







# TERMITES (ISOPTERA) OF THAILAND

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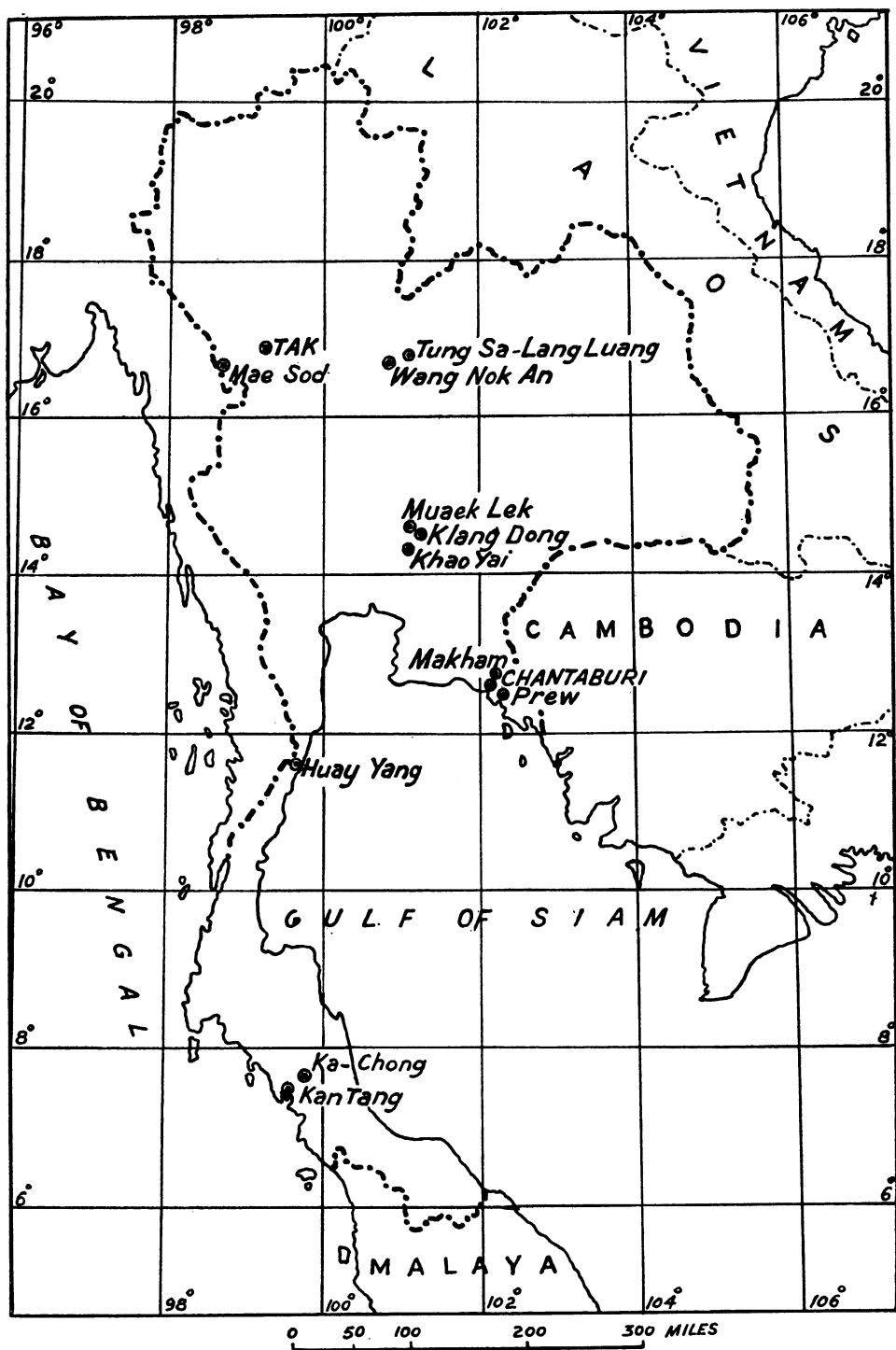


FIG. 1. Map of Thailand, showing the localities surveyed.



## INTRODUCTION

THE PRESENT MONOGRAPH deals with the termite fauna of Thailand, the survey of which was carried out by the author during March and April, 1962, under the sponsorship of the South-East Asia Treaty Organization, Bangkok. A small collection made by Mr. Domrung Chaiglom of the Royal Forest Department, Bangkok, has also been incorporated in the present study. Altogether, 74 species representing 29 genera are described here. Of these, 32 species are new to science.

The termite fauna of Thailand has hitherto been very poorly investigated. Snyder (1949), in his catalogue of the termites of the world, listed only six species from Thailand. These are: *Bifiditermes indicus* (Holmgren), *Cryptotermes domesticus* (Haviland), *Coptotermes havilandi* Holmgren, *Macrotermes annandalei* (Silvestri), *Macrotermes carbonarius* (Hagen), and *Odontotermes formosanus* (Shiraki). All these species, except *Macrotermes annandalei*, were recorded by Holmgren (1913b) in his monograph on the systematics of the termites of the Oriental Region.

For the facilities and assistance extended to me during my stay in Thailand, I wish to express my deep gratitude to Mr. Chakratong Tongyai, Under-Secretary of State, Ministry of Agriculture, Bangkok, and to the following officers of the Royal Forest Department, Bangkok: Mr. Vichien Kunjara Na Ayudhaya, Director-General; Mr. Dusit Phani-chapatna, Deputy Director-General; Dr. Thanom Premrasmi, Chief, Forest Products Research Division, and Mr. Tim Simitanand, Forest Botanist. To Mr. Dhanee Phanichapol and Mr. Wichitra Krisnabamrung, both of the Royal Forest Department, Bangkok, I owe a particular debt for their untiring efforts in the field. Dr. Kumar Krishna of the American Museum of Natural History has been very kind in sending me specimens of termites from his collection from Burma, which I needed in connection with my present study. My thanks are also extended to the South-East Asia Treaty Organization for a generous financial grant, without which this work would not have been possible.

Holotype specimens are in the author's collection lodged in the Department of Zoology,

TABLE 1  
ANALYSIS OF THE TERMITE COLLECTION  
FROM THAILAND

Family and Subfamily	Number of Genera	Number of Species	Number of New Species
Kalotermitidae	4	7	3
Rhinotermitidae			
Coptotermitinae	1	5	1
Rhinotermitinae	2	4	2
Termitidae			
Macrotermatinae	4	19	7
Amitermitinae	6	10	4
Nasutitermitinae	5	14	7
Termitinae	7	15	8
Total	29	74	32

University of the Panjab, Lahore, Pakistan. Paratypes (except those of *Glyptotermes ka-chongensis* and *Mirocapritermes latignathus*) are deposited in the American Museum of Natural History.

All the text figures, except the map, were drawn by the author with the aid of a camera lucida.

### ANALYSIS OF THE TERMITE COLLECTION FROM THAILAND

In the 40 days of field work, nearly 400 colonies representing 74 species were collected. An analysis of the collection is given in table 1.

### LOCALITIES SURVEYED

Termites were collected from the following 13 localities in the southern, eastern, central, and northwestern parts of Thailand (fig. 1): Ka-Chong, Kan Tang, Huay Yang, Muaek Lek, Klang Dong, Khao Yai, Chantaburi, Makham, Prew, Tung Sa-Lang Luang National Park, Wang Nok An, Tak, and Kilometer 20 east of Mae Sod on the Tak Road.

Ka-Chong and Kan Tang are in the thick evergreen forest belt. There are numerous rubber plantations in the area. During my stay of 13 days in the southern province of Trang, I collected chiefly in the evergreen forests and rubber plantations in the vicinity

TABLE 2

LIST OF TERMITE COLLECTING LOCALITIES, WITH THE ALTITUDE, LATITUDE, AND LONGITUDE

Name of locality	Name of Province	Altitude (Meters)	Latitude	Longitude
Ka-Chong	Trang	100	7°33' N.	99°47' E.
Kan Tang	Trang	100	7°23' N.	99°30' E.
Huay Yang	Prachuab	50	11°35' N.	99°38' E.
Muaek Lek	Saraburi	220	14°39' N.	101°12' E.
Klang Dong	Nakhon Rachasima	360	14°38' N.	101°16' E.
Khao Yai	Nakhon Rachasima	767	14°26' N.	101° 2' E.
Chantaburi	Chantaburi	10	12°36' N.	102°07' E.
Makham	Chantaburi	10	12°40' N.	102°12' E.
Prew	Chantaburi	100	12°31' N.	102°11' E.
Tung Sa-Lang Luang National Park	Pitsanulok	563	16°50' N.	100°54' E.
Wang Nok An	Pitsanulok	80	16°51' N.	100°31' E.
Tak	Tak	110	16°47' N.	99° 9' E.
20 kilometers east of Mae Sod on Tak Road	Tak	600	—	—

of the Ka-Chong Forest Experiment Station. Huay Yang Forest Experiment Station is on the seacoast. The climate here is dry, and the forest is of scrub type. Muaek Lek and Klang Dong are situated in an area where much of the forest has been cleared for cultivation. Khao Yai is at an altitude of 767 meters and is surrounded by thick evergreen forests. It is a very good locality for termite collecting. Around Chantaburi there are only rubber plantations; forests are near Makham, 16 kilometers north of Chantaburi. Prew Agricultural Experiment Station is situated at the foot of low hills which are covered with thick evergreen forests. At the foot of the hills there are rubber plantations. Tung Sa-Lang Luang National Park extends over a vast area, most of which is under thick rain forest. At higher altitudes in the Park there are also pine forests. Collecting was done mostly in the vicinity of the Forest Rest House. The forests around Wang Nok An are of mixed deciduous type, which is also found near Tak. In Mae Sod District, the collecting site was selected at 20 kilometers east of Mae Sod town on the road to Tak. The forests here are of thick evergreen type, and the altitude is 600 meters.

A list of the localities, with the altitude, latitude, and longitude, is given in table 2.

#### TERMINOLOGY

The first tooth of the imago-worker mandible is designated as the apical tooth, and the rest are termed the marginal teeth which, in mandibles like those of *Coptotermes*, are further designated as the first, second, and third marginal teeth (Emerson, 1933; Ahmad, 1950). The two sides of a marginal tooth are referred to as anterior and posterior cutting edges. The small tooth at the base of the anterior cutting edge of the first marginal tooth of the right mandible as seen in the rhinotermitids is called the subsidiary tooth.

The width of the head of the imago includes the eyes.

The diameter of the eye includes the ocular sclerite.

The length of the mandible of the soldier is measured from the condyle to the tip.

The length of the postmentum is the median length of the sclerotized portion.

The length of the pronotum is the distance between the anterior and posterior emarginations measured along the median line.



# SYSTEMATIC ACCOUNT

## KEY TO THE GENERA

### IMAGOS

1. Fontanelle absent; pronotum flatly arched. 2  
Fontanelle present; pronotum not flatly  
arched . . . . . 5
2. Forewing with media and cubitus arising from  
a common stem outside wing scale . . . . .  
. . . . . *Bifiditermes*  
Forewing with media and cubitus arising from  
inside wing scale. . . . . 3
3. Left imago-nymph mandible with posterior  
cutting edge of first marginal tooth almost  
as long as anterior cutting edge of second  
marginal tooth. . . . . 4  
Left imago-nymph mandible with posterior  
cutting edge of first marginal tooth distinctly  
shorter than anterior cutting edge of  
second marginal tooth . . . . *Cryptitermes*
4. Middle tibia with three apical spurs and an  
additional spine; media of forewing not so  
strongly sclerotized as radial sector . . . . .  
. . . . . *Postelectrotermes*  
Middle tibia with three apical spurs and with-  
out additional spine; media of forewing as  
strongly sclerotized as radial sector . . . . .  
. . . . . *Glyptitermes*
5. Fontanelle without plate; left imago-worker  
mandible with three marginal teeth; right  
mandible with distinct subsidiary tooth at  
base of anterior cutting edge of first marginal  
tooth . . . . . 6  
Fontanelle with plate; left imago-worker  
mandible with two marginal teeth; right  
mandible without or with weakly developed  
subsidiary tooth. . . . . 7
6. Left imago-worker mandible with second marginal  
tooth shorter than first marginal  
tooth; clypeus anteriorly produced and  
with median groove . . *Schedorhinitermes*  
Left imago-worker mandible with second  
marginal tooth longer than first marginal  
tooth; postclypeus not produced anteriorly  
and without median groove . *Coptitermes*
7. Right imago-worker mandible with posterior  
cutting edge of second marginal tooth  
straight. . . . . 8  
Right imago-worker mandible with posterior  
cutting edge of second marginal tooth concave  
. . . . . 15
8. Left imago-worker mandible with deep cut in  
front of second marginal tooth; labrum  
longer than wide and with sclerotized transverse  
band in middle. . . . . 9  
Left imago-worker mandible without deep  
cut in front of second marginal tooth; labrum  
as long as or shorter than wide and  
without sclerotized transverse band in  
middle . . . . . 11
9. Wings unusually long; postclypeus much  
lighter than rest of head capsule; antennae  
with 15-18 articles. . . . . *Microtermes*  
Wings not unusually long; postclypeus not  
much lighter than rest of head capsule; antennae  
with 19-20 articles. . . . . 10
10. Fontanelle raised, closed; left imago-worker  
mandible with deep cut between last marginal  
tooth and molar plate. . *Odontitermes*  
Fontanelle not raised, open; left imago-  
worker mandible with shallow cut between  
last marginal tooth and molar plate . . . .  
. . . . . *Hypotermes*
11. Tibial spur arrangement 3:2:2. . . . . 12  
Tibial spur arrangement 2:2:2. . . . . 13
12. Head parallel sided in front of eyes; cutting  
edge between two marginal teeth of left  
imago-worker mandible concave; antennae  
with 13-14 articles (usually with 14  
articles). . . . . *Microcerotermes*  
Head not parallel sided beyond eyes; cutting  
edge between two marginal teeth of left  
imago-worker mandible nearly straight; antennae  
with 15 articles; wings hairy and  
dark . . . . . *Globitermes*
13. Fontanelle plate wide. . . . . 14  
Fontanelle plate narrow; postclypeus much  
lighter than frons . . . . . *Nasutitermes*
14. Larger species; width of head, 1.61-1.69 mm.;  
width of pronotum, 1.43-1.53 mm.; head  
covered with dense coat of short hairs and  
scattered long bristles; fontanelle almost as  
long as ocellus, forked anteriorly . . . . .  
. . . . . *Havilanditermes*  
Smaller species; width of head not exceeding  
1.40 mm.; width of pronotum up to 1.14  
mm. . . . . *Bulbitermes*
15. Apical tooth of imago-worker mandible ap-  
preciably longer than first marginal tooth. 16  
Apical tooth of imago-worker mandibles as  
long as or slightly shorter or slightly longer  
than first marginal tooth . . . . . 18
16. Posterior cutting edge of first marginal tooth  
of left imago-worker mandible almost  
straight; second marginal tooth of same  
mandible small and round . . . . .  
. . . . . *Pseudocapritermes*  
Posterior cutting edge of first marginal tooth  
of left imago-worker mandible sinuate; sec-

- ond marginal tooth of same mandible distinct and somewhat pointed. . . . . 17
17. Right mandible with second marginal tooth considerably reduced; angle between apical tooth and first marginal tooth in both mandibles comparatively broad. . . . . *Termes*  
Right mandible with second marginal tooth distinct; angle between apical tooth and first marginal tooth in both mandibles comparatively narrow; head covered with bristles and a mat of short hairs . . . . .  
. . . . . *Dicuspiditermes*
18. Apical tooth of imago-worker mandible slightly longer than first marginal tooth; posterior cutting edge of first marginal tooth of right imago-worker mandible as long as or slightly longer than anterior cutting edge of second marginal tooth . . . . .  
. . . . . *Pericapritermes*  
Apical tooth of imago-worker mandible as long as or slightly shorter than first marginal tooth; posterior cutting edge of first marginal tooth of right imago-worker mandible appreciably longer than anterior cutting edge of second marginal tooth. . 19
19. Head with large, ocellus-like, median spot . . . . . *Speculitermes*  
Head without median spot . . . *Euhamitermes*
- SOLDIERS
1. Mandibles well developed, functional; head not produced into a nasus. . . . . 2  
Mandibles degenerate, non-functional; head produced into a nasus (nasutiforms) . . 22
2. Head without fontanelle; eyes as large as base of antenna; pronotum flatly arched, usually as wide as head . . . . . 3  
Head with fontanelle; eyes, if present, smaller than base of antenna; pronotum not arched, flat, or shaddle-shaped . . . . . 4
3. Head long or weakly phragmotic . . . . .  
. . . . . *Glyptotermes*  
Head short and strongly phragmotic . . . . .  
. . . . . *Cryptotermes*
4. Pronotum flat. . . . . 5  
Pronotum saddle shaped . . . . . 7
5. Fontanelle very wide and close to clypeus . . . . .  
. . . . . *Coptotermes*  
Fontanelle small, circular, placed much behind clypeus. . . . . 6
6. Soldiers dimorphic; mandibles with large marginal teeth. . . . . *Schedorhinotermes*  
Soldiers monomorphic; mandibles without marginal teeth. . . . . *Prorhinotermes*
7. Mandibles symmetrical, curved at tips, used for biting . . . . . 8  
Mandibles slightly to strongly asymmetrical, used for snapping or for both snapping and biting . . . . . 17
8. Labrum with hyaline tip; mesonotum and metanotum greatly expanded laterally; soldiers dimorphic . . . . . *Macrotermes*  
Labrum without hyaline tip; mesonotum and metanotum not greatly expanded laterally; soldiers monomorphic. . . . . 9
9. Postmentum broad and arched in middle; mandibles saber shaped; left mandible with or without a tooth or with crenulations at base . . . . . 10  
Postmentum narrow, not arched in middle, flat. . . . . 12
10. Left mandible with crenulations at base, without marginal tooth. . . . . *Hypotermes*  
Left mandible without crenulations, with marginal tooth or denticle. . . . . 11
11. Mandibles with outer margin strongly concave at base; with or without denticle; antennae with 12-15 articles; soldiers much smaller than workers. . . . . *Microtermes*  
Mandibles with outer margin not particularly concave at base, with a tooth in variable positions; antennae with 15-19 articles . . . . .  
. . . . . *Odontotermes*
12. Mandibles serrated; head long, parallel sided; antennae usually with 13 articles . . . . .  
. . . . . *Microcerotermes*  
Mandibles not serrated; with a tooth. . . 13
13. Clypeus bilobed; head narrowed anteriorly, longer than wide; mandible with pointed, laterally or posteriorly directed tooth . . . . .  
. . . . . *Amitermes*  
Clypeus not bilobed . . . . . 14
14. Head as broad as long or slightly broader; mandibles long, slender, very strongly curved apically . . . . . *Globitermes*  
Head rectangular; mandibles stoutly built, not very strongly curved apically . . . . . 15
15. Pronotum very strongly saddle shaped, anterior lobe longer than posterior lobe; head hypognathous, covered with dense coat of thin short hairs; tarsi three-segmented . . . . .  
. . . . . *Indotermes*  
Pronotum not very strongly saddle shaped; anterior lobe not longer than posterior lobe . . . . . 16
16. Mandibles with large broad tooth . . . . .  
. . . . . *Speculitermes*  
Mandibles with small, pointed tooth . . . . .  
. . . . . *Euhamitermes*
17. Head with frontal projection . . . . . 18  
Head without frontal projection . . . . . 19
18. Mandibles slightly asymmetrical, long and slender, rodlike, bent downward. . . *Termes*  
Mandibles strongly asymmetrical, right mandible twisted . . . . . *Mirocapritermes*
19. Mandibles slightly asymmetrical, long and



- slender, tips incurved. . . . . *Procapritermes*  
 Mandibles strongly asymmetrical, left mandible twisted . . . . . 20
20. Anterior margin of labrum deeply concave, with its lateral corners produced into long, needle-like projections; anterolateral corners of head with pointed projections below antennal sockets. . . . . *Dicuspitermes*  
 Anterior margin of labrum straight; anterolateral corners of head without projections . . . . . 21
21. Tip of left mandible narrow, bent in form of hook . . . . . *Pseudocapritermes*  
 Tip of left mandible broad, not strongly bent . . . . . *Pericapritermes*, *Capritermes*
22. Head constricted behind antennae . . . . . 23  
 Head not constricted behind antennae . . . . . 24
23. Head greatly produced behind, strongly depressed at base of nasus; antennae and legs unusually long. . . . . *Hospitalitermes*  
 Head not produced behind, not depressed at base of nasus; antennae and legs not unusually long. . . . . *Bulbitermes*
24. Nasus with minute projection at base on each side; head covered with minute hairs; mandibles without apical projection; posterior cutting edge of second marginal tooth of right mandible of worker concave . . . . . *Aciculitermes*  
 Nasus without projection at base; posterior cutting edge of second marginal tooth of worker mandible straight . . . . . 25
25. Antennal articles long, apical projection of mandible with minute tooth. . . . . *Havilanditermes*  
 Antennal articles short; apical projection of mandible without tooth. . . . . *Nasutitermes*

### FAMILY KALOTERMITIDAE

#### GENUS POSTELECTROTREMES KRISHNA

The genus *Postelectrotermes* has hitherto been represented in the Indo-Malayan Region by only two species: *Postelectrotermes militaris* (Desneux) and *P. pishinensis* (Ahmad). The other species of the genus are recorded from the Malagasy, Ethiopian, and Palearctic regions (Krishna, 1961). *Postelectrotermes militaris* is known from Ceylon; *P. pishinensis*, from the southwestern part of West Pakistan bordering Afghanistan. With the discovery of *Postelectrotermes tongyaii*, new species, described below, the range of distribution of *Postelectrotermes* in the Indo-Malayan Region now extends to Thailand in the east.

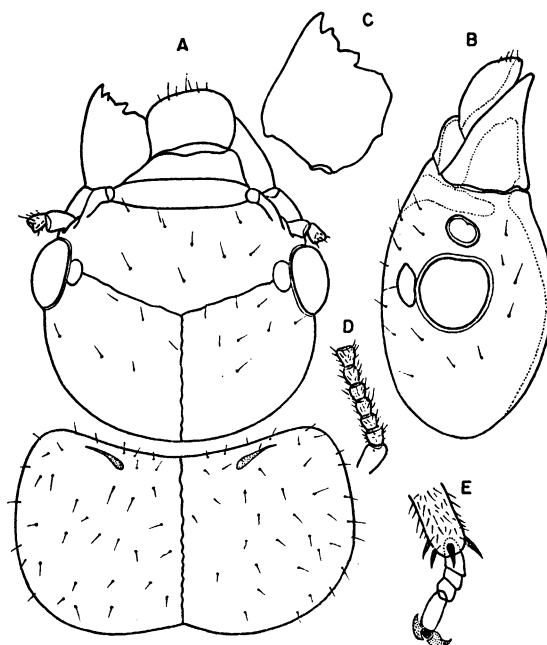


FIG. 2. Imago of *Postelectrotermes tongyaii*, new species. A. Head and pronotum from above. B. Head from side. C. Left mandible. D. Antenna. E. Middle leg.

#### *Postelectrotermes tongyaii*, new species

IMAGO (FIG. 2): Head reddish brown; postclypeus darker than head; anteclypeus pale; labrum light reddish brown; antennae light brown; pronotum of same color as head; legs pale brown; wings hyaline, anterior veins brown, media lighter than radial sector. Head with a few scattered bristles; pronotum with a few short hairs and long bristles; wings with short hairs along costal margins. Head posterior to eyes semicircular; Y suture distinct, lateral arms extending up to ocelli. Eyes not quite circular, anterior margin straight; separated from lower margin of head by slightly more than half of their long diameter. Ocellus prominent, broadly oval, touching eye. Anteclypeus trapezoid. Labrum dome shaped, broader than long; anterior margin nearly straight in middle. Mandibles as shown in figure 2. Antennae with 18 articles, second indistinctly longer than third, fourth and third subequal. Pronotum broader than head, flatly arched; anterior margin shallowly concave; posterior margin slightly depressed in middle; sides weakly convex.

Forewing with media less strongly sclerotized than radial sector, running closer to radial sector than to cubitus. Tibial spur arrangement 3:3:3; middle tibia with distinct spur, close to outer apical spur.

**MEASUREMENTS (IN MM.) OF HOLOTYPE IMAGO:** Length of head to tip of labrum, 1.90; length of head to side base of mandibles, 1.36; width of head, 1.60; long diameter of eye, 0.44; short diameter of eye, 0.39; eye from lower margin of head, 0.25; length of ocellus, 0.18; width of ocellus, 0.14; length of pronotum, 0.90; width of pronotum, 1.87.

**COMPARISON:** *Postelectrotermes tongyaii*, new species, can easily be distinguished from *P. militaris* (Desneux), the only other species of *Postelectrotermes* from the Indo-Malayan Region of which the imago caste is known, by its distinctly smaller size and by the fact that its apical spine on the middle tibia is closer to the outer apical spur.

**TYPE LOCALITY:** Ka-Chong, one imago (holotype), collected by M. Ahmad, March 3, 1962, at light.

The species is named in honor of Mr. Chakratong Tongyai, Under-Secretary of State, Ministry of Agriculture, Bangkok, who in spite of his multifarious administrative duties still maintains his interest in the study of insects.

#### GENUS *GLYPTOTERMES* FROGGATT

##### KEY TO THE SPECIES

###### IMAGOS

- Width of head, 0.97–1.01 mm. . . . .  
 . . . . . *G. brevicaudatus* (Haviland)  
 Width of head, 0.79–0.82 mm. . . . .  
 . . . . . *G. pinangae* (Haviland)

###### SOLDIERS

1. Head short, weakly phragmotic . . . . .  
 . . . . . *G. pinangae* (Haviland)
- Head long, not phragmotic. . . . . 2
2. Anterodorsal prominences on forehead distinct, with a pimple-like tubercle at tip . . . . .  
 . . . . . *G. kachongensis*, new species
- Anterodorsal prominences on forehead indistinct, broadly rounded, without pimple-like tubercles. . . . . *G. brevicaudatus* (Haviland)

##### *Glyptotermes brevicaudatus* (Haviland)

*Calotermes brevicaudatus* HAVILAND, 1898, p. 375 (imago, soldier).

*Calotermes (Glyptotermes) brevicaudatus*: HOLMGREN, 1911a, p. 56, pl. 4, fig. 21 (soldier).

*Calotermes (Glyptotermes) brevicaudatus*: HOLMGREN, 1913b, pp. 52–53 (imago, soldier), text fig. 7a–b (soldier mandibles), pl. 1, figs. 13a (major soldier), 13b (minor soldier).

*Glyptotermes brevicaudatus*: SNYDER, 1949, p. 46 (synonymy).

*Glyptotermes brevicaudatus*: AHMAD, 1958, p. 50 (soldier).

*Glyptotermes brevicaudatus*: KRISHNA, 1961, p. 347 (systematics).

**IMAGO (FIG. 3):** Head reddish brown; anteclypeus pale; labrum and antennae brownish yellow; pronotum light reddish brown, with a faint T-shaped marking; abdominal tergites of same color as pronotum. Head with a few scattered bristles; anteclypeus without hairs; tip of labrum with a few short hairs; pronotum with short hairs and long bristles on margins and a few scattered bristles on disc. Head anterior to eyes nearly parallel sided, posterior to eyes semicircular; Y suture present. Eyes rather large, moderately bulging, separated from lower margin of head by less than their short diameter. Ocellus broadly oval, almost touching eye. Anteclypeus trapezoid. Labrum with anterior margin almost straight; lateral margin slightly convex in middle. Antennae with 13 articles; second one and a half times as long as third and slightly longer than fourth. Pronotum narrower than head; anterior margin very shallowly concave; lateral margins parallel; posterolateral margins convex; posterior margin almost straight, with a faint depression in middle; anterolateral corners broadly rounded.

**SOLDIER (FIG. 4):** Head reddish brown, lighter posteriorly; frons dark reddish brown; labrum and antennae pale brown; pronotum brownish yellow, anterior margin darker; legs and abdominal tergites pale brownish yellow. Head scantily hairy, anterodorsal prominences with a few short hairs; tip of labrum with a few short hairs; pronotum with short hairs along anterior margin and long bristles on lateral margins and on disc. Head rectangular, slightly more than one and a half times as long as broad; Y suture present but not very distinct; anterodorsal prominences weakly developed, broadly rounded; forehead in profile sloping at an angle of approximately 140 degrees. Eyes small, broadly oval. Labrum longer than broad, extending a little beyond middle of mandibles. Mandibles short,

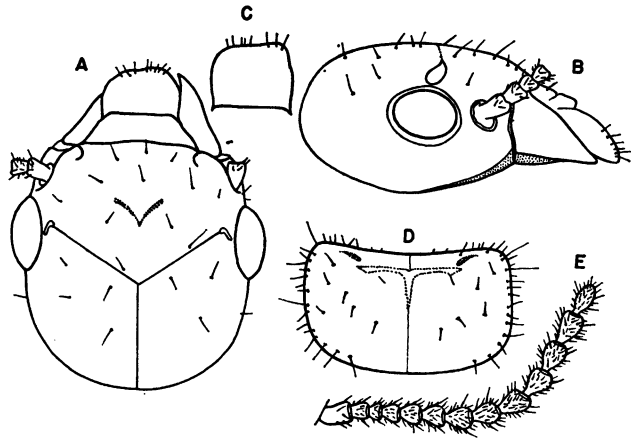


FIG. 3. Imago of *Glyptotermes brevicaudatus* (Haviland). A. Head from above. B. Head from side. C. Labrum from above. D. Pronotum from above. E. Antenna.

with basal humps; left mandible with three marginal teeth, first and second close together, first broad, with both cutting edges convex, second marginal tooth with anterior cutting edge much shorter than its posterior cutting edge; right mandible with two marginal teeth. Postmentum elongate, flat, more than three times as long as its maximum width, twice as wide anteriorly as posteriorly. Antennae with 11–12 articles; in specimens with 12 articles the second one and a half times as long as third and indistinctly longer than fourth. Pronotum slightly narrower than head; anterior margin shallowly concave; posterior margin weakly convex, with a slight depression in middle.

**MEASUREMENTS (IN MM.):** Range of measurements, with means in parentheses. *Seven imagoes:* Length of head to tip of labrum, 1.22–1.29 (1.24); length of head to side base of mandibles, 0.88–1.00 (0.91); width of head, 0.97–1.01 (0.99); long diameter of eye, 0.31–0.32 (0.31); short diameter of eye, 0.23–0.26 (0.24); eye from lower margin of head, 0.16–0.18 (0.17); length of ocellus, 0.11–0.13 (0.12); width of ocellus, 0.07–0.09 (0.08); length of pronotum, 0.46–0.52 (0.49); width of pronotum, 0.83–0.88 (0.84). *Fourteen soldiers:* Length of head to side base of mandibles, 1.69–2.05 (1.88); width of head, 1.04–1.27 (1.17); height of head, 0.93–1.15 (1.06); length of left mandible, 0.72–0.86 (0.79); first marginal tooth of left mandible from tip of apical tooth, 0.14–0.21 (0.17); length of post-

mentum, 1.22–1.55 (1.40); maximum width of postmentum, 0.36–0.46 (0.42); minimum width of postmentum, 0.19–0.25 (0.21); length of pronotum, 0.43–0.61 (0.53); width of pronotum, 0.91–1.22 (1.10).

**LOCALITY:** Ka-Chong, imagoes, nymphs, collected by M. Ahmad, March 4, 1962, in a stump; soldiers, nymphs, collected by M. Ahmad, March 6, 1962, in a stump; three imagoes, two soldiers, nymphs, collected by M. Ahmad, March 10, 1962, in a stump.

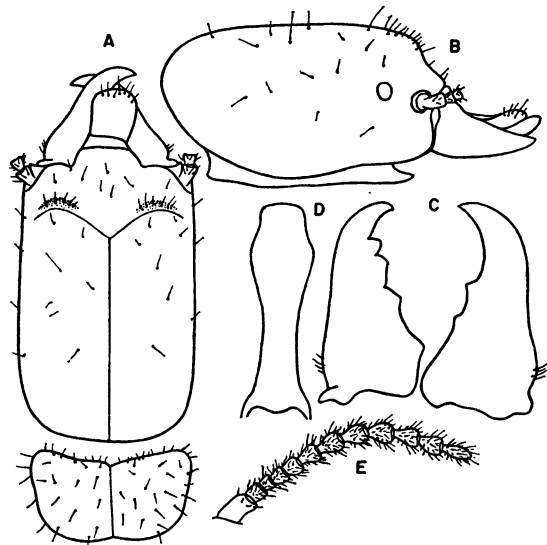


FIG. 4. Soldier of *Glyptotermes brevicaudatus* (Haviland). A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Postmentum from below. E. Antenna.

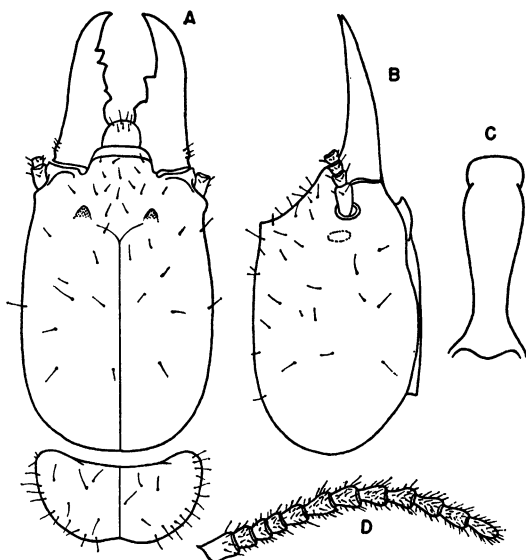


FIG. 5. Soldier of *Glyptotermes kachongensis*, new species. A. Head and pronotum from above. B. Head from side. C. Postmentum from below. D. Antenna.

***Glyptotermes kachongensis*, new species**

**SOLDIER (FIG. 5):** Head light reddish brown, slightly darker near postclypeus; labrum light brown; mandibles dark brown in outer three-fourths, reddish brown at bases; antennae brownish yellow; pronotum yellow; legs and abdominal tergites brownish yellow. Head with scattered bristles; forehead with several short bristles; mandibles with a few short hairs at outer bases; pronotum with several bristles along lateral margins and a few scattered bristles on disc. Head elongate, parallel sided, slightly constricted behind antennae; Y suture present, but not distinct; anterodorsal prominences distinct, small, pimple-like tubercle at tip of each prominence; forehead in profile concave. Eyes whitish, oval, indistinct. Labrum small, parallel sided; anterior margin broadly rounded. Mandibles long; basal humps weakly developed; left mandible with three marginal teeth, first with anterior cutting edge shorter than posterior cutting edge, latter longer than anterior cutting edge of second; right mandible with two marginal teeth. Postmentum elongate, flat, narrowest in basal third. Antennae with 12 articles; second slightly longer than third, fourth a little longer than third. Pronotum narrower than head; ante-

rior margin shallowly concave; lateral sides convex; posterior margin slightly depressed in middle.

**MEASUREMENTS (IN MM.):** Measurements of two soldiers, holotype and paratype, respectively: Length of head to side base of mandibles, 1.85, 1.75; width of head, 1.17, 1.20; length of left mandible, 0.95, —; first marginal tooth of left mandible from tip of apical tooth, 0.25, —; length of right mandible, 0.95, 1.00; first marginal tooth of right mandible from tip of apical tooth, 0.40, 0.45; length of postmentum, 1.25, 1.25; maximum width of postmentum, 0.35, 0.35; minimum width of postmentum, 0.17, 0.17; length of pronotum, 0.50, 0.47; width of pronotum, 1.07, 1.05.

**COMPARISONS:** *Glyptotermes kachongensis*, new species, comes very close to *Glyptotermes concavifrons* Krishna and Emerson from West Java and *G. kirbyi* Krishna and Emerson from Sumatra. It can be distinguished from *G. concavifrons* by its shorter mandibles, with their apices less curved, and by its narrower head and pronotum. *Glyptotermes kirbyi* has a distinctly longer head, more curved apices of the mandibles, and a broader pronotum.

**TYPE LOCALITY:** Ka-Chong, two soldiers (holotype and paratype), nymphs, collected by M. Ahmad, March 5, 1962, in sound portion of a stump.

***Glyptotermes pinangae* (Haviland)**

*Calotermes pinangae* HAVILAND, 1898, p. 374 (imago, soldier).

*Calotermes (Lobitermes) pinangae*: HOLMGREN, 1911a, p. 56, pl. 4, figs. 17–18 (soldier).

*Calotermes (Lobitermes) pinangae*: HOLMGREN, 1913b, p. 59 (imago, soldier, worker), text fig. 13, pl. 1, fig. 18 (soldier).

*Glyptotermes pinangae*: SNYDER, 1949, p. 50 (synonymy).

*Glyptotermes pinangae*: AHMAD, 1958, p. 50 (soldier).

*Glyptotermes pinangae*: KRISHNA, 1961, p. 347 (systematics).

**IMAGO (FIG. 6):** Head brown; region around antennal sockets and lateral sides of postclypeus reddish brown; anteclypeus brownish yellow; labrum light brown; mandibles reddish brown, teeth darker; antennae light brown, with tips of articles whitish; pronotum reddish brown; tibiae and tarsi brownish yellow; wing membrane light smoky brown.

Head very sparsely hairy; labrum with a few short hairs at tip; pronotum with short hairs along anterior margin, long bristles and short hairs on lateral margins, a few scattered bristles on disc. Head subcircular; Y suture indistinct. Eyes moderately bulging, not round; ocular suture distinct. Ocellus small, broadly oval to almost circular, touching eye. Labrum broad, dome shaped; lateral sides converging posteriorly. Mandibles as shown in figure 6. Antennae with 11 articles; second slightly longer than third and as long as fourth. Pronotum narrower than head; anterior margin indistinctly concave; lateral margins weakly convex; anterolateral corners narrowly rounded.

**SOLDIER (FIG. 7):** Head reddish brown; frons dark brown; mandibles dark reddish brown; labrum and antennae light brown; pronotum slightly lighter than head. Head scantily hairy; pronotum with long and short bristles along lateral margins and on disc. Head short, weakly phragmotic; anterodorsal prominences distinct, high, broadly rounded; forehead in profile nearly vertical in upper half, gradually sloping in lower half. Eyes small, oval, 0.11–0.13 mm. from antennal

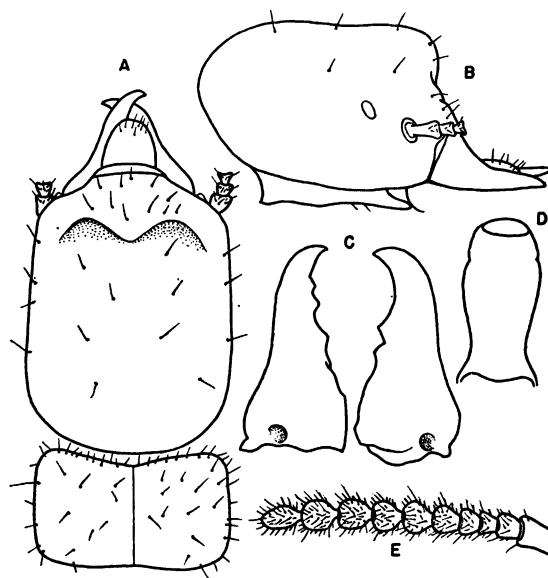


FIG. 7. Soldier of *Glyptotermes pinangae* (Haviland). A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Postmentum from below. E. Antenna.

sockets. Labrum tongue shaped, extending up to three-fourths of mandibles. Mandibles short, with basal humps; left mandible with three marginal teeth; right mandibles with two marginal teeth. Postmentum twice as long as its maximum width, narrowest near posterior end. Antennae short, with 10 articles, third shortest. Pronotum as broad as head, nearly rectangular; anterior margin very shallowly concave; posterior margin straight; lateral sides parallel; anterolateral corners broadly rounded.

**MEASUREMENTS (IN MM.):** Range of measurements, with means in parentheses. *Five imagoes*: Length of head to tip of labrum, 0.90–1.00 (0.96); length of head to side base of mandibles, 0.68–0.75 (0.73); width of head, 0.79–0.82 (0.79); long diameter of eye, 0.21–0.23 (0.22); short diameter of eye, 0.18–0.19 (0.18); eye from lower margin of head, 0.11–0.16 (0.13); length of ocellus, 0.06–0.07 (0.06); width of ocellus, — (0.05); length of pronotum, 0.39–0.43 (0.42); width of pronotum, 0.64–0.72 (0.67). *Ten soldiers*: Length of head to side base of mandibles, 1.06–1.11 (1.08); width of head, 0.86–0.90 (0.88); height of head, 0.54–0.57 (0.56); length of eye, 0.09–0.10 (0.09); width of eye, 0.05–0.07 (0.06);

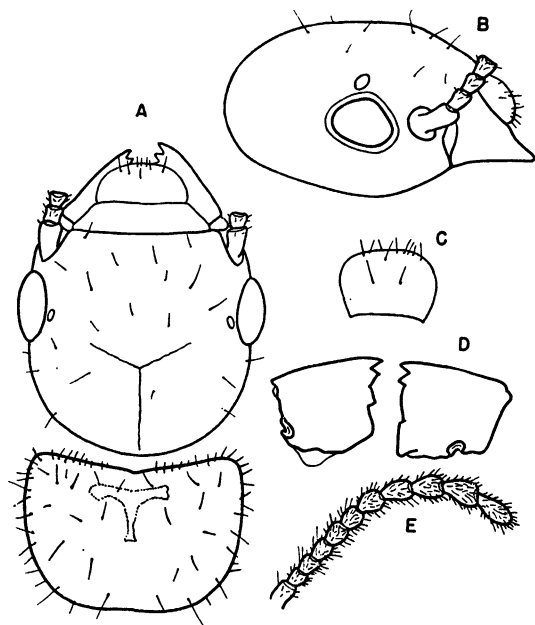


FIG. 6. Imago of *Glyptotermes pinangae* (Haviland). A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Antenna.



length of left mandible, 0.54–0.57 (0.56); first marginal tooth of left mandible from tip of apical tooth, 0.11–0.12 (0.11); length of postmentum, 0.64–0.68 (0.66); maximum width of postmentum, 0.32–0.34 (0.32); minimum width of postmentum, 0.23–0.25 (0.24); length of pronotum, 0.43–0.46 (0.44); width of pronotum, 0.82–0.90 (0.87).

**DISTRIBUTION:** Prew, soldiers, nymphs, collected by M. Ahmad, March 30, 1962, in a log; Tung Sa-Lang Luang, queen, imagoes, soldiers, nymphs, collected by M. Ahmad, April 10, 1962, from sound portion of a log.

#### GENUS *BIFIDITERMES* KRISHNA

##### *Bifiditermes indicus* (Holmgren)

*Kalotermes* (*Kalotermes*) *indicus* HOLMGREN, 1913b, p. 37 (imago).

*Kalotermes indicus*: KEMNER, 1934, pp. 30–31 (imago).

*Kalotermes indicus*: SNYDER, 1949, p. 16 (synonymy).

*Kalotermes indicus*: AHMAD, 1958, p. 36 (imago).

*Kalotermes indicus*: ROONWAL AND SEN-SARMA, 1960, pp. 113–116, text fig. 21 (wings), pl. 21 (imago).

*Bifiditermes indicus*: KRISHNA, 1961, p. 369 (new combination).

**IMAGO:** The following description is reproduced from Roonwal and Sen-Sarma (1960): "Head-capsule deep straw-coloured to yellowish brown above, antennae slightly paler; labrum straw-coloured; pronotum coloured like dorsum of head; abdominal tergites paler. Head and body sparingly pilose. Approximate body-length without wings 7.0 mm., and with wings 13.0–13.5 mm.

"Head-capsule subrectangular when viewed from above, sparsely pilose; length to base of mandibles (1.55 mm.) a little more than maximum width including the eyes (1.44 mm.); slightly arched above; frons gently sloping in front and not depressed medially; Y-suture not visible. *Eyes*: Paired, one on each side; very large, maximum diameter including ocular sclerite 0.70 mm. . . .; subcircular (surface facing the antenna being flattened), black and lying very close to antennae, almost touching the proximal margin of antennal socket. *Ocelli*: Two lateral ocelli, one on either side; oval, translucent, whitish, lying close to eye and touching the ocular sclerite; maximum diameter 0.25 mm. *Antennae*: With 19–20 segments; all but the first

one pilose, pilosity gradually increasing distally; segment 1 cylindrical, longest and largest; 2 less than half as long as 1; 3 longer than 2; 4 smallest. . . .; segment 5 to the penultimate one gradually increasing in length; last segment shorter than penultimate one. *Clypeus*: Postclypeus subrectangular and darker than frons, otherwise not demarcated from the latter; with 2–3 pairs of hairs at the antero-lateral border. Anteclypeus trapezoid, whitish and longer than postclypeus; apilose. *Labrum*: Subsquarish, with sides swollen at middle and gradually narrowing anteriorly and posteriorly; anterior margin slightly rounded (often appearing falsely straight owing to bending); tip and body pilose; length a little less than maximum width. *Mandibles*: Of typical *Kalotermes*-type. Left mandible with an apical and two marginal teeth; apical finger like and longer than marginals, the latter two large, triangular and subequal. Right mandibles also with an apical and two marginal teeth; apical subequal to 1st marginal; 2nd slightly shorter than 1st; molar plate only slightly shorter than posterior border of 2nd marginal and undulating.

"*Thorax: Pronotum*: Subrectangular; moderately pilose with shorter hairs; slightly to much broader than head-width; maximum width of pronotum 1.70–1.90 mm.; length of pronotum 1.0–1.14 mm.; much longer than half its width; anterior margin concave, not notched medially; sides slightly sloping behind; posterior margin straight with a shallow median concavity."

**REMARKS:** This species was not collected by the present author. Holmgren (1913b) recorded it from Bangkok.

#### GENUS *CRYPTOTERMES* BANKS

##### KEY TO THE SPECIES

###### IMAGOES

Eyes larger, long diameter of eye, 0.27–0.30 mm.; short diameter of eye, 0.21–0.23 mm. . . .

. . . . . *C. thailandis*, new species

Eyes smaller, long diameter of eye, 0.23–0.28 mm.; short diameter of eye, 0.13–0.23 mm. . . .

. . . . . *C. domesticus* (Haviland)

###### SOLDIERS

One tubercle at base of antenna. . . . .

. . . . . *C. domesticus* (Haviland)

Two tubercles at base of antenna . . . . .

. . . . . *C. thailandis*, new species

***Cryptotermes thailandis*, new species**

**IMAGO (FIG 8):** Head reddish brown; anteclypeus yellowish; labrum light brownish yellow; mandibles brownish yellow, teeth reddish brown; antennae brownish yellow; pronotum slightly darker than head, with a T-shaped marking. Wings light smoky brown. Head sparsely hairy; pronotum with scattered, short and long bristles on anterolateral and lateral margins and on disc. Head posterior to eyes semicircular; Y suture with median arm distinct, rest indistinct. Eyes moderately bulging, shaped as shown in figure 8. Ocellus small, oval, almost touching the eye. Anteclypeus trapezoid. Labrum broad, dome shaped; sides converging posteriorly. Left mandible with posterior cutting edge of first marginal tooth distinctly shorter than anterior cutting edge of second marginal tooth; right mandible with posterior cutting edge of second marginal tooth longer than molar plate. Antennae with 14–15 articles; in specimen with 14 articles, the second as long as third, fourth a little shorter than second. Pronotum slightly broader than head, more

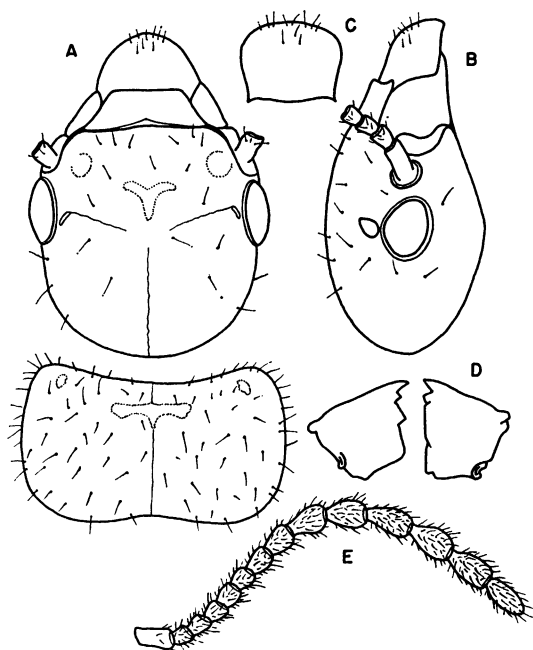


FIG. 8. Imago of *Cryptotermes thailandis*, new species. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Antenna.

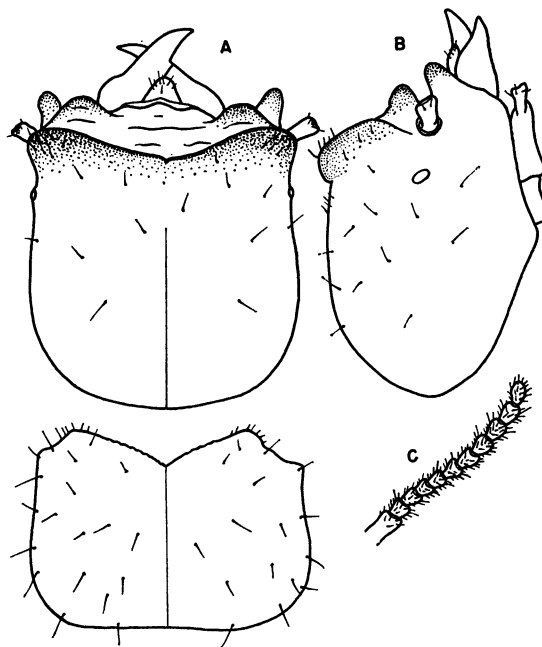


FIG. 9. Soldier of *Cryptotermes thailandis*, new species. A. Head and pronotum from above. B. Head from side. C. Antenna.

than one and a half times as long as broad; anterior margin shallowly concave; lateral margins weakly convex; posterior margin depressed in middle; anterolateral corners broadly rounded.

**SOLDIER (FIG. 9):** Head reddish brown in posterior region, becoming darker anteriorly; forehead almost black; labrum yellow; pronotum light yellowish brown, with darker patches on disc; legs pale; abdominal tergites pale brown. Head scantily hairy, anterolateral corners with a few short bristles; pronotum with short bristles along anterior margin, long, scattered bristles on disc. Head strongly phragmotic, short, thick, about as long as wide; Y suture present, but not distinct; frontal phalanx (ridge) prominent, concave, without any notch in middle; profile of front nearly vertical, not overhanging; two lobelike projections at base of antenna, one above and one below. Eyes whitish, oval; 0.10 mm. long and 0.03 mm. wide. Mandibles short, with distinct basal humps; teeth rudimentary. Labrum short, broadly rounded apically. Antennae short, with 11 articles; basal three articles more strongly sclerotized than the rest, second almost as long as third, fourth

shortest. Pronotum as broad as head, slightly longer than half of its width; anterior margin broadly V-shaped, finely serrated; anterolateral lobes notched; lateral margins moderately convex, depressed behind anterolateral corners; posterior margin almost straight.

MEASUREMENTS (IN MM.): Measurements of two imagoes, morphotype and paramorphotype, respectively: Length of head to tip of labrum, 1.19, 1.26; length of head to side base of mandibles, 0.96, 0.98; width of head, 0.93, 0.96; long diameter of eye, 0.27, 0.30; short diameter of eye, 0.21, 0.23; eye from lower margin of head, 0.18, 0.19; length of ocellus, 0.09, 0.10; width of ocellus, 0.08, 0.08; length of pronotum, 0.57, 0.61; width of pronotum, 1.02, 1.02.

Holotype soldier: Length of head to side base of mandibles, 1.30; width of head, 1.26; length of left mandible, 0.64; length of pronotum, 0.68; width of pronotum, 1.26.

COMPARISONS: Both the imago and the soldier of *Cryptotermes thailandis*, new species, resemble those of *C. bengalensis* Snyder,<sup>1</sup> except that the pronotum of the imago of *C. thailandis* is broader, and, in the soldier, the frontal phalanx (ridge) is unincised in the middle and the pronotum is somewhat rectangular rather than being subcircular. *Cryptotermes cynocephalus* Light and *C. perforans* Kemner are smaller, in both imago and soldier, and the soldier of *C. dudleyi* is larger. The imago of *C. sumatrensis* Kemner has the anterior margin of the pronotum notched in the middle, and the soldier of that species has a deeply incised frontal phalanx. *Cryptotermes domesticus* (Haviland) has smaller eyes in the imago, and there is a single tubercle at the base of the antenna in the soldier.

TYPE LOCALITY: Klang Dong, two imagoes (morphotype and paramorphotype), one soldier (holotype), and nymphs, collected by M. Ahmad, March 22, 1962, in the stem of a *Ficus*.

#### *Cryptotermes domesticus* (Haviland)

*Calotermes domesticus* HAVILAND, 1898, p. 374 (imago, soldier, nymph), pl. 23, figs. 3-4 (soldier), 5 (imago), 6 (wing).

<sup>1</sup> I now agree with Roonwal and Chhotani (1962b) that *Cryptotermes bengalensis* Snyder is a valid species. It is not a synonym of *C. havilandi* (Sjöstedt).

*Calotermes* (*Cryptotermes*) *domesticus*: HOLMGREN, 1911a, p. 55, pl. 4, fig. 9 (soldier).

*Calotermes* (*Cryptotermes*) *Formosae* HOLMGREN, 1911a, p. 55.

*Calotermes* (*Cryptotermes*) *kotoensis* OSHIMA, 1912, p. 56.

*Calotermes* (*Cryptotermes*) *domesticus*: HOLMGREN, 1913b, p. 46 (imago, soldier, nymph), pl. 1, fig. 16 (soldier).

*Calotermes* (*Cryptotermes*) *Formosae*: HOLMGREN, 1913b, pp. 47-48 (imago, soldier, nymph), text fig. 5 (soldier mandibles), pl. 1, fig. 17 (soldier).

*Calotermes* (*Cryptotermes*) *kotoensis*: HOZOWA, 1915, pp. 51-56 (imago, soldier, nymph), text figs. 11 (imago), 12 (soldier), 13 (nymph), pl. 2, figs. 9 (imago), 10 (soldier).

