

TERMITE FAUNA OF KRAKATAU AND ASSOCIATED ISLANDS, SUNDA STRAITS, INDONESIA

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Summary

Frequent volcanic eruptions, submergence and emergence of some of the Indonesian islands has made them an object of intense biogeographical significance. These geological catastrophies resulted in complete sterilization of the area biologically, wiping out all forms of life. Subsequent revegetation and establishment of new fauna attracted many scientists, some of them having made very significant contributions.

*The present contribution deals with termite fauna of Krakatau and associated islands. In all, twenty five species and 13 genera, the highest number so far reported, from Carita (9 species), Panaitan Islands (6 species), Rakata Besar (2 species), Anak Krakatau and Sertung (1 species each) have been recorded in this publication. Of these, while, *Prorhinotermes panaitanensis* is new to science, two species (*Glyptotermes besarensis* and *G. panaitanensis*) have been described recently by the senior author (MLT). Similarly *Glyptotermes minutus*, *Nasutitermes culasiensis* and *Hospitalitermes buzpnensis* have been recorded for the first time from the Indonesia. Several other species are new distributional records. *Nasutitermes matagensis matagensiformis* and *Schedorhinotermes javanicus* are the most successfully colonized species, recorded almost in all the islands under reference.*

Besides the taxonomic treatment of the fauna, the paper also gives key to genera based on soldier caste.

INTRODUCTION

Krakatau and associated Islands, comprising Anak Krakatau, Rakata Besar, Rakata Kecil, Sertung, Panaitan Islands, form a part of Sunda (Soenda) Straits, lying in between the islands of Java and Sumatra. These islands have been geologically unstable volcanoes. The Krakatau islands underwent a major catastrophic volcanic eruptions and were completely sterilized biologically more than a century ago in 1883 (Dammerman, 1948). Thereafter, there have been records of volcanic destruction of lesser magnitude. The last major eruption of the island took place in 1939 (Roonwal, 1969). The region as a whole is humid tropical and lies wholly south of equator in the Southern hemisphere. The climate is equable with average temperature of 26°C at sea level. The rainfall is heavy, with heavier precipitation occurring during December to March. A few vials from Carita (West Java) have also been included here in this account.

The frequent submergence and emergence of some of the islands, has made these islands an object of intense biogeographical significance and have attracted many biologists to study the fauna and flora of these islands. The termite fauna of various Indonesian islands as a whole was studied mainly by Hagen (1858), Haviland (1898), Desn-

eux (1905), Holmgren (1914), Oshima (1914), Dammerman (1915), Beckman (1919), John (1925), Kalshoven (1930), Kemner (1930, 1934), Light (1933), Snyder (1949), Toxopeus (1950), Roonwal and Sen-Sarma (1956), Krishna & Emerson (1962), Roonwal and Maiti (1966), Roonwal (1969) and Abe (1984).

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SYSTEMATIC ACCOUNT OF TERMITE FAUNA

(a) General: Twenty five species from Carita, West Java (11-species), Panaitan Islands (7-species), Rakata Besar (6-species), Anak Krakatau and Sertung (3-species) are recorded here. They are distributed over 13 genera, four families : Kalotermitidae (6-species), Rhinotermitidae (5-species), Macrotermitidae (4-species) and Termitidae (10-species). While one species of genus *Prorhinotermes* (*P. panaitanensis* sp. nov.) is new to science, two species of genus *Glyptotermes* (*G. besarensis* and *G. panaitanensis*) have been described recently by the senior author (M.L.T., 1989). *Glyptotermes minutus* (Haviland), *Nasutitermes culasiensis* Oshima and *Hospitalitermes luzonensis* (Oshima) are being recorded for the first time from the Indonesian Island and several others are new distributional records. *Nasutitermes matangensis matangensisformis* is the most successful species, which has colonized almost all the islands.

LIST OF SPECIES RECORDED FROM KRAKATAU AND ASSOCIATED ISLANDS (SUNDA STRAITS)

FAMILY I. Kalotermitidae

Genus (1) *Cryptotermes* Banks.

1. *Cryptotermes domesticus* (Haviland)
2. *Cryptotermes sumatrensis* Kemner

Genus (2) *Glyptotermes* Froggatt.

3. *Glyptotermes besarensis* Thakur
4. *Glyptotermes caudomunitus* Kemner
5. *Glyptotermes minutus* (Haviland)
6. *Glyptotermes panaitanensis* Thakur

FAMILY II. Rhinotermitidae Sub-family-i Coptotermitinae

Genus (3) *Coptotermes* Wasmann

7. *Coptotermes curvignathus* Holmgren
8. *Coptotermes kalshoveni* Kemner

Sub-family-ii Rhinotermitinae

- Genus (4) *Prorhinotermes* Silvestri
 9. *Prorhinotermes panaitanensis* sp.
 nov.
 Genus (5) *Schedorhinotermes* Silvestri
 10. *Schedorhinotermes javanicus*
 Kemner
 11. *Schedorhinotermes tarakanensis*
 (Oshima)

FAMILY III. Macrotermitidae

- Genus (6) *Macrotermes* Holmgren
 12. *Macrotermes gilvus* (Hagen)
 Genus (7) *Odontotermes* Holmgren
 13. *Odontotermes grandiceps* Holmgren
 14. *Odontotermes makassarensis*
 Kemner
 Genus (8) *Microtermes* Wasmann
 15. *Microtermes insperatus* Kemner

FAMILY IV. Termitidae

Sub-family-i

Termitinae

- Genus (9) *Pericapritermes* Silvestri
 16. *Pericapritermes semarangi* Holm-
 gren

Sub-family-ii

Nasutitermitinae

- Genus (10) *Nasutitermes* Banks
 17. *Nasutitermes acutus* (Holmgren)
 18. *Nasutitermes culasiensis* Oshima
 19. *Nasutitermes matangensis matang-*
ensiformis (Holmgren)
 20. *Nasutitermes matangensis pyrice-*
phalus (Kemner)
 Genus (11) *Bulbitermes* Emerson
 21. *Bulbitermes gedeensis* (Kemner)
 22. *Bulbitermes lakshmani* Roonwal
 & Maiti
 23. *Bulbitermes neopusillus* Snyder &
 Emerson
 Genus (12) *Lacessititermes* Holmgren
 24. *Lacessititermes atrior* (Holmgren)
 Genus (13) *Hospitalitermes* Holmgren
 25. *Hospitalitermes luzonensis* (Oshima)

Since the descriptions of most of the species dealt with here are scanty, it has been though desirable to include a brief description of all species recorded here giving the salient and diagnostic features.

(b) Key to genera. — Tentative keys for identification of termites of Krakatau and its associated Islands, as recorded here, are given for genera and species. The key to genera is restricted to soldier caste only as this caste is generally encountered in the field and exhibits diversity of morphological characters for easy diagnosis.

- 1 (10) Pronotum flat (not saddle shaped)
- 1 (5) Head-capsule without fontanelle and frontal gland; mandibles with prominent marginal teeth.
- 3 (4) Head-capsule short, thick, highly phragmotic; mandibles comparatively short and sharply attenuated anteriorly.
1. *Cryptotermes*
- 4 (3) Head-capsule elongated, not phragmotic; mandibles comparatively long.
2. *Glyptotermes*
- 5 (2) Head-capsule with fontanelle and frontal gland; mandibles with or without marginal teeth.
- 6 (7) Fontanelle opening, in front with a tubular elongation.
3. *Coptotermes*
- 7 (6) Fontanelle in normal position, without tubular elongation.
- 8 (9) Mandibles without distinct teeth; head-capsule convex behind, oval. Soldiers monomorphic.
4. *Prorhinotermes*
- 9 (8) Mandibles with distinct teeth; head-capsule depressed behind. Soldiers dimorphic; soldier minor differing markedly in form and size from the soldier major.
5. *Schedorhinotermes*
- 10 (1) Pronotum saddle shaped.
- 11 (8) Mandibles well developed, functional; head-capsule not produced into a long nasus.
- 12 (13) Mandibles asymmetrical, twisted, used for snapping and biting or only for snapping.
6. *Pericapritermes*
- 13 (12) Mandibles symmetrical, curved at tip, used for biting only.
- 14 (15) Labrum with a hyaline tip; meso- and metanota prominently expanded laterally.
7. *Macrotermes*
- 15 (14) Labrum without a hyaline tip; meso- and metanotum not expanded laterally.
- 16 (17) Mandibles large, generally strong; left mandible with a tooth placed at different positions. Forelegs normal, not fossorial. Soldiers usually larger than workers.
8. *Odontotermes*
- 17 (16) Mandibles short, thin, delicate; left mandible invariably without a tooth. Forelegs swollen, fossorial. Soldiers distinctly smaller than workers.
9. *Microtermes*
- 18 (11) Mandibles degenerated, non-functional; head-capsule drawn out into a long nasus.

- 19 (20) Head-capsule not depressed, not greatly produced behind; not constricted behind the antennae. 10. *Nasutitermes*
- 20 (19) Head-capsule depressed, greatly produced behind; strongly constricted behind the antennae.
- 21 (22) Legs not greatly elongated; hind femora shorter than abdomen. 11. *Bulbitermes*.
- 22 (21) Legs greatly elongated; hind femora as long as or longer than abdomen.
- 23 (24) Third antennal segment shorter than 4th; nasus long, somewhat thick at base. 12. *Lacessititermes*.
- 24 (23) Third antennal segment longer than 4th; nasus short; slender. 13. *Hospitalitermes*.

SYSTEMATIC ACCOUNT OF SPECIES.

FAMILY (I) KALOTERMITIDAE

GENUS (1) *Cryptotermes* Banks

KEY TO SPECIES

- 1 (2) Head-capsule with only one ventral prominent tubercle (horn-like projection of ventral genae); dorsal tubercle only a weak swelling. Frontal ridge of head strongly projecting in front medially. *C. domesticus* (Haviland)
- 2 (1) Head-capsule with two prominent tubercles. Frontal ridge of head not projecting in front medially. *C. sumatrensis* Kemner.

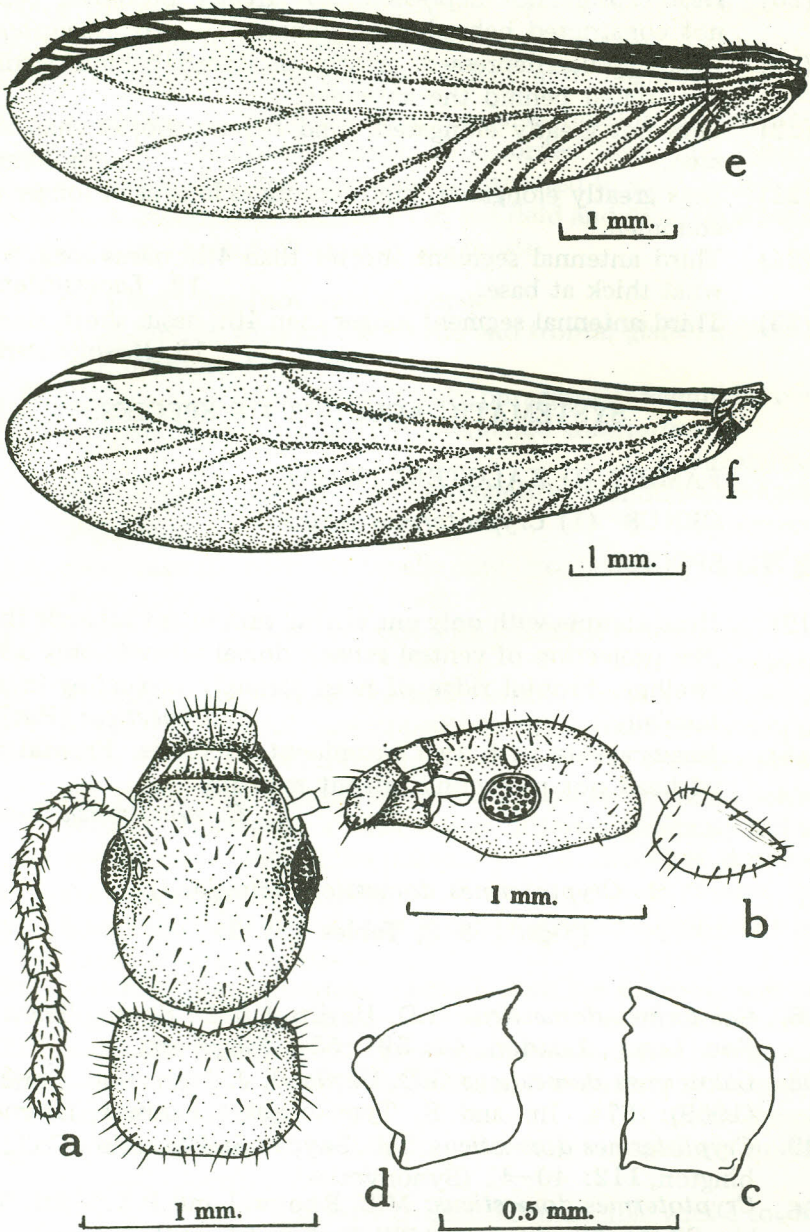
1. *Cryptotermes domesticus* (Haviland)

(Figs. 1 & 2, Tables 1 & 2)

1896. *Calotermes domesticus* G.D. Haviland & D. Sharp. Trans. ent. Soc. Lond., London, 44: 591–594. Singapore.
1898. *Calotermes domesticus* G.D. Haviland, J. Linn. Soc. Lond., 26 (1969): 374. Im and S. Type-locality: Sarawak (Borneo).
1949. *Cryptotermes domesticus*: T.E. Snyder. Smiths. misc. Coll., Washington, 112: 40–41 (Synonymies).
1966. *Cryptotermes domesticus*: M.L. Roonwal and P.K. Maiti, Treubia, 27 (1): 78–79. S. and PW. Berhala Island (Indonesia).
1970. *Cryptotermes domesticus*: O.B. Chhotani, Mem. Zool. Surv. India, Calcutta, XV (1): 24–34.

(a) Material.

One vial with one imago, one soldier (abdomen damaged) and 3 pseudoworkers, from Sertung, Coll. T. Abe, 6.11.1982.



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Fig. 1. *Cryptotermes domesticus* (Haviland), Imago caste (a) Head and pronotum, dorsal view (b) Head and pronotum, side view (c) Right mandible (d) Left mandible (e) Fore-wing (f) Left hind-wing.

(b) Description.

Since detailed description of the species has been given by Chhotani (1970), only salient features are given below for reference, based primarily on the material examined as well as incorporating information from the literature.

I—IMAGO : (Fig. 1, Tabel 1)

General: Head-capsule ochraceous, slightly paler anteriorly; head and body moderately pilose. Total body-length with wing 9.00 mm (7.90—9.17 mm); without wings 6.00 mm (4.50 — 6.87).

Head: Head-capsule subrectangular; lateral sides subparallel; posterior margin broadly rounded. Eyes: Oval, of medium size. Ocelli: Small, lying very close to eyes, either touching or separated by a thin line. Antennae: 14—17 segmented; 2 cylindrical; 3 pyriform, either subequal to or slightly shorter than 2; 4 shortest. Labrum: Shovel shaped, broader than long; anterior margin broadly rounded; pilose. Mandibles: Of *Cryptotermes* type.

Thorax: Pronotum: flat; subreniform; width variable, generally distinctly narrower than head-width, sometimes subequal to or even broader than head-width with eyes; lateral sides substraight to weakly convex: anterior margin weakly concave; posterior margin sub-straight; rarely weakly incurved medially; apical tibial spurs 3:3:3; tarsi 4—segmented; arolium present. Wings: Costa, subcosta, Radius, Radial sector thick, strongly chitinized. Median and Cubitus non-chitinized and thin. Forewing: Subcosta short, arising independently from the scales, joining just outside the scale. Radius also short and thick; joining Costa in the proximal half, at almost one-fourth to one-third of the wing membrane. Radial sector long, thick, arising independently from scale, running parallel with costa and branching (6—10 branches) distally. Median non-chitinized, arising independently from scale, running medially, curving up distally and joining Radius sector near the distal third of the wing membrane. Cubitus: Also thin, non-chitinized; with 11—13 branches. Hindwing: Costa and Radius as in forewing; Cubitus with 10—11 branches.

Abdomen: Oblong. Cerci 2-jointed; ca 0.88 — 0.10 mm long. Styli one-jointed, ca. 0.07 — 0.08 mm long.

Table 1. Body measurements (in mm) of Imago of *Cryptotermes domesticus* (Haviland).

No.	Body-parts	Sertung	Chhotani, 1970
I. General			
1.	Total body-length with wing ca.	9.00	7.90 — 9.17
2.	Total body-length without wing ca.	6.00	4.50 — 6.87
II. Head			
3.	Head-length to tip of Labrum	1.30	1.23 — 1.37
4.	Head-length to lateral base of mandible.	1.00	0.90 — 1.00
5.	Max. width of head	1.03	0.90 — 1.00
6.	Height of head	0.55	0.50 — 0.60
7.	Max. diameter of eye	0.25	0.27 — 0.37
8.	Minimum diameter of eye	0.23	— —
9.	Maximum diameter of ocellus	0.10	0.09 — 0.13
10.	Minimum diameter of ocellus	0.08	0.07 — 0.10
III. Thorax.			
11.	Length of pronotum	0.63	0.57 — 0.77
12.	Maximum width of pronotum	0.95	0.73 — 1.10

II—SOLDIER: (Fig. 2; Table 2)

2. General: Head-capsule black, fuscus brown posteriorly; mandibles deep reddish brown with blackish tinge. Head and body sparsely hairy. Total body-length ca. 4.00 — 6.00 mm (Chhotani, 1970).

Head: Head-capsule subquaderate; almost as long as broad; with two tubercles on either sides; ventral tubercle prominently projecting knob like, dorsal tubercle only a weak swelling arising from frons, frontal ridge prominent, weakly to strongly notched anteriorly in the middle and strongly projecting in front (fig. 2); frons truncated, forming almost right angle with mandibles.

Antennae: 11—12 segmented, segment 3 narrower and only slightly shorter than 2; 4 shortest; In 12-segmented condition, 3 shortest; 4 & 5 sub-equal. According to Chhotani (1970), 3rd segment variable-shortest, subequal or a little longer than 4. Labrum: Tongue-shaped, broader than long. Mandibles: Short, thick and triangular, tips sharply pointed: with a prominent basal hump; marginal teeth either absent or with 2 weak marginal teeth on the inner margin. Postmentum: Short, squarish, broader posteriorly.

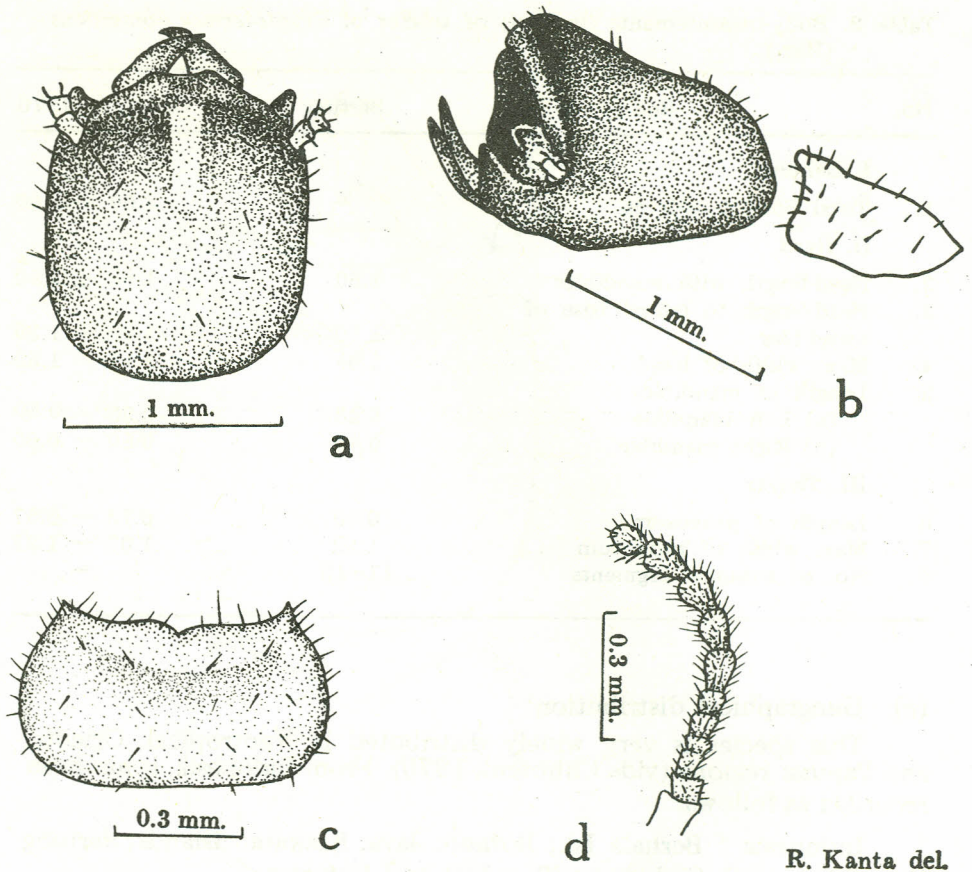


Fig. 2. *Cryptotermes domesticus* (Haviland), Soldier caste (a) Head, dorsal view (b) Head and pronotum, side view (c) Pronotum, dorsal view. (d) Right antenna.

Thorax: Pronotum: Flat; subrectangular; weakly uplifted near the anterior margin; narrower than head-width, rarely subequal in width; anterior margin distinctly concave, notched medially; antero-lateral corners projecting in front; weakly convex, with a weak median depression. Tibial spurs 3:3:3. Tarsi 4-segmented.

Abdomen: Oblong, hairy. Cerci 2-segmented, ca. 0.10 mm long; styli, when present, single jointed; ca. 0.03 – 0.05 mm long.

Table 2. Body-measurements (in mm) of soldier of *Cryptotermes domesticus* (Hav.)

No.	Body-parts	Sertung	Chhotani, 1970.
I. General			
1.	Total body length ca.	—	4.00 — 6.00
II. Head			
2.	Head-length with mandibles	1.60	1.63 — 1.80
3.	Head-length to lateral base of mandibles	1.10	1.20 — 1.30
4.	Max. width of head	1.08	1.13 — 1.30
5.	Length of mandibles		
	(a) Left mandible	0.48	0.50 — 0.60
	(b) Right mandible	0.48	0.50 — 0.60
III. Thorax			
6.	Length of pronotum	0.70	0.73 — 0.87
7.	Max. width of pronotum	1.10	1.07 — 1.27
8.	No. of antennal segments	11—12	—

(c) Geographical distribution:

This species is very widely distributed in Neotropical, Oriental and Papuan regions (vide Chhotani, 1970). From Indonesia, it has been recorded as follows:

Indonesia : Berhala Isl.; Borneo; Java; Krakatau Islands; Sertung (Present record); Sinhabang (Simalur) and Sumatra.

2. *Cryptotermes sumatrensis* Kemner (Fig. 3 & Table 3)

1930. *Cryptotermes sumatrensis* N.A. Kemner, Tijdschr. Ent., Amsterdam, 3(3-4): 301-305. Soldier & Pseudoworker. Type locality: Indonesia: (Sumatra: Andalas, Fort de Kock.
1949. *Cryptotermes sumatrensis*: T.E. Snyder, Smiths misc. Coll. Washington, 112: 44.
1970. *Cryptotermes sumatrensis*: O.B. Chhotani, Mem. Zool. Surv. India, Calcutta, 15 (1): 64-68.

(a) Material.

One vial with one imago, one soldier (abdomen damaged) and 3 pseudoworkers, from Sertung, Coll, T. Abe, 6-11-1982.

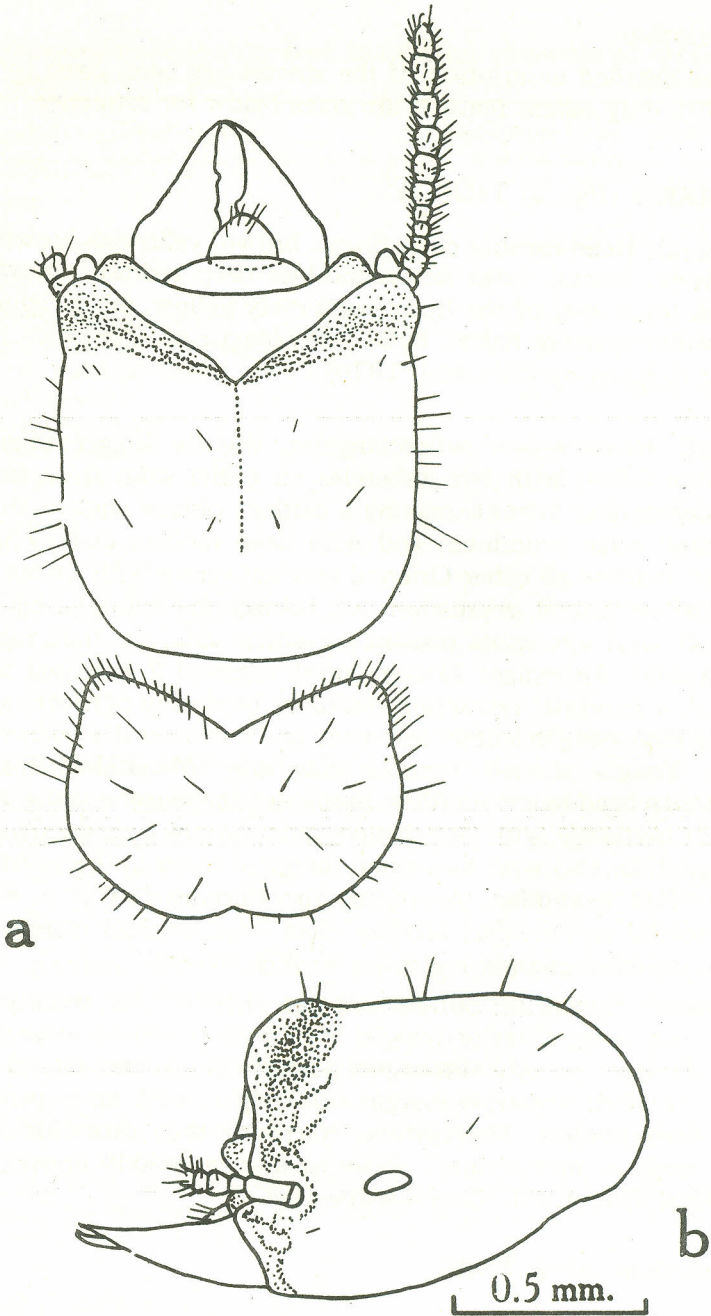


Fig. 3. *Cryptotermes sumatrensis* (Haviland), Soldier caste (a) Head, dorsal view (b) Protonum, dorsal view (c) Right antenna.

(b) Description.

Since detailed description of the species has been given by Chhotani (1970), only salient features are given below for reference.

I SOLDIER : (Fig. 3; Table 3)

General: Head-capsule deep fuscus brown, yellowish brown posteriorly; frons, frontal ridge and mandibles deep reddish brown with a blackish tinge; rest of the body parts rusty yellow, much lighter than head-capsule; sparsely hairy. Total body-length *ca.* 3.90 mm (3.50 - 4.80 mm as given by Chhotani, 1970).

Head: Head-capsule subrectangular, slightly longer than broad (head-index 0.95); with two tubercles on either side; frons incurved, sharply descending in front, making a distinct obtuse angle with mandibles; frontal ridge prominent and with deep median cleft; which distinguished it from all other Oriental species; vertex with a deep median and 2 shallow lateral depression just behind the frontal ridge: **Eyes:** two, small, oval eye spots present on either side, *ca.* 0.08 mm long. **Ocelli:** Absent. **Antennae:** 11-segmented; segment 2 subequal to 3 & 4 combined; 4 shortest; remaining gradually becoming pyriform and progressively increasing in length; last ovate and narrower than penultimate. **Labrum:** Tongue shaped; broader than long. **Mandibles:** Short, less than half its head-length; with a hump on the outer margin near the base. Left mandible with two shallow indentations near the distal third. Right mandible also with two small marginal teeth in the middle. **Postmentum:** Not examined. According to Chhotani (1970, p. 68), it is short, broadly rectangular; broader than long; anterior margin weakly concave; posterior margin and sides weakly convex.

Thorax: **Pronotum:** Sub-rectangular, anterior lobe weakly raised; broader than long; anterior margin with a deep, obtuse emargination; sides sub-straight, weakly converging posteriorly; postero-lateral corners broadly rounded; posterior margin substraight, with an imperceptible median emargination. **Mesonotum:** Narrower than pronotum, but almost as wide as mesonotum; posterior margin weakly convex. **Legs:** Short; tibial spur 3:3:3. **Tarsi** 4-segmented.

Abdomen: Long, hairy.

Table 3. Body-measurements (in mm) and indices of soldier of *Cryptotermes sumatrensis*, Kemner.

No.	Body parts	Specimen from Rakata Besar	Chhotani, 1970.
I. General			
1.	Total body-length ca.	3.90	4.80
II. Head			
2.	Head-length with mandibles	1.43	1.60
3.	Head-length to base of mandibles	1.00	1.20
4.	Maximum width of head	0.95	1.10
5.	Height of head	0.70	0.87
6.	Length of mandibles		
	(a) Left mandible	0.43	0.53
	(b) Right mandible	0.42	0.50
III. Thorax			
7.	Length of pronotum	0.63	0.70
8.	Maximum width of pronotum	0.88	1.03
9.	Pronotum-index (length/width)	0.71	—

(c) Geographical distribution:

Indonesia : Andalas. (Sumatra) : Fort de Kock. (ca. 80 km north of Pandong (Type-locality). Krakatau Island: Rakata Besar (Present-record).

(d) Remarks:

The specimen from Rakata Besar is smaller in size, but otherwise it matches very well with *C. sumatrensis* in morphological characters.

Genus (2) *Glyptotermes* Holmgren

KEY TO SPECIES.

Out of four species recorded here, imago and soldier castes are known in three species. A workable key is given below for their diagnosis.

1. IMAGO CASTE :

- 1 (2) Larger species. Head-subcircular; Head-length with mandibles over 1.10 mm; Head-width more than head-length to base of mandibles
1. *G. minutus* Kemner

- 2(1) Smaller species. Head-subrectangular; head-length with mandibles less than 1.10 mm; head-capsule almost as long as or a little longer than broad.
- 3(4) Head-width with eyes 0.73–0.75 mm; eyes comparatively larger (0.25 mm); separated from the lower margin of head by a distance of ca. 0.083. 2. *G. caudomunitus* Kemner
- 4(3) Head-width with eyes 0.75–0.80 mm; eyes small (0.18–0.20 mm) from the lower margin of head-capsule by a distance of ca. 0.10 mm. 3. *G. panaitanensis* Thakur

2. SOLDIER CASTE :

- 1(2) 10th abdominal tergite not strongly chitinised than other segment; anterior margin of pronotum broadly emarginate. *G. besarensis* Thakur
- 2(1) 10th abdominal tergite strongly chitinised than other segment; anterior margin of pronotum deeply emarginate.
- 3(4) Mandibles comparatively long (head-mandibular index 0.47–0.49); head-capsule widest near the middle in the proximal half. *G. caudomunitus* Kemner
- 4(3) Mandibles comparatively short (head-mandibular index 0.43); head-capsule widest near the posterior third. *G. panaitanensis* Thakur

3. *Glyptotermes besarensis* Thakur

(Figs. 4 & 5; Table 4 & 5)

(a) Material.

One vial with 2 soldiers and 8 pseudoworkers from Rakata Besar, Krakatau Islands, Indonesia, coll. Takuya Abe. 31–10–1982 Ex. wood.

(b) Description.

1. IMAGO : UNKNOWN.
2. SOLDIER : (Fig 4; Table 4)

General: Head-capsule and antennae pale yellow to yellowish brown with reddish tinge; antennae of same colour as head-capsule; labrum brownish yellow to brown; frons area a little paler; mandibles light brown to deep reddish brown; legs creamy-yellow to rusty brown;

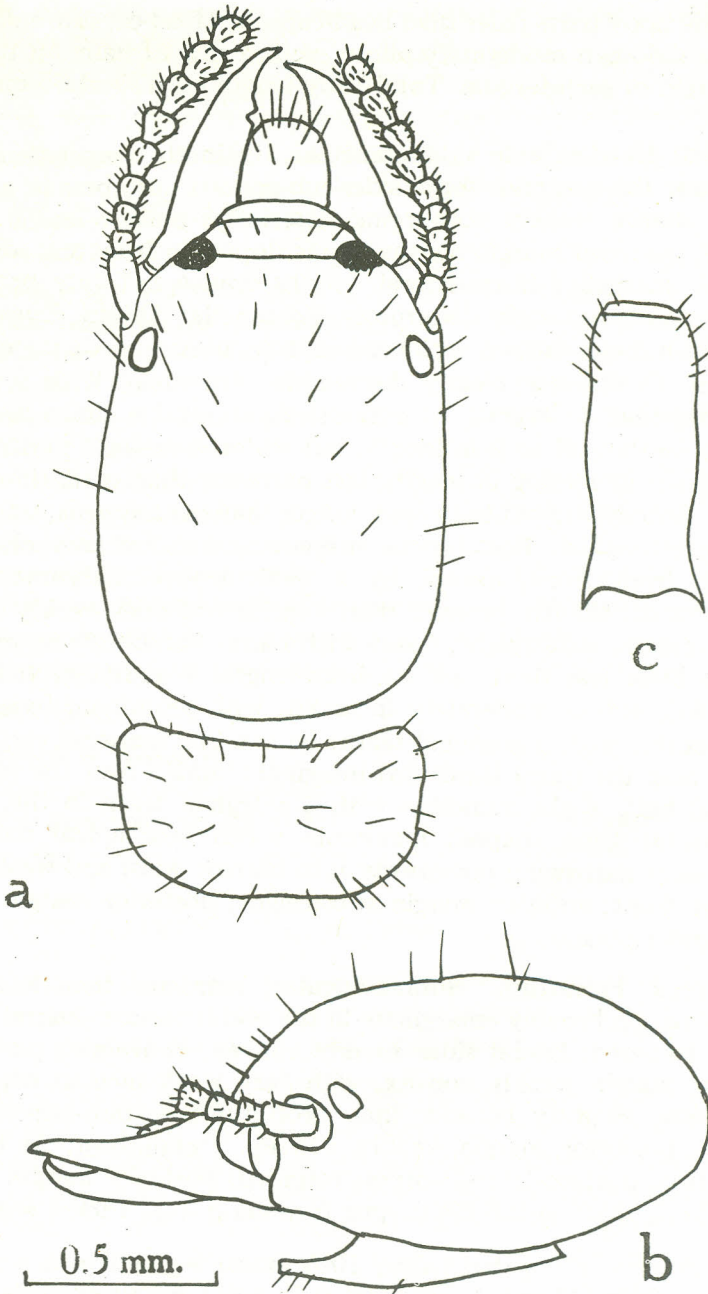


Fig. 4. *Glyptotermes besarensis* Thakur, Soldier caste (a) Head and pronotum dorsal view (b) Head, side view (c) Postmentum, in-situ.

rest of the body parts paler than head-capsule. Head-capsule and thorax sparsely, abdomen moderately pilose, with a row of hairs on the posterior margin of each tergum. Total body-length ca. 4.70–4.85 mm.

