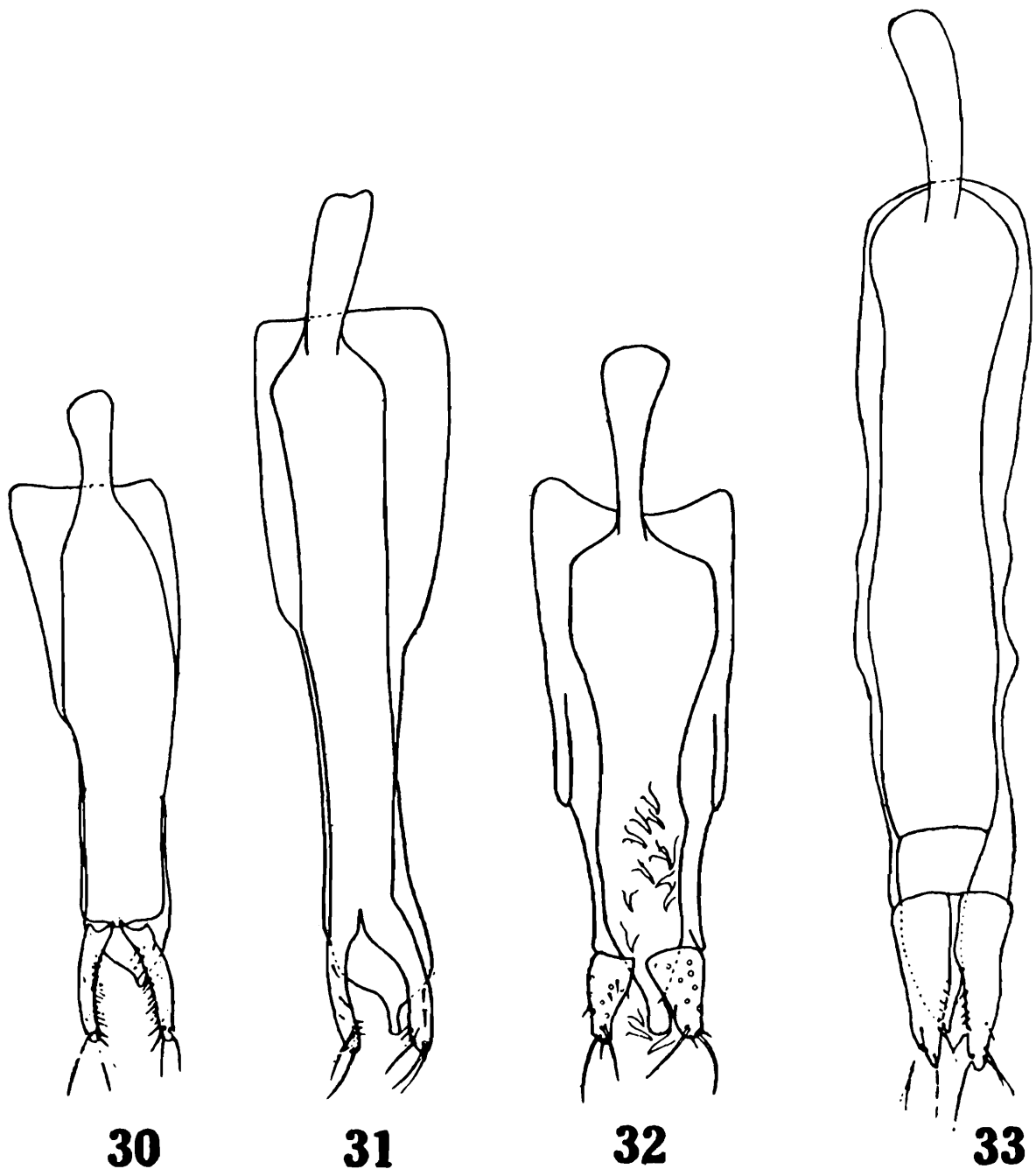


Figs. 16—29. *Psammoecus trimaculatus* Motschulsky : 16, Ventral views ; 17, Head, Dorsal view ; 18, Prothorax, Ventral view ; 19, Front leg ; 20, Meso-metathorax, Ventral view ; 21, Abdomen, Ventral view ; 22, Left elytron, Dorsal view ; 23, Wing ; 24, Right mandible, Ventral view ; 25, Left maxilla ; 26, Labium, Ventral view ; 27, Labrum ; 28, Ovipositor ; 29, Aedeagus, Dorsal view.

