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A Revision of the Indomalayan Termite Genus *Homalotermes* (Isoptera, Termitidae, Termitinae)

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ABSTRACT

Two new species, *Homalotermes eleanorae* Emerson and *H. exiguus* Krishna, and the hitherto unknown imago caste of *H. pilosus* (Mathur and Thapa) are described and illustrated. The previously known species, *H. foraminifer* (Haviland) and *H. pilosus* (Mather and Thapa), are redescribed and illustrated. *Homalotermes penangi* (Holmgren) is treated as a synonym of *H. foraminifer*. The species *H. huananensis* Yu and Ping is removed from the genus *Homalotermes* and placed in the genus *Procapritermes*. A key to the imagoes and soldiers and a map showing the distribution of each species are included.

The present paper is the third in a series dealing with termite genera having soldiers with asymmetrical snapping mandibles. The genus *Homalotermes* has been redescribed and its phylogenetic relationships discussed by Krishna (1968). The purpose of the present paper is to re-evaluate and redescribe the previously known species and to describe a new caste and two new species, on the basis of abundant new material. Two species, *H. eleanorae*, new species, and *H. foraminifer* (Haviland), build distinctive above-ground carton nests, which are species-characteristic. The descriptions of these nests and of the construction behavior of these species will be published in the near future by Alfred E. Emerson.

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This study is based on specimens in the collection of the American Museum of Natural History. Holotypes, paratypes, and morphotypes of new species are deposited in the American Museum of Natural History. Duplicate paratypes are in the National Museum of Natural History, Smithsonian Institution, Washington, D. C.; the British Museum (Natural History), London; and the Zoological Survey of India, Calcutta, India.

The research reported herein has been supported by the National Science Foundation (Grants GB-388, GB-5158, and GB-20684). I am indebted to Dr. Alfred E. Emerson for helpful discussions and the generous use of his systematic card catalogues and to my wife, Dr. Valerie Krishna, for editorial assistance.

KEY TO THE SPECIES OF *HOMALLOTERMES*

IMAGO

1. Larger species: head length, 0.64–0.89 mm.; head width, 0.87–1.14 mm.; eye diameter, 0.28–0.41 mm.; pronotum width, 0.63–0.92 mm. 2
 Smaller species: head length, 0.54–0.57 mm.; head width, 0.71–0.80 mm.; eye diameter, 0.21–0.23 mm.; pronotum width, 0.50–0.58 mm. 3
2. Eyes larger: diameter, 0.38–0.41 mm.; head length, 0.84–0.89 mm.; head width, 1.10–1.14 mm.; pronotum width, 0.84–0.92 mm.; forewing scale length, 0.71–0.74 mm. (fig. 1) *H. eleanorae*
 Eyes smaller: diameter, 0.28–0.31 mm.; head length, 0.64–0.73 mm.; head width, 0.87–0.94 mm.; pronotum width, 0.63–0.73 mm.; forewing scale length, 0.49–0.59 mm. (fig. 5) *H. foraminifer*
3. Postclypeus faintly convex in profile, 3.4–3.7 times wider than long; fontanelle distinctly visible, pear-shaped, 0.04 mm. wide; eyes prominently convex, diameter 0.23 mm. (fig. 3) *H. exiguus*
 Postclypeus prominently convex in profile, 1.9–2.1 times wider than long; fontanelle barely visible, punctate; eyes not prominently convex, diameter, 0.20–0.21 mm. (fig. 7) *H. pilosus*

SOLDIER

1. Larger species: head length, 1.20–1.67 mm.; head width, 0.87–1.02 mm.; left mandible length, 1.45–1.68 mm. 2
 Smaller species: head length, 0.87–0.94 mm.; head width, 0.64–0.77 mm.; left mandible length, 0.92–1.13 mm. 3
2. Labrum with anterior margin distinctly concave (fig. 6D); left mandible distinctly longer than head capsule (1.18–1.22 times), its inner apical margin deeply concave, long and rough or finely serrated (fig. 6A) *H. foraminifer*
 Labrum with anterior margin straight or faintly convex (fig. 2D); left mandible slightly longer than head capsule (1.02–1.09 times), its inner apical margin slightly concave, short and smooth (fig. 2A) *H. eleanorae*
3. Labrum deeply concave (fig. 4D); left mandible 1.20 times longer than head capsule, moderately bent, its outer margin deeply concave in lower half; right mandible with angular inner apical margin long (fig. 4A) *H. exiguus*

Labrum broadly concave (fig. 8D); left mandible 1.05 times longer than head capsule, slightly bent, its outer margin broadly concave in lower half; right mandible with angular inner apical margin short *H. pilosus*

***Homallotermes eleanorae*, new species¹**

Termes foraminifer HAVILAND, 1898, pp. 378, 419, 420 (imago, soldier, worker) (imago from Sarawak only), pl. 25, figs. 67, 68 (imago), (soldier from Perak = *H. foraminifer*).

Termes (Eutermes) foraminifer: DESNEUX, 1904, p. 42 (locality).

Capritermes foraminifer: HOLMGREN, 1913, p. 254 (imago only).

Homallotermes foraminifer: JOHN, 1925, p. 413 (locality).

Homallotermes foraminifer: SNYDER, 1949, p. 191 (localities from Borneo only).

Homallotermes foraminifer: AHMAD, 1958, p. 183 (imago only).

The king, queen, and soldiers of this species from Sarawak, Borneo, were described under the species *foraminifer* by Haviland (1898) and Holmgren (1913). A study of series number 369 in Haviland's collection from Borneo and new material collected by A.E. Emerson shows that Haviland's specimens from Borneo are not *foraminifer*, but a new species, diagnosed by Emerson on the basis of soldier characters and given the name *eleanorae*. From the collection records it seems that this species is more common to Borneo than to Malaya. In the American Museum's collection all the material of this species is from Borneo, with one exception, a single vial with specimens from Taiping, Malaya, although both areas have been sampled widely. (See also under *H. foraminifer*.)

DIAGNOSIS: See key and comparisons for diagnostic characters.

IMAGO (FIG. 1): Head reddish brown; postclypeus lighter than head; anteclypeus cream-colored; labrum yellowish; bases of mandibles yellowish brown; antennae brown; pronotum brown; legs light yellowish brown. Head and pronotum densely covered with stiff bristles of varying sizes, longest about 0.17 mm. Head with central area around fontanelle depressed; fontanelle long, narrow, and slitlike or slightly dumbbell-shaped, in some specimens not clearly visible; Y-suture not visible. Postclypeus slightly convex in profile, 2.8 times wider than long, with a faint median line. Eyes large, largest of all the known species, shaped as in figure 1B. Ocellus oval, very close (0.01 mm.) to eye, in some specimens almost touching eye. Antennae broken, with 13-plus articles, third shortest, second equal to fourth, fifth shorter than fourth or sixth. Pronotum of a width equal to 0.8 of head width, 1.3 to 1.6 times wider than long; posterolateral corners broadly rounded; posterior margin broadly indented in middle.

¹ The author of this species is Alfred E. Emerson, who discovered this new species and wrote the description.