Head: Head-capsule subrectangular, distinctly longer than broad; widest near the posterior third; sides sub-parallel upto base of antennal sockets, thence weakly converging anteriorly; postero-lateral corners rounded; posterior margin convex; frons sloping in front and somewhat depressed medially; dorso-lateral protuberance not very prominent. Y-suture faint, not early discernible. Fontanelle: Absent. Eyes: Small, oval whitish spots, flushed with head-capsule; maximum diameter 0.13–0.15 mm. Ocelli: Not clearly discernible. Antennae: With 9–10 segments; segment 1 largest; 2 cylindrical, about $1\frac{1}{2}$ times the 3rd; 3 shortest; 4-subequal to 2 in length, but wider; 5-onward pyriform and progressively increasing in length; last narrower than penultimate one. Clypeus. Anteclypeus subtrapezoid, longer than postclypeus; translucent and sub-rectangular. Postclypeus subrectangular, not very clearly demarcated from frons, except by a weak groove. Labrum: Broadly tongue-shaped; slightly broader than long; lateral sides weakly convex; anterior margin substraight; beset with hairs. Mandibles: Short, thick; length a little less than half its head-length. Mandibular head-index (0.47–0.49); apices moderately incurved, with prominent basal hump. Left mandible with 3 marginal teeth; 1st and 2nd marginal very closely situated near the spical third; 3rd marginal situated near the middle in the basal half. Right mandible with 2 marginal teeth in the middle. Postmentum: Club shaped; maximum width near apical one-fourth whence sides narrowing posteriorly into narrow waist and weakly narrowing in front; anterior margin substraight; posterior margin convex and bulged medially.

Thorax: Pronotum: Subrectangular; narrower than head-width; anterior margin broadly emarginate in the middle; antero-lateral corners broadly rounded; lateral sides weakly convex, converging posteriorly; posterior margin weakly convex, with very weak median depression. Mesonotum: Slightly broader than pronotum; postero-lateral corners rounded; posterior margin weakly convex. Metanotum: As broad as mesonotum; postero-lateral corners rounded; posterior margin convex. Legs: Short, thick apical tibial spur formula 3:3:3. Tarsi-4 segmented.

Abdomen: Elongated hairy; 10th apical segment not very much chitinised, Cerci 2-jointed, ca. 0.08–0.10 mm long. Styli single-jointed, ca. 0.08 mm long.

Table 4. Body, measurements (in mm) and indices of 2 soldiers of *Glyptotermes besarensis* Thakur.

No.	Body-parts	Range	Mean
I. General			
1.	Total body-length ca.	4.70—4.85	4.78
II. Head			
2.	Head length with mandibles	1.63—1.80	1.72
3.	Head length to base of mandibles	1.18—1.28	1.23
4.	Maximum width of head	0.90—0.95	0.93
5.	Height of head	0.65—0.58	0.66
6.	Head-Index I (width/length)	0.74—0.76	0.75
7.	Length of mandibles:		
	(a) Left mandible	0.58—0.60	0.59
	(b) Right mandible	0.55—0.60	0.58
8.	Head mandibular—Index I (left mandible length/head-length)	0.47—0.49	0.48
9.	Minimum (Median) length of postmentum	0.70—0.80	0.75
10.	Maximum width of postmentum	0.33	—
11.	Minimum width of postmentum	0.20—0.24	0.22
III. Thorax			
12.	Length of pronotum	0.40—0.50	0.45
13.	Maximum width of pronotum	0.75—0.90	0.83
14.	Pronotum-index (length/width)	0.52—0.56	0.54

3. PSEUDOWORKER : (Fig. 5; Table 5)

General: Head-capsule creamy yellow; antennae with brownish tinge; postclypeus and labrum more chitinised, brownish. Head-capsule and body moderately pilose; total body-length ca. 3.50—4.70 mm.

Head: Head-capsule semi-circular; broader than long; broadest near the posterior third; lateral sides weakly convex, slightly converging anteriorly; Postero-lateral corners rounded; posterior margin convex. Fontanelle and Ocelli: Absent. Eyes: Hardly discernible, small oval spots, one on either side. Antennae: With 9—10 segments; segment 1 largest; 2 cylindrical, narrower than 1: In 9-segmented conditions, 2 broader and longer than 3; 4 shortest; in 10-segmented condition, 2 almost twice as long as 3; 3 narrowest and shortest; remaining gradually increasing in length and becoming broader; last ovate, narrower than penultimate one. Clypeus: Anteclypeus a narrow strip, bulging medially. Postclypeus subrectangular; darker than frons and demarcated by

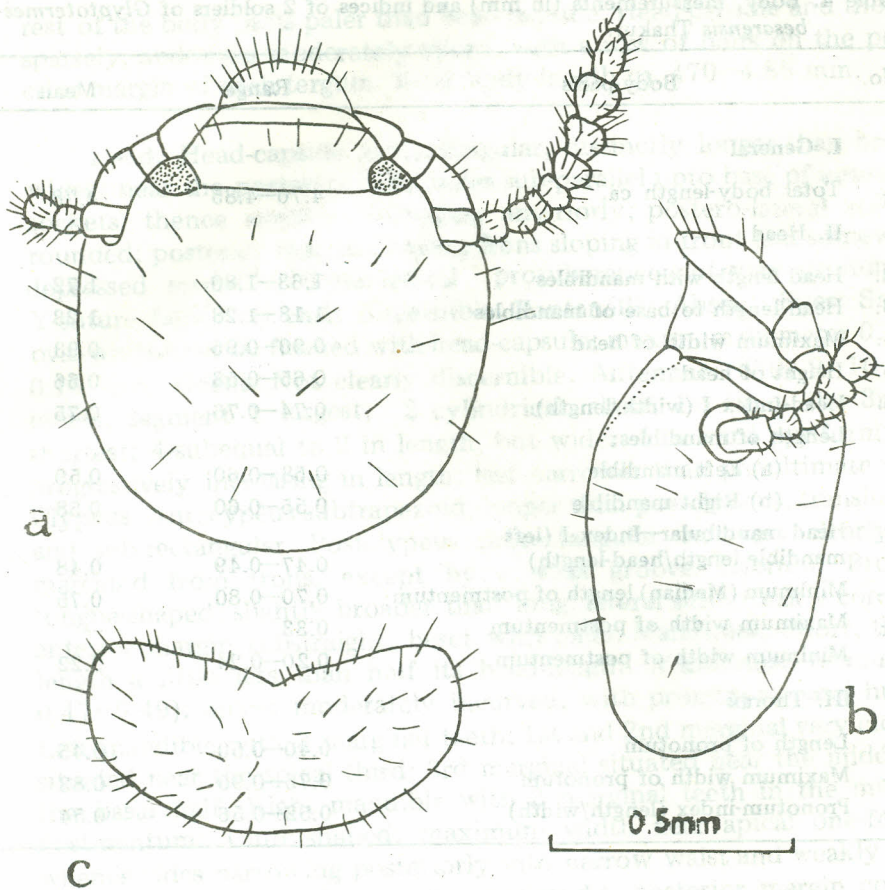


Fig. 5. *Glyptotermes besarensis* Thakur, Worker caste (a) Head, dorsal view (b) Head, side view (c) Pronotum, dorsal view.

a ridge. Labrum: Shovel shaped; broader than long; sides converging to broadly rounded anterior margin. Mandibles: Of typically *Glyptotermes* type.

Thorax: Pronotum: Subrectangular; broader than long; distinctly narrower than head-capsule; anterior margin truncated, broadly concave and with a very weak median notch; posterior margin with a distinct median notch in the middle. Mesonotum: Slightly broader than pronotum; posterior margin weakly convex. Metanotum: Broader than mesonotum; posterior margin weakly convex. Legs: As in soldier.

Abdomen: Globular; hairy, cerci 2-segmented; ca. 0.08–0.10 mm long. Styli one jointed; ca. 0.8 mm long.

Tabel 5. Body, measurements (in mm) of 5 Pseudoworkers of *Glyptotermes besarensis* Thakur.

No.	Body-parts	Range	Mean
I— General			
1.	Total body-length ca.	3.50—4.70	4.10
II— Head			
2.	Head-length to tip of labrum	0.98—1.10	1.04
3.	Head-length to base of mandibles	0.65—0.88	0.75
4.	Maximum width of head	0.75—0.95	0.83
5.	Height of head	0.40—0.55	0.47
III— Thorax			
6.	Length of pronotum	0.25—0.35	0.31
7.	Maximum width of pronotum	0.60—0.75	0.70

(c) Geographical distribution

INDONESIA: Krakatau Islands: Rakata Besar (Type-locality).

4. *Glyptotermes caudomunitus* Kemner
(Figs. 6 & 7; Tables 6 & 7)

1932. *Glyptotermes caudomunitus* N.A. Kemner, Ent. Tidsker, 53 (2—3): 137—138. Im. Soldier. Type-locality: West Java: Depok.

1949. *Glyptotermes caudomunitus*: T.E. Snyder, Smiths. misc. Coll., Washington, 112: 46.

(a) Material.

(i) One vial with one soldier and four Pseudoworkers from Anak Krakatau Islands, Coll. Takuya Abe, 7.11.1982.

(ii) One vial with two imagoes and an immature nymph, from Carita (West Java), Coll. Takuya Abe., 16.11.1982. Ex: wood.

(b) Description:

1 IMAGO: (Fig. 6, Table 6)

General: Head-capsule, thorax and abdominal tergites castaneous brown; labrum, clypeus and antennae yellowish brown, paler than head-capsule. Head and body sparsely hairy. Total body-length with wings ca. 6.00—6.20 mm., without wings ca. 4.25—4.85 mm.

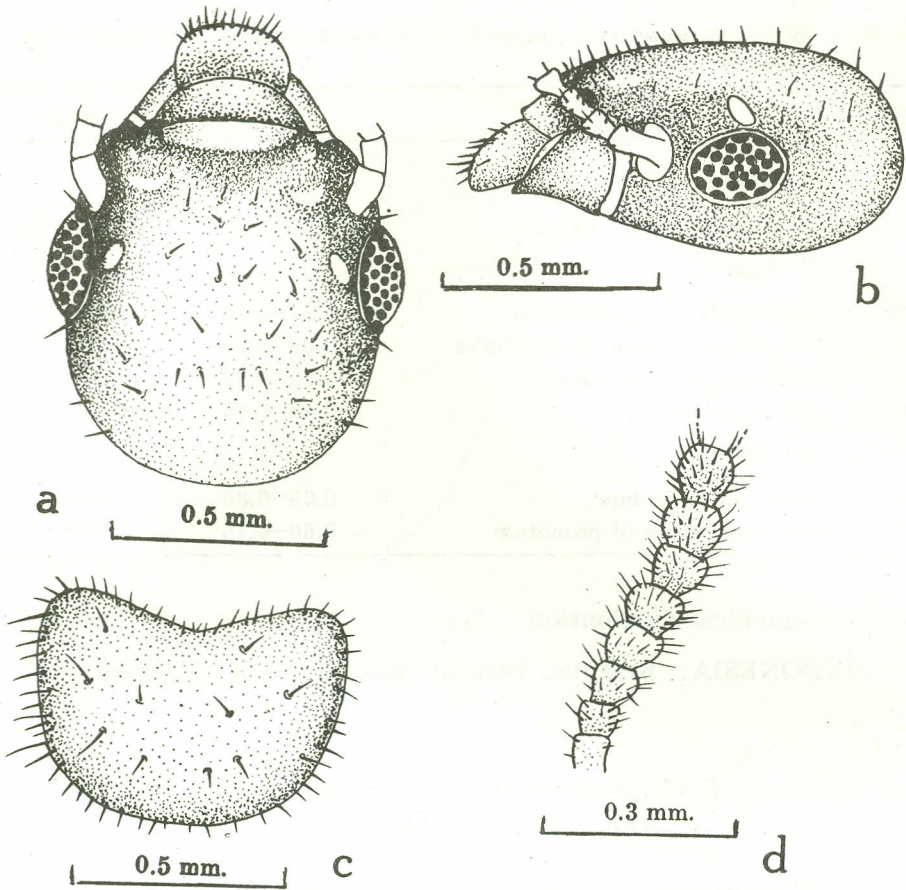


Fig. 6. *Glyptotermes caudomunitus* Kemner, Imago caste (a) Head, dorsal view (b) Head, side view (c) Pronotum, dorsal view (d) Right antenna.

Head: Head-capsule subrectangular, almost as long as broad with eyes; lateral sides substraight; posterior margin rounded. Y-suture not discernible. Fontanelle: Absent. Eyes: Small, oval faceted; maximum diameter 0.23–0.25 mm; minimum diameter 0.15–0.18 mm. Ocelli: Small oval; lying very close to but not exactly touching the ocular sclerites, eye-ocellus distance 0.13. Antennae: Broken in the specimens, only upto 9-segments present (11–12 segments as given by Kemner, 1934); segment 2-cylindrical, subequal to or very slightly shorter than 3; 4 thicker than 3; rest progressively increasing in length. Clypeus: Subtrapezoid; anterior margin weakly convex. Labrum: Shovel shaped, distinctly broader than long; anterior margin broadly convex, hairy. Mandibles: Not examined.

Thorax: Pronotum: Almost as broad as head-width; anterior margin weakly concave; sides sub-straight, converging posteriorly; posterior margin small, substraight and without any median depression. Wings: Costa, subcosta, radius, radial sector and median prominent and strongly chitinised; cubitus weakly chitinised and faint. Forewing: All veins arising independently from the scale. Costa running along the anterior margin and with a row of hairs along the margin. Subcosta short and fusing with costa just outside the scale. Radius also short and joining the costa near the proximal one-third of wing membrane. Radial sector running all along and parallel with costa. Median slightly curving upward and running parallel with radial sector. Cubitus with nearly 11–14 branches. Hind wing: Costa, radius and radial sector as in forewing. Subcosta absent. Median arising from the radial sector near the proximal one fourth of wing membrane running close to parallel with radial sector. Cubitus as in forewing.

Abdomen: Oblong; hairy. Cerci 2-jointed, 0.10 mm long. Styli one jointed; 0.07 mm long.

Table 6. Body-measurements (in mm) and indices of two imagoes of *Glyptotermes caudomunitus* Kemner.

No.	Body-parts	Specimens from Carita (Java)		Kemner,
		Range	Mean	1934 Range
I. General				
1.	Total body-length with wings ca.	6.00–6.20	6.10	5.30–5.80
2.	Total body-length without wings ca.	4.25–4.85	4.55	3.85–4.42
II. Head				
3.	Head-length to tip of labrum	1.00–1.05	1.03	—
4.	Head-length to base of mandibles	0.73–0.75	0.74	—
5.	Maximum width of head	0.73–0.75	0.74	0.74–0.78
6.	Height of head	0.40–0.50	0.54	—
7.	Maximum diameter of eye	0.25	—	—
8.	Minimum diameter of eye	0.18	—	—
9.	Maximum diameter of ocellus	0.07–0.09	0.08	—
10.	Minimum diameter of ocellus	0.05–0.07	0.06	—
11.	Minimum eye-ocellus distance	0.03	—	—
III. Thorax				
12.	Length of pronotum	0.40–0.45	0.43	0.42
13.	Maximum width of pronotum	0.70–0.75	0.73	0.66–0.70
14.	Length of forewing with scales	5.00–5.10	5.05	—
15.	Length of forewing without scale	1.00–1.10	1.05	—
16.	Length of hindwing with scale	4.90–5.10	5.00	—
17.	Length of hindwing without scale	0.90–1.00	0.95	—

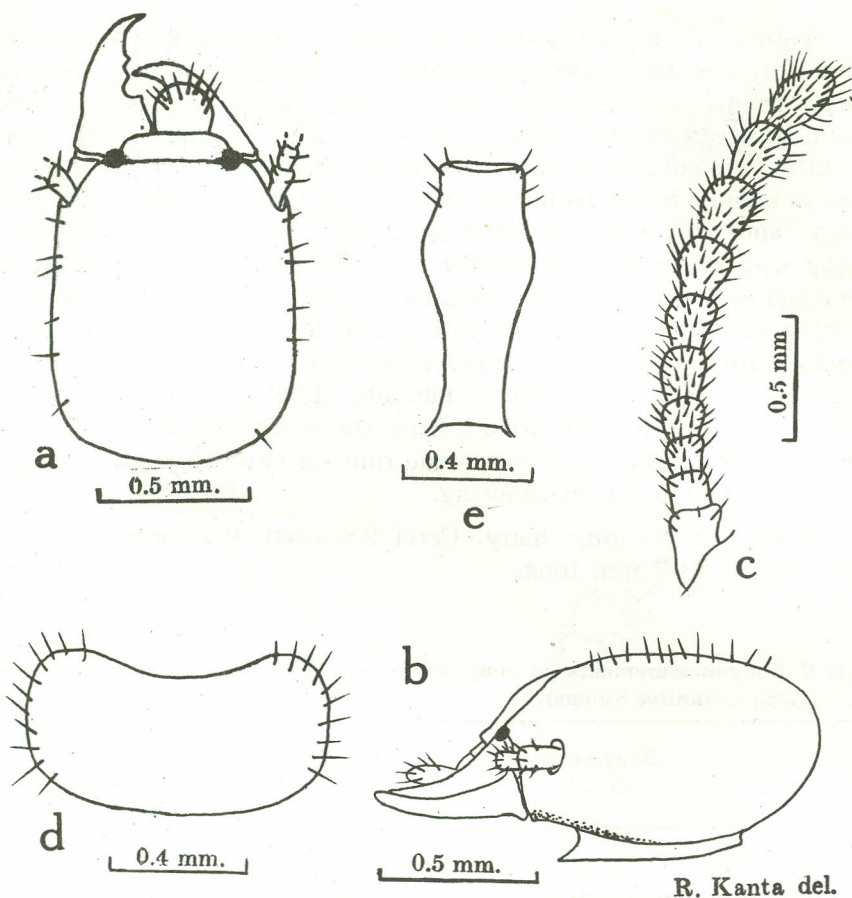


Fig. 7. *Glyptotermes caudomunitus* Kemner, Soldier caste (b) Head, side view (c) Right antenna (d) Pronotum, dorsal view (e) Postmentum, in situ.

2. SOLDIER: (Fig. 7; Table 7)

General: Head-capsule yellow brown, paler towards the peripheral region; antennae yellowish with brownish tinge, paler distally, legs rusty brown; rest of the body parts creamy yellow. Head-capsule sparsely, pronotum and abdomen moderately pilose. Total body length ca. 6.50 mm (5.00 mm as given by Kemner for soldier major).

Head: Subrectangular; short and thick; widest near the middle in the proximal half; rather gently sloping in front with a prominent median depression; with dorso-lateral protuberances not very prominent lateral sides subparallel to weakly convex, weakly converging anteriorly but more so posteriorly; postero-lateral corners rounded; poste-

rior margin weakly convex. Y-suture faintly visible. Fontanelle: Absent. Eye: Small, oval shaped, present on either side; maximum diameter *ca.* 0.10 mm. Ocelli: Minute, hardly discernible. Antennae: 10-segmented, 9–10 as given by Kemner (1934). Segment 1 largest; 2 cylindrical, distinctly longer than 3; 3 shortest; 4 onward pyriform and progressively increasing in length; last shorter and narrower than penultimate. Clypeus: Anteclypeus subrectangular, translucent; anterior margin substraight. Post-clypeus brown, darker than head-capsule and demarcated by ridge; Labrum: Broader than long; lateral sides weakly convex; anterior margin substraight; beset with hairs. Mandible: Short and thick with moderately incurved apices; basal hump prominent; length slightly less than half the head-length (head-mandibular index 0.49). Left mandible with 3 marginal teeth; teeth 1 & 2 closely situated near the apical third; 3rd more widely separated; inner margin between 2 & 3 concave. Right mandible with two marginal teeth at the level of 3rd marginal teeth of left mandible. Postmentum: Club shaped; widest near the apical fourth, whence sides converging and narrowing posteriorly forming a waist a little below the middle; anterior margin substraight; posterior margin concave and bulged medially.

Thorax: Pronotum: Rectangular; much broader than long; a little narrow than head width; anterior margin deeply emarginated with a notch in the middle; antero-lateral corners rounded; lateral sides subparallel, weakly converging and narrowing posteriorly forming a waist a little below the middle; anterior margin substraight; posterior margin concave and bulged medially.

Abdomen: Elongated; 10th abdominal tergite more strongly chitinised than the other segments. Cerci: 2-jointed, *ca.* 0.08 mm long. Styli one-jointed, *ca.* 0.08 mm long.

Table 7. Body-measurements (in mm) and indices of one soldier of *Glyptotermes caudomunitus* Kemner

No.	Body-parts	
I. General		
1.	Total body-length <i>ca.</i>	6.50
II. Head		
2.	Length of head with mandibles	1.85
3.	Length of head to base of mandibles	1.28
4.	Maximum width of head	0.95
5.	Height of head	0.78
6.	Head-Index. I (width/length of head)	0.74
7.	Length of labrum	0.18
8.	Maximum width of labrum	0.25
9.	Length of mandibles:	
	(a) Left mandible	0.63
	(b) Right mandible	0.60

cont'd

No.	Body-parts	
10.	Head-mandibular-Index I (left mandible length/ head-length to base of mandible)	0.49
11.	Minimum (Median) length of postmentum	
12.	Maximum width of postmentum	
III. Thorax		
13.	Length of pronotum	0.45
14.	Maximum width of pronotum	0.88
15.	Pronotum-Index (length/width)	0.51

(c) Geographical distribution:

INDONESIA: Java: Depok. Anak Krakatau and Carita (Java) (Present record).

(d) Remarks: This species was first described by Kemner in 1930. He however, again redescribed it as a new species of Java and Celebes (Sulawesi). Snyder (1949) did not mention about Kemner's second reference.

5. *Glyptotermes minutus* Kemner
(Fig. 8 and Table 8)

1930. *Calotermes (Glyptotermes) minutus* Kemner, F.P. Jepson, Tech. Rep. Dep. Agric., Ceylon, 1929: 6 (MS name).
1932. *Glyptotermes minutus* Kemner, Ent. Tidskr., Stockholm, 53: 149-150. Im., S. Type-locality: Sri-lanka. Perideniya. (selected by Chhotani, 1975).
1949. *Glyptotermes minutus*: T.E. Snyder, Smiths. misc. Coll., Washington, 112, 49.
1953. *Kalotermes (Glyptotermes) minutus*: Rattan lal and R.D. Menon, Cat. Indian. Insects., Pt. 27. Isoptera, Delhi: 15.
1975. *Glyptotermes minutus*: O.B. Chhotani, Rec. Zool. Surv., India, Calcutta, 68: 150-155.

(a) Material :

One vial with one dealated imago, from Rakata Kecil, Krakatau Island, Coll. T. Abe, 11.11.1982.

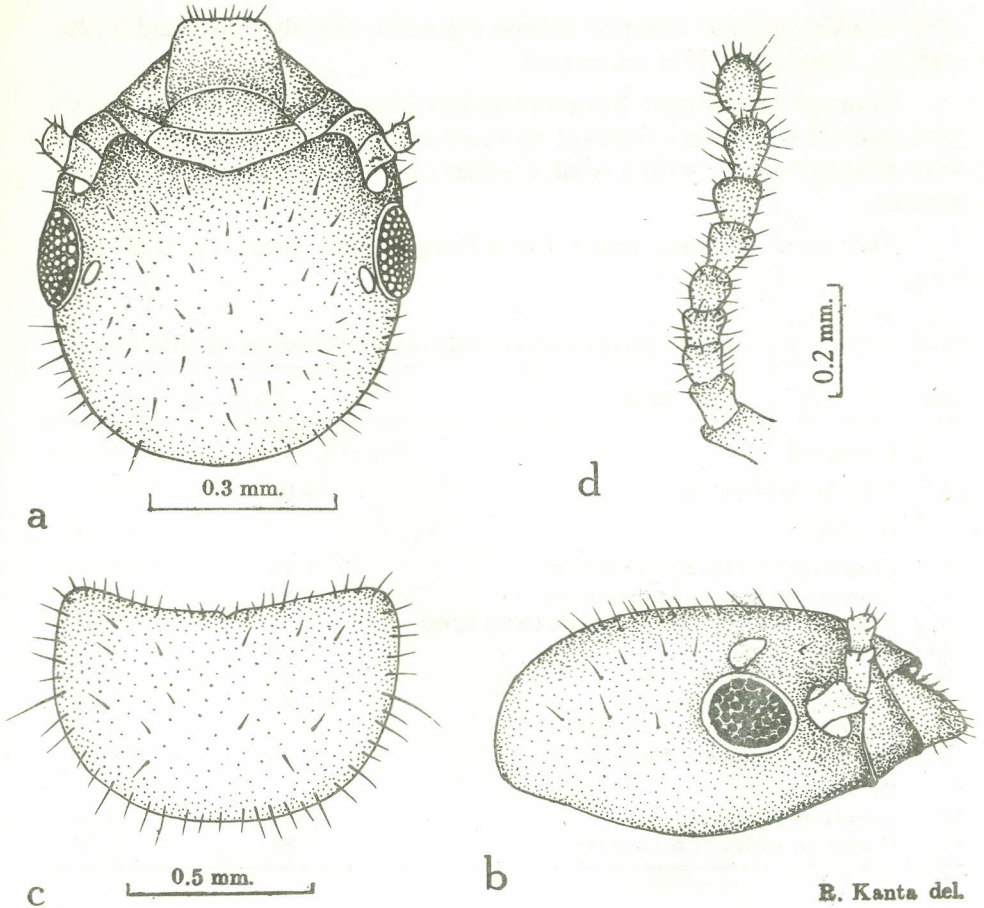


Fig. 8. *Glyptotermes minutus* Kemner, Imago caste (a) Head, dorsal view (b) Head, side view (c) Pronotum, dorsal view (d) Right antenna.

(b) Description:

1. IMAGO: (Fig. 9; Table 9)

General: Head-capsule, thorax and abdomen deep dark brown; Anteclypeus, labrum and antennae brownish yellow, paler than head-capsule. Head and body sparsely hairy. Total body-length without wings 4.95 mm.

Head: Head-capsule subcircular. width a little more than length to base of mandibles; sides weakly convex, converging posteriorly to rounded posterior margin. Y— Suture present. Fontanelle: Absent. Eyes: of median size, black, faceted and oval in shape. Ocelli: Small, oval; almost touching the eyes. Antennae: Incomplete (maximum 9 segment present), segment 2 subequal to 3; 4 longer than 3. Postclypeus scantily pilose, anterior margin weakly convex. Labrum: Sub-squarish;

sides weakly convex; anterior margin rounded, slightly depressed in the middle. Mandibles: Not examined.

Thorax: Pronotum: Subrectangular; Narrower than head width with eyes; sides weakly convex; anterior margin weakly concave; posterior margin convex, with a weak median notch. Wings: Only wing scale present.

Abdomen: Oblong, hairy. Cerci 2-segmented, short. ca. 0.05 mm long.

Table 8. Body-measurement (in mm) of one imago of *Glyptotermes minutus* Kemner.

No.	Body Parts	Chhotani, 1975	
I. General			
1.	Total body-length ca	4.95	—
II. Head			
2.	Head-length to tip the of labrum	1.18	—
3.	Head-length to base of mandibles	0.83	0.80
4.	Maximum width of head-capsule (with eyes)	0.93	0.85
5.	Height of head	0.55	—
6.	Maximum diameter of eye	0.25	0.25
7.	Minimum diameter of eye	0.23	0.20
8.	Maximum diameter of ocellus	0.08	0.09
9.	Minimum diameter of ocellus	0.05	0.07
III. Thorax			
10.	Length of pronotum	0.50	0.49
11.	Maximum width of pronotum	0.88	0.73

(c) Geographical distribution:

This species was known so far from the type-locality only, (Peradeniya, Sri-Lanka). This is the first record outside Sri-Lanka.

(d) Remarks:

The specimen from Rakata Kacil is larger in size, otherwise it resembles very much with the description given by Kemner and Chhotani. Therefore, it has been assigned to *G. minutus* Kemner.

6. *Glyptotermes panaitanensis* Thakur
(Figs. 9-11; Tables 9-11)

(a) Material:

One vial with 2 imagoes, 1 soldier and 5 pseudoworkers from Panaitan Island (Indonesia), Coll. Takuya Abe 21 10 1982 Ex. Wood.

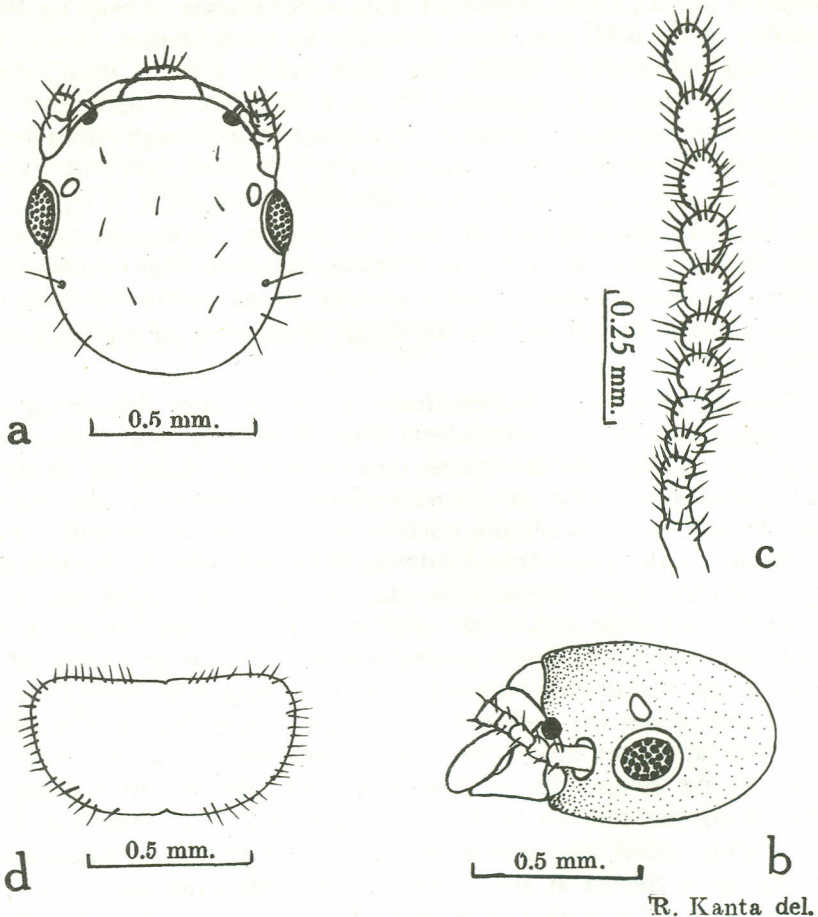


Fig. 9. *Glyptotermes panaitanensis* Thakur, Imago caste (a) Head, dorsal view (b) Head, side view (c) Right antenna (d) Pronotum, dorsal view.

(b) Description:

1. IMAGO : Fig. 9; Table 9)

General: Head-capsule and antennae pale yellow to light brown; wings, main veins light brown to rusty brown; darker than head-capsule; postclypeus slightly darker than head-capsule; rest of the body parts creamy yellow. Head-capsule sparsely, thorax with a row of hair along the margins; abdomen moderately hairy. Total body-length with wings ca. 6.50–6.60 mm without wings 5.40–5.75 mm.

Head: Head-capsule subrectangular, distinctly longer than broad; lateral sides with eyes substraight; posterior margin round. Y-suture present, median arm faintly visible. Fontanelle: Absent. Eyes: small, maximum diameter with ocular sclerites 0.18–0.20 mm; minimum

diameter 0.15–0.19 mm; separated from lower margin of head by about a distance of *ca.* 0.10 mm; from antennae by *ca.* 0.03 mm. Ocelli: Two small, oval, translucent ocelli, one each either side of head; almost touching the eyes, only separated by *ca.* 0.02 distance. Antennae: 11–12 segmented; segment 1 longest, cylindrical; 2 in 11-segmented antennae, slightly longer than 3; 3 longer than 5; 4 shortest; rest club-shaped, 5–8 almost subequal, 9-onward progressively increasing in length; last ovate. Clypeus: Subtrapesoidal; anterior margin weakly convex, indistinctly divided into ante and post-clypeus. Labrum: Slightly converging anteriorly; anterior margin weakly convex; beset with a few long hairs near the anterior margin and on the body. Mandibles: of typically *Glyptotermes* type.