vertex superficial and extending slightly more than half way across head ; puncturation on vertex coarse and dense, clypeus more or less smooth ; setae projecting forward. Antenna long and slender, scape moderately large and less than twice as long as broad, segments 2—6 shorter, subequal and elongate, segments 7—11 slightly wider than segment 6, segment 7 slightly elongate, segments 8 about as broad as long, segments 9 and 10 slightly transverse, segment 11 elongate and acuminate to apex. *Prothorax* transverse, convex, across anterior margin narrower than head across eyes, maximum pronotal width near middle, anterior margin feebly rounded with two minute denticles on either extremity ; lateral margin outwardly curved and with six or seven teeth of variable length, longest tooth in posterior half, slightly longer than broad and somewhat blunt at apex ; anterior and posterior angles obtuse ; puncturation on pronotum coarse, dense and slightly coarser than that on vertex of head, setae on pronotal disc projecting forward and on lateral sides projecting outward, *Scutellum* subtriangular, transverse and more or less smooth. *Elytra* shorter than one and a half times as long as broad, ovoid and widest near middle, striae moderately large and rounded, interstices usually slightly wider than a puncture, sometimes equal to a puncture width, setae moderately long and directed posteriorly ; a more or less rounded blackish spot present on each elytron in posterior half and a longitudinal sutural spot posterior to them, rounded spot sometimes connected with a sutural spot by extensions. Aedeagus (Fig. 29) with median lobe long and slender, each paramere with a long apical seta, a few short setae along inner margin and similar setae present in large numbers at broad base.

*Measurements* : Total length 2.23—2.94 mm., width of head across eyes 0.64—0.73 mm, length of antenna 1.38—1.44 mm., width of prothorax across middle 0.64—0.79 mm., length of elytra 1.47—1.88 mm. and width across middle 1.00-1.32 mm.

*Material examined* : 101 ex. 'Types', 5 ex. mounted on single rectangular white board, labelled : *Psammoecus trimaculatus* Motsch., Mt. Nura Ellia, Ceylon (Motschulsky's handwriting on rectangular yellow label) (in Zoological Museum, Moscow Lomonosov State University) ; INDIA : ASSAM, Kaziranga, 1 ex. 14. xi. 1974, T. Sengupta, garbage with hays ; Phulbari, 1 ex., 24. xi. 1974, T Sengupta, leaf garbage ; MEGHALAYA, Tura, 2 ex., 23. xi. 1974, T Sengupta,



Figs. 30—33. Aedeagus, Dorsal view ; 30, *Psammoecus trilochana*, sp. nov. ; 31, *P. lepidus* Grouvelle ; 32, *P. harmandi* Grouvelle ; 33, *P. bambusae* sp. nov.

under dry cut grass ; Shillong, 1 ex., 29. xi. 1974, T. Sengupta, leaf garbage ; 1 ex., 27. iv. 1971, T. Sengupta, haystack ; WEST BENGAL : Howrah District, Sankrail, 2 ex., 14. ix. 1976, T K. Pal, haystack ; Sarda, 1 ex., H. G. Champion ; BIHAR, Chaibasa, 2 ex., 8. i. 1971, T Sengupta, under dead grass ; 1 ex., 19. x. 1976, T Sengupta, haystack ; ORISSA, Daitari District, Jajpur-Keonjhar, 1 ex., 27. xi. 1967, beaten material ; Bhubaneswar town, 1 ex., 11. xi. 1967, Gy. Topal, singled material ; UTTAR PRADESH, Anandnagar, 25 km. from