*Cryptotermes domesticus*: OSHIMA, 1923, p. 5 (imago).

*Calotermes* (*Cryptotermes*) *campbelli* LIGHT, 1924, pp. 57-60 (queen, soldier).

*Cryptotermes hermsi* KIRBY, 1925, pp. 437-441 (imago, soldier).

*Calotermes* (*Cryptotermes*) *buxtoni* HILL, 1926, p. 298.

*Calotermes* (*Cryptotermes*) *gulosus* HILL, 1927, pp. 11-13, pl. 1, fig. 13 (imago).

*Calotermes* (*Cryptotermes*) *repentinus* HILL, 1927, pp. 13-14, pl. 1, fig. 13 (imago).

*Cryptotermes domesticus*: SNYDER, 1949, p. 41 (synonymy).

*Cryptotermes domesticus*: AHMAD, 1958, pp. 54 (imago), 55 (soldier).

*Cryptotermes domesticus*: KRISHNA, 1961, p. 382 (systematics).

IMAGO: Head yellowish brown, sparsely hairy. Eyes moderately bulging, not quite round, anterior margin almost straight. Ocellus small, oval, nearly touching eye. Antennae with 14-17 articles; second, third, and fourth nearly subequal. Pronotum trapezoid, shallowly concave anteriorly. Length of head to side base of mandibles, 0.91-0.93 mm.; width of head, 0.88-0.91 mm.; long diameter of eye, 0.23-0.28 mm.; short diameter of eye, 0.13-0.23 mm.; length of ocellus, 0.104-0.109 mm.; width of ocellus, 0.07 mm.; length of pronotum, 0.54 mm.; width of pronotum, 0.83-0.88 mm.

SOLDIER: Head subquadrate; black anteriorly, lighter posteriorly; one tubercle at base of antenna. Antennae with 11-14 articles; in specimens with 12 articles, second slightly longer than third, fourth shortest. Pronotum broadly emarginate anteriorly; posterior margin almost straight. Length of head with

mandibles, 1.76 mm.; length of head without mandibles, 1.45 mm.; width of head, 1.32 mm.; length of pronotum, 0.67 mm.; width of pronotum, 1.22 mm.

REMARKS: This species is not represented in the author's collection from Thailand. It has been recorded from Bangkok.

FAMILY RHINOTERMITIDAE

SUBFAMILY COPTOTERMITINAE

GENUS COPTOTERMES WASMANN

KEY TO THE SPECIES

IMAGOS

Larger species; width of head across eyes, 1.40–1.55 mm.; width of pronotum, 1.32–1.40 mm.; darker in color . . . *C. premasmii*, new species  
Smaller species; width of head across eyes, 1.26–1.36 mm.; width of pronotum, 1.22–1.26 mm.; lighter in color . . . *C. havilandi* Holmgren

SOLDIERS

1. Larger species; length of head to side base of mandibles, 1.65–1.76 mm.; maximum width of head, 1.40–1.63 mm.; mandibles strongly curved. . . . . *C. curvignathus* Holmgren  
Smaller species; length of head to side base of mandibles, 1.00–1.51 mm.; maximum width of head, up to 1.40 mm.; mandibles not strongly curved. . . . . 2
2. Head nearly as long as broad; waist of postmentum nearer to posterior margin than to widest point . . . . . 3  
Head distinctly longer than broad; waist of postmentum midway between posterior margin and widest point. . . . . 4
3. Larger species; length of head to side base of mandibles, 1.40–1.45 mm.; maximum width of head, 1.40 mm. . . . .  
. . . . . *C. premasmii*, new species  
Smaller species; length of head to side base of mandibles, 1.00–1.15 mm.; maximum width of head, 0.90–0.99 mm. . . . .  
. . . . . *C. kalshoveni* Kemner
4. Larger species; length of head to side base of mandibles, 1.40–1.51 mm.; maximum width of head, 1.15–1.24 mm. . . . .  
. . . . . *C. gestroi* (Wasmann)  
Smaller species; length of head to side base of mandibles, 1.11–1.36 mm.; maximum width of head, 1.05–1.15 mm. . . . .  
. . . . . *C. havilandi* Holmgren

*Coptotermes premasmii*, new species

IMAGO (FIG. 10): Head dark brown, with a crescent-shaped, yellow margin in front of each ocellus; postclypeus pale; anteclypeus

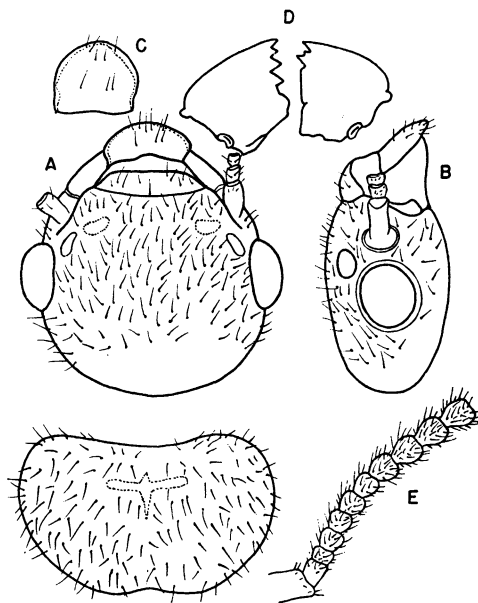


FIG. 10. Imago of *Coptotermes premasmii*, new species. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Antenna.

white; labrum brownish yellow; antennae light yellowish brown; pronotum lighter than head, with a faint T-shaped marking on disc; abdominal tergites brown to dark brown. Head moderately hairy, with a few scattered bristles and more numerous short hairs; postclypeus with a few hairs; pronotum with long bristles and short hairs along margins and on disc. Head subcircular, wider than long without mandibles; fontanelle small, indistinct. Eyes large, bulging, almost round. Ocellus broadly oval, separated from eye by a distance of 0.02 mm. Postclypeus very narrow, more than three times as broad as long. Labrum broad, dome shaped. Left mandible with three marginal teeth, second longer than first. Right mandible with two marginal teeth and a subsidiary tooth at base of anterior cutting edge of first marginal tooth. Antennae with 20–23 articles, third shortest; articles becoming rounded from eighth onward. Pronotum slightly narrower than head; anterior margin shallowly concave; lateral margins strongly convex; anterolateral corners not distinct, low, broadly rounded; posterior margin slightly emarginate.

SOLDIER (FIG. 11): Head reddish yellow;

TABLE 3

MEASUREMENTS (IN MILLIMETERS) OF 10 IMAGOS OF *Coptotermes premrasmii*, NEW SPECIES

	Morphotype	Range	Mean
Length of head to tip of labrum	1.55	1.40-1.55	1.50
Length of head to side base of mandibles	1.15	1.05-1.15	1.10
Width of head across eyes	1.45	1.40-1.50	1.43
Diameter of eye	0.40	0.37-0.42	0.39
Eye from lower margin of head	0.15	0.15	0.15
Length of ocellus	0.15	0.15-0.17	0.16
Width of ocellus	0.12	0.10-0.12	0.11
Length of pronotum	0.75	0.75-0.80	0.77
Width of pronotum	1.35	1.32-1.40	1.35

labrum brownish yellow; mandibles dark reddish brown, lighter at base; antennae light brown; pronotum lighter than head; legs and abdominal tergites yellow. Head very scantily hairy; tip of labrum with two long bristles; postmentum with two bristles at anterior margin; pronotum with only a few short and long bristles along margins, disc without bristles or hairs; abdominal tergites with a row of bristles along their posterior margins and a few irregularly arranged bristles else-

where. Head considerably narrowed anteriorly, as long as or slightly longer than broad; opening of frontal gland broadly oval, 0.15 mm. long, 0.12 mm. broad. Labrum longer than broad, hyaline tip short. Mandibles long, slender, slightly curved apically; inner margin of left mandible with three crenulations at base; right mandible devoid of crenulations. Postmentum nearly twice as long as its maximum width, one and a half times as long anteriorly as posteriorly; waist nearer to posterior margin than to widest point. Antennae with 15 articles; second as long as or slightly longer than third. Pronotum with anterior margin slightly notched in middle; lateral margins broadly convex; pos-

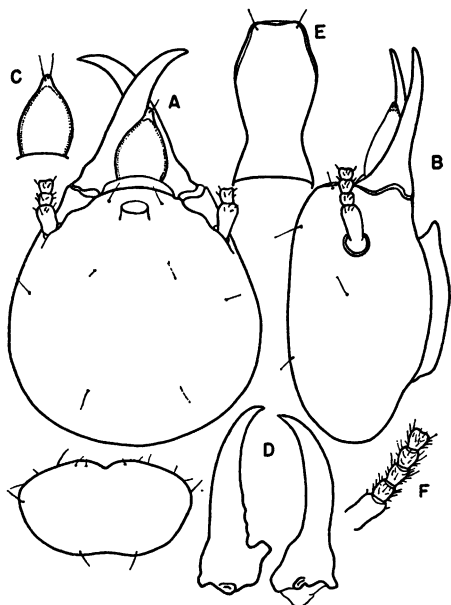


FIG. 11. Soldier of *Coptotermes premrasmii*, new species. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

TABLE 4

MEASUREMENTS (IN MILLIMETERS) OF TWO SOLDIERS OF *Coptotermes premrasmii*, NEW SPECIES

	Holo-type	Para-type
Length of head to side base of mandibles	1.45	1.40
Width of head at side base of mandibles	0.75	0.75
Maximum width of head	1.40	1.40
Height of head	0.95	0.90
Length of left mandible	0.90	0.90
Length of postmentum	0.87	0.85
Maximum width of postmentum	0.45	0.45
Minimum width of postmentum	0.27	0.30
Length of pronotum	0.50	0.50
Width of pronotum	0.95	0.95



terior margin depressed in middle.

**COMPARISONS:** The imago of *Coptotermes premrasmii*, new species, closely resembles that of *C. havilandi* Holmgren, but differs from it in being larger and darker in color. *Coptotermes travians* (Haviland) and *C. heimi* (Wasmann) have the antennal articles rounded from the eleventh onward; *C. vastator* Light and *C. ceylonicus* Holmgren, from the ninth onward. *Coptotermes formosanus* Shiraki has a longer head. *Coptotermes curvignathus* Holmgren and *C. menadoensis* Oshima have distinctly larger eyes.

The soldier of *Coptotermes premrasmii*, new species, in having the head considerably narrowed anteriorly, resembles that of *C. kalshoveni* Kemner and that of *C. gaurii* Roonwal and Krishna, but it can be easily distinguished from both by its distinctly larger size.

**TYPE LOCALITY:** Ka-Chong, imagoes (morphotype and paramorphotypes), two soldiers (holotype and paratype), workers, collected by M. Ahmad, March 11, 1962, in a log.

The species is named in honor of Dr. Thanom Premrasmi, Chief, Forest Products Research Division, Royal Forest Department, Bangkok.

#### *Coptotermes havilandi* Holmgren

*Coptotermes Havilandi* HOLMGREN, 1911a (*nomen nudum*).

*Coptotermes Havilandi* HOLMGREN, 1911c, p. 192 (imago).

*Coptotermes Havilandi*: HOLMGREN, 1913b, p. 75 (imago).

*Coptotermes Havilandi*: BUGNION, 1913, p. 3.

*Coptotermes javanicus* KEMNER, 1934, pp. 59–61 (imago, soldier, worker).

*Coptotermes Havilandi*: KEMNER, 1934, p. 62 (imago).

*Coptotermes havilandi*: SNYDER, 1949, p. 79 (synonymy).

*Coptotermes havilandi*: AHMAD, 1958, pp. 61 (imago), 67–68 (soldier).

*Coptotermes havilandi*: KALSHOVEN, 1962b, pp. 121–137 (systematics, biology).

**IMAGO (FIG. 12):** Head reddish brown, with a halfmoon-shaped, brownish yellow spot in front of each ocellus; postclypeus and labrum pale; anteclypeus yellowish; mandibles brownish yellow; teeth reddish brown; antennae light brown; pronotum pale brown. Head moderately hairy; postclypeus with a

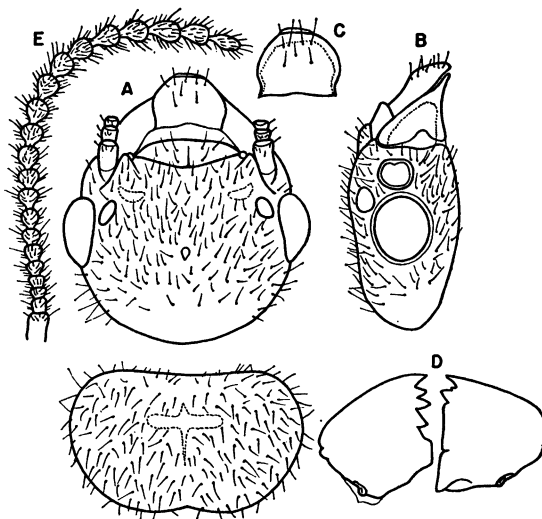


FIG. 12. Imago of *Coptotermes havilandi* Holmgren. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Antenna.

few long bristles; labrum with a few bristles in anterior half; pronotum more densely hairy than head. Head subcircular, rather flat; fontanelle small, not prominent. Eyes moderately large, bulging, almost round, separated from lower margin of head by nearly one-third of their long diameter. Ocellus broadly oval, very close to eye. Postclypeus very narrow, nearly four times as broad as long. Labrum dome shaped, slightly broader than long. Mandibles as shown in figure 12. Antennae with 18–21 articles; third shortest; articles nearly circular from eighth onward. Pronotum slightly narrower than head; anterior margin very shallowly concave; posterior margin emarginate; lateral margins convex; anterolateral corners broadly rounded.

**SOLDIER (FIG. 13):** Head light yellow to reddish yellow; mandibles reddish brown, yellowish at bases; labrum, antennae, pronotum, legs, and abdominal tergites pale. Head with a few scattered bristles; tip of labrum with two long bristles; pronotum scantily hairy; abdominal tergites with a row of bristles along posterior margins and with a few scattered bristles elsewhere. Head elongately oval, narrowed anteriorly, widest in middle; opening of frontal gland conspicuous, broadly oval, 0.15 mm. long, 0.12 mm. broad. Labrum

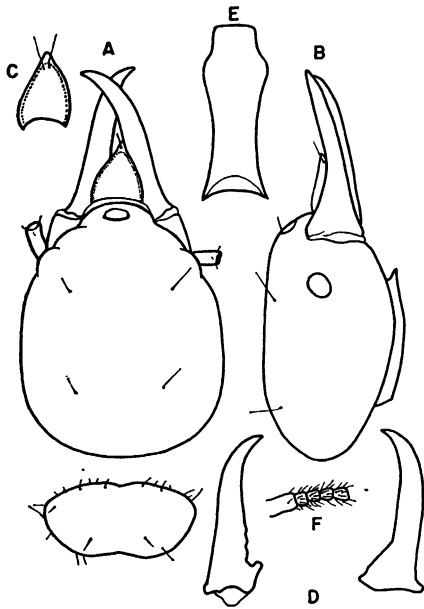


FIG. 13. Soldier of *Coptotermes havilandi* Holmgren. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

longer than broad, widest in basal third, tip hyaline. Mandibles long, slightly curved apically; left mandible with crenulations at base; right mandible without crenulations. Postmentum a little more than twice as long as its maximum width; waist midway between posterior margin and widest point. Antennae with 14 articles; second indistinctly longer than third. Pronotum nearly twice as broad as long; anterior margin slightly notched in middle; posterior margin emarginate; anterolateral angles broadly rounded.

**MEASUREMENTS (IN MM.):** Range of measurements, with means in parentheses. *Ten alates*: Length of head to tip of labrum, 1.36–1.47 (1.41); length of head to side base of mandibles, 0.97–1.03 (1.00); width of head at side base of mandibles, 0.90–1.00 (0.96); width of head across eyes, 1.26–1.36 (1.32); long diameter of eye, 0.36–0.39 (0.37); short diameter of eye, 0.35–0.36 (0.35); eye from lower margin of head, 0.12–0.14 (0.13); length of ocellus, 0.14–0.16 (0.14); width of ocellus, 0.10–0.12 (0.10); length of pronotum, 0.72–0.75 (0.73); width of pronotum, 1.22–1.26 (1.23). *Twenty-seven soldiers*: Length of head to side base of mandibles, 1.11–1.36

(1.28); width of head at side base of mandibles, 0.61–0.70 (0.66); maximum width of head, 1.05–1.15 (1.10); height of head, 0.68–0.85 (0.76); length of left mandible, 0.75–0.85 (0.77); length of postmentum, 0.79–1.00 (0.87); minimum width of postmentum, 0.21–0.25 (0.23); maximum width of postmentum, 0.35–0.45 (0.38); length of pronotum, 0.35–0.45 (0.40); width of pronotum, 0.75–0.80 (0.77).

**DISTRIBUTION:** Bangkok, soldiers, workers, collected by D. Chaiglom, December 1, 1959, Bang Khen, Bangkok, soldiers, workers, collected by D. Chaiglom, February, 4, 1961; Bangkok, imagoes, collected by D. Chaiglom, February 11, 1961; Ka-Chong, soldiers, workers, collected by M. Ahmad, March 3, 1962, in a decaying stump; soldiers, workers, collected by M. Ahmad, March 6, 1962, in a stump; Huay Yang, soldiers, workers, collected by M. Ahmad, March 15, 1962; Tung Sa-Lang Luang National Park, soldiers, workers, collected by M. Ahmad, April 12, 1962, in a stump.

#### *Coptotermes curvignathus* Holmgren

*Coptotermes curvignathus* HOLMGREN, 1913b, pp. 77–78 (soldier, worker, nymph), pl. 2, fig. 11 (soldier).

*Coptotermes robustus* HOLMGREN, 1913b, p. 78 (imago).

*Coptotermes gestroi* OSHIMA, 1913, p. 276 (soldier).

*Coptotermes curvignathus*: HOLMGREN, 1914, p. 236 (locality).

*Coptotermes robustus*: HOLMGREN, 1914, p. 236 (locality).

*Coptotermes gestroi*: RICHARDS, 1917, p. 338 (locality).

*Coptotermes curvignathus*: JOHN, 1925, pp. 381–382 (locality).

*Coptotermes curvignathus*: KEMNER, 1934, pp. 58–59 (systematics), 185–186 (biology), pl. 2, fig. 2 (nest).

*Coptotermes curvignathus*: SNYDER, 1949, p. 77 (synonymy).

*Coptotermes curvignathus*: AHMAD, 1958, pp. 60 (imago), 63 (soldier).

*Coptotermes curvignathus*: KALSHOVEN, 1962a, pp. 223–229 (biology).

*Coptotermes curvignathus*: KALSHOVEN, 1963, pp. 90–100 (biology).

**SOLDIER (FIG. 14):** Head yellow, region around postclypeus and opening of frontal gland brownish yellow; labrum light brown;

mandibles reddish brown, lighter at bases; antennae brownish yellow, apices whitish; pronotum, legs, and abdominal tergites yellow. Head with a few long bristles; labrum with two long bristles at tip; postmentum with three bristles in apical third; anterior margin of pronotum with a few short bristles, lateral and posterior margins with long bristles, a few bristles on disc; abdominal tergites with dense bristles, posteriorly arranged in a row. Head oval, widest in basal third; opening of frontal gland not quite round. Postclypeus with posterior margin not distinct. Labrum slightly longer than broad; tip hyaline, broad, anterior margin nearly straight. Mandibles elongate, saber shaped, strongly curved apically; left mandible with crenulations at base; right mandible devoid of crenulations. Postmentum more than twice as long as its maximum width, waist nearer to posterior margin than to widest point. Antennae with 15–16 articles; second slightly longer than third and fourth. Pronotum emarginate both anteriorly and posteriorly.

**MEASUREMENTS (IN MM.):** Range of measurements of 16 soldiers, with means in parentheses. Length of head to side base of mandibles, 1.65–1.76 (1.69); width of head at side base of mandibles, 0.86–0.90 (0.87); maximum width of head, 1.40–1.63 (1.53); height of head, 0.97–1.11 (1.06); length of left mandible, 1.08–1.22 (1.14); long diameter of fontanelle opening, 0.15–0.21 (0.18); short diameter of fontanelle opening, 0.15–0.18 (0.16); length of postmentum, 0.97–1.11 (1.08); maximum width of postmentum, 0.43–0.46 (0.44); minimum width of postmentum, 0.23–0.30 (0.26); length of pronotum, 0.54–0.63 (0.57); width of pronotum, 1.04–1.18 (1.12).

**DISTRIBUTION:** Ka-Chong, soldiers, workers, collected by M. Ahmad, March 4, 1962, under encrustation on stem of a standing rubber tree; Chantaburi, soldiers, workers, collected by M. Ahmad, March 25, 1962, from a log in a rubber plantation; Prew, soldiers, workers, collected by M. Ahmad, March 29, 1962, in stem of a rubber tree.

**REMARKS:** This termite is very common in the wet southern and eastern parts of Thailand. It was found causing considerable damage to living rubber trees in Ka-Chong, Chantaburi, and Prew.



FIG. 14. Soldier of *Coptotermes curvignathus* Holmgren. A. Head and pronotum from above. B. Head from side. C. Postmentum from below. D. Antenna.

#### *Coptotermes kalshoveni* Kemner

*Coptotermes Kalshoveni* KEMNER, 1934, p. 61 (soldier).

*Coptotermes kalshoveni*: SNYDER, 1949, p. 80 (synonymy).

*Coptotermes kalshoveni*: AHMAD, 1958, p. 66 (soldier).

**SOLDIER (FIG. 15):** Head brownish yellow; labrum light brown; mandibles reddish brown, lighter at base; antennae brownish yellow; pronotum, legs, and abdominal tergites pale. Head with several long bristles; labrum with two bristles at tip; postmentum with a pair of bristles at anterior margin and another pair a little below middle point; pronotum with a few short and long bristles along periphery and on disc; abdominal tergites with numerous bristles. Head pear shaped, considerably narrowed anteriorly, only slightly longer than broad; opening of frontal gland broadly oval. Labrum longer than broad; tip hyaline, narrowly pointed. Mandibles saber shaped, very slightly bent at tips. Postmentum about twice as long as broad at widest point, nearly one and a half times as broad anteriorly as posteriorly; waist nearer to posterior margin than to

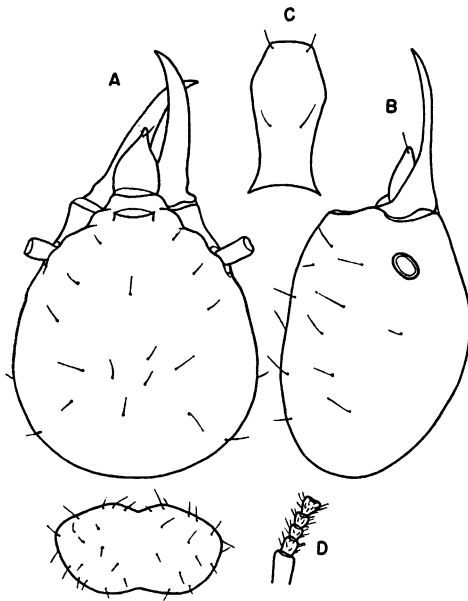


FIG. 15. Soldier of *Coptotermes kalshoveni* Kemner. A. Head and pronotum from above. B. Head from side. C. Postmentum from below. D. Antenna.

widest point. Antennae with 14 articles; second slightly longer than third, latter indistinctly shorter than fourth. Pronotum emarginate anteriorly; anterior margin convex near emargination; posterior margin slightly depressed in middle.

MEASUREMENTS (IN MM.): Range of measurements of 10 soldiers, with means in parentheses: Length of head to side base of mandibles, 1.00–1.15 (1.07); width of head at side base of mandibles, 0.46–0.52 (0.49); maximum width of head, 0.90–0.99 (0.93); height of head, 0.66–0.77 (0.71); length of left mandible, 0.59–0.68 (0.63); length of postmentum, 0.50–0.68 (0.59); maximum width of postmentum, 0.27–0.34 (0.30); minimum width of postmentum, 0.21–0.27 (0.22); length of pronotum, 0.27–0.34 (0.30); width of pronotum, 0.61–0.72 (0.65).

LOCALITY: Ka-Chong, soldiers, workers, collected by M. Ahmad, March 3, 1962, in a decaying stump; soldiers, workers, collected by M. Ahmad, March 12, 1962, in a log.

***Coptotermes gestroi* (Wasmann)**

*Termes Gestroi* WASMANN, 1896a, p. 628 (soldier).

*Termes Gestroi*: HAVILAND, 1898, p. 390 (soldier, worker).

*Coptotermes Gestroi*: HOLMGREN, 1911a, p. 73, pl. 5, fig. 9 (soldier).

*Coptotermes Gestroi*: HOLMGREN, 1911b, p. 457 (soldier).

*Coptotermes gestroi*: HOLMGREN AND HOLMGREN, 1917, p. 145 (locality).

*Coptotermes gestroi*: SNYDER, 1949, p. 78 (synonymy).

*Coptotermes gestroi*: AHMAD, 1958, p. 64 (soldier).

*Coptotermes gestroi*: ROONWAL AND CHHOTANI, 1962a, pp. 34–38 (soldier, worker).

*Coptotermes gestroi*: ROONWAL AND CHHOTANI, 1962b, pp. 306–307 (soldier).

SOLDIER (FIG. 16): Head reddish yellow; labrum light brownish yellow; mandibles reddish brown; antennae light brown; pronotum light brownish yellow, lighter than head; legs and abdomen pale. Head with a few scattered bristles; tip of labrum with two bristles; postmentum with a pair of bristles at anterior margin and another pair a little posteriorly; pronotum scantily hairy. Head elongately oval, distinctly longer than broad, widest in middle; fontanelle broadly oval, approaching circular shape. Labrum narrowly pointed, longer than broad; tip hyaline, nar-

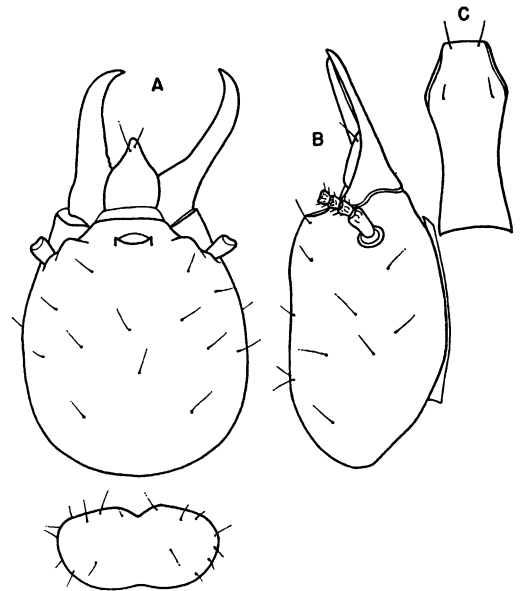


FIG. 16. Soldier of *Coptotermes gestroi* (Wasmann). A. Head and pronotum from above. B. Head from side. C. Postmentum from below.

row, short. Mandibles moderately curved apically. Postmentum long, two and a half times as long as broad at widest point, one and a half times as broad anteriorly as posteriorly; waist midway between posterior margin and widest point. Antennae with 14–15 articles, second longer than third, fourth and third subequal. Pronotum slightly more than twice as broad as long; anterior margin distinctly emarginate; posterior margin depressed in middle; lateral margins broadly rounded.

**MEASUREMENTS (IN MM.):** Range of measurements of 10 soldiers, with means in parentheses: Length of head to side base of mandibles, 1.40–1.51 (1.45); width of head at side base of mandibles, 0.68–0.75 (0.71); maximum width of head, 1.15–1.24 (1.19); height of head, 0.84–0.90 (0.86); length of left mandible, 0.82–0.93 (0.90); length of postmentum, 0.93–1.00 (0.97); maximum width of postmentum, 0.37–0.41 (0.38); minimum width of postmentum, 0.23–0.28 (0.25); length of pronotum, 0.39–0.43 (0.41); width of pronotum, 0.86–0.90 (0.88).

**LOCALITY:** Twenty kilometers east of Mae Sod on Tak Road, soldiers, workers, collected by M. Ahmad, April 17, 1962, in a stump.

#### SUBFAMILY RHINOTERMITINAE

#### GENUS *PRORHINOTERMES* SILVESTRI

#### *Prorhinotermes tibiaoensisformis*, new species

**SOLDIER (FIG. 17):** Head yellow; anterior margin of postclypeus and antennal carinae light reddish brown; labrum and antennae brownish yellow; mandibles reddish brown, lighter at bases; pronotum, legs, and abdomen pale. Head with a few scattered, long bristles; postclypeus without hairs or bristles; labrum with two short bristles at tip; pronotum scantily hairy. Head oval, narrowed anteriorly, widest in basal third; posterior margin slightly produced; fontanelle small, circular, with a groove running in front. Eyes distinct, broadly oval, slightly bulging. Postclypeus more than twice as broad as long. Labrum with lateral margins convex, anterior margin broadly rounded. Mandibles long, saber shaped, like those of *Coptotermes*, but without crenulations at base. Postmentum nearly two and a half times as long as broad at its widest point; waist midway between

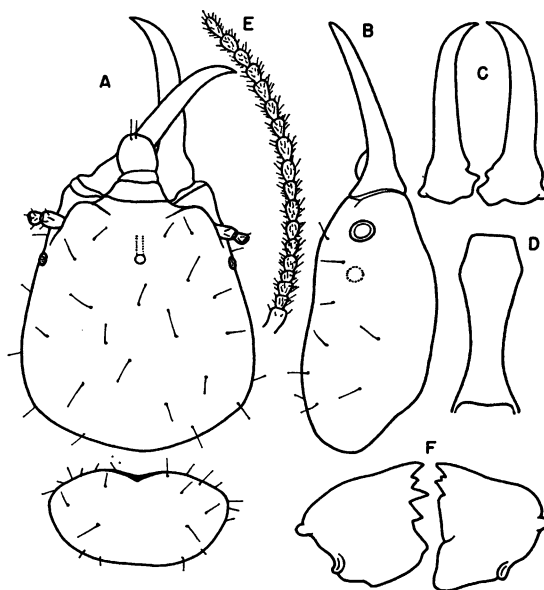


FIG. 17. *Prorhinotermes tibiaoensisformis*, new species. Soldier: A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Postmentum from below. E. Antenna. Worker: F. Mandibles.

posterior margin and widest point. Antennae with 17–19 articles; in specimens with 18 articles, second slightly shorter than third, latter in some specimens slightly more sclerotized than other articles, obconic in shape. Pronotum with anterior margin convex, notched in middle; posterior margin not emarginate; lateral sides broadly rounded.

**COMPARISONS:** *Prorhinotermes tibiaoensisformis*, new species, comes very close to *Prorhinotermes tibiaoensis* (Oshima) from the Philippines, but differs as follows: the mandibles are less strongly curved, the head is relatively more narrowed anteriorly, and the pronotum is smaller. *Prorhinotermes flavus* (Bugnion and Popoff) from Ceylon is darker in color and has larger eyes. *Prorhinotermes krakatau* (Holmgren) is distinctly smaller. *Prorhinotermes gracilis* Light has fewer articles in the antenna. In *P. japonicus* (Holmgren) the posterior margin of the head is not produced, and the pronotum is indistinctly notched anteriorly in the middle.

**TYPE LOCALITY:** Wang Nok An, soldiers (holotype, paratypes), workers, collected by M. Ahmad, April 11, 1962, from inside the hollow of a big tree.



TABLE 5  
MEASUREMENTS (IN MILLIMETERS) OF 10 SOLDIERS OF *Prorhinotermes tibiaoensisformis*,  
NEW SPECIES

	Holotype	Range	Mean
Length of head to side base of mandibles	1.80	1.56-1.87	1.70
Width of head at side base of mandibles	0.90	0.88-0.98	0.91
Width of head at posterolateral ends of antennal carinae	1.14	1.09-1.24	1.21
Maximum width of head	1.50	1.32-1.56	1.45
Length of left mandible	1.10	1.09-1.24	1.14
Long diameter of eye	0.12	0.11-0.13	0.12
Short diameter of eye	0.10	0.08-0.10	0.09
Length of postmentum	1.09	1.04-1.26	1.11
Maximum width of postmentum	0.45	0.46-0.52	0.49
Minimum width of postmentum	0.25	0.23-0.26	0.23
Length of pronotum	0.57	0.48-0.57	0.54
Width of pronotum	1.20	1.04-1.24	1.16
Width of mesonotum	1.10	0.98-1.14	1.07
Width of metanotum	1.10	0.98-1.14	1.06

REMARKS: This is the first record of the occurrence of *Prorhinotermes* from the interior of the mainland, some 250 miles from the sea-coast. This genus has a characteristically insular distribution.

GENUS **SCHEDORHINOTERMES** SILVESTRI

KEY TO THE SPECIES

MAJOR SOLDIERS

1. Larger species; length of head to side base of mandibles, 2.28-2.49 mm., maximum width of head, 2.28-2.54 mm. . . . . *S. sarawakensis* (Holmgren)
2. Head rectangular. *S. rectangularis*, new species

MINOR SOLDIERS

1. Larger species; length of head to side base of mandibles, 1.04-1.27 mm., maximum width of head, 0.92-1.11 mm. . . . . *S. sarawakensis* (Holmgren)
2. Antennae with 16 articles; lateral margins of head depressed in middle . . . . . *S. medioobscurus* (Holmgren)

**Schedorhinotermes medioobscurus** (Holmgren)

*Rhinotermes* (*Schedorhinotermes*) *brevialatus* f. *medioobscurus* HOLMGREN, 1914, p. 241 (imago).

*Rhinotermes* (*Schedorhinotermes*) *brevialatus* HOLMGREN, 1914, p. 240.

*Rhinotermes* (*Schedorhinotermes*) *longirostris* HOLMGREN, 1914, p. 240.

*Rhinotermes* (*Schedorhinotermes*) *translucens* HOLMGREN, 1914, p. 240.

*Schedorhinotermes medioobscurus*: SNYDER, 1949, p. 94 (synonymy).

*Schedorhinotermes medioobscurus*: AHMAD, 1958, pp. 79 (imago), 81 (major soldier), 83 (minor soldier).

IMAGO (FIG. 18): Head reddish yellow, slightly lighter posteriorly; postclypeus light reddish yellow, with a brown median line; anteclypeus pale; labrum and antennae light brownish yellow; pronotum yellow, with reddish tinge at anterior and posterior margins; basal third of wings light smoky brown, rest hyaline. Head with a few scattered, erect bristles; labrum with a double row of bristles on disc and two short hairs at tip; pronotum with long bristles along anterolateral and lateral margins, a row of posteriorly directed, suberect bristles a little posterior to anterior margin, a few scattered bristles on lateral sides; wing scales with long, posteriorly directed, suberect bristles. Head almost round; fontanelle small, circular, situated at level of posterior ends of ocelli. Eyes large, circu-

lar, bulging, separated from lower margin of head by one-fourth of their diameter. Ocellus broadly oval, separated from eye by slightly less than its short diameter. Postclypeus somewhat conical, with broad base and rounded tip; seen in profile, convex, overhanging anteclypeus. Labrum broad, dome shaped. Left mandible with three marginal teeth, second shorter than first. Right mandible with two marginal teeth and a distinct subsidiary tooth at base of anterior cutting edge of first marginal tooth. Antennae with 20 articles; third obconic, one and a half times as long as second. Pronotum with anterior margin slightly convex in middle, not emarginate; anterolateral sides broadly rounded; posterior margin almost straight.

**MAJOR SOLDIER (FIG. 19):** Head reddish yellow, margins of frontal groove, basal margin of postclypeus, and antennal carinae reddish brown; labrum of same color as head; mandibles reddish brown; antennae pale, with a brownish tinge; pronotum yellow, with a brownish tinge anteriorly and posteriorly. Head very scantily hairy; tip of labrum fringed with short hairs, hairs becoming shorter in middle, left anterolateral corner with three and right corner with two bristles; postmentum with three bristles along lateral margins just below tip; pronotum with a few minute hairs on anterior margin in middle, lateral lobe with a long bristle, one bristle at

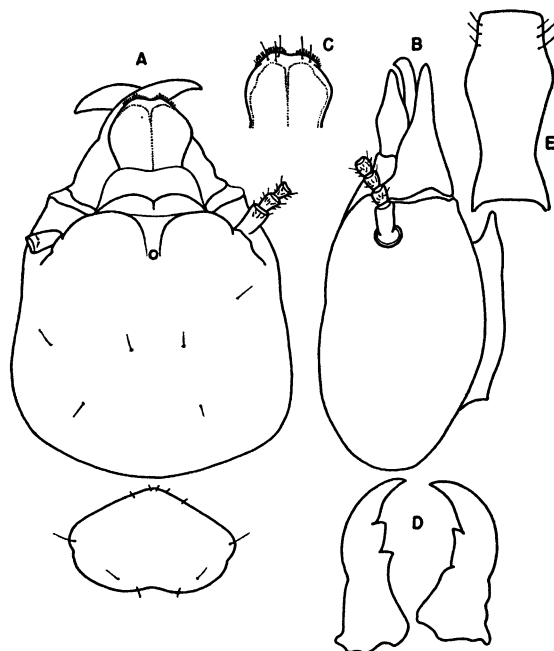


FIG. 19. Major soldier of *Schedorhinotermes medioobscurus* (Holmgren). A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below.

each posterolateral side, rest of pronotum without bristles or hairs. Head squarish; lateral margins slightly bulging at posterolateral ends of antennal carinae; slightly depressed just below bulge; maximum width in basal third; fontanelle circular, with a groove running in front. Postclypeus much wider than long, with a median groove. Anteclypeus short, membranous. Labrum almost as broad as long, broadest in middle; tip hyaline, weakly bilobed. Mandibles stoutly built, sickle shaped, strongly curved at tips; left mandible with two marginal teeth and right with one. Postmentum moderately arched, a little more than one and a half times as broad at widest point as at waist; constriction nearer to posterior margin than to widest point. Antennae with 16–17 articles; in specimens with 17 articles, second longer than third and fourth. Pronotum produced anteriorly; lateral lobes small, broadly rounded, with a notch just below; posterior margin slightly depressed in middle.

**MINOR SOLDIER (FIG. 20):** Head yellow; lateral margins of frontal groove, posterior

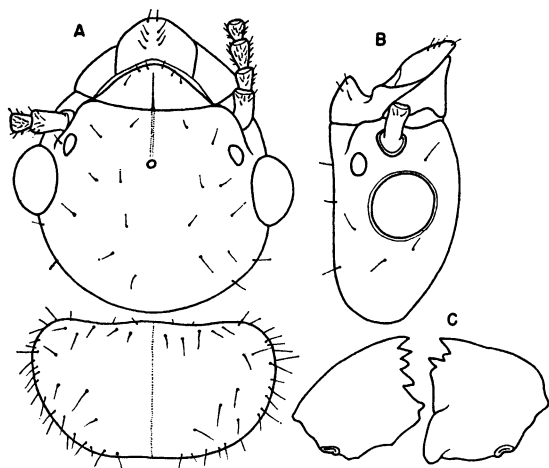


FIG. 18. Imago of *Schedorhinotermes medioobscurus* (Holmgren). A. Head and pronotum from above. B. Head from side. C. Mandibles.

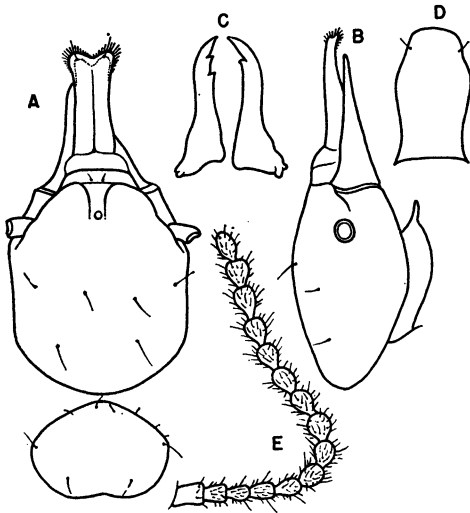


FIG. 20. Minor soldier of *Schedorhinotermes medioobscurus* (Holmgren). A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Postmentum from below. E. Antenna.

margin of postclypeus, and antennal carinae reddish brown; labrum brownish yellow, tip hyaline; mandibles light reddish brown, lighter at base; pronotum light brownish yellow, with reddish tinge along margins; legs pale. Head with a few long bristles in posterior half; postclypeus with two small bristles; tip of labrum fringed with short hairs, two short bristles at each anterolateral lobe of tip; postmentum with one or two small bristles at lateral margins in front of broadest point; pronotum very scantily hairy. Head nearly parallel sided in middle, widest at posterolateral ends of antennal carinae; fontanelle circular, with a groove running anteriorly. Labrum elongate, extending beyond the tips of mandibles, grooved along median line; tip bilobed. Mandibles delicate, sickle shaped; left mandible with two marginal teeth; right mandible with one sharply pointed marginal tooth. Postmentum arched, broad, only slightly wider at broadest point than at waist; constriction near posterior margin. Antennae with 15-16 articles; in specimens with 15 articles, second slightly longer than third, latter slightly shorter than fourth. Pronotum as shown in figure 20, one and a half times as broad as long; anterior margin slightly produced in

front, without emargination; posterior margin slightly depressed in middle.

MEASUREMENTS (IN MM.): Range of measurements, with means in parentheses. *Ten imagoes*: Length of head to tip of labrum, 1.61-1.71 (1.65); length of head to side base of mandibles, 1.09-1.21 (1.15); width of head across eyes, 1.61-1.66 (1.62); long diameter of eye, 0.39-0.46 (0.40); short diameter of eye, 0.33-0.39 (0.37); eye from lower margin of head, 0.07-0.11 (0.09); length of ocellus, 0.14-0.16 (0.15); width of ocellus, 0.10-0.13 (0.11); ocellus from eye, 0.06-0.10 (0.08); length of pronotum, 0.78-0.83 (0.79); width of pronotum, 1.35-1.40 (1.38). *Fourteen major soldiers*: Length of head to side base of mandibles, 1.45-1.61 (1.54); width of head at side base of mandibles, 0.98-1.09 (1.03); width of head at posterolateral ends of antennal carinae, 1.32-1.45 (1.39); width of head in middle, 1.40-1.61 (1.50); length of left mandible, 0.85-0.93 (0.91); first marginal tooth of left mandible from tip of apical tooth, 0.26-0.28 (0.26); length of postmentum, 0.93-1.09 (1.03); maximum width of postmentum, 0.40-0.46 (0.42); minimum width of postmentum, 0.26-0.28 (0.26); length of pronotum, 0.54-0.57 (0.56); width of pronotum, 0.85-0.95 (0.90); width of mesonotum, 0.80-0.88 (0.84); width of metanotum, 0.90-0.95 (0.92). *Ten minor soldiers*: Length of head to side base of mandibles, 0.75-0.85 (0.80); width of head at side base of mandibles, 0.48-0.54 (0.49); width of head at posterolateral ends of antennal carinae, 0.70-0.78 (0.72); width of head in middle, 0.66-0.72 (0.68); length of left mandible, 0.52-0.59 (0.57); first marginal tooth of left mandible from tip of apical tooth, 0.07-0.10 (0.08); length of postmentum, 0.52-0.54 (0.52); maximum width of postmentum, 0.27-0.29 (0.28); minimum width of postmentum, 0.23-0.24 (0.23); length of pronotum, 0.35-0.40 (0.38); width of pronotum, 0.49-0.58 (0.53); width of mesonotum, 0.50-0.57 (0.53); width of metanotum, 0.57-0.67 (0.59).

DISTRIBUTION: Kan Tang, major soldiers, minor soldiers, workers, collected by M. Ahmad, March 8, 1962, in a log; Ka-Chong, major soldiers, minor soldiers, workers, collected by M. Ahmad, March 9, 1962, in a log; Chantaburi, major soldiers, minor soldiers, workers, collected by M. Ahmad, March 26,

1962, in a log in rubber plantation; Makham, major soldiers, minor soldiers, workers, collected by M. Ahmad, March 27, 1962; Prew, major soldiers, minor soldiers, workers, collected by M. Ahmad, March 29, 1962, from a log in rubber plantation; Tung Sa-Lang Luang, imagoes, major soldiers, minor soldiers, workers, collected by M. Ahmad, April 8, 1962, in a mound of *Macrotermes*.

***Schedorhinotermes rectangularis*, new species**

**MAJOR SOLDIER (FIG. 21):** Head reddish yellow; margins of fontanelle, lateral margins of frontal groove, posterior margin of postclypeus, and antennal carinae tinged with red; anteclypeus whitish; labrum of same color as head; mandibles reddish brown, lighter basally; antennae light brownish yellow; pronotum and abdomen yellow; legs pale. Head without hairs; labrum with a row of short hairs at tip; pronotum with a few minute hairs along middle of anterior margin, rest without hairs. Head somewhat rectangular; lateral margins almost parallel up to antennae and then converging toward base of mandible; fontanelle circular, with a groove running toward clypeus. Postclypeus very narrow, much broader than long, grooved in middle. Labrum almost as long as broad, maximum width in basal third; anterior margin broad, slightly depressed in middle, hyaline; lateral lobes broadly rounded. Mandibles stout; left mandible with two marginal teeth; first marginal tooth 0.21–0.23 mm. from tip of apical tooth; right mandible with

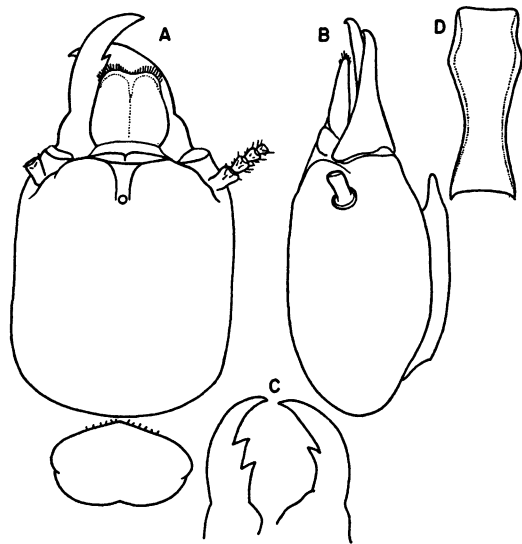


FIG. 21. Major soldier of *Schedorhinotermes rectangularis*, new species. A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Postmentum from below.

sharply pointed marginal tooth. Postmentum slightly arched, one and a half times as broad anteriorly as posteriorly; waist nearly midway between broadest point and lower margin. Antennae with 16 articles, second slightly longer than third, fourth shortest. Pronotum with anterior margin produced in middle; lateral lobes broadly rounded; posterior margin slightly emarginate.

**MINOR SOLDIER (FIG. 22):** Head yellow, with a reddish tinge; rim of fontanelle open-

TABLE 6

MEASUREMENTS (IN MILLIMETERS) OF 10 MAJOR SOLDIERS OF *Schedorhinotermes rectangularis*, NEW SPECIES

	Holotype	Range	Mean
Length of head to side base of mandibles	1.37	1.30–1.43	1.40
Width of head at side base of mandibles	0.91	0.62–0.93	0.86
Width of head at posterolateral ends of antennal carinae	1.17	1.14–1.24	1.18
Width of head in middle	1.19	1.14–1.24	1.20
Length of left mandible	0.78	0.72–0.81	0.77
Length of postmentum	1.04	1.01–1.07	1.04
Maximum width of postmentum	0.39	0.37–0.41	0.39
Minimum width of postmentum	0.23	0.22–0.24	0.23
Length of pronotum	0.41	0.39–0.42	0.41
Width of pronotum	0.70	0.65–0.75	0.71
Width of mesonotum	0.65	0.65–0.70	0.66
Width of metanotum	0.75	0.72–0.78	0.75

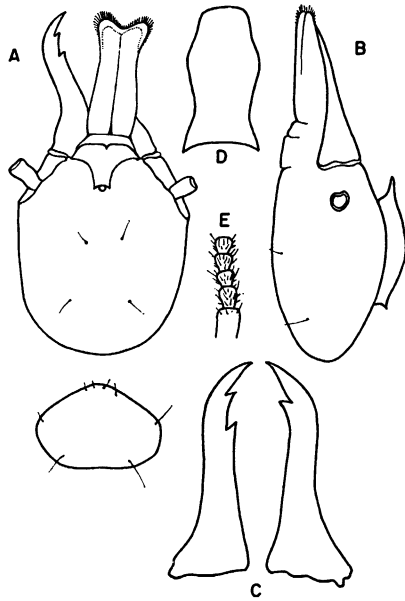


FIG. 22. Minor soldier of *Schedorhinotermes rectangularis*, new species. A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Postmentum from below. E. Antenna.

ing, posterior margin of postclypeus, and antennal carinae reddish brown; postclypeus and labrum slightly lighter than head; mandibles light reddish brown, yellowish at bases; antennae brownish yellow; pronotum yellow. Head with a pair of bristles in posterior third and another pair a little in front of middle; tip of labrum with a row of short hairs; pronotum with two long bristles near posterior

margin, one bristle on each lateral lobe and a few shorter bristles along anterior margin in middle. Head with lateral margin slightly converging posteriorly from posterolateral ends of antennal carinae where head is broadest; fontanelle minute, circular, groove in front wider than fontanelle. Postclypeus much broader than long, with a median groove. Labrum long, extending a little beyond tips of mandibles; tip bilobed. Mandibles long, slender, incurved apically; left mandible with two sharply pointed marginal teeth, first marginal tooth 0.10–0.13 mm. from tip of apical tooth; right mandible with one marginal tooth, slightly farther from tip of apical tooth than first marginal tooth of left mandible. Postmentum strongly arched, only slightly broader anteriorly than at waist, latter nearer to posterior margin than to broadest point. Antennae with 15 articles; second one and a half times as long as third; fourth slightly longer than third and fifth. Pronotum shaped as shown in figure 22; lateral margins broadly rounded; posterior margin very weakly emarginate.

COMPARISONS: The major soldier of *Schedorhinotermes rectangularis*, new species, approaches that of *S. makassarensis* Kemner in size, but it has a somewhat rectangular head (rather square in *S. makassarensis*). The major soldiers of *Schedorhinotermes javanicus* Kemner, *S. medioobscurus* (Holmgren), and *S. longirostris* (Brauer) are larger and have rather square heads.

The minor soldier of *Schedorhinotermes*

TABLE 7

MEASUREMENTS (IN MILLIMETERS) OF SEVEN MINOR SOLDIERS OF *Schedorhinotermes rectangularis*, NEW SPECIES

	Morphotype	Range	Mean
Length of head to side base of mandibles	0.70	0.67–0.78	0.72
Width of head at side base of mandibles	0.46	0.44–0.52	0.46
Width of head at posterolateral ends of antennal carinae	0.67	0.62–0.79	0.68
Width of head in middle	0.65	0.59–0.70	0.64
Length of left mandible	0.57	0.55–0.62	0.57
Length of postmentum	0.52	0.49–0.57	0.52
Maximum width of postmentum	0.26	0.26–0.29	0.27
Minimum width of postmentum	0.20	0.20–0.26	0.22
Length of pronotum	0.31	0.29–0.36	0.33
Width of pronotum	0.49	0.45–0.59	0.49
Width of mesonotum	0.46	0.44–0.62	0.49
Width of metanotum	0.49	0.49–0.65	0.59



*rectangularis*, new species, resembles that of *S. medioobscurus* but differs as follows: (1) the first marginal tooth of the left mandible is farther from the tip of the apical tooth, (2) the apical tooth is narrower, and (3) the antennae have 15 articles.

TYPE LOCALITY: Chantaburi, soldiers (holotype, paratypes, morphotype, paramorphotypes), workers, collected by M. Ahmad, March 26, 1962, in a log; soldiers (paratypes, paramorphotypes), collected by M. Ahmad, March 26, 1962, from the ground; soldiers (paratypes, paramorphotypes), collected by M. Ahmad, March 25, 1962, from a log in a rubber plantation.

***Schedorhinotermes sarawakensis* (Holmgren)**

*Rhinotermes* (*Schedorhinotermes*) *sarawakensis* HOLMGREN, 1913b, pp. 87–88 (major soldier, minor soldier, worker), pl. 2, fig. 13 (major soldier), fig. 18 (minor soldier).

*Rhinotermes* (*Schedorhinotermes*) *sarawakensis*: HOLMGREN, 1914, p. 242 (soldier, worker).

*Schedorhinotermes magnificus* SILVESTRI, 1914, p. 425 (soldier).

*Rhinotermes* (*Schedorhinotermes*) *sarawakensis*: JOHN, 1925, p. 384 (locality).

*Schedorhinotermes sarawakensis*: SNYDER, 1949, p. 95 (synonymy).

*Schedorhinotermes sarawakensis*: AHMAD, 1958, pp. 79–80 (major soldier), 81 (minor soldier).

**MAJOR SOLDIER (FIG. 23):** Head yellow, with a reddish tinge; labrum and antennae brownish yellow; mandibles reddish brown, lighter at bases; pronotum, mesonotum, and metanotum yellow; legs straw colored, abdomen of same color as thorax. Head with a few scattered, long bristles; tip of labrum fringed with short hairs, becoming still shorter in median depressed portion; pronotum with a few scattered, long and short bristles. Head narrowed anteriorly, broadest in basal third; posterior margin slightly produced in middle, with a low concavity on each side; fontanelle small, circular, placed at level of bases of antennae, with a groove in front. Postclypeus much broader than long, with a median groove. Labrum slightly longer than broad; sides convex; maximum width in basal third; tip slightly depressed in middle, hyaline. Mandibles stout, apices incurved; left mandible with two marginal teeth, first larger than second, placed at a distance of 0.39–0.52 mm. from

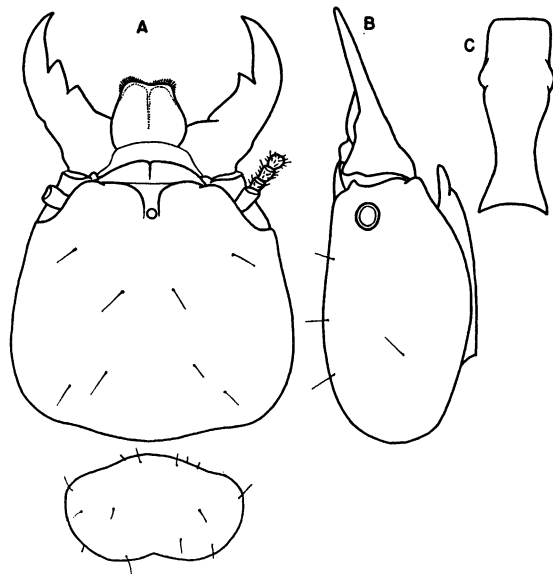


FIG. 23. Major soldier of *Schedorhinotermes sarawakensis* (Holmgren). A. Head and pronotum from above. B. Head from side. C. Postmentum from below.

tip of apical tooth; right mandible with one marginal tooth, placed a little below the level of first marginal tooth of left mandible. Postmentum long, slightly arched, about twice as wide anteriorly as posteriorly; waist nearer to posterior margin than to broadest point. Antennae with 16–18 articles; in specimens with 17 articles, second shorter than third and nearly as long as fourth. Pronotum with anterior margin convex, not emarginate; lateral sides broadly rounded; posterior margin emarginate.