Thorax: Pronotum: Subreniform; much broader than long; anterior margin broadly concave; lateral sides weakly convex, slightly converging posteriorly; postero-lateral corners sharply rounded; posterior margin substraight, with an imperceptible depression in the middle. Wings: Translucent, membrane covered with prominent granules. Forewing: Scale a little longer than hindwing scale. All veins arising independently from the scale. Costa, subcosta, radius, radial sector and median strongly chitinised and thick; cubitus generally weak somewhat prominent near the scale. Costa running along the anterior border of the wing upto the distal end. Subcosta minute, fusing with costa little distance outside the scale. Radius short, arising independently, but joining with Costa at about one-sixth of wing membrane. Radial Sector and Median arising independently from the scale, curving up and running parallel along the anterior border. Cubitus with 15–18 branches. Hindwing: Costa, radius and radial sector as in forewing. Median arising from the radial Sector at about one-fourth of wing membrane; running close to and parallel with the radial Sector up to distal end. Cubitus as in forewing, with 13–15 branches. Legs: Short, hairy; apical tibial spur formula 3:3:3. Tarsi 4-segmented; an arolium present.

Abdomen: Oblong, hairy, Cerci 2-jointed, *ca.* 0.07–0.10 mm Styli one-jointed; *ca.* 0.05–0.07 mm long.

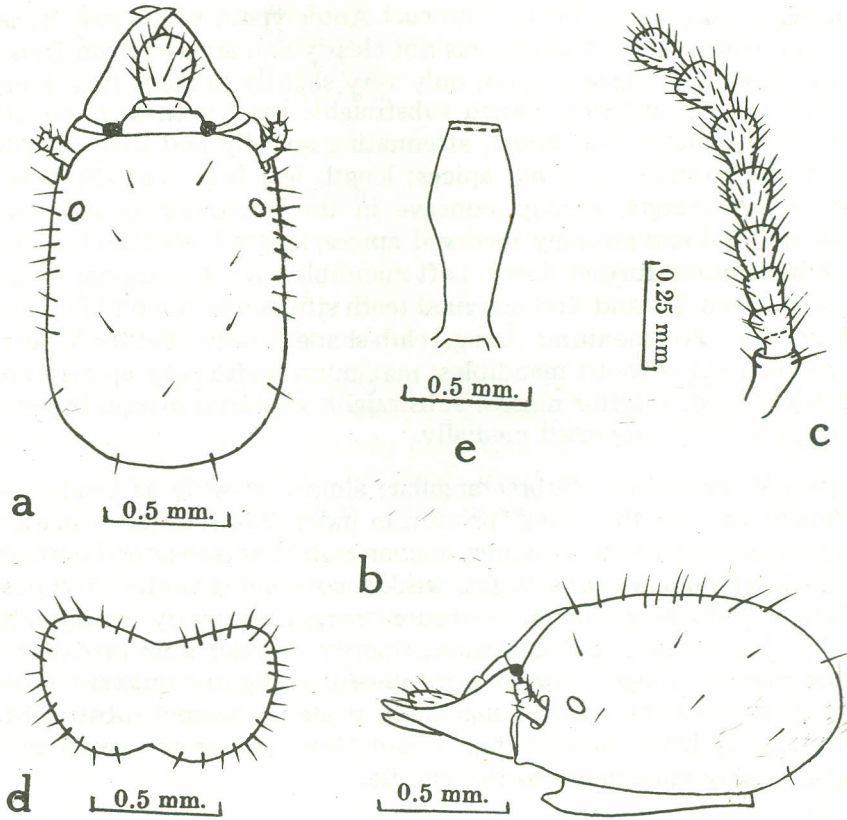
Table 9. Body-measurements (in mm) of 2 imagoes of *Glyptotermes panaitanensis* Thakur.

No.	Body-parts	Range	Mean
I. General			
1.	Total body-length with wings <i>ca.</i>	6.50–6.60	6.55
2.	Total body-length without wings <i>ca.</i>	5.50–5.75	5.58

cont'd

No.	Body-parts	Range	Mean
II. Head			
3.	Head-length to tip of labrum	1.00—1.03	1.02
4.	Head-length to base of mandibles	0.80—0.85	0.83
5.	Maximum width of head with eyes	0.75—0.80	0.78
6.	Maximum diameter of eye	0.18—0.20	0.19
7.	Minimum diameter of eye	0.15—0.18	0.17
8.	Maximum diameter of Ocellus	0.07—0.08	0.075
9.	Minimum diameter of Ocellus	0.05—	—
10.	Distance of eye from the lower margin of head	0.10—	—
11.	Minimum eye-antennal socket distance	0.03—	—
12.	Minimum eye-ocellus distance	0.02—	—
III. Thorax			
13.	Length of pronotum	0.43—0.45	0.44
14.	Maximum width of pronotum	0.70—0.75	0.73

2. SOLDIER: (Fig. 10 : Table 10)



R. Kanta del.

Fig. 10. *Glyptotermes panaitanensis* Thakur, Soldier caste (a) Head, dorsal view (b) Head, side view (c) Antenna (d) Pronotum, dorsal view (e) Postmentum, in situ.

General: Head-capsule yellow brown, paler posteriorly; antennae brownish yellow; mandibles deep brown, reddish brown basally, frons and postclypeus darker; pronotum translucent laterally, yellowish with brownish tinge; rest of the body-parts much paler. Head-capsule and pronotum sparsely hairy; abdomen and legs moderately hairy; 10th abdominal tergites more strongly sclerotised. Total body-length ca. 6.60 mm.

Head: Head-capsule, much longer than broad, widest near the posterior third, sides sub-parallel, almost up to base of antennae whence slightly converging anteriorly; posterolateral margins rounded; posterior margin weakly convex, frons sloping in front gently, lateral grooves on antero-dorsal corner present, t-suture faintly marked; median arm more distinct, extending upto occiput. **Fontanelle:** Absent. **Eyes:** Two lateral, oval, unpigmented eyes, one on either side; flush with head surface; separated from antennal socket by ca. 0.13 mm **Ocelli:** Small dot like. **Antennae:** with 9-segments, segment 1 largest; 2 cylindrical, subequal to 3 & 4 combined; 3 shortest; 5 to penultimate pyriform, progressively increasing in length; last ovate. **Clypeus:** Anteclypeus a thin pale translucent and apilose strip. Postclypeus not clearly demarcated from frons. **Labrum:** Broadly tongue shaped; only very slightly broader than long; sides sub-parallel; anterior margin substraight; beset with hairs on the tip and body. **Mandibles:** Short, attenuating apically and with sharply pointed and strongly incurved apices; length less than half the head-length; outer margin weakly concave in the basal region and with sharply pointed and strongly incurved apices; length less than half the a weak basal hump further down. Left mandible with 2 marginal teeth; margin between 1st and 2nd marginal teeth situated in the middle two-third portion. **Postmentum:** Long, club-shaped; only slightly smaller than head-length without mandibles; maximum width near apical one-third; waist long; anterior margin substraight; posterior margin broadly concave, convexly projected medially.

Thorax: **Pronotum:** Subrectangular; almost as wide as head-capsule; much broader than long (pronotum index 0.52); anterior margin deeply concave and with a distinct median notch; antero-lateral corners angulated; lateral sides substraight, weakly converging posteriorly; postero-lateral corners rounded; posterior margin distinctly emarginate medially. **Mesonotum:** Sub-quadrate; slightly broader than pronotum; anterior margin straight; lateral sides diverging slightly outward posteriorly; postero-lateral corners angulated; posterior margin substraight. **Metanotum:** A little broader than mesonotum; posterior margin substraight, weakly emarginate in the middle.

Abdomen: Elongated; moderately pilose. Cerci 2-jointed small ca. 0.07 mm. long. Styli one-jointed, ca. 0.05 mm long.

Table 10. Body-measurements (in mm). and indices of holotype soldier of *Glyptotermers panaitanensis* Thakur.

No.	Body-parts	Length in mm/index
I. General		
1.	Total body-length <i>ca</i>	6.60
II. Head		
2.	Length of head with mandibles	1.82
3.	Length of head to base of mandibles	1.35
4.	Maximum width of head	0.93
5.	Width at side base of mandibles	0.75
6.	Width at side base of antennae	0.88
7.	Head-Index. I. (width/length of head)	0.69
8.	Head-Index. II. (width at base of mandibles/Max/width)	0.81
9.	Head-Index III (width at base of antennae/ Max. width of head)	0.95
10.	Length of mandibles	
	(a) Left mandible	0.58
	(b) Right mandible	0.58
11.	Head-mandibular Index I.	0.43
12.	Minimum (Median) length of postmentum	0.88
13.	Maximum with of postmentum	0.35
14.	Minimum width of postmentum	0.23
III. Thorax		
15.	Length of pronotum	0.48
16.	Maximum width of pronotum	0.93
17.	Pronotum—Index	0.52

3. Pseudoworkers: (Fig. 11; Table 11)

(a) Pseudoworker Major

General: Head-capsule creamy yellow; postclypeus brownish, darker than frons; labrum pale brown, translucent; antennae creamish, with yellowish tinge; rest of the body parts creamy white, paler than head-capsule; pronotum slightly chitinised. Head and body sparsely pilose, pronotum a little more hairy. Total body-length *ca.* 5.20–6.00 mm.

Head: Head-capsule subcircular; a little broader than long (up to base of mandibles); widest near the middle in lower half; lateral sides convex; weakly converging anteriorly; more so posteriorly; posterior margin convex. Fontanelle: 10–11 segmented; segment 1 largest; segment 2 cylindrical, narrower than 1st; almost 1½ times of 3rd; 3rd shortest. In 11-segmented condition, segment 2 almost equal to 3 & 4 combined; 3 narrowest and shortest, 4 to penultimate gradually increasing in size and broadly pyriform; last ovate, narrower than penultimate. In one specimen right antennae is 9-segmented; segment 2 & 3 narrowest; 2 almost twice of 3; 3 shortest. Clypeus Labrum and mandibles as in imago.

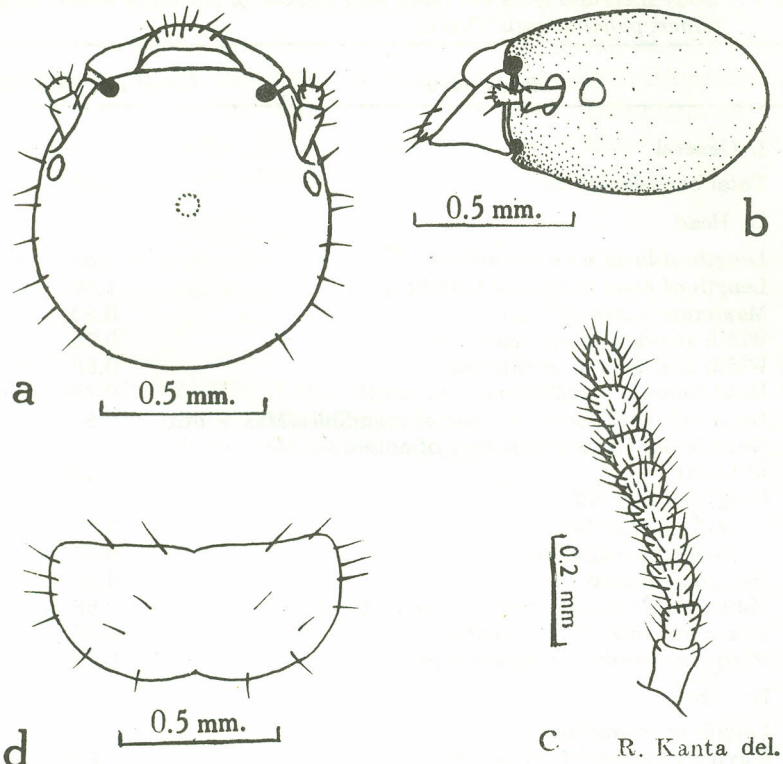


Fig. 11. *Glyptotermes panaitanensis* Thakur, Worker caste (a) Head, dorsal view (b) Head, side view (c) Right antennae (d) Pronotum, dorsal view.

Thorax: Pronotum: Subreniform; distinctly broader than long; almost as wide as or slightly narrower than head-width, anterior margin truncated, broadly concave medially and without any notch; lateral sides weakly convex, converging posteriorly; posterior margin weakly convex slightly depressed medially. Mesonotum: Slightly broader than pronotum; lateral sides substraight, diverging outward posteriorly to angulated postero-lateral corners; posterior margin bulged medially. Metanotum: Slightly broader than mesonotum; posterior margin as in mesonotum.

Abdomen: Cylindrical. Cerci 0.08–0.10 mm long. Styli 0.10 mm long.

Table 11. Body measurements (in mm). of Pseudoworkers of *Glyptotermes Panaitanensis* Thakur

No.	Body-parts	Pseudoworker major	Pseudoworker minor	
		Range (3-examples)	Mean	(1-example)
I. General				
1.	Total body-length ca.	5.20—6.00	5.50	3.90
II. Head				
2.	Head-length to tip of labrum	1.05—1.10	1.07	0.90
3.	Head-length to base of mandibles	0.70—0.80	0.75	0.70
4.	Maximum width of head	0.83—0.85	0.84	0.73
5.	Height of head	0.50—0.55	0.53	0.43
III. Thorax				
6.	Length of pronotum	0.45—0.53	0.48	0.38
7.	Maximum width of pronotum	0.78—0.83	0.85	0.65

- (b) Pseudoworker Minor: Resembles pseudoworker major in all respects except for size.
- (c) Geographical distribution: INDONESIA: Panaitan Island (type-locality).

FAMILY (II) RHINOTERMITIDAE
 SUB-FAMILY (i) COPTOTERMITINAE
 GENUS. (3) *Coptotermes* Wasmann

KEY TO SPECIES.—

- 1(2) Larger species. Head-length with mandibles 2.39—2.65 mm; without mandibles 1.45—1.62; head-width 1.30—1.52 mm. Head-capsule flat; large mandibles, nearly two-third of head capsule; head mandibular index higher 0.63—0.69.
- Coptotermes curvignathus* Holmg.
- 2 (1) Smaller species. Head-length with mandibles 1.59—1.76 mm; without mandibles 1.02—1.18 mm; head-width 0.92—1.03 mm. Head-capsule swollen behind the fontanelle opening; mandibles smaller, a little more than half the head-length; head-mandibular index lower 0.55—0.53.

Coptotermes kalshoveni Kemner

7. *Coptotermes curvignathus* Holmgren
(Fig. 12; Table 12)

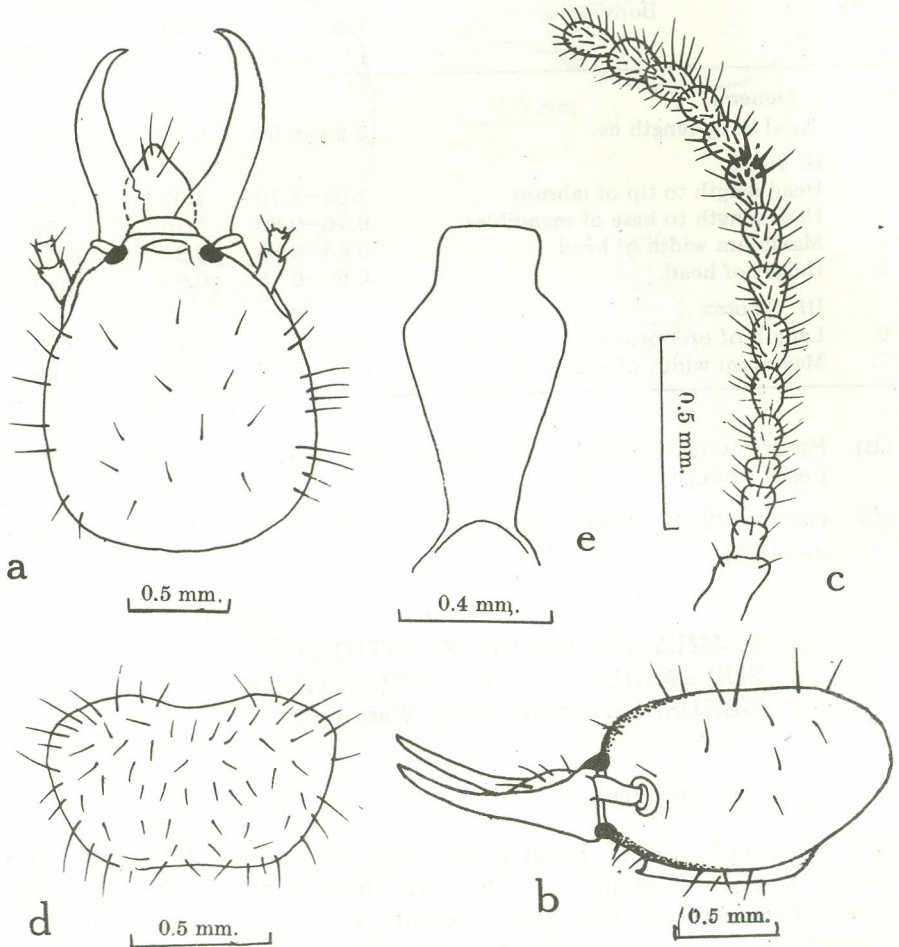


Fig. 12. *Coptotermes curvignathus* Holmgren, Soldier caste (a) Head, dorsal view (b) Head, side view (c) Right antenna (d) Pronotum, dorsal view (e) Postmentum, in situ.

1913. *Coptotermes curvignathus* N. Holmgren, K.Sv.vet Akad. Handl Stockholm, 50 (2): 77-78, 266, S.W. & Ny.
Type-localities: Singapore (Malay Peninsula); Sarawak (Borneo) and Burma.
1949. *Coptotermes curvignathus*: T.E. Snyder, Smiths. Misc. Coll., Washington, 112: 77. (Malaya and Burma).

1962. *Coptotermes curvignathus*: M.L. Roonwal and O.B. Chhotani, Indian Counc. Agric. Res. Ent. Mongr. No. 2:8 & 34—35.
1966. *Coptotermes curvignathus*. M.L. Roonwal & P.K. Maiti, Treubia, Bogor, 27 (1) : 81—82.

(a) Material :

One vial with 9 soldiers and one worker, from Panaitan Islands, Indonesia, Coll. Takuya Abe., 9—10—82. *Ex.* wood.

(b) Description:

1. SOLDIER: (Fig. 12; Table 12).

General: Head-capsule and antennae golden yellow; antennal carinae, fontanelle gland opening, anteriormost part of head capsule, adjoining mandibles light brown; mandibles reddish brown; yellowish brown basally; rest of the body parts whitish yellow. Head-capsule and pronotum sparsely, body moderately hairy. Total body-length ca. 5.40—6.7 10 mm.

Head: Head-capsule broadly oval, longer than broad; broadest near the posterior third; sides weakly convex, sharply converging anteriorly; posterior margin broadly rounded; dorsum of head not swollen behind the fontanelle; in profile almost straight. Fontanelle: large circular, with a brown chitinised border. Eyes and Ocelli: Absent. Antennae: with 14-16 segments; segment 1 largest; in 15 segmented antennae, segment 3 almost as long as or slightly longer than 2; 4 shortest; in 16—segmented condition, 2 subequal to 3 & 4 combined; 3rd smallest, rest pyriform gradually increasing in length; last ovate. In one specimen right antenna is 14—segmented; and segment smaller than 3; 3 pyriform widening anteriorly; 4 shortest; 6 subdivided. Labrum: Subtriangular, longer than broad, sides narrowing anteriorly to broadly pointed whitest hyaline tip; distal tip with one or two bristles. Mandibles: Sabre shaped, broadest at base, gradually narrowing distally into sharply pointed and moderately incurved apices. Length nearly two-third of head-capsule. Left mandible with crenulations at the basal region and a projection below them. In one specimen, left mandible has a distinct dentition near apical forth (fig.) Right mandible, with similar but weaker crenulations & no basal projection. Postmentum: Club-shaped with a few bristles in the anterior one-third, broadest in the anterior one-third; waist lying in the basal half; anterior margin translucent, sub-straight; posterior margin weakly concave.

Thorax: Pronotum: Flat, subreniform, much broader than long (pronotum-index 0.54–0.60), anterior margin with a broad deep prominent median notch. **Mesonotum:** Narrower than pronotum; posterior margins substraight. **Metanotum:** Broader than mesonotum but narrower than pronotum; posterior margin weakly convex. **Legs:** Long, slender; tibial spurs 3:2:2; tarsi 4 segmented.

Abdomen: Elongated to subglobular; hairy. Cerci 2 jointed; 0.13–0.15 mm long. Styli one jointed ca 0.10 mm long.

Table 12. Body-measurements (in mm) and indices of 7-soldiers of *Coptotermes curvignathus* Holmgren.

No.	Body parts	Range	Mean	Ahmad'58
I. General				
1.	Total body length ca.	5.40–6.70	5.70	—
II. Head				
2.	Head-length with mandibles	2.40–2.55	2.47	2.39–2.65
3.	Head-length to base of mandibles.	1.45–1.55	1.48	1.48–1.62
4.	Maximum width of head	1.30–1.40	1.37	1.34–1.52
5.	Minimum width of head at side base of mandibles	0.73–0.80	0.78	0.78–0.83
6.	Width at side base of antennae	1.05–1.15	1.12	—
7.	Height of head	0.78–0.95	0.84	0.93–0.98
8.	Head-index-I (width/head)	0.86–0.96	0.91	—
9.	Head convergence index-I (minimum width/max. width)	0.54–0.50	0.58	—
10.	Length of mandibles			
	(a) Left mandible	0.95–1.00	0.98	—
	(b) Right mandible	0.93–1.00	0.97	—
11.	Head-mandibular index-I (Left mandible length/head length)	0.63–0.69	0.66	—
12.	Minimum (median) length of postmentum	0.88–1.00	0.96	0.93
13.	Maximum width of postmentum	0.38–0.43	0.41	0.39–0.44
14.	Minimum width of postmentum	0.23–0.25	0.24	—
III. Thorax				
15.	Length of pronotum	0.53–0.58	0.55	0.48–0.53
16.	Maximum width of pronotum	0.95–0.98	0.97	0.93–1.06
17.	Pronotum index (length/width)	0.54–0.60	0.57	—

(c) Geographical distribution : INDONESIA : Panaitan Island.

INDONESIA : Java : Gn. Batu near Bogor *Kalimantan* (Borneo):
Andalas : (Sumatra) Soengei Bamban, Bah Boelian, Bahsoemboe, Siak,
Tanjong Slamet. Panaitan Island (Present record).

Elsewhere : Malay Peninsular and Burma.

8. *Coptotermes Falshoveni* Kemner
(Fig. 13; Table 13)

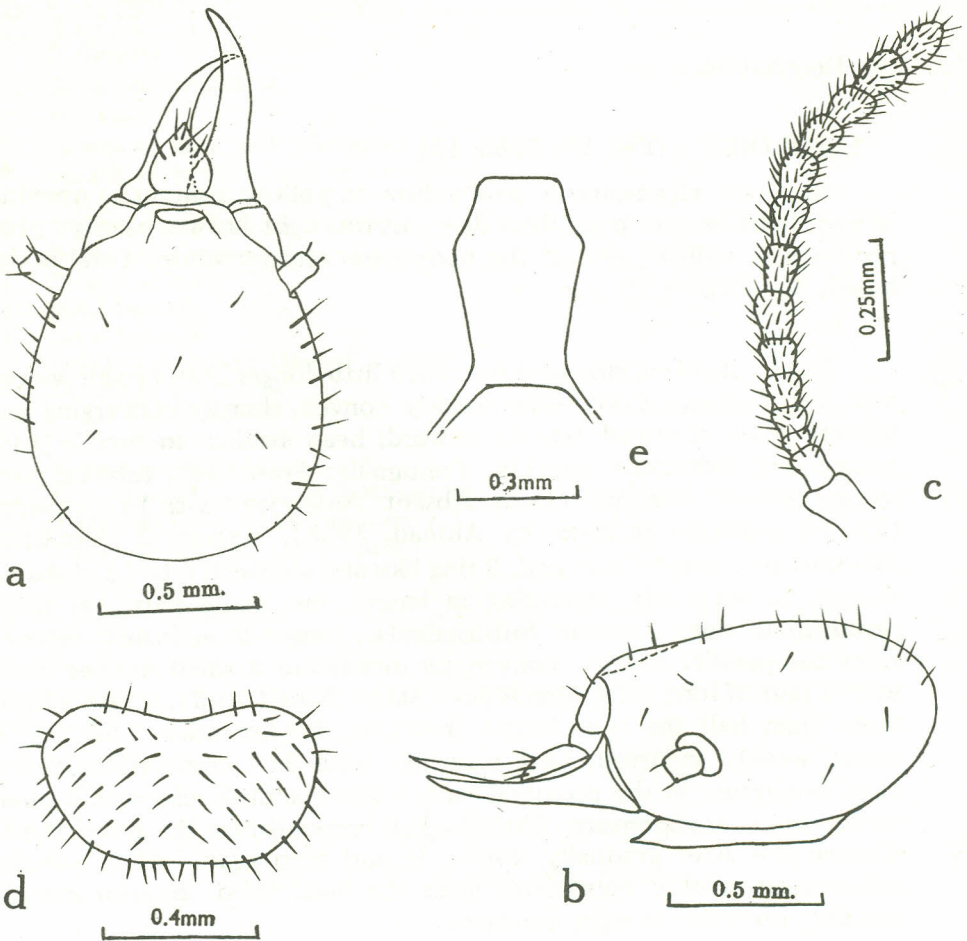


Fig. 13. *Coptotermes kalshoveni* Kemner, Soldier caste (a) Head, dorsal view (b) Head, side view (c) Right antenna (d) Pronotum, dorsal view (e) Postmentum in situ.

1934. *Coptotermes kalshovani* N.A. Kemner, K.Sv.Vet. Akad. Handl., Stockholm (3) 13 (4): 61. Type-locality: Semarang (Middle Java).
1949. *Coptotermes kalshoveni*: T.E. Snyder, Smiths. Misc. Coll., Washington, 112: 80.
1966. *Coptotermes kalshoveni* : M.L. Roonwal & P.K. Maiti, Treubia, Bogor, 27 (1) : 81.

(a) Material:

One vial with 4 soldiers and one worker from Carita (West Java), coll. Takuya Abe, 2.11.1982. *Ex.* Wood.

(b) Description :

1. SOLDIER : (Fig. 13; Table 13)

General : Head-capsule pale yellow to yellow; fontanelle opening, labrum light brown; mandibles deep brown, light brown basally; pronotum pale yellow; rest of the body-parts creamy white. Total body-length ca. 3.75–4.70 mm.

Head : Head-capsule pear shaped, a little longer than broad; widest near the posterior third, sides weakly convex, sharply converging anteriorly from antennal faveola onward; head swollen in profile just behind the fontanelle opening. Fontanelle: Prominent, tubular, projecting in front. *Eyes* and *Ocelli*: Absent. Antennae : with 14-segments; (13–14 segments as given by Ahmad, 1958), segment 2 cylindrical subequal to 3 and 4 combined, 3 ring like and shortest; 5 to 13 globular shaped, progressively increasing in length, last ovate narrower than penultimate one. Labrum: Subtriangular, longer than broad; lateral sides sub-parallel basally, converging distally to a small hyaline apex with a pair of long hairs. Mandibles : Sabre shaped, short, length a little more than half the head length (head-mandibular index 0.55–0.57); apices weakly incurved; Left mandible with 3–4 crenulations and a basal projection in the proximal half. Right mandible also with 3 small crenulations. Postmentum: Club shaped, broadest near the apical third, whence the sides gradually sloping in and then again out to parallel sides; waist weakly constricted near the basal third; anterior margin straight; posterior margin concave.

Thorax : Flat, subreniform; anterior margin convex, with a prominent deep median notch; posterior margin broadly invaginated in the middle. Mesonotum : Narrower than pronotum; posterior margin sub-straight to weakly convex. Metanotum: Broader than mesonotum, but narrower than pronotum; posterior margin weakly convex. Legs: Long, slender and hairy; tibial spur 3:2:2; tarsi 4-segmented.

Abdomen : Elongated to globular. Cerci 2-jointed; 0.10 mm long. Styli one-jointed; 0.07 mm long.

Table 13. Body-measurements (in mm) and indices of soldiers of *Coptotermes kalshoveni* Kemner.

No.	Body-parts	Range	(4 examples) Mean
I. General			
1.	Total body-length ca	3.75-4.70	4.00
II. Head			
2.	Length of head with mandibles	1.65-1.76	1.71
3.	Length of head to base of mandibles	1.10-1.18	1.13
4.	Maximum width of head	0.98-1.03	1.00
5.	Width at side base of mandibles	0.50	—
6.	Width at side base of antennae	0.75-0.80	0.78
7.	Height of head	0.58-0.68	0.63
8.	Head-Index-I.	0.85-0.93	—
9.	Head-Index-II.	0.49-0.51	0.50
10.	Occipito-fontanelle opening distance	1.13-1.18	1.15
11.	Length of mandibles :		
	(a) Left mandible	0.60-0.63	0.62
12.	(b) Right mandible	0.60-0.63	0.61
12.	Head-mandibular-Index-I.	0.55-0.57	0.50
13.	Min. (Median) length of postmentum	0.55-0.60	0.58
14.	Maximum width of postmentum	0.33-0.35	0.34
15.	Minimum width of postmentum	0.25-0.28	0.26
III. Thorax			
16.	Length of pronotum	0.39-0.40	0.39
17.	Maximum width of pronotum	0.68-0.70	0.69
18.	Pronotum-Index (length/width)	0.54-0.59	0.56

SUB-FAMILY (ii) RHINOTERMITINAE

GENUS (4) *Prorhinotermes* Silvestri9. *Prorhinotermes panaitanensis* sp. nov.

(Figs. 14-15; Tables 14-15)

(a) Material:

i) One vial, with four soldiers and 3 workers from Panaitan, Krakatau Islands, Coll. Takuya Abe, 21-10-1982. *Ex.* wood.

ii) One vial with 3 soldiers and 8 workers, from Rakata Besar, Krakatau Islands, Coll. Takuya Abe, 31-10-1982. *Ex.* wood.

(b) Description:

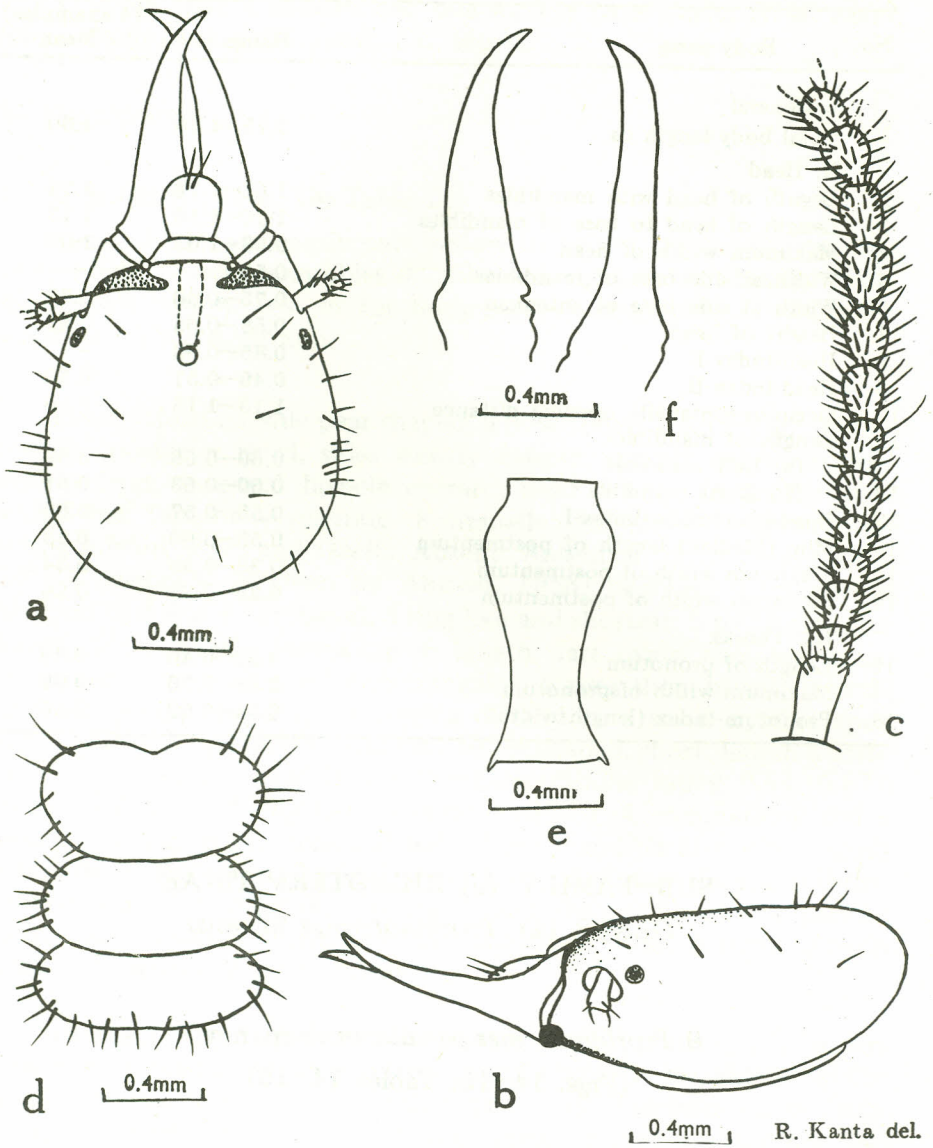


Fig. 14. *Prorhinotermes panaitanensis* sp. nov., Soldier caste (a) Head, dorsal view (b) Head, side view (c) Thorax (pronotum, mesonotum and metanotum), dorsal view (d) mandibles (e) Right antenna (f) Postmentum, in situ.