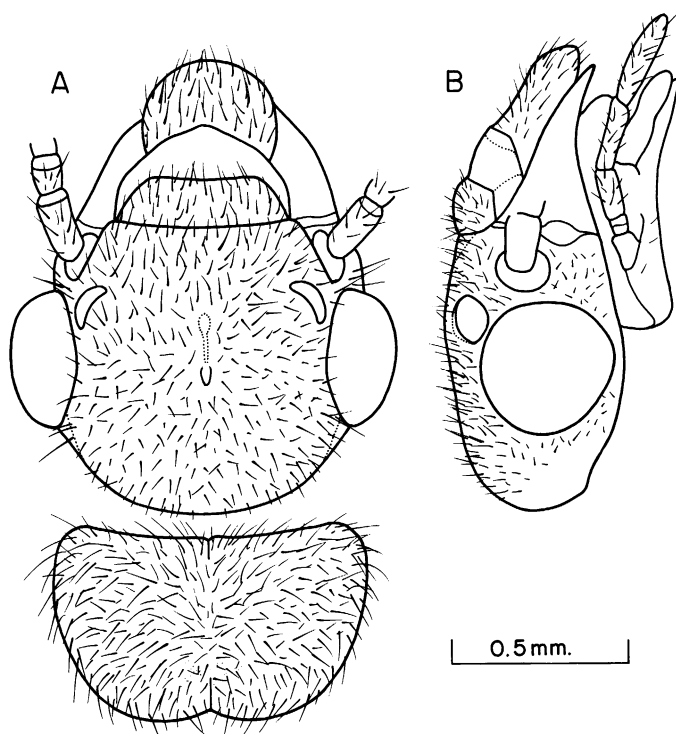


FIG. 1. Imago of *Homallotermes eleanorae*, new species; morphotype queen from type colony. A. Head and pronotum from above. B. Head from side.

TABLE 1
MEASUREMENTS (IN MILLIMETERS) OF SEVEN DEALATE IMAGOS OF
Homallotermes eleanorae, NEW SPECIES

	Morphotype	Range	Mean
Lateral length of head capsule	0.87	0.84–0.89	0.87
Width of head with eyes	1.14	1.10–1.14	1.12
Diameter of eye	0.40	0.38–0.41	0.40
Eye from lower margin	0.01	0.01	0.01
Long diameter of ocellus	0.12	0.11–0.15	0.14
Short diameter of ocellus	0.11	0.10–0.13	0.12
Ocellus from eye	0.01	0.01	0.01
Maximum length of pronotum	0.56	0.54–0.60	0.57
Maximum width of pronotum	0.92	0.84–0.92	0.90
Length of hind tibia	—	1.28–1.31	1.30
Length of forewing scale	0.74	0.71–0.74	0.72

COMPARISONS: The imago of *Homallotermes eleanorae* is the largest imago in all measurements of all known species of the genus. Besides differences in size, *H. eleanorae* differs from *H. foraminifer* in having a longer third antennal segment and the posterior margins of the mesonotum and metanotum less deeply and broadly indented.

SOLDIER (FIG. 2): Head light yellow, frontal gland area paler; labrum and legs pale yellow; antennae brownish yellow; mandibles reddish brown, proximal half of left mandible much darker. Head and pronotum with a few erect bristles. Head about 1.43 times longer than wide; sides faintly rounded, narrowing anteriorly; frontal gland large, extending almost to posterior margin; in profile, frontal region slightly humped; fontanelle large and rounded, situated on frontal slope. Labrum with anterior margin straight or faintly convex; anterolateral corners projected into short points, much shorter than in *foraminifer*. Left mandible about 1.02 to 1.09 times longer than head capsule; moderately bent in lower half (much more than in *foraminifer*); tip beak-shaped; inner margin below tip grooved; prominent toothlike projection at base. Right mandible only slightly narrow at base (much less than in *foraminifer*); outer margin near tips slightly concave; inner inclined margin below tip concave and much shorter than in *foraminifer*; in profile, lower margin broadly arched. Postmentum with sides concave and narrowing in lower half. Antennae with 13 articles, third shorter than second, fourth longer than second or third, fourth to eighth subequal, ninth to thirteenth subequal. Pronotum of a width equal to 0.49 of head width; anterior margin notched in middle; posterior margin almost evenly rounded.

COMPARISONS: The soldier of *Homallotermes eleanorae* most closely resembles that of *H. foraminifer*. It differs from *H. foraminifer* in the following respects: the head is larger; the anterior margin of the labrum is straight, and its anterolateral corners have short points (in *foraminifer* the anterior margin is broadly concave, and its anterolateral corners have longer points); the mandibles are more robust; the left mandible is only slightly longer than the head capsule (in *foraminifer* it is much longer); the left mandible is much more bent and arched in the middle, and its inner concave edge below the tip is shorter (in *foraminifer* the left mandible is less bent and arched, and its inner concave edge below the tip is long and finely serrated); the inner inclined margin below the tip of the right mandible is shorter; the sides of the postmentum are more constricted posteriorly. The soldiers of *H. exiguus* and *H. pilosus* are much smaller in all respects.

MATERIAL EXAMINED AND TYPE LOCALITY: BORNEO: *Sarawak* (latitude 1° 38' N, longitude 113° 35' E), altitude 228 m. (type locality), queen

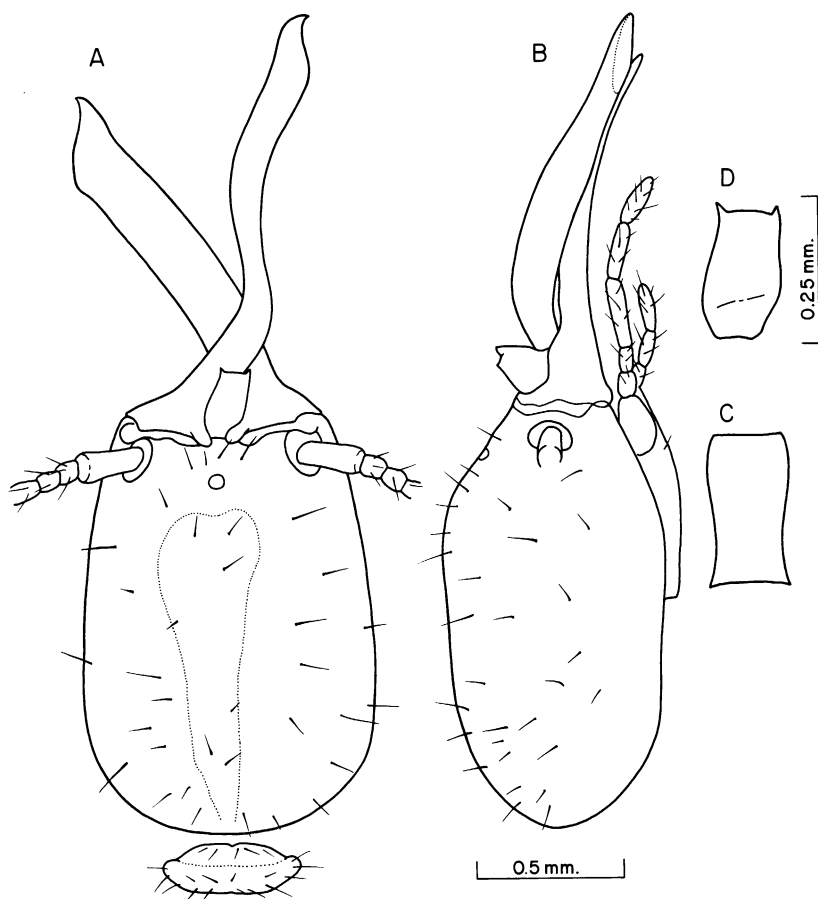


FIG. 2. Soldier of *Homallotermes eleanorae*, new species; paratype from type colony. A. Head and pronotum from above. B. Head from side. C. Postmentum from below. D. Labrum from above.