**MINOR SOLDIER (FIG. 24):** Head yellow, with a reddish tinge; labrum and antennae light brownish yellow; mandibles reddish brown, lighter at bases; pronotum yellow, with reddish tinge; legs straw colored. Head with a few scattered bristles in posterior half; labrum tip bordered with a row of short hairs; pronotum scantily hairy. Head nearly parallel sided up to posterior ends of antennal carinae; sides only slightly convex; fontanelle circular, placed about level of bases of antennae. Labrum long, not extending up to tips of mandibles. Mandibles long, slender; left mandible with two marginal teeth, first marginal tooth 0.11–0.15 mm. from tip of apical tooth; right mandible with one mar-

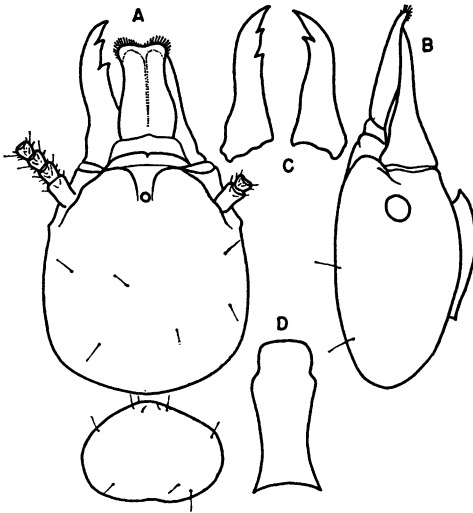


FIG. 24. Minor soldier of *Schedorhinotermes sarawakensis* (Holmgren). A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Postmentum from below.

ginal tooth, placed slightly below level of first marginal tooth of left mandible. Postmentum strongly arched, less than one and a half times as broad anteriorly as posteriorly; waist nearer to posterior margin than to broadest point. Antennae with 16 articles; second indistinctly longer than third; fourth slightly shorter than third. Pronotum shaped as shown in figure 24; anterior margin broadly convex, slightly produced in middle, without notch; lateral margins broadly rounded; posterior margin indistinctly depressed in middle.

**MEASUREMENTS (IN MM.):** Range of measurements, with means in parentheses. *Eighteen major soldiers:* Length of head to side base of mandibles, 2.28–2.49 (2.42); width of head at side base of mandibles, 1.45–1.61 (1.50); width of head at posterolateral ends of antennal carinae, 1.92–2.15 (2.05); width of head in basal third, 2.28–2.54 (2.43); length of left mandible, 1.24–1.50 (1.34); first marginal tooth of left mandible from tip of apical tooth, 0.39–0.52 (0.42); length of postmentum, 1.56–1.84 (1.69); maximum width of postmentum, 0.62–0.67 (0.64); minimum width of postmentum, 0.33–0.39 (0.35); length of pronotum, 0.75–0.83 (0.78); width of pronotum, 1.38–1.58 (1.49); width of mesonotum, 1.37–1.63 (1.49); width of meta-

notum, 1.45–1.61 (1.53). *Twelve minor soldiers:* Length of head to side base of mandibles, 1.04–1.27 (1.16); width of head at side base of mandibles, 0.67–0.78 (0.72); width of head at posterolateral ends of antennal carinae, 0.93–1.04 (0.98); width of head in middle, 0.92–1.11 (1.01); length of left mandible, 0.72–0.80 (0.76); first marginal tooth of left mandible from tip of apical tooth, 0.11–0.15 (0.13); length of postmentum, 0.72–0.80 (0.76); maximum width of postmentum, 0.33–0.39 (0.35); minimum width of postmentum, 0.23–0.31 (0.27); length of pronotum, 0.46–0.52 (0.49); width of pronotum, 0.72–0.81 (0.77); width of mesonotum, 0.75–0.83 (0.79); width of metanotum, 0.80–0.93 (0.86).

**DISTRIBUTION:** Ka-Chong, soldiers (major and minor), workers, collected by M. Ahmad, March 10, 1962, from ground under debris; Tung Sa-Lang Luang, soldiers (major, minor), workers, collected by M. Ahmad, April 10, 1962, in a stump; Mae Sod, soldiers (major, minor), workers, collected by M. Ahmad, April 19, 1962, in a log.

#### FAMILY TERMITIDAE

##### SUBFAMILY MACROTERMITINAE

##### GENUS MACROTREMES HOLMGREN

#### KEY TO THE SPECIES

##### IMAGOS

- Ocelli separated from eyes by much less than their short diameter . . . . . *M. gilvus* (Hagen)  
 Ocelli separated from eyes by their diameter . . . . . *M. carbonarius* (Hagen)

##### MAJOR SOLDIERS

1. Tip of labrum greatly elongated, sharply pointed . . . . . *M. malaccensis* (Haviland)  
 Tip of labrum not greatly elongated, not sharply pointed, trilobed. . . . . 2
2. Head almost black . *M. carbonarius* (Hagen)  
 Head castaneous brown or lighter. . . . . 3
3. Lateral margins of thoracic tergites not produced into lobes, uniformly rounded. . . . . *M. gilvus* (Hagen)  
 Lateral margins of pronotum produced into narrowly rounded lobes . . . . . 4
4. Larger species; length of head to side base of mandibles, 4.78–5.04 mm.; maximum width of head, 3.84–4.36 mm. . . . . *M. annandalei* (Silvestri)  
 Smaller species; length of head to side base of

- mandibles, 3.27–4.03 mm.; maximum width of head, 2.70–3.31 mm. . . . . 5
5. Postmentum broadest in posterior half . . . . .  
     . . . . . *M. chaiglomi*, new species  
 Postmentum broadest in apical third . . . . .  
     . . . . . *M. maesodensis*, new species

#### MINOR SOLDIERS

1. Tip of labrum greatly elongated, sharply pointed . . . . . *M. malaccensis* (Haviland)  
 Tip of labrum not greatly elongated, trilobed, not sharply pointed . . . . . 2
2. Head almost black . . . . . *M. carbonarius* (Hagen)  
 Head castaneous brown or lighter. . . . . 3
3. Lateral sides of pronotum not produced into a lobe, uniformly rounded . . . . . *M. gilvus* (Hagen)  
 Lateral sides of pronotum produced into a narrowly rounded lobe . . . . . 4
4. Larger species; length of head to side base of mandibles, 2.96–3.12 mm. . . . .  
     . . . . . *M. annandalei* (Silvestri)  
 Smaller species; length of head to side base of mandibles, up to 2.44 mm. . . . . 5
5. Postmentum with a distinct constriction in anterior half, wider posteriorly than anteriorly . . . . . *M. chaiglomi*, new species  
 Postmentum with an indistinct constriction, nearly as wide posteriorly as anteriorly . . . . .  
     . . . . . *M. maesodensis*, new species

#### *Macrotermes gilvus* (Hagen)

?*Termes taprobanes* WALKER, 1853, p. 522.

*Termes gilvus* HAGEN, 1858, pp. 148–151 (imago, queen, major soldier, minor soldier), pl. 2, fig. 9 (soldier), pl. 3, fig. 14 (imago).

?*Termes dives* HAGEN, 1858, p. 142 (soldier). Java only.

?*Termes fatalis* HAGEN, 1858, p. 144 (soldier).

*Termes Taprobanes?* HAGEN, 1860, p. 103 (soldier).

*Termes* (*Macrotermes*) *gilvus*: HOLMGREN, 1913b, pp. 98–100 (imago, major soldier, minor soldier, worker), pl. 3, figs. 9 (imago), 10 (major soldier), 11 (minor soldier).

*Termes* (*Macrotermes*) *gilvus*: HOLMGREN, 1914, p. 243.

*Termes gilvus*: LIGHT, 1921, p. 251 (synonymy, locality).

*Macrotermes gilvus*: JOHN, 1925, pp. 385–386 (locality).

*Termes* (*Macrotermes*) *gilvus*: BATHELLIER, 1927, pp. 141–145 (systematics), 187–209 (biology), 258–274 (development).

*Macrotermes gilvus*: KEMNER, 1934, pp. 72–77 (imago, major soldier, minor soldier, worker), 187–199 (biology).

*Macrotermes gilvus*: SNYDER, 1949, p. 211 (synonymy).

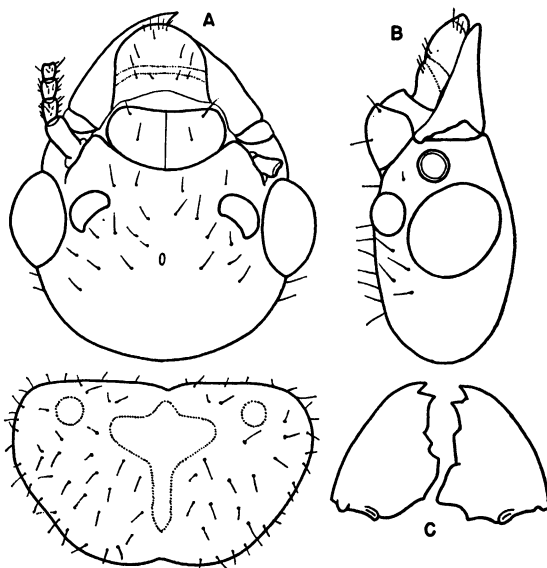


FIG. 25. Imago of *Macrotermes gilvus* (Hagen). A. Head and pronotum from above. B. Head from side. C. Mandibles.

*Macrotermes gilvus*: AHMAD, 1958, pp. 93 (imago), 94–95 (major soldier), 96 (minor soldier).

IMAGO (FIG. 25): Head reddish brown; postclypeus yellowish brown; anteclypeus whitish; labrum yellowish brown; antennae dark brown; pronotum brown, with a T-shaped marking on disc and an ocellus-like marking at each anterolateral corner, markings lighter in color than rest of pronotum. Head sparsely hairy; postclypeus with a few long hairs; labrum with a few hairs at tip and a few on disc; pronotum slightly more hairy than head. Head round; fontanelle small, situated a little above level of posterior ends of eyes. Eyes large, bulging, not quite circular. Ocellus large, broadly oval, very close to eye. Postclypeus swollen, slightly less than half as long as broad. Labrum broad, dome shaped, Left mandible with two marginal teeth, with a cut in front of second marginal tooth. Right mandible with two marginal teeth and an indistinct subsidiary tooth at base of anterior cutting edge of first marginal tooth. Antennae with 19 articles; second and third subequal; fourth shorter. Pronotum almost as wide as head; anterior margin indistinctly and posterior margin distinctly emarginate; anterolateral sides broadly

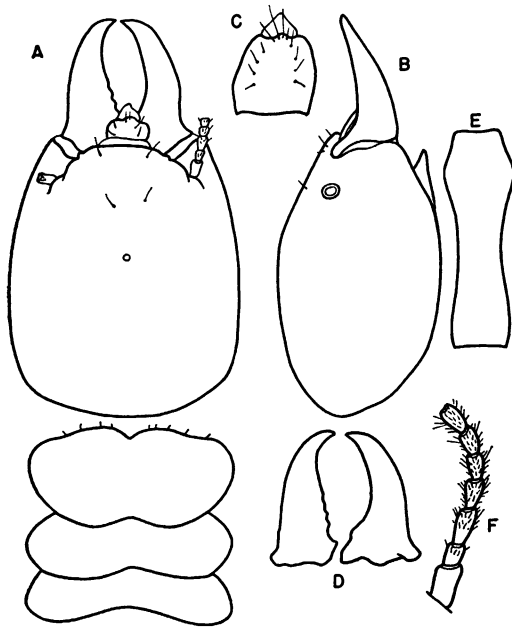


FIG. 26. Major soldier of *Macrotermes gilvus* (Hagen). A. Head, pronotum, mesonotum, and metanotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

rounded; anterior margin straight, in some specimens shallowly concave.

**MAJOR SOLDIER (FIG. 26):** Head light reddish brown, slightly darker anteriorly; labrum reddish brown; mandibles dark reddish brown, lighter at bases; antennae brown, apices of articles whitish; thoracic tergites much lighter than head. Head with a few hairs in anterior region, rest without hairs; labrum with a row of bristles along lateral sides and a few bristles at base of hyaline tip; pronotum with a few minute hairs along anterior margin, disc without hairs. Head subrectangular, lateral margins weakly convex; maximum width in middle; fontanelle minute, dotlike, situated slightly above middle. Eyes minute, circular. Labrum slightly longer than broad; tip hyaline, rather triangular, sides rounded at base, not greatly produced anteriorly. Mandibles stout, thick at bases, tips incurved; left mandible with a few crenulations at base; right mandible without crenulations. Postmentum long, broadest in apical fourth; narrowest in middle; lateral margins concave in middle, convex in basal

fourth. Antennae with 17 articles; third one and a half times as long as second; fourth shorter than third. Pronotum distinctly emarginate both anteriorly and posteriorly; lateral sides broadly rounded, lobes not produced. Mesonotum with broadly rounded lateral sides; posterior margin broadly emarginate. Metanotum like mesonotum; posterior margin broadly concave.

**MINOR SOLDIER (FIG. 27):** Head light yellowish brown; labrum and antennae brown; mandibles dark reddish brown, bases lighter; pronotum lighter than head. Head scantily hairy, one pair of bristles in posterior half, another pair near postclypeus; labrum with a row of long bristles on each lateral side and a few bristles at base of hyaline tip; pronotum with a few minute hairs on anterior margin, rest without hairs. Head subrectangular; fontanelle small, nearly circular, placed in middle. Anteclypeus very short, much broader than long. Labrum longer than broad, sides moderately convex, broadest

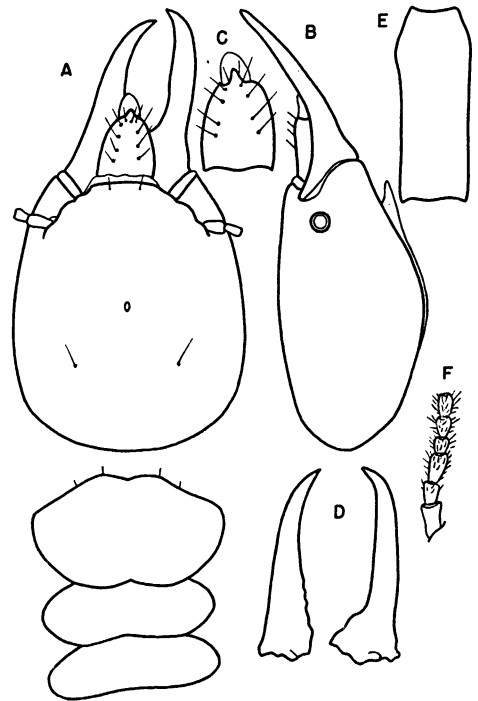


FIG. 27. Minor soldier of *Macrotermes gilvus* (Hagen). A. Head, pronotum, mesonotum, and metanotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

slightly below middle; tip hyaline, dome shaped. Mandibles long, rather slender, slightly curved apically; left mandible with a few crenulations at base; right mandible without crenulations. Postmentum long, nearly parallel sided. Antennae with 17 articles; second shorter than third; fourth half as long as third. Pronotum, mesonotum, and metanotum with lateral sides broadly rounded.

**MEASUREMENTS (IN MM.):** Range of measurements, with means in parentheses. *Twenty imagoes*: Length of head to tip of labrum, 2.80–3.17 (2.96); length of head to side base of mandibles, 1.72–2.39 (1.99); width of head, 2.45–2.80 (2.59); long diameter of eye, 0.79–0.93 (0.85); short diameter of eye, 0.64–0.80 (0.69); eye from lower margin of head, 0.07–0.13 (0.11); length of ocellus, 0.32–0.44 (0.38); width of ocellus, 0.25–0.36 (0.31); ocellus from eye, 0.02–0.10 (0.06); length of pronotum, 1.33–1.58 (1.48); width of pronotum, 2.23–2.75 (2.56). *Thirty-two major soldiers*: Length of head to side base of mandibles, 3.24–4.00 (3.47); width of head at side base of mandibles, 1.45–2.08 (1.76); width of head at posterolateral ends of antennal carinae, 2.08–2.91 (2.47); maximum width of head, 2.36–3.32 (2.85); length of left mandible, 1.42–2.02 (1.63); length of postmentum, 2.04–2.86 (2.50); maximum width of postmentum, 0.62–0.95 (0.78); width of postmentum at constriction, 0.43–0.64 (0.54); width of postmentum in posterior half, 0.64–0.72 (0.68); length of pronotum, 0.93–1.29 (1.08); width of pronotum, 1.82–2.80 (2.67); width of mesonotum, 1.56–2.44 (2.25); width of metanotum, 1.61–2.86 (2.31). *Seventeen minor soldiers*: Length of head to side base of mandibles, 1.82–2.28 (2.23); width of head at side base of mandibles, 0.88–1.35 (1.01); width of head at posterolateral ends of antennal carinae, 1.26–1.71 (1.44); maximum width of head, 1.50–1.97 (1.67); length of left mandible, 1.14–1.50 (1.32); length of postmentum, 1.14–1.61 (1.31); maximum width of postmentum, 0.46–0.98 (0.60); width of postmentum at constriction, 0.41–0.57 (0.46); width of postmentum in posterior half, 0.46–0.50 (0.48); length of pronotum, 0.59–0.88 (0.72); width of pronotum, 1.04–1.61 (1.27); width of mesonotum, 0.83–1.50 (1.07); width of metanotum, 0.98–1.56 (1.18).

**DISTRIBUTION:** Bangkok, imagoes, collected by D. Chaiglom, January 1, 1959; Bangkok, Bangkok, soldiers, workers, collected by D. Chaiglom, January 29, 1961; Ayudhya, king, queen, workers, collected by D. Chaiglom, February 4, 1961; Ka-Chong, queen, soldiers, workers, collected by M. Ahmad, March 3, 1962, from a mound at the base of a tree; Huay Yang, imagoes, soldiers, workers, collected by M. Ahmad, March 14, 1962, from a mound; Makham, soldiers, workers, collected by M. Ahmad, March 27, 1962, from a mound; Sopa Waterfall, Tung Sa-Lang Luang, soldiers, workers, collected by M. Ahmad, April 12, 1962; Tak, soldiers, workers, collected by M. Ahmad, April 16, 1962, from a mound.

**REMARKS:** *Macrotermes gilvus* is one of the most widely distributed fungus-growing termites in Thailand. Almost every log examined in localities visited by the author was found infested by this termite.

#### ***Macrotermes carbonarius* (Hagen)**

*Termes carbonarius* HAGEN, 1858, p. 130, pl. 1, fig. 2 (soldier), pl. 2, fig. 8 (imago), pl. 3, fig. 12 (imago).

*Termes carbonarius*: HAVILAND, 1898, p. 380 (imago, soldier, worker).

*Termes (Macrotermes) carbonarius*: HOLMGREN, 1913b, pp. 93–94 (imago, major soldier, minor soldier, worker), pl. 3, figs. 1 (imago), 2 (major soldier), 3 (minor soldier).

*Macrotermes carbonarius*: JOHN, 1925, p. 385 (locality, biology).

*Termes (Macrotermes) carbonarius*: BATHELLIER, 1927, pp. 148–152 (systematics), 209–210 (biology).

*Macrotermes carbonarius*: SNYDER, 1949, p. 210 (synonymy).

*Macrotermes carbonarius*: AHMAD, 1958, pp. 92 (imago), 94 (major soldier), 96 (minor soldier).

**KING (FIG. 28):** Head dark brown; postclypeus brown; mandibles reddish brown, teeth black; antennae brown, apices of articles lighter; pronotum dark brown; central portion of disc reddish brown, abdominal tergites dark brown. Head sparsely hairy; postclypeus with two bristles anteriorly; pronotum with a few short hairs along anterior margin and a few scattered bristles on disc. Head subcircular; fontanelle minute, circular, placed at posterior level of eyes. Eyes bulging, not quite circular, separated from lower

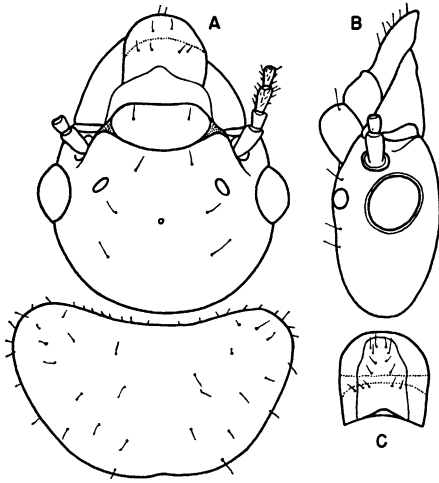


FIG. 28. Imago of *Macrotermes carbonarius* (Hagen). A. Head and pronotum from above. B. Head from side. C. Labrum from above.

margin of head by one-fourth of their long diameter. Ocellus small, almost circular, separated from eye by slightly more than its diameter. Postclypeus swollen, nearly twice as broad as long. Labrum dome shaped, about as long as broad; anterior margin broadly rounded. Antennae incomplete; third twice as long as second and nearly one and a half times as long as fourth. Pronotum broader than head, slightly more than half as long as wide; anterior margin shallowly concave; anterolateral corners broadly rounded; posterior margin weakly depressed in middle.

MAJOR SOLDIER (FIG. 29): Head dark brown, vertex reddish brown, region around postclypeus pale brown; labrum and antennae brown; mandibles dark brown, bases reddish brown; thoracic tergites brown, with lighter areas in center; legs brownish yellow; abdominal tergites of same color as thoracic tergites. Head scantily hairy, postclypeus with a few short hairs; labrum with a few medium-sized bristles along lateral sides and at base of hyaline portion of tip; pronotum with a few minute hairs on anterior margin; rest without hairs. Head subrectangular, sides moderately convex; fontanelle minute, circular, placed slightly below level of eyes. Eyes small, circular, whitish. Anteclypeus trapezoid, much broader than long. Labrum dome shaped, longer than broad, broadest in anterior half; tip subtriangular, hyaline.

Mandibles stout, thick, saber shaped; inner margin of left mandible crenulate; right mandible without crenulations. Postmentum elongate, rectangular; sides nearly parallel, slightly convex near posterior margin. Antennae long, slender, with 17 articles; third slightly more than twice as long as second; fourth shorter than third and longer than fifth. Pronotum halfmoon shaped, twice as broad as long; anterior margin convex in middle, slightly emarginate; posterior margin slightly depressed in middle; lateral lobes rather broadly rounded. Mesonotum slightly narrower than pronotum; lateral sides angularly rounded. Metanotum nearly as wide as mesonotum; posterior margin almost straight.

MINOR SOLDIER (FIG. 30): Head dark brown, pale brown anteriorly; labrum and antennae brown; mandibles dark reddish brown; thorax and abdomen brown; legs pale brown. Head with a few hairs near postclypeus, rest without hairs; labrum with long bristles along lateral sides; pronotum with a few short hairs along anterior margin. Head

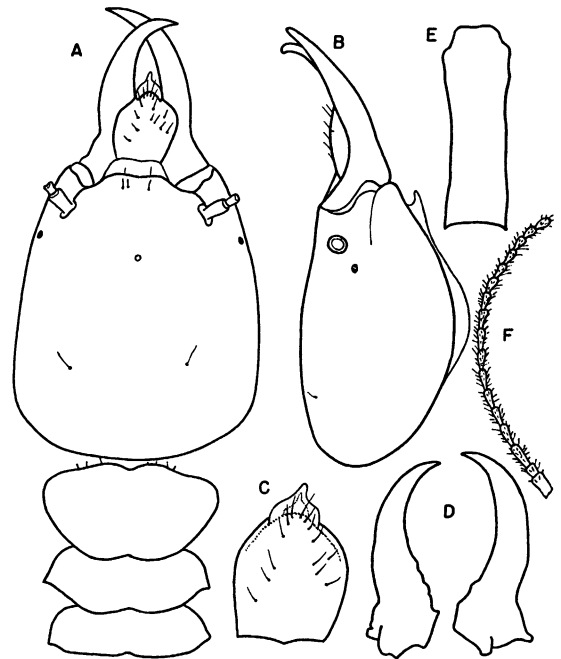


FIG. 29. Major soldier of *Macrotermes carbonarius* (Hagen). A. Head, pronotum, mesonotum, and metanotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

somewhat rectangular, broadest in middle; fontanelle small, circular, placed about level of eyes. Eyes small, whitish. Labrum dome shaped, broadest in anterior half; tip subtriangular, hyaline, median portion slightly produced. Mandibles long, saber shaped; left mandible with, and right mandible without, crenulations at bases. Postmentum rectangular; sides almost parallel in middle, slightly convex near posterior margin. Antennae with 17 articles; third twice as long as second; fourth shorter than third. Pronotum twice as broad as long; lateral angles distinct; anterior margin convex, emarginate; posterior margin moderately emarginate. Mesonotum narrower than pronotum; lateral lobes broadly rounded. Metanotum slightly wider than mesonotum.

MEASUREMENTS (IN MM.): *King*: Length of head to tip of labrum, 3.79; length of head to side base of mandibles, 2.28; width of head, 3.17; long diameter of eye, 0.78; short diameter of eye, 0.72; eye from lower margin of head, 0.20; diameter of ocellus, 0.26; ocellus from eye, 0.31; length of postclypeus, 0.62; width of postclypeus, 1.19; length of

pronotum, 1.87; width of pronotum, 3.43.

Range of measurements, with means in parentheses. *Ten major soldiers*: Length of head to side base of mandibles, 4.78–4.99 (4.83); width of head at side base of mandibles, 2.34–2.48 (2.41); width of head at posterolateral ends of antennal carinae, 3.17–3.43 (3.33); maximum width of head, 3.90–4.31 (4.08); length of left mandible, 2.75–2.86 (2.83); length of postmentum, 3.06–3.38 (3.25); maximum width of postmentum, 0.93–1.14 (1.05); minimum width of postmentum, 0.78–0.90 (0.84); length of pronotum, 1.40–1.56 (1.47); width of pronotum, 2.80–3.01 (2.93); width of mesonotum, 2.60–2.86 (2.71); width of metanotum, 2.54–2.83 (2.69). *Eight minor soldiers*: Length of head to side base of mandibles, 3.24–3.43 (3.32); width of head at side base of mandibles, 1.61–1.76 (1.68); width of head at posterolateral ends of antennal carinae, 2.23–2.39 (2.30); maximum width of head, 2.54–2.75 (2.67); length of left mandible, 1.87–2.08 (2.00); length of postmentum, 2.18–2.34 (2.27); maximum width of postmentum, 0.64–0.78 (0.70); minimum width of postmentum, 0.54–0.62 (0.58); length of pronotum, 1.09–1.14 (1.12); width of pronotum, 2.02–2.10 (2.04); width of mesonotum, 1.56–1.82 (1.64); width of metanotum, 1.66–1.84 (1.77).

DISTRIBUTION: Ka-Chong, soldiers, workers, collected by M. Ahmad, March 5, 1962, from a mound; Kan Tang, king, queen, soldiers, workers, collected by M. Ahmad, March 8, 1962, from a mound; Chantaburi, soldiers, workers, collected by M. Ahmad, March 25, 1962, from a mound; Prew, soldiers, workers, collected by M. Ahmad, March 29, 1962, from a mound.

#### *Macrotermes chaiglomi*, new species

MAJOR SOLDIER (FIG. 31): Head reddish brown, anterolateral corners slightly darker; labrum and antennae brown; mandibles dark brown, slightly lighter at bases; pronotum brown, with a reddish tinge; mesonotum and metanotum and abdominal tergites rust yellow; legs pale brown. Head very scantily hairy, one pair of bristles at anterior margin of postclypeus and another pair a little posterior to fontanelle; labrum with a row of four bristles along each lateral side, and two long and two short bristles at base of hyaline tip;

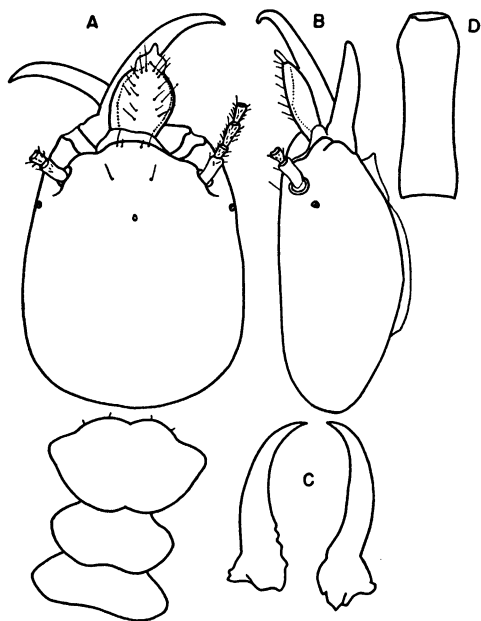


FIG. 30. Minor soldier of *Macrotermes carbonarius* (Hagen). A. Head, pronotum, mesonotum, and metanotum from above. B. Head from side. C. Mandibles. D. Postmentum from below.



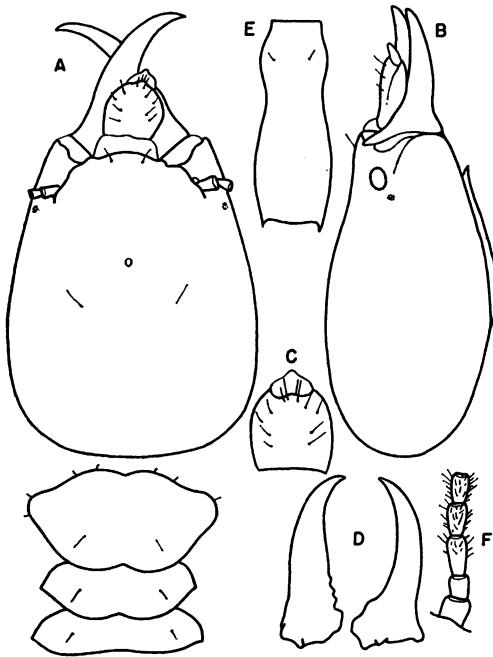


FIG. 31. Major soldier of *Macrotermes chaiglomi*, new species. A. Head, pronotum, mesonotum, and metanotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

postmentum with two bristles anterior to waist; pronotum very sparsely hairy, with a few minute hairs on anterior margin and a pair of bristles in posterior half; mesonotum and metanotum with a pair of posteriorly

directed bristles. Head narrowed anteriorly, widest a little below middle, slightly depressed in middle at level of eyes; fontanelle minute, circular, placed a little anterior to middle. Anteclypeus membranous, much broader than long. Labrum broad, dome shaped, broadest in anterior half; tip hyaline, triangular. Mandibles long, stout, moderately incurved apically; left mandible with a few crenulations at base; right mandibles without crenulations. Postmentum arched, constricted in anterior third, broadest in basal third; lateral margins distinctly convex in basal half. Antennae with 17 articles; third nearly twice as long as second; fourth shorter than third and slightly longer than fifth. Pronotum much narrower than head, with an indistinct, T-shaped, median marking; anterior margin convex in middle, median notch shallow but distinct; lateral lobes produced, narrowly rounded; posterior margin emarginate. Mesonotum narrower than pronotum; lateral lobes angular; posterior margin emarginate. Metanotum slightly broader than mesonotum; lateral lobes angular; posterior margin shallowly concave in middle.

MINOR SOLDIER (FIG. 32): Head brownish yellow; labrum and antennae brown; mandibles reddish brown, lighter at bases; pronotum pale brown; legs straw colored; abdominal tergites light brown. Head sparsely hairy; labrum with a row of bristles along lateral side at base of hyaline tip; pronotum with a few bristles along margins. Head like

TABLE 8

MEASUREMENTS (IN MILLIMETERS) OF SIX MAJOR SOLDIERS OF *Macrotermes chaiglomi*, NEW SPECIES

	Holotype	Range	Mean
Length of head to side base of mandibles	4.03	3.88-4.03	3.97
Width of head at side base of mandibles	2.01	1.94-2.16	2.02
Width of head at posterolateral ends of antennal carinae	2.55	2.44-2.73	2.59
Maximum width of head	3.20	3.02-3.31	3.21
Length of left mandible	2.02	2.01-2.08	2.04
Length of postmentum	2.70	2.37-2.73	2.56
Width of postmentum anterior to constriction	0.93	0.86-0.93	0.88
Width of postmentum at constriction	0.72	0.67-0.72	0.69
Width of postmentum in posterior half	0.95	0.93-0.97	0.94
Length of pronotum	1.15	1.08-1.15	1.10
Width of pronotum	2.39	2.27-2.39	2.31
Width of mesonotum	2.08	1.83-2.11	1.99
Width of metanotum	2.16	2.01-2.17	2.11

that of major soldier; fontanelle minute, circular, situated a little anterior to middle. Eyes small, almost circular. Labrum with lateral sides convex, broadest in middle; tip hyaline, subtriangular. Mandibles long, slender, slightly curved at tips; left mandible with a few crenulations at base; right mandible without crenulations. Postmentum strongly arched, about twice as long as its maximum width, broadest in posterior half; waist in anterior half. Antennae with 17 articles; third slightly longer than second and fourth; fifth shorter than fourth. Pronotum narrower than head; anterior margin convex, raised, indistinctly notched; lateral lobes produced, narrowly rounded; posterior margin emarginate. Mesonotum slightly narrower than pronotum; lateral lobes angular. Metanotum broader than mesonotum; posterior margin almost straight, indistinctly depressed in middle.

**COMPARISONS:** The major soldier of *Macrotermes chaiglomi*, new species, in having the postmentum wider in the middle than anteriorly, comes closest to that of *M. estherae* (Desneux), from which it can be distinguished by its smaller dimensions, narrower constriction, and more produced and more narrowly rounded lateral lobes of the pronotum. *Macrotermes carbonarius*, *M. malaccensis*, and *M. annandalei* are larger.

The minor soldier of *Macrotermes chaiglomi*, new species, can be distinguished from the minor soldiers of all hitherto known Indo-

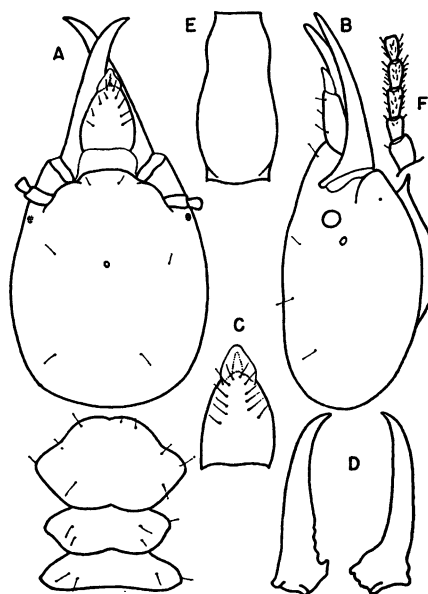


FIG. 32. Minor soldier of *Macrotermes chaiglomi*, new species. A. Head, pronotum, mesonotum, and metanotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

Malayan species of *Macrotermes* by the shape of the postmentum. Only *M. estherae* has the postmentum wider posteriorly than anteriorly, but the waist is indistinct, and the lateral sides in the posterior half are less convex.

**TYPE LOCALITY:** Bangkhen, Bangkok,

TABLE 9  
MEASUREMENTS (IN MILLIMETERS) OF 15 MINOR SOLDIERS OF *Macrotermes chaiglomi*,  
NEW SPECIES

	Morphotype	Range	Mean
Length of head to side base of mandibles	2.44	2.01-2.44	2.30
Width of head at side base of mandibles	1.19	1.00-1.22	1.12
Width of head at posterolateral ends of antennal carinae	1.65	1.36-1.67	1.57
Maximum width of head	1.97	1.72-2.08	1.91
Length of left mandible	1.55	1.47-1.59	1.55
Length of postmentum	1.66	1.36-1.72	1.60
Width of postmentum above constriction	0.61	0.57-0.64	0.59
Width of postmentum at constriction	0.57	0.53-0.58	0.56
Maximum width of postmentum	0.78	0.72-0.79	0.76
Length of pronotum	0.86	0.81-0.87	0.85
Width of pronotum	1.56	1.29-1.58	1.46
Width of mesonotum	1.19	1.02-1.32	1.21
Width of metanotum	1.40	1.15-1.44	1.34

TABLE 10  
MEASUREMENTS (IN MILLIMETERS) OF FIVE MAJOR SOLDIERS OF *Macrotermes maesodensis*,  
NEW SPECIES

	Holotype	Range	Mean
Length of head to side base of mandibles	3.69	3.27-3.74	3.54
Width of head at side base of mandibles	1.76	1.74-1.97	1.87
Width of head at posterolateral ends of antennal carinae	2.28	2.34-2.65	2.51
Maximum width of head	2.75	2.70-3.01	2.88
Length of left mandible	1.56	1.56-1.69	1.63
Length of postmentum	2.08	1.79-2.39	2.10
Maximum width of postmentum	0.78	0.78-0.88	0.81
Minimum width of postmentum	0.62	0.62-0.67	0.64
Length of pronotum	0.88	0.88-0.93	0.90
Width of pronotum	1.82	1.76-1.97	1.83
Width of mesonotum	1.43	1.40-1.50	1.44
Width of metanotum	1.56	1.56-1.66	1.60

major soldiers (holotype, paratypes), minor soldiers (morphotype, paramorphotypes), workers, collected by D. Chaiglom, January 11, 1962.

***Macrotermes maesodensis*, new species**

MAJOR SOLDIER (FIG. 33): Head light reddish brown, region around postclypeus and anterolateral corners slightly darker; labrum reddish brown, tip whitish, hyaline; mandibles dark reddish brown, with lighter bases; antennae brownish; thorax pale brown; abdominal tergites a shade lighter than thoracic tergites. Head very scantily hairy, with a few bristles on postclypeus and two or three bristles farther behind; labrum with a row of bristles along lateral sides; postmentum with a few long bristles and short hairs anteriorly; pronotum with a few short hairs on anterior margin and one pair of bristles on each side of disc. Head subrectangular, seen in profile raised in middle and slightly sloping anteriorly; fontanelle minute, circular, placed almost in middle. Eyes small, dotlike. Labrum with sides narrowed anteriorly, broadest in posterior half; tip broadly triangular. Mandibles short, thick, slightly curved at tips; left mandible with finely serrated inner margin and indistinct crenulations at base; right mandible not serrated, without crenulations at base. Postmentum elongate, slightly arched; waist a little below widest part; lateral margins weakly convex in posterior half. Antennae with 17 articles; second and third nearly subequal. Pronotum with an-

terior margin convex, notched in middle; lateral lobes produced, narrowly rounded; posterior margin distinctly emarginate. Mesonotum much narrower than pronotum; lateral lobes slightly angular; posterior margin weakly depressed in middle. Metanotum slightly broader than mesonotum; lateral sides broadly rounded; posterior margin almost straight.

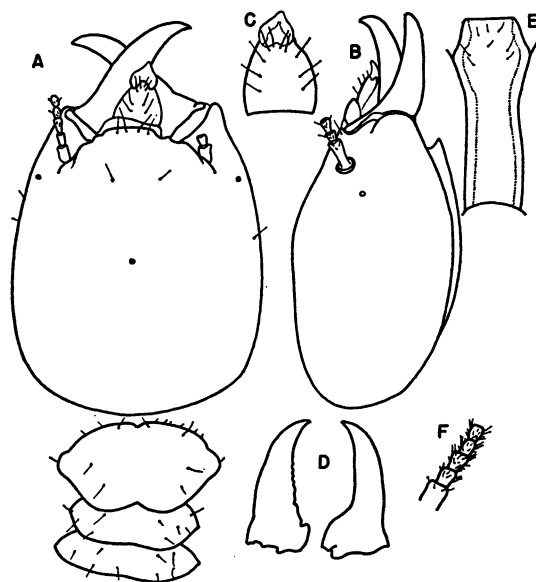


FIG. 33. Major soldier of *Macrotermes maesodensis*, new species. A. Head, pronotum, mesonotum, and metanotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

**MINOR SOLDIER (FIG. 34):** Head light brownish yellow; postclypeus slightly darker than head; labrum and antennae brown; mandibles reddish brown; thoracic and abdominal tergites a little paler than head; legs yellow. Head with a few scattered bristles; labrum with a row of long bristles on each lateral side; postmentum with a few scattered bristles anteriorly and a few minute hairs in basal third; pronotum with a few minute hairs along anterior margin and scattered bristles on disc; mesonotum with a transverse row of bristles; metanotum with similar arrangement of bristles as mesonotum. Head narrowed anteriorly, lateral margins convex; fontanelle minute, dotlike, placed a little posterior to middle. Eyes minute, whitish. Labrum elongate, tongue shaped, broadest in posterior half; tip hyaline. Mandibles long, slender, slightly incurved at apices; left mandible with a few crenulations at base, rest of inner margin without serration; right mandible without serration and crenulations. Postmentum moderately arched, a little more than twice as long as its maximum width; lateral margins almost parallel; with an indication of waist. Antennae with 17 articles; second slightly longer than third, latter a little shorter than fourth. Pronotum slightly more than half as long as broad; anterior margin indistinctly notched in middle; lateral lobes narrowly rounded; posterior margin weakly depressed in middle. Mesonotum narrower than pronotum, with posterior margin very shallowly concave in middle. Metanotum distinctly broader than mesonotum; posterior margin straight.

**COMPARISONS:** The major soldier of *Macrotermes maesodensis*, new species, resembles closely that of *M. khajuriae* Roonwal and Chhotani and that of *M. barneyi* Light. From that of *M. khajuriae* the major soldier of the new species differs in having the head, postmentum, and pronotum much less hairy and the postmentum with a constriction immediately posterior to the broadest point (no indication of a waist in *M. khajuriae*). In the major soldier of *M. barneyi* the lateral lobes of the pronotum are a little more broadly rounded and less produced, and the third antennal article is twice as long as the second (only slightly longer in *M. maesodensis*).

The minor soldier of *Macrotermes maesodensis*

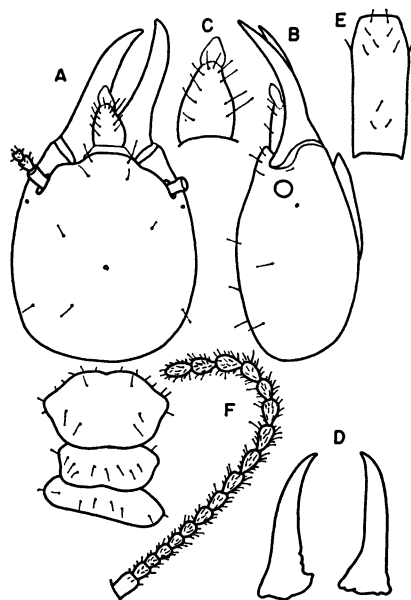


FIG. 34. Minor soldier of *Macrotermes maesodensis*, new species. A. Head, pronotum, mesonotum, and metanotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

*densis* differs from that of *M. khajuriae* Roonwal and Chhotani in having 17 articles in the antenna (16 articles in *M. khajuriae*) and the postmentum with a constriction slightly indicated. In *M. barneyi* Light, the third antennal article is one and a half times as long as the second, and the thoracic tergites are narrower.

**TYPE LOCALITY:** Kilometer 20 east of Mae Sod on the road to Tak; soldiers (holotype, paratypes, morphotype, paramorphotype), workers, collected by M. Ahmad, April 18, 1962, in a log.

#### ***Macrotermes malaccensis* (Haviland)**

*Termes malaccensis* HAVILAND, 1898, p. 381 (major soldier, minor soldier).

*Gnathotermes Aurivilli* HOLMGREN, 1912a, p. 23, fig. 6b (soldier), pl. 2, fig. 8 (soldier).

?*Gnathotermes Havilandi* HOLMGREN, 1912a, p. 23, fig. 6a (soldier) (parasitized).

*Termes (Macrotermes) malaccensis*: HOLMGREN, 1913b, pp. 96-98 (imago, major soldier, minor soldier, worker), pl. 3, figs. 7 (major soldier), 8 (minor soldier).

*Gnathotermes Aurivilli*: KEMNER, 1925, pp. 1-15 (synonymy).

TABLE 11  
MEASUREMENTS (IN MILLIMETERS) OF 10 MINOR SOLDIERS OF *Macrotermes maesodensis*,  
NEW SPECIES

	Morphotype	Range	Mean
Length of head to side base of mandibles	1.82	1.82-1.92	1.87
Width of head at side base of mandibles	0.88	0.88-0.93	0.90
Width of head at posterolateral ends of antennal carinae	1.35	1.32-1.40	1.36
Maximum width of head	1.56	1.56-1.63	1.58
Length of left mandible	1.19	1.09-1.19	1.14
Length of postmentum	1.14	1.09-1.14	1.12
Maximum width of postmentum	0.46	0.46	0.46
Minimum width of postmentum	0.44	0.41-0.46	0.44
Length of pronotum	0.62	0.62-0.65	0.63
Width of pronotum	1.04	1.04-1.09	1.06
Width of mesonotum	0.80	0.80-0.83	0.81
Width of metanotum	0.96	0.96-1.01	0.99

?*Gnathotermes Havilandi*: KEMNER, 1925, p. 1-15 (synonymy).

*Macrotermes malaccensis*: JOHN, 1925, p. 385 (locality).

*Termes (Macrotermes) malaccensis*: BATHELLIER, 1927, pp. 145-148 (systematics), 209 (biology).

*Macrotermes malaccensis*: SNYDER, 1949, p. 214 (synonymy).

*Macrotermes malaccensis*: AHMAD, 1958, pp. 92 (imago), 93 (major soldier), 96 (minor soldier).

**MAJOR SOLDIER (FIG. 35):** Head light reddish brown, small area surrounding fontanelle brown; postclypeus slightly darker than head capsule; labrum reddish brown; antennae brown; mandibles dark brown; pronotum brownish yellow; mesonotum and metanotum and abdominal tergites slightly lighter than pronotum; legs pale. Head scantily hairy; labrum with long bristles on sides and at base of hyaline tip; postmentum with two pairs of bristles near anterior end; pronotum with a few short hairs on anterior margin and a few bristles on disc. Head distinctly narrowed anteriorly, one and a half times as broad posteriorly as anteriorly; fontanelle minute, circular, placed in anterior half. Eyes dotlike, circular, whitish. Labrum dome shaped, broadest in anterior half; tip hyaline, trilobed, median lobe greatly produced. Mandibles long, saber shaped, curved apically; left mandible with three crenulations at base; right mandible without crenulation. Postmentum elongated, narrow, slightly arched; lateral margins almost paral-

lel in middle. Antennae with 17 articles; third twice as long as second and one and a half times as long as fourth and fifth. Pronotum nearly twice as broad as long; anterior margin indistinctly notched in middle; lateral angles narrowly rounded; posterior margin moder-

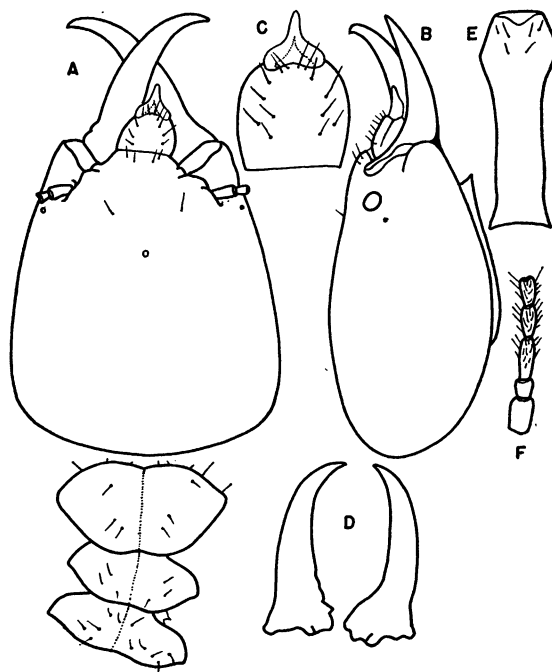


FIG. 35. Major soldier of *Macrotermes malaccensis* (Haviland). A. Head, pronotum, mesonotum, and metanotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

ately emarginate. Mesonotum with lateral lobes angular; posterior margin slightly emarginate. Metanotum broader than pronotum; lateral lobes angular; posterior margin almost straight.

**MINOR SOLDIER (FIG. 36):** Head brownish yellow; labrum and antennae brown; mandibles reddish brown; thorax and abdomen lighter than head. Head without hairs, labrum with long bristles on lateral sides; postmentum with two bristles at tip; pronotum with short hairs along anterior margin and a few long bristles on disc; mesonotum and metanotum with a few long, posteriorly directed bristles. Head subrectangular, narrowed anteriorly; fontanelle minute, circular, situated in anterior half. Eyes dotlike. Labrum longer than broad; sides weakly convex; tip hyaline, triangular, median lobe greatly produced. Mandibles long, slender. Postmentum elongate, weakly arched; waist nearer to widest point than to posterior margin. Antennae with 17 articles; second shorter than third; fourth as long as third. Pronotum indistinctly emarginate both anteriorly and posteriorly; lateral lobes narrowly rounded, somewhat produced. Mesonotum and metanotum angularly pointed laterally.

**MEASUREMENTS (IN MM.):** Range of measurements, with means in parentheses. *Ten major soldiers:* Head length to side base of mandibles, 4.81–5.20 (4.96); width of head at side base of mandibles, 2.34–2.54 (2.44); width of head at posterolateral ends of antennal carinae, 3.19–3.53 (3.35); maximum width of head, 3.79–4.21 (4.00); length of left mandible, 2.60–2.96 (2.78); length of postmentum, 2.86–3.32 (3.16); maximum width of postmentum, 0.93–1.09 (0.96); minimum width of postmentum, 0.62–0.67 (0.66); length of pronotum, 1.19–1.40 (1.32); width of pronotum, 2.46–2.75 (2.59); width of mesonotum, 2.02–2.23 (2.11); width of metanotum, 2.18–2.49 (2.32). *Ten minor soldiers:* Length of head to side base of mandibles, 2.86–3.27 (3.03); width of head at side base of mandibles, 1.35–1.50 (1.44); width of head at posterolateral ends of antennal carinae, 1.92–2.18 (1.99); maximum width of head, 2.23–2.54 (2.33); length of left mandible, 0.90–1.04 (0.96); length of postmentum, 1.87–2.08 (1.98); maximum width of postmentum,

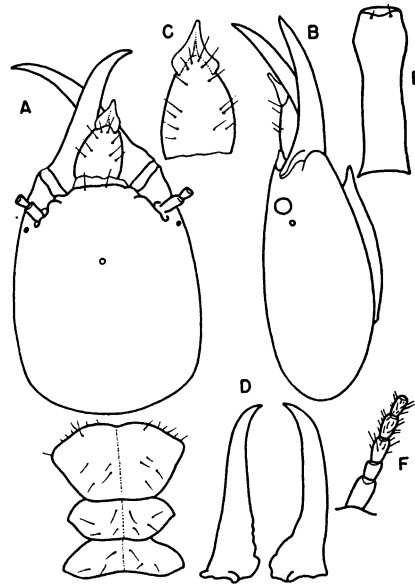


FIG. 36. Minor soldier of *Macrotermes malaccensis* (Haviland). A. Head, pronotum, mesonotum, and metanotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

0.57–0.67 (0.61); minimum width of postmentum, 0.41–0.52 (0.46); length of pronotum, 0.90–1.04 (0.96); width of pronotum, 1.56–1.66 (1.61); width of mesonotum, 1.24–1.35 (1.30); width of metanotum, 1.42–1.56 (1.48).

**LOCALITY:** Ka-Chong, soldiers, workers, collected by M. Ahmad, March 4, 1962, in a log; soldiers, workers, collected by M. Ahmad, March 13, 1962, in a log.

#### *Macrotermes annandalei* (Silvestri)

*Termes annandalei* SILVESTRI, 1914, p. 427, fig. 3 (soldiers, worker).

*Macrotermes annandalei*: SNYDER, 1949, p. 208 (synonymy).

*Macrotermes annandalei*: AHMAD, 1958, pp. 95 (major soldier), 97 (minor soldier).

**MAJOR SOLDIER (FIG. 37):** Head reddish brown, margins slightly darker; labrum brown, with a reddish tinge; mandibles dark brown, bases slightly lighter; pronotum smoky brown, disc pale brown; mesonotum and metanotum slightly lighter than pronotum; abdominal tergites dark brown. Head with a few scattered bristles; labrum with long bristles along lateral sides; postmentum

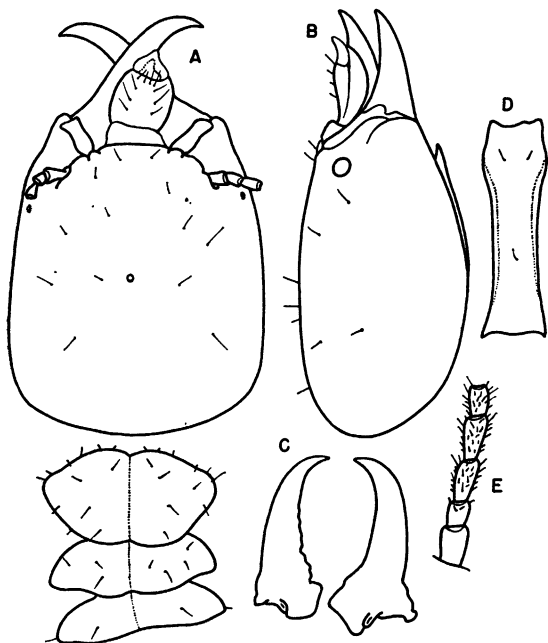


FIG. 37. Major soldier of *Macrotermes annandalei* (Silvestri). A. Head, pronotum, mesonotum, and metanotum from above. B. Head from side. C. Mandibles. D. Postmentum from below. E. Antenna.

with two bristles near tip; pronotum sparsely hairy. Head subrectangular, slightly narrowed anteriorly, slightly less than one and a half times as long as broad at widest point; fontanelle minute, broadly oval. Eyes dotlike. Labrum as shown in figure 37; hyaline tip triangular, not greatly produced anteriorly. Mandibles stoutly built, thick, tips curved; left mandible with a few distinct crenulations at base; right mandible without crenulations. Postmentum elongate, parallel sided in middle; lateral margins near posterior end slightly convex. Antennae with 17 articles; third slightly less than twice as long as second; fourth shorter than third and slightly longer than second. Pronotum emarginate both anteriorly and posteriorly; posterior emargination more distinct than anterior emargination; lateral lobes produced, narrowly rounded; lateral margins of mesonotum and metanotum somewhat angular.