1. SOLDIER : (Fig. 14; Table 14)

General : Head-capsule golden yellow, paler near the occiput; frons, postclypeus, labrum and basal region of mandibles yellowish brown, darker than head-capsule; antennae and pronotum of same colour as posterior region of head-capsule; mandibles light brown. Head and pronotum with few scattered hairs; abdominal tergites with a row of hairs on the posterior margin. Total bodylength ca. 4.50–6.00 mm.

Head : Head-capsule sub-oval, longer than broad; widest near the posterior third, thence converging anteriorly; sides weakly convex; posterior margin broadly rounded. **Fontanelle**: Small, round, translucent, situated near the apical third; a broad groove running from the fontanelle towards the base of postclypeus; broadening anteriorly. **Eyes**: Small, translucent and oval shaped situated a little behind the base of antennae. **Ocelli** : Absent. **Antennae** : 18-segmented; segment 1 largest; 2 cylindrical, almost half of 1st; 3rd more chitinised, slightly longer than 2nd; 4 shortest; 5 to penultimate pyriform; last ovate, a little narrower than penultimate one. **Labrum** : Tongue shaped, slightly broader than long; lateral sides weakly convex, converging anteriorly to broadly rounded anterior margin, with a pair of bristles. **Clypeus**: Anteclypeus narrow, hyaline, nearly as broad as base of labrum. Postclypeus darker than anteclypeus. **Mandibles** : Sabre shaped, with weakly incurved apices, inner margins almost straight. Left mandible with very fine crenulations on the inner margin, except near the tip. Right mandible with inner margin smooth, with 2–3 weak crenulations near the base. **Postmentum** : Club shaped; broadest near the apical one-fourth; narrowest waist near the basal third; anterior margin sub-straight; posterior margin weakly wavy and concave.

Thorax : **Pronotum** : Subreniform, flat; anterior margin with a broad median invagination; lateral sides sloping in posteriorly; posterior margin substraight with an imperceptible median depression. **Mesonotum** : Almost as broad as pronotum. **Metanotum** : Slightly broader than pronotum; posterior margin weakly convex. **Legs** : Short; moderately hairy; femora thickened; tibiae slender, tibial spurs 3:2:2. **Tarsi** 4-segmented.

Abdomen : Oblong, **Cerci** 2-segmented, ca. 0.10–0.13 mm long. **Styli** one-jointed, hairy ca. 0.08–0.10 mm long.

Table 14. Body-measurements and indices (in mm) of soldiers of *Prorhinotermes panattanensis* sp. nov.

No.	Body-parts	Range	Mean
I. General			
1.	Total body-length ca.	4.50-6.00	5.30
II. Head			
2.	Head-length with mandibles	2.35-2.60	2.53
3.	Head-length to base of mandibles	1.35-1.50	1.46
4.	Maximum width of head	1.20-1.33	1.26
5.	Width at side base of mandibles	0.80-0.88	0.83
6.	Width at side base of antennae	1.05-1.20	1.13
7.	Head-index-I (width/length of head)	0.85-0.89	0.87
8.	Head-convergence index (min/max head/width)	0.63-0.67	0.65
9.	Length of mandibles		
	(a) Left mandible	1.00-1.10	1.05
	(b) Right mandible	1.00-1.10	1.05
10.	Head-mandibular index-I.	0.89-0.76	0.72
11.	Minimum (median) length of postmentum	1.00-1.10	1.05
12.	Max. width of postmentum	0.43-0.48	0.24
13.	Minimum width of postmentum	0.23-0.25	0.24
III. Thorax			
14.	Length of pronotum	0.50-0.58	0.54
15.	Maximum width of pronotum	0.93-1.05	0.98
16.	Pronotum index (length/width of pronotum)	0.51-0.56	0.54

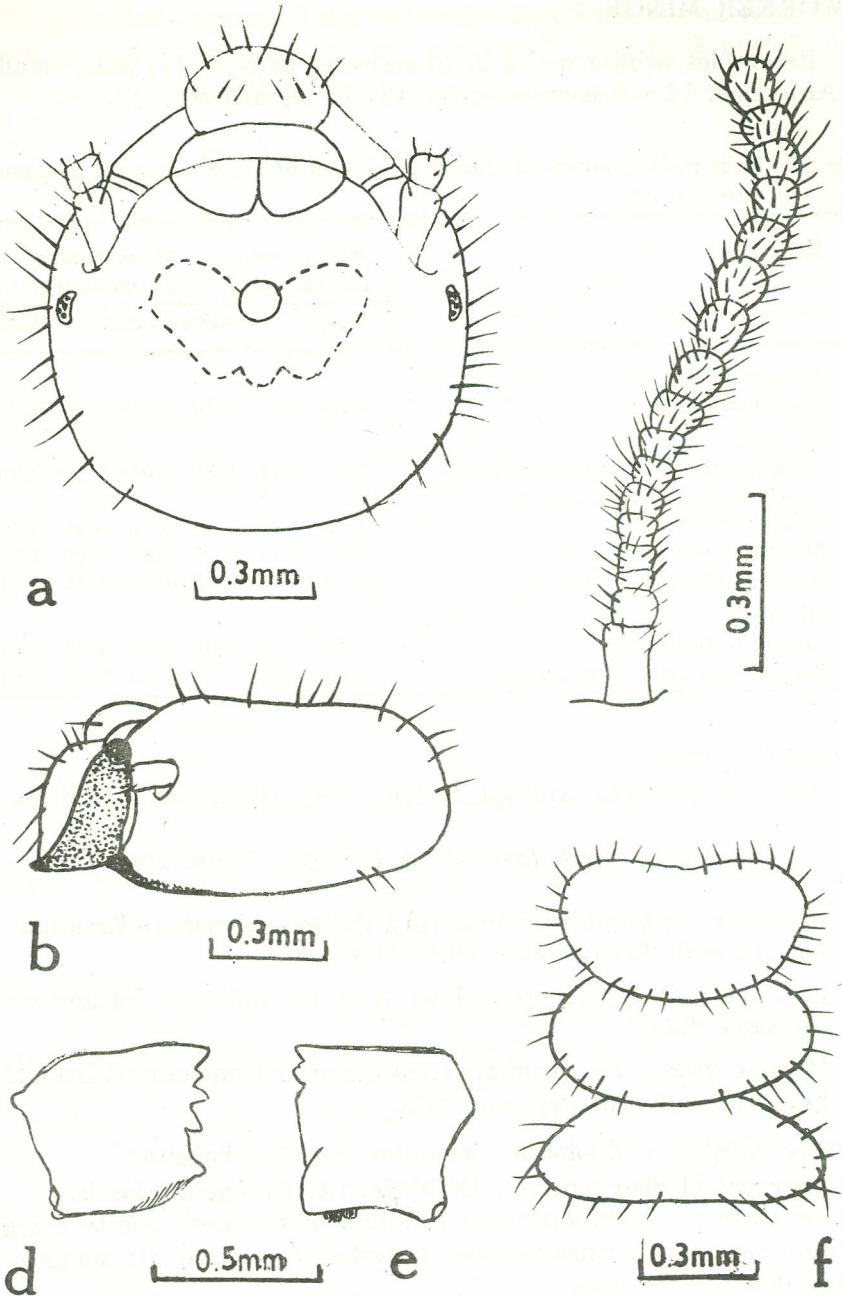
2. WORKER MAJOR (Fig. 15; Table 15)

General : Head-capsule creamy yellow; frons, post clypeus and outer region of mandibles pale yellow, darker than head-capsule; rest of the body parts paler than head-capsule. Head-capsule sparsely, thorax somewhat moderately hairy, abdominal tergites with row of hairs at the posterior margin. Total body-length ca. 4.20-5.30 mm.

Head : Head-capsule squarishly sub-circular, lateral sides converging posteriorly to rounded posterior margin. Y-suture present, faint. Fontanelle : Small, round, ca. 0.13-0.15 mm diameter, situated at the junction of suture. Eyes : small (diameter ca. 0.10-0.13 mm), on either side of head-capsule. Ocelli : Absent. Antennae : 16-17 segmented; segment 2 cylindrical, longer than 3; 3 narrower; 4 shortest; 5 & 6 sub-equal; rest globular shaped; last ovate. Labrum : Larger, broader than long; anterior margin rounded. Clypeus : Anteclypeus small and sub-rectangular. Post-clypeus, weakly swollen; length much less than half its width. Mandibles : of typical *Prorhinotermes* type.

Thorax : Pronotum : Flat, subreniform; much broader than long; anterior margin weakly convex. Mesonotum : Slightly broader than pronotum; posterior margin convex. Metanotum : Slightly broader than mesonotum; posterior margin broadly convex. Legs : Short and swollen; tibial spurs 3:2:2; tarsi 4-segmented.

Abdomen : As in soldier.



R. Kanta del.

Fig. 15. *Prorhinotermes panaitanensis* sp. nov., worker caste (a) Head, dorsal view (b) Head, side view (c) Right antennae (d) Right mandible (e) Left mandible (f) Thorax (Pronotum, mesonotum metanotum), dorsal view.

3. WORKER MINOR :

Resembles worker major in all respects, except : (1) Body smaller
(ii) Antennae: 14–15 segmented (vs. 16–17 segmented).

Table 15. Body-measurements (in mm) of workers of *Prorhinotermes panaitanensis* sp. nov.

No.	Body-parts	Worker major (5 examples)		Worker minor (2 examples)	
		Range	Mean	Range	Mean
I. General					
1.	Total body-length ca.	4.20–5.30	4.60	3.80–4.00	3.90
II. Head					
2.	Head-length to tip of labrum base	1.18–1.40	1.27	1.00–1.10	1.05
3.	Head-length to lateral base of mandibles.	1.00–1.13	1.08	0.70–0.80	0.75
4.	Maximum width of head	1.05–1.15	1.12	0.90–1.00	0.95
5.	Maximum height of head	0.65–0.75	0.69	0.40–0.45	0.43
III. Thorax					
6.	Length of pronotum	0.38–0.43	0.48	0.30–0.33	0.32
7.	Maximum width of pronotum	0.68–0.75	0.73	0.60–0.65	0.63

(c) Type-specimens :

All type-specimens (in spirit) have been deposited as follows :

Forest Research Institute & Colleges, Dehra Dun.

1. Holotype : A holotype soldier (in a vial from Panaitan, Krakatau Islands, coll. Takuya Abe, 19.10.1982).
2. Paratype : One paratype soldier from the holotype lot and with the same data.
3. Morphotypes : Two workers (one major and one minor) from the holotype and with the same data.

(d) Type locality : Indonesia : Krakatau Islands : Panaitan.

(e) Geographical distribution : INDONESIA. Krakatau Islands.

(f) *Gomparison* : *Prorhinotermes panaitanensis* comes close to *Prorhinotermes ravani* in having weak crenulations on the left mandibles but differs as follows.

(i) Smaller species (head-length with mandibles 2.35–2.60 mm (ws. 2.73–2.82 mm; Head-length to base of mandibles 1.35–1.50 mm. vs. 1.68–1.73; head width 1.20–1.35 mm vs. 1.43–1.46; head-mandibular index 0.69–0.76 (vs. 0.64–0.67) (ii) Antennae 18-segmented vs.

17 segmented; segment 3 slightly longer than 2 (vs. considerably longer than 2) (iii) anterior margin of pronotum with a weak median notch (vs. more prominently notched in *ravani*).

GENUS (5) *Schedorhinotermes* Silvestri

KEY TO SPECIES : (Soldier Caste)

- 1 (2) Mandibles comparatively shorter, mandible length two third of head-length. Head-mandibular index 0.58–0.68; antennae 16-segmented; 3 segment distinctly longer than 2; 4th shortest.
Schedorhinotermes javanicus Kemner
- 2 (1) Mandibles comparatively longer. Head-mandibular index 0.69–0.79; antennae 15-segmented; segment 3 very slightly longer than 2; 4th sub-equal to 4th.
Schedorhinotermes tarakanensis (Oshima)

10. *Schedorhinotermes javanicus* Kemner
(Figs. 16–18; Tables 16–17)

- 1934 *Schedorhinotermes javanicus* N.A. Kemner, K. Sv. Veh. Akad. Handl; Stockholm (3) 13 (4) : 51–54. Im. Soldiers (Major and minor). Type Locality : Java.
1949. *Schedorhinotermes javanicus* : T.E. Snyder, Smith. misc. Coll; Washington, 112: 92.
1969. *Schedorhinotermes javanicus* : M.L. Roonwal & P.K. Maiti, Treubia, 27 (1) : 90–91.

(a) Material :

(i) One vial with one imago, 5 soldiers (3 major, 2 minor) and 7 workers, from Rakata Besar, Krakatau Islands, Coll. Takuya Abe, 28. 10.1982. Ex. wood. (ii) One vial with 1 imago, soldiers (2 major and 2 minor) & 1 worker, from Sertung, coll. Tokuya Abe, 13.11.1982 (iii) One vial with 2 imagoes, from Rakata Kacil, Coll. Takuya Abe, 8.11.1982. (iv) One vial with 3 soldiers and one imago from Carita, coll. Takuya Abe, 1.11.1982.

(d) Description :

I— IMAGO (Fig. 16; Table 16)

General : Head-capsule, pronotum, abdominal tergites golden yellow; wings rusty yellow, antennae and wing scales pale yellow. Head-capsule sparsely pilose; pronotum fairly pilose and abdomen moderately pilose. Total body-length with wings 12.55 mm, without wings 8.95 mm.

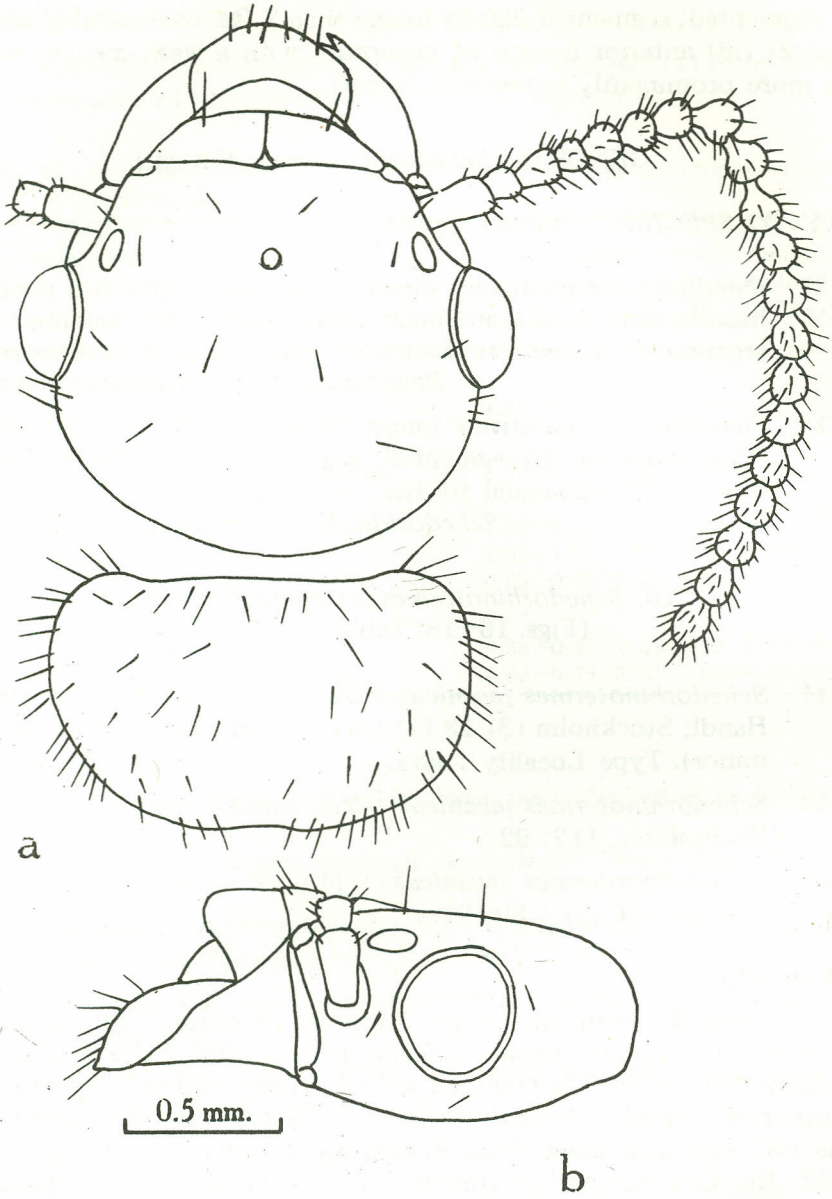


Fig. 16. *Schedorhinotermes javanicus* Kemner, Imago caste (a) Head and pronotum, dorsal view (b) Head, side view.

Head : Head capsule broadly oval, somewhat flat, depressed posteriorly; width (with eyes) slightly more than length to lateral base of mandibles; sides weakly convex; posterior margin broadly rounded. Frons flat, slightly raised and bilobed in the middle; two whitish oval spots present on the anterolateral position of the head-capsule. **Eyes** : Moderately large; almost circular and lying close to antennae (minimum eye-antennal distance 0.05). **Ocelli** : Small oval, separated from eyes by their short diameter. **Fontanelle plate** : Small circular whitish spot, situated near the anterior one-third of head-capsule; suture indistinct. **Clypeus**: **Anteclypeus** : small, hyaline. **Postclypeus**: much broader than length; length less than half its width; with a distinct median groove and a few bristles on the body. **Antennae**: 20 segmented; 2 almost subequal to 3; 3rd pyriform; longer than 2; 4 shortest; rest globular shaped progressively increasing in length; last ovate, smaller than penultimate. **Labrum**: Subsquamish, only slightly longer than broad; apical margin broadly rounded. **Mandibles**: : Of typical *Schedorhinotermes* type. Left mandible with an apical and 3 marginal teeth; apical finger like; 1st-marginal subequal to apical; 2nd marginal shortest; 3rd marginal pointed, facing downward; its anterior border almost double its posterior border. Right mandible with one apical and 3 marginal teeth; apical finger like; 1st rudimentary; 2nd largest; 3rd short and blunt.

Thorax : **Pronotum** : Flat, almost crescentic; much broader than long; anterior margin weakly raised in the middle, almost straight, with an imperceptible concavity in the middle; anterolateral corners broadly rounded; lateral sides substraight; postero-lateral corners, without a median notch. **Legs** : Hairy, femora slender; tibia slender and a little longer than femora; tibial spur formula 3:2:2; tarsi 4-segmented.

Wings: Translucent, tuberculate, margins fringed with hairs. **Forewing** : Costa and Radius sclerotic, prominent and running parallel along anterior margin. Radial Sector arising independently & runs upto proximal fifth of wing memberane. Median arising independently from the wing scale; bifurcates near the middle of wing membrane, beset with 11 branches near distal region. Cubitus with 9–11 branches. **Hindwing** : Costa and Radius as in forewing; Median arising from the radius just outside the wing scale; with 4 branches. Cubitus with 15–16 branches.

Abdomen : Cylindrical hairy, cerci 2-segmented.

Table 16. Body-measurements (in mm) of four imagoes *Schedorhinotermes javanicus* Kemner.

No.	Body-parts	Range	Mean
I. General			
1.	Total body-length with wings. ca.	12.55—13.00	12.84
2.	Total body-length without wings ca.	8.50—9.10	8.80
II. Head			
3.	Head-length to tip of labrum	1.65—1.75	1.70
4.	Head-length to lateral base of mandibles	1.25—1.40	1.34
5.	Maximum width of head (with eyes)	1.50—1.65	1.65
6.	Length of labrum	0.36—0.40	0.38
7.	Width of labrum	0.28—0.35	0.33
8.	Maximum diameter of eye	0.43—0.45	0.44
9.	Minimum diameter of eye	0.36—0.38	0.37
10.	Maximum diameter of ocellus	0.10—0.13	0.12
11.	Minimum diameter of ocellus	0.08—0.01	0.09
12.	Minimum eye-ocellus distance	0.08—0.10	0.09
III. Thorax			
13.	Length of pronotum	0.77—0.88	0.81
14.	Maximum width of pronotum	1.25—1.45	1.37
15.	Length of forewing with scale	9.60—1.00	9.90
16.	Length of forewing without scale	8.60—8.90	8.76
17.	Length of forewing scale	1.00—1.00	1.05
18.	Length of hindwing with scale	9.60—9.70	9.35
19.	Length of hindwing without scale	8.45—8.90	8.56
20.	Length of hindwing scale	0.65—0.90	0.83

2. SOLDIER MAJOR (Fig. 17; Table 17)

General : Head-capsule golden yellow, frons postclypeus, basal portion of labrum slightly darker; mandibles reddish brown distally, reddish yellow basally; antennae, thorax, abdomen and legs pale creamish yellow, paler than head-capsule. Head, thorax and abdomen sparsely hairy; legs somewhat more hairy. Total bodylength ca. 4.85—5.20 mm.

Head : Head-capsule subsquarish, almost as wide as long to lateral base of mandibles; lateral sides almost paralell up to the base of antennal faveolae, whence converging anteriorly to base of mandibles; posterior-lateral corners broadly rounded; posterior margin weakly convex. **Fontanelle :** Distinct, circular, placed anteriorly at level of antennae; a narrow, shallow groove on headsurface running from fontanelle to the tip of labrum and widening anteriorly. **Eyes and Ocelli :** Absent. **Antennae:** 16-segmented; segment 2 cylindrical, distinctly shorter than 3; 3: pyriform; 4: sub-globular, shortest; 5—7 almost subequal; rest subpyriform progressively increasing in length; last ovate, slightly narrower than penultimate. **Labrum:** Subsquarish, with the anterior margin slightly narrower than the posterior margin; widest near the posterior third;

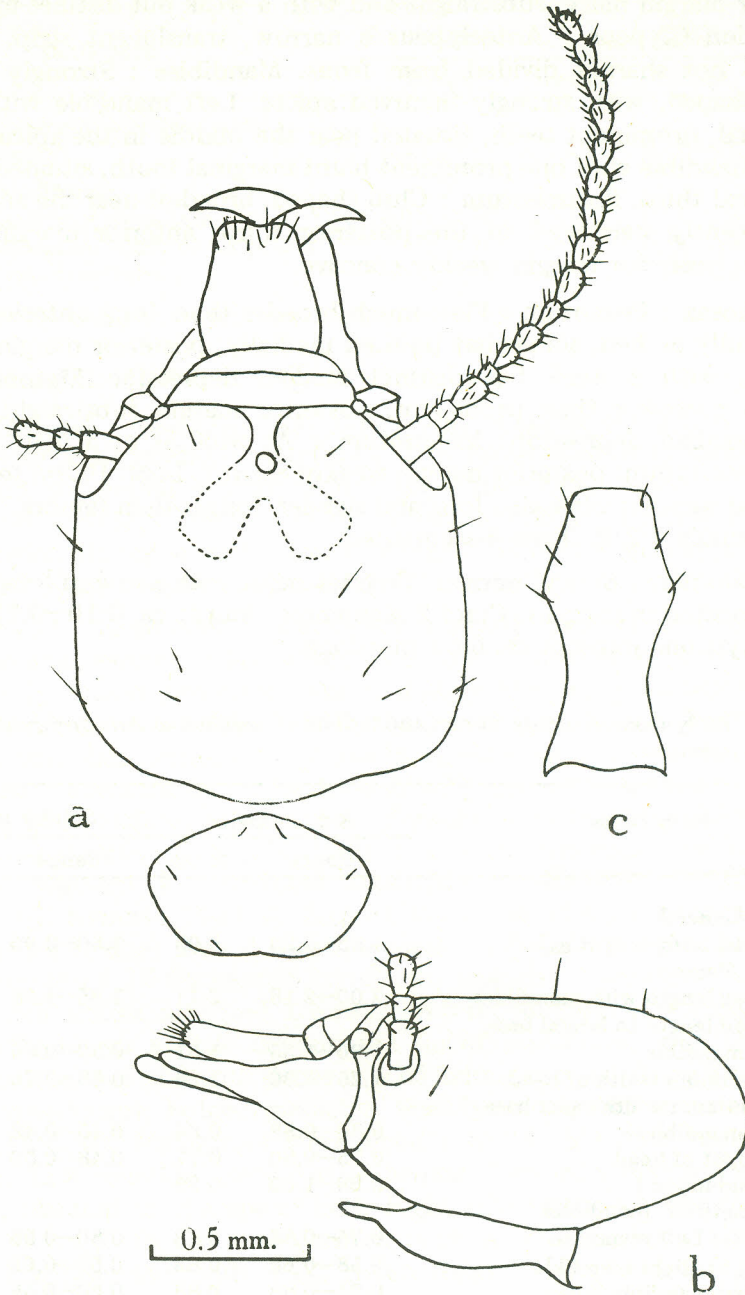


Fig. 17. *Schedorhinotermes javanicus* Kemner, Soldier Major caste. (a) Head and pronotum, dorsal view (b) Head, side view (c) Postmentum, in situ.

anterior margin hairy, substraight and with a weak but distinct median depression Clypeus : Anteclypeus a narrow, translucent strip. Postclypeus not sharply divided from frons. Mandibles : Strongly built, sickle shaped, with strongly incurved apices. Left mandible with two sub-equal, prominent teeth, situated near the middle in the apical half. Right mandible with one prominent blunt marginal tooth, situated near the apical third. Postmentum : Club shaped, broadest near the anterior third, gently narrowed in the posterior third; anterior margin substraight; posterior margin weakly concave.

Thorax : Pronotum : Flat; much broader than long; anterior margin broadly arched, somewhat pointed medially; posterior margin substraight, with a weak but distinct median depression. Mesonotum: A little narrower than pronotum; posterior margin substraight with broad median depression. Metanotum : As wide as or a little wider than mesonotum; posterior margin weakly convex. Legs: Hairy; femora long and slender; tibia also long and slender, longer than femora. Tibial spur formula 3:2:2. Tarsi 4-segmented.

Abdomen : Subcylindrical. Tergites beset with a row of long hairs at the posterior margins. Cerci 2-segmented, hairy; ca. 0.10–0.13 mm long. Styli one jointed; ca. 0.07 mm long.

Table 17. Body-measurements in mm and indices of soldiers or *Schedorhinotermes javanicus*.

Body-parts	Soldier major		Soldier minor	
	Range	mean	Range	mean
I. General				
1. Total body-length ca.	4.85–5.20	5.05	3.80–3.95	3.88
II. Head				
2. Head-length with mandibles	2.00–2.18	2.11	1.35–1.38	1.37
3. Head-length to lateral base of mandible	1.30–1.35	1.31	0.80–0.85	0.83
4. Maximum width of head	1.25–1.30	1.28	0.68–0.70	0.69
5. Minimum width (near base of mandibles)	0.80–0.88	0.84	0.45–0.48	0.47
6. Height of head	0.75–0.80	0.77	0.48–0.50	0.49
7. Head-index-I	0.98–1.00	0.99	—	—
8. Length of mandibles				
(a) Left mandible	0.75–0.88	0.83	0.50–0.55	0.53
(b) Right mandible	0.58–0.68	0.63	0.59–0.62	0.60
9. Head-mandible index	0.75–0.88	0.83	0.50–0.55	0.53
10. Min. (Median length of postmentum)	0.88–0.95	0.91	0.45–0.50	0.48
11. Maximum width of postmentum	0.38–0.43	0.40	0.30	
12. Minimum width of postmentum	0.33–0.35	0.34	0.25–0.28	0.27

cont'd

Body-parts	Soldier major		Soldier minor	
	Range	mean	Range	mean
13. Postmentum index (width/length)	0.42—0.46	0.43	0.60—0.67	0.64
III. Thorax				
14. Length of pronotum	0.45—0.50	0.47	0.38—0.40	0.39
15. Maximum width of pronotum	0.65—0.75	0.70	0.45—0.50	0.49
16. Pronotum-index	0.64—0.70	0.67	0.82—0.84	0.83

3. SOLDIER MINOR : (Fig. 18; Table 17)

General : Head-capsule, pale golden yellow; labrum yellowish, with a tinge of rustiness; mandibles light brown yellowish basally; thorax and abdominal tergites slightly paler than head-capsule; antennae, sternites and legs creamy yellow. Head-capsule with a few scattered long hairs; abdomen with a row of hairs at the posterior margin of each tergum. Total bodylength ca. 3.80—3.95 mm.

Head : Head-capsule somewhat subovate; broadest near the level of antennal carinae, whence the sides gently sloping in posteriorly to a broadly convex posterior margin; sharply narrowing towards the base of antennae; head-capsule distinctly longer than broad. **Fontanelle** : Small, circular, translucent, situated a little anterior to the level of antennae; aperture facing backward; with narrow and shallow groove on the head-surface, running from fontanelle to the tip of labrum and widening distally. **Eyes and Ocelli** : Absent. **Antennae** : with 15-segments; segment 2 cylindrical, distinctly smaller than 1; (15—16 as given by Kemner 1934 & Ahmad 1958). In 15-segmented antennae segment 3 smaller than 2 and 4; sometimes 3rd almost subequal to 2, narrowest; In 16-segmented condition, segment 4 shortest; rest pyriform and almost subequal. **Labrum** : Sub-rectangular, extending almost up to the tip or a little beyond the tip of mandibles; anterior margin weakly concave and with dense row of hairs. **Clypeus** : Anteclypeus narrow, translucent, bulged medially. Postclypeus similar to anteclypeus, but yellowish. **Mandibles** : More slender and feebly built than soldier major. Left mandible with two subequal, forwardly directed marginal teeth, situated in the apical half. Right mandible with one forwardly pointed tooth in the corresponding portion. **Postmentum** : Similar to soldier major, but with waist much longer, lying near the posterior third; anterior margin substraight; posterior margin weakly concave.

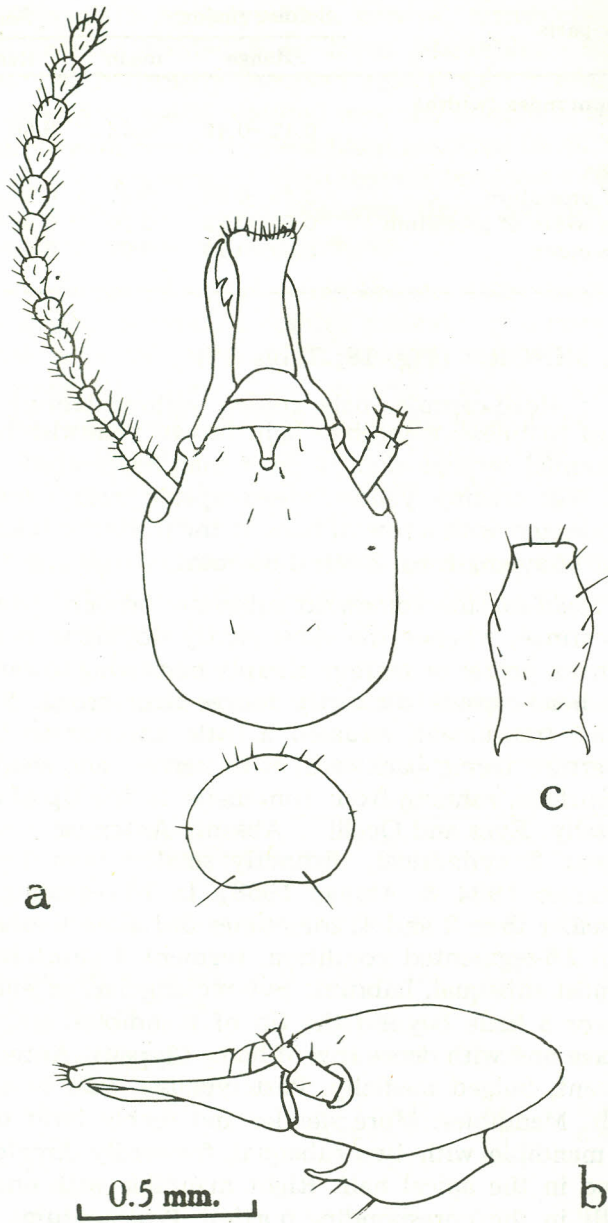


Fig. 18. *Schedorhinotermes javanicus* Kemner, Soldier Minor caste. (a) Head and pronotum, dorsal view (b) Head, side view (c) Postmentum, in situ.

Thorax : Pronotum : Flat, broader than long; anterior margin broadly arched; lateral sides substraight, somewhat converging posteriorly; posterior margin substraight, with a weak median depression. **Mesonotum:** Narrower than pronotum; posterior margin substraight. **Metanotum :** Almost as wide as or a little wider than pronotum; posterior margin weakly convex. **Legs:** As in soldier major.

Abdomen : As in soldier major.

(c) **Geographical distribution :**

INDONESIA : Java : Bogor and also 'Java' (Given a type by Kemner). **Krakatau Islands,** Rakata Besar; Rakata Kecil and Sertung (all present records).

(d) **Remarks :** The specimens of soldier minor from Sertung are slightly smaller in size.