(morphotype), soldiers (holotype and paratypes), collected by A.E. Emerson, Feb. 27, 1963, from nest in end of soft rotten log with envelope and lined cavity, in rainforest, nest photographed at the American Museum of Natural History, notes on and diagram of nest in Emerson's field book; *idem*, soldiers (paratypes), workers, nymphs, collected by A.E. Emerson, Jan. 20, 1963 (Collembola and Staphylinid beetles also collected); *idem*, king, queen (paramorphotypes), soldiers (paratypes), collected by A.E. Emerson and E. Emerson, Jan. 27, 1963, from nest with hard, dry, thick

TABLE 2
MEASUREMENTS (IN MILLIMETERS) OF TWENTY SOLDIERS OF
Homalotermes eleanorae, NEW SPECIES

	Holotype	Range	Mean
Lateral length of head capsule	1.40	1.40-1.67	1.51
Maximum width of head	1.00	0.96-1.16	1.05
Maximum height of head	0.80	0.80-0.91	0.85
Length of left mandible	1.53	1.48-1.63	1.55
Length of right mandible	1.42	1.38-1.51	1.43
Maximum width of postmentum	0.28	0.27-0.33	0.30
Minimum width of postmentum	0.20	0.20-0.23	0.22
Length of postmentum	0.51	0.51-0.64	0.56
Maximum length of pronotum	0.17	0.17-0.20	0.19
Maximum width of pronotum	0.51	0.49-0.56	0.52
Length of hind tibia	0.89	0.88-1.09	0.96

walls of dark brown excrement 1 m. high on surface of hardwood tree, covered thinly with soft rootlet soil on vertical surface; *idem*, king, queen (paramorphotypes), soldiers (paratypes), workers, collected by A.E. Emerson, Jan. 28, 1963, royal cell 3.17 cm. by 3.17 cm. and 1.58 cm. high, nest wall thick, solid, dry construction in excavated large hole inside hard wood of stump in forest, workers repair with nest crumbs, with head and saliva, no anal drops, nest appears excrementous; *idem*, soldiers (paratypes), workers, collected by A.E. Emerson and E. Emerson, Jan. 29, 1963, in large fallen tree, in portion off ground; *idem*, soldiers (paratypes), workers, collected by A.E. Emerson, Jan. 31, 1963, from dirt carton nest 1.5 m. above ground in dead stump, royal cell and other large cells with eggs; *idem*, imagoes (paramorphotypes), soldiers (paratypes), collected by A.E. Emerson, Feb. 12, 1963; *idem*, soldiers (paratypes), workers, collected by A.E. Emerson, Feb. 12, 1963, nest with ventilation pores; *idem*, soldier (paratype), workers, collected by A.E. Emerson, Feb. 12, 1963, debris of drying termites below *Bulbitermes* nest from epiphytic mass 14 m. above ground; *idem*, soldiers (paratypes), workers, collected by A.E. Emerson and E. Emerson, Feb. 12, 1963, nest 40 cm. long by 23 cm. wide by 13 cm. thick, behind rootlet of dead stump, round ventilation pores (Collembola and mites also collected); *idem*, soldiers (paratypes), collected by A.E. Emerson, Feb. 21, 1963, nest with round pores photographed at the American Museum of Natural History, notes on nest and repair behavior in Emerson's field book; *idem*, soldiers (paratypes), workers, collected by A.E. Emerson, Feb. 21, 1963, carton nest at base of large dead stump with in-

vading *Hospitalitermes*; *idem*, soldiers (paratypes), workers, nymphs, collected by A.E. Emerson, Feb. 21, 1963, nest with round pores; *idem*, soldiers (paratypes), workers, collected by A.E. Emerson, Feb. 27, 1963, nest in hollow of log with carton envelope; *idem*, two vials containing soldiers (paratypes), workers, collected by A.E. Emerson, Feb. 27, 1963, small prone log. *Sarawak* (latitude 1° 38' N, longitude 113° 33' E), queen (paramorphotype), soldiers (paratypes), workers, collected by A.E. Emerson, Feb. 6, 1963, queen in royal cell in definitive carton nest 1.5 m. above ground in decayed stump. *Sarawak* (latitude 1° 38' N, longitude 113° 34' E), altitude 183 m., king, queen (paramorphotypes), soldiers (paratypes), workers, collected by A.E. Emerson, Feb. 1, 1963, definitive carton nest structure with smooth surface, 23 cm. by 13 cm. taken out of decayed log above ground, nest 35 cm. above ground surface, royal cell 2 cm. long, 0.6 cm. high, with thick walls; *idem*, soldiers (paratypes), workers, collected by A.E. Emerson, Feb. 15, 1963, fallen log. *Sarawak* (latitude 1° 38' N, longitude 113° 32' E), soldiers (paratypes), workers, collected by A.E. Emerson, Feb. 18, 1963, hollow log; *idem*, soldiers (paratypes), workers, collected by A.E. Emerson, Feb. 27, 1963, foraging in dead vine. *Sarawak*, near Matang (latitude 1° 32' N, 110° 21' E), queen (paramorphotype), soldiers (paratypes), workers, determined by G.D. Haviland as "*Termes foraminifer*," series no. 369, collected by G.D. Haviland, 1894 (queen in Haviland's collection, Cambridge University). *Sarawak*, soldiers (paratypes), workers, determined by G.D. Haviland as "*Termes foraminifer*," collected by G.D. Haviland, 1894; *idem*, one soldier (paratype), determined by G.D. Haviland as "*Termes foraminifer*," series no. 534 (in Haviland's collection, Cambridge University); *idem*, soldier (paratypes) workers, determined by N. Holmgren as "*Capritermes foraminifer*." MALAYA ("Malacca"): Taiping, Maxwell's Hill (latitude 4° 55' N, longitude 100° 44' E), soldiers (paratypes), workers, determined by N. Holmgren (1914, p. 284), as "*Capritermes (C) foraminifer*," collected by H. v. Buttel-Reepen, series no. 132, Feb. 1912.

DISTRIBUTION: Borneo, Malaya.

ETYMOLOGY: This species is named in honor of Mrs. Eleanor F. Emerson, who has accompanied her husband, Alfred E. Emerson, on many field trips and who has collected many important and rare species.

***Homallotermes exiguus*, new species**

Homallotermes, new species, KRISHNA, 1968, p. 285, fig. 15c (worker mandible).

DIAGNOSIS: See key and comparisons for diagnostic characters.

IMAGO (FIG. 3): Head, postclypeus, antennae, wing scales, and abdomi-

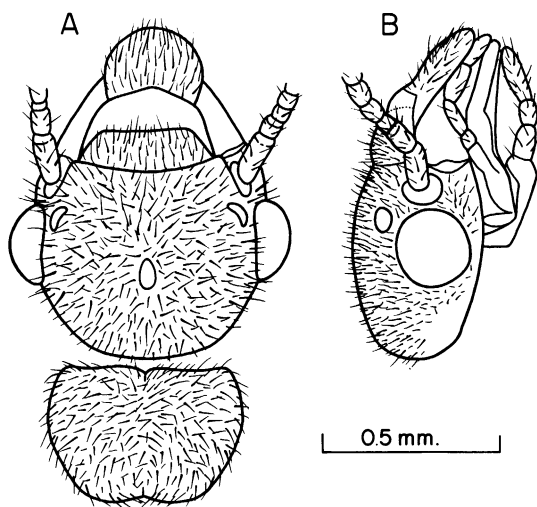


FIG. 3. Imago of *Homalotermes exiguus*, new species; paramorphotype from type colony. A. Head and pronotum from above. B. Head from side.

nal tergites brown; anteclypeus, labrum, and mandibles light yellowish; pronotum brown, lighter than head; legs light yellowish brown. Head and pronotum densely covered with stiff bristles and hairs of varying sizes; wing membrane with minute hairs. Head with a faint triangular depression posterior to epistomal suture; fontanelle pear-shaped, 0.04 mm. wide; Y-suture not visible. Postclypeus only faintly convex in profile, about 3.4 to 3.7 times wider than long. Eyes prominently convex, shaped as in figure 3B. Ocellus oval, not touching eye. Antennae with 15 articles, third shortest, second subequal to third and fourth combined, fourth through seventh subequal, eighth through fifteenth slightly longer than seventh. Pronotum of a width equal to 0.70 of head width; anterior margin faintly biconvex, middle portion slightly upturned, with notch in middle; posterior margin with broad indentation.