**MINOR SOLDIER (FIG. 38):** Head brown, with a reddish tinge, labrum and antennae brown; mandibles reddish brown; pronotum brown; mesonotum and metanotum slightly

lighter than pronotum. Head scantily hairy; labrum with a few long bristles along lateral sides; postmentum with a pair of bristles along each anterolateral margin, and a few bristles more posteriorly; pronotum sparsely hairy. Head subrectangular, one and a half times as long as broad, broadest in middle; fontanelle minute, circular, placed in middle of head. Labrum longer than broad; lateral margins weakly convex; tip triangular, median lobe not greatly produced. Mandibles as shown in figure 38. Postmentum arched, lateral margins almost parallel. Antennae with 17 articles; third about one and a half times as long as second and slightly longer than fourth; fifth and fourth subequal. Pronotum longer than half of its width, indistinctly notched anteriorly in middle; posterior margin emarginate; lateral lobes narrowly rounded.

**MEASUREMENTS (IN MM.):** Range of measurements, with means in parentheses. *Six major soldiers:* Length of head to side base of mandibles, 4.78–5.04 (4.88); width of head at side base of mandibles, 2.49–2.60 (2.54); width of head at posterolateral ends of antennal carinae, 3.27–3.48 (3.40); maximum

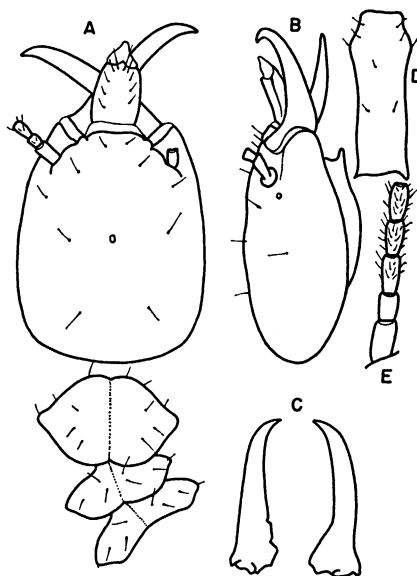


FIG. 38. Minor soldier of *Macrotermes annandalei* (Silvestri). A. Head, pronotum, mesonotum, and metanotum from above. B. Head from side. C. Mandibles. D. Postmentum from below. E. Antenna.



width of head, 3.84–4.36 (4.00); length of left mandible, 2.44–2.60 (2.52); length of postmentum, 2.65–3.27 (2.88); maximum width of postmentum, 0.98–1.09 (1.04); minimum width of postmentum, 0.67–0.83 (0.78); length of pronotum, 1.35 (1.35); width of pronotum, 2.65–2.86 (2.75); width of mesonotum, 2.54–2.70 (2.65); width of metanotum, 2.60–2.70 (2.65). *Five minor soldiers*: Length of head to side base of mandibles, 2.96–3.12 (3.04); width of head at side base of mandibles, 1.40–1.50 (1.46); width of head at posterolateral ends of antennal carinae, 2.08–2.18 (2.11); maximum width of head, 2.34–2.44 (2.39); length of left mandible, 1.82–1.92 (1.85); length of postmentum, 1.95–2.02 (1.97); maximum width of postmentum, 0.75–0.78 (0.77); minimum width of postmentum, 0.67–0.72 (0.68); length of pronotum, 0.98–1.06 (1.01); width of pronotum, 1.71–1.87 (1.79); width of mesonotum, 1.45–1.53 (1.49); width of metanotum, 1.71–1.76 (1.74).

LOCALITY: Huay Yang, soldiers (major and minor), workers, collected by M. Ahmad, April 14, 1962, in a mound.

#### GENUS ODONTOTERMES HOLMGREN

##### KEY TO THE SPECIES

###### IMAGOS

- Ocelli separated from eyes by slightly less than their short diameter . . . . . *O. maesodensis*, new species  
 Ocelli separated from eyes by one and a half times their long diameter . . . . . *O. proformosanus*, new species

###### SOLDIERS

1. Head oval . . . . . 2  
 Head rectangular to subrectangular . . . . . 3
2. Smaller species; length of head to side base of mandibles, 1.06–1.22 mm.; maximum width of head, 0.91–1.09 mm.; head broadly oval . . . . . *O. proformosanus*, new species  
 Larger species; length of head to side base of mandibles, 1.43–1.45 mm.; maximum width of head, 1.24–1.30 mm.; head elongately oval . . . . . *O. formosanus* (Shiraki)
3. Head rectangular . . . . . 4  
 Head subrectangular . . . . . 6
4. Smaller species; length of head to side base of mandibles, 1.11–1.24 mm.; maximum width of head, 0.83–0.93 mm.; tooth of left mandible placed in apical third. . . . .

- . . . . . *O. sarawakensis* Holmgren  
 Larger species; length of head to side base of mandibles, 1.66–1.89 mm.; maximum width of head, 1.19–1.30 mm.; tooth of left mandible more posteriorly placed . . . . . 5  
 5. Length of left mandible, 0.78–0.83 mm.; head more narrowed anteriorly . . . . . *O. paraoblongatus*, new species  
 Length of left mandible, 0.88–0.93 mm.; head less narrowed anteriorly . . . . . *O. oblongatus* Holmgren  
 6. Smaller species; length of head to side base of mandibles, 1.48–1.58 mm.; maximum width of head, 1.17–1.27 mm.; postmentum less than one and a half times as long as broad. . . . . *O. takensis*, new species  
 Larger species; length of head to side base of mandibles, 2.15–2.96 mm.; maximum width of head, 1.69–2.60 mm.; postmentum more than one and a half times as long as broad. 7  
 7. Tooth of left mandible anteriorly directed, larger . . . . . *O. feae* (Wasmann)  
 Tooth of left mandible posteriorly directed, smaller . . . . . 8  
 8. Smaller species; length of head to side base of mandibles, 2.23–2.39 mm.; maximum width of head, 1.79–1.87. . . . . *O. maesodensis*, new species  
 Larger species; length of head to side base of mandibles, 2.70–2.96 mm.; maximum width of head, 2.23–2.60 mm. . . . . *O. longinathus* Holmgren

###### Odontotermes maesodensis, new species

IMAGO (FIG. 39): Head brown, with a reddish tinge, region in front of ocelli a little lighter; postclypeus slightly lighter than head, with a dark brown median line; anteclypeus whitish; labrum light brownish yellow in basal half and darker in distal half, tip whitish; mandibles dark reddish brown, lighter at bases; pronotum lighter than head, with a T-shaped marking on disc and an ocellus-like marking at each anterolateral corner and at base in middle. Head with numerous short hairs and scattered long bristles; postclypeus with several long bristles and short hairs; labrum sparsely pubescent; pronotum nearly as hairy as head. Head sub-circular, broader than long without mandibles; fontanelle plate small, broadly oval, raised. Eyes large, bulging, almost circular, separated from lower margin of head by one-sixth of their short diameter. Ocellus large, prominent, broadly oval, separated from eye by less than its short diameter. Postclypeus

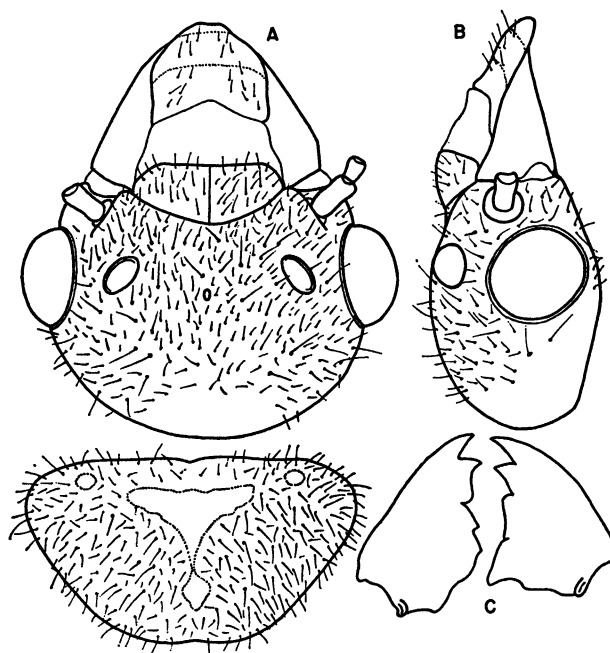


FIG. 39. Imago of *Odontotermes maesodensis*, new species. A. Head and pronotum from above. B. Head from side. C. Mandibles.

not strongly arched, shorter than half of its width. Anteclypeus membranous, trapezoid, more than twice as broad as long. Labrum large, dome shaped. Mandible as shown in figure 39. Antennae with 19 articles; second nearly one and a half times as long as third; fourth and third nearly subequal. Pronotum

slightly narrower than head, halfmoon shaped; anterior margin almost straight, only slightly raised in middle, very indistinctly notched in middle; anterolateral lobes broadly rounded, posterior margin weakly depressed in middle.

SOLDIER (FIG. 40): Head light brownish

TABLE 12

MEASUREMENTS (IN MILLIMETERS) OF TWO IMAGOS OF *Odontotermes maesodensis*,  
NEW SPECIES

	Morphotype	Paramorphotype
Length of head to tip of labrum	3.12	3.17
Length of head to side base of mandibles	1.92	1.97
Width of head across eyes	2.70	2.82
Long diameter of eye	0.73	0.76
Short diameter of eye	0.62	0.67
Eye from lower margin of head	0.13	0.14
Length of ocellus	0.33	0.35
Width of ocellus	0.26	0.28
Ocellus from eye	0.20	0.23
Length of postclypeus	0.39	0.41
Width of postclypeus	1.04	0.98
Length of pronotum	1.35	1.40
Width of pronotum	2.65	2.60

yellow, anterolateral corners, anterior margin of postclypeus, and antennal carinae darker; labrum brown; mandibles dark brown; pronotum lighter than head. Head scantily hairy; labrum with long bristles along lateral sides and at tip; postmentum with a few bristles in apical third; pronotum more densely hairy than head. Head subrectangular, gradually narrowed anteriorly, broadest a little below middle. Anteclypeus membranous, much broader than long. Labrum extending beyond tooth of left mandible, longer than broad, broadest a little anterior to middle; anterior margin produced into a small, narrowly rounded lobe. Mandibles stoutly built, distinctly curved at tips; left mandible with a laterally directed tooth posterior to middle; right mandible with a minute denticle slightly below level of tooth of left mandible. Postmentum elongate, twice as long as broad, with indication of a waist anterior to middle; lateral margins convex below middle and then becoming straight. Antennae with 17 articles; second nearly twice as long as third and one and a half times as long as fourth; fifth slightly shorter than fourth. Pronotum saddle shaped, twice as broad as long; anterior margin slightly indented in middle; posterior margin shallowly depressed in middle; lateral lobes broadly rounded.

COMPARISONS: In having the ocelli separated from the eye by less than their short diameter and the postclypeus shorter than half of its width, the imago of *Odontotermes maesodensis*, new species, resembles that of *O. proximus* Holmgren, *O. dehraduni* (Sny-

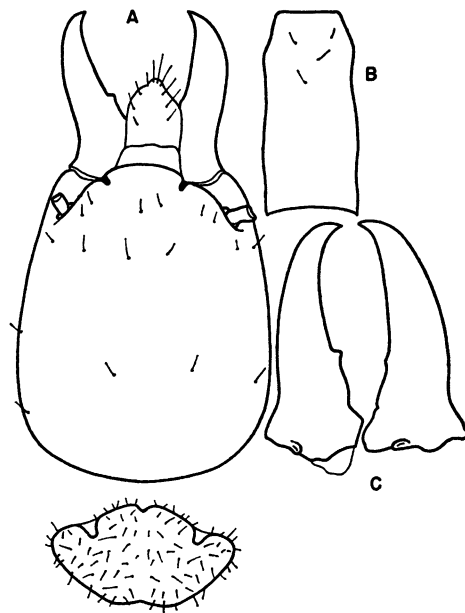


FIG. 40. Soldier of *Odontotermes maesodensis*, new species. A. Head and pronotum from above. B. Postmentum from below. C. Mandibles.

der), *O. preliminaris* (Holmgren), *O. koenigi* (Desneux), and *O. dives* (Hagen). *Odontotermes proximus* and *O. dehraduni* have the ocelli much closer to the eyes. *Odontotermes preliminaris*, *O. koenigi*, and *O. dives* are smaller. In *O. feae* the postclypeus is more swollen and is as long as half of its width.

The soldier of *Odontotermes maesodensis*, new species, comes close to that of *O. parvidens* Holmgren and Holmgren and that of *O. karnyi* Kemner. *Odontotermes parvidens*

TABLE 13  
MEASUREMENTS (IN MILLIMETERS) OF 10 SOLDIERS OF *Odontotermes maesodensis*,  
NEW SPECIES

	Holotype	Range	Mean
Length of head to side base of mandibles	2.34	2.23-2.39	2.30
Width of head at side base of mandibles	1.19	1.14-1.19	1.16
Width of head at posterolateral ends of antennal carinae	1.61	1.53-1.63	1.57
Maximum width of head	1.87	1.79-1.87	1.82
Length of left mandible	1.24	1.14-1.30	1.18
Marginal tooth of left mandible from tip of apical tooth	0.70	0.65-0.70	0.68
Length of postmentum	1.45	1.37-1.53	1.42
Width of postmentum	0.67	0.65-0.70	0.67
Length of pronotum	0.72	0.65-0.72	0.68
Width of pronotum	1.37	1.27-1.37	1.31

TABLE 14  
MEASUREMENTS (IN MILLIMETERS) OF KING AND QUEEN OF *Odontotermes proformosanus*,  
NEW SPECIES

	Morphotype King	Paramorphotype Queen
Length of head to tip of labrum	2.57	2.48
Length of head to side base of mandibles	1.76	1.61
Width of head	2.44	2.21
Long diameter of eye	0.52	0.49
Short diameter of eye	0.46	0.49
Eye from lower margin of head	0.18	0.18
Length of ocellus	0.19	0.20
Width of ocellus	0.14	0.15
Ocellus from eye	0.31	0.33
Length of postclypeus	0.36	0.36
Width of postclypeus	0.65	0.62
Length of pronotum	1.11	1.06
Width of pronotum	2.13	1.95

has a smaller and more posteriorly placed marginal tooth in the left mandible.

TYPE LOCALITY: Kilometer 20 east of Mae Sod, one imago (morphotype), soldiers (holotype, paratypes), workers, collected by M. Ahmad, April 19, 1962, in a tall mound.

*Odontotermes proformosanus*, new species

IMAGO (FIG. 41): Head dark reddish brown, lighter near postclypeus; anteclypeus whit-

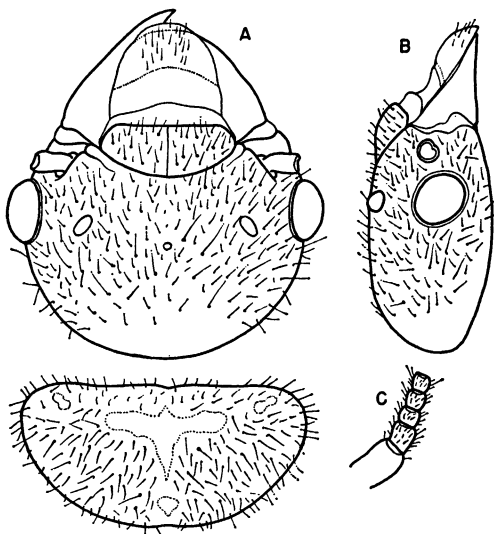


FIG. 41. Imago of *Odontotermes proformosanus*, new species. A. Head and pronotum from above. B. Head from side. C. Antenna.

ish; labrum with a light reddish brown transverse band in middle, tip whitish; pronotum dark brown, with a yellow, T-shaped marking on disc and a spot of same color at each anterolateral corner and one near posterior margin in middle. Head with numerous short hairs and scattered long bristles; postclypeus as hairy as head; labrum with short hairs in median region; pronotum as densely pubescent as head. Head semicircular, broader than long without mandibles; fontanelle small, circular, placed a little posterior to level of ocelli. Eyes of medium size, moderately bulging, not quite circular, separated from lower margin of head by less than half of their short diameter. Ocellus broadly oval, a little more than one and a half times its long diameter from eye. Postclypeus short, less than half as long as broad. Antennae broken; second antennal article one and a half times as long as third; fourth slightly longer than third, almost as long as fifth. Pronotum narrower than head, halfmoon shaped, indistinctly emarginate, both anteriorly and posteriorly.

SOLDIER (FIG. 42): Head yellowish brown to reddish brown; antennae yellow, uniformly colored; pronotum yellow. Head sparsely hairy; labrum with long bristles along lateral sides; postmentum with a few bristles in anterior half; pronotum with short hairs along anterior margin and a few long bristles elsewhere. Head oval, distinctly narrowed ante-

riorly; lateral margins convex. Labrum longer than broad, extending up to middle of mandibles; tip rather narrowly rounded. Mandibles sickle shaped; left mandible with a sharply pointed, somewhat anteriorly directed tooth placed in apical third; right mandible with a denticle a little below level of tooth of left mandible, another denticle at base. Postmentum arched, slightly longer than broad, broadest in middle; lateral margins convex. Antennae with 15–16 articles; in specimens with 15 articles, second nearly twice as long as third, fourth shortest. Pronotum indistinctly emarginate anteriorly; posterior margin convex, depressed in middle; lateral lobes broadly rounded.

COMPARISONS: Among the imagoes of *Odontotermes* species from the Indo-Malayan Region, that of *O. proformosanus*, new species, comes closest to that of *O. formosanus* (Shiraki), but it can be distinguished by its smaller ocelli, which are a little more distantly separated from the eyes, and by its slightly smaller eyes. *Odontotermes distans* Holmgren and Holmgren is larger in all respects. In the imago of *O. almorensis* (Snyder) the clypeus is more swollen and is half as long as broad, the eyes are larger, and the pronotum is more deeply emarginate posteriorly.

The soldier of *Odontotermes proformosanus*, new species, comes closest to that of *O. formosanus*, from which it can be distinguished by its smaller dimensions, more broadly oval head, and much more strongly arched postmentum. *Odontotermes giriensis* Roonwal and Chhotani has a comparatively longer and

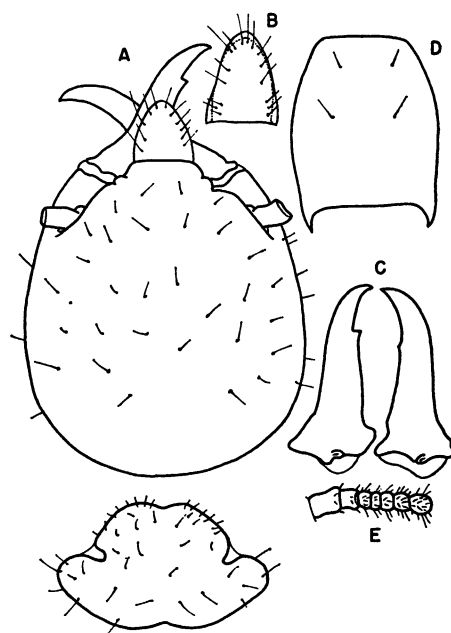


FIG. 42. Soldier of *Odontotermes proformosanus*, new species. A. Head and pronotum from above. B. Labrum from above. C. Mandibles. D. Postmentum from below. E. Antenna.

parallel-sided postmentum, a more anteriorly placed tooth in the left mandible, and distal antennal articles darker than the basal articles. The soldier of *O. kapuri* Roonwal and Chhotani is larger.

TYPE LOCALITY: Ka-Chong, king (morphotype), queen (paramorphotype), soldiers (holotype, paratypes), workers, collected by M. Ahmad, March 9, 1962, in a mound; Huay-Yang, soldiers (paratypes), workers,

TABLE 15  
MEASUREMENTS (IN MILLIMETERS) OF 12 SOLDIERS OF *Odontotermes proformosanus*,  
NEW SPECIES

	Holotype	Range	Mean
Length of head to side base of mandibles	1.22	1.06–1.22	1.14
Width of head at side base of mandibles	0.65	0.55–0.67	0.63
Width of head at posterolateral ends of antennal carinae	0.96	0.83–0.98	0.93
Maximum width of head	1.09	0.91–1.09	1.02
Length of left mandible	0.65	0.62–0.67	0.65
Tooth of left mandible from tip	0.19	0.15–0.19	0.17
Length of postmentum	0.65	0.49–0.65	0.57
Width of postmentum	0.52	0.39–0.52	0.44
Length of pronotum	0.46	0.39–0.46	0.43
Width of pronotum	0.83	0.75–0.83	0.78

collected by M. Ahmad, March 15, 1962, in a log.

***Odontotermes formosanus* (Shiraki)**

*Termes vulgaris* SHIRAKI, 1909, p. 233.

*Termes formosana* SHIRAKI, 1909, p. 234.

*Termes (Termes) vulgaris*: OSHIMA, 1909, p. 37.

*Odontotermes (Cyclotermes) formosanus*: HOLMGREN, 1912a, p. 38.

*Odontotermes formosanus*: HOLMGREN, 1912b, p. 127 (imago, soldier).

*Odontotermes (Cyclotermes) formosana*: OSHIMA, 1913, p. 278.

*Odontotermes sinensis* HOLMGREN, 1913b, pp. 115–116 (imago), pl. 4, fig. 12 (imago).

*Odontotermes (Cyclotermes) formosanus*: HOLMGREN, 1913b, pp. 116–118 (imago, soldier, worker), pl. 4, fig. 11 (imago), pl. 5, fig. 11 (soldier).

*Odontotermes (Cyclotermes) formosanus*: Hozowa, 1915, pp. 105–119 (imago, soldier, worker), text figs. 26 (imago), 27 (soldier), 28 (worker), pl. 3, figs. 21 (imago), 22 (queen), 23 (soldier).

*Termes formosanus*: LIGHT, 1924, pp. 248–250 (imago, soldier).

*Termes formosanus*: LIGHT, 1931, pp. 583–584, 594 (locality).

*Odontotermes (Odontotermes) formosanus*: SNYDER, 1949, p. 228 (synonymy).

*Odontotermes (O.) formosanus*: AHMAD, 1958, pp. 103 (imago), 111 (soldier).

**SOLDIER (FIG. 43)**: Head brown, with a reddish tinge; labrum of same color as head; mandibles dark reddish brown, lighter at bases; antennae brownish, uniformly colored; pronotum pale. Head with a few scattered bristles; labrum with some bristles along lateral sides; postmentum with four bristles anteriorly; pronotum sparsely hairy. Head oval, narrowed anteriorly; lateral margins weakly convex. Labrum domeshaped, broadly rounded apically. Mandibles saber shaped, left mandible with a sharply pointed and forwardly directed tooth placed in apical third; right mandible with a denticle slightly anterior to middle. Postmentum moderately arched, one and a half times as long as broad. Antennae with 16 articles; second one and a half times as long as third and nearly twice as long as fourth. Pronotum indistinctly notched anteriorly in middle, distinctly emarginate posteriorly.

**MEASUREMENTS (IN MM.) OF TWO SOLDIERS**: Range of measurements, with means in parentheses: Length of head to side base of

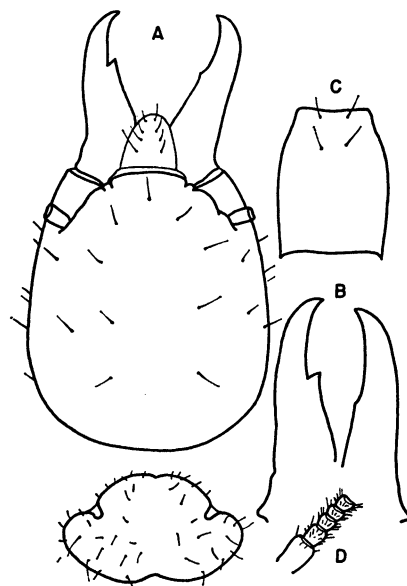


FIG. 43. Soldier of *Odontotermes formosanus* (Shiraki). A. Head and pronotum from above. B. Mandibles. C. Postmentum from below. D. Antenna.

mandibles, 1.43–1.45 (1.44); width of head at side base of mandibles, 0.80–0.85 (0.82); width of head at posterolateral ends of antennal carinae, 1.09–1.11 (1.10); maximum width of head, 1.24–1.30 (1.27); length of left mandible, 0.83 (0.83); tooth of left mandible from tip, 0.31 (0.31); length of postmentum, 0.80–0.83 (0.81); maximum width of postmentum, 0.57 (0.57); length of pronotum, 0.52–0.54 (0.53); width of pronotum, 0.91–0.96 (0.93).

**LOCALITY**: Muaek Lek, two soldiers, workers, collected by M. Ahmad, March 20, 1962, in a stump.

***Odontotermes oblongatus* Holmgren**

*Odontotermes (Odontotermes) oblongatus* HOLMGREN, 1913b, pp. 139–140 (soldier, worker), pl. 5, fig. 5 (soldier).

*Odontotermes (Odontotermes) oblongatus*: SNYDER, 1949, p. 235 (systematics).

*Odontotermes (O.) oblongatus*: AHMAD, 1958, p. 112 (soldier).

**SOLDIER (FIG. 44)**: Head yellow, with a reddish tinge; labrum brownish; mandibles dark brown; antennae light brown, uniformly colored; pronotum yellow. Head scantily hairy; labrum with a row of bristles along

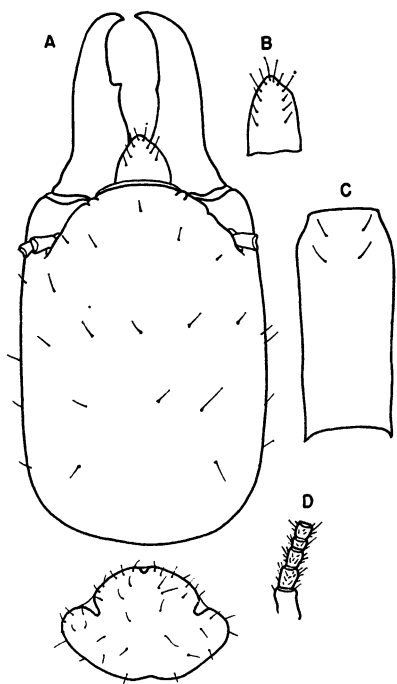


FIG. 44. Soldier of *Odontotermes oblongatus* Holmgren. A. Head and pronotum from above. B. Labrum from above. C. Postmentum from below. D. Antenna.

lateral sides and at tip; postmentum with two pairs of bristles anteriorly; pronotum with scattered bristles along margins and on disc. Head rectangular. Labrum longer than broad, parallel sided; tip narrowly rounded. Mandible stout, thick; tip curved; left mandible with a prominent, laterally directed tooth a little anterior to middle; right mandible with an indistinct denticle nearly in middle. Postmentum elongate, two and a half times as long as broad; lateral sides parallel; maximum width in apical fourth. Antennae with 16 articles; second slightly longer than third; fourth shortest. Pronotum longer than half of its width, anterior margin convex, indistinctly notched in middle; posterior margin slightly depressed in middle.

MEASUREMENTS (IN MM.) OF 10 SOLDIERS: Range of measurements, with means in parentheses: Length of head to side base of mandibles, 1.82–1.89 (1.86); width of head at side base of mandibles, 0.96–1.01 (0.99); width of head at posterolateral ends of antennal carinae, 1.14–1.22 (1.19); maximum width of head, 1.19–1.30 (1.24); length of left man-

dible, 0.88–0.93 (0.91); tooth of left mandible from tip, 0.33–0.36 (0.35); length of postmentum, 1.17–1.30 (1.22); width of postmentum, 0.45–0.52 (0.49); length of pronotum, 0.52–0.57 (0.53); width of pronotum, 0.85–0.93 (0.90).

LOCALITY: Three kilometers east of Ka-Chong, soldiers, workers, collected by M. Ahmad, March 12, 1962, in a log.

#### *Odontotermes paraoblongatus*, new species

SOLDIER (FIG. 45): Head light reddish brown; labrum of same color as head; mandibles dark reddish brown, bases lighter; antennae light brown, uniformly colored; pronotum yellow, with a brownish tinge. Head very sparsely hairy; labrum with long bristles along lateral sides and at tip; postmentum with a pair of short hairs at tip and a pair of bristles a little more posteriorly; pronotum with scattered short hairs and long bristles along margins and on disc. Head somewhat rectangular; sides indistinctly convex, gradually sloping anteriorly. Labrum longer than broad, narrowly rounded at tip. Mandibles stoutly built, not strongly hooked at tips; left mandible with a laterally directed

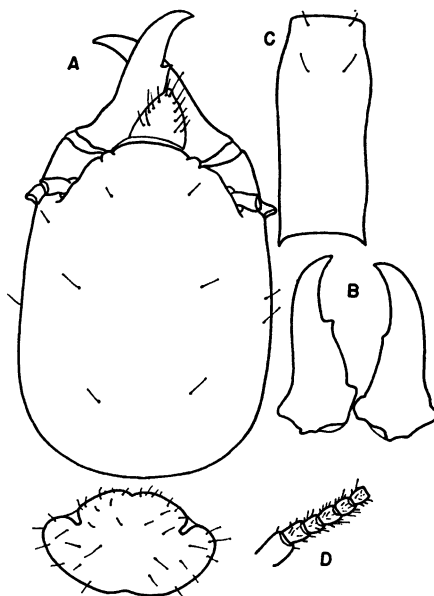


FIG. 45. Soldier of *Odontotermes paraoblongatus*, new species. A. Head and pronotum from above. B. Mandibles. C. Postmentum from below. D. Antenna.



TABLE 16  
MEASUREMENTS (IN MILLIMETERS) OF THREE SOLDIERS OF *Odontotermes paraoblongatus*,  
NEW SPECIES

	Holotype	Range	Mean
Length of head to side base of mandibles	1.69	1.66-1.74	1.71
Width of head at side base of mandibles	0.91	0.88-0.93	0.90
Width of head at posterolateral ends of antennal carinae	1.14	1.11-1.17	1.15
Maximum width of head	1.22	1.20-1.30	1.24
Length of left mandible	0.80	0.78-0.83	0.80
Tooth of left mandible from tip	0.33	0.31-0.33	0.31
Length of postmentum	1.09	1.09-1.14	1.11
Width of postmentum	0.46	0.46	0.46
Length of pronotum	0.49	0.44-0.50	1.47
Width of pronotum	0.96	0.88-0.98	0.92

tooth placed above middle; right mandible with a denticle situated a little below level of tooth of left mandible. Postmentum elongate, flat, about two and a half times as long as broad; lateral margins weakly concave in middle and convex above and below. Antennae with 15 articles; second longer than third; latter a little shorter than fourth. Pronotum nearly twice as broad as long, slightly emarginate anteriorly and posteriorly; lateral lobes broadly rounded.

COMPARISONS: *Odontotermes paraoblongatus*, new species, comes closest to *O. oblongatus* but differs as follows: head slightly more narrowed anteriorly; mandibles shorter and less strongly hooked at tips, and antennae with 15 articles (16 articles in *O. oblongatus*). *Odontotermes assmuthi* Holmgren approaches *O. paraoblongatus* in the size and shape of the head, but it has the tooth of the left mandible anteriorly directed and more anteriorly placed, and its mandibles are not so stoutly built.

TYPE LOCALITY: Muaek Lek, soldiers (holotype, paratypes), workers, collected by M. Ahmad, March 20, 1962, in a stump.

***Odontotermes sarawakensis* Holmgren**

*Odontotermes* (*Cyclotermes*) *sarawakensis* HOLMGREN, 1913b, p. 118 (soldier, worker), pl. 5, fig. 16 (soldier).

*Odontotermes* (*Odontotermes*) *sarawakensis*: HOLMGREN, 1914, p. 247 (locality).

*Odontotermes* (*Cyclotermes*) *sarawakensis*: JOHN, 1925, pp. 386-387 (locality).

*Odontotermes* (*Odontotermes*) *sarawakensis*: SNYDER, 1949, p. 239 (synonymy).

*Odontotermes* (*O.*) *sarawakensis*: AHMAD, 1958, p. 109 (soldier).

SOLDIER (FIG. 46): Head light brownish yellow to castaneous brown; mandibles dark reddish brown; antennae pale, distal articles of same color as basal articles; pronotum lighter than head. Head with a few scattered bristles; labrum with a few bristles along lateral sides; postmentum with four bristles in anterior half; pronotum with a few scattered bristles along margin and on disc. Head

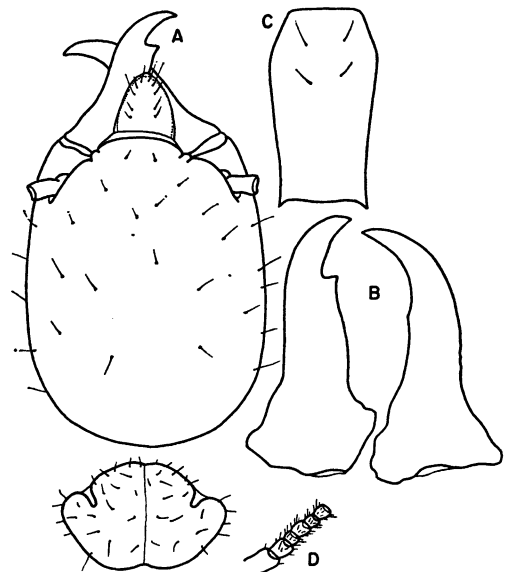


FIG. 46. Soldier of *Odontotermes sarawakensis* Holmgren. A. Head and pronotum from above. B. Mandibles. C. Postmentum from below. D. Antenna.

somewhat rectangular, sides weakly convex, very gradually sloping anteriorly. Labrum dome shaped, longer than broad, broadly rounded apically. Mandibles sickle shaped; left mandible with a sharply pointed, anteriorly directed tooth placed in apical third; right mandible with an indistinct denticle anterior to middle. Postmentum nearly twice as long as broad, widest in apical third. Antennae with 15 articles; second twice as long as third and one and a half times as long as fourth. Pronotum with anterior margin convex, not emarginate; lateral lobes broadly rounded; posterior margin emarginate.

MEASUREMENTS (IN MM.) OF FIVE SOLDIERS: Range of measurements, with means in parentheses: Length of head to side base of mandibles, 1.11–1.24 (1.19); width of head at side base of mandibles, 0.62–0.67 (0.63); width of head at posterolateral ends of antennal carinae, 0.78–0.88 (0.83); maximum width of head, 0.83–0.93 (0.89); length of left mandible, 0.57–0.62 (0.60); tooth of left mandible from tip, 0.18–0.20 (0.18); length of postmentum, 0.65–0.78 (0.72); width of postmentum, 0.33–0.37 (0.35); length of pronotum, 0.33–0.39 (0.36); width of pronotum, 0.54–0.67 (0.62).

LOCALITY: Mae Sod, soldiers, workers, collected by M. Ahmad, April 17, 1962, in a stump.

***Odontotermes takensis*, new species**

SOLDIER (FIG. 47): Head reddish brown; labrum of same color as head; mandibles dark brown, lighter at bases; antenna light brownish yellow, uniformly colored; pronotum pale. Head sparsely hairy; labrum with long bristles along lateral sides and at tip; postmentum with a few bristles anteriorly; pronotum with scattered short hairs and bristles of medium size. Head subrectangular, slightly longer than broad; lateral margin weakly convex. Labrum longer than broad, dome shaped; sides convex; maximum width in middle. Mandibles short, stout; left mandible with a small, laterally directed tooth situated a little anterior to middle; right mandible with two denticles, one nearly in middle and other at base. Postmentum moderately arched, about one and a half times as long as broad, broadest in middle; lateral margins convex. Antennae with 16 articles; second as

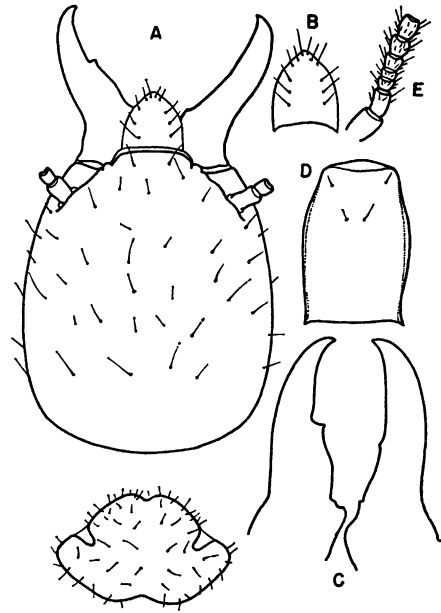


FIG. 47. Soldier of *Odontotermes takensis*, new species. A. Head and pronotum from above. B. Labrum from above. C. Mandibles. D. Postmentum from below. E. Antenna.

long as third and fourth combined; fourth shortest. Pronotum longer than half of its width, moderately notched anteriorly; posterior margin emarginate; lateral lobes broadly rounded.

COMPARISONS: Among the species of *Odontotermes* with the tooth of the left mandible laterally directed and the shape of the head approaching a subrectangular condition, *O. horai* Roonwal and Chhotani comes close to *O. takensis*, new species, but differs in having a more parallel-sided head, a narrower postmentum, and longer and less curved mandibles. *Odontotermes butteli* Holmgren, *O. ceylonicus* (Wasmann), and *O. billitoni* Holmgren have a somewhat more rectangular head and are also larger. *Odontotermes holmgreni* Snyder and Emerson and *O. anamallensis* Holmgren and Holmgren have the head like that of *O. takensis* in shape, but they are larger.

TYPE LOCALITY: Tak, soldiers (holotype, paratypes), collected by M. Ahmad, April 16, 1962, in a log.

***Odontotermes feae* (Wasmann)**

*Termes Feae* WASMANN, 1896a, pp. 625–626 (soldier, worker).

TABLE 17

MEASUREMENTS (IN MILLIMETERS) OF SOLDIERS OF *Odontotermes takensis*, NEW SPECIES

	Holotype	Paratypes	
		Range	Mean
Length of head at side base of mandibles	1.56	1.48-1.58	1.51
Width of head at side base of mandibles	0.85	0.80-0.85	0.82
Width of head at posterolateral ends of antennal carinae	1.09	1.06-1.14	1.09
Maximum width of head	1.24	1.17-1.27	1.22
Length of left mandible	0.80	0.75-0.80	0.77
Tooth of left mandible from tip	0.33	0.33	0.33
Length of postmentum	0.88	0.83-0.88	0.84
Width of postmentum	0.54	0.52-0.54	0.52
Length of pronotum	0.52	0.49-0.52	0.51
Width of pronotum	0.91	0.88-0.91	0.90

*Odontotermes* (*Odontotermes*) *feae*: Holmgren, 1913b, pp. 129-130 (imago, soldier, worker), pl. 4, fig. 2 (imago), pl. 5, fig. 2 (soldier).

*Odontotermes feae*: SILVESTRI, 1914, p. 428 (locality).

*Odontotermes* (*Odontotermes*) *feae*: HOLMGREN AND HOLMGREN, 1917, p. 156 (locality).

*Odontotermes* (*Odontotermes*) *feae*: SNYDER, 1949, p. 226 (synonymy).

*Odontotermes* (*O.*) *feae*: AHMAD, 1958, p. 115 (soldier).

*Odontotermes feae*: ROONWAL AND CHHOTANI, 1962b, pp. 337-339 (locality, soldier), text fig. 15 (soldier).

*Odontotermes feae*: KRISHNA, 1965, pp. 22-23.

**SOLDIER (FIG. 48):** Head light reddish brown; labrum reddish brown; mandibles dark brown, bases reddish brown; antennae brownish, uniformly colored; pronotum yellow, with a brownish tinge. Head with a few scattered bristles; labrum with long bristles along lateral sides and at tip; postmentum with two bristles near anterior end; pronotum sparsely hairy. Head subrectangular; sides rather straight, gradually narrowed anteriorly; maximum width below middle. Labrum with tip narrowly rounded, broadest in middle; lateral margins moderately convex. Mandibles long, stout; left mandible with a large, sharply pointed, anteriorly directed tooth a little in front of middle; right mandible with a minute denticle in middle. Postmentum moderately arched, twice as long as wide, broadest in basal half; waist nearer to anterior margin than to posterior margin. Antennae with 17 articles; second almost twice as long as third and slightly longer than fourth;

third shortest. Pronotum twice as broad as long, weakly emarginate anteriorly and rather distinctly emarginate posteriorly; lateral lobes broadly rounded.

**MEASUREMENTS (IN MM.) OF 10 SOLDIERS:** Range of measurements, with means in parentheses: Length of head to side base of mandibles, 2.15-2.31 (2.21); width of head at side base of mandibles, 1.06-1.17 (1.12); width of head at posterolateral ends of antennal carinae, 1.32-1.58 (1.46); maximum width of head, 1.69-1.84 (1.77); length of left man-

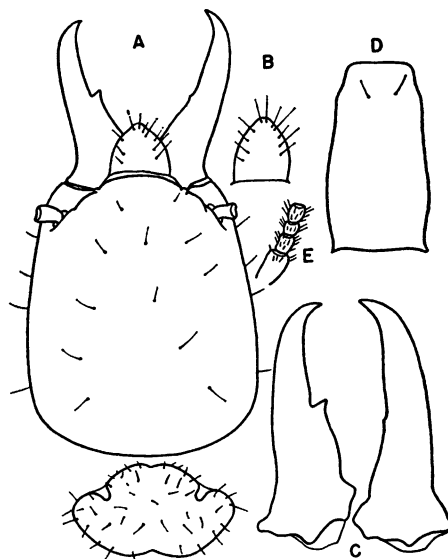


FIG. 48. Soldier of *Odontotermes feae* (Wasmann). A. Head and pronotum from above. B. Labrum from above. C. Mandibles. D. Postmentum from below. E. Antenna.

dible, 1.17–1.24 (1.20); tooth of left mandible from tip, 0.57–0.60 (0.58); length of postmentum, 1.37–1.53 (1.44); width of postmentum, 0.65–0.78 (0.73); length of pronotum, 0.67–0.72 (0.69); width of pronotum, 1.24–1.32 (1.25).

**DISTRIBUTION:** Ka-Chong, soldiers, workers, collected by M. Ahmad, March 2, 1962, from mound at base of a tree; Makham, soldiers, workers, collected by M. Ahmad, March 27, 1962; Mae Sod, soldiers workers, collected by M. Ahmad, April 18, 1962, in a log.

***Odontotermes longignathus* Holmgren**

*Odontotermes* (*Odontotermes*) *longignathus* HOLMGREN, 1914, pp. 244–245 (soldier).

*Odontotermes* (*Odontotermes*) *longignathus*: SNYDER, 1949, p. 232 (systematics).

*Odontotermes* (*O.*) *longignathus*: AHMAD, 1958, p. 113 (soldier).

**SOLDIER (FIG. 49):** Head light reddish brown; mandibles dark brown; antennae brown; pronotum yellow. Head scantily hairy; labrum with long bristles arranged in a row along lateral sides; postmentum with two bristles near anterior end; pronotum more pubescent than head. Head subrectangular. Labrum slightly longer than broad; tip narrowly rounded. Mandibles long, thick, tips hooked; left mandible with a prominent, broad-based, laterally directed tooth situated in middle; right mandible without any denticle present. Postmentum elongate, slightly arched; lateral margins slightly depressed in front of middle, convex in basal third; maximum width in basal third. Antennae with 17 articles; second one and a half times as long as third; fourth slightly longer than third and fifth. Pronotum slightly indented anteriorly in middle; posterior margin weakly depressed in middle; lateral margins broadly rounded.

**MEASUREMENTS (IN MM.) OF 10 SOLDIERS:** Range of measurements, with means in parentheses: Length of head to side base of mandibles, 2.70–2.96 (2.89); width of head at side base of mandibles, 1.45–1.61 (1.52); width of head at posterolateral ends of antennal carinae, 1.97–2.13 (2.06); maximum width of head, 2.23–2.60 (2.37); length of left mandible, 1.40–1.56 (1.45); tooth of left mandible

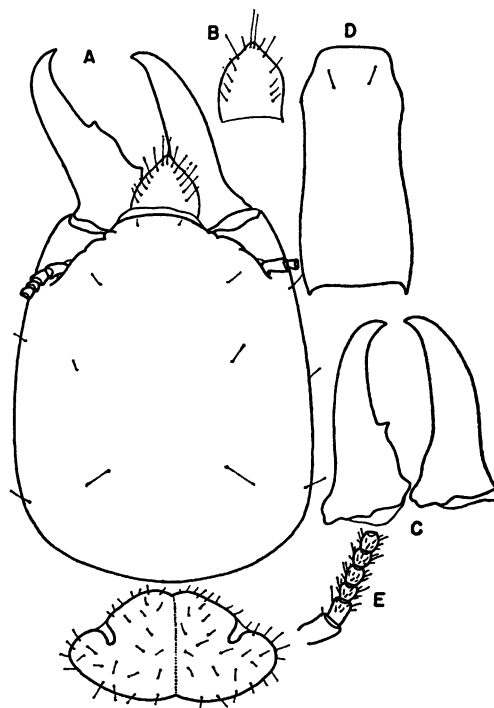


FIG. 49. Soldier of *Odontotermes longignathus* Holmgren. A. Head and pronotum from above. B. Labrum from above. C. Mandibles. D. Postmentum from below. E. Antenna.

from tip, 0.75–0.78 (0.77); length of postmentum, 1.71–1.92 (1.83); width of postmentum, 0.83–0.93 (0.86); length of pronotum, 0.83–0.88 (0.86); width of pronotum, 1.61–1.82 (1.68).

**DISTRIBUTION:** Three kilometers east of Ka-Chong, soldiers, workers, collected by M. Ahmad, March 12, 1962, under cow dung; Tung Sa-Lang Luang, soldiers, workers, collected by M. Ahmad, April 8, 1962, in a log.

**GENUS *HYPOTERMES* HOLMGREN**

**KEY TO THE SPECIES**

**IMAGOS**

Smaller species; width of head across eyes, 1.87–2.08; long diameter of eye, 0.54; length of ocellus, 0.20 . . . . .*H. xenotermis* (Wasmann)  
Larger species; width of head across eyes, 2.30 mm.; long diameter of eye, 0.67 mm.; length of ocellus, 0.28 mm. . . . .*H. makhamensis*, new species

**SOLDIERS**

Right mandible slightly curved from molar plate onward, postmentum nearly parallel sided . .

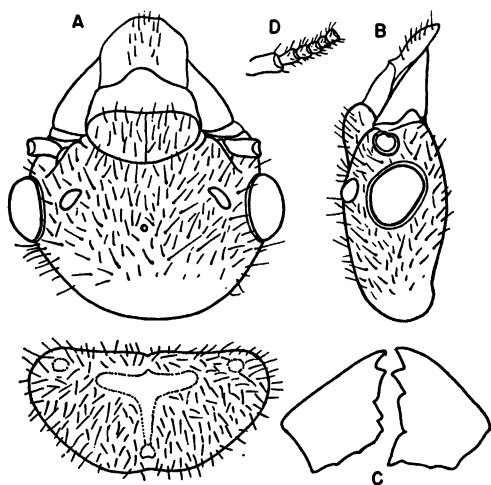


FIG. 50. Imago of *Hypotermes xenotermitis* (Wasmann). A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Antenna.

..... *H. xenotermitis* (Wasmann)  
 Right mandible strongly curved from molar plate  
 onward, postmentum with lateral margins con-  
 vex ..... *H. makhamensis*, new species

***Hypotermes xenotermitis* (Wasmann)**

*Termes xenotermitis* WASMANN, 1896a, p. 628  
 (soldier, worker).

*Termes xenotermitis*: WASMANN, 1896b, p. 152  
 (queen, soldier).

*Termes (Eutermes) xenotermitis*: DESNEUX,  
 1904b, p. 46 (synonymy).

*Odontotermes (Xenotermes) Xenotermitis*: HOLM-  
 GREN, 1912a, p. 39 (systematics).

*Odontotermes (Hypotermes) Xenotermitis*: HOLM-  
 GREN, 1913b, pp. 143-144 (imago, soldier).

*Odontotermes (Hypotermes) xenotermitis*: HOLM-  
 GREN AND HOLMGREN, 1917, p. 158 (locality).

*Odontotermes (Hypotermes) xenotermitis*: SNY-  
 DER, 1949, p. 244 (synonymy).

*Hypotermes nongpriangi* ROONWAL AND SEN-  
 SARMA, 1956, pp. 21-25 (soldier, worker), text  
 figs. 5 (soldier), 6 (worker). Placed in synonymy  
 with *Hypotermes xenotermitis* by Krishna, 1965,  
 p. 25.

*Odontotermes (H.) xenotermitis*: AHMAD, 1958,  
 pp. 120 (imago), 121 (soldier).

*Hypotermes nongpriangi*: ROONWAL AND CHHO-  
 TANI, 1962b, pp. 359-360 (soldier, locality), text  
 fig. 20 (soldier).

KING (FIG. 50): Head reddish brown; post-  
 clypeus light yellowish brown; anteclypeus  
 whitish; antennae brown, apices of antennal  
 articles lighter; pronotum slightly darker

than head, with a yellow, T-shaped marking  
 on disc and an ocellus-like, yellow marking  
 at each anterolateral corner. Head with num-  
 erous short hairs and scattered long bristles;  
 postclypeus as hairy as head; labrum with  
 median rows of hairs; pronotum densely  
 pubescent. Head semicircular; fontanelle  
 small, circular, placed a little posterior to level  
 of ocelli. Eyes of medium size, moderately  
 bulging, not quite circular, separated from  
 lower margin of head by one-fourth of their  
 short diameter. Ocellus broadly oval, sepa-  
 rated from eye by nearly its short diameter.  
 Postclypeus slightly less than half as long as  
 broad, with a dark median line. Anteclypeus  
 large, trapezoid, more than twice as broad  
 as long. Labrum dome shaped. Mandibles of  
*Odontotermes* type. Antennae broken; second  
 article one and a half times as long as third  
 and twice as long as fourth; fifth shortest.  
 Pronotum narrower than head, twice as broad  
 as long, halfmoon shaped; anterior margin  
 almost straight, with an indistinct notch in  
 middle; posterior margin slightly depressed in  
 middle.

SOLDIER (FIG. 51): Head light yellowish  
 brown to brown, slightly lighter anteriorly;  
 labrum light brown; mandibles light reddish  
 brown; antennae brownish; pronotum yellow.  
 Head sparsely hairy; labrum with long bris-

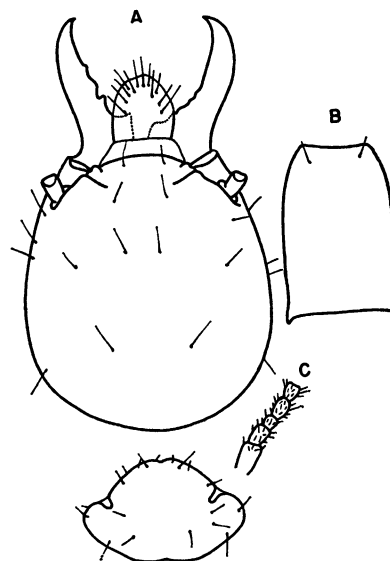


FIG. 51. Soldier of *Hypotermes xenotermitis* (Wasmann). A. Head and pronotum from above. B. Postmentum from below. C. Antenna.

tles arranged in a line around periphery in anterior half; postmentum with two bristles near anterior margin; pronotum scantily hairy. Head oval, considerably narrowed anteriorly, a little more than one and a half times as broad in middle as at base of mandibles. Labrum slightly longer than broad, dome shaped; anterior margin broadly rounded. Mandibles slender, slightly incurved apically; left mandible with three crenulations in middle; right mandible with serrations above molar plate. Postmentum arched, nearly parallel sided, nearly one and a half times as long as broad. Antennae with 15–16 articles; in specimens with 15 articles, second article twice as long as third, fourth and second nearly subequal, third shortest; Pronotum indistinctly notched anteriorly in middle; shallowly emarginate posteriorly; lateral margins broadly rounded.

**MEASUREMENTS (IN MM.):** *King*: Length of head to side base of mandibles, 1.48; width of head, 2.08; long diameter of eye, 0.54; short diameter of eye, 0.49; eyes from lower margin of head, 0.13; length of ocellus, 0.20; width of ocellus, 0.15; ocellus from eye, 0.15; length of postclypeus, 0.39; width of postclypeus, 0.85; length of pronotum, 0.93; width of pronotum, 1.87.

Range of measurements of 25 soldiers, with means in parentheses: Length of head to side base of mandibles, 1.09–1.50 (1.30); width of head at side base of mandibles, 0.57–0.80 (0.70); width of head at posterolateral ends of antennal carinae, 0.80–1.18 (1.02); maximum width of head, 0.93–1.32, (1.14); length of left mandible, 0.54–0.70 (0.62); length of postmentum, 0.46–0.88 (0.70); width of postmentum, 0.41–0.84 (0.55); length of pronotum, 0.39–0.54 (0.47); width of pronotum, 0.65–0.88 (0.77).

**DISTRIBUTION:** Ka-Chong, king, queen, soldiers, workers, collected by M. Ahmad, March 4, 1962, dug out from an underground nest; Mae Sod, soldiers, workers, collected by M. Ahmad, April 17, 1962, in a log.