11. *Schedorhinotermes tarakanensis* (Oshima)

(Fig. 19, Table 18)

1914. *Rhinotermes (Schedorhinotermes) tarakanensis* M. Oshima, *Annot. Zool, Jap., Tokyo*, 8: 56, pl. 10, fig. 2 Soldier (Minor) and workers. Type locality: Tarakan, Kalimantan (Borneo).
1921. *Rhinotermes (Schedorhinotermes) tarakanensis* : M. Oshima, *Philipp. J. Sci., Manila*, 17(5) : 492—493, pl. 3, fig. 7 & 7; pl. 4, fig. 6 & 7; Soldier (major and minor), worker. (Species spelling differ).
1921. *Rhinotermes (Schedorhinotermes) tarakanensis* : S.F. Light, *Phillipp. J. Sci., Manilla*, 18(3) : 251 (Species spellings differ).
1949. *Schedorhinotermes tarakanensis*: T.E. Snyder, *Smiths, Misc. Coll., Washington*, 112: 95—96 (Synonymies).
1966. *Schedorhinotermes tarakanensis*: M.L. Roonwel and P.K. Maiti, *Treubia, Bogor*, 27(1) : 91.

(a) **Material :**

(i) One vial with three soldiers (Minor) and 4 workers, found mixed with *Prorhinotermes* (now separated) from Panaitan, Islands, Indonesia, coll. Takuya Abe, 21.10.1982, Ex. wood.

(ii) One vial with 2 soldiers (Minor) and 3 workers, from Carita, (West Java), Indonesia, coll. Takuya Abe, 25.10.1982, Ex. Wood.

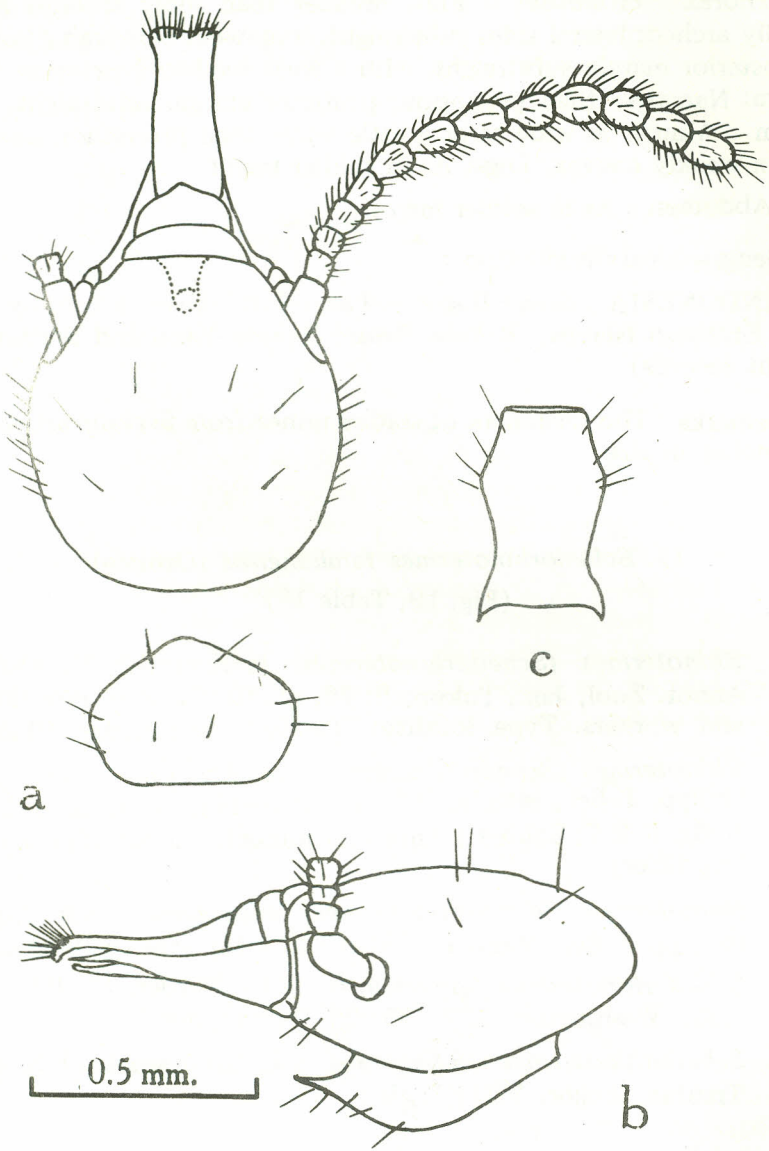


Fig. 19. *Schedorhinotermes tarakanensis* (Oshima), Soldier caste. (a) Head and pronotum, dorsal view (b) Head, side view (c) Postmentum, in situ.

(b) Description :

I— SOLDIER MINOR (Fig. 19; Table 18)

General : Head-capsule pale yellow, paler posteriorly; antennae, thorax of same colour as posterior region of head-capsule; mandibles yellowish brown basally, light brown apically; legs and abdomen whitish yellow. Head-capsule with a few long hairs; abdomen with a row of hairs at the posterior margins of each tergum. Total body-length ca. 2.80–3.50 mm.

Head : Head-capsule subovate; broadest near the middle in the apical half, thence converging sharply anteriorly and gently narrowing posteriorly to a rounded posterior margin; slightly longer than broad. **Fontanelle** : Small, circular, translucent, situated a little behind the postclypeus; with a narrow groove, running from fontanelle to the tip of labrum and somewhat widening distally. **Eyes and Ocelli** : Absent. **Antennae** : 15-segmented; (in one specimen, left antennae 14-segmented; where 3rd segment is incompletely subdivided; 3rd distinctly longer than 2; 4 shortest) in 15-segmented condition, segment 2 nearly twice as long as 3; 3rd narrowest and shortest; rest globular shaped and almost sub-equal and last ovate. **Labrum** : Subrectangular, slightly extending beyond the mandibles; anterior margin weakly concave and beset a tuft of dense row of short hairs. **Mandibles** : Slender, with weakly incurved apices; length nearly 3/4th of the head-capsule (head-mandibular index 0.69–0.79) left mandible with two subequal forwardly directed marginal teeth, situated near the apical third of inner margin. Right mandible with one forwardly directed tooth in the corresponding position. **Postmentum** : Somewhat similar to the condition as found in soldier major.

Thorax : **Pronotum** : Flat; much broader than long; anterior margin broadly arched, medially pointed; lateral sides substraight, sloping inwards; posterior margin substraight. **Mesonotum** : Almost as wide as pronotum; posterior margin substraight, with an imperceptible median depression. **Metanotum** : Distinctly broader than pronotum; posterior margin weakly convex. **Legs** : As in soldier major.

Abdomen : Short, sub-cylindrical. Cerci 2-segmented, ca. 0.88 mm long.

Table 18. Body measurements and indices (in mm) of soldiers of *Schedorhinotermes tarakanensis* (Oshima)

No.	Body-parts	Soldier major (After Thapa, 1982)	Soldier minor Range (5-examples)	mean
I. General				
1.	Total body length ca.	—	2.80—3.50	3.20
II. Head				
2.	Head-length to tip of labrum	—	1.18—1.25	1.23
3.	Head-length with mandibles	—	1.10—1.23	1.19
4.	Head-length to base of mandibles	1.28—1.42	—	—
5.	Maximum width of head	—	0.60—0.65	0.63
6.	Width at side base of mandibles	0.90—0.97	0.38—0.45	0.41
7.	Head-index-I (Head-width/head-length)	—	0.92—0.93	0.92
8.	Length of mandibles	—	—	—
	(a) Left mandible	0.85—0.93	0.45—0.50	0.48
	(b) Right mandible	—	0.43—0.50	0.47
9.	Head-mandibular index (Left mandible/head-length)	—	0.69—0.79	0.73
III. Thorax				
10.	Length of pronotum	0.40—0.50	0.30—0.33	0.31
11.	Maximum width of pronotum	0.70—0.80	0.38—0.43	0.41
12.	Pronotum index (length/width)	—	0.70—0.80	0.74

(c) Geographical distributions :

INDONESIA : Kalimantan (Borneo) : Tarakan. Peutjang Isl. (near western tip of Java sea). Java : Carita, Panaitan Island. (Present record)
Elsewhere : Philippines : Luzon (Laguna Province).

(d) Remarks :

The specimens (soldier minor) from Carita and Panaitan Islands match very well with *S. tarakanensis* (Oshima), except that they are smaller in size. In 14-segmented antennae the 3rd segment incompletely subdivided, hence segment 4 is shortest.

FAMILY. (III) MACROTERMITIDAE

GENUS. (6) *Macrotermes* Holmgren12. *Macrotermes gilvus* (Hagen)

(Figs. 20 & 21; Table 19)

1959. *Termes gilvus* H.A. Hagen, Linn. Entomol., 12: 148. Im., soldier (major & minor). Type-locality: Java.

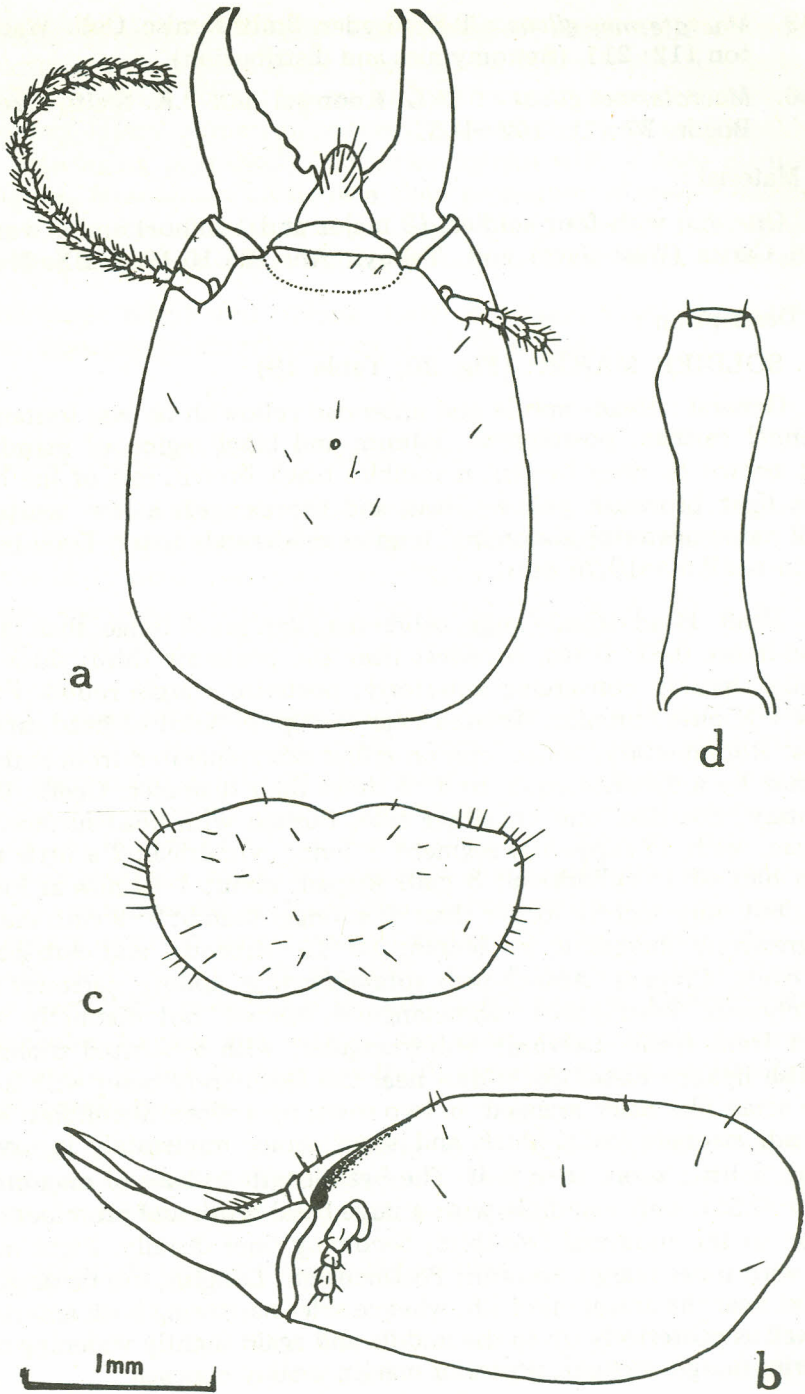


Fig. 20. *Macrotermes gilvus* (Hagen), Soldier Major caste. (a) Head, dorsal view (b) Head, side view (c) Pronotum, dorsal view (d) Postmentum, in situ.

1949. *Macrotermes gilvus* : T.E. Snyder, Smiths. misc. Coll. Washington 112: 211. (Synonymies and distribution)
1966. *Macrotermes gilvus* : M.L. Roonwal and P.K. Maiti, Treubia, Bogor, 27 (1): 102-105.

(a) Material :

One vial with four soldiers (3 major and 1 minor) and 5 workers from Carita (West Java) coll. Takuya Abe. 25.10.1982 EX. Mound.

(b) Description :

1. SOLDIER MAJOR: (Fig. 20; Table 19)

General : Head-capsule and antennae yellowish brown; fontanelle, antennal carinae, postclypeus, labrum and basal region of mandibles light brown to deep brown; mandibles black brown; rest of the body parts light brownish yellow; Head and thorax with a few scattered small hairs; posterior abdominal tergites moderately hairy. Total body-length ca. 9.50-10.75 mm.

Head : Head-capsule large, subrectangular, much longer than broad (head-index 0.82-0.86); broadest near the posterior third; sides subparallel, weakly converging anteriorly; posterior margin round. **Fontanelle** : Minute, circular, situated near the apical third of head-capsule. **Eyes** : Rudimentary, white, one on either side; separated from antennal carinae by a distance equal to 4-5 times their diameter. **Ocelli** : Rudimentary, dot like, one on either side, flushed with head surface. **Antennae** : with 17-segments; segment 1 long, cylindrical; 2 a little more than half of 1; cylindrical; 3 club shaped, about 1½ times as long as 2nd, but only slightly longer than 4; 4 longer than 5; 5-9 club shaped, progressively increasing in length; 10-15 subequal and club shaped; last ovate. **Clypeus** : Anteclypeus subrectangular, apilose, narrower than postclypeus. Postclypeus subrectangular, apilose, not distinctly separated from frons. **Labrum** : Sub-triangular, with a pointed triangular whitish hyaline distal tip; widest near the base; body beset with a few long setae like hairs arranged in two rows; tip apilose. **Mandibles** : Sabre shaped, strongly built, thick and stout; apice moderately incurved; length a little more than half. The head-length to base of mandibles (0.49-0.55). Left mandible with a large basal tooth and prominent serration in the proximal two-third, becoming finer distally. Right mandible with inner margin smooth. **Postmentum** : Longish, sub-rectangular, widest near the apical one-fifth, whence sides narrowing both anteriorly as well as posteriorly up to the middle and again slightly widening out; anterior margin straight, posterior margin weakly concave.

Thorax: Pronotum: Weakly, saddle shaped; much narrower than head width; length a little more than half its width (Pronotum index 0.54–0.58); anterior margin convex and with a prominent deep median notch; antero-lateral corners prominently rounded; lateral sides weakly convex converging posteriorly; posterior margin with a deep median emargination. **Mesonotum:** Narrower than pronotum; posterior margin with deep and broad emargination. **Legs:** Long, slender; hind tibiae much longer than other tibiae, tibial spur formula 3:2:2. **Tarsi** 4 jointed.

Abdomen: Short and oblong. **Cerci** 2-jointed; length *ca.* 0.18–0.20 mm. **Styli** one jointed; length *ca.* 0.10–0.13 mm.

2. SOLDIER MINOR (Fig. 21; Table 19).

General : Head-capsule pale yellow; antennae yellowish brown, much paler basally; labrum rusty brown; mandibles light reddish brown, rest of the body parts creamy yellow. Head and thorax with a few scattered hairs, abdomen sparsely hairy; legs a little more hairy. Total body-length *ca.* 7.00 mm. (6.20–6.80 mm as given by Roonwal & Maiti, 1966).

Head: Head-capsule subrectangular, longer than broad; widest near the posterior third; sides weakly convex, converging anteriorly; posterior margin round. **Fontanelle, Eyes & Ocelli:** As in soldier major, but smaller; not distinctly visible. **Antennae:** 17-segmented; segment 2 cylindrical, so long as or a little shorter than 3; 4 subequal to 3; 5–8 progressively in length, remaining segments almost subequal; last ovate. **Labrum:** As in soldier major. **Mandibles:** Sabre shaped thin and long; apices weakly incurved; length nearly two-third of head-capsule (head-mandibular index 0.64). Left mandible with prominent crenulations near the base. Right mandible with inner margin smooth. **Postmentum:** Subrectangular, longish and without any waist; sides substraight, converging weakly in the anterior one-third; anterior margin substraight; posterior margin concave.

Thorax: Pronotum: As in soldier major but pronotum length-width ratio, comparatively higher (Pronotum index 0.66 *vs.* 0.54–0.58). **Mesonotum and Metanotum:** As in soldier major.

Abdomen: As in soldier major but smaller.

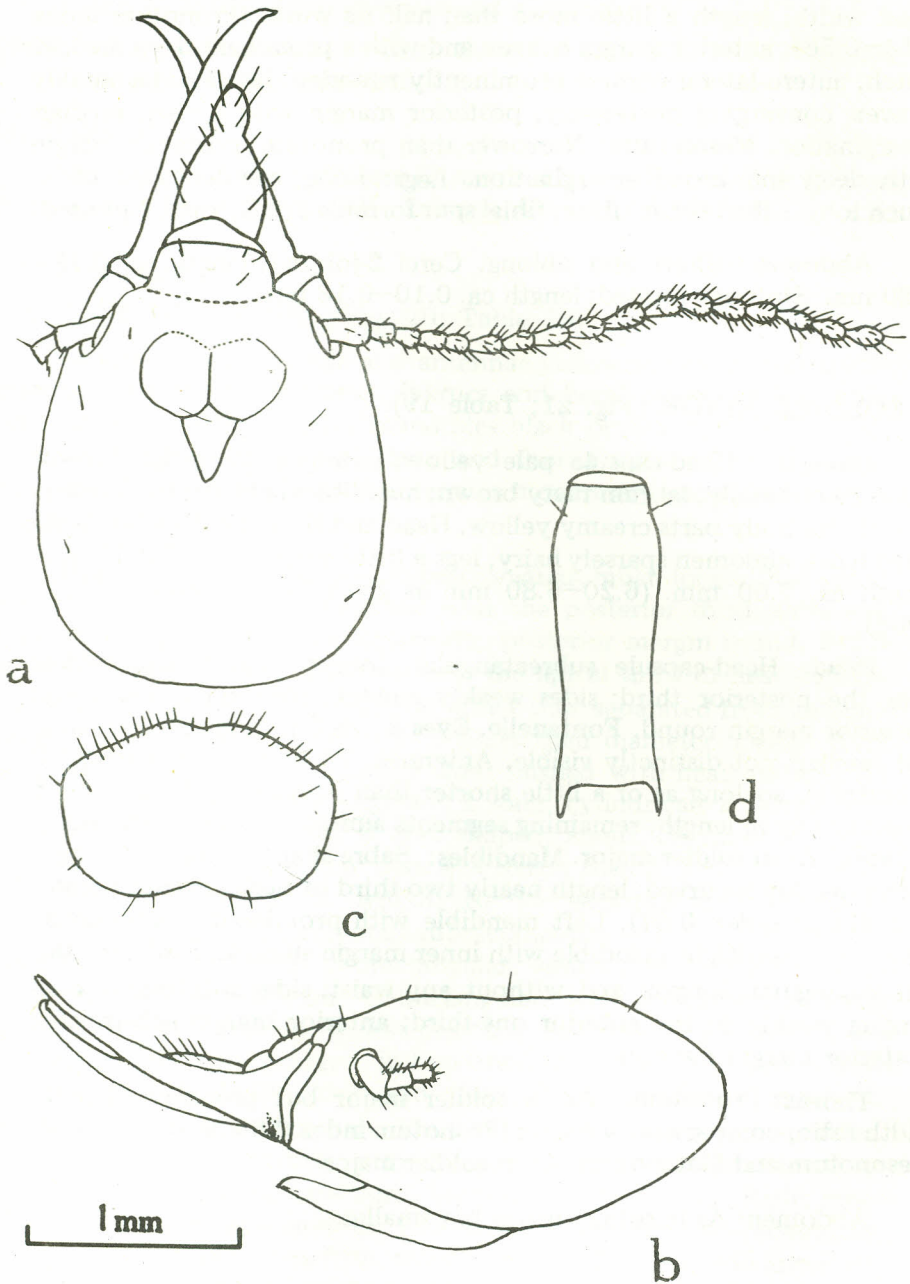


Fig. 21. *Macrotermes gilvus* (Hagen), Soldier Minor caste. (a) Head, dorsal view (b) Head, side view (c) Pronotum, dorsal view (d) Postmentum, in situ.

Table 19. Body-measurements (in mm) and indices of soldiers of *Macrotermes gilvus* (Hagen)

No.	Body-parts	Range		Mean
		Soldier Major (3 examples)	Soldier Minor (One examples)	
I. General				
1.	Total body-length ca.	9.50—1075	10.10	7.00
II. Head				
2.	Length of head with mandibles	4.05—05.30	4.85	3.20
3.	Length of ehad to base of mandibles	3.30—03.00	3.40	1.95
4.	Maximum width of head	2.70—03.00	2.86	1.60
5.	Width at side base of mandibles	1.70—01.90	1.77	0.95
6.	Width at side base of antennae	2.35—02.70	2.50	1.35
7.	Head-Index-I (width/length)	0.82—0.86	0.84	0.82
8.	Head-Index-II (min width/	0.60—0.63	0.62	0.60
9.	Head-Index. III (width at the base of antennae/max. width)	0.87—0.90	0.88	0.84
10.	Length of mandible:			
	(a) Left mandible	1.65—1.83	1.76	1.25
	(b) Right mandible	1.65—1.80	1.73	1.23
11.	Head-mandibular-Index I (Left mandible length/head-length)	0.49—0.55	0.52	0.64
12.	Min. (Median) Length of postmentum	2.40—2.80	2.60	1.30
13.	Maximum width of postmentum	0.70—0.75	0.72	0.50
14.	Postmentum-Index-I (width/length)	0.27—0.29	0.25	0.39
III. Thorax.				
15.	Length of pronotum	1.15—1.38	1.27	0.83
16.	Maximum width of pronotum	2.15—2.40	2.27	1.25
17.	Pronotum-Index (length/width)	0.54—0.58	0.57	0.66

(c) Geographical distribution

INDONESIA: Kalimantan (Borneo). Sulawesi (Celebes). Java: Bandung, Banyuglugur, Besuki, Bogor; Carita (Present record) Djati-barang, Gedangar, Gn. Batu, Kandangan, Kediri, Manggar, Pare, Ujung Kulon, Andalas (Sumatra).

GENUS. (7) *Odontotermes* Holmgren

KEY TO SPECIES — (Soldier Caste)

- 1 (2) Larger species. Head-length with mandibles 3.70 (3.90)—3.80 (3.98; without mandibles 2.45 — (2.60) — 2.60 (2.65); Head width 2.10 — 2.25 mm; second segment of antennae one and a half times as long as 3; mandibles length less than half the head-length to lateral base of mandibles (Head-mandibular length index 0.46—0.51).

O. grandiceps. Holmgren.

- 2 (1) Smaller species. Head-length with mandibles 2.75–3.10 mm; without mandibles (1.78) 1.90–2.05 mm; head-width (1.55) 1.60–1.75 mm; second segment of antennae nearly twice as long as 3; mandible length more than half the head-length to lateral base of mandibles (Head-mandibular index 0.5 – 0.54.

O. makassarensis Kemner

13. *Odontotermes grandiceps*. Holmgren

(Fig. 22 and Table 20)

1912. *Odontotermes (Cyclotermes) grandiceps*: N. Holmgren, K. Sv. Vet. Akad. Handl., Stockholm, 48 (4) : 38 Java. Nomen nudum.
1913. *Odontotermes (Odontotermes) grandiceps*: N. Holmgren, K. Sv. Vet. Akad. Handl., 50 (2) : 134–135. S&W. Type-locality: Java: Nongkodjadjar (1200 m. alt.)
1914. *Odontotermes (Odontotermes) grandiceps*: T.E. Snyder Smiths. misc. coll., Washington, 112: 228.
1966. *Odontotermes grandiceps*: M.L. Roonwal & P.K. Maiti, Treubia, Bogor, 27 (1): 106–107.

(a) Material

One vial, with two soldiers and a few workers, from Carita (West Java), Coll. Takuya Abe, 3.11.1982 Ex. Subterranean nest.

(b) Description:

1. SOLDIER_s (Fig. 22; Table 20)

General : Head-capsule deep yellowish brown, slightly paler towards the peripheral regions; antennae brownish yellow, of uniform colour; postclypeus and labrum brown, darker than head-capsule; mandibles deep blackish brown, deep brown basally; Thorax and legs rusty yellow; body whitish yellow. Head-capsule with a few stactered hairs, thorax moderately, body a little more densely pilose. Total body-length 8.70–9.20.

Head : Head-capsule subrectangular, distinctly longer than broad; widest just below the middle; sides weakly convex converging weakly both anteriorly and posteriorly; posterior margin convex. Fontanelle: Indistinct. Eyes and Ocelli: Absent Antennae : 17-segmented; segment 1 largest; 2nd cylindrical, a little smaller than 1st, almost 1½ times of 3; 3 smaller than 4; 5 shortest; 6 onward progressively increasing in length; last ovate. Clypeus : Anteclypeus thin, hyaline and apilose. Postclypeus subrectangular, not distinctly demarcated from frons. Labrum:

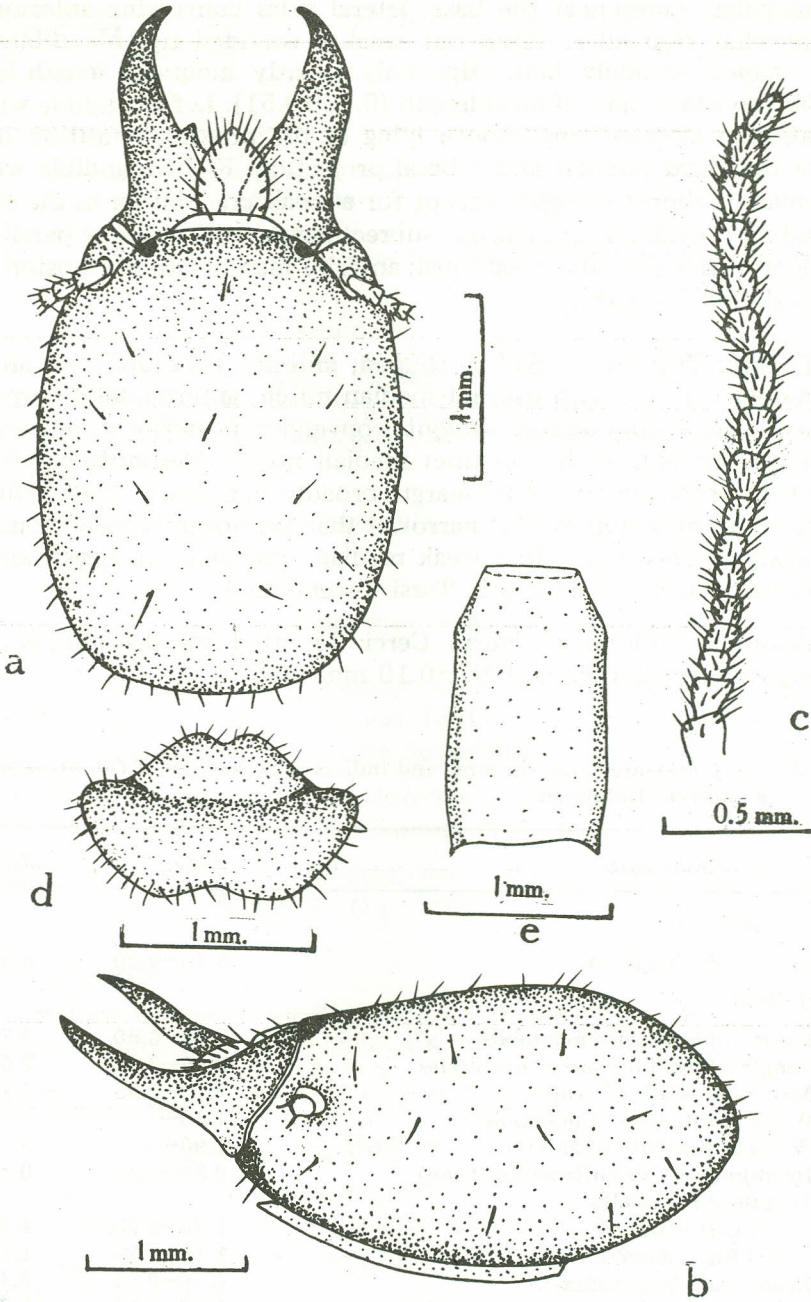


Fig. 22. *Odontotermes grandiceps* Holmgren, Soldier caste (a) Head, dorsal view (b) Head, side view (c) Right antenna (d) Pronotum, dorsal view (e) Postmentum, in situ.

Subtriangular, widest near the base; lateral sides converging anteriorly to somewhat triangular, sharp but weakly rounded tip. Mandibles : Sabre shaped, strongly built, tips only slightly incurved; length less than half to nearly half of head-length (0.46–0.51). Left mandible with one laterally directed small tooth lying in the proximal position of middle one-third portion and a basal projection. Right mandible with inner margin almost straight, except for a small crenulation in the corresponding position. Postmentum: subrectangular, sides almost parallel, but slightly wide near the basal third; anterior margin straight; posterior margin slightly concave.

Thorax: Pronotum: Saddle shaped; anterior to be uplifted; anterior margin convex, with distinct median notch; antero-lateral corners rounded; lateral sides almost straight, converging posteriorly, posterior margin substraight, with a distinct median notch. **Mesonotum :** Narrower than pronotum; posterior margin broadly emarginate. **Metanotum:** Broader than mesonotum, but narrower than pronotum; posterior margin weakly convex and with a weak median emargination. **Legs:** Long, slender hairy; tibial spurs 3:2:2. Tarsi 4-segmented.

Abdomen: Elongate, hairy. Cerci 2-jointed ca. 0.13–0.15 mm long styli single jointed, ca. 0.07–0.10 mm long.

Table 20. Body measurements (in mm) and indices of 2 soldiers of *Odontotermes grandiceps* Holmgren.

No.	Body parts	Range	Mean
I. General			
1.	Total body-length ca.	8.70–9.20	8.95
II. Head			
2.	Length of head with mandibles	3.70–3.80	3.75
3.	Length of head to base of mandibles	2.45–2.60	2.53
4.	Maximum width of head	2.10–2.25	2.18
5.	Width at side base of mandibles	1.40–	—
6.	Width at side base of antennae	1.90–	—
7.	Head-Index-I (width/length of head)	0.86–0.87	0.865
8.	Length of mandibles :		
	(a) Left mandible	1.20–1.25	1.23
	(b) Right mandible	1.15–1.23	1.19
9.	Head-mandibular-Index-I.	0.46–0.51	0.49
10.	Distance of tooth from tip of mandible	0.70–0.75	0.73
11.	Mandible-tooth Index	0.58–0.60	0.59
12.	Min. (Median) length of postmentum	1.78	
13.	Maximum width of postmentum	0.85	
14.	Minimum width of postmentum	0.50	

cont'd

No	Body parts	Range	Mean
III. Thorax			
15.	Length of pronotum	0.78—0.80	0.79
16.	Maximum width of pronotum	1.50	
17.	Pronotum-Index	0.52—0.53	—

(c) Geographical distribution :

INDONESIA : Java : Buitenzorg (Bogor), Nongkodjadjar, Trio-grek, Tjibodas, Tjisolak, Tjitjourouk (Tjitjurug; Gadangan (Central Java), Carita, (Present record) Tebing Tinggi, Kwala Bingei, Soengei Bamban.

Elsewhere : Malay Peninsula : Selangor, Malacca.

14. *Odontotermes makassarensis* Kemner

1934. *Odontotermes makasarensis* N.A. Kemner, K. Sv. Vet. Akad. Handl., Stockholm, (3) 13 (4) : 100—102, Im. Soldier and Worker. Type. Locality Sulawesi (Celebes) Makassar.
1949. *Odontotermes (Odontotermes) makassarensis*: T.E. Snyder, Smiths. misc. Coll., Washington, 112: 232.
1966. *Odontotermes makassarensis* : M.L. Roonwal & P.K. Maiti, Treubia, Bogor, 27 (1) : 109.

(a) Material :

Two vials with soldiers and a few workers, from Panaitan, coll. Takuya Abe, 18—19.10. 1982. Ex. Subterranean nest.

(b) Description :

1. SOLDIER (Fig. 23; Table 21)

General : Head-capsule golden yellow to yellowish brown; fontanelle gland area much paler; antennae rusty brown; labrum translucently brown; mandibles deep reddish brown, with blackish tinge, pale reddish brown basally; rest of the parts rusty yellow. Head-capsule with a few scattered hairs, thorax sparsely, abdomen moderately hairy. Total body-length ca. 5.15—6.00 mm.

Head : Head-capsule rectangularly oval, longer than broad; widest near the posterior third; lateral sides sub-parallel weakly convex, converging anteriorly and posteriorly; posterior margin broadly convex.