COMPARISONS: In size, the imago of *Homalotermes exiguus* is closest to that of *H. pilosus*. It differs from *H. pilosus* as follows: the head is wider; the fontanelle is distinctly visible and pear-shaped (it is barely visible and punctate in *pilosus*); the eyes are more prominent and more convex; the postclypeus is only faintly convex in profile and wider than long by 3.4 to 3.7 times (it is much more prominently convex and only 1.9 to 2.1 times wider than long in *pilosus*); the sides of the pronotum are more rounded. The imagoes of *H. eleanorae* and *H. foraminifer* are much larger than those of *H. exiguus* and *H. pilosus*.

SOLDIER (FIG. 4): Head light yellow, frontal gland area lighter; antennae yellowish brown; labrum, legs, and pronotum cream-colored; man-

TABLE 3
MEASUREMENTS (IN MILLIMETERS) OF SIX IMAGOS OF
Homallotermes exiguus, NEW SPECIES

	Morphotype	Range	Mean
Lateral length of head capsule	0.56	0.54-0.56	0.55
Width of head with eyes	0.79	0.79-0.80	0.79
Diameter of eye	0.23	0.23	0.23
Eye from lower margin	0.01	0.01	0.01
Long diameter of ocellus	0.08	0.07-0.08	0.08
Short diameter of ocellus	0.08	0.07-0.08	0.07
Ocellus from eye	0.03	0.02-0.03	0.03
Maximum length of pronotum	0.36	0.30-0.38	0.35
Maximum width of pronotum	0.54	0.50-0.58	0.54
Length of hind tibia	0.71	0.70-0.71	0.71
Length of forewing from suture	5.50	5.20-5.90	5.61
Length of forewing scale	0.43	0.43	0.43
Width of forewing	1.40	1.40	1.40

dibles reddish brown, left mandible with basal half darker, right uniformly throughout, except slightly darker at base. Head moderately covered with stiff, erect bristles, about seven to nine bristles near fontanelle; pronotum with a few bristles along margins and disc. Head 1.2 to 1.3 times longer than wide; sides faintly rounded, narrowing anteriorly; frontal gland almost reaching posterior margin of head; fontanelle circular, situated on frontal slope; narrow groove between labrum and fontanelle. Labrum with anterior margin deeply concave; anterolateral corners projected as moderately long, pointed processes. Left mandible about 1.2 times longer than head; lower half bent, with outer margin broadly concave; tip hooked; inner margin below tip grooved; prominent toothlike projection at base. Right mandible narrow at base, broader anteriorly; hooked at tip; in profile lower margin arched. Postmentum short; from widest part, sides converging anteriorly to front margin; sides weakly narrowing posteriorly. Antennae with 13 articles, third shortest, second shorter than fourth, fourth subequal to fifth, remaining articles longer. Pronotum of a width equal to 0.54 of head width; anterior and posterior margins faintly indented in middle.

COMPARISONS: The soldier of *Homallotermes exiguus* most closely resembles that of *H. pilosus*, from India, in size. However, it differs from *H. pilosus* in the following respects: the head is longer and wider; the mandibles are longer; the left mandible is more bent in the lower half and longer, about 1.20 times, than the head capsule (in *pilosus* it is only slightly longer, 1.05

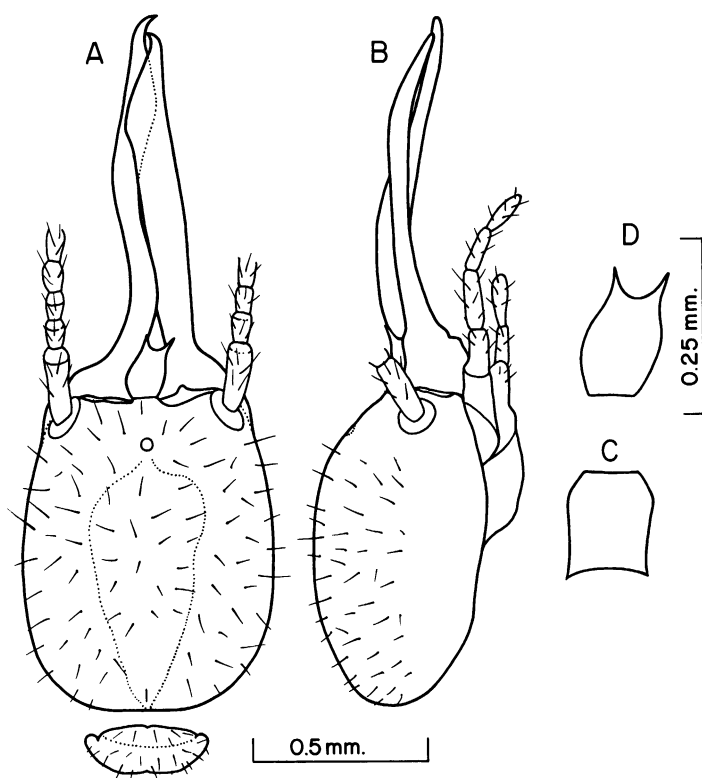


FIG. 4. Soldier of *Homallotermes exiguus*, new species; paratype from type colony. A. Head and pronotum from above. B. Head from side. C. Postmentum from below. D. Labrum from above.

times, than the head capsule), and without an extra tooth in front of the prominent toothlike projection in the basal region (in *pilosus* there is a distinct tooth in front of the prominent toothlike projection); the right mandible is not of uniform width throughout, but narrower at the base, with its tip more hooked and the inner angular margin below its tip longer; the anterior margin of the labrum is deeply concave (in *pilosus*, it is broadly concave); the postmentum is short and wide (in *pilosus* it is longer and more constricted posteriorly). The soldiers of *H. eleanorae* and *H. foraminifer* are much larger than those of *H. exiguus* and *H. pilosus*.

MATERIAL EXAMINED AND TYPE LOCALITY: BORNEO: *Sarawak* (latitude 1° 38' N, longitude 113° 35' E) (type locality), imagoes (morphotypes), soldiers (holotype and paratypes), workers, collected by A.E. Emer-

TABLE 4
MEASUREMENTS (IN MILLIMETERS) OF SEVEN SOLDIERS OF
Homallotermes exiguus, NEW SPECIES

	Holotype	Range	Mean
Lateral length of head capsule	0.94	0.94–0.97	0.95
Maximum width of head	0.73	0.71–0.77	0.74
Maximum height of head	0.59	0.59	0.59
Length of left mandible	1.10	1.10–1.13	1.12
Length of right mandible	1.05	1.05–1.07	1.05
Maximum width of postmentum	0.26	0.25–0.26	0.25
Minimum width of postmentum	0.22	0.22	0.22
Length of postmentum	0.29	0.29–0.31	0.30
Maximum length of pronotum	0.15	0.15–0.16	0.15
Maximum width of pronotum	0.41	0.38–0.41	0.40
Length of hind tibia	0.56	0.56	0.56

son and E. Emerson, Jan. 29, 1963, in loose dirt cells below leaf and rootlet litter on steep bank; *idem*, one imago (morphotype), soldiers (paratypes), collected by A.E. Emerson and E. Emerson, Jan. 23, 1963, in loose, wet soil in rootlets at base of tree.