***Hypotermes makhamensis*, new species**

**KING (FIG. 52):** Head dark brown; postclypeus brown; labrum with a brown transverse band in middle; antennae brown; pronotum dark brown, with a T-shaped, light brown marking on disc and an ocellus-like

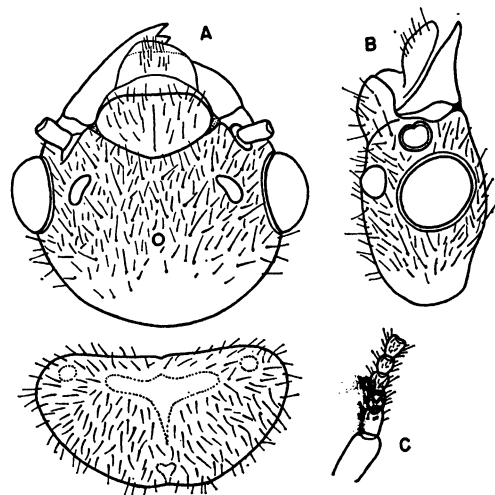


FIG. 52. Imago of *Hypotermes makhamensis*, new species. A. Head and pronotum from above. B. Head from side. C. Antenna.

marking at each anterolateral corner and near posterior margin in middle. Head densely hairy; postclypeus as densely pubescent as head; labrum with short, fine hairs in middle; pronotum densely hairy. Head semicircular; fontanelle conspicuous, broadly oval, situated below level of ocelli. Eyes large, bulging, almost circular, separated from lower margin of head by one fifth of their short diameter. Ocellus large, broadly oval, separated from eye by less than its short diameter. Postclypeus swollen, half as long as broad. Labrum dome shaped, tip membranous. Antennae

TABLE 18

MEASUREMENTS (IN MILLIMETERS) OF KING (MORPHOTYPE) OF *Hypotermes makhamensis*, NEW SPECIES

Length of head to side base of mandibles	1.58
Width of head	2.30
Long diameter of eye	0.67
Short diameter of eye	0.54
Eye from lower margin of head	0.10
Length of ocellus	0.28
Width of ocellus	0.23
Ocellus from eye	0.16
Length of postclypeus	0.41
Width of postclypeus	0.85
Length of pronotum	0.96
Width of pronotum	1.89

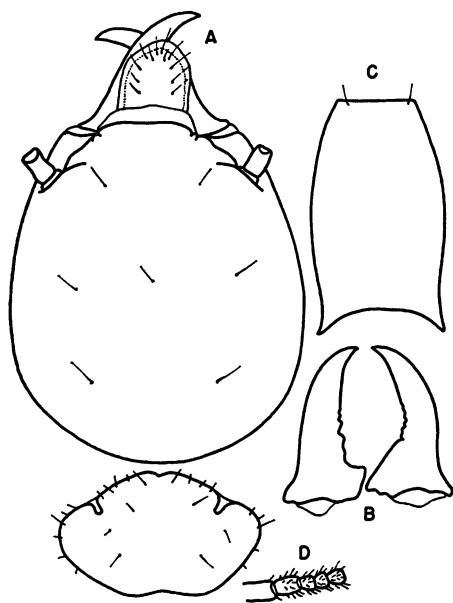


FIG. 53. Soldier of *Hypotermes makhamensis*, new species. A. Head and pronotum from above. B. Mandibles. C. Postmentum from below. D. Antenna.

incomplete; second article one and a half times as long as third; fourth and third nearly subequal. Pronotum narrower than head, half as long as broad; anterior margin nearly straight, with an indistinct notch in middle; posterior margin slightly emarginate.

**SOLDIER (FIG. 53):** Head smoky brown, slightly lighter anteriorly; labrum brown; mandibles dark brown; antennae brown, basal articles lighter. Head very scantily hairy;

labrum with long bristles peripherally arranged; postmentum with two short bristles at anterior margin; pronotum sparsely hairy. Head oval; lateral margins convex; broadest in middle. Labrum with lateral margins parallel, broadly rounded anteriorly. Mandibles half as long as head capsule; left mandible with three crenulations at base; right mandible more curved than left mandible, finely serrate near molar plate. Postmentum one and a half times as long as broad; sides convex; broadest in middle. Antennae with 16 articles; second one and a half times as long as third and twice as long as fourth, latter shortest. Pronotum indented slightly anteriorly, broadly and shallowly emarginate posteriorly; lateral lobes broadly rounded.

**COMPARISONS:** The imago of *Hypotermes makhamensis*, new species, resembles that of *H. obscuriceps* (Wasmann) very closely, but is much darker. In the imago of *H. winifredae* Ahmad the ocelli are nearer the eyes, and those of *H. xenotermitis* (Wasmann) are smaller.

The soldier of *Hypotermes makhamensis*, new species, comes very close to that of *H. xenotermitis* but differs as follows: the right mandible is more strongly curved, the color is darker, and the postmentum is not parallel sided. The soldier of *Hypotermes obscuriceps* (Wasmann) has a less narrowed head, with the lateral sides rather straight; that of *H. winifredae* Ahmad is larger and has a subrectangular head; that of *H. sumatrensis* Holmgren is smaller and has a parallel-sided head.

**TYPE LOCALITY AND DISTRIBUTION:** Mak-

TABLE 19

MEASUREMENTS (IN MILLIMETERS) OF 13 SOLDIERS OF *Hypotermes makhamensis*, NEW SPECIES

	Holotype	Range	Mean
Length of head to side base of mandibles	1.22	1.14-1.40	1.26
Width of head at side base of mandibles	0.70	0.62-0.88	0.69
Width of head at posterolateral corners of antennal carinae	0.93	0.80-1.01	0.92
Maximum width of head	1.11	0.98-1.19	1.08
Length of left mandible	0.65	0.52-0.65	0.58
Length of postmentum	0.78	0.65-0.83	0.74
Width of postmentum	0.52	0.44-0.57	0.48
Length of pronotum	0.44	0.39-0.52	0.43
Width of pronotum	0.75	0.65-0.83	0.72



ham (type locality), king (morphotype), queen, soldiers (holotype, paratypes), workers, collected by M. Ahmad, March 27, 1962, from a low mound; Muaek Lek, soldiers (paratypes), collected by M. Ahmad, March 20, 1962, in a mound.

GENUS **MICROTERMES** WASMANN

KEY TO THE SPECIES

SOLDIERS

Head oval; mandibles weakly curved apically . . . . . *M. obesi* Holmgren  
 Head subcircular; mandibles strongly curved apically . . . . . *M. pakistanicus* Ahmad

**Microtermes obesi** Holmgren

*Microtermes obesi* HOLMGREN, 1912c, p. 787 (imago)

*Microtermes Anandi* HOLMGREN, 1913a, p. 114.

*Microtermes obesi*: HOLMGREN, 1913b, p. 150 (imago), pl. 6, fig. 5 (imago).

*Microtermes Anandi*: HOLMGREN, 1913b, pp. 152–153 (soldier, worker).

*Microtermes Anandi* f. *curvignatus* HOLMGREN, 1913b, p. 153 (soldier), pl. 6, fig. 9 (soldier).

*Microtermes anandi*: HOLMGREN, 1914, pp. 250–251 (locality).

*Microtermes anandi*: HOLMGREN AND HOLMGREN, 1917, p. 160 (locality).

*Microtermes anandi*: SILVESTRI, 1923, p. 225 (locality).

*Microtermes obesi*: SNYDER, 1949, p. 252 (synonymy).

*Microtermes obesi*: AHMAD, 1955b, pp. 231–234 (imago, soldier), figs. 21 (imago), 22 (soldier).

*Microtermes anandi*: ROONWAL AND SEN-SARMA, 1956, p. 27 (*M. obesi* considered as a synonym of *M. anandi*).

*Microtermes obesi*: AHMAD, 1958, pp. 123–124 (imago), 126 (soldier).

*Microtermes obesi*: KRISHNA, 1965, pp. 25–26.

**IMAGO (FIG. 54)**: Head brown; postclypeus yellow, labrum and antennae yellow, with a brownish tinge; pronotum light brown, with a T-shaped marking on disc and an ocellus-like spot at each anterolateral corner. Head moderately densely hairy; postclypeus with a few long bristles and several short hairs; pronotum as hairy as head. Head nearly circular; fontanelle small, circular, placed in center. Eyes bulging, almost circular, separated from lower margin of head by about one-fourth of their short diameter. Ocellus

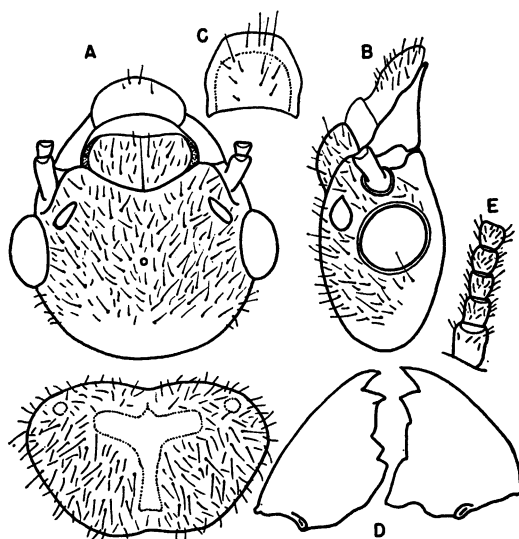


FIG. 54. Imago of *Microtermes obesi* Holmgren. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Antenna.

large, oval, separated from eye by less than its short diameter. Postclypeus swollen, slightly longer than half of its width. Labrum dome shaped; anterior margin straight; lateral margin convex in middle. Mandibles as shown in figure 54. Antennae with 15 articles; second and third subequal; fourth a little shorter. Pronotum slightly narrower than head, a little longer than half of its width; anterior margin convex, slightly emarginate; posterior margin weakly depressed in middle.

**SOLDIER (FIG. 55)**: Head yellow; labrum yellow, with brownish tinge; antennae light yellowish brown; thorax, legs, and abdomen pale. Head densely pilose; labrum sparsely hairy; postmentum with scattered bristles and short hairs; pronotum slightly less hairy than head. Head elongately oval, longer than broad, widest a little below middle. Labrum lancet shaped, longer than broad, widest below middle; lateral margins convex in basal third, converging anteriorly. Mandibles slender, slightly incurved apically, without denticles. Postmentum arched, slightly longer than wide, widest in middle. Antennae with 13–14 articles; in specimens with 14 articles, second longer than third, fourth and third

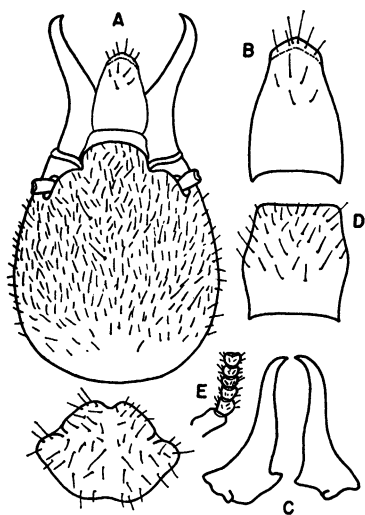


FIG. 55. Soldier of *Microtermes obesi* Holmgren. A. Head and pronotum from above. B. Labrum from above. C. Mandibles. D. Postmentum from below. E. Antenna.

subequal. Pronotum saddle shaped, longer than half its width; anterior margin distinctly notched in middle; posterior margin very weakly depressed in middle; lateral lobes prominent, broadly rounded.

**MEASUREMENTS (IN MM.):** Range of measurements, with means in parentheses. *Ten imagoes*: Length of head to tip of labrum, 1.48–1.56 (1.50); length of head to side base of mandibles, 0.91–1.04 (0.98); width of head, 1.32–1.43 (1.36); long diameter of eye, 0.34–0.39 (0.36); short diameter of eye, 0.32–0.36 (0.33); eye from lower margin of head, 0.07–0.10 (0.08); length of ocellus, 0.14–0.19 (0.16); width of ocellus, 0.11–0.14 (0.13); ocellus from eye, 0.05–0.09 (0.06); length of postclypeus, 0.28–0.36 (0.31); width of postclypeus, 0.49–0.59 (0.54); length of pronotum, 0.65–0.72 (0.69); width of pronotum, 1.17–1.30 (1.20). *Seventeen soldiers*: Length of head to side base of mandibles, 0.85–0.98 (0.91); width of head at side base of mandibles, 0.52–0.62 (0.56); width of head at posterolateral ends of antennal carinae, 0.65–0.76 (0.70); maximum width of head, 0.79–0.85 (0.82); length of left mandible, 0.46–0.57 (0.51); length of postmentum, 0.41–0.49 (0.43); width of postmentum, 0.36–0.39 (0.36); length of pronotum, 0.28–0.36 (0.32); width of pronotum, 0.49–0.59 (0.53).

**DISTRIBUTION:** Ka-Chong, soldiers, work-

ers, collected by M. Ahmad, March 3, 1962, in a decaying log; Huay Yang, soldiers, workers, collected by M. Ahmad, March 14, 1962, in a log; pine forest, Tung Sa-Lang Luang, imagoes, soldiers, workers, collected by M. Ahmad, April 9, 1962, from a mound of *Odontotermes*; Mae Sod, imagoes, soldiers, workers, collected by M. Ahmad, April 19, 1962, from a mound of *Odontotermes*.

#### *Microtermes pakistanicus* Ahmad

*Termes pallidus* RAMBUR, 1842, p. 303.

*Termes pallidus*: WALKER, 1853, p. 504.

*Termes pallidus*: HAVILAND, 1898, p. 389 (queen, soldier, worker).

*Microtermes pallidus*: HOLMGREN, 1912a, p. 42, fig. 20 (soldier mandibles).

*Microtermes pallidus*: HOLMGREN, 1913b, pp. 147–148 (imago, soldier, worker), pl. 6, figs. 2 (imago), 7 (soldier).

*Microtermes pallidus*: HOLMGREN, 1914, p. 251 (locality).

*Microtermes pallidus*: JOHN, 1925, p. 390 (locality).

*Microtermes pallidus*: SNYDER, 1949, p. 252 (synonymy).

*Microtermes pakistanicus* AHMAD, 1955a, pp. 25–27 (soldier), fig. 1 (soldier).

*Microtermes pallidus*: AHMAD, 1958, pp. 123 (imago), 125 (soldier).

*Microtermes pakistanicus*: AHMAD, 1958, p. 125 (soldier).

*Microtermes pakistanicus*: KRISHNA, 1965, pp. 26–27 (synonymy).

**SOLDIER (FIG. 56):** Head yellow, labrum yellow to brownish yellow; mandibles light to dark reddish brown; antennae pale, in some specimens brownish yellow; thorax, legs, and abdomen pale. Head very sparsely hairy; labrum with long bristles in anterior half; postmentum with a few scattered bristles in anterior half; pronotum with minute hairs along anterior margin and scattered bristles on lateral margins and on disc. Head rectangularly oval to almost round. Anteclypeus membranous, narrow, trapezoid, much wider than long. Postclypeus with anterior margin convex; posterior margin not demarcated. Labrum dome shaped; lateral margins weakly convex; anterior margin broadly rounded. Mandibles sickle shaped, curvature at tips variable; left mandible with a minute denticle above middle; right mandible with a similar denticle placed a little more posteri-

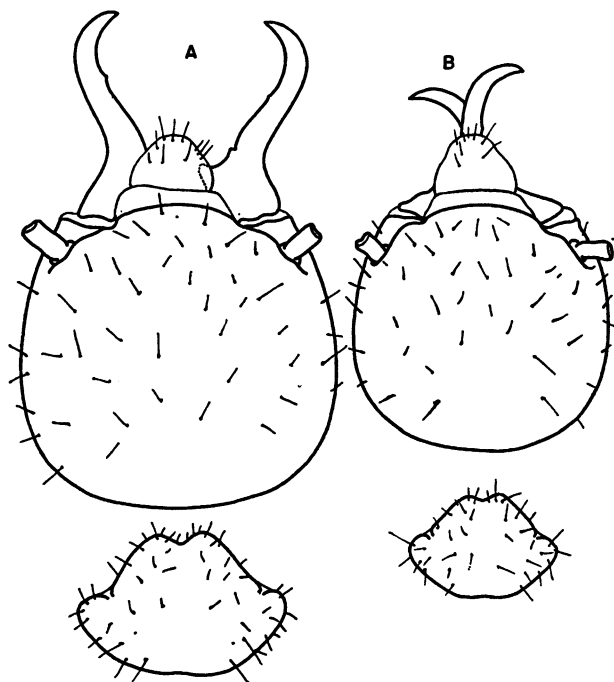


FIG. 56. *Microtermes pakistanicus* Ahmad. A. Head and pronotum of large soldier. B. Head and pronotum of small soldier.

only, in some specimens denticle absent. Postmentum strongly arched, indistinctly longer than broad. Antennae with 15–16 articles; second one and a half times as long as third; fourth as long as or slightly shorter than third. Pronotum notched anteriorly in middle, slightly emarginate posteriorly.

MEASUREMENTS (IN MM.) OF 61 SOLDIERS: Range of measurements, with means in parentheses: Length of head to side base of mandibles, 0.78–1.17 (0.96); width of head at side base of mandibles, 0.59–1.04 (0.72); width of head at posterolateral ends of antennal carinae, 0.72–1.11 (0.88); width of head in middle, 0.75–1.14 (0.92); length of left mandible, 0.52–0.67 (0.61); length of postmentum, 0.44–0.67 (0.54); width of postmentum, 0.36–0.57 (0.45); length of pronotum, 0.36–0.52 (0.41); width of pronotum, 0.52–0.88 (0.67).

DISTRIBUTION: Ka-Chong, soldiers, workers, collected by M. Ahmad, March 4, 1962, in a stump; Kan Tang, soldiers, workers, collected by M. Ahmad, March 8, 1962; Muaek Lek, soldiers, workers collected by M. Ahmad, March 20, 1962, in a stump;

Chantaburi, soldiers, workers, collected by M. Ahmad, March 25, 1962, in a log; Prew, soldiers, workers, collected by M. Ahmad, March 28, 1962; Tung Sa-Lung Luang, soldiers, workers, collected by M. Ahmad, April 6, 1962, from mound of *Macrotermes*; pine forest, Tung Sa-Lang Luang, soldiers, workers, collected by M. Ahmad, April 9, 1962, from mound of *Odontotermes*; Mae Sod, soldiers, workers, collected by M. Ahmad, April, 18, 1962.

REMARKS: There is considerable variation in the size of the head of the soldiers collected from different localities. The degree of curvature of the mandibles also varies appreciably. In many colonies of this termite are present two types of soldiers, large and small.

#### SUBFAMILY AMITERMITINAE

#### GENUS *INDOTERMES* ROONWAL AND SEN-SARMA

#### *Indotermes thailandis* Ahmad

*Indotermes thailandis* AHMAD, 1963, pp. 397–399 (soldier, worker), figs. 1a–j (soldier), 2a–h (worker).

SOLDIER (FIG. 57): The following description is quoted from Ahmad (1963): "Head

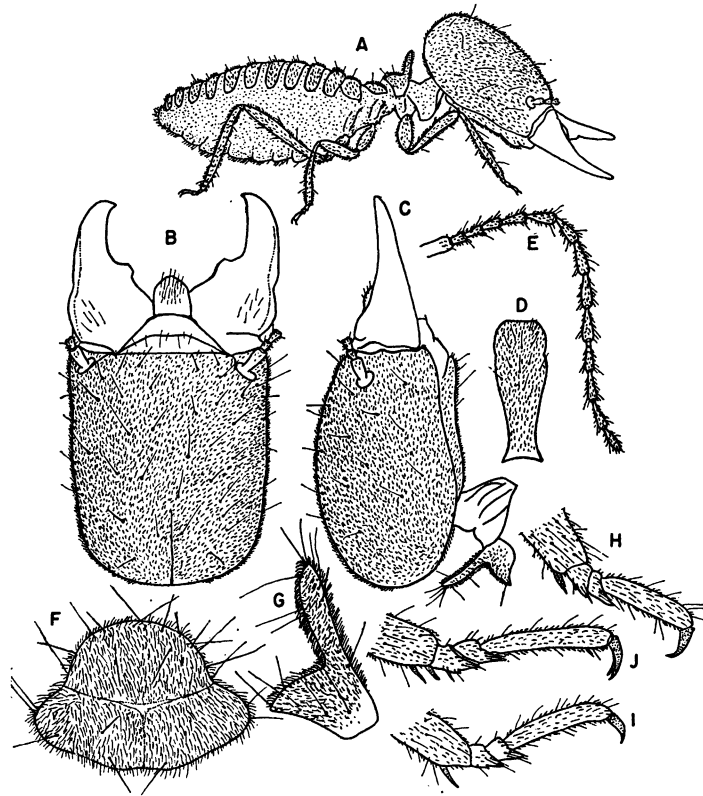


FIG. 57. Soldier of *Indotermes thailandis* Ahmad. A. Whole body from side. B. Head from above. C. Head from side. D. Postmentum from below. E. Antenna. F, G. Pronotum from above and side. H. Foreleg. I. Middle leg. J. Hind leg. (From Ahmad, 1963.)

brown with reddish tinge, sides slightly darker than central portion; labrum and antennae yellow with a brownish tinge; mandibles yellowish brown at base, brown in the region of tooth and beyond; thoracic and abdominal tergites brownish, with a white streak running all along middorsum; legs pale.

"Head capsule covered with a dense mat of short hairs and scattered long bristles; postclypeus with a few hairs; labrum moderately hairy; mandibles with a few microscopic hairs at base; pronotum densely pubescent, with a few very long bristles; meso- and metanota slightly less hairy than pronotum; abdominal tergites and sternites densely hairy; legs with a covering of dense short hairs and scattered long bristles.

"Head hypognathous, quadrate, slightly wider anteriorly. Labrum almost as long as wide, tongue-shaped; sides parallel. Mandi-

bles stoutly built; tips slightly incurved; bases swollen with outer margin humped; anterior half attenuated; inner margin with a distinct broad tooth placed almost in middle. Postmentum flat, more than twice as long as wide, widest in anterior half, narrowest near posterior end. Antennae long, slender, with 14 segments, the second indistinctly shorter than third, latter almost as long as the fourth but shorter than the fifth. Pronotum strongly saddle-shaped, anterior lobe much longer than the posterior, anterior margin convex, without any notch, posterior margin slightly depressed in middle. Tarsi 3-segmented."

MEASUREMENTS (IN MM.) OF TWO SOLDIERS: Range of measurements, with means in parentheses: Length of head to side base of mandibles, 2.18–2.23 (2.20); length of left mandible, 1.19–1.22 (1.20); tooth of left mandible from tip, 0.54–0.57 (0.55); length of right

mandible, 1.17–1.19 (1.18); tooth of right mandible from tip, 0.54–0.57 (0.55); width of head at side base of mandibles, 1.71–1.76 (1.73); width of head in middle, 1.66–1.74 (1.70); length of postmentum, 1.22–1.24 (1.23); maximum width of postmentum, 0.45 (0.45); minimum width of postmentum, 0.23–0.26 (0.24); length of pronotum, 0.59–0.65 (0.62); width of pronotum, 0.83 (0.83).

LOCALITY: Tung Sa-Lang Luang National Park, two soldiers, workers, collected by M. Ahmad, April 7, 1962, from a mound of *Macrotermes*.

REMARKS: *Eurytermes isodentatus*, described by Tsai and Chen (1963) from southern China, actually belongs to the genus *Indotermes*. Although I have had no opportunity to examine this species, judging from its figure I have no doubt that it belongs to *Indotermes*. The shape of its mandibles, the hypognathous condition of its head, and its pronotum, with the anterior lobe greatly enlarged, are like those of *Indotermes*. In the description the authors state that the head is covered with a dense coat of hairs. This is also an important character of *Indotermes*. Therefore, I redesignate *Eurytermes isodentatus* Tsai and Chen as *Indotermes isodentatus* (Tsai and Chen). In the shape of its mandibles and the length of the head capsule it comes closer to *I. maymensis* Roonwal and Sen-Sarma than to *I.*

*thailandis* Ahmad. In having a somewhat rectangular rather than a rather square head, it resembles *I. thailandis*, but it is larger.

#### GENUS *SPECULITERMES* WASMANN

##### *Speculitermes macrodentatus*, new species

QUEEN (FIG. 58): Head dark reddish brown; with an ocellus-like, lightly colored spot below lateral end of postclypeus; postclypeus much lighter than head, light pale brown, anteclypeus white; labrum yellowish; pronotum slightly lighter than head, devoid of reddish tinge; mesonotum and metanotum dark brown; a median white streak on pronotum, mesonotum, and metanotum; abdominal tergites and sternites brown; legs brownish yellow. Head with numerous short hairs and scattered long bristles; postclypeus with a few short hairs and long bristles; labrum sparsely hairy; pronotum as densely hairy as head. Head almost subcircular, wider than long without mandibles, with a large, subtriangular, white, middorsal spot; Y suture visible, with lateral arms less distinct than median arm. Eyes of medium size, bulging, almost circular, separated from lower margin of head by less than half of their diameter. Ocellus small, broadly oval, separated from eye by one and a half times its long diameter. Postclypeus moderately arched, about half as long as wide. Anteclypeus trapezoid. La-

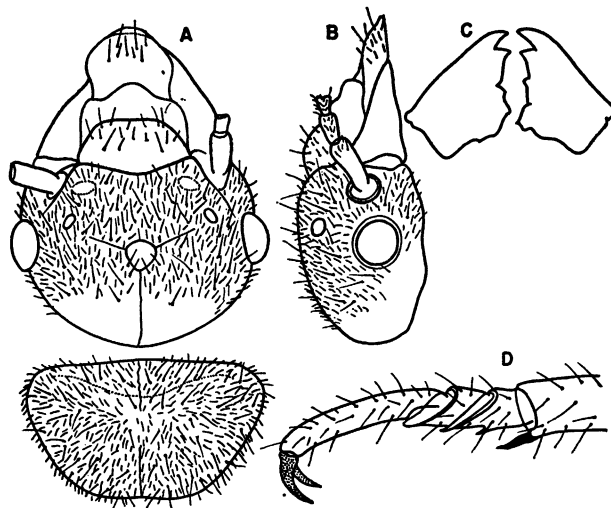


FIG. 58. Imago of *Speculitermes macrodentatus*, new species. A. Head and pronotum from above. B. Head from side. C. Mandibles.

TABLE 20  
MEASUREMENTS (IN MILLIMETERS) OF MOR-  
PHOTYPE QUEEN OF *Speculitermes macroden-  
tatus*, NEW SPECIES

Length of head to tip of labrum	1.97
Length of head to side base of mandibles	1.06
Width of head	1.58
Long diameter of eye	0.33
Short diameter of eye	0.32
Eye from lower margin of head	0.13
Length of ocellus	0.11
Width of ocellus	0.10
Ocellus from eye	0.17
Length of postclypeus	0.15
Width of postclypeus	0.33
Length of pronotum	0.85
Width of pronotum	1.43

brum dome shaped. Mandibles as shown in figure 58. Antennae with 15 articles; second slightly shorter than fourth and nearly twice as long as third. Pronotum a little narrower than head, anterior margin slightly raised in middle, without emargination; lateral sides broadly rounded; posterior margin weakly depressed in middle. Tarsi three-segmented.

**SOLDIER (FIG. 59):** Head brown, with a reddish tinge, slightly lighter at middorsum; anteclypeus whitish in anterior half and brownish posteriorly; labrum brownish yellow, tip whitish; mandibles reddish brown, slightly lighter at bases; antennae light brown; pronotum with peripheral region smoky brown, rest yellow-brown; mesonotum and metanotum lighter than pronotum; abdominal tergites yellowish brown, posterior tergites lighter; a white streak running on mid-dorsum of thoracic and abdominal tergites. Head with numerous short hairs and scattered long bristles in anterior half, pilosity decreasing posteriorly, posterior third devoid of hairs; labrum with a few bristles; postmentum with a few bristles and short hairs in anterior third; pronotum scantily hairy; abdominal tergites and sternites with long bristles. Head subrectangular, Y suture faintly indicated. Anteclypeus much broader than long. Labrum small, broader than long; lateral margins nearly parallel; anterolateral corners broadly rounded; tip truncated. Mandibles stoutly built, broad based; tips incurved; each mandible with a prominent,

broad tooth almost in middle; right mandible with a minute protuberance posterior to tooth. Postmentum flat, two and a half times as long as its maximum width, narrowest a little below middle. Antennae with 14 articles; second indistinctly shorter than third; fourth and third subequal. Pronotum saddle shaped, indistinctly emarginate anteriorly; lateral lobes prominent, produced; posterior margin convex, not emarginate. Tarsi three-segmented.

**COMPARISONS:** The imago of *Speculitermes macrodentatus*, new species, can be easily distinguished from that of *S. cyclops* (Wasmann), the only species of the genus from the Indo-Malayan Region of which the imago is known, by the presence of the Y suture and by its differently shaped ocellus which is much farther from the eye. The pronotum has also a different shape from that of the new species.

The soldiers of *Speculitermes macrodentatus*, new species, differ from those of *S. sinhalensis* Roonwal and Sen-Sarma in having dense pilosity in the anterior half of the head and a broad-based tooth in the mandibles.

**TYPE LOCALITY:** Tung Sa-Lang Luang Na-

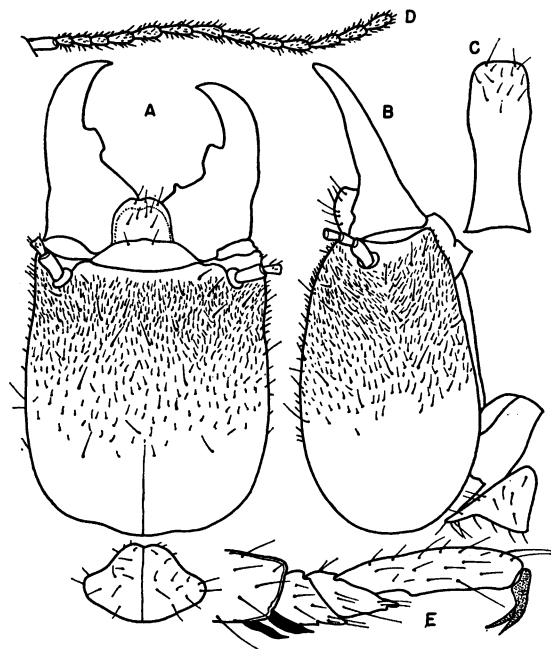


FIG. 59. Soldier of *Speculitermes macrodentatus*, new species. A. Head and pronotum from above. B. Head from side. C. Postmentum from below. D. Antenna. E. Hind leg.

TABLE 21  
MEASUREMENTS (IN MILLIMETERS) OF TWO SOLDIERS OF *Speculitermes macrodentatus*,  
NEW SPECIES

	Holotype	Paratype
Length of head to side base of mandibles	2.28	2.23
Width of head at side base of mandibles	1.75	1.56
Width of head at posterolateral ends of antennal carinae	1.79	1.63
Maximum width of head	1.92	1.74
Length of left mandible	1.43	1.43
Marginal tooth of left mandible from tip of apical tooth	0.62	0.65
Length of postmentum	1.30	1.19
Maximum width of postmentum	0.52	0.46
Minimum width of postmentum	0.33	0.31
Length of pronotum	0.65	0.65
Width of pronotum	0.96	0.93

tional Park, queen (morphotype), two soldiers (holotype and paratype), workers, collected by M. Ahmad, April 7, 1962, from a mound of *Macrotermes*.

GENUS *EUHAMITERMES* HOLMGREN

*Euhamitermes hamatus* (Holmgren)

*Hamitermes* (*Euhamitermes*) *hamatus* HOLMGREN, 1912a, p. 89 (soldier), fig. 57 (soldier), p. 93, fig. 66 (soldier mandible), pl. 4, fig. 22 (soldier).

*Hamitermes* (*Euhamitermes*) *hamatus*: HOLMGREN, 1913b, pp. 223–224 (soldier), pl. 8, fig. 18 (soldier).

*Euhamitermes hamatus*: SNYDER, 1949, p. 112 (synonymy).

*Euhamitermes hamatus*: AHMAD, 1958, p. 163 (soldier).

*Euhamitermes hamatus*: KRISHNA, 1965, pp. 4–5 (imago, soldier, worker), fig. 1.

IMAGO (FIG. 60): Head dark brown, slightly lighter around postclypeus, a small, light brown spot in front of fontanelle and a large, ocellus-like spot of same color in front of each ocellus; postclypeus light brown; anteclypeus creamy white; labrum yellow, with a brownish tinge; antennae light brown; pronotum brown, lighter than head; legs yellow, with a brownish tinge; abdominal tergites brown. Head densely pubescent, with short hairs and scattered long bristles; postclypeus as hairy as head; labrum with long bristles and short hairs; pronotum densely hairy; abdominal tergites and sternites thickly hairy; wings covered with minute hairs. Head almost circular, wider than long without mandibles; fontanelle small, situated below level of ocelli.

Eyes round, separated from lower margin of head by about one-fifth of their diameter. Ocellus broadly oval, slightly longer than broad, separated from eye by slightly less than its short diameter. Postclypeus not strongly arched, slightly shorter than half of its width. Labrum dome shaped. Mandibles as shown in figure 60. Antennae with 15 articles; second slightly less than twice as long as third; fourth longer than third and as long as fifth. Pronotum slightly narrower than head, a little longer than half of its width; anterior margin not emarginate; posterior

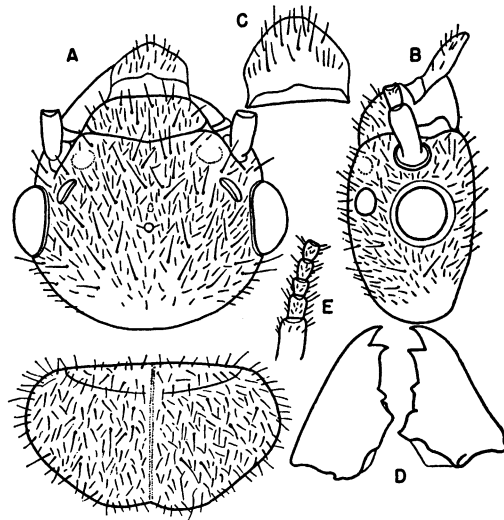


FIG. 60. Imago of *Euhamitermes hamatus* (Holmgren). A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Antenna.

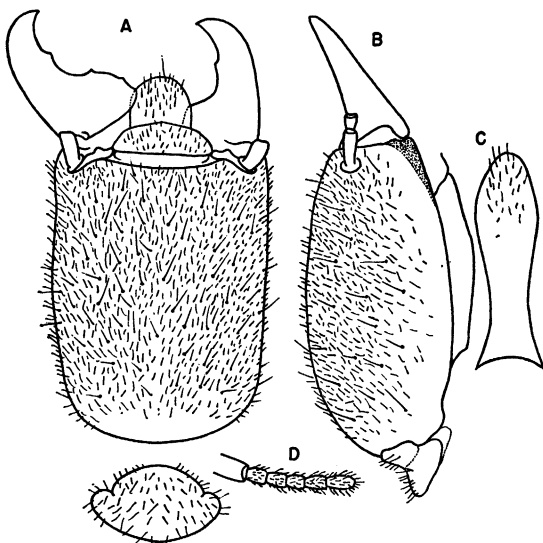


FIG. 61. Soldier of *Euhamitermes hamatus* (Holmgren). A. Head and pronotum from above. B. Head from side. C. Postmentum from below. D. Antenna.

margin distinctly depressed in middle; anterolateral corners broadly rounded.

**SOLDIER (FIG. 61):** Head yellow, with a brownish tinge; anterolateral corners reddish brown; postclypeus slightly darker than head; anteclypeus light brownish yellow; labrum whitish; mandibles reddish brown, lighter at bases; antennae yellowish; pronotum yellow; abdomen creamy white; legs with a yellowish tinge. Head covered with a mat of short hairs and scattered long bristles; clypeus and labrum with numerous hairs; postmentum hairy anteriorly; pronotum slightly less hairy than head. Head rectangular, less than one and a half times as long as broad, widest at posterolateral ends of antennal carinae. Labrum wider than long, dome shaped; lateral margins very weakly convex. Mandibles stoutly built, thick, broad based, with a small, sharply pointed tooth; inner margin of each mandible posterior to tooth deeply concave; left mandible with two minute denticles on molar plate. Postmentum elongate, about twice as broad anteriorly as posteriorly, narrowest in basal third. Antennae with 14 articles; third almost as long as second and longer than fourth. Pronotum saddle shaped; anterior margin convex, without emargination; posterior margin convex, not emarginate; lateral lobes distinct.

**MEASUREMENTS (IN MM.);** Range of measurements, with means in parentheses. *Ten imagoes:* Length of head to tip of labrum, 1.17–1.30 (1.22); length of head to side base of mandibles, 0.72–0.80 (0.75); width of head, 1.06–1.11 (1.08); length of postclypeus, 0.18–0.23 (0.19); width of postclypeus, 0.44–0.49 (0.46); long diameter of eye, 0.27–0.31 (0.29); short diameter of eye, 0.27–0.29 (0.28); eye from lower margin of head, 0.05–0.07 (0.06); length of ocellus, 0.11–0.13 (0.11); width of ocellus, 0.09–0.10 (0.09); ocellus from eye, 0.06–0.08 (0.06); length of pronotum, 0.54–0.57 (0.56); width of pronotum, 0.96–1.04 (1.00). *Two soldiers:* Length of head to side base of mandibles, 1.43–1.53 (1.48); width of head at side base of mandibles, 1.04–1.11 (1.07); width of head at posterolateral ends of antennal carinae, 1.11–1.14 (1.12); width of head in middle, 1.09–1.13 (1.11); length of left mandible, 0.67–0.70 (0.68); tooth of left mandible from tip, 0.23–0.26 (0.24); length of postmentum, 0.91–1.04 (0.97); maximum width of postmentum, 0.37–0.39 (0.38); minimum width of postmentum, 0.23 (0.23); length of pronotum, 0.39 (0.39); width of pronotum, 0.65 (0.65).

**LOCALITY:** Ka-Chong, imagoes, two soldiers, and workers, collected by M. Ahmad, March 9, 1962, from a mound of *Hypotermes*; imagoes, workers, collected by M. Ahmad, March 9, 1962, in a log.

#### GENUS *MICROCEROTERMES* SILVESTRI

##### KEY TO THE SPECIES

###### IMAGOS

1. Antennae with 13 articles; width of head, 0.70–0.72 mm. . . . . *M. minutus*, new species  
Antennae with 14 articles; width of head, 0.85–0.98 mm. . . . . 2
2. Pronotum distinctly emarginate posteriorly . . . . . *M. paracelebensis*, new species  
Pronotum indistinctly emarginate posteriorly . . . . . 3
3. Lateral margins of pronotum broadly convex throughout. . . . . *M. crassus* Snyder  
Lateral margins of pronotum straight in posterior half . . . . . *M. annandalei* Silvestri

###### SOLDIERS

1. Smaller species; length of head without mandibles, 1.09 mm. . . . . *M. minutus*, new species  
Larger species; length of head without mandibles, 1.43–1.89 mm. . . . . 2



2. Length of left mandible, 0.75–0.85 mm. . . . .  
     . . . . . *M. paracelebensis*, new species  
     Length of left mandible, 1.04–1.20 mm. . . . 3  
 3. Mandibles only slightly longer than half of  
     length of head capsule. . . . .  
     . . . . . *M. annandalei* Silvestri  
     Mandibles distinctly longer than half of length  
     of head capsule. . . . .  
     . . . . . *M. crassus* Snyder

***Microcerotermes minutus*, new species**

IMAGO (FIG. 62): Head smoky brown; postclypeus a shade lighter than head; anteclypeus whitish; labrum brownish yellow; antennal articles yellow, with brownish tinge; pronotum as dark as head, with a T-shaped yellowish marking on disc. Head and postclypeus moderately pubescent; labrum with thin, long hairs in anterior half; pronotum with numerous long bristles and short hairs. Head capsule semicircular in posterior half, parallel sided anterior to eyes; fontanelle plate indistinct. Eyes almost circular, separated from lower margin of head by half of their short diameter. Ocellus small, broadly oval, separated from eye by its short diameter. Postclypeus moderately arched, slightly less than half of its width. Labrum broad, dome shaped, broader than long. Mandibles as shown in figure 62. Antennae with 13 articles; second longer than third, latter shortest. Pronotum narrower than head, slightly less than half as long as broad; anterior margin indistinctly notched in middle; posterior margin very weakly emarginate.

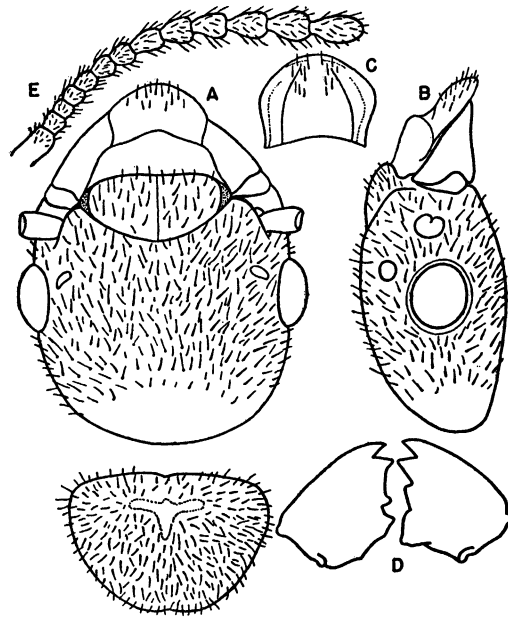


FIG. 62. Imago of *Microcerotermes minutus*, new species. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Antenna.

SOLDIER (FIG. 63): Head yellow, with a brownish tinge; postclypeus light brown; anteclypeus white; labrum brownish yellow, lighter apically. Antennae yellow; scape darker than other articles; pronotum lighter than head; legs pale. Head with several scattered hairs; labrum with a few hairs anteriorly; postmentum with a few hairs near tip; pronotum sparsely hairy. Head rectangular,

TABLE 22

MEASUREMENTS (IN MILLIMETERS) OF FIVE IMAGOS OF *Microcerotermes minutus*, NEW SPECIES

	Morphotype	Range	Mean
Length of head to tip of labrum	0.85	0.75–0.85	0.82
Length of head to side base of mandibles	0.67	0.59–0.67	0.63
Width of head	0.70	0.70–0.72	0.70
Long diameter of eye	0.20	0.19–0.20	0.19
Short diameter of eye	0.18	0.17–0.19	0.17
Eye from lower margin of head	0.07	0.06–0.09	0.08
Length of ocellus	0.07	0.06–0.07	0.06
Width of ocellus	0.05	0.04–0.05	0.04
Ocellus from eye	0.04	0.03–0.05	0.04
Length of postclypeus	0.15	0.15	0.15
Width of postclypeus	0.36	0.36–0.39	0.36
Length of pronotum	0.36	0.33–0.36	0.34
Width of pronotum	0.54	0.46–0.54	0.50

TABLE 23  
MEASUREMENTS (IN MILLIMETERS) OF A SINGLE  
SOLDIER (HOLOTYPE) OF *Microcerotermes minutus*,  
NEW SPECIES

Length of head to side base of mandibles	1.09
Width of head	0.67
Height of head	0.62
Length of left mandible	0.57
Length of postmentum	0.65
Maximum width of postmentum	0.24
Minimum width of postmentum	0.18
Length of pronotum	0.26
Width of pronotum	0.44

about one and a half times as long as broad. Labrum nearly as long as broad; anterior margin almost straight; lateral margins weakly convex. Mandibles finely serrated, about half as long as head capsule; tips moderately incurved. Postmentum slightly less than three times as long as broad in anterior half; waist in basal third, nearer to posterior margin than to broadest point. Antennae with 13 articles; second about twice as long as third and one and a half times as long as fourth. Pronotum weakly emarginate both anteriorly and posteriorly.

COMPARISONS: The only other species of *Microcerotermes* that has the antennae of the imago with 13 articles is *M. baluchistanicus* Ahmad, from West Pakistan, but it is larger than *M. minutus*, new species.

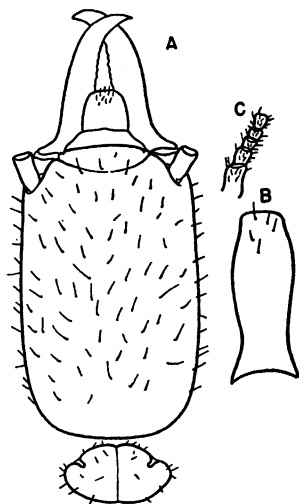


FIG. 63. Soldier of *Microcerotermes minutus*, new species. A. Head and pronotum from above. B. Postmentum from below. C. Antenna.

In the size of the head capsule, the soldier of *Microcerotermes minutus*, new species, comes very close to that of *M. havilandi* Holmgren, but it has distinctly shorter mandibles. The soldier of *Microcerotermes baluchistanicus* Ahmad is larger and has a much wider head.

TYPE LOCALITY: Wang Nok An, five imagoes (morphotype, paramorphotype), one soldier (holotype), and three workers, collected by M. Ahmad, April 11, 1962, from ground under leaf mold.

*Microcerotermes paracelebensis*, new species

IMAGO (FIG. 64): Head brown; postclypeus yellowish brown, with a white, weakly indicated, median line; anteclypeus whitish; labrum yellow, with a brownish tinge; antennal articles brown; pronotum brown, with a whitish, T-shaped marking on disc and a fuzzy spot at each anterolateral corner; abdominal tergites brown. Head with numerous short hairs and scattered long bristles; postclypeus as densely hairy as head; pronotum densely hairy. Head with lateral sides anterior to eyes nearly parallel, semicircular in posterior half, wider than long without mandibles; fontanelle small, circular, placed nearly in center. Eyes almost circular, bulging, separated from lower margin of head by one-third of their long diameter. Ocellus moderately large, very broadly oval, separated from

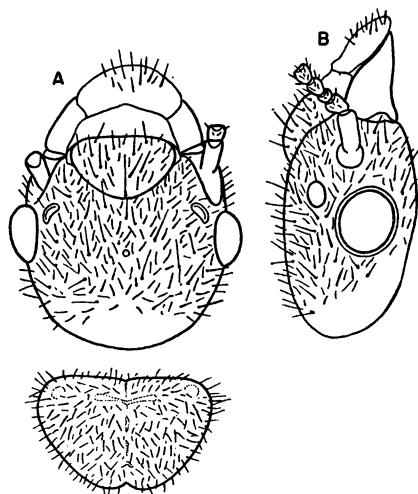


FIG. 64. Imago of *Microcerotermes paracelebensis*, new species. A. Head and pronotum from above. B. Head from side.

TABLE 24

MEASUREMENTS (IN MILLIMETERS) OF 10 IMAGOS OF *Microcerotermes paracelebensis*, NEW SPECIES

	Morphotype	Range	Mean
Length of head to tip of labrum	1.04	1.04-1.18	1.08
Length of head to side base of mandibles	0.80	0.78-0.83	0.80
Width of head	0.93	0.88-0.93	0.91
Long diameter of eye	0.26	0.23-0.26	0.25
Short diameter of eye	0.22	0.22-0.23	0.22
Eye from lower margin of head	0.07	0.07-0.10	0.08
Length of ocellus	0.10	0.06-0.10	0.07
Width of ocellus	0.06	0.06-0.07	0.06
Ocellus from eye	0.06	0.06-0.07	0.06
Length of postclypeus	0.26	0.23-0.26	0.23
Width of postclypeus	0.46	0.44-0.46	0.45
Length of pronotum	0.44	0.41-0.44	0.42
Width of pronotum	0.70	0.65-0.70	0.68

eye by its short diameter. Postclypeus swollen, as long as or slightly longer than half of its width. Antennae with 14 articles; third shortest. Pronotum narrower than head, more than half as long as broad; anterior margin nearly straight, posterior margin distinctly emarginate; lateral margins weakly convex; anterolateral corners broadly rounded.

**SOLDIER (FIG. 65):** Head brownish yellow, postclypeus darker anteriorly; anteclypeus whitish; labrum yellow, with brownish tinge; mandibles dark brown; pronotum pale. Head scantily hairy; postmentum with a few hairs in anterior half; pronotum with short hairs along anterior margin and a few scattered hairs on disc. Head parallel sided, slightly more than one and a half times as long as broad. Labrum parallel sided, slightly wider than long; anterolateral margins meeting at an angle. Mandibles short, thick, incurved

apically, only slightly longer than half of length of head capsule; serration coarse. Postmentum three times as long as broad at widest point; waist in basal third. Antennae with 13 articles; third shortest. Pronotum slightly more than half as long as broad, indistinctly notched anteriorly in middle; posterior margin convex, not depressed in middle.

**COMPARISONS:** The imago of *Microcerotermes paracelebensis* comes very close to that of *M. celebensis* Kemner, from which it can be distinguished by its weakly indicated median line on the postclypeus, the larger eyes, and the distinctly emarginate posterior margin of the pronotum. The imago of *Microcerotermes beelsoni* Snyder from northern India has smaller eyes and a less deeply emarginate pronotum.

The soldier of *Microcerotermes paracelebensis*

TABLE 25

MEASUREMENTS (IN MILLIMETERS) OF 10 SOLDIERS OF *Microcerotermes paracelebensis*, NEW SPECIES

	Holotype	Range	Mean
Length of head to side base of mandibles	1.45	1.43-1.53	1.47
Width of head	0.91	0.85-0.91	0.88
Height of head	0.80	0.75-0.85	0.79
Length of left mandible	0.85	0.75-0.85	0.78
Length of postmentum	0.91	0.85-0.93	0.89
Maximum width of postmentum	0.28	0.28-0.31	0.28
Minimum width of postmentum	0.20	0.20-0.26	0.22
Length of pronotum	0.31	0.28-0.34	0.31
Width of pronotum	0.57	0.54-0.59	0.56

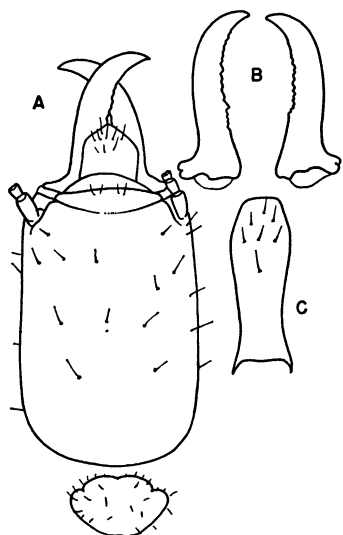


FIG. 65. Soldier of *Microcerotermes paracelebensis*, new species. A. Head and pronotum from above. B. Mandibles. C. Postmentum from below.

*sis*, new species, comes very close to that of *M. celebensis* Kemner also, but differs in having less incurved mandibles and a narrower head. In the soldier of *M. beelsoni* Snyder the mandibles are more coarsely serrated, less curved, and slightly more slender. The soldier of *Microcerotermes uncatus* Krishna has more strongly hooked mandibles and the head is longer and narrower.

TYPE LOCALITY: Ka-Chong, imagoes (morphotype, paramorphotype), two soldiers (holotype, paratype), workers, collected by M. Ahmad, March 6, 1962, nest on a tree trunk; imagoes (paramorphotype), soldiers (paratype), workers, collected by M. Ahmad, March 6, 1962, from nest at base of a tree; soldiers (paratypes), workers, collected by M. Ahmad, March 12, 1962, in a log.

***Microcerotermes crassus* Snyder**

*Microcerotermes crassus* SNYDER, 1934, pp. 22-23 (soldier).

*Microcerotermes burmanicus* AHMAD, 1947, p. 6 (soldier), fig. 6 (soldier); considered as a synonym of *M. crassus* by Krishna (1965).

IMAGO (FIG. 66): Head smoky brown; postclypeus slightly lighter than head, with a dark median line; anteclypeus white; labrum brown; pronotum slightly lighter than head, with a whitish T-shaped marking on

disc and a small, dotlike spot near posterior margin in middle. Head covered with short hairs and long scattered bristles; pronotum about as densely hairy as head. Head suboval, lateral margins in front of eyes parallel; fontanelle minute, circular, situated in center of head. Eyes nearly circular, separated from lower margin of head by less than half of their short diameter. Ocellus small, broadly oval, separated from eye by its long diameter. Postclypeus arched, as long as or longer than half of its width. Antennae with 14 articles; third shortest. Pronotum narrower than head, slightly more than half as long as broad, indistinctly emarginate both anteriorly and posteriorly; lateral sides distinctly convex throughout.

SOLDIER (FIG. 67): Head brownish yellow, slightly darker anteriorly; labrum brownish yellow; mandibles dark brown; antennae light brown; pronotum lighter than head. Head with only a few scattered hairs; tip of labrum with four hairs; postmentum with a pair of hairs at tip; pronotum scantily hairy. Head rectangular, slightly more than one and a half times as long as broad; labrum wider than long; lateral margins parallel, anterior margin weakly convex. Mandibles long, sickle shaped, finely serrated. Postmentum elongate, weakly arched, three times as long as its maximum width; waist nearer to posterior margin than to widest point. Antennae with 13 articles;

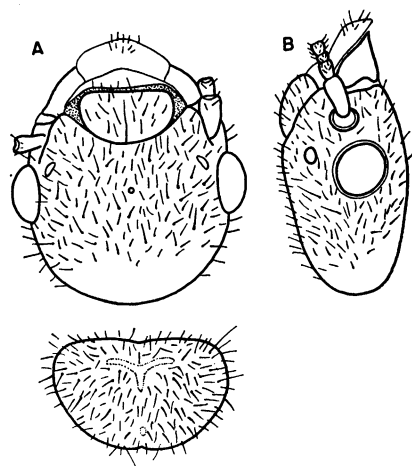


FIG. 66. Imago of *Microcerotermes crassus* Snyder. A. Head and pronotum from above. B. Head from side.

third shortest. Pronotum indistinctly emarginate both anteriorly and posteriorly.

MEASUREMENTS (IN MM.): Range of measurements, with means in parentheses. *Ten imagoes*: Length of head to tip of labrum, 1.09–1.17 (1.12); length of head to side base of mandibles, 0.78–0.83 (0.80); width of head, 0.91–0.96 (0.93); long diameter of eye, 0.24–0.26 (0.25); short diameter of eye, 0.22–0.24 (0.23); eye from lower margin of head, 0.07–0.10 (0.09); length of ocellus, 0.06–0.07 (0.06); width of ocellus, 0.05–0.06 (0.06); ocellus from eye, 0.06–0.07 (0.06); length of postclypeus, 0.23–0.26 (0.23); width of postclypeus, 0.46–0.49 (0.47); length of pronotum, 0.41–0.45 (0.42); width of pronotum, 0.65–0.72 (0.69). *Seventeen soldiers*: Length of head to side base of mandibles, 1.43–1.75 (1.52); width of head, 0.91–1.10 (0.97); length of left mandible, 1.06–1.20 (1.10); length of postmentum, 0.78–0.95 (0.87); maximum width of postmentum, 0.31–0.39 (0.33); minimum width of postmentum, 0.20–0.26 (0.23); length of pronotum, 0.31–0.40 (0.35); width of pronotum, 0.59–0.70 (0.64).