Fontanelle: Indistinct. Eyes & Ocelli: Absent, Antennae: Short, with 17-segments; segment 1 longest and largest; 2 cylindrical, almost twice as long as 3; 4 longer and wider than 3; 5 slightly wider, otherwise almost as long as 3; rest globular shaped, progressively increasing in length; last ovate. In one specimen, left antennae is 16-segmented; 5-segment subdivided. Clypeus: Anteclypeus hyaline, apilose strip. Post-

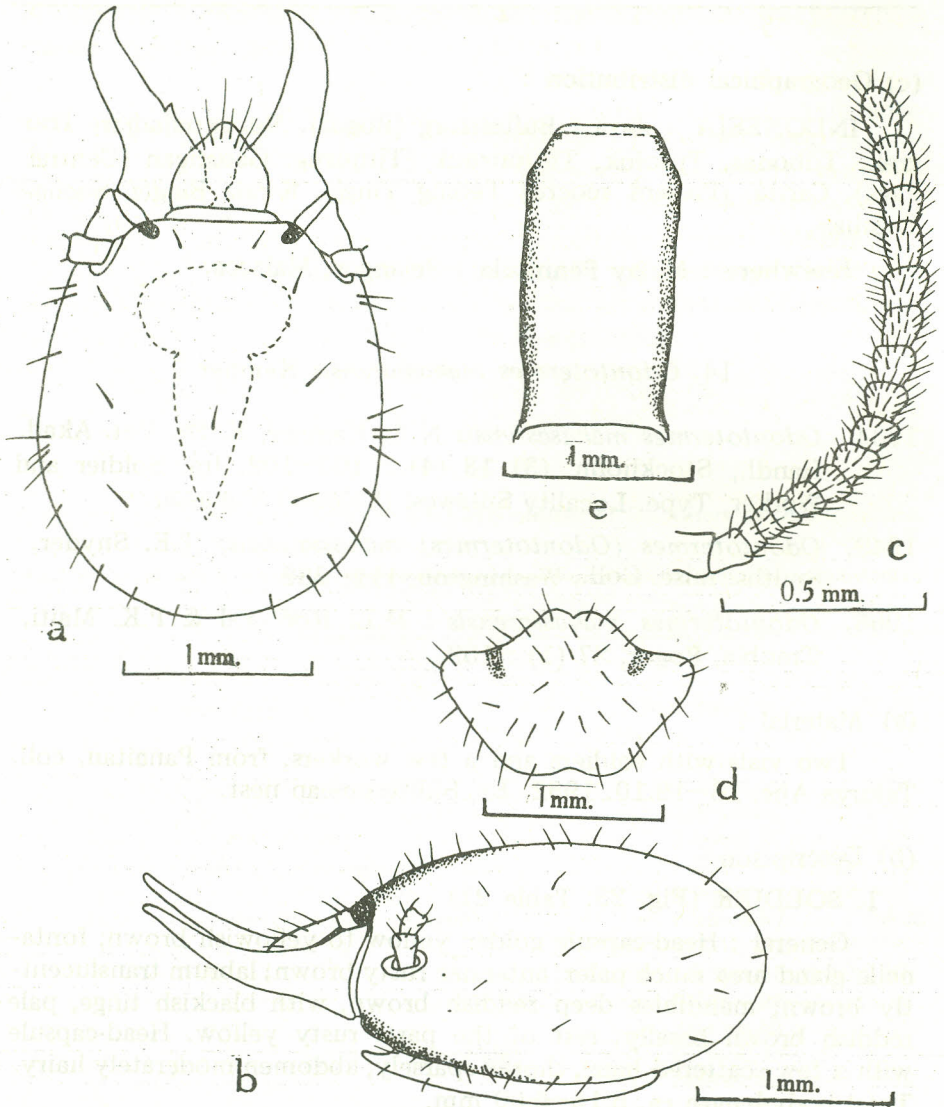


Fig. 23. *Odontotermes makassarensis* Kemner, Soldier caste. (a) Head, dorsal view (b) Head, side view (c) Right antenna (d) Pronotum, dorsal view (e) Postmentum, in situ.

clypeus not distinctly separated from frons. Labrum: Subtriangular, Lancet shape; lateral sides weakly convex, converging anteriorly to narrowly rounded tip; body beset with long hairs arranged in two rows. Mandibles: Sabre shaped, slightly incurved near the tip; length more than half the head-length (Head-mandibular index 0.53). Left mandible with a small, but prominent laterally directed tooth, placed near the upper edge of middle one-third, inner margin below the tooth convex. Right mandible with a very small crenulation placed in the corresponding position. Postmentum: Subrectangular; lateral sides subparallel, widest near the basal third; anterior margin straight; posterior margin weakly concave, with a distinct median bulge.

Thorax: Pronotum: Saddle-shaped; anterior lobe uplifted; broader than long (pronotum index 0.54–0.57) anterior margin convex, with a distinct median notch; posterior margin with a distinct median notch. Mesonotum: Narrower than pronotum; posterior margin notched in the middle. Metanotum: Almost as wide as pronotum; posterior margin weakly convex. Legs: Slender; hairy; tibial spurs 3:2:2. Tarsi 4-segmented.

Abdomen : Elongated; hairy. Cerci 2-jointed, ca. 0.10–0.13 mm long; Styli one jointed; ca. 0.10 mm long.

Table 21. Body-measurements (in mm) and indices of 5 soldiers of *Odontotermes makassarensis* Kemner.

No.	Body parts	Range	Mean
I. General			
1.	Total body-length ca.	5.15–6.00	5.60
II. Head			
2.	Length of head with mandibles	2.75–3.10	2.98
3.	Length of head to base of mandibles	1.90–2.05	1.98
4.	Maximum width of head	1.60–1.75	1.68
5.	Width at side base of mandibles	1.00–1.13	1.07
6.	Width at side base of antennae	1.45–1.55	1.52
7.	Height of head	1.00–1.05	1.03
8.	Head - Index - I	0.83–0.88	0.85
9.	Length of mandibles :		
	(a) Left mandible	1.00–1.05	1.03
	(b) Right mandible	1.00–1.05	1.03
10.	Head-mandibular Index-I	0.51–0.54	0.52
11.	Distance of tooth from tip of mandible	0.60–0.65	0.62
12.	Mandible-tooth Index	0.57–0.63	0.60
13.	Min. (Median) length of postmentum	1.25–1.35	1.28
14.	Maximum width of Postmentum	0.67–0.75	0.70
15.	Minimum width of postmentum	0.45–0.48	0.47
III. Thorax			
16.	Length of pronotum	0.65–0.75	0.69
17.	Maximum width of pronotum	1.08–1.23	1.16
18.	Pronotum Index	0.54–0.45	0.59

(c) Geographical distribution :

INDONESIA : Bali : Bedugul, Dadjam Danu (On Lake Bratan).
Panaitan Island (Present record) : Sulawesi (Celebes) : Makassar.

GENUS. (8) *Microtermes*15. *Microtermes insperatus* Kemner

(Fig. 24; Table 22)

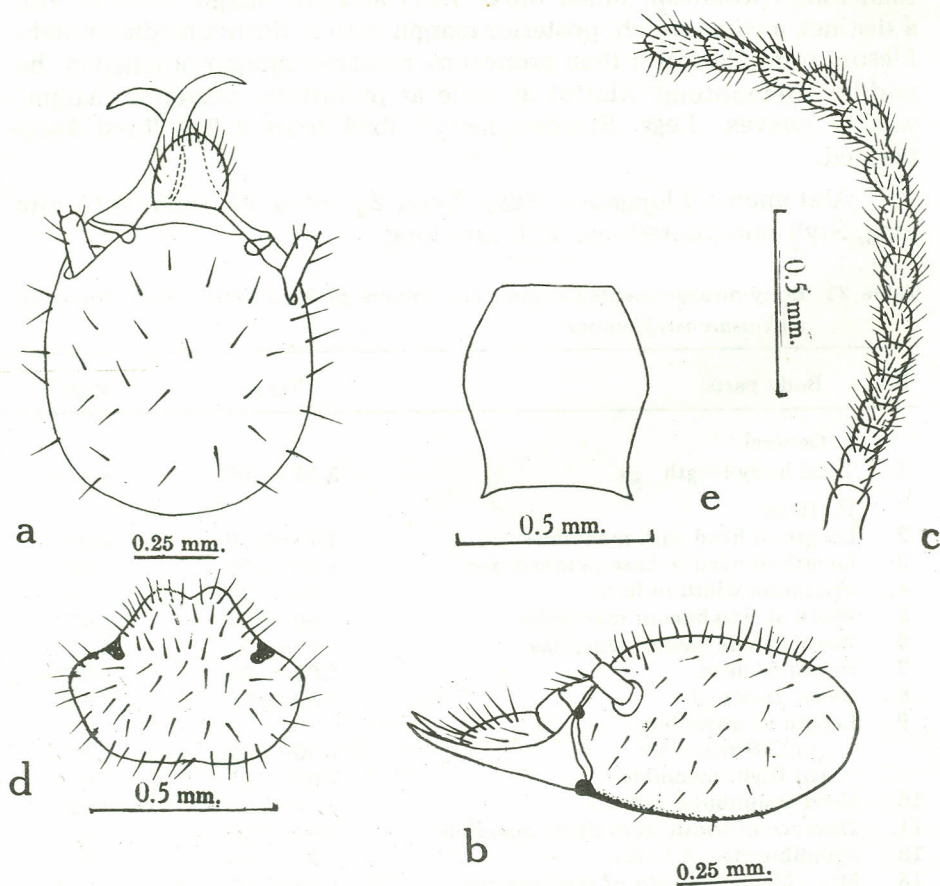


Fig. 24. *Microtermes insperatus* Kemner, Soldier caste. (a) Head, dorsal view (b) Head, side view (c) Right antenna (d) Pronotum, dorsal view (e) Postmentum, in situ.

1934. *Microtermes insperatus* N.A. Kemner, K.Sv. Vet. Akad. Handl., Stockholm, (3) 4: 106—109. Im S. *Type-locality*: Java.
1949. *Microtermes insperatus*: T.E. Snyder, Smiths, misc. Coll., Washington, 112: 250.
1966. *Microtermes insperatus*: M.L. Roonwal and P.K. Maiti, *Treubia*, Bogor, 27 (1): 110—11.

(a) Material :

One vial with 3 soldiers and 4 workers from Carita, coll. Takuya Abe, 25.10.82. Ex. Subterranean nest.

(b) Description :

1. SOLDIER : (Text-fig 24; Table 22)

General : Head-capsule pale yellow, fontanelle gland area whitish, paler than Head-capsule; frons, postclypeus and basal region of mandibles and labrum yellow, darker than head-capsule; rest of the body-parts paler than head-capsule. Head-capsule and thorax sparsely hairy; abdomen moderately hairy, with a row of hairs on the posterior margin of each tergum. Total body-length ca. 3.80—4.25 mm.

Head : Head-capsule broadly subround, almost as long as broad; widest near the middle, thence sides converging both anteriorly and posteriorly; posterior margin round. **Fontanelle**: Indistinct. **Eyes and Ocelli** : Absent. **Antennae**: 15-segmented; segment 2 cylindrical; subequal to 3 and 4 combined; 4 shortest; 5 onward club-shaped, progressively increasing in length; last ovate. **Labrum**: Sub-triangular, sides sub-parallel basally, converging anteriorly to a pointed tip; beset with a few long hairs. **Mandibles** : Thin, strongly hooked apically ; length nearly 3/4th of head-capsule; outer margins deeply concave; with rudimentary tooth near the apical part of middle two-third portion, on the inner margin. **Postmentum**: Strongly arched; broadest near the middle; anterior margin substraight; posterior margin concave.

Thorax : **Pronotum** : Saddle shaped; anterior lobe strongly raised, subcircular, and with a broad invagination in the middle, lateral sides converging backward and inward; posterior margin substraight, with an imperceptible median depression, **Mesonotum**: Slightly narrower than pronotum; posterior margin substraight, weakly depressed medially, **Metanotum**: Broader than pronotum: posterior margin weakly convex. **Legs**: Short, femora slender, fore tibia short and fossorial; tibial spurs 3:2:2. **Tarsi** 4 segmented.

Abdomen: Sub-cylindrical; hairy. **Cerci** 2-segmented; ca. 0.13 mm long.

Table 22. Body-measurements and indices (in mm) of 3 soldiers of *Microtermes insperatus* Kemner.

No.	Body-parts	Range	Mean
I. General			
1.	Total body-length ca.	3.80—4.25	4.00
II. Head			
2.	Head-length with mandibles	1.38—1.55	1.43
3.	Head-length to lateral base of mandibles.	0.75—0.90	0.85
4.	Maximum width of head	0.75—0.90	0.83
5.	Maximum height of head	0.55—0.63	0.58
6.	Head-index I (width/length of head)	0.98—1.00	0.99
7.	Length of mandibles		
	(a) Left mandible	0.58—0.63	0.60
	(b) Right mandible	0.58—0.63	0.60
8.	Head-mandibular index (Left mandible length/head-length)	0.70—0.77	0.74
9.	Minimum (median length of postmentum	0.48—0.55	0.51
10.	Maximum width of postmentum	0.35—0.45	0.41
III. Thorax			
11.	Length of pronotum	0.35—0.43	0.38
12.	Maximum width of pronotum	0.58—0.63	0.60
13.	Pronotum index (length/width)	0.67—0.74	0.70

(c) Geographical distribution :

INDONESIA : Java : Bogor (Buitenzorg), Depok, Palimanan (Near Cirebon), Cimango, Jember; also other places in East and West Java. Krakatau Islands: Carita (Present record).

Elsewhere : Malay Peninsula : Johore, Segamat, Selangor, Kuala Lumpur and Batu caves.

(d) Remarks :

The head-mandibular index is higher in the present specimens (0.70—0.77).

FAMILY. TERMITIDAE

SUB-FAMILY. (i) TERMITINAE

GENUS. (9) *Pericapritermes* Silvestri

(16). *Pericapritermes semarangi* (Holmgren)
(Fig. 25 a and b; Table 23)

1913. *Capritermes semarangi* N. Holmgren, K. Sv. Vet. Akad. Handl., Stockholm, 50(2) : 247. Im. Soldier & Worker. Type-locality : Java : Semarang.

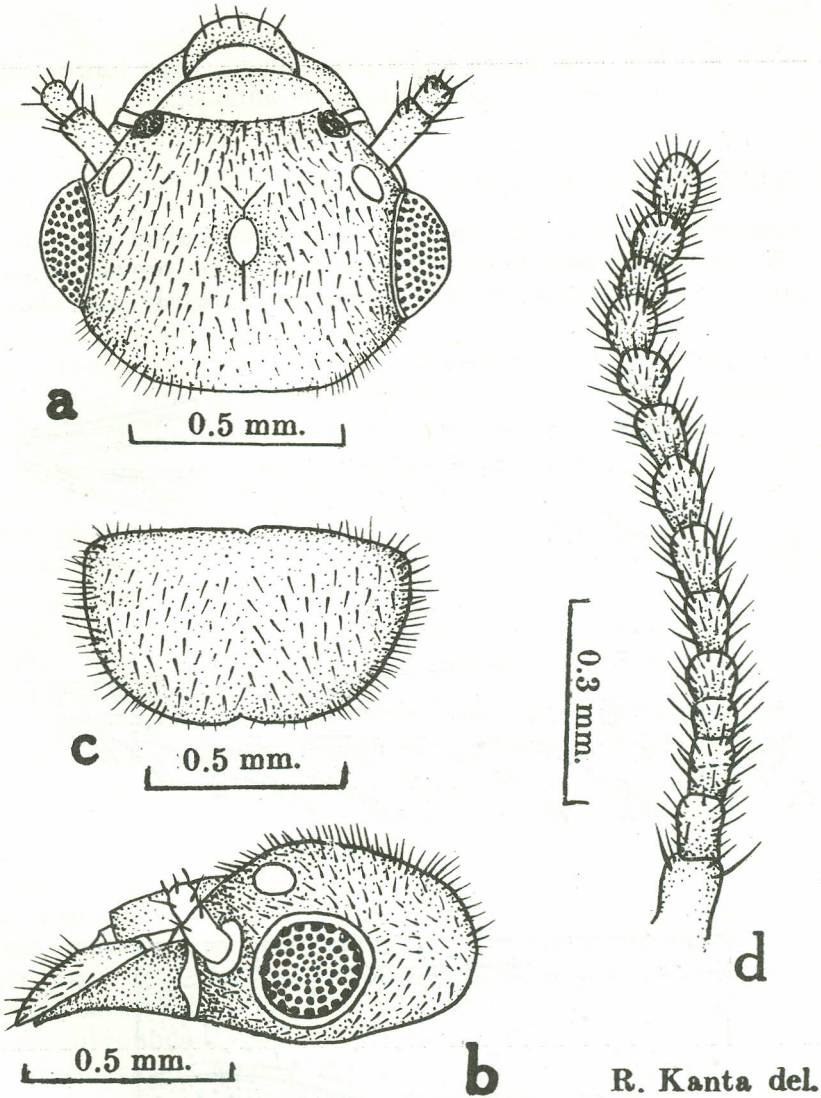


Fig. 25. a. *Pericapritermes semarangi* (Holmgren), Imago caste. (a) Head, dorsal view (b) Head, side view (c) Pronotum, dorsal view (d) Right antenna.

1949. *Capritermes semarangi* : T.E. Snyder, *Smiths. misc. Coll.*, Washington. 112 : 197.
1958. *Capritermes semarangi* : M. Ahmad, *Biologia*, Lahore, 4(2): 196.
1925. *Pericapritermes sumatrensis* O. John, *Treubia*, 6(3-4): 415-416.
1968. *Pericapritermes sumatrensis* : K. Krishna, *Bull. Am. Mus. Nat. Hist.*, New York, 138 (5) : 294.

(a) Material :

One vial with four alates (with loose wings), from Carita, (West-Java) coll. Takuya Abe, 1;11.1982. Ex. under humus.

(b) Description :

1. IMAGO : (Fig. 25a and b; Table 23)

General : Head-capsule, pronotum and abdominal tergites and sternites light castaneous brown to dark castaneous brown; antennae and postclypeus and anterior half of pronotum slightly paler; labrum

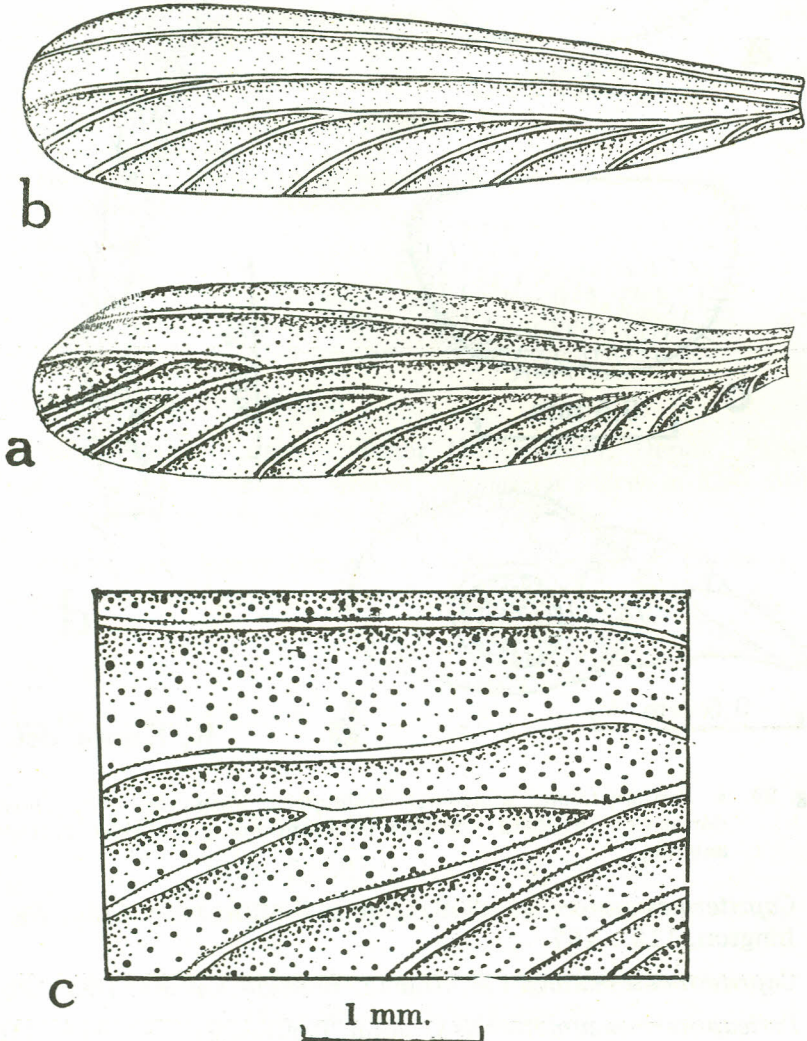


Fig. 25b. *Pericapritermes semarangi* (Holmgren), Imago caste. (a) Left forewing (b) Left hind wing (c) Enlarged distal part of forewing.

pale yellow. Head-capsule, pronotum and abdomen with a thick mat of hairs. Total body-length with wings ca. 7.00–8.70 mm. (9–9.50 mm as given by Holmgren, 1913), without wings 4.70–5.20 mm.

Head: Head-capsule broadly oval; densely covered with hairs; lateral sides without eyes weakly convex; posterior margin broadly convex; frons weakly declivous: Fontanelle: Small oval shaped; situated a little below the level of posterior margin of eyes; diameter 0.05 mm; with two diverging lines from its tip. Eyes: Of median size; sub-circular; maximum diameter with ocular sclerites 0.28–0.30 mm (0.26 mm as given in Holmgren, 1913); separated from lower margin of head-capsule and antennal foveolae by ca. 0.03 mm distance (0.65 mm as given by Holmgren). Ocelli: Small, oval shaped; separated from eyes, by almost half their short diameter. Antennae: 14–15 segmented; segment 1 largest; in 14 segmented condition, segment 2 cylindrical, broader than 3; but subequal in length to 3; 4 ring like, shortest; in 15-segmented antennae, segment 2 almost subequal to 3 & 4 combined; 3 shortest; 5 shorter than 4; rest progressively increasing in length; last ovate. Clypeus: Anteclypeus white, translucent, trapezoid; hyaline, bulged medially; Postclypeus yellowish brown, well chitinised, thickly hair, length less than half its width. Labrum: shovel shaped; lateral sides convex, converging anteriorly to broadly rounded anterior margin. Mandibles: Of typical *Pericapritermes* type. Left mandible with one apical, two marginal teeth and basal projection; apical subequal to 1st marginal; posterior margin of 1st marginal sinuate; 2nd marginal widely separated; molar plate separated from 2nd marginal by a gap. Right mandible with one apical, two marginals and a molar plate; 1st marginal subequal to 1st marginal; 2nd marginal prominent; its posterior margin sinuous; molar plate bifurcated. Thorax: Pronotum: Much narrower than head-width; flat; subtrapezoid; anterior margin slightly elevated substraight without any notch in the middle; anterolateral corners subrounded; sides converging inwardly and posteriorly; posterior margin small, weakly emarginate. Meso and Metanotum: With shallow broad median emargination in middle. Legs: Short, hairy; tibial spurs 3:2:2. Tarsi 4-segmented. Wings: Dirty brown; pilose all round the broader; punctate. Forewing: Costa-subcosta fused sclerotic and running along the anterior margin of wing. Radius absent. Radial sector thickly chitinised, running close to and parallel with costa-subcosta, unbranched. Median non-pigmented, weakly but clearly visible; arising independently from the wing scale, less chitinised; with 3–4 veins to the posterior region. Cubitus: With 8–9 branches; Proximal branches more chitinised. Hindwing: Costa, Subcosta, and Radial Sector as in forewing; Median arising from the Radius just outside the wing scale; with 3–5 branches. Cubitus as in forewing, with 8–10 branch.

Abdomen: Cylindrical; abdominal tergites and sternites well demarcated and chitinised; thickly hairy. Cerci 2-segmented and hairy.

Table 23. Body measurements (in mm) of 5 imagoes of *Pericapritermes semarangi* Holmgren

No.	Body-parts	Range	After Holmgren, 1913 and Ahmad, 1958
I, General			
1.	Total body-length with wings	7.00—8.70	9.00—9.50
2.	Total-body-length without wings	4.70—5.20	5.00
II. Head			
3.	Head-length to tip of Labrum	1.00—1.08	0.94—1.03
4.	Head length without mandibles	0.60—0.75	0.67
5.	Maximum width of head	0.90—0.95	0.91—0.93
6.	Height of head	0.43—0.50	—
7.	Maximum diameter of eye	0.28—0.30	0.26
8.	Minimum diameter of eye	0.25—0.28	—
9.	Maximum diameter of ocellus	0.10—0.12	0.13
10.	Minimum diameter of ocellus	0.08—0.10	—
11.	Eye Ocellus distance	0.05	—
12.	Distance of eye from the lower margin of head-capsule	0.02—0.03	0.065
III. Thorax			
13.	Length of pronotum	0.43—0.48	0.42—0.46
14.	Width of pronotum	0.65—0.70	0.68—0.81
15.	Forewing with scale	7.30—7.65	—
16.	Forewing without scale	6.80—7.20	—
17.	Hind wing without scale	6.80—7.00	—

(c) Geographical distribution :

INDONESIA Java : Carita (Present record); Semarang (Type-locality).

SUBFAMILY. (ii) NASUTITERMITINAE

GENUS (10) *Nasutitermes* Banks (nee Dudley)

KEY TO SPECIES :

SOLDIER CASTE :

1. Head yellow to orange coloured 2
- Head darker 3
2. Mandibles without free apical portion; head orange coloured, with a few scattered hairs; dorsal profile almost straight; head-length with nasus 1.48, without nasus 0.95—0.99, width at the base of antennae 0.52 *N. acutus* (Holmgren)

3. Mandibles with small apical portion, head yellow to orange; dorsal profile weakly sinuous; head-length with nasus 1.44–1.61, without nasus 0.84–1.06, width 0.84–1.02. *N. culasiensis* (Oshima)
4. Head-length with nasus 1.63–1.75, without nasus 0.91, maximum width 1.04 *N. matangensis matangensisformis* (Holmgren)
Head-length with nasus 1.77–1.87, without nasus 1.13–1.20, maximum width 1.13–1.27. *N. matangensis pyricephalus* (Kemner)

17. *Nasutitermes acutus* (Holmgren)

Syn. *N. Buitenzorg* (Holmgren)

(Fig. 26; Table 24)

1913. *Eutermes (Eutermes) acutus* N. Holmgren, K. Sv. Vet. Akad. Handl., Stockholm, 50 (2): 189.— Im. Type. locality: Wonosobo (Java).
1949. *Nasutitermes acutus* : T.E. Snyder, Smiths. misc. Coll., Washington, 112: 265.
1966. *Nasutitermes acutus* : M.L. Roonwal and P.K. Maiti, Treubia, Bogor, 27(1) : 111–112.

(a) Material :

(i) One vial with 3 soldiers, from Panaitan, Indonesia, Coll. Takuya Abe, 19.10.1982. Ex. Nest (ii) One vial with one soldier and worker from Carita, coll. Takuya Abe, 25.10.1982. (iii) One vial with one soldier and 3 workers from Sumatra, coll. Takuya Abe, 11-10-1982.

(b) Description :

SOLDIER : (Fig. 26; Table 24).

General : Head-capsule and antennae yellowish brown; nasus brown with reddish tinge darker towards the tip; abdominal tergites somewhat smoky brown; rest of body parts creamy yellow, much paler than head-capsule. Total body length ca. 2.85–3.25.

Head : Head-capsule pear shaped, not constricted behind the antennae; slightly longer than broad (head-index 0.92–0.97), covered with minute hairs; dorsal profile almost straight; posterior margin round. **Rostrum**: Short, (rostrum head index 0.53–0.59) conical; broader at base, gradually tapering in front with a weak hump; with a tuft of hairs at the tip. **Fontanelle**: Tube well marked. **Antennae** : short; with 13 segments; segment 1 largest; 2 cylindrical, distinctly smaller than 3; 3rd about 1½ times of 2 and almost twice as long as 4;

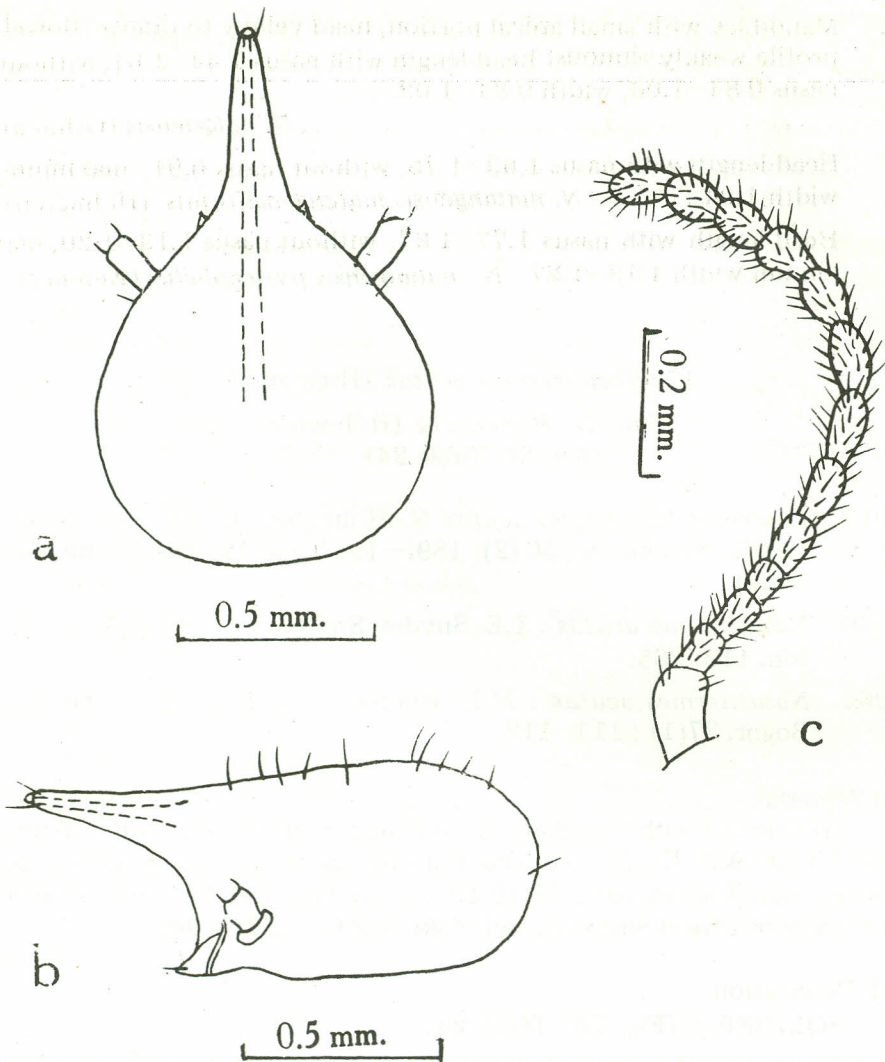


Fig. 26. *Nasutitermes acutus* (Holmgren), Soldier caste. (a) Head, dorsal view (b) Head, side view (c) Right antenna.

4 shortest; remaining segments progressively increasing in length; last shorter and thinner than penultimate. Mandibles: vestigial; spine like lateral processes absent. Thorax: Pronotum: Saddle shaped; small, beset with small hairs; anterior margin rounded, with very weakly emargination in the middle; posterior margin weakly convex. Legs: Long, slender; tibial spur formula 2:2:2. Tarsi 4-segmented.

Abdomen : Elongate; each tergum with long hairs on extreme lateral margins; remaining portion with short bristles; sternites densely pilose. Cerci 2-jointed, hairy, ca. 0.08 mm long.

Table 24. Body-measurements (in mm) and indices of soldiers of *Nasutitermes acutus* (Holmgren)

No.	Body parts	Range	Mean
I General			
1.	Total body-length ca.	2.85—3.25	3.08
II Head			
2.	Head-length with rostrum	1.25—1.33	1.25
3.	Head-length without rostrum	0.85—0.88	0.86
4.	Length of rostrum	0.40—0.48	0.43
5.	Maximum width of head	0.78—0.85	0.83
6.	Height of head	0.45—0.50	0.48
7.	Head-index (width/length)	0.92—0.95	0.95
8.	Rostrum-head index	0.53—0.59	0.56
III Thorax			
9.	Length of pronotum	0.20	
10.	Maximum width of pronotum	0.43	

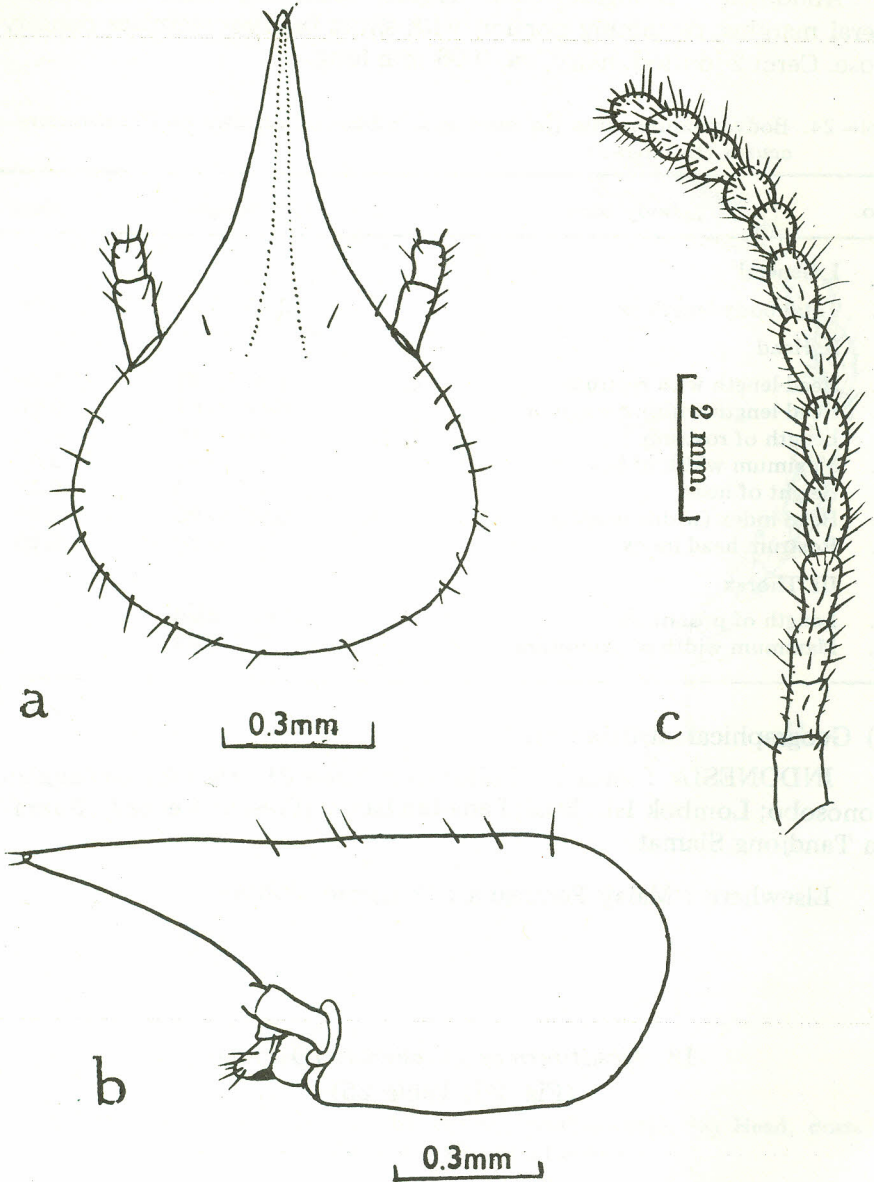
(c) Geographical distribution :

INDONESIA : Java : Buitenzorg (Bogor), Depok, Gedangan, Wonosobo; Lombok Isl.; Bual; Panaitan Island (Present Record); Sumatra Tandjong Slamet.

