

**THE IMAGO OF TERMITE *NASUTITERMES INDICOLA*
(HOLMGREN AND HOLMGREN) (ISOPTERA :
TERMITIDAE) AND THE NESTING HABITS
OF THE SPECIES**

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(With 3 Plates, 1 Text-figure and 1 Table)

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I—INTRODUCTION

Nasutitermes indicola (Holmgren, K. and Holmgren, N., 1917) (Isoptera : Termitidae : Nasutitermitinae) was described from soldiers and workers from Mercara, Coorg (Mysore State), and the Anamalai Hills (South India). Prasad and Sen-Sarma (1959), in their recent revision of Indian *Nasutitermes* Banks, recorded the species from Mysore also and designated the Anamalai Hills as the type-locality.

During a survey of termites of South India in November, 1962 the author made an extensive collection of the above species in the Mercara Reserve Forest, about 2 km. from Mercara on the road to Mysore, from a large number of carton nests constructed by the species, and also made some observations on its nesting habits. The collections generally comprised of soldiers and workers and, in a few cases, of the king and queen ; nymphs of both workers and adults were also obtained.

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Holmgren and Holmgren (1917) recorded that their material came from Mercara "from globular nest built around a branch" ; and from the Anamalai Hills from "Nest in tree" and "Nest in dead stump." No other data on the biology and the nests of the species are available in the literature.

In this paper the hitherto unknown imago caste of the species is described from four queens and a king. The nest is described in detail and some field notes on the biology and nesting habits are given.

II—*Nasutitermes indicola* (Holmgren and Holmgren)

1917. *Nasutitermes indicola* Holmgren and Holmgren, *Mem. Dept. Agric. India. (Ent.)* Calcutta, 5 (3), p. 161.
 1959. *Nasutitermes indicola*, Prashad and Sen-Sarma, *Revision of Nasutitermes Banks : from Indian Region*, Delhi, pp. 35-39.

(i) Material

All from Mercara Reserve Forest, Mercara (Coorg, Mysore State, India). O. B. Chhotani coll., 20th Nov., 1962, as follows :—(i) Three vials, Nos. 01/, 010/ and 021/20-11-62, each with a queen and several soldiers, workers, nymphs and eggs. (ii) A vial, No. 03/20-11-62, with a king, a queen and several soldiers, workers, nymphs and eggs. (iii) A vial, No. 016/20-11-62, with several soldiers and workers only. All ex. "carton nests on tree." (iv) Three vials with several soldiers and workers as follows : No. 09/20-11-62, ex. "galleries on the stem of 'chedle' tree ; the galleries leading to a carton nest on the tree" ; No. 020/20-11-62, ex. "at base of a dead tree" ; and No. 024/20-11-62, ex. "galleries over an unknown tree." (v) A vial with several soldiers, workers and nymphs ex. "under stone."