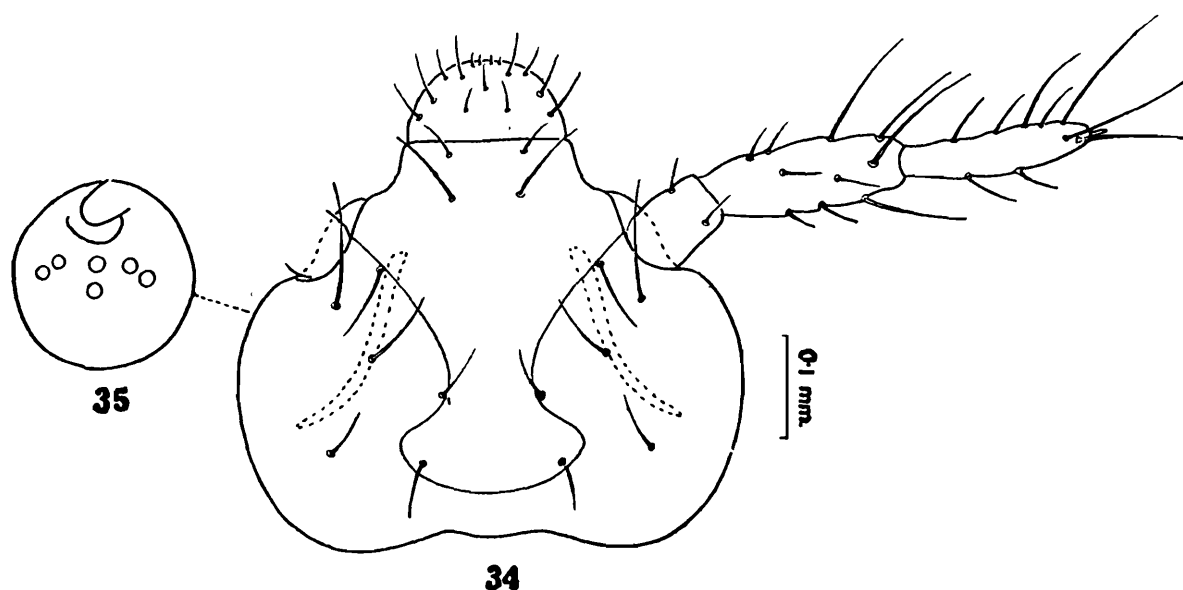
Lachmipur, 3 ex., 9. x. 1976, T Sengupta, haystack ; Natanwa 24 km. from Lachmipur, 1 ex., 11. x. 1976, T Sengupta, by beating bush ; Kosi, 4 ex., 18. x. 1976, T Sengupta, haystack ; Pantnagar, 2 ex., 21. iii. 1971, T Sengupta, haystack ; JAMMU & KASHMIR, Jammu, 1 ex., 25. v. 1972, T Sengupta, haystack ; DELHI, 4 ex., 12. v. 1972, T Sengupta, hays of Jower ; KARNATAKA, North Coorg, Fraserpet, 1 ex., xii. 30, N. C. Chatterjee ; Bangalore, 50 ex., 10. xii. 1971, T Sengupta, under stack of hay of Rai Crop (*Brassica nepus*) ; TAMIL NADU, Madras, 1 ex., 29. xi. 1971, T Sengupta, leaf garbage ; Coimbatore, 440 m, 2 ex., 22. xi. 1972, Besuchet-Löbl-Mussard ; Trichinopoly, 1 ex. ; KERALA, Cardamom Hill, Vallara Fall, 950 m., 1 ex., 4. xi. 1972 ; BHUTAN, Chimakothi, 1904-2300 m., 1 ex., Nat. Hist. Museum Basel-Bhutan expedition 1972 ; Changra, 18 km. S. Tongsa, 1900 m., 1 ex., Nat. Hist. Museum Basel-Bhutan Expedition 1972 ; Kamjee, 850 m., 1 ex., Nat. Hist. Museum Basel-Bhutan Expedition 1972 ; NEPAL : Kathmandu, 1371 m., 7 ex., 28. iii. 1972 ; Daman 2316 m., 1 ex., 29. iii. 1972, T Sengupta, dead grass.

*Distribution* : INDIA : Assam, Meghalaya, West Bengal, Bihar, Orissa, Uttar Pradesh, Jammu & Kashmir, Delhi, Karnataka, Tamil Nadu, Kerala ; NEPAL ; BHUTAN ; SRI LANKA ; BURMA ; MALAYSIA ; AUSTRALIA ; JAPAN ; MADAGASCAR.