DISTRIBUTION: Bangkok, soldiers, workers, collected by D. Chaiglom, January 21, 1961; Ayudhya, soldiers, workers, collected by D. Chaiglom, February 4, 1961; Ka-Chong, soldiers, workers, collected by M. Ahmad,

March 4, 1962, nest on top of a tree; Kan Tang, soldiers, workers, collected by M. Ahmad, March 8, 1962, nest on ground; Huay Yang, soldiers, workers, collected by M. Ahmad, March 14, 1962, in a stump; Muaek Lek, soldiers, workers, collected by M. Ahmad, March 22, 1962; Klang Dong, soldiers, workers, collected by M. Ahmad, March 22, 1962, in a stump; Chantaburi, imagoes, soldiers, workers, collected by M. Ahmad, March 25, 1962, from a log in a rubber plantation; Prew, soldiers, workers, collected by M. Ahmad, March 29, 1962, from nest at base of a rubber tree; Tung Sa-Lang Luang, soldiers, workers, collected by M. Ahmad, April 5, 1962, from an arboreal nest; Tak, imago, soldiers, workers, collected by M. Ahmad, April 16, 1962, long, column-like nest on top of a stump; Mae Sod, soldiers, workers, collected by M. Ahmad, April 17, 1962, from a small nest on ground.

#### *Microcerotermes annandalei* Silvestri

*Microcerotermes annandalei* SILVESTRI, 1923, pp. 225–228 (imago, soldier), figs. 3, 1–7 (imago), 4, 1–7 (soldier).

*Microcerotermes annandalei*: ROONWAL AND SEN-SARMA, 1956, p. 12 (locality, soldier).

*Microcerotermes annandalei*: AHMAD, 1958, pp. 166 (imago), 168 (soldier).

IMAGO (FIG. 68): Head reddish brown; postclypeus slightly lighter than head, with a reddish brown median line; anteclypeus whitish; labrum brownish yellow; antennae light brown; pronotum slightly lighter than head, with a white, broken, median line and a fuzzy transverse band anteriorly. Head rather densely hairy, with short hairs and scattered long bristles; postclypeus as hairy as head; labrum with a few hairs near anterior margin; pronotum moderately pilose. Head suboval, semicircular posteriorly, nearly parallel sided anteriorly; fontanelle small, circular, not very distinct. Eyes of medium size, bulging, almost circular, separated from lower margin of head by nearly half of their short diameter. Ocellus rather small, very broadly oval, separated from eye by its long diameter. Postclypeus arched, nearly half as long as broad. Antennae with 14 articles; third shortest. Pronotum narrower than head; anterior margin almost straight; posterior

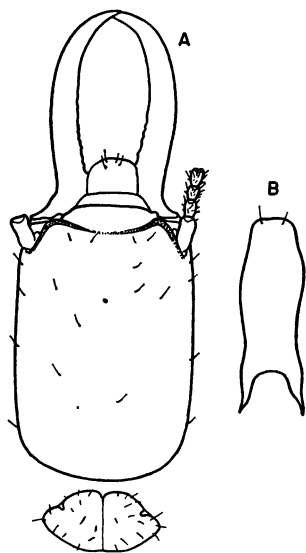


FIG. 67. Soldier of *Microcerotermes crassus* Snyder. A. Head and pronotum from above. B. Postmentum from below.

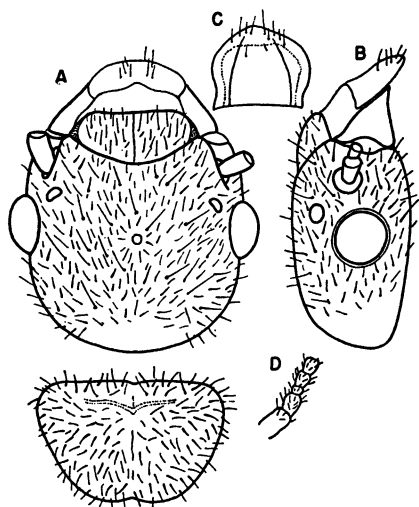


FIG. 68. Imago of *Microcerotermes annandalei* Silvestri. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Antenna.

margin slightly depressed in middle; lateral margins weakly convex.

**SOLDIER (FIG. 69):** Head yellow, with a brownish tinge; postclypeus and antennal carinae darker; labrum light brownish yellow; mandibles dark brown; antennae light brown; pronotum lighter than head. Head scantily hairy; labrum with a few short hairs at tip; postmentum with a pair of hairs on anterior margin; pronotum sparsely hairy. Head rectangular, a little more than one and a half times as long as broad. Labrum parallel sided; anterolateral sides meeting in a broad-angled tip. Mandibles stoutly built, finely serrated, slightly less than half of length of head capsule. Postmentum elongate, more than three times as long as broad in anterior half; waist in basal third. Antennae with 13 articles; second about one and a half times as long as third, latter shortest. Pronotum weakly emarginate both anteriorly and posteriorly, less than twice as long as broad.

**MEASUREMENTS (IN MM.):** Range of measurements, with means in parentheses. *Ten imagoes*: Length of head to tip of labrum, 1.14–1.24 (1.19); length of head to side base of mandibles, 0.80–0.91 (0.85); width of head, 0.85–0.98 (0.94); long diameter of eye, 0.24–0.26 (0.24); short diameter of eye, 0.23–0.24 (0.23); eye from lower margin of head, 0.09–

0.13 (0.10); length of ocellus, 0.07–0.09 (0.07); width of ocellus, 0.05–0.06 (0.05); ocellus from eye, 0.06–0.09 (0.07); length of postclypeus, 0.22–0.26 (0.23); width of postclypeus, 0.44–0.52 (0.47); length of pronotum, 0.44–0.49 (0.45); width of pronotum, 0.70–0.80 (0.74). *Ten soldiers*: Length of head to side base of mandibles, 1.76–1.89 (1.83); width of head, 1.04–1.09 (1.06); length of left mandible, 1.04–1.18 (1.08); length of postmentum, 1.14–1.19 (1.16); maximum width of postmentum, 0.33 (0.33); minimum width of postmentum, 0.23–0.27 (0.25); length of pronotum, 0.39–0.41 (0.39); width of pronotum, 0.67–0.72 (0.70).

**LOCALITY:** Mae Sod, imagoes, soldiers, workers, collected by M. Ahmad, April 19, 1962, nest on ground.

#### GENUS *GLOBITERMES* HOLMGREN

##### *Globitermes sulphureus* (Haviland)

*Termes sulphureus* HAVILAND, 1898, p. 405 (imago, soldier, worker), pl. 24, figs. 42–43 (soldier), 44 (imago).

*Termes annamensis* DESNEUX, 1904a, p. 148 (soldier, worker).

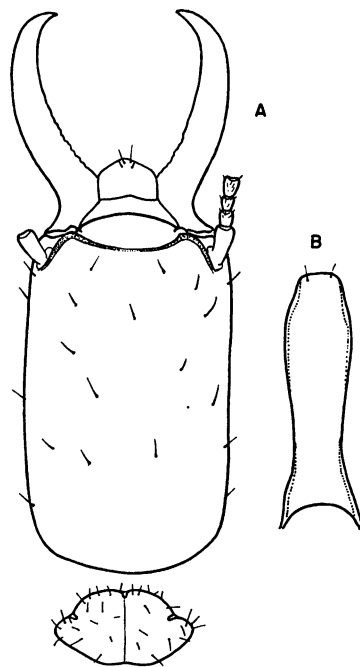


FIG. 69. Soldier of *Microcerotermes annandalei* Silvestri. A. Head and pronotum from above. B. Postmentum from below.

*Termes (Eutermes) sulphureus*: DESNEUX, 1904b, p. 45 (synonymy).

*Hamitermes (Globitermes) sulphureus*: HOLMGREN, 1912a, pp. 87, fig. 56 (imago mandibles), 93, fig. 63 (soldier mandibles).

*Hamitermes (Globitermes) sulphureus*: HOLMGREN, 1913b, pp. 231, 232 (imago, soldier, worker).

*Hamitermes (Globitermes) annamensis*: HOLMGREN, 1913b, p. 232 (soldier, worker), pl. 8, fig. 16 (soldier).

*Hamitermes (Globitermes) sulphureus*: HOLMGREN, 1914, pp. 273-274 (locality).

*Globitermes audax* SILVESTRI, 1914, p. 432 (soldier, worker), figs. 7, 8<sub>2</sub> (soldier), 8<sub>9</sub> (worker).

*Hamitermes (Globitermes) sulphureus*: JOHN, 1925, pp. 408-409 (imago, soldier, worker).

*Hamitermes (Globitermes) annamensis*: BATHELLIER, 1927, pp. 164-167 (systematics), 218-220 (biology).

*Amitermes (Globitermes) birmanicus* SNYDER, 1934, pp. 17-18 (soldier), fig. 9 (soldier).

*Globitermes sulphureus*: SNYDER, 1949, p. 130 (synonymy).

*Globitermes sulphureus*: AHMAD, 1958, pp. 172 (imago), 174 (soldier).

*Globitermes sulphureus*: KRISHNA, 1965, p. 6.

IMAGO (FIG. 70): Head dark brown; postclypeus brownish yellow; anteclypeus whitish; labrum of same color as postclypeus; antennae brown; pronotum dark brown, with a yellow, T-shaped marking on disc and an

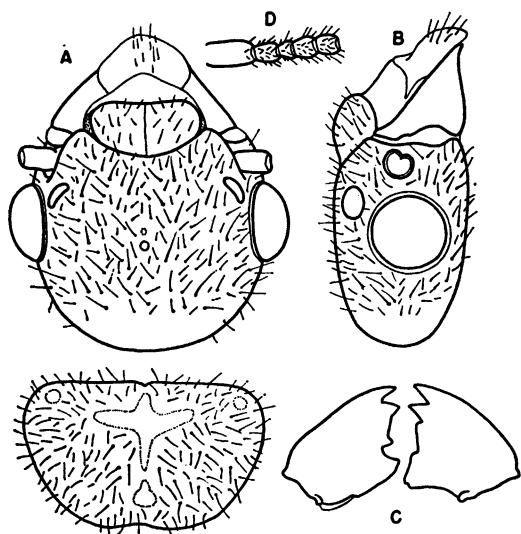


FIG. 70. Imago of *Globitermes sulphureus* (Haviland). A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Antenna.

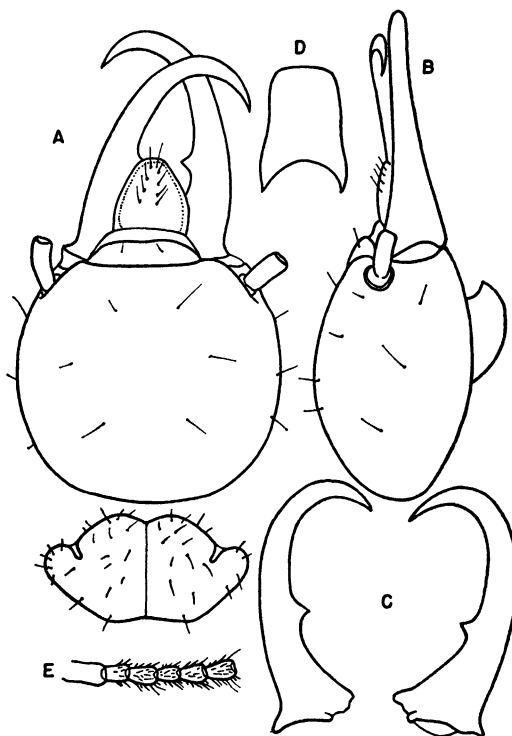


FIG. 71. Soldier of *Globitermes sulphureus* (Haviland). A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Postmentum from below. E. Antenna.

ocellus-like spot at each anterolateral corner; wing membrane brown, veins dark brown. Head moderately hairy; pronotum as hairy as head; wing scales covered with long, posteriorly directed hairs. Head subcircular, wider than long without mandibles; fontanelle small, circular, with a small spot in front. Eyes large, bulging, almost circular, close to lower margin of head. Ocellus broadly oval, slightly longer than broad, separated from eye by less than half of its short diameter. Postclypeus moderately arched, about half as long as broad. Mandibles as shown in figure 70. Antennae with 15 articles; second twice as long as third and as long as fourth, latter a little longer than fifth. Pronotum slightly narrower than head, slightly longer than half of its width, anterior margin almost straight, posterior margin depressed in middle, anterolateral corners broadly rounded.

SOLDIER (FIG. 71): Head brownish yellow; postclypeus slightly darker than head; anteclypeus whitish; labrum light brown; mandi-

bles reddish in distal half and brownish yellow in posterior half; antennae light brown; anterior lobe of pronotum brownish yellow; posterior lobe yellow. Head scantily hairy; postclypeus with two hairs; labrum with two median rows of bristles; pronotum with a few long bristles and short hairs. Head almost round, slightly wider than long without mandibles. Postclypeus raised. Labrum tongue shaped, almost as long as broad, extending up to tooth of mandible. Mandibles large, strongly curved, each mandible with a laterally directed tooth situated below middle. Postmentum strongly arched, slightly less than one and a half times as long as broad; waist weakly indicated. Antennae with 14 articles; second slightly shorter than third and almost as long as fourth. Pronotum saddle shaped, slightly emarginate both anteriorly and posteriorly, in some specimens anterior emargination indistinct; lateral lobes prominent.

**MEASUREMENTS (IN MM.):** Range of measurements, with means in parentheses. *Ten imagoes*: Length of head to tip of labrum, 1.17–1.30 (1.22); length of head to side base of mandibles, 0.85–0.96 (0.89); width of head, 1.11–1.17 (1.13); long diameter of eye, 0.33–0.39 (0.35); short diameter of eye, 0.31–0.36 (0.32); eye from lower margin of head, 0.03–0.07 (0.05); length of ocellus, 0.11–0.14 (0.12); width of ocellus, 0.09–0.11 (0.09); ocellus from eye, 0.02–0.03 (0.02); length of postclypeus, 0.20–0.26 (0.22); width of postclypeus, 0.46–0.52 (0.48); length of pronotum, 0.54–0.59 (0.57); width of pronotum, 0.91–0.98 (0.94). *Twenty-two soldiers*: Length of head to side base of mandibles, 0.75–0.98 (0.87); width of head at side base of mandibles, 0.61–0.83 (0.72); width of head at posterolateral ends of antennal carinae, 0.70–0.96 (0.87); width of head in middle, 0.80–1.09 (0.93); length of left mandible, 0.65–0.93 (0.79); tooth of left mandible from tip, 0.31–0.44 (0.38); tooth of left mandible from base, 0.33–0.46 (0.40); length of postmentum, 0.26–0.36 (0.29); width of postmentum, 0.19–0.27 (0.22); length of pronotum, 0.26–0.39 (0.32); width of pronotum, 0.57–0.80 (0.67).

**DISTRIBUTION:** Ka-Chong, queen, soldiers, workers, collected by M. Ahmad, March 3, 1962, from a mound; Kan Tang, soldiers, workers, collected by M. Ahmad, March 8,

1962, infesting woodwork of Forest Office building; Huay Yang, soldiers workers, collected by M. Ahmad, March 16, 1962, in a log; Chantaburi, soldiers, workers, collected by M. Ahmad, March 25, 1962, from a mound in a rubber plantation; Tung Sa-Lang Luang, imagoes, soldiers, workers, collected by M. Ahmad, April 13, 1962, from a mound; Tak, imagoes, soldiers, workers, collected by M. Ahmad, April 16, 1962, from a mound; Mae Sod, imagoes, soldiers, workers, collected by M. Ahmad, April 18, 1962, from a mound.

**REMARKS:** *Globitermes sulphureus* is one of the most common mound-building termites of Thailand. Its mound can be easily distinguished from mounds of fungus growers by their smaller size and more symmetrical shape which is like a dome. The outer surface is smooth. Sometimes the mounds are built on top of mounds of fungus-growing termites.

Economically this termite appears to be quite important. Logs in the forests, fence poles by the roadsides, and woodwork in the buildings were found infested with this termite.

#### GENUS *AMITERMES* SILVESTRI

#### KEY TO THE SPECIES

##### SOLDIERS

- Mandibles more than half as long as head capsule, tooth small, posteriorly directed. . . . .  
 . . . . . *A. longignathus*, new species  
 Mandibles less than half as long as head capsule, tooth large, laterally directed . . . . .  
 . . . . . *A. dentatus* (Haviland)

##### *Amitermes longignathus*, new species

**SOLDIER (FIG. 72):** Head yellow, area around fontanelle slightly darker; postclypeus yellow, anteclypeus whitish, labrum yellow, with a brownish tinge; mandibles reddish brown, lighter at bases; pronotum, legs, and abdominal tergites pale. Head with a few scattered hairs; labrum with two long bristles at tip and short hairs on disc; postmentum with a pair of hairs at each anterolateral corner, pronotum with long bristles along periphery and short hairs elsewhere; abdominal tergites with short hairs; sternites with short hairs and a few long bristles. Head thick, lateral margins convex, converging anteriorly; frontal projection slightly indicated; frons gradually sloping. Postclypeus short,



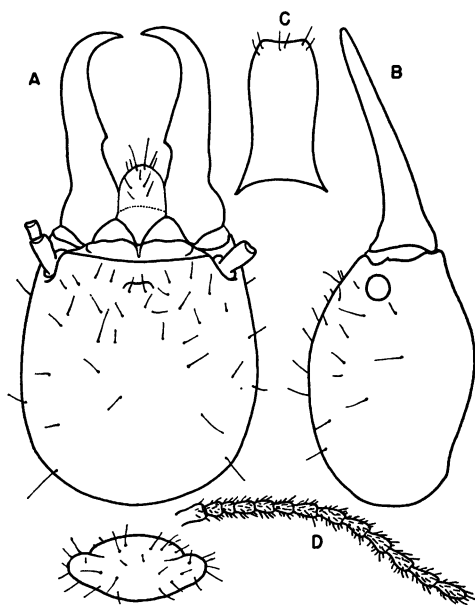


FIG. 72. Soldier of *Amitermes longignathus*, new species. A. Head and pronotum from above. B. Head from side. C. Postmentum from below. D. Antenna.

with a median groove. Anteclypeus bilobed. Labrum longer than broad, dome shaped; lateral margins straight. Mandibles long, tips hooked; each mandible with a small, posteriorly directed tooth, placed a little below middle. Postmentum arched; waist nearer to posterior margin than to widest point. Antennae with 13 articles; in some specimens fourth article appears to be subdivided; second article longer than third and shorter than

fourth. Pronotum saddle shaped; lateral lobes prominent; anterior margin convex, without emargination; posterior margin convex, not depressed in middle.

COMPARISONS: *Amitermes longignathus*, new species, can be easily distinguished from all other hitherto known species of *Amitermes* from the Indo-Malayan Region by the shape of its mandibles. *Amitermes belli* (Desneux) from West Pakistan comes closest to *A. longignathus*, but its mandibles are less curved and are relatively shorter. *Amitermes dentatus* Holmgren and *A. paradentatus* Ahmad have very differently shaped mandibles, with more prominent and laterally directed teeth.

TYPE LOCALITY AND DISTRIBUTION: Huay Yang (type locality), soldiers (holotype, paratypes), collected by M. Ahmad, March 16, 1962, from nest of *Termes*; Makham, soldiers (paratypes), collected by M. Ahmad, March 27, 1962, from nest of *Termes*.

***Amitermes dentatus* (Haviland)**

*Termes dentatus* HAVILAND, 1898, p. 408 (imago, soldier, worker), figs. 45–46 (soldier), 47 (imago), 48 (wing).

*Termes (Eutermes) dentatus*: DESNEUX, 1904b, p. 41 (synonymy).

*Hamitermes (Hamitermes) dentatus*: HOLMGREN, 1912a, pp. 91, 93, fig. 60 (soldier mandible).

*Hamitermes (Hamitermes) dentatus*: HOLMGREN, 1913b, pp. 226–227 (imago, soldier, worker), pl. 8, fig. 9 (soldier).

*Hamitermes (Hamitermes) dentatus*: Holmgren, 1914, p. 272 (locality).

*Hamitermes (Hamitermes) minor* HOLMGREN, 1914, p. 273 (imago, soldier, worker).

TABLE 26

MEASUREMENTS (IN MILLIMETERS) OF 10 SOLDIERS OF *Amitermes longignathus*, NEW SPECIES

	Holotype	Range	Mean
Length of head to side base of mandibles	1.30	1.17–1.35	1.25
Width of head at side base of mandibles	0.88	0.78–0.93	0.84
Width of head at posterolateral ends of antennal carinae	1.01	0.85–1.01	0.94
Width of head in middle	1.14	1.01–1.14	1.07
Length of left mandible	1.01	0.96–1.04	0.99
Tooth of left mandible from tip	0.57	0.52–0.59	0.55
Length of postmentum	0.59	0.57–0.70	0.62
Maximum width of postmentum	0.31	0.29–0.35	0.31
Minimum width of postmentum	0.28	0.23–0.28	0.25
Length of pronotum	0.33	0.28–0.35	0.31
Width of pronotum	0.65	0.62–0.67	0.64

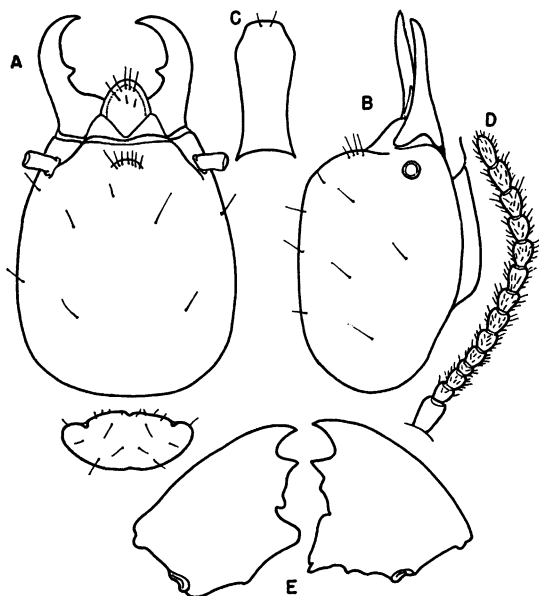


FIG. 73. *Amitermes dentatus* (Haviland). Soldier: A. Head and pronotum from above. B. Head from side. C. Postmentum from below. D. Antenna. Worker: E. Mandibles.

*Hamitermes* (*Hamitermes*) *dentatus*: JOHN, 1925, p. 408 (soldier, worker).

*Amitermes dentatus*: SNYDER, 1949, p. 116 (synonymy).

*Amitermes minor*: SNYDER, 1949, p. 121 (synonymy).

*Amitermes dentatus*: AHMAD, 1958, pp. 177 (imago), 178 (soldier).

*Amitermes minor*: AHMAD, 1958, pp. 177 (imago), 178 (soldier).

**SOLDIER** (FIG. 73): Head yellow, with a brownish tinge; anterolateral corners reddish brown; mandibles reddish brown, bases light yellowish brown; pronotum yellow, with a brownish tinge. Head with a few scattered bristles, a cluster of from six to eight hairs around fontanelle; labrum with a few hairs in anterior half; pronotum sparsely hairy. Head oval, thick; frons abruptly sloping. Postclypeus very narrow. Anteclypeus bilobed. Labrum dome shaped. Mandibles short, thick at bases, strongly hooked, each mandible with a prominent, laterally directed tooth. Postmentum slightly arched, broadest in apical third and narrowest in basal third, only slightly wider anteriorly than posteriorly. Antennae with 14 articles; second and third almost subequal; fourth shortest. Pro-

notum less than half as long as broad, without emargination both anteriorly and posteriorly.

**MEASUREMENTS** (IN MM.) OF 10 SOLDIERS: Range of measurements, with means in parentheses: Length of head to side base of mandibles, 1.22–1.40 (1.30); width of head at side base of mandibles, 0.65–0.70 (0.68); width of head at posterolateral ends of antennal carinae, 0.83–0.93 (0.85); width of head in middle, 1.01–1.17 (1.07); length of left mandible, 0.54–0.62 (0.57); tooth of left mandible from tip, 0.23–0.26 (0.24); length of postmentum, 0.59–0.67 (0.65); maximum width of postmentum, 0.26–0.29 (0.27); minimum width of postmentum, 0.23–0.27 (0.25); length of pronotum, 0.26–0.28 (0.27); width of pronotum, 0.59–0.68 (0.63).

**DISTRIBUTION**: Ka-Chong, soldiers, workers, collected by M. Ahmad, March 11, 1962, from mound of a *Macrotermes*; Huay Yang, soldiers, workers, collected by M. Ahmad, March 15, 1962, under a log.

**REMARKS**: There is a complete overlap in the measurements of *A. dentatus* (Haviland) and those of *A. minor* Holmgren, on the basis of which I consider *A. minor* a synonym of *A. dentatus*.

#### SUBFAMILY NASUTITERMITINAE

##### GENUS HAVILANDITERMES LIGHT

##### *Havilanditermes proatripennis*, new species

**IMAGO** (FIG. 74): Head dark brown; postclypeus light brown; anteclypeus white; labrum yellow, with a brownish tinge; antennae light brown; pronotum dark brown, with a T-shaped, brownish yellow marking on disc and an ocellus-like spot of same color at each anterolateral corner; wings smoky brown; abdominal tergites dark brown. Head covered with a dense mat of short hairs and scattered long bristles; postclypeus with short hairs and a few bristles; labrum with short hairs and long bristles; pronotum with more bristles than head; abdominal tergites densely pubescent; wings strongly hairy. Head subcircular; fontanelle plate large, forked anteriorly. Eyes large, bulging, almost round. Ocellus almost circular, separated from eye by its short diameter or slightly less. Postclypeus narrow, three to four times as long as broad, with a reddish median line. Labrum dome shaped. Mandibles as shown in figure

TABLE 27

MEASUREMENTS (IN MILLIMETERS) OF 10 IMAGOS OF *Havilanditermes proatripennis*, NEW SPECIES

	Morphotype	Range	Mean
Length of head to tip of labrum	1.82	1.76-1.95	1.82
Length of head to side base of mandibles	1.17	1.11-1.30	1.21
Width of head	1.61	1.61-1.69	1.64
Long diameter of eye	0.46	0.46-0.52	0.48
Short diameter of eye	0.44	0.41-0.46	0.43
Eye from lower margin of head	0.10	0.07-0.10	0.09
Length of ocellus	0.15	0.15-0.18	0.16
Width of ocellus	0.14	0.13-0.15	0.13
Ocellus from eye	0.10	0.10-0.13	0.11
Length of pronotum	0.85	0.80-0.88	0.84
Width of pronotum	1.50	1.43-1.53	1.46

74. Antennae with 15 articles; third indistinctly longer than second. Pronotum narrower than head; lateral sides straight posterior to lateral lobes; posterior and anterior margins indistinctly emarginate.

SOLDIER (FIG. 75): Head light brownish yellow to light reddish brown; tip of nasus darker than head; antennae light brown; pronotum light brown, anterior lobe darker than posterior lobe; abdominal tergites dark brown; legs yellow. Head without or with only a few short hairs; tip of nasus with hairs of varying sizes; anterior margin of pronotum with a row of short hairs, rest without hairs. Head without nasus seen from above almost circular, not constricted behind antennae, dorsal profile depressed at base of nasus; nasus long, raised, rather thick at base, cylindrical in distal half. Mandibles with long apical portions; left mandible with a minute tooth below the tip of apical portion; right mandible with only an indication of a tooth below tip. Antennae long, with 14 articles;

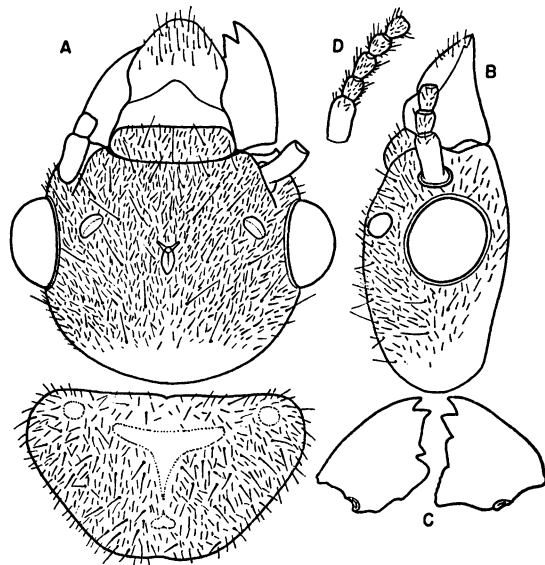


FIG. 74. Imago of *Havilanditermes proatripennis*, new species. A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Antenna.

TABLE 28

MEASUREMENTS (IN MILLIMETERS) OF 13 SOLDIERS OF *Havilanditermes proatripennis*, NEW SPECIES

	Holotype	Range	Mean
Length of head to tip of nasus	2.36	2.02-2.47	2.28
Length of head without nasus	1.32	1.09-1.43	1.30
Width of head in middle	1.43	1.17-1.61	1.42
Height of head	1.06	0.80-1.17	1.01
Length of pronotum	0.31	0.27-0.33	0.31
Width of pronotum	0.62	0.57-0.72	0.64

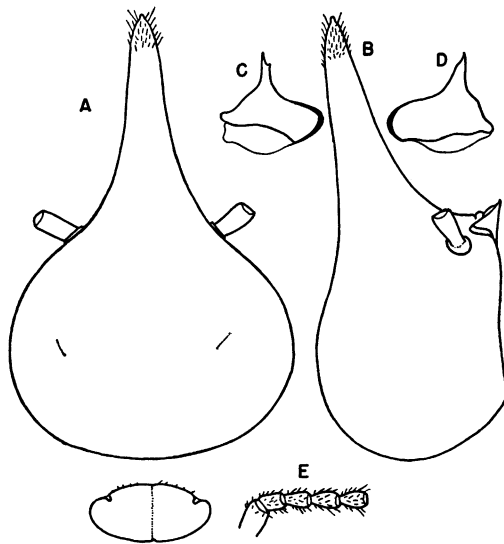


FIG. 75. Soldier of *Havilanditermes proatripennis*, new species. A. Head and pronotum from above. B. Head from side. C. Left mandible. D. Right mandible. E. Antenna.

third almost as long as second. Pronotum without emargination both anteriorly and posteriorly.

COMPARISONS: The imago of *Havilanditermes proatripennis*, new species, resembles that of *H. atripennis* (Haviland) very closely but differs as follows: (1) the ocelli are almost circular (oval in *H. atripennis*); the median line of the postclypeus is less distinct; and (3) the pronotum has the lateral lobes less produced and more broadly rounded.

The soldier of *Havilanditermes proatripennis* differs from that of *H. atripennis* Light, the only other species in the genus, in having a nasus that is shorter and thicker at the base.

TYPE LOCALITY: Ka-Chong, imagoes (morphotype, paramorphotypes), soldiers (holotype, paratypes), workers, collected by M. Ahmad, March 9, 1962, in a log; soldiers (paratypes), workers, collected by M. Ahmad.

#### GENUS NASUTITERMES DUDLEY

##### KEY TO THE SPECIES

###### IMAGOES

- Eyes larger, long diameter, 0.57–0.62 mm. . . . .  
 . . . . . *N. matangensisformis* (Holmgren)  
 Eyes smaller, long diameter, 0.41 mm. . . . .  
 . . . . . *N. tungsangensis*, new species

#### SOLDIERS

1. Mandibles without apical portion . . . . .  
 . . . . . *N. johoricus* (John)
- Mandibles with apical portion. . . . . 2
2. Soldier dimorphic. . . . . *N. bififormis*, new species
- Soldier monomorphic . . . . . 3
3. Smaller species; length of head with nasus,  
 1.01–1.06 mm. . . . . *N. perparvus*, new species
- Larger species; length of head with nasus,  
 1.50–1.89 mm. . . . . 4
4. Nasus raised; dorsum of head distinctly depressed  
 at base of nasus . . . . .  
 . . . . . *N. fuscipennis* (Haviland)
- Nasus not raised; dorsum of head not depressed  
 at base of nasus. . . . . 5
5. Head pear shaped . . . . .  
 . . . . . *N. tungsangensis*, new species
- Head subcircular . . . . .  
 . . . . . *N. matangensisformis* (Holmgren)

#### *Nasutitermes matangensisformis* (Holmgren)

*Eutermes* (*Eutermes*) *matangensisformis* HOLMGREN, 1913b, p. 185 (imago, soldier, worker).

*Eutermes* (*Eutermes*) *matangensisformis*: HOLMGREN, 1914, p. 265 (locality).

*Nasutitermes matangensisformis*: OSHIMA, 1923, pp. 16–18 (soldier, worker).

*Eutermes* (*Eutermes*) *javanicus* JOHN, 1925, p. 394 (synonymy).

*Eutermes* (*Eutermes*) *matangensisformis*: JOHN, 1925, p. 398 (locality).

*Eutermes* (*Eutermes*) *timoriensis* JOHN, 1925, p. 398 (soldier, worker).

*Nasutitermes matangensisformis*: SNYDER, 1949, p. 286 (synonymy).

*Nasutitermes matangensis matangensisformis*: ROONWAL AND SEN-SARMA, 1956, pp. 27–29 (synonymy).

*Nasutitermes matangensisformis*: AHMAD, 1958, pp. 147 (imago), 150 (soldier).

*Nasutitermes matangensis matangensisformis*: PRASHAD AND SEN-SARMA, 1959, pp. 51–52 (synonymy).

IMAGO (FIG. 76): Head brown, with a reddish tinge; postclypeus much lighter than head; anteclypeus pale; labrum brownish yellow; antenna light brown; pronotum yellow, with a brownish tinge; wings hyaline, veins brown. Head rather densely hairy; pronotum slightly less hairy than head. Head circular, fontanelle plate narrow, elongate. Eyes large, bulging, subcircular, slightly longer than broad, separated from lower margin of head by one-fifth to one-sixth of their short diameter. Ocellus broadly oval, separated from eye by about one-fourth of its short diameter.

Postclypeus narrow, not swollen, less than half as long as broad. Antennae with 15 articles; second and third nearly subequal; fourth shorter. Pronotum narrower than head, slightly longer than half of its width; anterior margin straight, indistinctly raised in middle; posterior margin convex, very weakly depressed in middle.

**SOLDIER (FIG. 77):** Head orange to reddish brown; anterior half of nasus darker than head, basal half as dark as head; antennae light brown; pronotum brown; mesonotum and metanotum lighter than pronotum; abdominal tergites brownish yellow. Head with short hairs and long bristles; nasus with from two to four short hairs at tip; pronotum with short hairs along anterior margin, rest without hairs; abdominal tergites with four bristles, two in middorsum and one on each lateral side; sternites with more hairs than tergites. Head seen from above almost circular, only slightly wider than long without nasus; dorsal profile not depressed; nasul hump present; nasus conical, slightly longer than half of length of head capsule. Mandibles with short apical processes. Antennae with 13–14 articles; in specimens with 13 articles, third article about twice as long as second; in specimens with 14 articles, as long as second. Pronotum strongly saddle shaped, without emargination either anteriorly or posteriorly.

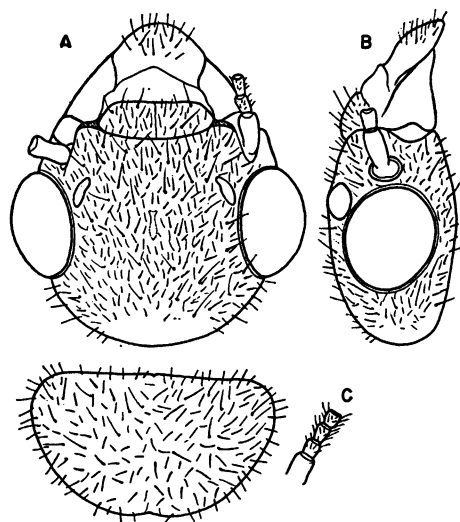


FIG. 76. Imago of *Nasutitermes matangensisformis* (Holmgren). A. Head and pronotum from above. B. Head from side. C. Antenna.

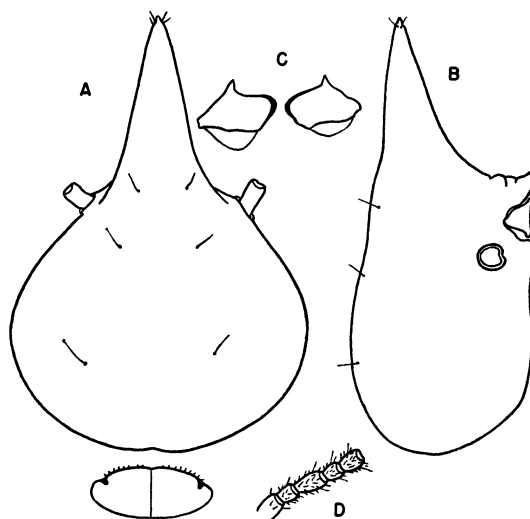


FIG. 77. Soldier of *Nasutitermes matangensisformis* (Holmgren). A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Antenna.

**MEASUREMENTS (IN MM.):** Range of measurements, with means in parentheses. *Nine imagoes:* Length of head to tip of labrum, 1.56–1.74 (1.67); length of head to side base of mandibles, 1.11–1.22 (1.16); width of head, 1.48–1.58 (1.51); long diameter of eye, 0.57–0.62 (0.58); short diameter of eye, 0.49–0.54 (0.51); eye from lower margin of head, 0.06–0.10 (0.07); length of ocellus, 0.15–0.20 (0.17); width of ocellus, 0.13–0.16 (0.14); ocellus from eye, 0.02–0.05 (0.03); length of pronotum, 0.70–0.76 (0.72); width of pronotum, 1.22–1.32 (1.25). *Fourteen soldiers:* Length of head with nasus, 1.61–1.89 (1.78); length of head without nasus, 1.01–1.22 (1.12); width of head, 1.04–1.27 (1.17); height of head, 0.72–0.85 (0.79); length of pronotum, 0.20–0.24 (0.21); width of pronotum, 0.49–0.57 (0.52).

**DISTRIBUTION:** Ka-Chong, imagoes, soldiers, workers, collected by M. Ahmad, March 11, 1962, nest on the stem of a tree; Khao Yai, soldiers, workers, collected by M. Ahmad, March 21, 1962, in a log; Prew, imagoes, soldiers, workers, collected by M. Ahmad, March 28, 1962, nest on a tree; Tung Sa-Lang Luang, soldiers, workers, collected by M. Ahmad, April 8, 1962, tubes on a tree trunk; Mae Sod, soldiers, workers, collected by M. Ahmad, April 18, 1962, tubes on a tree.

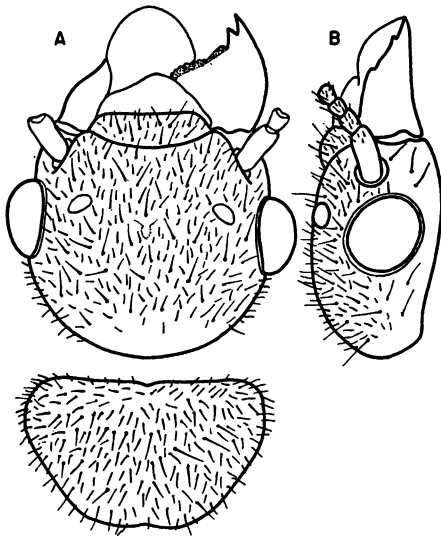


FIG. 78. Imago of *Nasutitermes tungsalangensis*, new species. A. Head and pronotum from above. B. Head from side.

***Nasutitermes tungsalangensis*, new species**

IMAGO (FIG. 78): Head with numerous short hairs and scattered long bristles; pronotum as densely hairy as head. Head almost circular; fontanelle lenticular. Eyes bulging, nearly circular, separated from lower margin of head by nearly one-fifth of their short diameter. Ocellus small, broadly oval, separated from eye by its large diameter. Postclypeus short, appreciably less than half as long as broad. Antennae with 15 articles; second almost as long as third. Pronotum a little narrower than head; anterior margin nearly straight; posterior margin slightly emarginate; anterolateral corner broadly rounded.

SOLDIER (FIG. 79): Head reddish brown, nasus of same color as head, antennae light yellowish brown; pronotum reddish brown,

TABLE 29

MEASUREMENTS (IN MILLIMETERS) OF A SINGLE MORPHOTYPE IMAGO OF *Nasutitermes tungsalangensis*, NEW SPECIES

Length of head to tip of labrum	1.58
Length of head to side base of mandibles	1.17
Width of head	1.48
Long diameter of eye	0.41
Short diameter of eye	0.36
Eye from lower margin of head	0.07
Length of ocellus	0.14
Width of ocellus	0.10
Ocellus from eye	0.14
Length of pronotum	0.67
Width of pronotum	1.14

slightly lighter than head; abdominal tergites and legs brownish yellow. Head with two pairs of bristles in posterior half; nasus with a few short and long hairs at tip and one or two bristles at base; pronotum with minute hairs on anterior margin, rest without hairs; abdominal tergites almost without hairs except for one or two bristles at posterior margin. Head pear shaped; dorsal profile nearly straight; nasal hump slightly indicated; nasus short, thick at base. Mandibles with short apical processes. Antennae with 13–14 articles; in specimens with 13 articles, third article longer than second and fourth. Pronotum without emargination either anteriorly or posteriorly.

COMPARISONS: The imago of *Nasutitermes tungsalangensis*, new species, comes closest to that of *N. taylori* Light and Wilson, from which it can be distinguished by the fact that its ocelli are more widely separated from the eye.

The soldier of *Nasutitermes tungsalangensis*, new species, comes very close to that of *N.*

TABLE 30

MEASUREMENTS (IN MILLIMETERS) OF 12 SOLDIERS OF *Nasutitermes tungsalangensis*, NEW SPECIES

	Holotype	Range	Mean
Length of head with nasus	1.50	1.50–1.79	1.66
Length of head without nasus	0.96	0.96–1.11	1.04
Width of head	0.91	0.91–1.14	1.03
Height of head	0.72	0.67–0.78	0.72
Length of pronotum	0.23	0.23–0.26	0.25
Width of pronotum	0.46	0.46–0.49	0.49

*taylori* Light and Wilson, from which it can be distinguished by its shorter apical processes on the mandibles and the thicker nasus. The soldier of *Nasutitermes garoensis* Roonwal and Chhotani from Assam, India, is smaller, and the head is broadest more anteriorly.

**TYPE LOCALITY AND DISTRIBUTION:** Tung Sa-Lang Luang (type locality), one freshly molted imago (morphotype), soldiers (holotype, paratypes), workers, collected by M. Ahmad, April 7, 1962; Khao Yai, soldiers (paratypes), workers, collected by M. Ahmad, March 21, 1962, tubes on a tree trunk.

***Nasutitermes fuscipennis* (Haviland)**

*Termes fuscipennis* HAVILAND, 1898, p. 422 (imago, soldier, worker), figs. 69–70 (soldier), 71 (imago), 72 (wing).

*Eutermes (Eutermes) fuscipennis*: HOLMGREN, 1913b, pp. 166–167 (imago, soldier, worker), pl. 8, fig. 9 (soldier).

*Nasutitermes fuscipennis*: SNYDER, 1949, p. 277 (synonymy).

*Nasutitermes fuscipennis*: AHMAD, 1958, p. 150 (soldier).

**SOLDIER (FIG. 80):** Head reddish brown; nasus of almost same color as head; antennae yellowish brown; thoracic and abdominal tergites brown; sternites light brown. Head very scantily hairy; nasus with one pair of hairs at tip on each side, another pair of hairs a

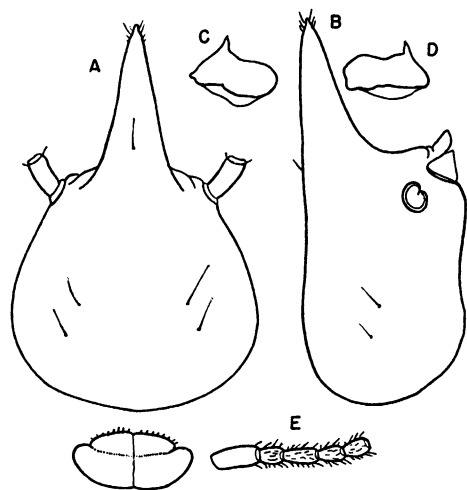


FIG. 79. Soldier of *Nasutitermes tungsalangensis*, new species. A. Head and pronotum from above. B. Head from side. C. Left mandible. D. Right mandible. E. Antenna.



FIG. 80. *Nasutitermes fuscipennis* (Haviland). Soldier: A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Antenna. Worker: E. Mandibles.

little posteriorly; pronotum with short hairs on anterior margin; abdominal tergites with a few bristles on posterior margin. Head seen from above somewhat pear shaped, broader than long; dorsal profile depressed at base of nasus, nasal hump absent, in some specimens weakly indicated; nasus elongate, raised, rather thick at base. Mandibles with apical processes. Antennae with 14 articles; third a little more than twice as long as second and one and a quarter times as long as fourth. Pronotum saddle shaped, not emarginate either anteriorly or posteriorly.

**MEASUREMENTS (IN MM.) OF 12 SOLDIERS:** Range of measurements, with means in parentheses: Length of head with nasus, 1.66–1.76 (1.68); length of head without nasus, 0.98–1.06 (1.01); width of head, 1.06–1.22 (1.11); height of head, 0.67–0.75 (0.70); length of pronotum, 0.26–0.28 (0.27); width of pronotum, 0.49–0.52 (0.50).

**LOCALITY:** Ka-Chong, soldiers, workers, collected by M. Ahmad, March 6, 1962, nest in the hollow of a tree trunk.

**REMARKS:** In Holmgren's description of *N. fuscipennis*, the third antennal article is stated to be shorter than the second.

***Nasutitermes dimorphus*, new species**

**MAJOR SOLDIER (FIG. 81):** Head smoky brown, nasus dark brown, tip of nasus reddish brown; antennae light brown; pronotum brown anteriorly, lighter posteriorly; legs straw colored; abdominal tergites light brown. Head covered with minute short hairs and a few scattered long bristles; nasus as hairy as head, tip with two long hairs each side; abdominal tergites with short hairs and a few long bristles. Head without nasus almost circular; sides in middle somewhat straight; dorsal profile almost straight; nasus cylindrical, half as long as head capsule. Mandibles with short apical processes. Antennae with 12 articles; second longer than third and almost as long as fourth. Pronotum saddle shaped, without emarginations either anteriorly or posteriorly.

**MINOR SOLDIER (FIG. 81):** Head brown, with a smoky tinge; nasus much darker than head, tip lighter, reddish brown; antennae pale, with a light brownish tinge; pronotum very light brown; anterior margin darker; abdominal tergites light brown; rest of body, including legs, creamy yellow. Pubescence on head and body as in major soldier. Head pear shaped, longer than broad; dorsal profile straight; nasus cylindrical, nasal hump not indicated. Mandible with short, but distinct, apical processes. Antennae with 12 articles; second longer than third and nearly as long as fourth.

**COMPARISONS:** *Nasutitermes dimorphus*, new species, can be easily distinguished from all other Indo-Malayan species of *Nasutitermes* with dimorphic soldiers by its much smaller size. *Nasutitermes bulbiceps* (Holmgren) and *N. longinasus* John are much larger and have a relatively longer nasus. *Nasutitermes cher-*

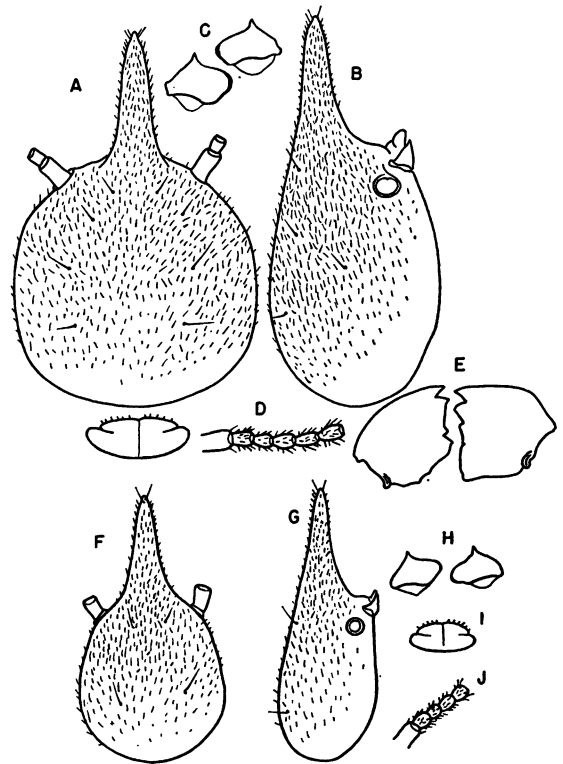


FIG. 81. *Nasutitermes dimorphus*, new species. Major soldier: A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Antenna. Minor soldier: F. Head from above. G. Head from side. H. Mandibles. I. Pronotum from above. J. Antenna. Worker: E. Mandibles.

*raensis* Roonwal and Chhotani, another dimorphic *Nasutitermes* species, is also larger and has a head of different shape.

**TYPE LOCALITY:** Kan Tang, major soldiers (holotype, paratypes), minor soldiers (morphotype, paramorphotypes), workers, col-

TABLE 31

MEASUREMENTS (IN MILLIMETERS) OF 10 MAJOR SOLDIERS OF *Nasutitermes dimorphus*, NEW SPECIES

	Holotype	Range	Mean
Length of head with nasus	1.53	1.53-1.58	1.54
Length of head without nasus	1.01	0.96-1.04	1.00
Width of head	0.91	0.91-0.96	0.93
Height of head	0.70	0.65-0.72	0.67
Length of pronotum	0.15	0.15-0.18	0.15
Width of pronotum	0.41	0.39-0.44	0.41



TABLE 32

MEASUREMENTS (IN MILLIMETERS) OF 10 MINOR SOLDIERS OF *Nasutitermes dimorphus*, NEW SPECIES

	Morphotype	Range	Mean
Length of head with nasus	1.06	1.01-1.11	1.06
Length of head without nasus	0.65	0.63-0.67	0.65
Width of head	0.52	0.52-0.57	0.53
Height of head	0.36	0.36-0.41	0.39
Length of pronotum	0.13	0.10-0.13	0.10
Width of pronotum	0.31	0.28-0.31	0.29

lected by M. Ahmad, March 8, 1962, from a mound of *Hypoterme*s.

*Nasutitermes perparvus*, new species

SOLDIER (FIG. 82): Head smoky brown, vertex light yellowish brown; nasus dark brown, much darker than head; antennae light yellowish brown, basal two articles much lighter than rest; pronotum brown, posterior lobe paler, with a brownish tinge; mesonotum and metanotum of same color as posterior lobe of pronotum; abdominal tergites light brown; legs straw colored. Head covered with numerous short hairs and a few scattered long bristles; nasus as hairy as head; pronotum sparsely hairy; abdominal tergites with numerous short hairs and a few long bristles; sternites densely pubescent. Head seen from above pyriform, longer than broad; dorsal profile almost straight; rostral hump very weakly indicated; nasus cylindrical, more than half as long as head capsule. Mandible with short apical processes. Antennae with 11 articles; third longer than second; fourth shorter than third. Pronotum not emarginate either anteriorly or posteriorly.

COMPARISONS: *Nasutitermes perparvus*, new species, comes very close to *N. parvus* Light and Wilson from the Philippines but

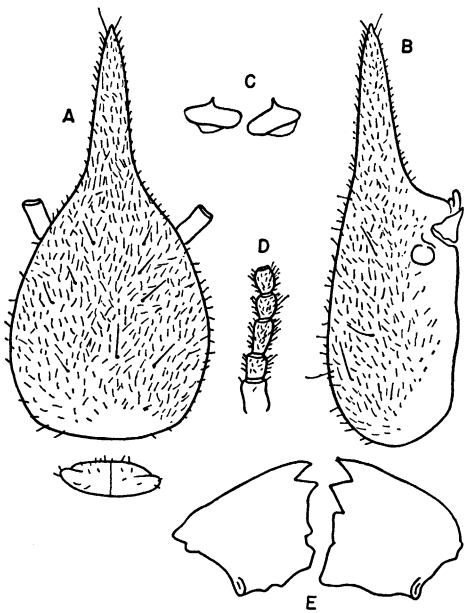


FIG. 82. *Nasutitermes perparvus*, new species. Soldier: A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Antenna. Worker: E. Mandibles.

differs in the following ways: is of smaller size and lighter color and has more prominent apical portions of the mandibles and lacks

TABLE 33

MEASUREMENTS (IN MILLIMETERS) OF EIGHT SOLDIERS OF *Nasutitermes perparvus*, NEW SPECIES

	Holotype	Range	Mean
Length of head with nasus	1.01	1.01-1.06	1.03
Length of head without nasus	0.65	0.59-0.65	0.61
Width of head	0.49	0.49-0.57	0.52
Height of head	0.33	0.32-0.36	0.35
Length of pronotum	0.10	0.10	0.10
Width of pronotum	0.26	0.26-0.28	0.27

projections on either side of the nasus at the base. The minor soldier of *N. dimorphus* resembles that of *N. perparvus*, new species, very closely, but it has antennae with 12 articles (11 articles in *N. perparvus*).

TYPE LOCALITY AND DISTRIBUTION: Wang Nok An (type locality), soldiers (holotype, paratypes), collected by M. Ahmad, April 11, 1962, under dried elephant dung; Huay Yang, soldiers (paratypes), workers, collected by M. Ahmad, March 16, 1962, from nest of *Amitermes*.

***Nasutitermes johoricus* (John)**

*Eutermes* (*Eutermes*) *johoricus* JOHN, 1925, p. 393 (soldier, worker).

*Nasutitermes johoricus*: SNYDER, 1949, p. 281 (synonymy).