DISTRIBUTION: Borneo.

ETYMOLOGY: This species name is from the Latin *exiguus*, meaning “small” and is applied to this species because of its diminutive size.

Homallotermes foraminifer (Haviland)

Termes foraminifer HAVILAND, 1898, pp. 419, 420 (soldier from Perak, Malaya, only; king and queen from Sarawak, Borneo = *Homallotermes eleanorae*, new species).

Termes (Eutermes) foraminifer: DESNEUX, 1904, p. 42 (Perak, Malaya, only) (distribution).

Capritermes foraminifer: HOLMGREN, 1913, pp. 254, 255 (soldier from Perak, Malaya, only; dealate imago from Sarawak, Borneo = *Homallotermes eleanorae*, new species).

Capritermes (Capritermes) foraminifer: HOLMGREN, 1914, p. 284 (locality, biology).

Capritermes (Capritermes) penangi HOLMGREN, 1914, pp. 283–284 (imago, soldier, worker).

Homallotermes foraminifer: JOHN, 1925, p. 413 (locality).

Homallotermes foraminifer: WHEELER, 1936, pp. 224, 235 (association with ants).

Homallotermes foraminifer: SNYDER, 1949, p. 191 (systematics and locality, Malaya only).

Homallotermes penangi: SNYDER, 1949, p. 191 (systematics and locality).

Homallotermes foraminifer: AHMAD, 1950, pp. 74, 84 (worker mandible).

Homallotermes foraminifer: AHMAD, 1958, p. 183 (key, soldier only; imago = *H. eleanorae*, new species).

Homallotermes penangi: AHMAD, 1958, p. 183 (key).

Homallotermes foraminifer: HARRIS, 1966, p. 14 (locality) (placed under *Homallotermes*).

Homallotermes foraminifer: YU AND PING, 1966, pp. 133, 137 (key).

Homallotermes penangi: YU AND PING, 1966, pp. 133, 137 (key).

Homallotermes foraminifer: KRISHNA, 1968, pp. 284, 285.

Homallotermes penangi: KRISHNA, 1968, p. 285 (placed *penangi* in synonymy).

Haviland (1898) described the species "*Termes foraminifer*," based on soldiers from Perak, Malaya, and on a king, a queen, and soldiers from Sarawak, Borneo. However, an examination by Emerson and Krishna of the series that Haviland refers to as the type colony (no. 114), from Perak, Malaya, containing soldiers only, and the series from Sarawak, Borneo (no. 369), containing the king, queen, and soldiers, in Haviland's collection in the Museum of Zoology, Cambridge, England, clearly shows that the king, queen, and soldiers from Sarawak do not belong to the species *foraminifer*, but to a new species, to which Emerson has given the name *eleanorae*. Holmgren (1913) followed Haviland and redescribed *foraminifer* from both Malaya and Borneo. Holmgren (1914) also described another species, "*Capritermes* (*C*) *penangi*," based on a dealate king and soldiers from Penang, Malaya. An examination of the cotype specimens of *penangi* showed that it is conspecific with *foraminifer*, as all characters of the soldiers and imago are identical, and Krishna (1968) placed *penangi* as a synonym of *H. foraminifer*. The dealate king therefore should be considered the morphotype for *H. foraminifer*. The distribution of *foraminifer* is now Malaya only.

DIAGNOSIS: See key and comparisons for diagnostic characters.

IMAGO (FIG. 5): Head reddish brown; postclypeus light brown; anteclypeus and labrum light yellow; bases of mandibles yellowish brown; antennae brown; pronotum brown, lighter than head. Head and pronotum densely covered with stiff bristles of different sizes, pilosity same as in *eleanorae*. Head with middle region around fontanelle slightly depressed; fontanelle longitudinal, oval, slitlike; Y-suture not visible. Postclypeus convex in profile, about 2.6 times wider than long. Eyes prominently convex, shaped as in figure 5B, smaller than in *eleanorae*. Ocellus oval, not touching eye. Antennae broken, with 13-plus articles; third shortest, second longer than fourth, fourth, fifth, and sixth subequal. Pronotum of a width equal to 0.72 to 0.75 of head width; 1.5 to 1.6 times wider than long; anterior margin turned upward slightly; posterior margin deeply indented in middle, in some specimens not so deeply as in figure 5A.

COMPARISONS: The imago of *Homallotermes foraminifer* is intermediate in size between *eleanorae*, on the one hand, and *pilosus* or *exiguus*, on the other. It differs from that of *eleanorae* in having a smaller head, pronotum, eye,

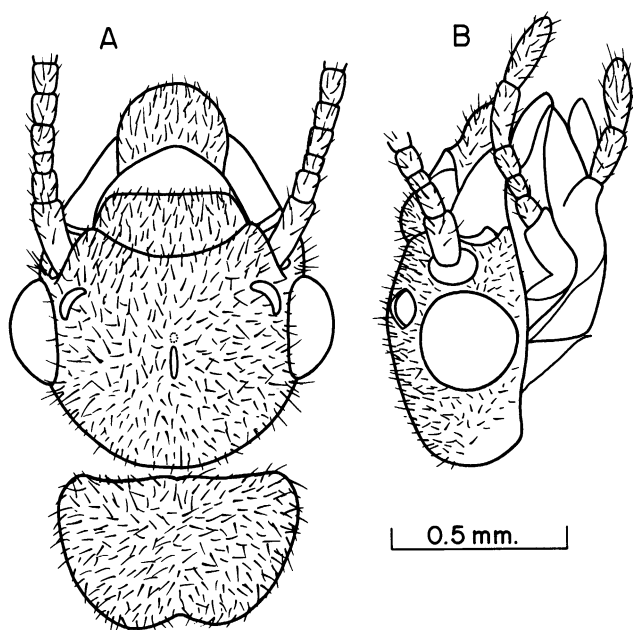


FIG. 5. Imago of *Homallotermes foraminifer* (Haviland); Bukit Belata Forest Reserve, Malaya. A. Head and pronotum from above. B. Head from side.