#### Larva of *Psamoecus trimaculatus* Motschulsky

General body from narrow-elongate, parallel-sided, slightly narrowed behind, subdepressed, whitish soft-bodied with long slender legs.

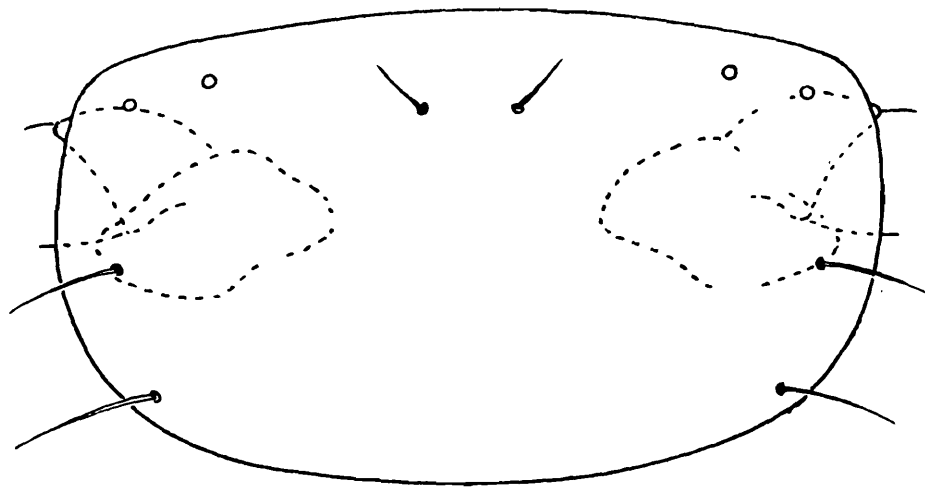
*Head* : Transverse, about as wide as prothorax, frontal suture Cucujoid-type, clypeus fused with frons, labrum distinctly separated from clypeus, dorsal surface with long, sparsely distributed setae (as in Fig. 34). Endocarina and metopic suture absent. Ocelli six on each side of head, in three groups behind antenna, two in each group (Fig. 35). Antenna rather long, 3-segmented, ratio of segment lengths 2 : 5 : 5, all segments elongated, segment 2 broadened towards apex, sensory appendage minute and lying at apical part of segment 3. Mandible (Fig. 38) with four apical teeth (three processes, proximal one bidentate), prostheca translucent at base with sharply pointed at apex, mola well-developed with 10 dorsal rows of fine, transverse ridges and about 9—10 rows of ventral rows of curved, longitudinal asperated ridges, inner margin of mola serrated with anterior and posterior



Figs. 34—35. *Psammoecus trimaculatus* Motschulsky, Larva ; 34, Head, Dorsal view ; 35, Ocelli.

angles projecting like large teeth. Maxillary mala (Fig. 40) falciform with single apical spine, outer margin with two ventral setae near apical spine, a dorsal row of six setae present along apical half of inner margin and three ventral setae on inner margin towards apex, base of mola with a group of dorsal denticles ; cardo well-developed, maxillary articulating area oval and well-defined, ratio of lengths of palpal segments 3 : 3 : 5, apical segment narrowed at middle and then finger-like to apex, Labium (Fig. 39) slightly narrowed anteriorly, palpi 2-segmented, apical segment narrower and longer than basal one, hypopharynx well-developed, hypopharyngeal bracon present, hypopharyngeal rods and hypostomal margins distinct and diverging posteriorly.

*Thorax and abdomen* : Tergites with sparsely distributed simple and moderately long setae. Pro-, meso- and metathorax about equal in length, pro- and mesothorax narrower than metathorax, arrangement of setae on pronotum as in figure (Fig. 36). First abdominal segment shorter than metathorax and second abdominal segment, abdominal segment 6—8 progressively becoming slightly narrower ; segment 9 with very short tergite, its sternite forming a long tubular pygopod-like projection (Fig. 41) ; without urogomphi (Crowson, 1955 reported that larvae of *Psammoecus* were said to possess urogomphi), segment 10 represented by a sclerite attached at the apex of pygopod-like projection.