SOLDIER (FIG. 83): Head reddish orange; nasus light reddish brown; thoracic tergites brownish yellow; abdominal tergites light brown; legs pale. Head with a few scattered bristles; tip of nasus with four short hairs and two bristles a little posteriorly; anterior margin of pronotum fringed with minute hairs, a few minute hairs elsewhere; abdominal tergites with a few minute hairs and from two to three bristles at posterior margins; sternites with short hairs and long bristles. Head capsule almost round, not constricted behind antennae; dorsal profile straight; rostral hump indicated; nasus short, conical, thickness at base shows some variability within and between colonies. Mandibles without

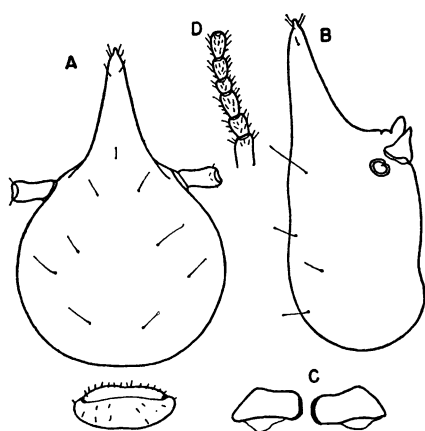


FIG. 83. Soldier of *Nasutitermes johoricus* (John). A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Antenna.

apical portion. Antennae with 12–13 articles; in specimens with 13 articles, third article slightly longer than second and nearly twice as long as fourth. Pronotum saddle shaped; anterior margin not notched in middle; posterior margin convex, not emarginate.

MEASUREMENTS (IN MM.) OF 13 SOLDIERS: Range of measurements, with means in parentheses: Length of head with nasus, 1.19–1.35 (1.26); length of head without nasus, 0.75–0.91 (0.83); width of head, 0.75–0.85 (0.79); height of head, 0.46–0.57 (0.53); length of pronotum, 0.18 (0.18); width of pronotum, 0.39–0.44 (0.42).

DISTRIBUTION: Ka-Chong, soldiers, workers, collected by M. Ahmad, March 7, 1962, tubes on rubber trees; Kan Tang, soldiers, workers, collected by M. Ahmad, March 8, 1962, tubes on a tree; Chantaburi, soldiers, workers, collected by M. Ahmad, March 26, 1962, tubes on a tree trunk; Prew, soldiers, workers, collected by M. Ahmad, March 28, 1962, tubes on a rubber tree; Mae Sod, soldiers, workers, collected by M. Ahmad, April 18, 1962, tubes on a tree trunk.

GENUS **BULBITERMES** EMERSON

KEY TO THE SPECIES

IMAGOS

1. Width of head across eyes, 1.06–1.14 mm. . . . . *B. parapusillus*, new species  
Width of head across eyes, 1.24–1.40 mm. . . . . 2
2. Eyes smaller and circular; diameter, 0.39 mm. . . . . *B. laticephalus*, new species  
Eyes larger and not quite circular; long diameter, 0.46–0.49; short diameter, 0.39–0.44 mm. . . . . *B. prabhae* Krishna

SOLDIERS

1. Antennal articles long; constriction of head behind antennae slight, color of head dark reddish brown to smoky brown . . . . . 2  
Antennal articles short; constriction behind antennae distinct, head orange to light reddish brown. . . . . 3
2. Larger species; length of head with nasus, 1.75–1.95 mm.; width of head, 1.15–1.25 mm.; head dark reddish brown . . . . . *B. makhamensis*, new species  
Smaller species; length of head with nasus, 1.37–1.76 mm.; width of head, 0.59–1.09 mm.; head smoky brown . . . . . *B. prabhae* Krishna
3. Larger species; length of head with nasus, 1.37–1.45 mm.; width of head, 0.88–0.98 mm.;

- mandibles without apical processes . . . . .  
 . . . . . *B. laticephalus*, new species  
 Smaller species; length of head with nasus,  
 1.17–1.35 mm.; width of head, 0.62–0.75  
 mm.; mandibles with apical processes. . . . .  
 . . . . . *B. parapusillus*, new species

***Bulbitermes prabhae* Krishna**

*Bulbitermes prabhae* KRISHNA, 1965, pp.  
 27–29.

IMAGO (FIG. 84): Head brown; postclypeus yellow; anteclypeus white; labrum yellow; antennae yellow, with a brownish tinge; pronotum light brown, with a yellow, T-shaped marking on disc and an ocellus-like spot on each anterolateral corner. Head sparsely hairy; postclypeus with two hairs on each side of median line; pronotum more densely hairy than head. Head suboval; fontanelle plate prominent, larger than ocellus, with four small, dotlike spots in front. Eyes large, bulging, round, very close to lateral margin of head. Ocellus large, broadly oval, separated from eye by one-third of its short diameter. Postclypeus moderately arched, less than half as long as broad. Labrum dome shaped. Mandibles of *Nasutitermes* type. Antennae with 15 articles; third twice as long as second and one and a half times as long as fourth. Pronotum narrower than head, longer than half of its width; anterior margin straight, without emargination; posterior margin indistinctly depressed in middle.

SOLDIER (FIG. 85): Head dark smoky brown, tip of nasus reddish brown; pronotum

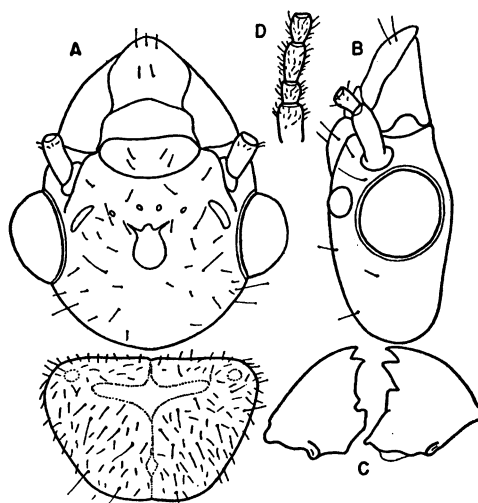


FIG. 84. Imago of *Bulbitermes prabhae* Krishna.  
 A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Antenna.

much lighter than head, anterior lobe darker than posterior lobe; abdominal tergites brown; sternites brownish yellow; legs straw colored. Head without hairs; nasus with four hairs at tip; antennal articles hairy; pronotum with minute hairs on anterior margin, rest devoid of hairs; last abdominal tergites with a few bristles, others without hairs; abdominal sternites with long bristles. Head pear shaped, produced behind, slightly constricted behind antennae; dorsal profile concave; nasus long and cylindrical. Mandible with long apical processes; right mandible

TABLE 34

MEASUREMENTS (IN MILLIMETERS) OF FOUR IMAGOS OF *Bulbitermes prabhae* KRISHNA

	Morphotype	Range	Mean
Length of head to tip of labrum	1.56	1.53–1.56	1.55
Length of head to side base of mandibles	1.01	0.97–1.01	1.00
Width of head	1.40	1.30–1.40	1.35
Long diameter of eye	0.46	0.46–0.49	0.47
Short diameter of eye	0.41	0.39–0.44	0.41
Eye from lower margin of head	0.05	0.05	0.05
Length of ocellus	0.18	0.18–0.19	0.18
Width of ocellus	0.13	0.10–0.13	0.11
Ocellus from eye	0.03	0.03	0.03
Length of postclypeus	0.20	0.20	0.20
Width of postclypeus	0.52	0.49–0.54	0.50
Length of pronotum	0.72	0.67–0.72	0.69
Width of pronotum	1.09	1.04–1.14	1.10

TABLE 35  
MEASUREMENTS (IN MILLIMETERS) OF 22 SOLDIERS OF *Bulbitermes prabhae* KRISHNA

	Range	Mean
Length of head with nasus	1.37-1.76	1.57
Length of head without nasus	0.80-1.14	0.98
Width of head	0.59-1.09	0.87
Height of head	0.46-0.80	0.63
Length of pronotum	0.15-0.28	0.22
Width of pronotum	0.33-0.54	0.45

with a minute, inconspicuous tooth below tip of apical process; left mandible without denticle. Antennae long, with 14 articles; third twice as long as second and slightly longer than fourth. Pronotum strongly saddle shaped, indistinctly emarginate both anteriorly and posteriorly.

DISTRIBUTION: Huay Yang, soldiers, workers, collected by M. Ahmad, March 15, 1962, under a log; Makham, soldiers, workers, collected by M. Ahmad, March 27, 1962, from a mound of *Odontotermes*; Mae Sod, soldiers, workers, collected by M. Ahmad, April 18, 1962, in a log.

REMARKS: Krishna in 1965 described this species from the soldier caste alone. The imago is described here for the first time. There is considerable variation in size of the

soldiers within a colony, so much so that if the largest and smallest soldiers are put together they would seem to be major and minor soldiers.

***Bulbitermes makhamensis*, new species**

SOLDIER (FIG. 86): Head dark reddish brown; tip of nasus lighter; antennae brown, with a yellowish tinge; abdominal tergites brown, sternites brownish yellow. Head without hairs; posterior abdominal tergites with a few bristles, sternites with long bristles. Head pear shaped, only slightly constricted behind antennae, laterally bulging below middle, about as broad as long without nasus; dorsal profile concave; nasus cylindrical,

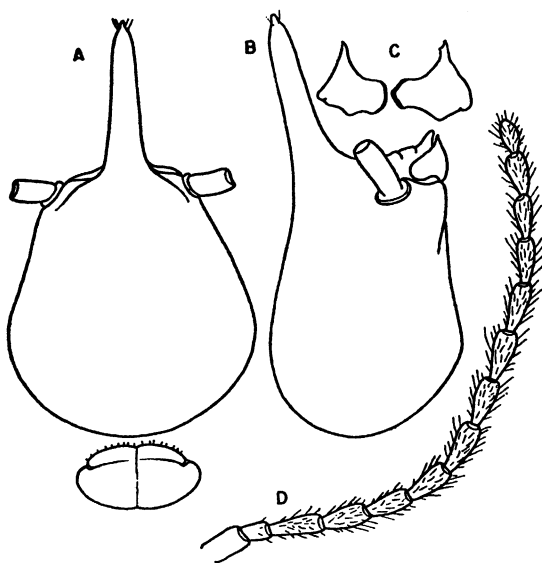


FIG. 85. Soldier of *Bulbitermes prabhae* Krishna. A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Antenna.

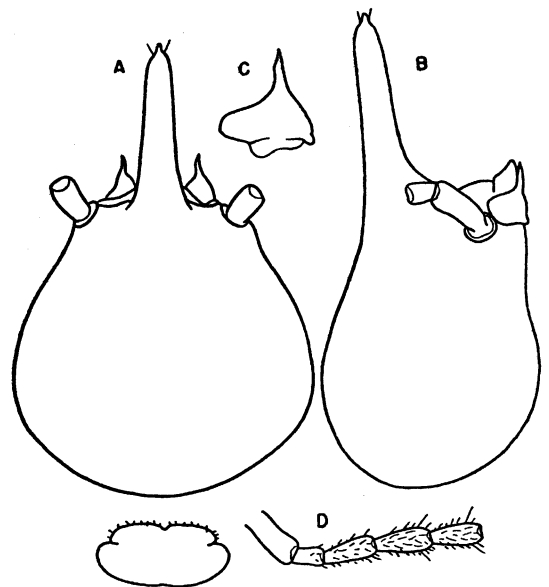


FIG. 86. Soldier of *Bulbitermes makhamensis*, new species. A. Head and pronotum from above. B. Head from side. C. Right mandible. D. Antenna.

TABLE 36  
MEASUREMENTS (IN MILLIMETERS) OF 10 SOLDIERS OF *Bulbitermes makhamensis*,  
NEW SPECIES

	Holotype	Range	Mean
Length of head with nasus	1.80	1.75-1.95	1.81
Length of head without nasus	1.20	1.15-1.25	1.20
Width of head	1.20	1.15-1.25	1.20
Height of head	0.87	0.83-0.90	0.86
Length of pronotum	0.25	0.25	0.25
Width of pronotum	0.55	0.55-0.60	0.58

slightly less than half as long as head capsule. Mandibles with long apical processes; right mandible with a minute tooth below tip. Antennae long, with 14 articles, third nearly twice as long as second and slightly longer than fourth. Pronotum indistinctly emarginate both anteriorly and posteriorly.

COMPARISON: *Bulbitermes makhamensis*, new species, resembles very closely *B. prabhae* Krishna, but differs as follows: it is larger and lighter in color and the head bulges more laterally below the middle.

TYPE LOCALITY: Makham, soldiers (holotype, paratypes), workers, collected by M. Ahmad, March 27, 1962, from a mound of *Odontotermes*

***Bulbitermes parapusillus*, new species**

IMAGO (FIG. 87): Head brown; postclypeus light brownish yellow; labrum brownish in center, tip hyaline; antennae light brown; pronotum much lighter than head, light pale brown, slightly darker anteriorly. Head moderately hairy; postclypeus with a few scattered long bristles and more numerous short hairs; pronotum as hairy as head. Head sub-circular, wider than long without mandibles; fontanelle plate large, conspicuous, broadly oval, anterior margin shallowly concave, anterolateral corners pointed. Eyes large, bulging, not quite circular; slightly longer than broad, separated from lower margin of head by about one-fifth of its short diameter. Ocellus broadly oval, separated from eye by slightly more than half of its short diameter. Postclypeus narrow, shorter than half of its width. Mandibles as shown in figure 87. Antennae with 15 articles; second nearly as long as third; fourth and third almost subequal. Pronotum narrower than head, slightly more

than half of its width; anterior margin straight, not emarginate; posterior margin convex, depressed in middle; lateral corners broadly rounded.

SOLDIER (FIG. 88): Head orange, with brownish tinge; nasus slightly darker than head; antennae light brown; pronotum light brownish yellow; mesothorax, metathorax, legs, and abdomen pale. Head with two bristles in posterior half, tip of nasus with a few hairs; anterior margin of pronotum with minute hairs, rest without hairs. Head pear shaped, constricted below antennae; dorsal profile almost straight; nasus cylindrical, half as long as head capsule. Mandibles minute, apical portion slender, pointed, projecting beyond level of molar surface. Antennae

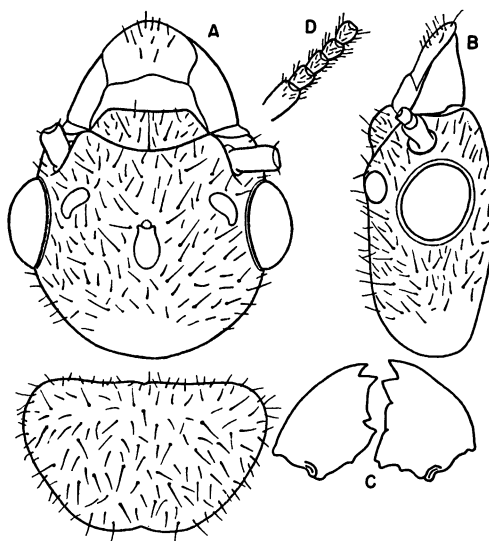


FIG. 87. Imago of *Bulbitermes parapusillus*, new species. A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Antenna.

TABLE 37  
MEASUREMENTS (IN MILLIMETERS) OF SEVEN IMAGOS OF *Bulbitermes parapusillus*,  
NEW SPECIES

	Morphotype	Range	Mean
Length of head to tip of labrum	1.24	1.24-1.35	1.29
Length of head to side base of mandibles	0.85	0.83-0.89	0.85
Width of head	1.06	1.06-1.14	1.09
Long diameter of eye	0.35	0.33-0.36	0.35
Short diameter of eye	0.31	0.31-0.33	0.31
Eye from lower margin of head	0.05	0.05-0.07	0.06
Length of ocellus	0.15	0.15-0.18	0.15
Width of ocellus	0.09	0.09-0.10	0.09
Ocellus from eye	0.05	0.03-0.06	0.05
Length of postclypeus	0.15	0.13-0.15	0.14
Width of postclypeus	0.36	0.36-0.41	0.38
Length of pronotum	0.52	0.52-0.57	0.55
Width of pronotum	0.85	0.85-0.91	0.89

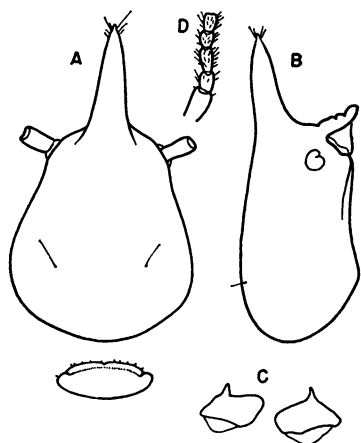


FIG. 88. Soldier of *Bulbitermes parapusillus*, new species. A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Antenna.

with 13 articles; third slightly longer than second; fourth nearly half as long as third. Pronotum strongly saddle shaped, without emargination either anteriorly or posteriorly.

COMPARISONS: The imago of *Bulbitermes parapusillus*, new species, can be distinguished from that of hitherto known species of *Bulbitermes* by its smaller size.

In the size, shape, and color of the soldier *Bulbitermes parapusillus* approaches *B. neopapusillus* Snyder and Emerson, from which it can be distinguished by its smaller dimensions and less constricted head. The soldier of *Bulbitermes flavicans* (Holmgren) has a longer antenna which has 12 articles (13 articles in *B. parapusillus*). In *B. singaporiensis* (Haviland) the nasus is relatively longer. The soldiers of *B. kraepelini* (Holmgren) and *B. borneensis* (Haviland) are smaller; of the

TABLE 38  
MEASUREMENTS (IN MILLIMETERS) OF 15 SOLDIERS OF *Bulbitermes parapusillus*,  
NEW SPECIES

	Holotype	Range	Mean
Length of head with nasus	1.35	1.17-1.35	1.24
Length of head without nasus	0.91	0.80-0.93	0.84
Width of head	0.75	0.62-0.75	0.68
Height of head	0.52	0.45-0.57	0.50
Length of pronotum	0.15	0.13-0.15	0.14
Width of pronotum	0.41	0.39-0.44	0.40

TABLE 39  
MEASUREMENTS (IN MILLIMETERS) OF TWO IMAGOS OF *Bulbitermes laticephalus*,  
NEW SPECIES

	Morphotype	Paramorphotype
Length of head to tip of labrum	1.43	1.40
Length of head to side base of mandibles	0.98	0.93
Width of head	1.27	1.24
Diameter of eye	0.39	0.39
Eye from lower margin of head	0.07	0.06
Length of ocellus	0.18	0.15
Width of ocellus	0.13	0.13
Ocellus from eye	0.06	0.06
Length of postclypeus	0.18	—
Width of postclypeus	0.49	—
Length of pronotum	0.62	0.62
Width of pronotum	1.01	1.04

other species of *Bulbitermes*, larger.

TYPE LOCALITY: Prew, imagoes (morphotype, paramorphotypes), soldiers (holotype, paratypes), workers, collected by M. Ahmad, March 29, 1962, nest at base of a bamboo tree.

***Bulbitermes laticephalus*, new species**

FRESHLY MOLTED IMAGO (FIG. 89): Head, postclypeus, labrum, and antennae creamy white; thorax, legs, and abdomen light yellow.

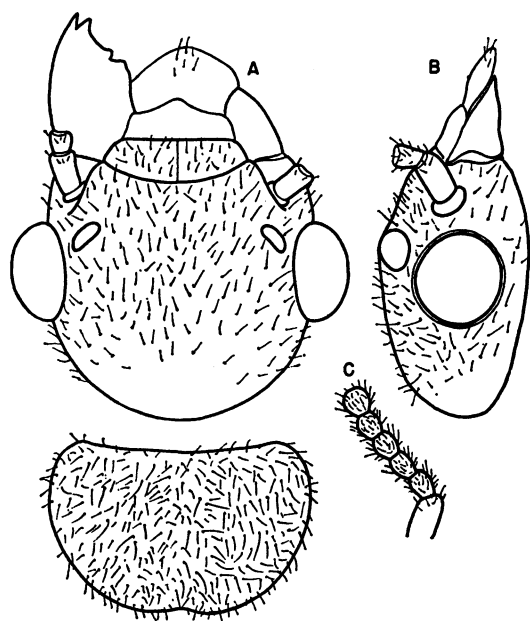


FIG. 89. Imago of *Bulbitermes laticephalus*, new species. A. Head and pronotum from above. B. Head from side. C. Antenna.

Head moderately hairy; pronotum slightly more densely hairy than head. Head round; fontanelle not clear. Eyes large, bulging, round, separated from lower margin of head by one-fifth of their short diameter. Ocellus prominent, very broadly oval, separated from eye by slightly less than half of its short diameter. Postclypeus narrow, less than half as long as broad. Antennae with 15 articles; second and third nearly subequal; fourth shorter. Pronotum narrower than head; anterior margin very shallowly concave, without median notch; posterior margin convex, slightly emarginate, lateral margins uniformly curved.

SOLDIER (FIG. 90): Head light reddish

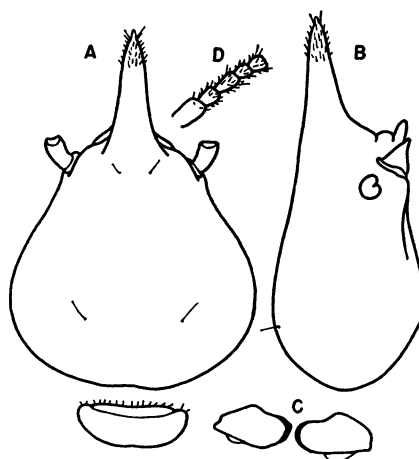


FIG. 90. Soldier of *Bulbitermes laticephalus*, new species. A. Head and pronotum from above. B. Head from side. C. Mandibles. D. Antenna.

TABLE 40  
MEASUREMENTS (IN MILLIMETERS) OF 10 SOLDIERS OF *Bulbitermes laticephalus*,  
NEW SPECIES

	Holotype	Range	Mean
Length of head with nasus	1.45	1.37-1.45	1.42
Length of head without nasus	0.98	0.93-1.01	0.97
Width of head	0.96	0.88-0.98	0.93
Height of head	0.62	0.58-0.62	0.60
Length of pronotum	0.14	0.13-0.16	0.14
Width of pronotum	0.44	0.41-0.44	0.42

brown; nasus slightly darker than head; antennae light brown; pronotum brownish yellow; abdomen yellow. Head with two bristles at base of nasus and two bristles in basal third; nasus with several short hairs in apical fourth, tip with four larger hairs; pronotum with minute hairs on anterior margin. Head pear shaped, greatly bulging in basal third, slightly less than twice as broad at widest point as at bases of antennae; dorsal profile almost straight. Mandibles without apical portions. Antennae with 13 articles; third slightly longer than second; fourth shorter than second. Pronotum strongly saddle shaped, without emargination either anteriorly or posteriorly.

COMPARISONS: The imago of *Bulbitermes laticephalus*, new species, comes close to that of *B. vicinus* (Kemner) but differs in having 15 articles and in being smaller. That of *Bulbitermes deltocephalus* (Tsai and Chen) from southern China has smaller eyes and a narrower pronotum, with the lateral margins straight (they are uniformly curved in *B. laticephalus*).

The soldier of *Bulbitermes laticephalus*, new species, resembles that of *Bulbitermes deltocephalus* (Tsai and Chen) very closely but differs in having the lateral bulges of the head less prominent.

TYPE LOCALITY AND DISTRIBUTION: Tung Sa-Lang Luang (type locality), imagoes (morphotype and paramorphotype), soldiers (holotype, paratypes), workers, collected by M. Ahmad, April 4, 1962, nest at base of a tree; Khao Yai, soldiers (paratypes), workers, collected by M. Ahmad, March 23, 1962; Prew, soldiers (paratypes), workers, collected by M. Ahmad, March 28, 1962, in a stump.

REMARKS: *Nasutitermes deltocephalus*, de-

scribed by Tsai and Chen (1963), should be included in the genus *Bulbitermes* as it has a distinct constriction behind the antennae.

#### GENUS *HOSPITALITERMES* HOLMGREN

#### KEY TO THE SPECIES

##### SOLDIERS

- Antennae brown, uniformly colored; thorax and legs brown . . . . . *H. jepsoni* (Snyder)  
Antennae light reddish brown, basal two articles slightly darker than others; thorax and legs light yellowish brown . . . . .  
. . . . . *H. ataramensis* Prashad and Sen-Sarma

#### *Hospitalitermes jepsoni* (Snyder)

*Nasutitermes* (*Hospitalitermes*) *jepsoni* SNYDER, 1934, p. 16 (soldier).

*Hospitalitermes jepsoni*: SNYDER, 1949, p. 320 (synonymy).

*Hospitalitermes jepsoni*: AHMAD, 1958, p. 142 (soldier).

SOLDIER (FIG. 91): Head dark brown; distal half of nasus reddish brown; antennae brown, uniformly colored; thoracic and abdominal tergites and legs brown. Head with two bristles in posterior half, tip of nasus with four hairs; pronotum with short hairs along anterior margin and a few minute setae on disc; posterior abdominal tergites with a few bristles; sternites with long bristles. Head pear shaped, markedly constricted behind antennae, vertex raised up; dorsal profile concave; nasus cylindrical, slightly less than half as long as head. Mandibles with long apical portions. Antennae with 14 articles; third and fourth subequal. Pronotum strongly saddle shaped, anterior and posterior margins not emarginate.

MEASUREMENTS (IN MM.) OF 10 SOLDIERS:



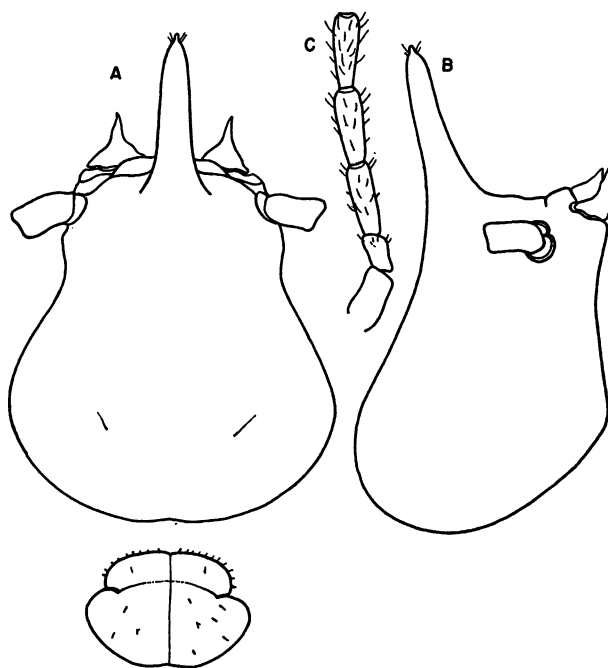


FIG. 91. Soldier of *Hospitalitermes jepsoni* (Snyder).  
A. Head and pronotum from above. B. Head from side.  
C. Antenna.

Range of measurements, with means in parentheses: Length of head with nasus, 1.75–1.80 (1.78); length of head without nasus, 1.20–1.25 (1.23); width of head, 1.10–1.20 (1.14); height of head, 0.80–0.90 (0.85); length of pronotum, 0.35–0.40 (0.39); width of pronotum, 0.60–0.65 (0.62).

LOCALITY: Ka-Chong, soldiers, workers, collected by M. Ahmad, March 6, 1962, nest in the hollow of a tree.

#### *Hospitalitermes ataramensis*

Prashad and Sen-Sarma

*Hospitalitermes ataramensis* PRASHAD AND SEN-SARMA, 1960, pp. 5–9.

SOLDIER (FIG. 92): Head up to constriction reddish brown, lighter beyond, antennae light reddish brown, basal two articles a shade darker than other articles; thoracic tergites and legs light yellowish brown; abdominal tergites brown. Head with two bristles in posterior half; tip of nasus with four short hairs; pronotum with minute hairs along anterior margin and minute setae elsewhere; abdominal tergites with minute setae; sternites with

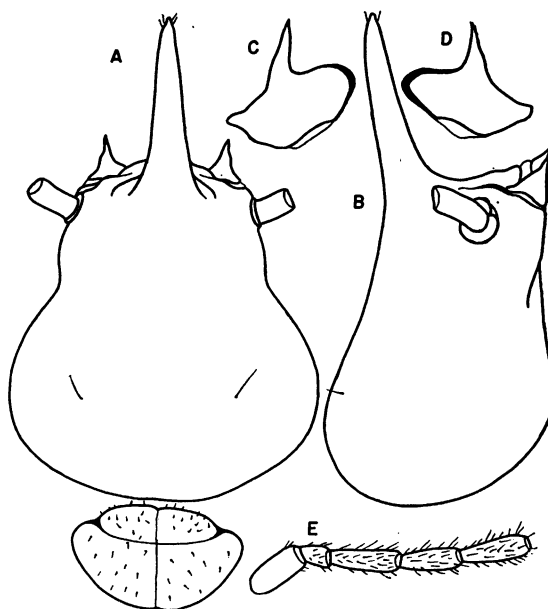


FIG. 92. Soldier of *Hospitalitermes ataramensis* Prashad and Sen-Sarma. A. Head and pronotum from above. B. Head from side. C. Left mandible. D. Right mandible. E. Antenna.

long bristles. Head pear shaped, markedly constricted behind antennae, a little longer than broad; dorsal profile concave; nasus cylindrical, indistinctly longer than half of length of head. Mandibles with long apical portions. Antennae with 14 articles; third a little more than two and a half times as long as second and slightly longer than fourth. Pronotum with anterior margins weakly convex, not emarginate, posterior margin convex.

MEASUREMENTS (IN MM.) OF 10 SOLDIERS: Range of measurements, with means in parentheses: Length of head with nasus, 1.76–1.89 (1.83); length of head without nasus, 1.19–1.30 (1.25); width of head, 1.14–1.27 (1.19); height of head, 0.78–0.91 (0.85); length of pronotum, 0.36–0.41 (0.38); width of pronotum, 0.59–0.71 (0.66).

DISTRIBUTION: Tung Sa-Lang Luang, soldiers, workers, collected by M. Ahmad, April 10, 1962, nest at base of a tree; So-Pa Waterfall, Tung Sa-Lang Luang National Park, collected by M. Ahmad, April 12, 1962.

GENUS *ACICULITERMES* EMERSON

*Aciculitermes maymyoensis* Krishna

*Aciculitermes maymyoensis* KRISHNA, 1965, pp. 29–30.

SOLDIER (FIG. 93): Head yellowish white, nasus light reddish brown; antennae pale, with a light brownish tinge, rest of body almost white. Head with numerous short hairs and a few scattered long bristles, hairs more numerous in basal third of head; tip of nasus with several short hairs; pronotum scantily hairy; abdominal tergites densely pubescent, sternites with long bristles. Head seen from above pear shaped, slightly constricted behind antennae; profile almost straight; nasus long, cylindrical, with a minute protuberance at base on either side. Mandibles minute, without apical portions. Antennae with 12 articles; second and fourth nearly subequal, third shorter. Pronotum saddle shaped, without anterior and posterior emarginations.

MEASUREMENTS (IN MM.) OF FOUR SOLDIERS: Range of measurements, with means in parentheses: Length of head with nasus, 1.32–1.45 (1.38); length of head without nasus, 0.80–0.85 (0.82); width of head, 0.65–0.75 (0.70); height of head, 0.49–0.50 (0.49); length of pronotum, 0.10–0.13 (0.11); width of pronotum, 0.39 (0.39).

LOCALITY: Khao Yai, four soldiers, workers, collected by M. Ahmad, March 27, 1962, under leaf mold on forest floor.

SUBFAMILY TERMITINAE

GENUS *TERMES* LINNÉ

KEY TO THE SPECIES

IMAGOS

1. Eyes larger; long diameter, 0.33–0.35 mm. . . . . *T. comis* Haviland  
Eyes smaller; long diameter, up to 0.28 mm. . . . . 2
2. Larger species; width of head, 0.93–1.07 mm. . . . . *T. huayangensis*, new species  
Smaller species; width of head, up to 0.75 mm. . . . . *T. propinquus* (Holmgren)

SOLDIERS

1. Anterior margin of frontal projection seen laterally curved, posteriorly sloping . . . . . 2  
Anterior margin of frontal projection seen laterally almost straight, not sloping posteriorly . . . . . *T. huayangensis*, new species
2. Larger species; length of head to side base of mandibles, 1.37–1.50 mm.; width of head, 0.91–1.02 mm. . . . . *T. comis* (Haviland)  
Smaller species; length of head to side base of mandibles, up to 1.11 mm.; width of head up to 0.75 mm. . . . . *T. propinquus* (Holmgren)

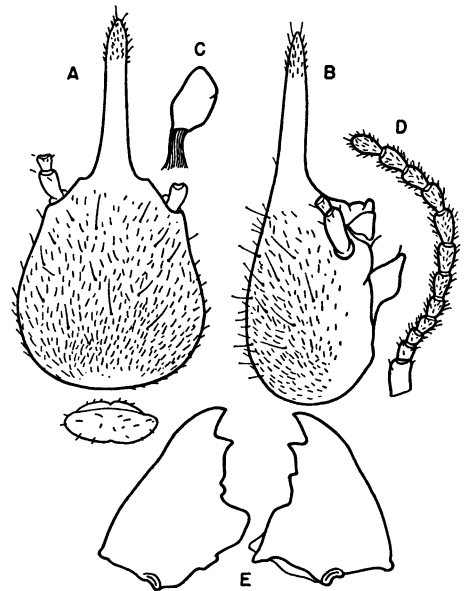


FIG. 93. *Aciculitermes maymyoensis* Krishna. Soldier: A. Head and pronotum from above. B. Head from side. C. Left mandible. D. Antenna. Worker: E. Mandibles.

TABLE 41  
MEASUREMENTS (IN MILLIMETERS) OF 10 IMAGOS OF *Termes huayangensis*,  
NEW SPECIES

	Morphotype	Range	Mean
Length of head to tip of labrum	1.19	1.14-1.22	1.19
Length of head to side base of mandibles	0.75	0.62-0.75	0.69
Width of head	1.06	0.93-1.07	1.01
Long diameter of eye	0.28	0.27-0.28	0.27
Short diameter of eye	0.27	0.24-0.27	0.26
Eye from lower margin of head	0.07	0.05-0.07	0.05
Length of ocellus	0.13	0.10-0.13	0.11
Width of ocellus	0.09	0.07-0.09	0.08
Ocellus from eye	0.03	0.02-0.05	0.03
Length of postclypeus	0.31	0.27-0.31	0.28
Width of postclypeus	0.46	0.46-0.52	0.49
Length of pronotum	0.52	0.46-0.57	0.54
Width of pronotum	0.91	0.88-0.96	0.91

***Termes huayangensis*, new species**

IMAGO: (FIG. 94): Head dark brown; postclypeus lighter than head; antennae brown, apices of articles whitish; pronotum of same color as head, with a T-shaped marking on disc. Head densely hairy; postclypeus with short hairs and a few long bristles; labrum sparsely hairy; pronotum as densely hairy as head. Head round; fontanelle distinct, oval, whitish. Eyes circular, bulging, separated

from lower margin of head by nearly one-sixth of their diameter. Ocellus large, broadly oval, separated from eye by less than its short diameter. Postclypeus swollen, more than half as long as broad. Mandibles as shown in figure 94. Antennae with 15 articles; second distinctly longer than third, latter shortest. Pronotum slightly narrower than head, a little longer than half of its width; anterior margin straight; posterior margin depressed in middle.

SOLDIER (FIG. 95): Head yellow; tip of frontal projection and anterolateral corners of head capsule reddish brown; labrum yellow, with a brownish tinge, margins hyaline; mandibles dark reddish brown; antennae light

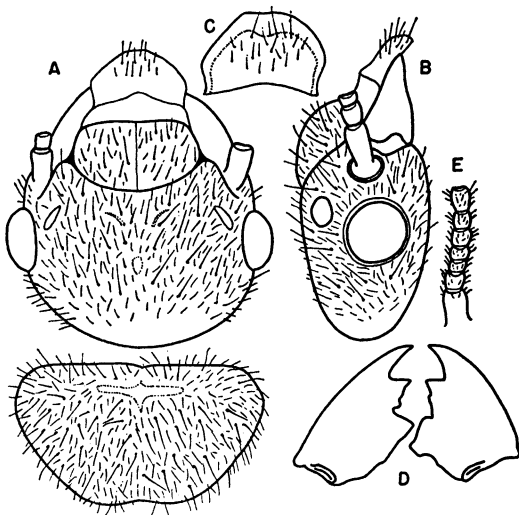


FIG. 94. Imago of *Termes huayangensis*, new species. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Antenna.

TABLE 42  
MEASUREMENTS (IN MILLIMETERS) OF A SINGLE  
SOLDIER (HOLOTYPE) OF *Termes*  
*huayangensis*, NEW SPECIES

Length of head to tip of frontal projection	1.48
Length of head to side base of mandibles	1.35
Width of head	0.93
Height of head	0.80
Length of frontal projection	0.17
Length of left mandible	0.71
Length of postmentum	0.59
Maximum width of postmentum	0.26
Minimum width of postmentum	0.20
Length of pronotum	0.28
Width of pronotum	0.62

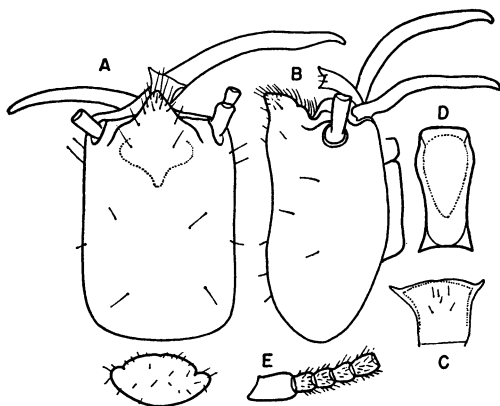


FIG. 95. Soldier of *Termes huayangensis*, new species. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Postmentum from below. E. Antenna.

brown; thorax, legs, and abdomen pale. Head scantily hairy, frontal projection with several long and thin hairs; labrum with a few short hairs in anterior half; pronotum thinly hairy. Head rectangular, median suture not visible; dorsum of head depressed in middle, with another depression near tip of frontal projection; frontal projection seen from above cone shaped, slightly upturned, narrowly rounded but not pointed at tip, anterior margin seen laterally almost straight up to notch. Labrum parallel sided, anterior margin weakly convex; anterolateral angles produced into laterally directed short processes. Mandibles long, slender, slightly asymmetrical; left mandible curved, tip incurved like a hook; right mandible slightly less curved than left mandible, tip incurved. Postmentum nearly one and a half times as broad anteriorly as posteriorly, narrowest below middle. Antennae with 14 articles; second indistinctly longer than third; fourth and third nearly subequal. Pronotum small, saddle-shaped, not emarginate either anteriorly or posteriorly.

**COMPARISONS:** The imago of *Termes huayangensis*, new species, can be distinguished from that of other Indo-Malayan species of *Termes* by its distinctly larger size.

The soldier of *Termes huayangensis*, new species, comes close to that of *T. comis*, from which it can be distinguished by its shorter, broader, and less curved frontal projection and more curved mandibles. The soldier of *Termes laticornis* Haviland has a shorter and

less upturned frontal projection, and the dorsum of the head has a weaker depression. The soldiers of other species of *Termes* from the Indo-Malayan Region are smaller and have longer and more projecting frontal projections.

**TYPE LOCALITY AND DISTRIBUTION:** Huay Yang (type locality), imagoes (morphotype, paramorphotypes), one soldier (holotype), workers, collected by M. Ahmad, March 16, 1962, nest on ground, collected along with soldiers and workers of *Amitermes longignathus*; Makham, imagoes (paramorphotypes), workers, collected by M. Ahmad, March 27, 1962, collected along with soldiers and workers of *Amitermes longignathus*.

#### *Termes comis* Haviland

*Termes comis* HAVILAND, 1898, p. 417 (imago, soldier, worker), pl. 25, figs. 61–62 (soldier), 63 (imago), 64 (wing).

*Termes (Eutermes) comis*: DESNEUX, 1904b, p. 41 (synonymy).

*Mirotermes (Mirotermes) comis*: HOLMGREN, 1912a, p. 11, fig. 80 (soldier mandibles), pl. 4, figs. 9, 12 (soldier).

*Mirotermes (Mirotermes) comis*: HOLMGREN, 1913b, pp. 235–236 (imago, soldier, worker), pl. 6, figs. 12, 14 (soldier).

*Mirotermes comis*: JOHN, 1925, p. 409 (locality).

*Mirotermes comis*: BATHELLIER, 1927, pp. 168–170 (systematics), 220 (biology).

*Termes comis*: SNYDER, 1949, p. 179 (synonymy).

*Termes comis*: AHMAD, 1958, pp. 179 (imago), 180 (soldier).

**IMAGO (FIG. 96):** Head light brown, vertex lighter; postclypeus yellow, with a brownish tinge; antennae light pale brown; pronotum with peripheral region light brown, disc yellowish. Head moderately hairy, with a few scattered bristles and more numerous short hairs; pronotum slightly more hairy than head. Head circular; fontanelle long, slitlike. Eyes large, bulging, round, very close to lower margin of head. Ocellus small, broadly oval, separated from eye by less than half of its short diameter. Postclypeus swollen, longer than half of its width. Mandibles as shown in figure 96. Antennae with 15 articles; second slightly longer than third and indistinctly shorter than fourth. Pronotum narrower than head, longer than half of its width; anterior margin very shallowly concave, not

emarginate; posterior margin depressed in middle.

**SOLDIER (FIG. 97):** Head yellow; tip of frontal projection and anterolateral corners of head capsule brownish; mandibles dark brown; antennae light brown; thorax, legs, and abdomen white. Head scantily hairy; tip of labrum with several long hairs; labrum with a few small hairs; pronotum sparsely hairy. Head rectangular, one and a half times as long (without mandibles) as broad; dorsum of head depressed a little anterior to middle; frontal projection narrow, upturned, seen laterally anterior margin curved, directed posteriorly. Labrum longer than broad, narrowest point nearer to anterior margin than to posterior margin; anterior margin weakly sinuate; anterolateral processes distinct. Mandibles long, slender, slightly asymmetrical; left mandibles weakly curved, tip hooked; right mandible less curved than left mandible, tip a little more strongly hooked than in left mandible. Postmentum three times as long as its narrowest width, widest in anterior half and narrowest below middle. Antennae with 14 articles; second slightly longer than third; fourth and third subequal. Pronotum with lateral lobes produced.

**MEASUREMENTS (IN MM.):** Range of measurements, with means in parentheses. *Ten*

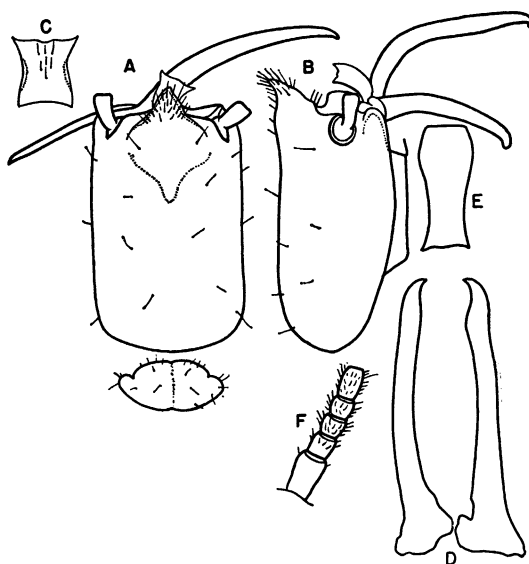


FIG. 97. Soldier of *Termes comis* Haviland. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

*imagoes*: Length of head to tip of labrum, 1.04–1.16 (1.08); length of head to side base of mandibles, 0.65–0.75 (0.71); width of head, 0.88–0.93 (0.91); long diameter of eye, 0.33–0.35 (0.34); short diameter of eye, 0.31–0.33 (0.32); eye from lower margin of head, 0.03–0.06 (0.04); length of ocellus, 0.05–0.07 (0.06); width of ocellus, 0.03–0.05 (0.04); ocellus from eye, 0.01–0.02 (0.01); length of postclypeus, 0.22–0.26 (0.23); width of postclypeus, 0.44–0.66 (0.44); length of pronotum, 0.44–0.48 (0.45); width of pronotum, 0.75–0.83 (0.77.) *Ten soldiers*: Length of head to tip of frontal projection, 1.56–1.82 (1.64); length of head to side base of mandibles, 1.37–1.50 (1.42); width of head, 0.91–1.02 (0.96); height of head, 0.83–0.91 (0.87); length of frontal projection, 0.15–0.23 (0.17); length of left mandible, 1.69–1.82 (1.75); length of postmentum, 0.65–0.78 (0.69); maximum width of postmentum, 0.28–0.33 (0.30); minimum width of postmentum, 0.18–0.23 (0.20); length of pronotum, 0.28–0.31 (0.29); width of pronotum, 0.59–0.62 (0.61).

**DISTRIBUTION:** Huay Yang, soldiers, workers, collected by M. Ahmad, March 14, 1962, nest at base of a tree; Chantaburi, imagoes, soldiers, workers, collected by M. Ahmad,

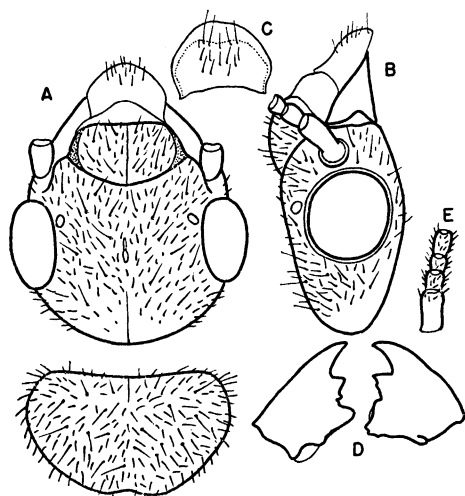


FIG. 96. Imago of *Termes comis* Haviland. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Antenna.

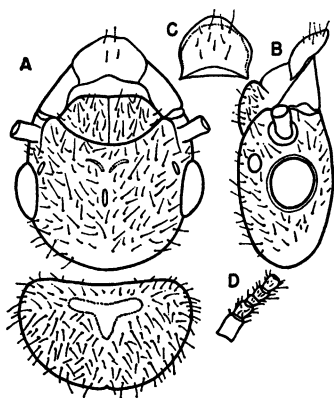


FIG. 98. Imago of *Termes propinquus* (Holmgren). A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Antenna.

March 26, 1962, from a nest; Makhm, king, queen, soldier, workers, collected by M. Ahmad, March 27, 1962, nest in the hollow of a stump; Tung Sa-Lang Luang, imagoes, soldiers, workers, collected by M. Ahmad, April 10, 1962, from a nest; Wang Nok An, imagoes, soldiers, workers, collected by M. Ahmad, April 11, 1962, in nest in the hollow of a tree trunk.

***Termes propinquus* (Holmgren)**

*Mirotermes (Mirotermes) propinquus* HOLMGREN, 1914, pp. 274-275 (soldier, worker).

*Mirotermes (Mirotermes) propinquus*: JOHN, 1925, pp. 410-411 (imago, soldier, worker).

*Termes propinquus*: SNYDER, 1949, p. 185 (synonymy).

*Termes propinquus*: AHMAD, 1958, p. 181 (soldier).

**IMAGO (FIG. 98):** Head castaneous brown, vertex lighter; postclypeus light brown; antennae brown, pronotum a shade lighter than head. Head moderately hairy, hairs short; labrum sparsely hairy; pronotum with numerous short hairs and scattered long bristles. Head subcircular; fontanelle slitlike. Eyes small, moderately bulging, almost round, separated from lower margin of head by one-fifth of their short diameter. Ocellus broadly oval, separated from eye by half or less than half of its short diameter. Postclypeus swollen, nearly half as long as broad. Antennae with 15 articles; second twice as long as third, latter shortest; fourth shorter than second

and almost as long as fifth. Pronotum narrower than head; anterior margin weakly concave; lateral margins uniformly curved.

**SOLDIER (FIG. 99):** Head yellow, margins of frontal projection, antennal carinae, and anterolateral corners of head brownish; mandibles dark reddish brown; antennae yellow, with a brownish tinge; thorax, legs, and abdomen creamy white. Head scantily hairy; tip of frontal projection with long hairs, labrum with a few hairs anteriorly; pronotum scantily hairy. Head rectangular, nearly one and a half times as long as wide; frontal projection long, slender, seen laterally anterior margin convex, posteriorly directed. Labrum with anterior margin slightly sinuate, anterolateral corners produced into tapering processes. Mandibles long, slender; left mandible appreciably curved, right mandible almost straight. Postmentum one and a half times as broad anteriorly as posteriorly; waist nearer to posterior margin than to widest point. Antennae with 14 articles; second longer than third; fourth and third subequal. Pronotum without emargination either anteriorly or posteriorly.

**MEASUREMENTS (IN MM.):** Range of measurements, with means in parentheses. *Ten imagoes*: Length of head to tip of labrum, 0.78-0.91 (0.85); length of head to side base of mandibles, 0.52-0.62 (0.56); width of head, 0.67-0.75 (0.72); long diameter of eye, 0.19-0.23 (0.21); short diameter of eye, 0.19-0.22 (0.20); eye from lower margin of head, 0.03-0.05 (0.03); length of ocellus, 0.05-0.07

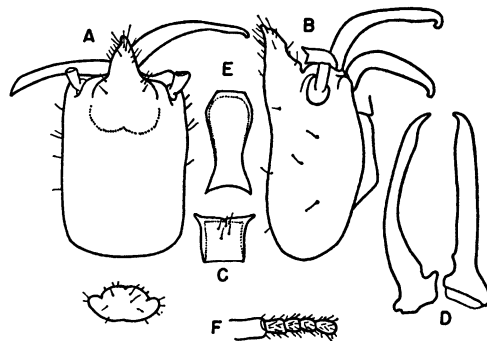


FIG. 99. Soldier of *Termes propinquus* (Holmgren). A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

(0.06); width of ocellus, 0.05–0.06 (0.05); ocellus from eye, 0.02–0.03 (0.02); length of postclypeus, 0.18 (0.18); width of postclypeus, 0.36–0.39 (0.36); length of pronotum, 0.33–0.41 (0.35); width of pronotum, 0.54–0.65 (0.59); *Ten soldiers*: Length of head to tip of frontal projection, 1.24–1.40 (1.33); length of head to side base of mandible, 0.98–1.11 (1.06); width of head, 0.68–0.75 (0.72); height of head, 0.66–0.72 (0.68); length of frontal projection, 0.20–0.26 (0.23); length of left mandible, 1.19–1.27 (1.23); length of postmentum, 0.49–0.57 (0.54); maximum width of postmentum, 0.26–0.28 (0.27); minimum width of postmentum, 0.15–0.22 (0.18); length of pronotum, 0.19–0.23 (0.21); width of pronotum, 0.40–0.46 (0.43).

**DISTRIBUTION:** Ka-Chong, king, queen, soldiers, workers, collected by M. Ahmad, March 3, 1962, nest in the hollow of a tree trunk; Huay Yang, soldiers, workers, collected by M. Ahmad, March 15, 1962, nest in a pit in the ground; Tung Sa-Lang Luang, imagoes, soldiers, workers, collected by M. Ahmad, April 8, 1962, nest at the base of a tree; Wang Nok An, soldiers, workers, collected by M. Ahmad, April 11, 1962; Tak, soldiers, workers, collected by M. Ahmad, April 16, 1962, nest at the base of a tree.

#### GENUS *MIROCAPRITERMES* HOLMGREN

##### KEY TO THE SPECIES

##### SOLDIERS

1. Mandibles relatively shorter and broader, shorter than head capsule measured up to tip of frontal projection; lateral margins of postmentum indistinctly concave . . . . .  
*M. latignathus*, new species  
 Mandibles relatively longer and more slender, longer than head capsule measured up to tip of frontal projection; lateral margins of postmentum distinctly concave . . . . . 2
2. Labrum deeply and broadly concave . . . . .  
*M. concaveus*, new species  
 Labrum broadly V-shaped . . . . . 3
3. Larger species; length of head to tip of frontal projection, 1.01–1.14 mm.; width of head, 0.75–0.83 mm.; frontal projection seen from above broadly rounded . . . . .  
*M. prewensis*, new species  
 Smaller species; length of head to tip of frontal projection, 0.91–0.93 mm.; width of head, 0.70–0.72 mm.; frontal projection seen from above narrowly rounded . . . . .  
*M. connectens* Holmgren

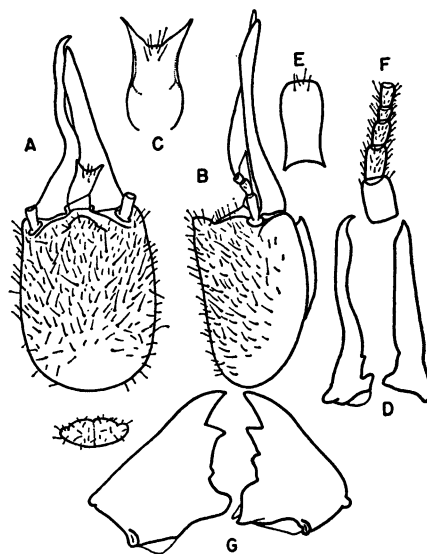


FIG. 100. *Mirocapritermes connectens* Holmgren. Soldier: A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna. Worker: G. Mandibles.

#### *Mirocapritermes connectens* Holmgren

*Mirocapritermes connectens* HOLMGREN, 1914, pp. 277–278 (soldier, worker).

*Mirocapritermes connectens*: SNYDER, 1949, p. 189.

*Mirocapritermes connectens*: AHMAD, 1958, pp. 182–183 (soldier).

**SOLDIER (FIG. 100):** Head light yellow; mandibles light reddish brown; antennae creamy white; pronotum lighter than head. Head densely pubescent; labrum with a few hairs anteriorly, pronotum less hairy than head. Head subrectangular, slightly less than one and a half times as long as broad, lateral margins weakly convex; frontal projection small, narrowly rounded. Labrum elongate, anterior margin broadly V-shaped, anterolateral corners produced into long processes. Mandibles long, asymmetrical; left mandible slightly longer than right mandible, weakly twisted, tip sharply incurved like a hook; right mandible straight, bladellike, broader than left mandible, tip not hooked. Postmentum moderately arched, nearly three times as long as broad at narrowest point; waist clearly indicated, nearer to posterior margin than to widest point. Antennae with 14 articles; second one and a half times as long as

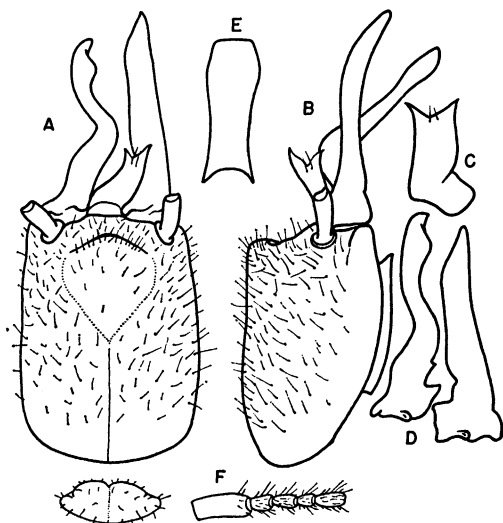


FIG. 101. Soldier of *Mirocapritermes latignathus*, new species. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

third; fourth shortest. Pronotum saddle shaped, indistinctly notched anteriorly; posterior margin convex, not emarginate.