TABLE 5
MEASUREMENTS (IN MILLIMETERS) OF FIVE DEALATE IMAGOS OF
Homallotermes foraminifer (HAVILAND)

	Morphotype	Range	Mean
Lateral length of head capsule	0.64	0.64–0.69	0.66
Width of head with eyes	0.87	0.87–0.94	0.91
Diameter of eye	0.30	0.28–0.31	0.29
Eye from lower margin	—	0.01	0.01
Long diameter of ocellus	0.10	0.10	0.10
Short diameter of ocellus	0.09	0.09–0.10	0.09
Ocellus from eye	—	0.01	0.01
Maximum length of pronotum	0.41	0.41–0.49	0.44
Maximum width of pronotum	0.63	0.63–0.73	0.69
Length of hind tibia	1.02	1.00–1.12	1.05
Length of forewing scale	0.49	0.49–0.59	0.54

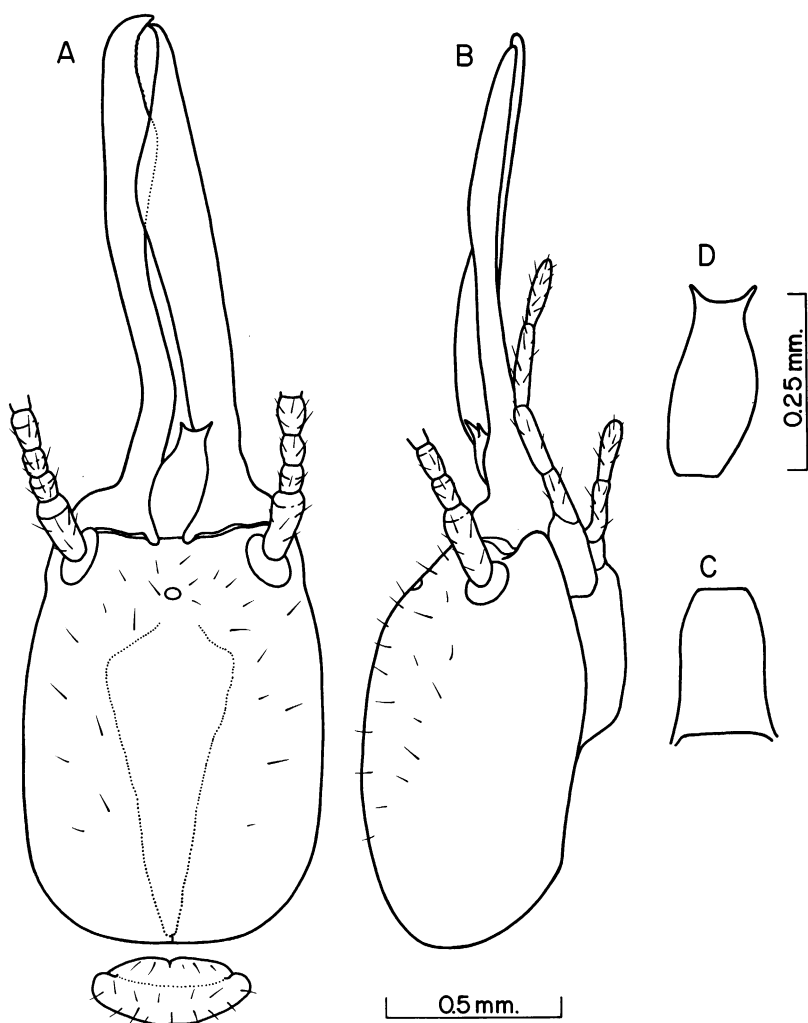


FIG. 6. Soldier of *Homallotermes foraminifer* (Haviland); paralectotype from lectotype colony. A. Head and pronotum from above. B. Head from side. C. Postmentum from below. D. Labrum from above.

and ocellus, the third segment of the antenna shorter, and the posterior margins of the mesonotum and metanotum more deeply indented. *Homallotermes exiguus* and *H. pilosus* are much smaller in all respects than *H. foraminifer*.

TABLE 6
MEASUREMENTS (IN MILLIMETERS) OF ELEVEN SOLDIERS OF
Homallotermes foraminifer (HAVILAND)

	Lectotype	Range Paralectotype and Other Specimens	Mean
Lateral length of head capsule	1.28	1.20-1.45	1.33
Maximum width of head	0.92	0.87-1.02	0.94
Maximum height of head	0.75	0.69-0.79	0.76
Length of left mandible	—	1.45-1.68	1.59
Length of right mandible	—	1.42-1.63	1.54
Maximum width of postmentum	0.28	0.27-0.31	0.29
Minimum width of postmentum	0.24	0.24-0.26	0.25
Length of postmentum	0.45	0.38-0.46	0.44
Maximum length of pronotum	0.19	0.18-0.19	0.18
Maximum width of pronotum	0.51	0.38-0.51	0.45
Length of hind tibia	0.83	0.79-0.92	0.86

SOLDIER (FIG. 6): Head light yellow (specimens from type colony yellowish brown), frontal gland area lighter; antennae yellow with brownish tinge; labrum yellow; pronotum and legs pale yellow; mandibles reddish brown, proximal region darker. Head with a few bristles of varying sizes, bristles closer to each other near fontanelle; pronotum with a few erect bristles along margin and disc. Head about 1.40 times longer than wide; sides slightly rounded, converging anteriorly near level of antennal sockets; frontal gland extending to posterior margin of head; in profile, upper margin of frontal slope evenly rounded; fontanelle round, situated on frontal slope. Labrum with anterior margin broadly concave, anterolateral corners projected into points, much longer than in *eleanorae*. Left mandible about 1.18 to 1.22 times longer than head; lower half more shallowly bent than in *eleanorae*, with outer margin broadly concave; tip hooked; inner margin below tip deeply concave, rough or finely serrated, longer than in *eleanorae*; prominent toothlike projection at base. Right mandible narrow, becoming broader distally; inner margin below tip angulate and long; in profile lower margin slightly arched. Postmentum with sides slightly angular anteriorly, converging to front margin; sides faintly concave or almost straight in posterior two-thirds; very slightly narrowed from broadest part. Antennae with 13 articles, second equal to third, fourth longer than second or third, fifth to thirteenth subequal. Pronotum of a width equal to 0.31 to 0.40 of head width; anterior margin

notched; posterior margin almost even.

COMPARISONS: See under *Homallotermes eleanorae*.

MATERIAL EXAMINED AND LOCALITIES: MALAYA: *Perak*, Tapah (latitude 4° 13' N, longitude 101° 7' E) (type locality), soldiers (lectotype and paralectotypes), determined by G.D. Haviland, type colony no. 114, Aug. 16, 1894, nest on surface of ground against a tree stump in jungle. *Taiping*, Maxwell's Hill (latitude 4° 55' N, longitude 100° 44' E), altitude 760 m., one soldier (homotype), workers, compared by A.E. Emerson, soldier smaller than type soldier, collected by H. v. Buttel-Reepen, Feb. 22, 1912, collection no. 132a. *Penang* (latitude 5° 25' N, longitude 100° 15' E), dealate king (morphotype), soldier (cotype colony), determined by N. Holmgren as "*Capritermes (C) penangi*," labeled by A.E. Emerson from unlabeled vial, collected by H. v. Buttel-Reepen, no. 862a. *Selangor*, Bukit Belata Forest Reserve (latitude 3° 42' N, longitude 101° 28' E), soldiers, workers, collected by A.E. Emerson, March 13, 1963, from dirt carton in log; *idem*, soldiers, workers, collected by A.E. Emerson, Mar. 13, 1963, from earth galleries in small stump; *idem*, queen, soldiers, workers, collected by A.E. Emerson, Mar. 13, 1963, from dirt carton nest in log on ground, cells 1.90 cm. to 2.54 cm. wide, queen cell equal in size to other cells; *idem*, soldiers, workers, collected by E. Emerson, Mar. 13, 1963, from stick in ground. *Semangkok Forest Reserve*, 13 km. S. of Gap Selangor (latitude 3° 16' N, longitude 101° 37' E), altitude 455 m., soldiers, workers, nymphs, collected by A.E. Emerson and E. Emerson, Mar. 14, 1963, from dirt carton in log. *Kanching Forest Reserve* (latitude 3° 16' N, longitude 101° 37' E), altitude 152 m., soldiers, workers, collected by A.E. Emerson and E. Emerson, Mar. 15, 1963, from nest with conspicuous projections at ventilation pores that go through wall, nest photographed at the American Museum of Natural History, portions in the American Museum's collection; *idem*, soldiers, workers, collected by A.E. Emerson and E. Emerson, Mar. 15, 1963, from definitive carton nest 7.60 cm. by 3.80 cm. with small projections $\frac{1}{2}$ to $\frac{2}{3}$ cm. high, $\frac{1}{2}$ cm. wide, on top only 38 projections, each with a convoluted pore at tip, nest on side of stump above ground; *idem*, soldiers, workers, collected by A.E. Emerson and E. Emerson, Mar. 15, 1963, from cells 2.54 cm. in diameter of dirt carton in stump; *idem*, soldiers, workers, collected by E. Emerson, Mar. 15, 1963, from hard carton nest in hollow tree associated with nest of *Hospitalitermes hospitalis*. *Sungei Buloh Forest Reserve* (latitude 3° 10' N, longitude 101° 34' E), altitude 46 m., king, queen, soldiers, workers, nymphs, collected by E. Emerson, Mar. 18, 1963, from large carton nest of small cells under log with galleries in wood and soil. *Sungei Lalang Forest Reserve* (latitude 3° 3' N, longitude 101° 53' E), altitude 242 m., king, queen, soldiers, workers, collected by