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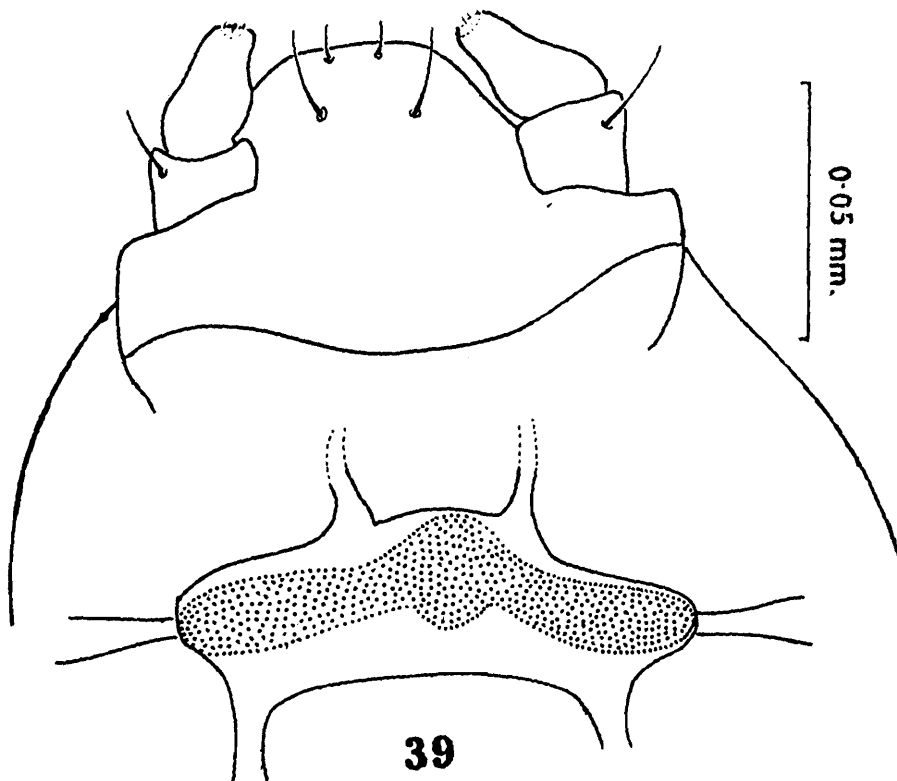
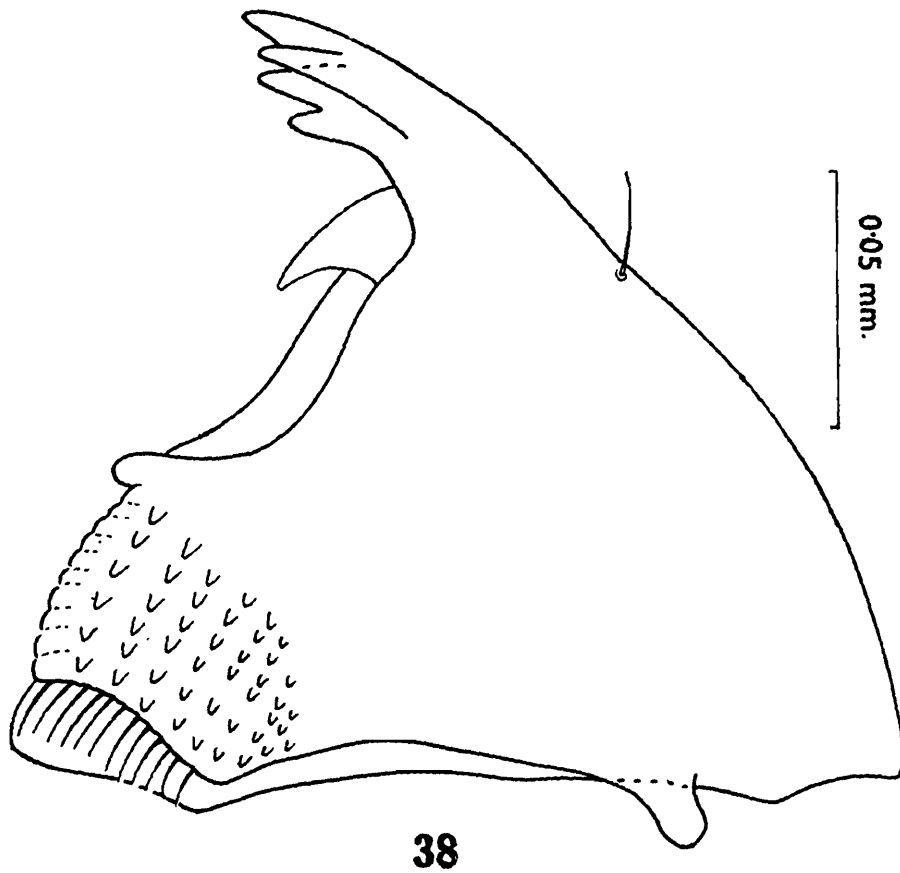
0.1 mm.