MEASUREMENTS (IN MM.) OF FOUR SOLDIERS: Range of measurements, with means in parentheses: Length of head to tip of frontal projection, 0.91–0.93 (0.92); width of head, 0.70–0.72 (0.71); height of head, 0.62–0.65 (0.63); length of left mandible, 0.93–0.98 (0.94); length of right mandible, 0.85–0.93 (0.88); length of postmentum, 0.44–0.49 (0.46); maximum width of postmentum, 0.19–0.23 (0.21); minimum width of postmentum, 0.15–0.16 (0.15); length of pronotum, 0.14–0.18 (0.16); width of pronotum, 0.33–0.41 (0.36).

LOCALITY: Ka-Chong, three soldiers, workers, collected by M. Ahmad, March 5, 1962, from base of a bamboo stump; one soldier, collected by M. Ahmad, March 11, 1962, dug out from ground under a log.

***Mirocapritermes latignathus*, new species**

SOLDIER (FIG. 101): Head reddish brown, slightly lighter posteriorly; labrum creamy white, margins hyaline; mandibles dark brown; antennae light brown, apices of articles hyaline; pronotum yellow with brownish

tinge. Head covered with numerous short and long hairs; frontal projection more hairy than rest of head capsule; labrum with two hairs at tip; postmentum devoid of hairs; pronotum less hairy than head. Head rectangular; frontal projection seen from side broadly rounded. Labrum much longer than broad; anterior margin shallowly concave; anterolateral corners produced into moderately long processes. Mandibles asymmetrical, broad, shorter than head capsule measured up to tip of frontal projection; left mandible strongly bent in middle, with bluntly pointed and slightly hooked tip; right mandible blade-like, tip narrowed and pointed but not hooked, slightly longer than left mandible. Postmentum one and a half times as long as its maximum width; waist weakly indicated. Antennae with 14 articles; second as long as third, and slightly shorter than fifth; fourth shortest. Pronotum with anterior margin convex, slightly notched in middle; posterior margin not depressed in middle.

MEASUREMENTS (IN MM.) OF TWO SOLDIERS: Holotype and paratype, respectively: Length of head to tip of frontal projection, 1.30, 1.22; width of head, 0.96, 0.91; height of head, 0.85, 0.80; length of left mandible, 1.06, 0.98; length of right mandible, 1.10, 1.04; length of postmentum, 0.65, 0.65; maximum width of postmentum, 0.27, 0.27; minimum width of postmentum, 0.18, 0.18; length of pronotum, 0.23, 0.23; width of pronotum, 0.57, 0.55.

COMPARISONS: *Mirocapritermes latignathus*, new species, can be easily distinguished from *M. connectens* by its relatively shorter and broader mandibles, larger size, and shorter second antennal article. *Microcapritermes valeriae* Krishna is larger, the anterior margin of its labrum is straighter, and the tip of the left mandible is more strongly hooked. In *M. concaveus*, new species, the labrum is more deeply and broadly concave, the mandibles are longer and more slender, and the tip of the left mandible is more strongly hooked. In *M. prewensis*, new species, the labrum and postmentum are of a different shape, the mandibles are more slender, and the dimensions are larger.

TYPE LOCALITY: Ka-Chong, two soldiers (holotype and paratype), workers, collected by M. Ahmad, March 9, 1962.



***Mirocapritermes concaveus*, new species**

**SOLDIER (FIG. 102):** Head yellow; frontal projection brownish; labrum light yellow; mandibles light reddish brown; antennae light brown, thorax and abdomen pale. Head with numerous long and short hairs; labrum with a few long bristles anteriorly; postmentum with two short hairs at tip; pronotum with a few short hairs on margin and on disc. Head rectangular, median suture faintly indicated; frontal projection seen laterally broadly rounded. Labrum deeply and broadly concave; anterolateral corners produced into long, incurved processes. Mandibles asymmetrical; left mandible bent in middle, tip produced into long, sharply pointed, hooklike process. Postmentum moderately arched, widest above and narrowest below middle. Antennae with 14 articles; second distinctly longer than third; fourth shortest. Pronotum small, saddle shaped; anterior margin notched in middle; posterior margin uniformly convex, without emargination.

**COMPARISON:** *Mirocapritermes concaveus*, new species, can be distinguished from all other species of *Mirocapritermes* by its deeply and broadly concave labrum with incurved anterolateral processes.

**TYPE LOCALITY AND DISTRIBUTION:** Khao Yai (type locality), three soldiers (holotype, paratypes), workers, collected by M. Ahmad, March 21, 1962, dug out from ground; Tung Sa-Lang Luang, two soldiers (paratypes), workers, collected by M. Ahmad, April 4, 1962, dug out from ground; one soldier (paratype), workers, collected by M. Ahmad, dug out from ground.

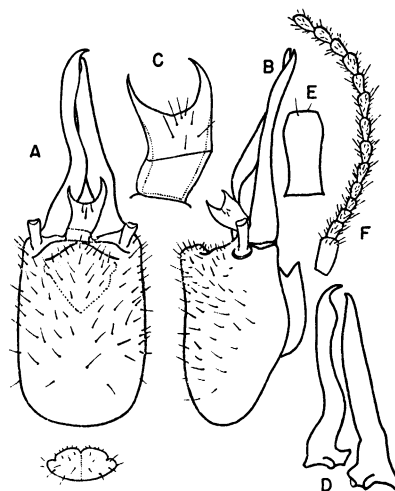


FIG. 102. Soldier of *Mirocapritermes concaveus*, new species. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

***Mirocapritermes prewensis*, new species**

**SOLDIER (FIG. 103):** Head light yellow; labrum creamy white; mandibles light reddish brown; antennae light yellow, with brownish tinge; thorax, legs, and abdomen yellowish white. Head covered with a large number of hairs, frontal projection more hairy than rest of head capsule; labrum with four long bristles near tip; pronotum sparsely hairy. Head rectangular, less than one and a half times as long as broad; median suture present, but not very distinct; frontal projection seen from side broadly rounded. Labrum with anterior margin deeply V-shaped, anterolateral cor-

TABLE 43

MEASUREMENTS (IN MILLIMETERS) OF SIX SOLDIERS OF *Mirocapritermes concaveus*, NEW SPECIES

	Holotype	Range	Mean
Length of head to tip of frontal projection	1.14	1.11-1.22	1.14
Width of head	0.83	0.80-0.83	0.81
Height of head	0.78	0.72-0.80	0.76
Length of left mandible	1.17	1.09-1.19	1.15
Length of right mandible	1.11	1.04-1.11	1.09
Length of postmentum	0.54	0.52-0.65	0.59
Maximum width of postmentum	0.26	0.26-0.28	0.26
Minimum width of postmentum	0.18	0.18-0.20	0.19
Length of pronotum	0.18	0.18-0.23	0.20
Width of pronotum	0.46	0.44-0.49	0.45

TABLE 44  
MEASUREMENTS (IN MILLIMETERS) OF FIVE SOLDIERS OF *Microcapritermes prewensis*,  
NEW SPECIES

	Holotype	Range	Mean
Length of head to tip of frontal projection	1.06	1.01–1.14	1.07
Width of head	0.80	0.75–0.83	0.79
Height of head	0.72	0.70–0.78	0.72
Length of left mandible	1.14	1.09–1.14	1.12
Length of right mandible	1.11	1.06–1.14	1.09
Length of postmentum	0.52	0.52–0.54	0.52
Maximum width of postmentum	0.23	0.23	0.23
Minimum width of postmentum	0.18	0.18	0.18
Length of pronotum	0.20	0.18–0.20	0.18
Width of pronotum	0.46	0.44–0.49	0.46

ners produced. Mandibles slightly asymmetrical; left mandible curved in middle, tip hooked; right mandible bladeliike. Postmentum moderately arched; waist nearer to posterior margin than to broadest point. Antennae with 14 articles; second indistinctly longer than third; fourth shortest. Pronotum indistinctly emarginate anteriorly, without posterior emargination.

COMPARISONS: *Mirocapritermes prewensis*, new species, comes close to *M. connectens*, but differs as follows: larger in size; more prominent and more broadly rounded frontal projection; and more deeply cut labrum. *Mir-*

*ocapritermes valeriae* is much larger, and *M. latignathus* has shorter and broader mandibles. In *M. concaveus* the labrum is more broadly cut with incurved anterolateral processes.

TYPE LOCALITY: Prew, soldiers (holotype, paratypes), collected by M. Ahmad, March 28, 1962, dug out from ground.

#### GENUS *PERICAPRITERMES* SILVESTRI

#### KEY TO THE SPECIES

##### SOLDIERS

- Larger species; length of head to side base of mandibles, 2.65–3.17 mm. . . . .  
 . . . . . *P. latignathus* (Holmgren)  
 Smaller species; length of head to side base of mandibles, 1.63–1.78 mm. . . . .  
 . . . . . *P. semarangi* (Holmgren)

#### *Pericapritermes latignathus* (Holmgren)

*Capritermes* (*Capritermes*) *latignathus* HOLMGREN, 1914, pp. 280–281 (soldier, worker).

*Capritermes latignathus*: KEMNER, 1934, pp. 174–175 (soldier, worker), fig. 51 (soldier).

*Capritermes latignathus*: SNYDER, 1949, p. 195.

*Capritermes latignathus*: AHMAD, 1958, p. 188 (soldier).

SOLDIER (FIG. 104): Head reddish yellow, slightly darker anteriorly; median suture reddish brown; labrum brownish yellow; mandibles dark brown; antennae brown, apices of articles whitish; pronotum, legs, and abdomen light yellow. Head scantily hairy; labrum with four hairs at tip and two pairs of shorter hairs on disc; pronotum sparsely hairy. Head rectangular, slightly narrowed anteriorly; fontanelle minute, dotlike; median

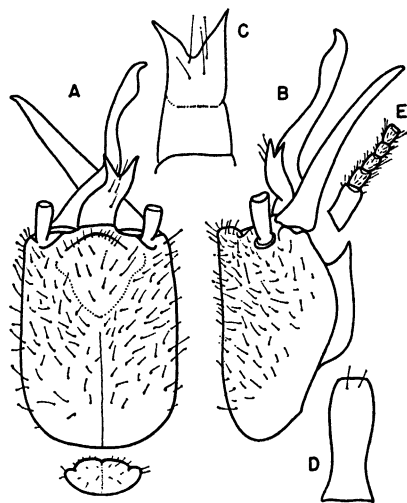


FIG. 103. Soldier of *Mirocapritermes prewensis*, new species. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Postmentum from below.

suture prominent, extending up to a little below fontanelle. Labrum broader than long; anterior margin almost straight; anterolateral corners produced into short, forwardly directed processes. Mandibles asymmetrical; left mandible strongly bent in middle, tip with an indistinct point; right mandible shorter than left mandible, bladelike, tip pointed, slightly outcurved. Postmentum elongate, lateral sides nearly parallel in middle, broadest in apical fourth. Antennae with 14 articles; second slightly shorter than third, latter a little longer than fourth. Pronotum with anterior margin convex, notched in middle; posterior margin convex, weakly depressed in middle.

MEASUREMENTS (IN MM.) OF 10 SOLDIERS: Range of measurements, with means in parentheses: Length of head to side base of mandibles, 2.65–3.17 (2.92); width of head, 1.50–1.71 (1.64); length of left mandible, 1.76–2.08 (1.91); length of right mandible,

1.61–1.92 (1.69); length of postmentum, 1.76–1.97 (1.87); maximum width of postmentum, 0.46–0.54 (0.51); minimum width of postmentum, 0.20–0.28 (0.24); length of pronotum, 0.36–0.49 (0.43); width of pronotum, 0.88–1.04 (0.95).

DISTRIBUTION: Ka-Chong, soldiers, workers, collected by M. Ahmad, March 3, 1962, dug out from ground; Tung Sa-Lang Luang, soldiers, workers, collected by M. Ahmad, April 10, 1962, dug out from ground; Mae Sod, one soldier, workers, collected by M. Ahmad, April 19, 1962, dug out from ground.

#### *Pericapritermes semarangi* (Holmgren)

*Capritermes semarangi* HOLMGREN, 1913b, p. 247 (imago, soldier, worker).

*Capritermes javanicus* HOLMGREN, 1913b, pp. 255–256 (imago, worker).

*Capritermes javanicus*: HOLMGREN, 1913c, p. 25.

*Capritermes semarangi*: HOLMGREN, 1913c, p. 26.

*Capritermes semarangi*: BUGNION, 1913, p. 6.

*Capritermes semarangi*: HOLMGREN, 1914, p. 279, fig. 27 (soldier).

*Capritermes semarangi*: SNYDER, 1949, p. 197 (synonymy).

*Capritermes semarangi*: AHMAD, 1958, pp. 186 (imago), 188 (soldier).

*Pericapritermes semarangi*: KRISHNA, 1965, p. 15.

SOLDIER (FIG. 105): Head yellow, with a reddish tinge, median suture reddish brown; mandibles dark brown; antennae yellowish brown; thorax, legs, and abdomen yellowish white. Head very sparsely hairy; labrum with four long bristles at tip and three hairs on disc; postmentum with four bristles at tip; pronotum scantily hairy. Head rectangular, about twice as long as wide; fontanelle very small, circular, placed in anterior third; median suture distinct, extending up to a point close to fontanelle. Labrum with anterior margin almost straight; anterolateral corners produced into short processes. Mandibles strongly asymmetrical, two-thirds as long as head capsule; tip of left mandible bent inward like a short beak. Postmentum elongate, widest in apical fourth. Antennae with 14 articles; second slightly longer than third; fourth shortest. Pronotum saddle shaped; anterior margin convex, slightly notched in middle; posterior margin convex, not emarginate.

MEASUREMENTS (IN MM.) OF NINE SOL-

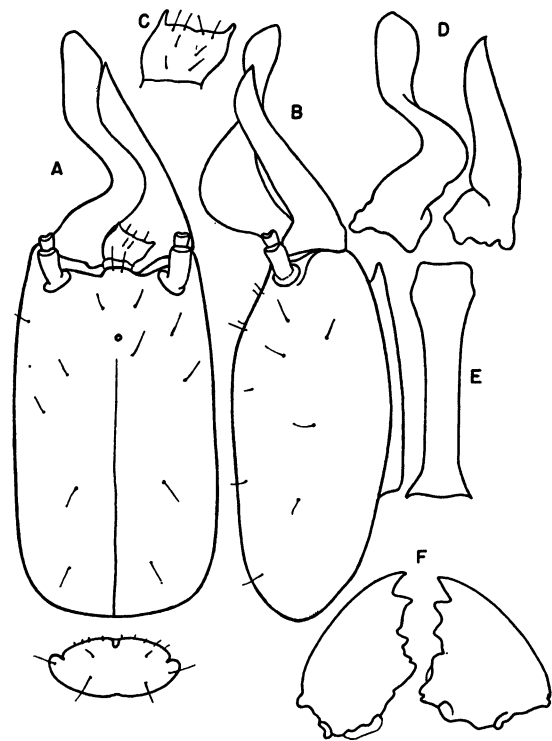


FIG. 104. *Pericapritermes latignathus* (Holmgren). Soldier: A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. Worker: F. Mandibles.

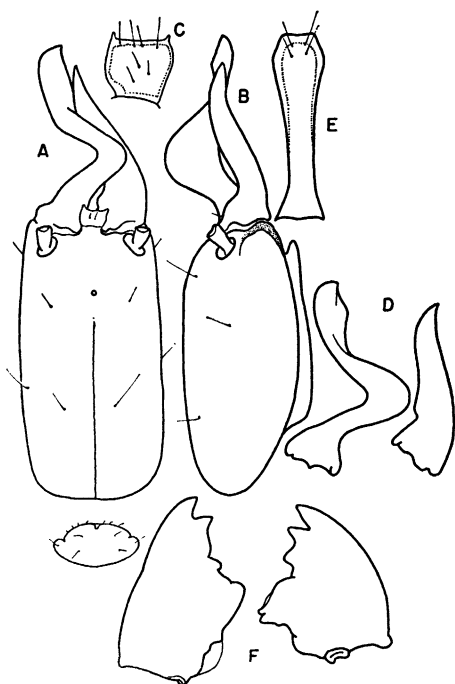


FIG. 105. *Pericapritermes semarangi* (Holmgren). Soldier: A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. Worker: F. Mandibles.

**DIERS:** Range of measurements, with means in parentheses: Length of head to side base of mandibles, 1.63–1.78 (1.69); width of head, 0.85–0.92 (0.88); length of left mandible, 0.98–1.09 (1.03); length of right mandible, 0.91–0.93 (0.92); length of postmentum, 1.04–1.24 (1.13); maximum width of postmentum, 0.31–0.33 (0.31); minimum width of postmentum, 0.15–0.18 (0.15); length of pronotum, 0.20–0.28 (0.24); width of pronotum, 0.46–0.57 (0.52).

**DISTRIBUTION:** Makham, two soldiers, workers, collected by M. Ahmad, March 27, 1962, dug out from ground at the base of a tree; Tung Sa-Lang Luang, soldiers, workers, collected by M. Ahmad, April 15, 1962, nest in the hollow of a tree.

#### GENUS *DICUSPIDITERMES* KRISHNA

##### KEY TO THE SPECIES

##### IMAGOS

Pronotum distinctly emarginate posteriorly . . .  
 . . . . . *D. makhamensis*, new species

Pronotum indistinctly emarginate posteriorly . . .  
 . . . . . *D. garthwaitei* (Gardner)

##### SOLDIERS

Labrum with minute processes at bases of antero-lateral, needle-like processes . . . . .  
 . . . . . *D. makhamensis*, new species  
 Labrum without minute processes at bases of anterolateral needle-like processes . . . . .  
 . . . . . *D. garthwaitei* (Gardner)

##### *Dicuspiditermes makhamensis*, new species

**QUEEN (FIG. 106):** Head dark brown; postclypeus slightly lighter than head; labrum creamy white; antennae brown; pronotum a shade lighter than head. Head covered with a dense coat of short hairs and scattered long bristles; postclypeus slightly less densely hairy than head; labrum with a few hairs; pronotum with numerous short hairs and fewer scattered long bristles. Head nearly circular; fontanelle indistinct. Eyes round, bulging, separated from lower margin of head by one-fourth of their short diameter. Ocellus rather prominent, broadly oval, separated from eye by its short diameter. Postclypeus twice as wide as long, median line weakly indicated. Labrum broadly dome shaped. Antennae incomplete; second article slightly longer than third, latter nearly as long as fourth. Pronotum slightly narrower than head, about twice as broad as long; anterior margin straight, not emarginate; lateral margins convex, maximum convexity a little

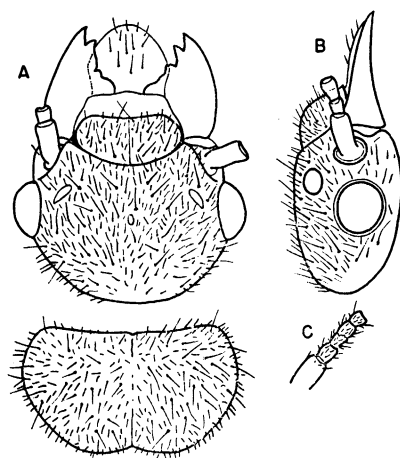


FIG. 106. Imago of *Dicuspiditermes makhamensis*, new species. A. Head and pronotum from above. B. Head from side. C. Antenna.

TABLE 45  
MEASUREMENTS (IN MILLIMETERS) OF TWO QUEENS OF *Dicuspiditermes makhamensis*,  
NEW SPECIES

	Morphotype	Paramorphotype
Length of head to tip of labrum	1.32	—
Length of head to side base of mandibles	0.83	0.91
Width of head	1.11	1.09
Long diameter of eye	0.28	0.28
Short diameter of eye	0.26	0.26
Eye from lower margin of head	0.07	0.06
Length of ocellus	0.14	0.13
Width of ocellus	0.10	0.10
Ocellus from eye	0.09	0.10
Length of postclypeus	0.23	0.23
Width of postclypeus	0.46	0.49
Length of pronotum	0.57	0.59
Width of pronotum	1.06	1.04

above middle; posterior margin very distinctly emarginate.

**SOLDIER (FIG. 107):** Head yellow, anterolateral corners brownish; labrum light yellow; left mandible dark brown; right mandible light reddish brown; antennae yellow, with a brownish tinge; thorax, abdomen, and legs

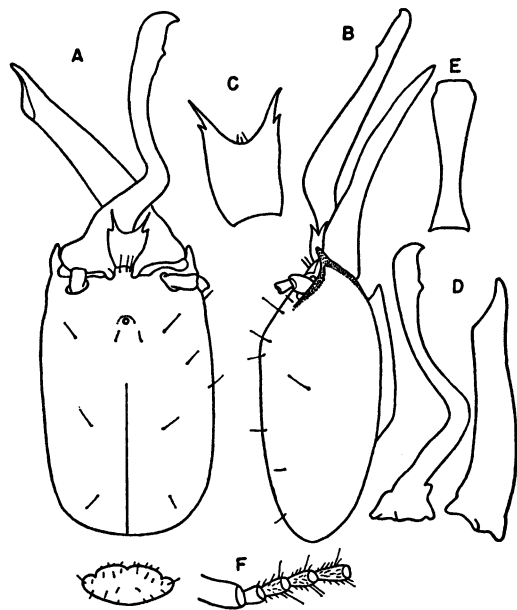


FIG. 107. Soldier of *Dicuspiditermes makhamensis*, new species. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

creamy white. Head with a few scattered bristles; labrum with three short hairs in the center of concavity; pronotum scantily hairy. Head long, nearly rectangular, lateral margins weakly convex, anterolateral corners produced into distinct tubercle-like projections; fontanelle small, circular; frons gradually sloping; median suture distinct, tip extending to a little beyond middle. Labrum deeply and broadly concave anteriorly; anterolateral corners produced into long, pointed processes; a small but distinct process at base of each anterolateral process. Mandibles asymmetrical; left mandible bent in middle, inner margin anterior to bend shallowly concave, tip incurved in form of a beak, a small tooth present below tip; right mandible broad, bladelike, lateral margins weakly curved, anterior margin shallowly concave. Postmentum elongate, three to four times as long as broad at widest point, nearly twice as broad anteriorly as at waist. Antennae with 14 articles; third longer than second and as long as fourth. Pronotum saddle shaped, twice as broad as long; anterior margin notched in middle; posterior margin convex, not emarginate; lateral lobes distinct, narrowly rounded.

**COMPARISONS:** The imago of *Dicuspiditermes makhamensis*, new species, resembles that of *D. incola* (Wasmann) and that of *D. obtusus* (Silvestri) in having the distance between the ocellus and the eye approximately equal to the width of the ocellus and in hav-

TABLE 46  
MEASUREMENTS (IN MILLIMETERS) OF 10 SOLDIERS OF *Dicuspiditermes makhamensis*,  
NEW SPECIES

	Holotype	Range	Mean
Length of head to tip of anterolateral tubercle	2.15	1.95-2.23	2.11
Width of head	1.22	1.22-1.30	1.24
Length of left mandible	1.92	1.89-2.05	1.98
Length of right mandible	1.87	1.79-1.95	1.88
Length of postmentum	0.93	0.93-1.09	1.01
Maximum width of postmentum	0.31	0.26-0.31	0.29
Minimum width of postmentum	0.15	0.14-0.18	0.15
Length of pronotum	0.28	0.26-0.31	0.27
Width of pronotum	0.65	0.59-0.65	0.61

ing the postclypeus half as long as wide. *Dicuspiditermes incola* is larger and has the pronotum only slightly emarginate posteriorly. In *D. obtusus*, the anterolateral corners of the pronotum are angularly pointed (broadly pointed in *D. makhamensis*).

The soldier of *Dicuspiditermes makhamensis*, new species, comes closest to that of *D. padangensis* Kemner from Sumatra, from which it can be distinguished by the following characters: (1) left mandible with the tip more strongly hooked and the anterior half of the inner margin less deeply concave; (2) tubercle-like process on anterolateral corners not present; (3) second antennal article shorter than third; and (4) head longer and broader.

**TYPE LOCALITY AND DISTRIBUTION:** Makham (type locality), queen (morphotype), soldiers (holotype, paratypes), workers, collected by M. Ahmad, March 27, 1962, dome-shaped nest on ground; queen (paramorphotype), soldiers (paratypes), workers, collected by M. Ahmad, March 27, 1962, nest on ground; Chantaburi, soldiers (paratypes), workers, collected by M. Ahmad, March 25, 1962, nest on ground.

***Dicuspiditermes garthwaitei* (Gardner)**

*Capritermes garthwaitei* GARDNER, 1944, pp. 106-108 (imago, soldier), figs. 2 (imago), 3-4 (soldier).

*Capritermes garthwaitei*: SNYDER, 1949, p. 195.

*Capritermes garthwaitei*: AHMAD, 1958, pp. 185 (imago), 191 (soldier).

*Dicuspiditermes garthwaitei*: KRISHNA, 1965, pp. 18-19.

**IMAGO (FIG. 108):** Head dark brown; postclypeus, antennae, and pronotum brown. Head with some long scattered bristles and more numerous short hairs; postclypeus as hairy as head; labrum with a few minute hairs on anterior margin and a few long bristles on disc; pronotum with long bristles and short hairs. Head subcircular; fontanelle narrow, rather slitlike, about three-fourths as long as ocellus. Eyes circular, bulging, separated from lower margin of head by about one-third of their diameter. Ocellus of medium size, broadly oval, separated from eye by a distance as long as or slightly longer

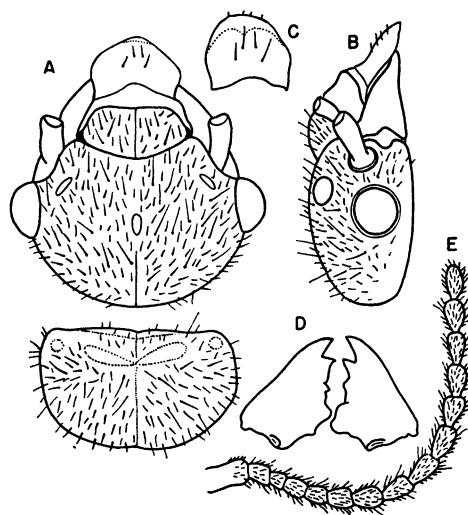


FIG. 108. Imago of *Dicuspiditermes garthwaitei* (Gardner). A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Antenna.

than its long diameter. Postclypeus twice as wide as long. Labrum broad, dome shaped. Mandibles as shown in figure 108. Antennae with 14–15 articles; in specimens with 15 articles, third shortest. Pronotum narrower than head, more than half as long as wide; anterior margin straight, without emargination; posterior weakly convex, very indistinctly depressed in middle.

**SOLDIER (FIG. 109):** Head yellow to reddish yellow; frons and anterolateral corners brownish; labrum cream-yellow, with brownish tinge in anterior half; mandibles dark reddish brown; antennae brown; thorax, legs, and abdomen light yellow. Head sparsely hairy; labrum with two short hairs in anterior half; pronotum scantily hairy. Head subrectangular, posterior margin convex, depressed in middle, lateral margins slightly sloping anteriorly, anterolateral corners tuberculate; fontanelle area raised up into a distinct protuberance; frons sloping rather steeply. Labrum elongate; anterior margin deeply concave, narrowly rounded at base; anterolateral corners produced into long, needle-like processes. Mandibles asymmetrical; tip of left mandible bent inward like a beak; right mandible bladelike. Postmentum elongate, narrowest below middle, widest a little below tip. Antennae with 14 articles; second and third subequal; fourth as long as or slightly longer than third. Pronotum more than twice as wide as long; anterior margin slightly notched in middle; posterior margin convex.

**MEASUREMENTS (IN MM.):** Range of measurements, with means in parentheses. *Ten imagoes*: Length of head to tip of labrum, 1.45–1.50 (1.47); length of head to side base of mandibles, 0.85–0.88 (0.86); width of head, 1.27–1.30 (1.28); long diameter of eye, 0.26–0.33 (0.28); short diameter of eye, 0.26–0.27 (0.26); eye from lower margin of head, 0.09–0.10 (0.09); length of ocellus, 0.11–0.14 (0.12); width of ocellus, 0.09–0.11 (0.09); ocellus from eye, 0.13–0.16 (0.14); length of postclypeus, 0.24–0.28 (0.26); width of postclypeus, 0.54–0.57 (0.55); length of pronotum, 0.59–0.65 (0.60); width of pronotum, 0.96–1.01 (0.99). *Ten soldiers*: Length of head to tip of anterolateral projections, 2.26–2.54 (2.40); length of head to tip of frontal lobe, 1.97–2.21 (2.11); width of head, 1.37–1.49 (1.46); height of head at frontal lobe, 1.19–1.32 (1.27);

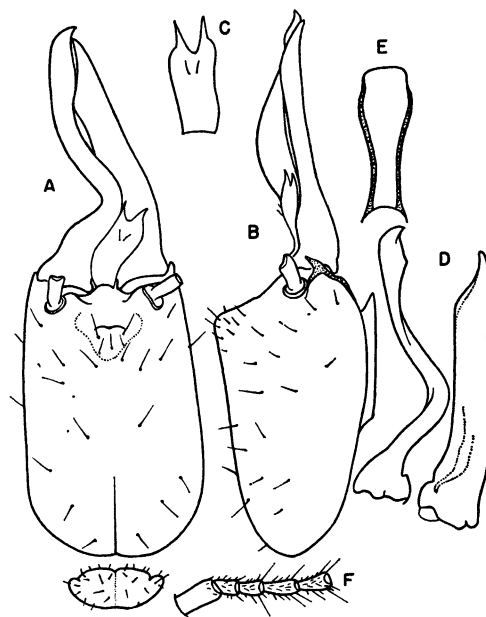


FIG. 109. Soldier of *Dicuspiditermes garthwaitei* (Gardner). A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

length of left mandible, 2.05–2.15 (2.10); length of right mandible, 2.08–2.21 (2.15); length of postmentum, 0.98–1.04 (1.01); maximum width of postmentum, 0.36–0.44 (0.40); minimum width of postmentum, 0.23 (0.23); length of pronotum, 0.31–0.35 (0.33); width of pronotum, 0.75–0.80 (0.77).

**DISTRIBUTION:** Tung Sa-Lang Luang, imagoes, soldiers, workers, collected by M. Ahmad, April 6, 1962, dug out from ground at the base of a tree; Mae Sod, soldiers, workers, collected by M. Ahmad, April 19, 1962, from a stump.

#### GENUS *CAPRITERMES* WASMANN

##### *Capritermes nitobei* (Shiraki)

*Eutermes nitobei* SHIRAKI, 1909, p. 238.

*Termes (Eutermes) nitobei*: OSHIMA, 1909, p. 40.

*Eutermes (Eutermes) longicornis* OSHIMA, 1910a, p. 411.

*Eutermes nitobei*: NITOBE, 1911, p. 14.

*Eutermes longicornis*: NAWA, 1911, p. 14.

*Eutermes longicornis*: OSHIMA, 1911, p. 9.

*Capritermes nitobei*: OSHIMA, 1912, p. 82.

*Capritermes (Capritermes) watasei* HOLMGREN, 1912a, p. 116.

*Capritermes sulcatus* HOLMGREN, 1913b, pp.

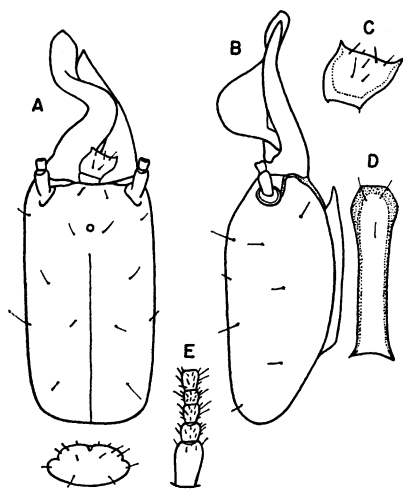


FIG. 110. Soldier of *Capritermes nitobei* (Shiraki). A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Postmentum from below. E. Antenna.

247–249 (imago, soldier, worker), pl. 6, figs. 22 (imago), 31 (soldier).

*Capritermes* (*Capritermes*) *nitobei*: OSHIMA, 1913, p. 279 (synonymy).

*Capritermes* (*Capritermes*) *nitobei*: OSHIMA, 1914, p. 2.

*Capritermes* (*Capritermes*) *nitobei*: HOZOWA, 1915, pp. 145–145 (imago, soldier, nymph, worker), text figs. 37 (imago), 38 (soldier), 39 (worker), pl. 4, figs. 37 (imago), 38 (soldier).

*Capritermes nitobei*: LIGHT, 1931, pp. 583, 585, 598 (locality).

*Capritermes nitobei*: WU, 1935, p. 22 (systematics).

*Capritermes nitobei*: SNYDER, 1949, p. 196 (synonymy).

*Capritermes nitobei*: AHMAD, 1958, pp. 187 (imago), 190 (soldier).

**SOLDIER (FIG. 110):** Head yellowish red, vertex lighter, anterior region darker; labrum brownish; mandibles dark brown; antennae light brown; thorax and abdomen yellow, with a brownish tinge. Head scantily hairy, labrum with four bristles on anterior margin and from two to three bristles on disc; postmentum with a few bristles in anterior third; pronotum scantily hairy. Head rectangular; fontanelle small, circular; median suture distinct, extending up to a little posterior to fontanelle. Labrum slightly wider than long; anterior margin straight, anterolateral corners produced into short, forwardly directed,

hyaline processes. Mandible strongly asymmetrical; tip of left mandible not incurved, with a minute, indistinct point. Postmentum elongate, nearly parallel sided in middle, widest a little below tip. Antennae with 14 articles; second and third subequal; fourth shorter. Pronotum strongly saddle shaped, anterior margin slightly notched in middle, posterior margin convex, not depressed in middle.

**MEASUREMENTS (IN MM.) OF A SINGLE SOLDIER:** Length of head to side base of mandibles, 2.21; width of head, 1.17; length of left mandible, 1.35; length of right mandible, 1.17; length of postmentum, 1.48; maximum width of postmentum, 0.39; minimum width of postmentum, 0.23; length of pronotum, 0.36; width of pronotum, 0.65.

**LOCALITY:** Mae Sod, one soldier, collected by M. Ahmad, April 19, 1962, from a mound of *Odontotermes*.

#### GENUS *PROCAPRITERMES* HOLMGREN

##### KEY TO THE SPECIES

##### SOLDIERS

- Mandibles only slightly longer than head capsule; head somewhat rectangular, nearly one and a half times as long as broad . . . . .  
 . . . . . *P. prosetiger*, new species  
 Mandibles distinctly longer than head capsule; head somewhat square, only slightly longer than broad . . . . . *P. longinathus*, new species

##### *Procapritermes prosetiger*, new species

**SOLDIER (FIG. 111):** Head yellow to brownish yellow; labrum white; mandibles dark reddish brown; antennae light brown, apices of articles whitish; pronotum, abdomen, and legs creamy white. Head moderately hairy; labrum with several long and thin hairs and a few short hairs; pronotum scantily hairy. Head rectangular, nearly one and a half times as long as broad; lateral sides wavy; median suture distinct, extending up to middle of head; frontal projection very low; frons gradually sloping. Labrum longer than broad, deeply concave anteriorly; anterolateral corners produced into long, slender, tapering processes. Mandibles elongate, slender, slightly asymmetrical; left mandible slightly bent in middle, tip curved inward like a hook; right mandible straighter than left mandible, tip slightly bent inward. Postmentum arched,



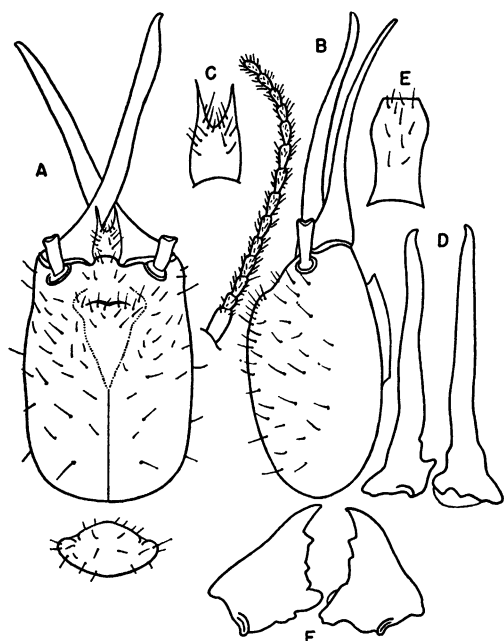


FIG. 111. *Procapritermes prosetiger*, new species. Soldier: A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. Worker: F. Mandibles.

broadest above and narrowest below middle. Antennae with 14 articles; third distinctly longer than second and slightly longer than fourth; in some specimens second, third, and fourth subequal. Pronotum saddle shaped, not indented anteriorly, without emargination posteriorly; lateral lobes distinct, narrowly rounded.

COMPARISONS: *Procapritermes prosetiger*, new species, comes closest to *P. setiger* (Havi-

land), from which it can be distinguished by its less strongly hooked mandibles, more deeply concave labrum, and the fact that the head is shorter and broader. *Procapritermes albipennis* Tsai and Chen, *P. atypus* Holmgren, and *P. sowerbyi* (Light) are larger, and *P. minutus* (Haviland) is smaller.

TYPE LOCALITY AND DISTRIBUTION: Ka-Chong (type locality), three soldiers (holotype, paratypes), collected by M. Ahmad, March 11, 1962, dug out from ground; two soldiers, workers, collected by M. Ahmad, March 3, 1962; Khao Yai, one soldier (paratype), workers, collected by M. Ahmad, March 21, 1962, dug out from ground; Prew, three soldiers (paratypes), workers, collected by M. Ahmad, March 30, 1962, dug out from ground.

#### *Procapritermes longinathus*, new species

SOLDIER (FIG. 112): Head light brown, with reddish tinge; labrum brownish medially and hyaline laterally; mandibles dark reddish brown; antennae brown, apices of articles whitish. Head sparsely hairy; labrum with a few hairs at tip; postmentum with two hairs on anterior margin; pronotum scantily hairy. Head somewhat square, only slightly longer than wide; posterior margin concave, depressed in middle; median suture distinct, extending up to middle of head; frontal projection indistinct. Labrum much longer than wide, anterior margin deeply concave; anterolateral corners produced into long thin processes. Mandibles slender, elongate, slightly asymmetrical. Postmentum moderately arched, distinctly constricted a little below middle, widest above middle. Antennae with

TABLE 47  
MEASUREMENTS (IN MILLIMETERS) OF NINE SOLDIERS OF *Procapritermes prosetiger*,  
NEW SPECIES

	Holotype	Range	Mean
Length of head to side base of mandibles	1.40	1.30-1.50	1.40
Width of head	0.97	0.91-1.04	0.97
Length of left mandible	1.58	1.43-1.61	1.51
Length of postmentum	0.54	0.54-0.65	0.58
Maximum width of postmentum	0.31	0.28-0.33	0.29
Minimum width of postmentum	0.20	0.20-0.23	0.22
Length of pronotum	0.28	0.23-0.31	0.27
Width of pronotum	0.59	0.54-0.62	0.58

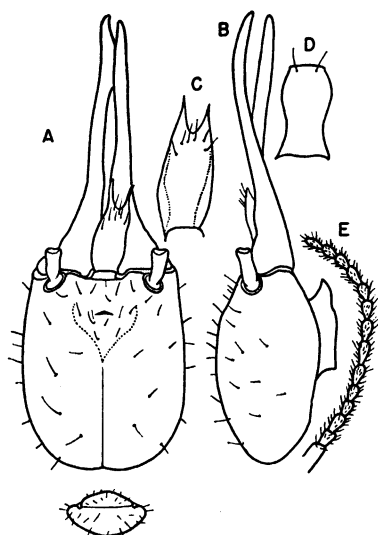


FIG. 112. Soldier of *procapritermes longignathus*, new species. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Postmentum from below. E. Antenna.

14 articles; second slightly shorter than third and indistinctly longer than fourth. Pronotum without emargination both anteriorly and posteriorly; lateral lobes distinct, narrowly rounded.

MEASUREMENTS (IN MM.) OF HOLOTYPE SOLDIER: Length of head to side base of mandibles, 1.19; width of head, 1.04; median length of labrum, 0.39; width of labrum, 0.20; length of left mandible, 1.50; length of postmentum, 0.54; maximum width of postmentum, 0.31; minimum width of postmentum, 0.23; length of pronotum, 0.23; width of pronotum, 0.54.

COMPARISONS: *Procapritermes longignathus*, new species, can be easily distinguished from all other hitherto known species of *Procapritermes* by the fact that it has the mandibles distinctly longer than the head capsule. *Procapritermes albipennis* Tsai and Chen, *P. atypus*, and *P. sowerbyi* (Light) are much larger. *Procapritermes prosetiger*, new species, has a more elongated head, a less deeply concave labrum, and a less constricted postmentum. *Procapritermes minutus* (Haviland) is smaller.

TYPE LOCALITY: Tung Sa-Lang Luang, one soldier (holotype), workers, collected by M. Ahmad, April 8, 1962, dug out from ground under a log.

#### GENUS *PSEUDOCAPRITERMES* KEMNER

##### *Pseudocapritermes parasilvaticus*, new species

IMAGO (FIG. 113): Head brown, with a yellowish tinge; postclypeus slightly lighter than head; labrum and antennae yellowish brown. Head moderately hairy, with short hairs and long bristles; labrum scantily hairy; pronotum as densely hairy as head. Head wider than long, semicircular below eyes; fontanelle plate very prominent, raised, ovoid; suture visible in posterior half of head. Eyes bulging, nearly circular. Ocellus prominent, elongately oval, one and a half times as long as broad, separated from eye by almost its short diameter. Postclypeus distinctly shorter than half of its length. Mandibles as shown in figure 113. Antennae incomplete; second article one and a half times as long as third and nearly as long as fourth; third shortest. Pronotum narrower than head, slightly longer than half of its width; anterior and posterior margins indistinctly emarginate.

SOLDIER (FIG. 114): Head light yellow; labrum creamy white; mandibles dark reddish brown; antennae light yellowish brown; thorax and abdomen yellowish white. Head very thinly hairy; labrum with a few long

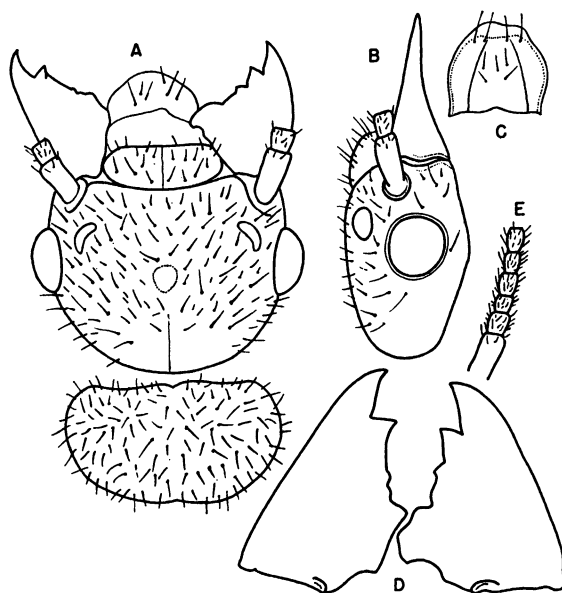


FIG. 113. Imago of *Pseudocapritermes parasilvaticus*, new species. A. Head and pronotum from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Antenna.

TABLE 48  
MEASUREMENTS (IN MILLIMETERS) OF THREE IMAGOS OF *Pseudocapritermes parasilvaticus*, NEW SPECIES

	Morphotype	Range	Mean
Length of head to tip of labrum	1.22	1.19-1.24	1.20
Length of head to side base of mandibles	0.70	0.70-0.80	0.76
Width of head	1.01	1.01-1.10	1.05
Diameter of eye	0.26	0.26-0.28	0.27
Eye from lower margin of head	0.03	0.03-0.07	0.05
Length of ocellus	0.10	0.10-0.14	0.11
Width of ocellus	0.06	0.06-0.09	0.07
Ocellus from eye	0.07	0.07	0.07
Length of postclypeus	0.15	0.15-0.16	0.15
Width of postclypeus	0.44	0.41-0.44	0.43
Length of pronotum	0.46	0.44-0.46	0.45
Width of pronotum	0.85	0.83-0.85	0.84

bristles anteriorly; postmentum with two short hairs at tip; pronotum with a few minute hairs along anterior margin and a few long bristles on lateral posterior margins; disc without hairs. Head rectangular, a little less than twice as long as broad; lateral margins almost parallel; posterior margin convex, slightly emarginate; median suture running up to middle of head; fontanelle distinct. Labrum one and a half times as long as broad;

anterior margin straight, anterolateral corners produced into short, thin, pointed processes. Mandibles asymmetrical; left mandible moderately twisted, tip produced into a prominent, incurved hook; right mandible not twisted, broad, bladelike. Postmentum more than three times as long as its maximum width, constricted in middle; posterior margin slightly wider than anterior margin. Antennae with 14 articles; third article distinctly longer than second and fourth and slightly shorter than fifth. Pronotum strongly saddle shaped, slightly emarginate both anteriorly and posteriorly.

COMPARISONS: The imago of *Pseudocapritermes parasilvaticus*, new species, resembles that of *P. silvaticus* Kemner closely but differs in having the pronotum slightly longer than half of its width (it is slightly shorter than half of its width in *P. silvaticus*). *Pseudocapritermes angustignathus* (Holmgren) has the third antennal article as long as the fourth and it is darker.

The soldier of *Pseudocapritermes parasilvaticus*, new species, resembles that of *P. silvaticus* Kemner in size, the shape of the left mandible, and in having the third antennal article longer than the second, but it differs as follows: the labrum is distinctly longer than broad, with the anterior margin straight and the lateral margins only slightly sinuate (in *P. silvaticus* the labrum is almost as long as broad, with the sides strongly curved and the anterior margin deeply concave), and the

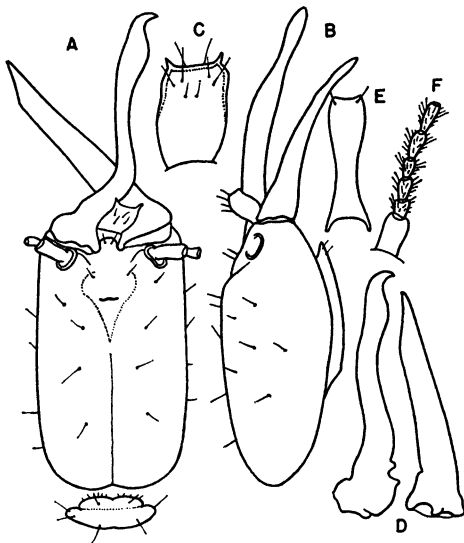


FIG. 114. Soldier of *Pseudocapritermes parasilvaticus*, new species. A. Head from above. B. Head from side. C. Labrum from above. D. Mandibles. E. Postmentum from below. F. Antenna.

TABLE 49  
MEASUREMENTS (IN MILLIMETERS) OF NINE SOLDIERS OF *Pseudocapritermes*  
*parasilvaticus*, NEW SPECIES

	Holotype	Range	Mean
Length of head to side base of mandibles	1.95	1.95-2.23	2.11
Width of head	1.17	1.17-1.27	1.22
Length of left mandible	1.84	1.76-1.97	1.85
Length of right mandible	1.79	1.69-1.87	1.79
Length of postmentum	0.93	0.91-1.17	1.04
Maximum width of postmentum	0.28	0.28-0.33	0.30
Minimum width of postmentum	0.15	0.15-0.16	0.15
Length of pronotum	0.26	0.26-0.28	0.27
Width of pronotum	0.67	0.67-0.75	0.70

median suture does not extend up to the fontanelle. In the soldier of *P. angustignathus* (Holmgren) the third antennal article is as long as the third and is larger. *Pseudocapritermes tikadari* Roonwal and Chhotani has the left mandible with a much smaller hook which is just like a point, the anterior margin of its labrum more deeply concave, and the post-

mentum narrower.

TYPE LOCALITY: Tung Sa-Lang Luang, three dealates (morphotype, paramorphotypes), soldiers (holotype and paratypes), workers, collected by M. Ahmad, April 14, 1962, under a log; soldiers (paratypes), workers, collected by M. Ahmad, April 13, 1962, under a log.

## SUMMARY

1. THE PRESENT STUDY deals with the termite fauna of Thailand, the survey of which was undertaken by the author during March and April, 1962.

2. Seventy-four species, representing 29 genera, are described. Of these, the following 32 species are new to science: *Postelectrotermes tongyaii*, *Glyptotermes kachongensis*, *Cryptotermes thailandis*, *Coptotermes premasmii*, *Prorhinotermes tibiaoensisiformis*, *Schedorhinotermes rectangularis*, *Macrotermes chaiglomi*, *Macrotermes maesodensis*, *Odontotermes maesodensis*, *Odontotermes proformosanus*, *Odontotermes paraoblongatus*, *Odontotermes takensis*, *Hypotermes makhamsensis*, *Speculitermes macrodentatus*, *Microcerotermes minutus*, *Microcerotermes paracelebensis*, *Amitermes longignathus*, *Havilanditermes proatripennisi*, *Nasutitermes tungsalangensis*, *Nasutitermes di-*

*morphus*, *Nasutitermes perparvus*, *Bulbitermes makhamsensis*, *Bulbitermes parapusillus*, *Bulbitermes laticephalus*, *Termes huayangensis*, *Mirocapritermes latignathus*, *Mirocapritermes concaveus*, *Mirocapritermes prewensis*, *Dicuspiditermes makhamsensis*, *Procapritermes prosetiger*, *Procapritermes longignathus*, and *Pseudocapritermes parasilvaticus*.

3. The imago of *Bulbitermes prabhae*, hitherto an unknown caste, is described.

4. *Amitermes minor* Holmgren has been made a synonym of *Amitermes dentatus* (Haviland).

5. *Eurytermes isodentatus* and *Nasutitermes deltocephalus*, recently described by Tsai and Chen (1963) have been transferred to the genera *Indotermes* and *Bulbitermes*, respectively.

## LIST OF 74 SPECIES RECORDED FROM THAILAND

### FAMILY KALOTERMITIDAE

*Postelectrotermes tongyaii*, new species  
*Glyptotermes brevicaudatus* (Haviland)  
*Glyptotermes kachongensis*, new species  
*Glyptotermes pinangae* (Haviland)  
*Bifiditermes indicus* (Holmgren)  
*Cryptotermes thailandis*, new species  
*Cryptotermes domesticus* (Haviland)

### FAMILY RHINOTERMITIDAE

*Coptotermes premasmii*, new species  
*Coptotermes havilandi* Holmgren  
*Coptotermes curvignathus* Holmgren  
*Coptotermes kalshoveni* Kemner  
*Coptotermes gestroi* (Wasmann)  
*Prorhinotermes tibiaoensisiformis*, new species  
*Schedorhinotermes medioobscurus* (Holmgren)  
*Schedorhinotermes rectangularis*, new species  
*Schedorhinotermes sarawakensis* (Holmgren)

### FAMILY TERMITIDAE

*Macrotermes gilvus* (Hagen)  
*Macrotermes carbonarius* (Hagen)  
*Macrotermes chaiglomi*, new species  
*Macrotermes maesodensis*, new species  
*Macrotermes malaccensis* (Haviland)  
*Macrotermes annandalei* (Silvestri)  
*Odontotermes maesodensis*, new species  
*Odontotermes proformosanus*, new species  
*Odontotermes formosanus* (Shiraki)

*Odontotermes oblongatus* Holmgren  
*Odontotermes paraoblongatus*, new species  
*Odontotermes sarawakensis* Holmgren  
*Odontotermes takensis*, new species  
*Odontotermes feae* (Wasmann)  
*Odontotermes longignathus* Holmgren  
*Hypotermes xenotermitis* (Wasmann)  
*Hypotermes makhamsensis*, new species  
*Microtermes obesi* Holmgren  
*Microtermes pakistanicus* Ahmad  
*Indotermes thailandis* Ahmad  
*Speculitermes macrodentatus*, new species  
*Euhamitermes hamatus* (Holmgren)  
*Microcerotermes minutus*, new species  
*Microcerotermes paracelebensis*, new species  
*Microcerotermes crassus* Snyder  
*Microcerotermes annandalei* Silvestri  
*Globitermes sulphureus* (Haviland)  
*Amitermes longignathus*, new species  
*Amitermes dentatus* (Haviland)  
*Havilanditermes proatripennisi*, new species  
*Nasutitermes matangensisiformis* (Holmgren)  
*Nasutitermes tungsalangensis*, new species  
*Nasutitermes fuscipennis* (Haviland)  
*Nasutitermes dimorphus*, new species  
*Nasutitermes perparvus*, new species  
*Nasutitermes johoricus* (John)  
*Bulbitermes prabhae* Krishna  
*Bulbitermes makhamsensis*, new species  
*Bulbitermes parapusillus*, new species

*Bulbitermes laticephalus*, new species  
*Hospitalitermes jepsoni* (Snyder)  
*Hospitalitermes ataramensis* Prashad and Sen-  
Sarma  
*Aciculitermes maymyoensis* Krishna  
*Termes huayangensis*, new species  
*Termes comis* Haviland  
*Termes propinquus* (Holmgren)  
*Mirocapritermes connectens* Holmgren  
*Mirocapritermes latignathus*, new species

*Mirocapritermes concaveus*, new species  
*Mirocapritermes prewensis*, new species  
*Pericapritermes latignathus* (Holmgren)  
*Pericapritermes semarangi* (Holmgren)  
*Dicuspiditermes makhamensis*, new species  
*Dicuspiditermes garthwaitei* (Gardner)  
*Capritermes nitobei* (Shiraki)  
*Procapritermes prosetiger*, new species  
*Procapritermes longignathus*, new species  
*Pseudocapritermes parasilvaticus*, new species

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