A.E. Emerson and E. Emerson, Mar. 16, 1963, from hard carton dirt nest at base of tree with several large cells averaging 2.54 cm. in diameter, with thick lining, royal cell 4.44 cm. in diameter by 2.54 cm. high; *idem*, soldiers, workers, collected by A.E. Emerson and C.M. Low, from carton nest with large cells 2.54 cm. in diameter and external short projections with convoluted ventilation pores at tips, single entrance opening between cells.

TYPE MATERIAL: The lectotype, from Perak, Malaya, selected by K. Krishna from type colony no. 114, is deposited in the collection of the Museum of Zoology, Cambridge University, Cambridge, England. Paralectotypes from colony no. 114 and a morphotype are present in the collection of the American Museum of Natural History.

DISTRIBUTION: Malaya.

Homallotermes huananensis Yu and Ping

Homallotermes huananensis YU AND PING, 1966, p. 136.

Yu and Ping (1966) have included this species under the genus *Homallotermes*. Specimens of this species were not available to the present author for examination. However, certain characteristics in the description — the 14-segmented antenna and the worker dentition — indicate that *huananensis* does not belong to the genus *Homallotermes* and should be included in the genus *Procapritermes*. The distinguishing character of *Homallotermes* is the 13-segmented antenna in the soldier.

Homallotermes pilosus (Mathur and Thapa)

Microcapritermes pilosus MATHUR AND THAPA, 1962, pp. 370–375 (soldier, worker).

Homallotermes pilosus: KRISHNA, 1968, p. 285 (synonymy).

This species was described by Mathur and Thapa (1962) under a new genus, *Microcapritermes*. Krishna (1968), in his revision of the *Capritermes* complex, concluded that *Microcapritermes* is congeneric with *Homallotermes*.

DIAGNOSIS: See key and comparisons for diagnostic characters.

IMAGO (FIG. 7): Head brown, region around Y-suture darker; anteclypeus cream-colored; postclypeus, pronotum, and antennae brown, lighter than head; wing scales rust brown. Head and pronotum densely covered with stiff bristles of varying sizes. Head with a faint triangular depression posterior to epistomal suture; fontanelle barely visible, punctate; Y-suture clearly visible. Postclypeus faintly bilobed, prominently convex, about 1.9 to 2.0 times wider than long. Eyes viewed from top not as convex as in *exiguus*. Ocellus oval, not touching eye. Antennae broken, with 13-plus articles, third very short, second longer than fourth, fifth shorter than fourth or sixth. Pronotum of a width equal to 0.7 to 0.8 of head width; 1.4 to 1.5 times wider than long; anterior margin slightly

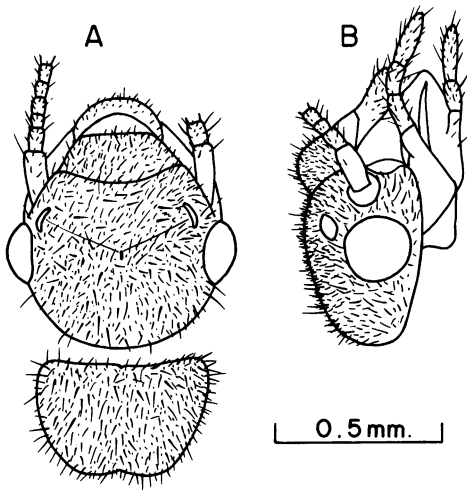


FIG. 7. Imago of *Homallotermes pilosus* (Mathur and Thapa); morphotype colony from Peermade, Kerala, India. A. Head and pronotum from above. B. Head from side.

upturned; posterior margin moderately indented in middle (slightly more than in *exiguus*).

COMPARISONS: See under *Homallotermes exiguus*.

SOLDIER (FIG. 8): Head light yellow, frontal gland area lighter; antennae, labrum, pronotum, and legs pale yellow; mandibles reddish brown, proximal half of left mandible darker. Head moderately covered with

TABLE 7
MEASUREMENTS (IN MILLIMETERS) OF THREE DEALATE IMAGOS OF
Homallotermes pilosus (MATHUR AND THAPA)

	Morphotype	Range	Mean
Lateral length of head capsule	0.57	0.55-0.57	0.56
Width of head with eyes	0.73	0.71-0.73	0.72
Diameter of eye	0.21	0.20-0.21	0.21
Eye from lower margin	0.03	0.03	0.03
Long diameter of ocellus	0.08	0.08	0.08
Short diameter of ocellus	0.06	0.06	0.06
Ocellus from eye	0.03	0.03	0.03
Maximum length of pronotum	0.36	0.33-0.38	0.36
Maximum width of pronotum	0.56	0.51-0.56	0.54
Length of hind tibia	0.68	0.68-0.69	0.68
Length of forewing scale	0.49	0.46-0.49	0.48

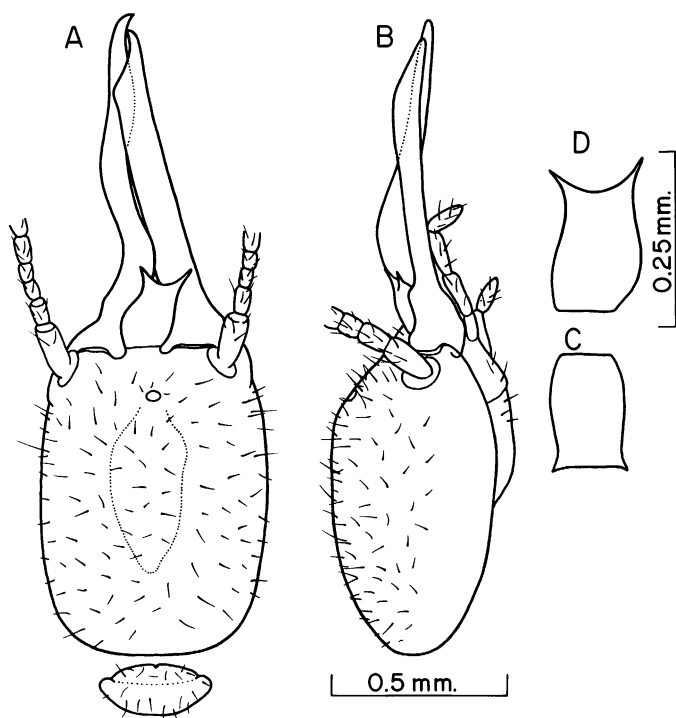


FIG. 8. Soldier of *Homallotermes pilosus* (Mathur and Thapa); paratype from type colony. A. Head and pronotum from above. B. Head from side. C. Postmentum from below. D. Labrum from above.