Elsewhere : Malay Peninsula : Pengaran, Johore

18. *Nasutitermes culasiensis* (Oshima)
(Fig. 27; Table 25)

1916. *Eutermes (Eutermes) gracilis* M. Oshima, Philipp. J. Sci., Manila, (D) 11 (6) : 362. Soldier. Type-locality : Philippines : Sarai.
1949. *Nasutitermes culasiensis* : T.E. Snyder, Smiths. misc. coll., Washington, 112: 173.



R. Kanta del.

Fig. 27. *Nasutitermes culasiensis* (Oshima), Soldier caste. (a) Head, dorsal view (b) Head, side view (c) Right antenna.

(a) **Material :**

(i) One vial with 5 soldiers and a few workers from Anak Krakatau Island, Indonesia, Coll. Takuya, Abe., 6.11.1982. Ex. nest. (ii) One vial with alates (+ loose wings) from Carita (West Java), Coll. Takuya Abe, 13-11-1982.

(b) **Description :**1. **SOLDIER :** (Fig. 27; Table 25).

General : Head-capsule and anterior lobe of pronotum yellow to dirty brown; fontanelle gland area paler; rostrum yellowish brown basally, light reddish brown apically; Antennae and legs pale yellow, with brownish tinge, abdomen rusty yellow. Total body-length ca. 3.60–3.90 mm.

Head : Head-capsule pear shaped when viewed from above; length to base of rostrum slightly longer than maximum width (almost as broad as long as given by Oshima, 1914) not densely covered with minute hairs, with a pair of long hairs on the vertex; dorsal profile weakly sinuous; posterior margin roundish. **Rostrum:** Short (rostrum-head index 0.50–0.58); Conical; much broader at base and progressively tapering in front; with a tuft of hairs at the tip. Fontanelle gland and fontanelle tube well marked. **Antennae:** with 12-segments; segment 1 largest; segment 2 almost subequal to 3 in length; 4–11 progressively increasing in length; last segment shorter and comparatively thinner than penultimate. **Mandibles:** vestigial; each with a small spine like lateral process lying about the middle of mandible; inner margin rounded.

Thorax : Pronotum : Saddle shaped; small; anterior margin rounded with a distinct median notch; lateral sides converging inward posteriorly; posterior margin substraight. **Mesonotum:** Broader than metanotum; posterior margin convex. **Legs:** Densely covered with long bristles; long, slender; apical tibial spur formula 2:2:2. Tarsi 4-segmented.

Abdomen: Elongate; anterior terga without long hairs; 7th onward, each tergum with long hairs on either extreme lateral margin and a pair on either side of middle; sternites densely pilose, with long and short hairs. Cerci short, 2-segmented; ca. 0.10 mm long. Styli single jointed ca. 0.08 mm long.

Table 25. Body-measurements (in mm) and indices of 5 soldiers of *Nasutitermes culasiensis* (Oshima).

No.	Body-parts	After Light & Wilson (1936)	Range	Mean
I. General				
1.	Total body-length Ca.	—	3.60—3.90	3.74
II. Head				
2.	Head length with rostrum	1.68—1.74	1.50—1.55	1.53
3.	Head length without rostrum	1.05—1.06	0.95—1.03	0.98
4.	Maximum width of head	1.10—1.20	0.90—0.95	0.93
5.	Length of rostrum	0.63—0.65	0.52—0.55	0.54
6.	Height of head	0.72—0.76	0.53—0.65	0.59
7.	Maximum bulge of head	—	0.30—0.35	0.33
8.	Head-index. I (width/length)	0.87—0.91	0.92—0.95	0.93
9.	Rostrum-head index	0.60	0.50—0.58	0.54
III. Thorax				
10.	Length of pronotum	0.18—0.13	1.18—0.23	0.20
11.	Max. width of pronotum		0.43—0.48	0.45

(c) Geographical distribution

Philippines : Sarai

Indonesia : Anak Krakatau Island (Present record)

(d) Remarks : Specimens from Anak Krakatau Islands are smaller in measurements.

19. *Nasutitermes matangensis matangensiformis* (Holmgren)(Syn. *Nasutitermes djemberensis* (Kemner)

(Fig. 28 and 29; Table 26 & 27)

1913. *Eutermes (Eutermes) matangensiformis* N. Holmgren, K. Sv. Vetén, Akad. Handl., Stockholm, 50 (2): 185. Im. S., and W. Type-locality: North Borneo (Kalimantan): Sarawak (Selected by Prashad & Sen-Sarma, 1959).
1949. *Nasutitermes matangensis matangensiformis*, T.E. Snyder, Smiths. misc. coll., Washington, 112: 286.
1956. *Nasutitermes matangensis matangensiformis* M.L. Roonwal and P.K. Sen-Sarma, Indian J. Agric. Sci., New Delhi, 26 (1): 27—29.
1959. *Nasutitermes matangensis matangensiformis*: B. Prashad and P. K. Sen-Sarma, Indian Council. Agric. Res. Monograph No. 1023: 51—53.

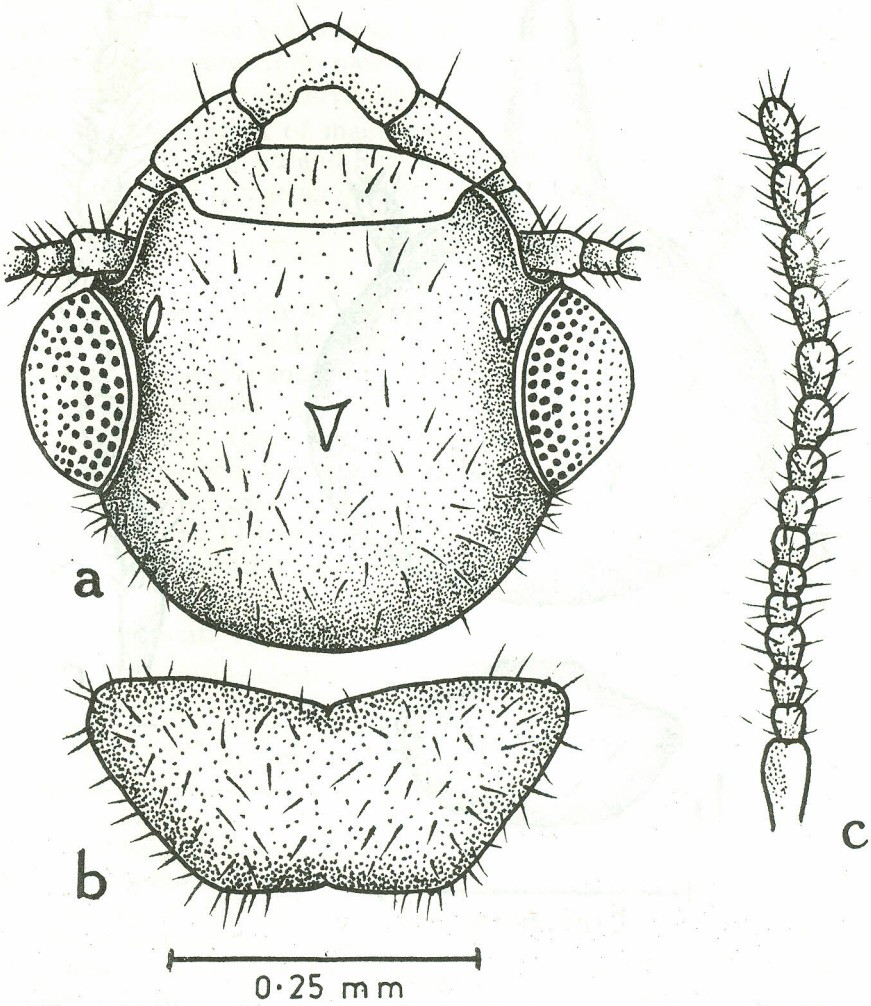


Fig. 28. *Nasutitermes matangensis matangensiformis* (Holmgren), Imago caste. (a) Head, dorsal view (b) Pronotum, dorsal view (c) Right antenna.

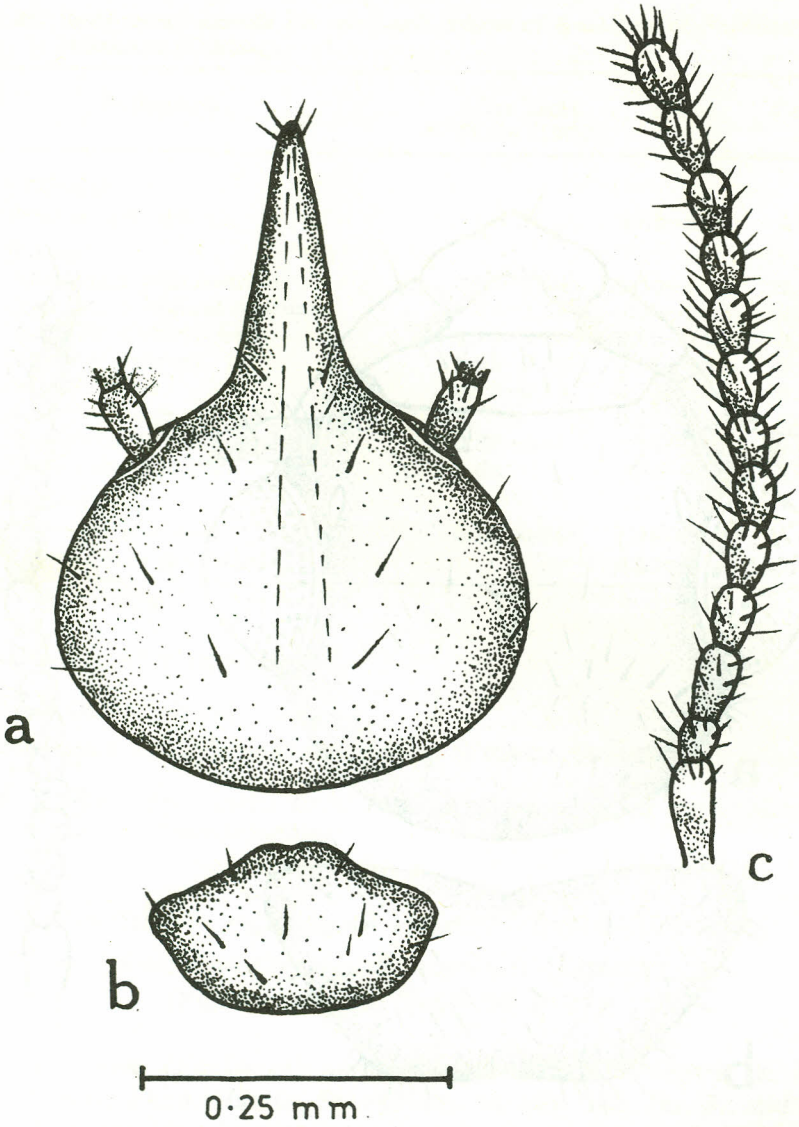


Fig. 29. *Nasutitermes matangensis matangensiformis* (Holmgren), Soldier caste (a) Head, dorsal view (b) Pronotum, dorsal view (c) Right antenna.

1966. *Nasutitermes matangensis matangensiformis* M.L. Roonwal and P.K. Maiti, *Treubia*, Bogor, 27(1) : 113–126.

Nasutitermes matangensis matangensisformis was described by Holmgren in 1913 from Sarawak as a distinct species. Oshima (1923) and Snyder (1949) maintained its specific status, however Roonwal and Sen-Sarma (1956), Prashad and Sen-Sarma (1959) relegated to the sub-specific status (as a sub-species of *N. matangensis*). This status has also been followed by Roonwal and Maiti (1966). We share their view on the basis of hair position (i.e. one long hair on either side near the margin and another long hair on either side of median line), we have placed the present material under *N. matangensis matangensisformis*. Since the description of main species *N. matangensis matangensis* has been given by Prashad and Sen-Sarma (1959), we are only giving here biometrical data and geographical distribution of this species.

(a) Material :

(i) One vial, with 4 soldiers and 4 workers, from Rakata Besar, Coll. Takuya Abe, 28.10. 1982. Ex. Arboreal nest (ii) One vial, with 2 imagoes, 4 soldiers and 2 workers, from Panaitan Island, Coll. Takuya Abe, 21.10.1982. Ex. Arboreal nest. from Anak Krakatau Island, Coll. Takuya Abe, 5.11.1982. Ex. Arboreal nest (iv) One vial with one soldier and 3 workers from Carita, coll. Takuya Abe, 2.11.1982. (v). One vial with 3 soldiers, one imago with workers from Rakata Besar, coll. Takuya Abe, 10.11.1982 (vi) Two vials with 2 imagoes, soldiers and workers from Sertung, coll. Takuya Abe, 28.10.1982 & 12.11.1982.

(b) Measurements :

Table 26. Body-measurements (in mm) of 3 imagoes of *Nasutitermes matangensis matangensisformis* (Holmgren).

No.	Body-parts	Range	Mean
I. General			
1.	Total body-length with wings ca.	15.00—15.60	15.60
2.	Total body-length without wings ca.	8.50—10.25	9.50
II. Head			
3.	Head-length to tip of labrum	1.85—1.05	1.91
4.	Head-length to base of mandibles	1.05—1.25	1.18
5.	Max. width of head (with eyes)	1.60—1.68	1.65
6.	Max. diameter of eye with ocular sclerite	0.53—0.60	5.55
7.	Min. diameter of eye with ocular sclerite	0.13—0.18	0.15
8.	Max. diameter of lateral ocellus	0.18—0.20	0.19
9.	Min. diameter of lateral ocellus	0.13—0.18	0.15
10.	Min. eye-ocellus distance	0.03—0.05	0.04
III Thorax			
11.	Length of pronotum	0.78—0.83	0.80
12.	Max. width of pronotum	1.30—1.40	1.36
13.	Length of forewing with scale	13.40—15.00	14.40
14.	Length of hindwing with scale	12.00—13.70	13.00
15.	Antennal segments	15	

Table 27. Body-measurements (in mm) and indices of 9 soldiers of *Nasutitermes matangensis matangensisformis* (Holmgren).

No.	Body-parts	Range	Mean
I. General			
1.	Total body-length <i>ca.</i>	4.30—5.60	5.20
II. Head			
2.	Head-length with rostrum	1.75—2.00	1.90
3.	Head-length without rostrum	1.15—1.30	1.24
4.	Length of rostrum	0.55—0.75	0.60
5.	Max. width of head		
6.	Max. posterior bulge of head	0.28—0.40	0.36
7.	Maximum height of head	0.75—0.88	0.83
8.	Rostrum head index	0.55—0.64	0.60
9.	Head-bulge index	0.23—0.30	0.28
III. Thorax			
10.	Length of pronotum	0.28—0.35	0.33
11.	Max. width of pronotum	0.60—0.70	0.66
12.	Number of antennal segments	13—14	

(c) Geographical distribution :

INDONESIA : Borneo (Kalimantan) : Pulo Daat, Sarawak. Java. Bantam Coast, Bondowoso, Depok, Jember Gedangan, Kandangan, Kediri, Pare, Tjepu, Sumber weringin, Ujung Kulon, Sumatra, Padang, Poeloe Gadang, Siak, Simalur, Sinabang, Sungei Pinang, Sunda Straits: Anak Krakatau Isl. Panaitan Isl. and Rakata Besar Isl. (Present record).

ELSEWHERE : Malay Peninsula : Johore, Segmat. Nicobars (Indian ocean) : Camorta, Isl. and Naukauri Isl. Burma and Cochin China.

20. *Nasutitermes matangensis pyricephalus* (Kemner)

(Text-fig. 30; Table 28)

1934. *Eutermes matangensis pyricephalus* Kemner, K. Sv: Vetensk. Akad Handl., 13 (4) : 124—127.

1949. *Nasutitermes matangensis pyricephalus*, Snyder, Smiths, misc. Coll., Washington, 112 : 287.

(a) Material :

Two vials with 3 soldiers and workers from Panaitan, coll. Takuya Abe, 19—20.10.1982.

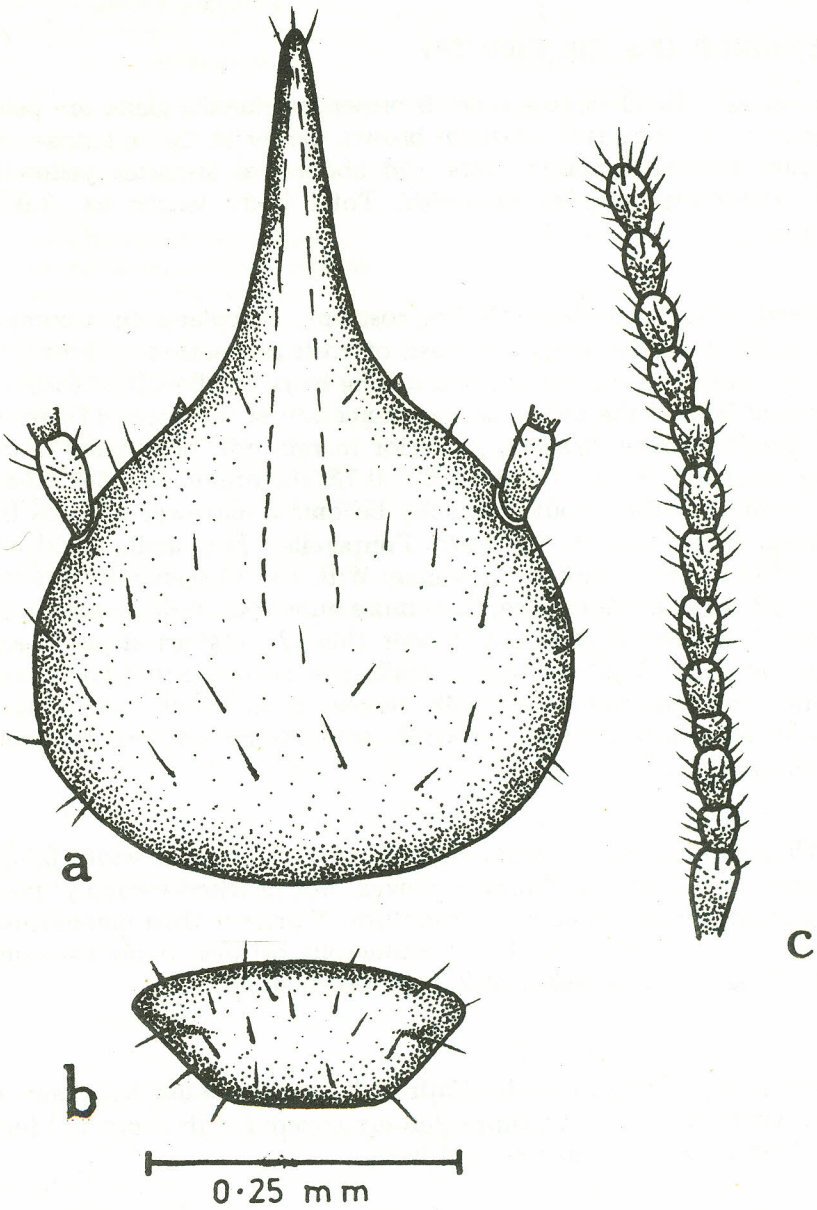


Fig. 30. *Nasutitermes matangensis pyricephalus* (Kemner) Soldier caste. (a) Head, dorsal view (b) Pronotum, dorsal view.

(b) Description :**SOLDIER (Fig. 30; Table 28)**

General : Head-capsule reddish brown; fontanelle gland are paler than rest of head-capsule; rostrum brown, darker at tip; antennae and pronotum brownish yellow; legs and abdominal sternites yellowish white; abdominal tergites brownish. Total body length ca. 3.90–4.25 mm.

Head : Head-capsule, excluding rostrum, orbicular with maximum width more than the length to base of rostrum; with a pair of long hairs on either side of vertex, a few long hairs on the tip of rostrum, constricted behind the antennae; no projection at the base of rostrum; dorsal profile almost straight; posterior margin not invaginated in the middle. **Rostrum:** Short, (length 0.65–0.73; rostrum-head index 0.58–0.66); conical; rather stout, gradually becoming narrower towards the tip; rostral hump absent; tip hairy. **Fontanelle:** Fontanelle gland and fontanelle tube well-marked. **Antennae:** With 13–14 segments; generally with 13 segments; all pilose, hairs more numerous in distal segments; segment 1 largest; 3 distinctly longer than 2, 4 shortest in 13-segmented antennae; 4 subdivided, 2 smallest in 14-segmented condition, segment 4 to penultimate gradually increasing in length. **Mandibles :** Vestigial; each with a short, brownish, spin-like lateral process situated in the middle.

Thorax: Pronotum: Saddle-shaped; small, maximum width 0.55–0.60 mm, pilose; anterior margin convex, not notched medially; posterior margin almost straight. **Mesonotum:** Narrower than metanotum. **Legs:** Short; densely covered with numerous bristles; femora slender; hind leg longest, tibial spurs 2:2:2; tarsi 4-segmented.

Abdomen: Elongated with both ends tapering; a few long hairs on tergites virtually absent; sternites densely covered with short and long hairs. Cerci short, 2-segmented and hairy.

Table 28. Measurements (in mm) of 3 soldiers of *Nasutitermes matangensis pyricephalus* (Kemner).

No.	Body-parts	Specimen from Panaitan	Kemner, 1934
I. General			
1.	Total body-length ca.	3.90—4.25	4.00—5.00
II. Head			
2.	Length of head with rostrum	1.70—1.75	1.77—1.87
3.	Length of head without rostrum	1.10—1.13	1.13—1.20
4.	Maximum width of head	1.05—1.15	1.13—1.27
5.	Length of rostrum	0.65—0.73	—
6.	Height of head	0.73—0.78	—
7.	Rostrum-head index	0.65—0.73	—
III. Thorax			
8.	Length of pronotum	0.20—0.23	—
9.	Maximum width of pronotum	0.55—0.60	0.53—0.56

(c) Geographical distribution :

Widely distributed in West Java. From the Panaitan island it is being recorded for the first time.

GENUS (11) *Bulbitermes* Emerson

KEY TO SPECIES

SOLDIER CASTE

- 1 (2) Apical portion of the mandible without tooth. Dorsal margin of head in profile not concave.
 *B. neopusillus* Snyder and Emerson
- 2 (1) Apical portion of the mandible with a distinct tooth. Dorsal margin of head in profile weakly concave.
- 3 (4) Larger species; Head-length with rostrum 1.55—1.84 mm width 0.98—1.06 mm. Head-capsule without constriction behind the antennae. *B. gedeensis* (Kemner)
- 4 (3) Smaller species; Head-length with rostrum 1.45—1.52 mm width 0.80—0.86 mm. Head-capsule with a distinct constriction behind the antennae. *B. lakshmani* Roonwal & Maiti

21. *Bulbitermes gedeensis* (Kemner)
(Fig. 31; Table 29)

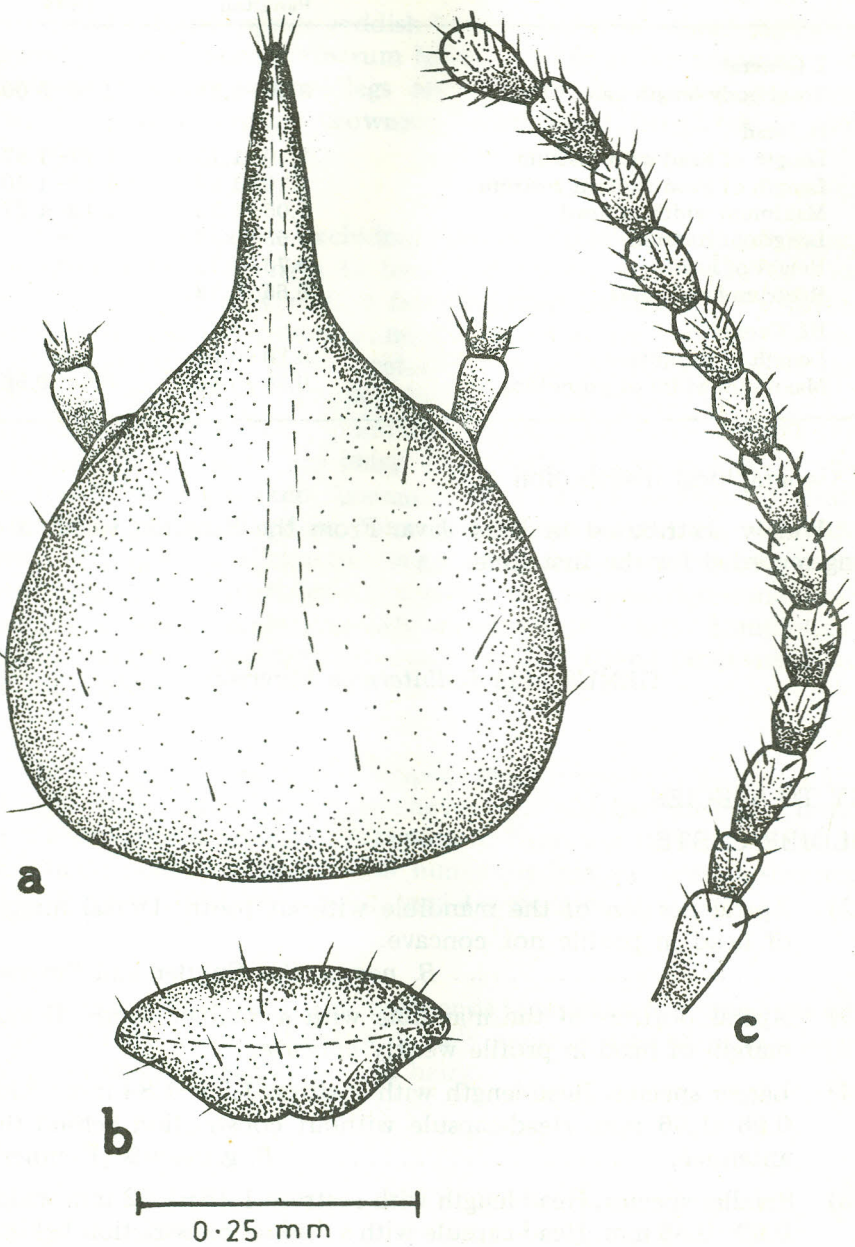


Fig. 31. *Bulbitermes gedeensis* (Kemner), Soldier caste. (a) Head, dorsal view (b) Pronotum, dorsal view (c) Right antenna.

1934. *Eutermes gedeensis* Kemner, K. Sv. Vetensk. Akad. Handl., 13 (4) : 135—137.
1949. *Bulbitermes gedeensis*, Snyder, Smiths, misc. Coll., Washington, 112 : 308.

(a) Material

One vial with 4 soldier and 3 workers from Panaitan Island, coll. Takuya Abe, 19.10.1982.

(b) Description

SOLDIER (Fig. 31; Table 29)

General : Head-capsule yellowish brown, paler posteriorly, tip of rostrum darker; antennae and pronotum pale brown; legs yellowish white, abdominal tergites brown with dark brown tinge. Head and body sparsely hairy. Total body-length (with rostrum) ca. 3.40–4.10 mm.

Head : Head-capsule somewhat broader and thick posteriorly with a longer nasus; dorsal profile weakly concave; slightly longer than broad (head-length without rostrum 1.05–1.10; maximum width of head 0.98–1.00 mm); posterior margin broadly rounded. **Rostrum:** Cylindrical, without basal hump; nearly half as long as head-capsule; rostrum-head index 0.46–0.50. **Antennae:** Generally 13-segmented, rarely 14 segmented; in specimens with 14-segments the third almost as long as the second, slightly shorter than the fourth; in specimens with 13-segment conditions, third twice as long as the second and one-and-a-half times as long as the fourth; **Fontanelle :** Fontanelle gland and fontanelle tube prominent. **Labrum:** Small, broader than long; anterior margin with a weak depression; antero-lateral angles rounded. **Clypeus:** Ante-clypeus whitish, much broader than long; Post-clypeus distinct with convex anterior margin; posterior margin not sharply differentiated. **Mandibles:** Apical portion of the right mandible with a distinct tooth at the tip. **Postmentum:** Broader than long (minimum median) length 0.28 mm; maximum width 0.33 mm broadest in the middle; anterior margin substraight, posterior margin concave.

Thorax: **Pronotum:** Saddle-shaped; width nearly double the length (maximum length 0.23–0.30; width 0.50–0.55 mm); anterior and posterior margins with a median notch. **Mesonotum and metanotum:** Posterior margin convex, not medially notched. **Legs:** Moderately long; femora with numerous short hairs; tibiae more densely pilose; hind-femora longer than tibiae and not reaching the tip of abdomen; tarsi 4-segmented, all densely covered with hairs. Apical tibial spurs 2:2:2.

Abdomen: All terga except the last 3 or 4 devoid of long hairs; sternites with numerous long hairs. Cerci short, 2-segmented (length 0.08 mm), hairy; styli absent.

Table 29. Body measurements (in mm) of soldiers of *Bulbitermes gedeensis* Kemner

No.	Body-parts	Specimen from Panaitan Island (4-soldiers)	Kemner, 1934
I. General			
1.	Total body-length ca.	3.40—4.10	3.36—3.60
II. Head			
2.	Length of head with rostrum	1.55—1.60	1.66—1.84
3.	Length of head without rostrum	1.05—1.10	1.13—1.16
4.	Maximum width of head	0.98—1.00	0.99—1.07
5.	Length of rostrum	0.50	—
6.	Height of head	0.55	—
7.	Minimum (median) length of postmentum	0.28	—
8.	Maximum width of postmentum	0.33	—
9. III. Thorax			
9.	Length of pronotum	0.23—0.30	0.21—0.24
10.	Maximum width of pronotum	0.50—0.55	0.49-0.56

(c). Geographical distribution :

Cibodas (West Java), Panaitan Island (Present record).

22. *Bulbitermes lakshmani* Roonwal & Maiti
(Fig. 32; Table 30)

1966. *Bulbitermes lakshmani* M.L. Roonwal and P.K. Maiti, *Treubia*.
Bogor, 27: 63—140.

(a) Material :

One vial with 3 soldiers from Carita, Coll..Takuya Abe, 16- 11-
1982.

(b) Description :

Since this species was described by the authors in details, only
salient features are given below.