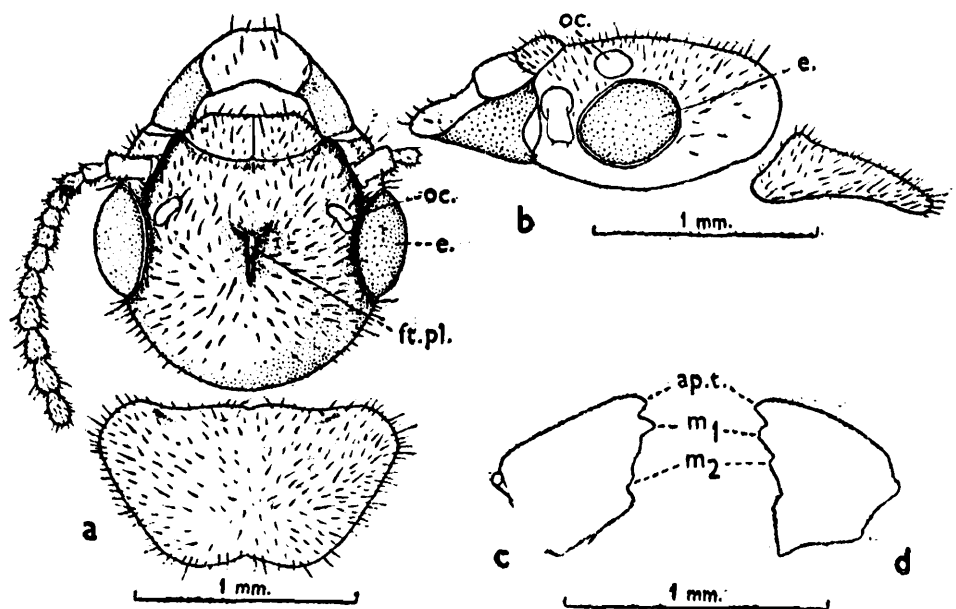
(ii) Description of imago

The hitherto unknown imago caste of *Nasutitermes indicola* is described below.

1 PHYSOGASTRIC QUEEN (Pl. 2, Fig. 1 ; Text-fig. 1 ; and Table 1).—

General : Head-capsule dark castaneous brown ; postclypeus, labrum, antennae and thorax yellowish brown ; mandibles brown with dark brown toothed margins ; wing-scale and abdominal tergites dark brown ; sternites pale brown, somewhat darker at sides ; rest of a domen whitish. Head-capsule, pronotum, wing-scales, legs and

abdominal tergites and sternites fairly densely pilose. Total body-length, without antennae *c.* 22.00—28.20 mm.



TEXT-FIG. 1.—*Nasutitermes indicola* (Holmgren and Holmgren). Imago (physogastric queen). From Mercara Reserve Forest, Mercara, O. B. Chhotani coll., 20th November, 1962 (No. 021/20-11-62).

(a) Head and pronotum, in dorsal view. (b) Ditto, in side view. (c) Left mandible. (d) Right mandible.

ap.t., apical tooth of mandibles ; *e.*, eye ; *ft. pl.*, fontanelle plate ; *m₁* and *m₂*, 1st and 2nd marginal teeth of mandibles respectively ; *oc.*, ocellus.

Head : Oval, length to tip of labrum 1.63—1.70 mm. ; head capsule subcircular ; broader than its length to base of mandibles (maximum width with eyes 1.40—1.47 ; length to side base of mandibles 1.10—1.17 mm.) ; posterior margin round ; epicranial sutures faint. **Fontanelle plate :** whitish, elongate and narrow, *c.* 0.10—0.13 mm. long ; situated a little above middle of head dorsum. **Eyes :** Two large, oval, black, faceted eyes, one on either side. **Ocelli :** Two lateral, oval, translucent ocelli, one on either side, situated in between and close to eyes ; each separated from the antenna of its side by its long diameter. **Antennae :** Incomplete in all specimens (maximum of 12 segments present) ; proximal segments sparsely, and distal ones fairly densely, pilose ; segment 1 longest, cylindrical ; 2 about half of 1 and cylindrical ; 3 subequal to, or slightly longer than, 2 ; 4 subequal to 5 ; segment 5 onwards club-shaped and gradually increasing in length. **Clypeus :** Divided into an ante- and a postclypeus. Anteclypeus translucent white, apilose ; medially somewhat projected in front. Postclypeus pilose ; divided into right and left halves by a dark median line ; length about one-third the width. **Labrum :** Broadly tongue-shaped ; broader than long ; pilose near anterior margin and on body medially. **Mandibles :** Each mandible with an apical and two marginal teeth. **Left mandible :** with apical tooth finger-like and broad ; 1st marginal slightly longer than apical and with a long posterior margin ; 2nd marginal short and without a notch at its anterior base. **Right mandible :** Apical tooth a little longer and narrower than the apical of left mandible ; 1st marginal subequal to apical, with posterior margin

a little longer than anterior ; 2nd short, with a long posterior margin ; molar plate weakly undulating at inner margin and longer than posterior margin of 2nd marginal.