scattered bristles, more dense near fontanelle. Head about 1.35 times longer than wide; sides faintly rounded; frontal gland occupying middle portion, not extending to posterior margin; fontanelle circular, situated on frontal slope. Labrum with anterior margin broadly concave, anterolateral corners projected into moderately long, pointed processes. Left mandible 1.05 times longer than head; lower half moderately bent, with outer margin more convex than in *exiguus*; tip not so hooked as in *exiguus*; inner cutting edge below tip grooved; small tooth in front of prominent toothlike projection at base. Right mandible of about uniform width; inner inclined margin below tip concave, shorter than in *exiguus*; in profile lower margin barely arched. Postmentum short; sides convex in middle, converging to front margin, weakly constricted in basal region. Antennae with 13 articles, second subequal to fourth, third slightly shorter than fourth, fifth subequal to fourth, sixth to thirteenth subequal.

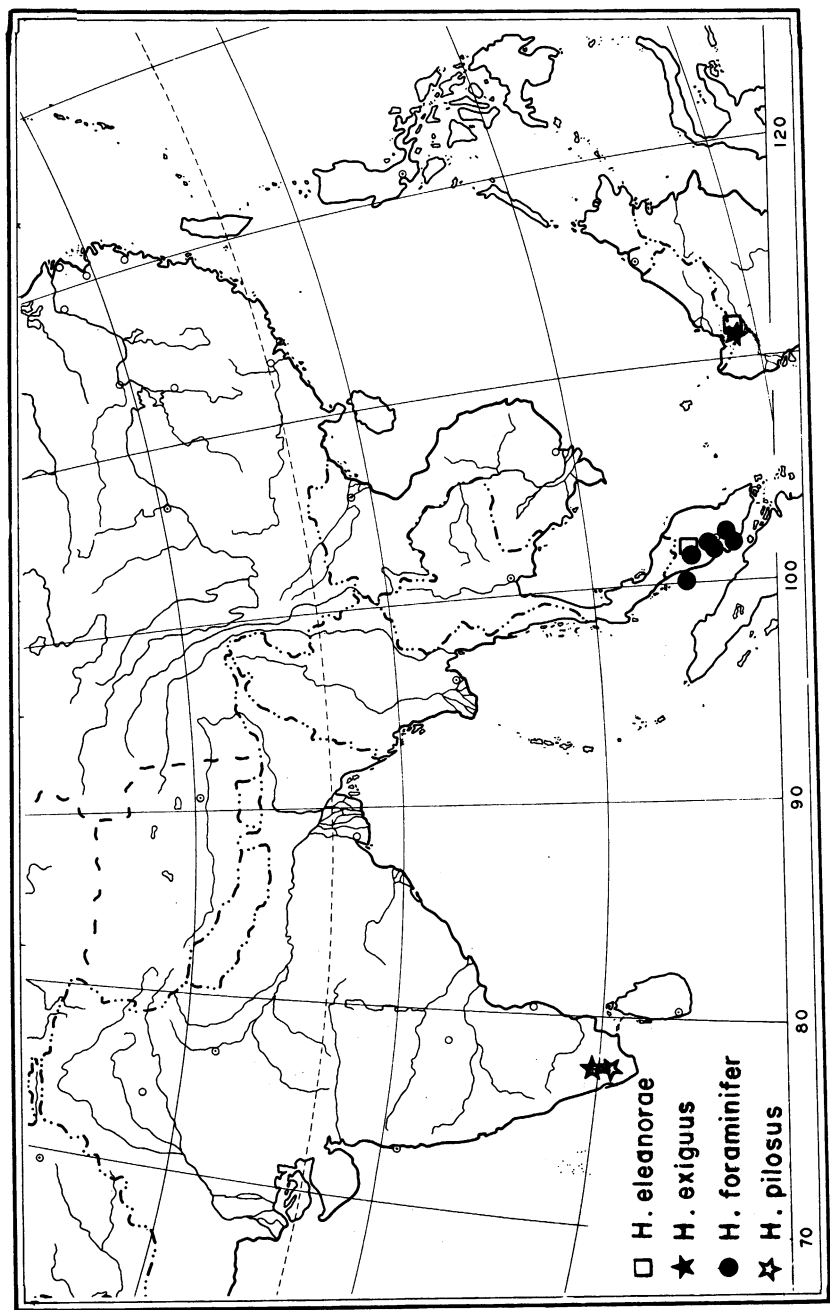


FIG. 9. Distribution of the species of the genus *Homalotermes*.

Pronotum of a width equal to 0.48 of head width; anterior margin with slight notch in middle; posterior margin evenly rounded.

COMPARISONS: See under *Homallotermes exiguus*.

TABLE 8
MEASUREMENTS (IN MILLIMETERS) OF SEVEN SOLDIERS OF
Homallotermes pilosus (MATHUR AND THAPA)

	Paratype	Range	Mean
Lateral length of head capsule	0.87	0.87–0.94	0.90
Maximum width of head	0.66	0.64–0.71	0.67
Maximum height of head	0.56	0.54–0.56	0.55
Length of left mandible	0.96	0.92–0.98	0.96
Length of right mandible	0.93	0.89–0.94	0.90
Maximum width of postmentum	0.20	0.20–0.24	0.22
Minimum width of postmentum	0.19	0.19–0.22	0.20
Length of postmentum	0.31	0.31–0.36	0.32
Maximum length of pronotum	0.13	0.13–0.15	0.14
Maximum width of pronotum	0.31	0.31–0.36	0.33
Length of hind tibia	—	0.51–0.54	0.52

MATERIAL EXAMINED AND LOCALITIES: INDIA: *Madras State*: Topslip, about 80 km. south of Pollachi (latitude 10° 28' N, longitude 77° 00' E [approximate]) (type locality), soldier (paratype from type colony), determined by R. N. Mathur and R. S. Thapa as "*Microcapritermes*," collected by Mathur, Jan. 1, 1960, in soil at root of tree; *idem*, two vials containing soldiers, workers, collected by K. Krishna, Mar. 21 and 22, 1969, in soil in tropical rain forest. *Kerala*: Peermade (Pirmed), 3 km. west on Thekkady to Kottayam Road (latitude 9° 31' N, longitude 77° 02' E), king, queen (morphotypes), soldiers, workers, collected by K. Krishna, Mar. 3, 1969, in small pockets in soil; *idem*, one dealate, soldiers, workers, collected by K. Krishna, Mar. 3, 1969, in small pockets in soil; *idem*, two vials containing soldiers, workers, collected by K. Krishna, Mar. 3, 1969. Two miles from dam on Periyar Lake (latitude 9° 30' N, longitude 77° 20' E), soldiers, workers, collected by A.E. Emerson, Oct. 21, 1960, in dry soil at base of tree in deep forest.

TYPE MATERIAL: Holotype and paratypes in the collection of the Forest Research Institute, Dehradun, U. P., India. A paratype soldier is in the collection of the American Museum of Natural History.

DISTRIBUTION: India.

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