0.05 mm.

37

Figs. 36—37. *Psammoecus trimaculatus*, Larva ; 36, Prothorax, Dorsal view ; 37, Tarsungulus.



Figs. 38—39. *Psammoecus trimaculatus*, Larva ; 38, Mandible, Ventral view ; 39, Labium, Ventral view.

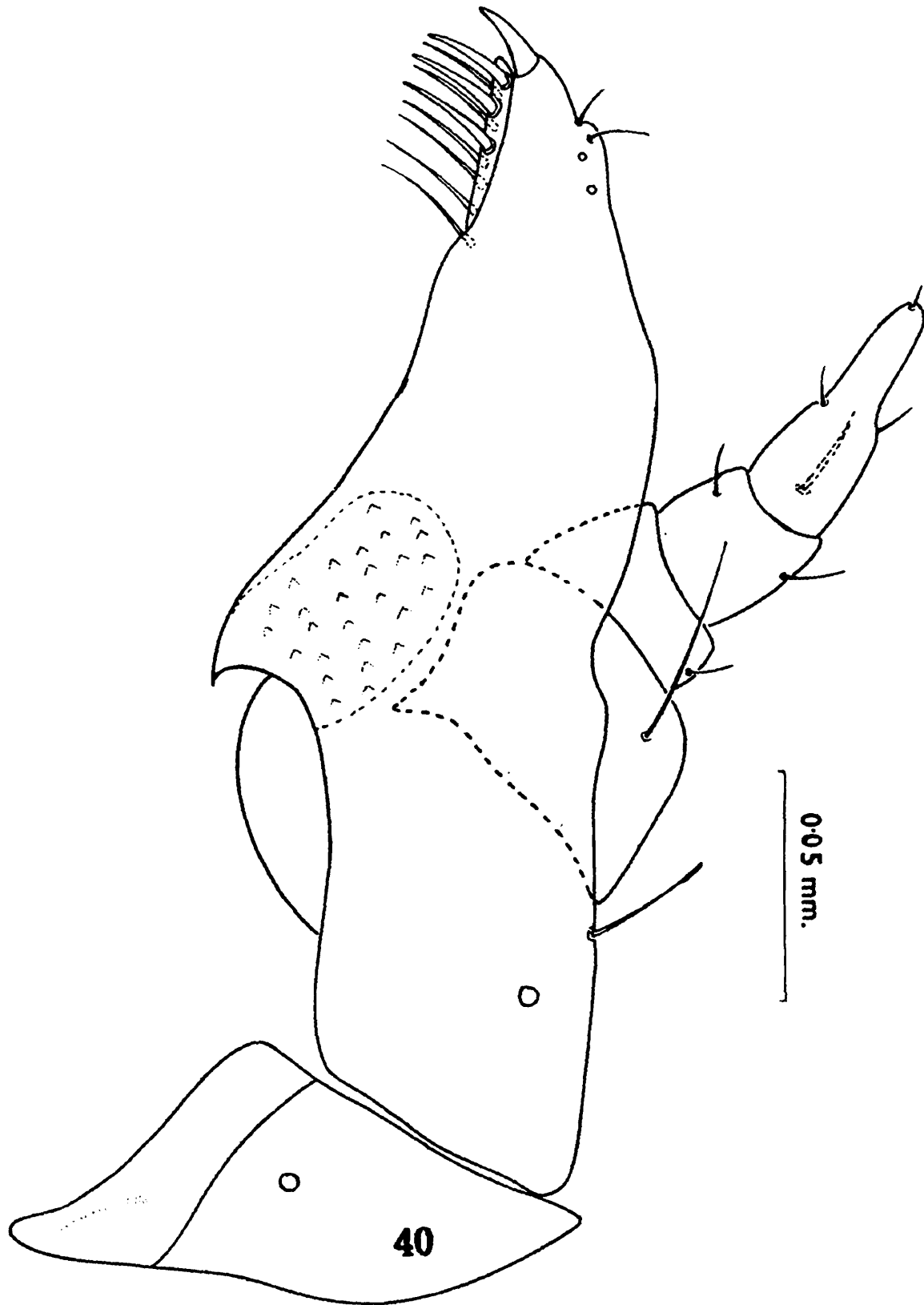
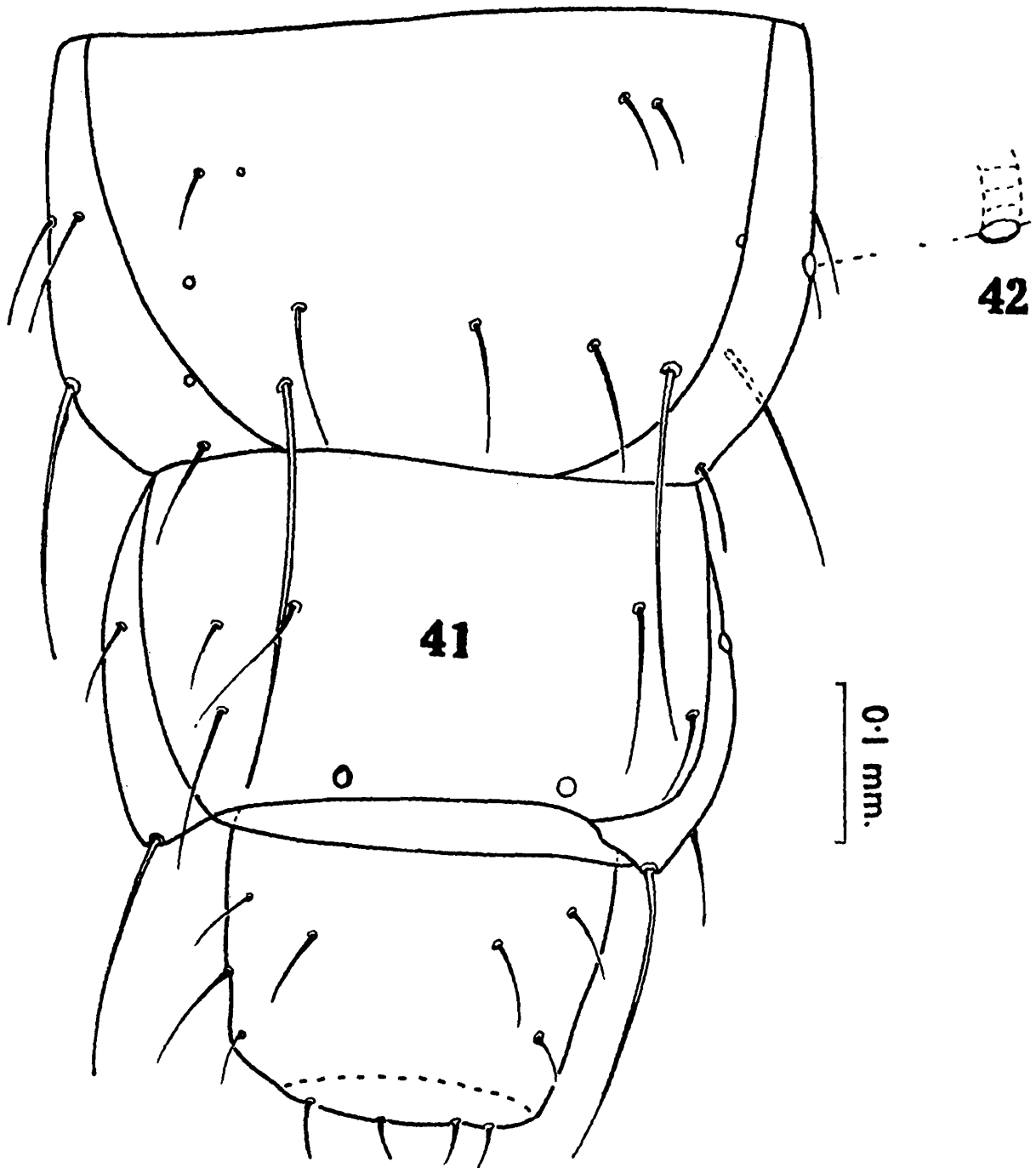


Fig. 40. *Psammoecus trimaculatus*, Larva : Maxilla, Ventral view.