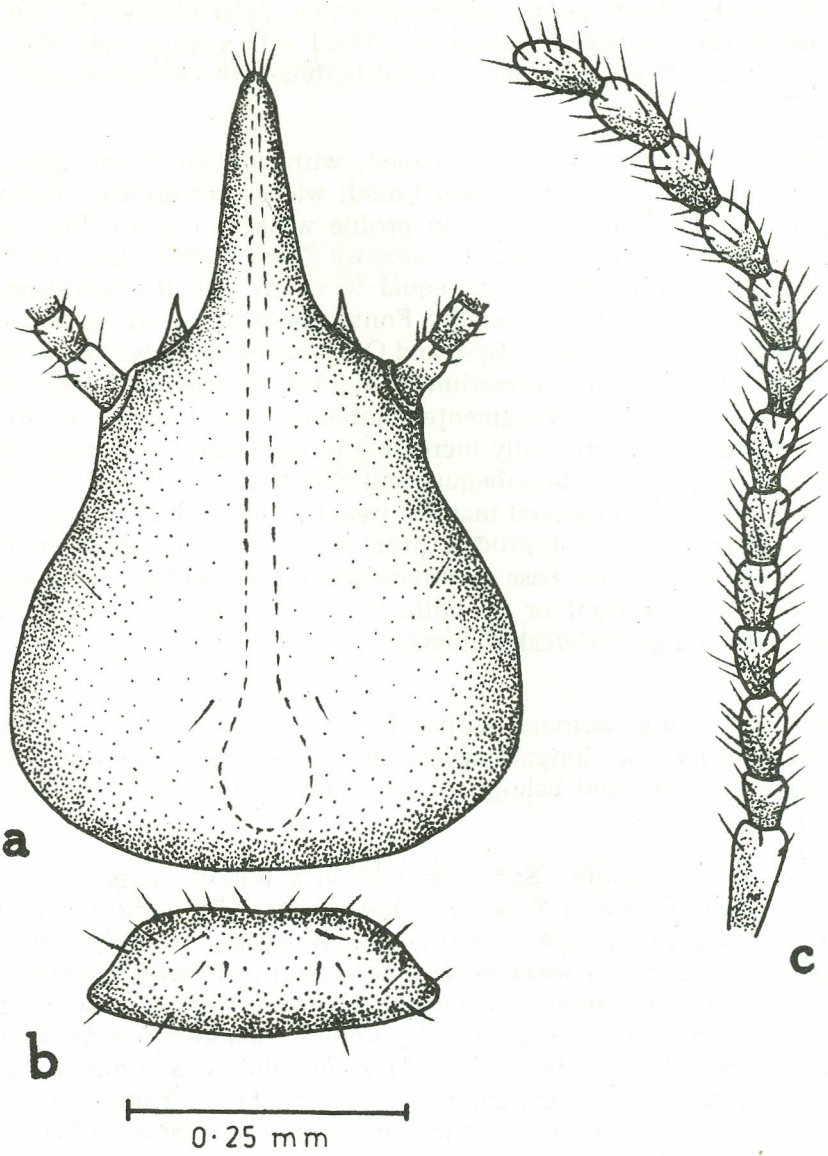


Fig. 32. *Bulbitermes lakshmani* Roonwal and Maiti, Soldier caste. (a) Head, dorsal view (b) Pronotum, dorsal view (c) Right antenna.

SOLDIER (Fig. 32; Table 20)

General : Head capsule yellowish brown, paler posteriorly; tip of rostrum darker; antennae pale brown. Head with a single pair of hairs on vertex; tip of rostrum hairy. Total body-length (with rostrum) ca. 3.30—3.80 mm.

Head : Head-capsule pear shaped, with a distinct constriction behind the antennae; longer than broad; widest posteriorly; posterior margin rounded; dorsal margin in profile weakly concave. *Rostrum*: Subcylindrical, slender; gradually narrowing and terminating in a narrow, weakly pointed tip, length equal to nearly half the head-length; basal hump indistinct. *Fontanelle*: Fontanelle tube visible in rostrum; fontanelle gland prominent. *Eyes and Ocelli*: Absent. *Antennae*: Generally with 13 segments, sometimes 14; in 13-segmented antennae 2 almost half of 3 (in 14-segmented antennae almost equal to 3); 4 smaller than 3; 5—8 gradually increasing in length and becoming club-shaped; 9 to penultimate subequal and club-shaped. *Labrum*: Subrectangular; anterior and lateral margins weakly convex. *Mandibles*: Small and rudimentary. Apical process prominent with an almost straight outer margin and broad base; a minute tooth on apical process present either on left or right or on both, in different positions, generally; molar plate straight or weakly convex.

Postmentum: Subhexagonal; with a few bristles near anterior margin; slightly broader than long; broadest almost in middle; sides gradually narrowing in front and behind; anterior margin substraight, posterior margin concave.

Thorax: *Pronotum*: Saddle-shaped with minute hairs on body; much narrower than head (maximum head-width 0.75—0.83; maximum pronotum width 0.45—0.48 mm); sides converging posteriorly; anterior margin convex, with a weak median depression; posterior margin convex, with a median notch. *Mesonotum*: Narrower than pronotum; with a few small hairs on margin; sides rounded; posterior margin almost straight. *Metanotum*: Subequal to pronotum; pilosity as in mesonotum; sides rounded; posterior margin weakly convex. *Legs*: Thin, fairly long and hairy; hind-femur not reaching tip of abdomen; apical tibial spur formula 2:2:2. *Tarsi* 4-jointed.

Abdomen: Oblong, hairy, each tergite with a few minute hairs; 3 or 4 posterior tergites with long hairs; sternites more hairy than tergites. *Cerci* short, 2-jointed. *Styli* absent.

Table 30. Body measurements (in mm) of soldiers of *Bulbitermes lakshmani* Roonwal & Maiti

No.	Body-parts	Specimens from Java (3-soldiers)	Roonwal and Maiti, 1966
I. General			
1.	Total body-length	3.30—3.80	3.5 —3.7
II. Head			
2.	Length of head with rostrum	1.40—1.48	1.45—1.52
3.	Length of head without rostrum	0.90—1.00	0.96—1.00
4.	Length of rostrum	0.50—0.55	0.48—0.55
5.	Maximum width of head	0.75—0.83	0.80—0.86
6.	Minimum width of head	0.50—0.55	0.55—0.60
7.	Maximum height of head	0.50—0.60	0.55—0.60
III. Thorax			
8.	Length of pronotum	0.18—0.23	0.15—0.20
9.	Maximum width of pronotum	0.45—0.48	0.44—0.48
10.	Length of hind tibia	0.90	0.98—1.10

(c) Geographical distribution :

Peutjang Island near westerntip of Java, Carita (present record), Indonesia.

23. *Bulbitermes neopusillus* Snyder & Emerson
(Fig. 33, Table 31)

1914. *Eutermes (Eutermes) pusillus* N. Holmgren, Zoolog. Jahrbucher. Abt. f. Syst; 36 Bd., 2/3 Heft., p. 256—257.
1949. *Eutermes neopusillus* T.E. Snyder & A.E. Emerson in Snyder, 1949, Smiths. misc. Coll., Washington, 112:309.

(a) Material :

One vial with one soldier and one worker from Carita (West Java), Coll. Takuya Abe, 25—10—1982 and 16—11—1982.

(b) Description :

SOLDIER : (Fig. 33, Table 31)

General : Head-capsule orange coloured, nasus reddish brown, antennae and pronotum reddish brown; abdominal tergites brown with dark brown tinge; legs light brown. Total bodylength (with rostrum) ca. 3.5—3.8 mm.

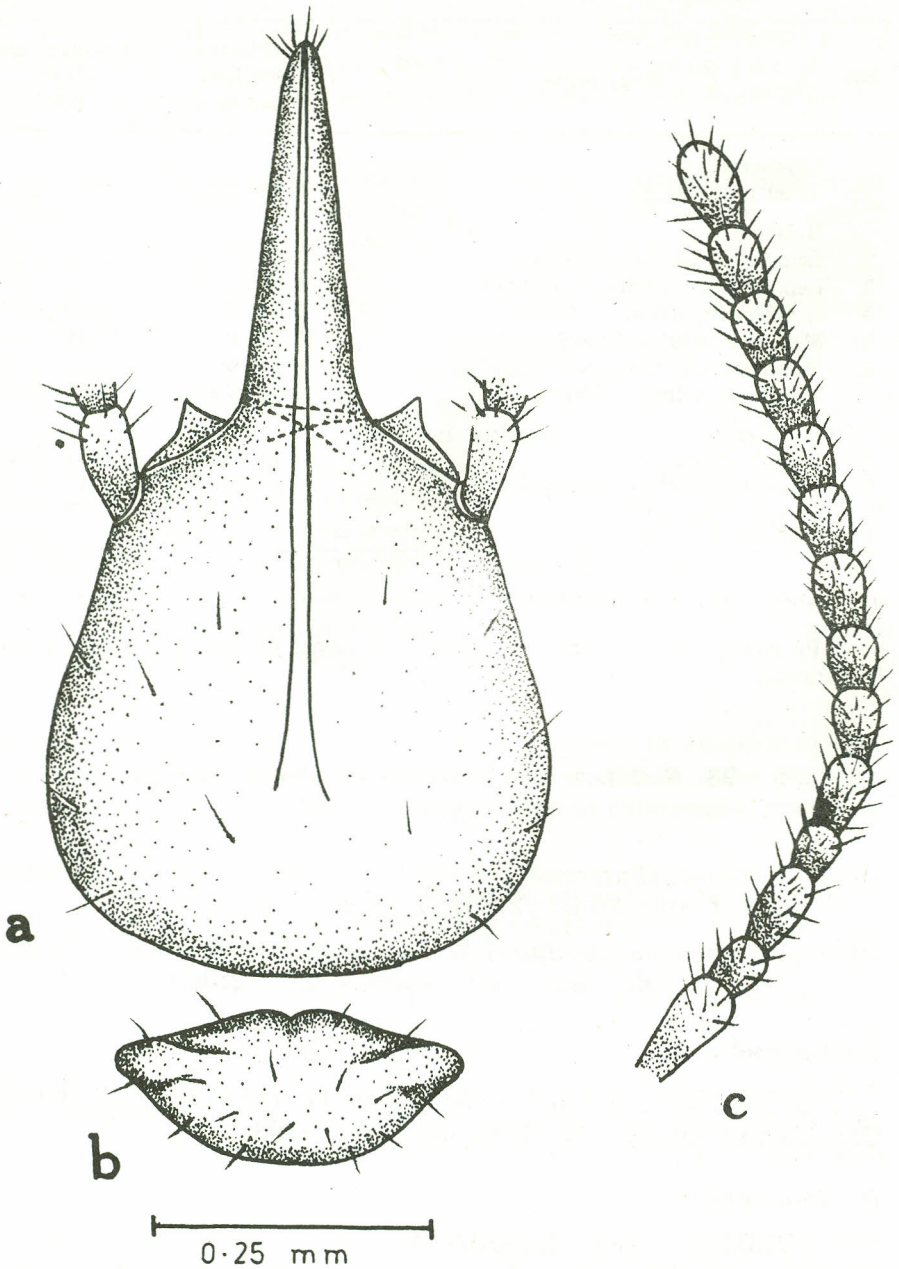


Fig. 33. *Bulbitermes neopusillus* Snyder and Emerson, Soldier caste (a) Head, dorsal view (b) Pronotum, dorsal view (c) Right antenna.

Head : Head-capsule without rostrum, almost pear-shaped, with a weak constriction behind base of antennae, longer than broad (head-length without rostrum 0.95; maximum head-width 0.78 mm); broadest posteriorly; posterior margin broadly rounded. **Rostrum:** long, cylindrical; length more than the half the length of the head-capsule without rostrum; with slight hump present; with a few bristles at the anterior tip. **Antennae:** with 13 segments, the third one and a half times as long as the second; 2 smallest, 4 subequal to 3. **Labrum:** Small, broader than long; anterior margin a little depressed. **Mandibles:** with moderately long apical processes. **Postmentum:** Broader than long, broadest in the middle; anterior margin substraight, posterior margins concave.

Thorax: Pronotum: Saddle shaped; width more than double the length (maximum length 0.18, maximum width 0.48 mm); anterior margin with a weak median notch; posterior margin convex. **Legs:** Femora, tibiae and tarsi moderately slender; femora with numerous short hairs; tibiae more densely pilose. Apical tibial spur formula 2:2:2.

Abdomen: All terga except the last 3 or 4 devoid of long hairs; sternites with numerous long hairs. Cerci short, 2 segmented, hairy; styli absent.

Table 31. Body measurements (in mm) of *Bulbitermes neopusillus* Snyder & Emerson.

No.	Body-parts	Specimen from Carita (West Java)	Holmg. 1914
	I. General		
1.	Total body-length	3.15	2.60—3.36
	II. Head		
2.	Length of head with rostrum	1.45	1.34—1.45
3.	Length of head without rostrum	0.95	0.85—0.95
4.	Length of rostrum	0.53	—
5.	Maximum width of head	0.78	0.71—0.81
6.	Height of head	0.50	—
	III. Thorax		
7.	Length of pronotum	0.18	0.21
8.	Maximum width of pronotum	0.48	0.43—0.46

(c) Geographical distribution :

Java; Buitenzorg, Tjiogrek, In morschem Holg. Carita, West Java (Present record).

GENUS (12) *Lacessititermes* Holmgren24. *Lacessititermes atrior* (Holmgren)

(Fig. 34; Table 32)

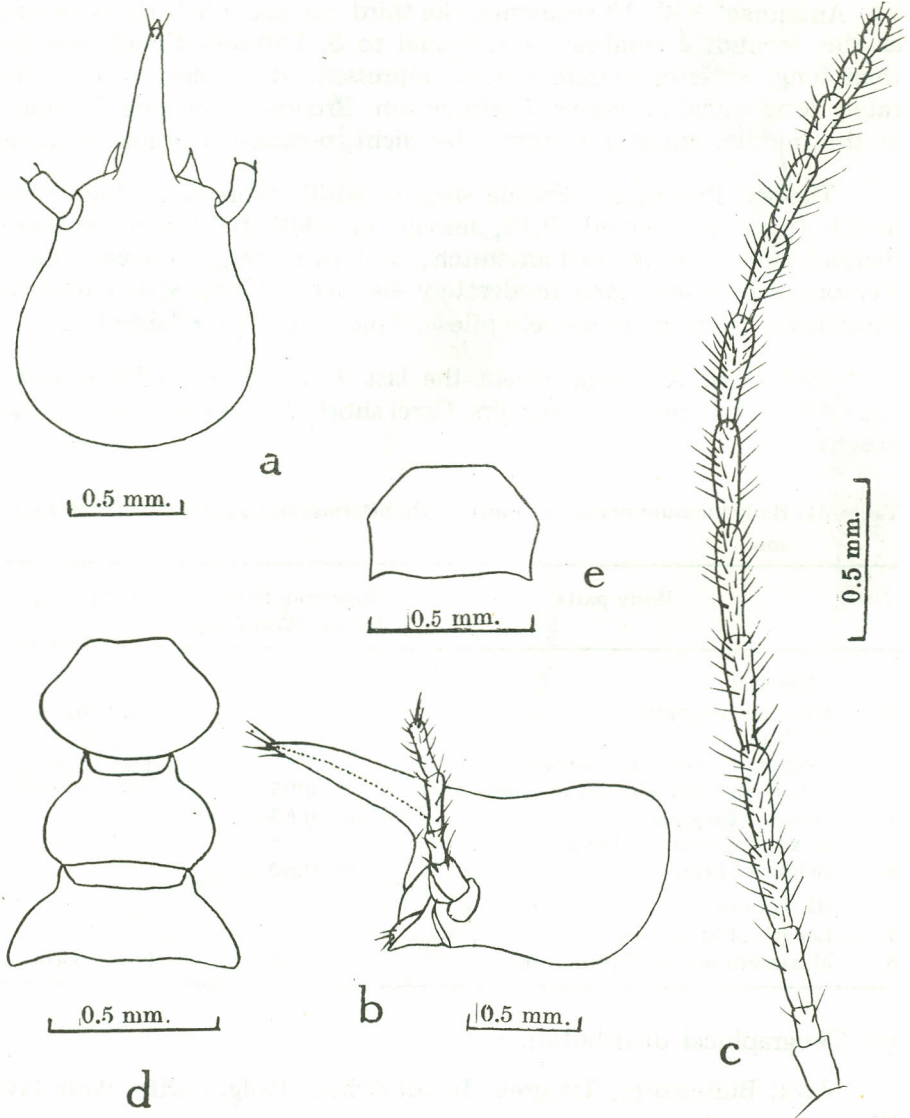


Fig. 34. *Lacessititermes atrior* (Holmgren), Soldier caste. (a) Head, dorsal view (b) Head, side view (c) Left antenna (d) Thorax (Pronotum, Mesonotum and Metanotum), dorsal view (e) Postmentum, in situ.

1912. *Eutermes (Lacessititermes) atrior* N. Holmgren, K.Sv. Vet. Akad. Handl., Stockholm, 48(4) : 65. Nomen Nudum. Borneo, Bukit Timah. Java.
1913. *Eutermes (Lacessititermes) atrior* N. Holmgren, K.Sv. Vet. Akad. Handl., Stockholm, 50(2) : 204 (Gives full description of the species).
1949. *Lacessititermes atrior*: T.E. Snyder, Smiths. misc. Coll. Washington, 112 : 315.

(a) Material :

One vial with 5 soldiers and workers from Carita (west Java), Coll. Takuya Abe, 25.10.1982. *Ex.* Arboreal nest.

(b) Description :

SOLDIER : (Fig. 34; Table 32)

General : Head-capsule including rostrum deep chocolate brown, with reddish tinge; rostrum tip reddish brown, antennae, thorax, abdominal tergites, coxae, femora dark smoky brown, antennae more darker, but slightly paler than head-capsule; tibial, tarsi and sternites paler than remaining parts of body. Head-capsule, thorax and abdominal tergites, except the hind terga, which have a row of long hairs on the hind margin, without hairs. Total body-length ca. 4.25–4.60 mm.

Head : Head-capsule pear shaped, with a marked constriction behind the antennae; longer than broad (length without rostrum 1.15–1.20; width of head 1.00–1.05 mm); widest posteriorly; in profile dorsal margin concave; posterior margin rounded, *Rostrum*: Conical gradually tapering apically; tip with a tuft of hairs; with a distinct basal hump; length a little more than head-length without rostrum (Rostrum-head index 0.52–0.57). *Fontanelle*: Fontanelle tube visible, not clearly visible in the rostrum; fontanelle gland prominent. *Eyes* and *Ocelli*: Absent. *Antennae*: with 14-segments; segment 1 thickest and darkest; segment 2 cylindrical, segment 3 onward elongated; segment 3 almost twice as long as 2; nearly as long as or only very slightly shorter than 4; 5–8 progressively increasing length; or onward progressively decreasing in length; last ovate and narrower than penultimate. *Clypeus*: Anteclypeus a thin, narrow, whitish hyaline strip along the anterior margin of postclypeus. Postclypeus sub-rectangular; brownish and transversely smaller; separated from the body by an indistinct groove. *Labrum*: Dome shaped, broader than long; lateral sides weakly convex; anterior margin broadly rounded. *Mandibles*: Vestigial; each with a spine like lateral process at about the middle of the mandibles; inner margin roundish. *Postmentum*: Sub-hexagonal shaped; slightly broader than long; broadest near the middle in the basal half; anterior margin sub-straight; posterior margin concave.

Thorax: Pronotum: Saddle shaped; much narrower than head; anterior margin convex, without any median depression in the middle; sides sharply converging posteriorly; posterior margin weakly convex. **Metanotum:** As broad as or slightly broader than pronotum; posterior margin weakly convex. **Legs:** Long, slender; hind femur almost as long as the abdomen; apical tibial spurs 2:2:2. **Tarsi** 4-segmented.

Abdomen: Oblong; all terga except the last 2—3 segments devoid of long hairs; sternites with many long hairs. **Cerci** short, 2 jointed, ca. 0.10—0.13 mm long. **Styli** absent.

Table 32. Body-measurements (in mm) and indices of 4 soldiers of *Lacessititermes atrior* (Holmgren)

No.	Body-parts	Range	Mean
I. General			
1.	Total body-length ca.	4.25—4.60	4.40
II. Head			
2.	Head-length with rostrum	1.75—1.88	1.83
3.	Head-length without rostrum	1.15—1.20	1.18
4.	Length of nasus	0.60—0.78	0.64
5.	Maximum width of head	1.00—1.05	1.03
6.	Posterior bulge of head	0.45—0.65	0.54
7.	Height of head	0.70—0.83	0.78
8.	Head-index I	0.86—0.88	0.87
9.	Head bulge index	0.39—0.62	0.49
10.	Min. (median) length of postmentum		
	Max. width of postmentum		
III. Thorax			
13.	Length of pronotum	0.30—0.38	0.34
14.	Maximum width of pronotum	0.55—0.65	0.61
15.	Pronotum index		
16.	Length of abdomen	1.90—2.05	1.98
17.	Length of tibia	1.90—2.60	2.16

(c) Geographical distribution :

INDONESIA : Kalimantan (Borneo) Bukit Timah. Java: Carita (present record). Malacca.

(d) Remarks

Lacessititermes atrior (Holmgren) belongs to a group of *Lacessititermes* where only last 3-segmented abdominal terga with a row of long hairs on the margin and where antennae, coxae and femora (brown black) are darker. In this respect the specimens from Carita (West Java) match very well with the description.

GENUS (13) *Hospitalitermes* Holmgren

25. *Hospitalitermes luzonensis* (Oshima)

(Figs. 35; Table 33)

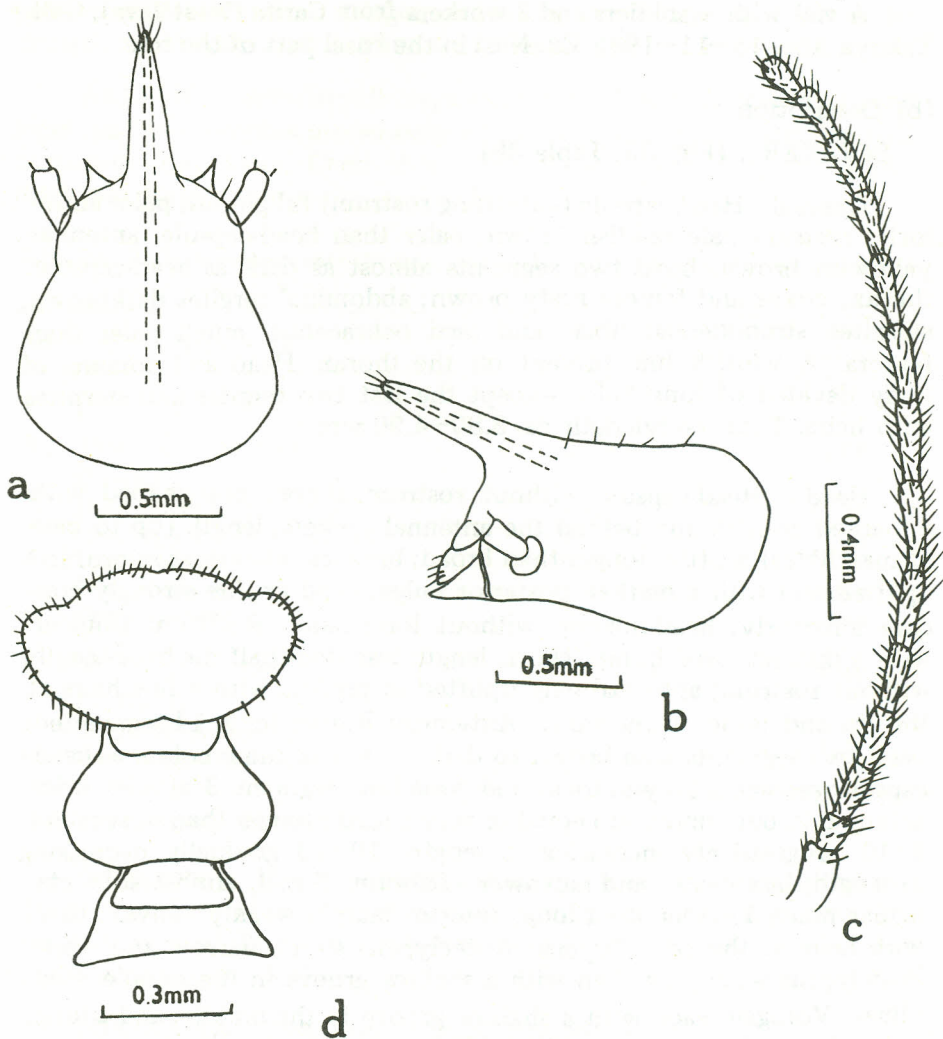


Fig. 85. *Hospitalitermes luzonensis* (Oshima), Soldier caste (a) Head, dorsal view (b) Head, side view (c) Right antenna (d) Thorax (Pronotum, Mesonotum and Metanotum), dorsal view.

1916. *Eutermes (Hospitalitermes) hospitalis* M. Oshima, Philipp. J. Sci. Manila, (D) 11(6) : 360. Soldiers and Workers. Type-locality: Philippines: Laguna, Sarai near Paeta.
1949. *Hospitalitermes luzonensis* : T.E. Snyder, Smiths. misc. Coll: Washington, 112:320—321 (Synonymies and distribution).

(a) Material :

A vial with 4 soldiers and 2 workers from Carita (West Java), Coll. Takuya Abe, 16—11—1982 Ex. Nest in the basal part of the tree.

(b) Description :

SOLDIER : (Fig. 35; Table 38)

General : Head-capsule (excluding rostrum) fuliginous; paler anteriorly; rostrum pale reddish brown, paler than head-capsule; antennae yellowish brown, basal two segments almost as dark as head-capsule; thorax, coxae and femora rusty brown; abdominal tergites dark brown; sternites stremineous; tibiae and tarsi ochraceous, much paler than femora. A whitish line present on the thorax. Head and dorsum of body devided of long hairs, except the last two tergites and sternites with hairs. Total bodylength ca. 3.80—4.90 mm.

Head : Head-capsule without rostrum almost pear-shaped with a marked constriction behind the antennal sockets; length (up to base of mandibles) a little longer than broad; broadest at vertex; in profiled uplifted and with a marked posterior bulge; head profile strongly concave anteriorly; head-dorsum without long hairs. **Rostrum**: Conical with a distinct basal hump, short, length less than half the head-length without rostrum; apex strongly uplifted in profile; with a few hairs at the tip and none on the body. **Antennae**: Rather long; 14-segmented; basal two segments aple brown to dark brown, or same colour as head-capsule; segments 1 cylindrical and broadest; segment 3 almost twice as long as 2, but almost sub-equal or very slightly longer than 4; segment 5—10 progressively increasing in length; 10—13 gradually decreasing in length; last ovate, and narrower. **Labrum**: Small, almost subrectangular much broader than long; anterior margin weakly convex, beset with hairs at the tip. **Clypeus**: Anteclypeus short, narrow and white. Postclypeus weakly swollen with a shallow groove in the middle. **Mandibles**: Vestigial; each with a shallow groove in the middle, and a long, pointed, non-dentate, spine like lateral process; molar plate semicircular; **Postmentum**: Rather small; broader than long, broadest posteriorly; anterior margin substraight; posteriorly weakly convex.

Thorax: Marked with a fine median, longitudinal, whitish line. **Pronotum:** Saddle shaped; length almost half its width; anterior margin only slightly convex; without any median notch; posterior margin strongly convex and without median invagination. **Mesonotum:** Narrower than pronotum; posterior margin substraight. **Metanotum:** Slightly narrower than pronotum but distinctly broader than pronotum; posterior margin substraight. **Legs:** Long, slender and hairy, hairs becoming denser and longer distally; femora smoky brown; tibiae much paler than femora; hind femora as long as or slightly shorter than abdomen, tibial spurs 2:2:2. Tarsi 4-segmented.

Abdomen: Globular; all terga except the last two devoid of long hairs; last two tergites moderately hairy with long hairs; sternites with numerous long hairs, Cerci short, 2-segmented and hairy; *ca.* 0.08–0.10 mm long.

Table 33. Body measurements (in mm) and indices of 3 soldiers of *Hospitalitermes luzonensis* (Oshima)

No.	Body-parts	Range	Mean
I. General			
1.	Total body-length <i>ca.</i>	3.80–4.90	4.50
II. Head			
2.	Head-length with rostrum	1.55–1.70	1.63
3.	Head-length without rostrum	1.13–1.20	1.15
4.	Length of rostrum	0.42–0.50	0.47
5.	Max. width of head	0.95–1.05	1.00
6.	Height of head	0.68–0.75	0.70
7.	Head-index — I.	0.84–0.88	0.87
8.	Head-rostrum index	0.42–0.49	0.46
III. Thorax			
9.	Length of pronotum	0.30–0.33	0.32
10.	Max. width of pronotum	0.60–0.65	0.63

(c) Geographical distribution

Philippines : This species has been reported as very widely distributed in the whole of Philippine Archipelago, ranging from the northern end of Luzon to Palawan and Southern and of Mindanao (Light and Wilson, 1936).

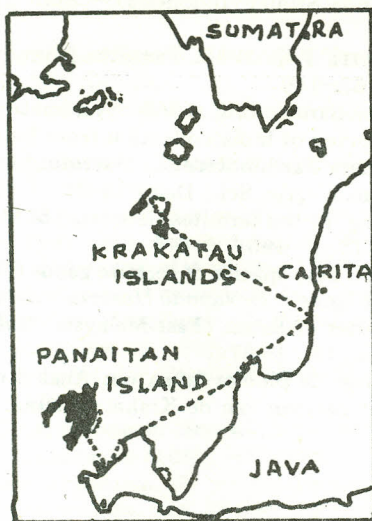
INDONESIA: West Java: Carita (Present record)

(d) **REMARKS:** This species displays a great deal of variation both in morphological and biometric characters. Wilson and Light (1936) have given a wide variation in the shape of head-capsule. It has been recorded for the first time from any locality outside the Philippine Archipelago.

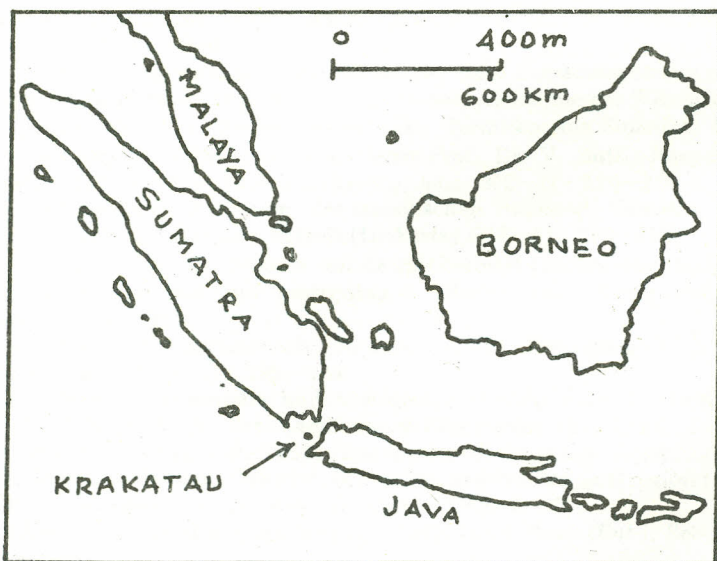
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a



b

Plate 1. Map of Sunda Straits (between Java and Sumatra) Indonesia, showing, the Krakatau group of Islands (a) Route followed by Prof. Takuya Abe for termite collection. (b) Showing location of the area (arrow-marked) covered under the present study.

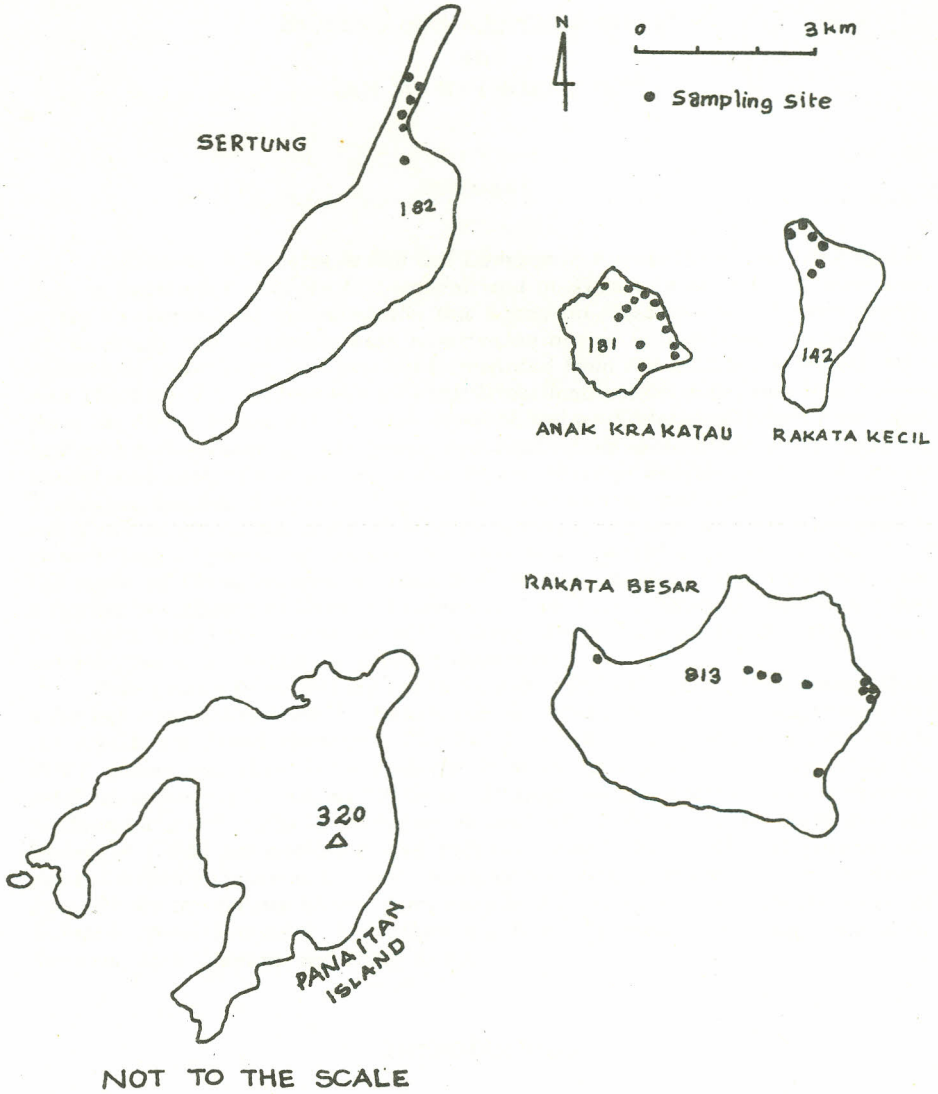


Plate 2. Map of Krakatau and associated Islands, showing the collection sites, where termite collection were made by Prof. Takuya Abe, Department of Zoology, Faculty of Science, Kyoto University, Kyoto 606, Japan (Closed circle indicate the sampling sites).