Thorax : Pronotum : Broader than long ; narrower than head with eyes (maximum length 0.70—0.80 ; maximum width 1.33 mm.) ; anterior margin slightly wavy with a weak median notch ; sides narrowing posteriorly ; posterior margin convex with a deep median notch. *Mesonotum and metanotum* : With a deep, angular median notch at hind margin. *Wing-scales* : Triangular ; forewing scales longer than hindwing scales and not covering the latter. *Legs* : Long, thin and hairy ; apical tibial spurs two on each leg ; tibial spur formula 2 : 2 ; 2. Tarsi 4-jointed.

Abdomen : Oblong ; greatly enlarged, c. 18.5-24.0 mm. long and ; 8.0 mm. wide ; tergites and sternite pilose. Cerci 2-jointed and pilose c. 0.13 mm. long. Styli absent.

2. MALE (KING) (Pl. 2, Fig. 2).—

Like queen, except that head and pronotum are slightly wider and the abdomen is small and normal (not physogastric). Total body-length without wings c. 8.5 mm.

(iii) Brief description of other castes

The soldier and worker castes have recently been described in some detail by Prashad and Sen-Sarma (1959). I, therefore, give below only a brief description and measurements of these castes and of the nymphs of workers and adults.

1. SOLDIER (Pl. 2, Fig. 3).—

Head-capsule brown ; rostrum dark brown ; antennae, legs and body pale brown. Head without rostrum pear-shaped ; rostrum long and cylindrical ; antennae 12-segmented ; segment 3 slightly longer than 2 ; mandibles vestigial, each with a short spine-like process. Pronotum strongly saddle-shaped ; legs long and thin ; apical tibial spur formula 2 : 2 : 2.

Measurements of soldiers (10 examples) :

	Range (mm.)
1. Total body-length (without antennae), c.	3.4—4.5
2. Length of head with rostrum	1.60—1.67
3. Length of head without rostrum	0.87—0.90
4. Maximum width of head	0.83—0.90
5. Length of rostrum	0.63—0.70
6. Maximum width of pronotum	0.47—0.50

2. WORKER (Pl. 12, Figs. 4 and 5).—

Dimorphic. Head-capsule brown ; antennae, labrum and legs pale yellow ; tergites and sternites transparent. Head subcircular ; antennae 13-segmented ; mandibles of the *Nasutitermes*-type, each with an apical and two marginal teeth. Pronotum strongly saddle-shaped. Legs as in soldier

Measurements of workers (in mm.) :

	Worker major (5 exs.)	Worker minor (6 exs.)
1. Total body-length (without antennae), c.	4.3 —4.9	3.7 —3.9
2. Length of head to tip of labrum	1.20—1.33	1.00—1.07
3. Length of head to side base of mandibles	0.97—1.00	0.80—0.83
4. Maximum width of head	1.07—1.10	0.83—0.90
5. Maximum width of pronotum	0.50—0.53	0.45—0.50

3. EGGS AND NYMPHS (Pl. 2, Figs. 6-8).—

Eggs small, oval, c. 0.60—0.70 mm. long. Nymphs of workers small, whitish, c. 1.5—4.0 mm. long. Nymphs of imago whitish; longer c. 4.0—6.0 mm. long; older nymph with brownish wing-pads.

III—NESTING HABITS AND NESTS

(Pls. 3 and 4)

(i) *Nesting habits and ecological habitat*

Nasutitermes indicola is arboreal in its nesting habits and builds carton nests on, and in between, the branches and on main trunks of trees. In the Mercara Reserve Forest, the species was found making nests on *Syzygium cuminis* (Linn.) Skeels (= *Eugenia jambolana* Lam.), *Croton oblongifolius* Roxb. and *Eucalytus* sp.; also on "chedle", "thadali" (local names) trees and many other plants in the vicinity. The height at which the nests were found was 2 to 10 meters from ground-level. Long, thin and narrow covered runways or galleries generally connect these nests with the soil below; through these galleries the soldiers and workers go out foraging. Small communities of soldiers and workers (and also nymphs in one case) were found under stones and at the base of trees.