*Spiracles and legs* : All spiracles annular and lying on body surface (Fig. 42). Legs narrow and long, coxae small and widely separated ; claw simple, rather long, with two tarsungular setae lying one beyond other (Fig. 37).



Figs. 41—42. *Psammoecus trimaculatus*, Larva : 41, Last abdominal segments, Dorsal view ; 42, Abdominal spiracle.

*Measurements* : Total length 4.20 mm. (mature larva), width of head 0.55 mm., width of prothorax across middle 0.55 mm., width of 9th abdominal segment across front margin 0.26 mm. (n = 1).

*Material examined*: 3 ex. INDIA: WEST BENGAL, Howrah District, Sankrail, 14.ii.1976, T. K. Pal, haystack, collected with adult *P. trimaculatus*.

#### SUMMARY

The paper sets out to provide a comprehensive taxonomic revision of Indian members of the genus *Psammoecus* Latreille. This genus predominates in the Oriental region. A brief historical review, notes on geographical distribution and a consideration of its systematic position is included. The genus *psammoecus* is redescribed and compared with *Indophanus* Pal and *Telephanus* Erichson. Sixteen species are included in the revision; 5 species viz., *P. khasia*, *P. complexus*, *P. bhutanicus*, *P. trilochana* and *P. bambusae* are new to science; *P. bellus* Grouvelle is synonymised with *P. nitidus* Grouvelle; *P. delicatus* Grouvelle and *P. simoni* Grouvelle are recorded for the first time from India. A key to the Indian species of *Psammoecus* is provided. A full description of a larva of *Psammoecus* (*P. trimaculatus* Motschulsky) is given for the first time.

#### ACKNOWLEDGEMENTS

I am indebted to Dr. B. K. Tikader, Director of the Zoological Survey of India for his constant inspiration and for providing necessary laboratory facilities. Grateful acknowledgement is made to Dr. T. Sengupta who borrowed the 'type' material of Grouvelle from Paris, compared the specimens of *Psammoecus andrewesi* with the 'type' in British Museum (Nat. Hist.), and gave encouragement and advice. I have pleasure in acknowledging the helpfulness and generosity of the following specialist colleagues for providing the author with the extralimital material for comparative purposes: Dr. S. Hisamatsu of Ehime University, Matsuyama, Japan for confirmation of *Psammoecus harmandi* Grouvelle, Dr. I. Gaedike of the Deutsches Entomologisches Institut, Eberswalde, E. Germany (DDR) for lending *Psammoecus simoni* Grouvelle and *Psammoecus trimaculatus* Motschulsky, Mr. R. D. Pope of the British Museum Nat. Hist., London, Dr. W. Wittmer of the Naturhistorischen Museum, Basel, Dr. I. Löbl of the Muséum d' Histoire Naturelle, Geneve and Dr. Z. Kaszab of the Természettudományi Múzeum, Budapest for sending their collections; Dr. R. B. Madge of the Commonwealth Institute of Entomology, U. K. gave help regarding some of the references cited. I thank the authorities especially Dr. Nicole Berti of the Muséum National d' Histoire Natu-

relle, Paris for lending the 'type' material of nine Grouvelle species, and Dr N. B. Nikitsky of the Zoological Museum, Moscow Lomonosov State University, USSR for lending the 'type' of *Psammoecus trimaculatus*. I thank Dr. D. G. H. Halstead of Pest Infestation Control Laboratory, Slough (U. K.) for continued encouragement and constructive criticism of the manuscript. The help rendered by Drs. S. Biswas and M. Datta for going through the manuscript is also duly acknowledged.

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