The Mercara Reserve Forest, where the nests were found in abundance, is about 2 km. from Mercara town on the road to Mysore. The plateau of Mercara (c. 1,200 m. or 4,000 ft. above sea-level) is crossed in all directions by minor hills and ridges; on the west it is bounded by the Western Ghats. The temperature of the region is moderate throughout the year (average daily mean 65° F. in winter and 70° F. in summer). The relative humidity varies from c. 48-87 per cent; it is lowest in December and highest in September, *i.e.* just after the rains. The rainfall is fairly heavy, the yearly average being about 300 cm. These ecological conditions seem to be very favourable for the species.

(ii) Nest-structure

The carton nests are globular to oval in shape, with the long diameter c. 15-45 cm. They are dark brown mottled with black, and are made up of vegetable matter. The outer wall is thin, rough and very brittle and breaks with a little pressure or touch. Inside the outer wall the structure is rough, honeycombed and hard. The honeycomb cavities extend to the interior into long, narrow, flat, horizontal galleries or chambers which, in the outer region of the nest, are larger and longer and are mottled with black. The galleries are interconnected by small, round or flat holes and are supported by small supporting constructions in between.

The royal chamber (Pl. 4, Figs. 3 and 4) lies approximately in the middle of the nest (Pl. 3, Fig. 2; and pl. 4, figs. 3 and 4) and is larger than other chambers, being c. 25 mm. long, 12 mm. wide and 7 mm. high. It is spindle-shaped and there are a few round or flat holes on its sides which communicate with the outer galleries.

IV—SUMMARY

1. The hitherto unknown imago caste of *Nasutitermes indicola* (Holmg. & Holmg.) is described here for the first time from four physogastric queens and a king. The collections were obtained from carton nests at Mercara (Coorg, Mysore State, India), which is one of the localities from where the species was originally described.

2. The other castes (namely the soldier and the worker) and the eggs and nymphs are briefly described.

3. The nesting habits and the carton nests of the species are described.

V—ACKNOWLEDGEMENTS

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VI—REFERENCES

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TABLE 1.—Measurements (in mm.) of *Nasutitermes indicola* (Holmg. and Holmg.). Imago (king and physogastric queen).

Body-parts	Physogastric queen (3 exs.)	King (1 ex.)
1. Total body-length <i>without</i> wings, (excluding antennae), <i>c.</i>	22.00—28.20	8.50
2. Length of head to tip of labrum	1.63— 1.70	1.57
3. Length of head to lateral base of mandibles	1.10— 1.17	1.10
4. Maximum width of head (with eyes)	1.40— 1.47	1.50
5. Maximum height of head	0.60	0.63
6. Length of fontanelle plate	0.10— 0.13	0.15
7. Maximum length of postclypeus	0.20— 0.21	0.20
8. Maximum width of postclypeus	0.57—0.58	0.57
9. Maximum length of labrum	0.37—0.47	0.43
10. Maximum width of labrum	0.50	0.50
11. Maximum diameter of compound eye (with ocular sclerite)	0.47— 0.50	0.50
12. Maximum diameter of lateral ocellus	0.15— 0.17	0.16
13. Minimum diameter of lateral ocellus	0.13— 0.15	0.13
14. Minimum eye-ocellus distance	0.03	0.03
15. Minimum eye-antennal distance	0.03— 0.05	0.03
16. Minimum ocellus-antennal distance	0.16—0.17	0.15
17. Maximum length of pronotum	0.70— 0.80	0.80
18. Maximum width of pronotum	1.33	1.40
19. Length of forewing scale	0.80— 0.83	0.80
20. Length of hindwing scale	0.63— 0.67	0.67