PART VII

BIOLOGICAL OBSERVATIONS ON SOME OTHER TERMITES
OF INDIAN REGION

(a) The termite *Macrotermes rilvus malayanus*
    (Haviland) (Termitidae) in Burma

(b) Termite 'Odontotermes obesus (Rambur)':
    Royal chamber with four queens and 50 kings

(c) The mound of the termite *Odontotermes fuscus*
    in India.

(d) Three queens in mounds of *Odontotermes*
    *mammalis* (Hassauer) (Termitidae :
    Isoptera)

(a) *Proc. nation. Inst. Sci. India, New Delhi,*
    8(6), pp. 308-316, 2 pls., 1961.

(b) *J. Bombay nat. Hist. Soc., Bombay, 59(3),*
    pp. 975-976, 2 pls., 1962.

(c) *Proc. 2nd All-India Congr. Zool., Calcutta.*
    [In press.]

(d) *Indian Forester, Dehra Dun, 68(10), pp. 623-624, 1 pl., 1960.*
THE TERMITE *MACROTTERMES GILVUS MALAYANUS* (HAVILAND) (TERMITIDAE) IN BURMA

By

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and

O. B. CHHOTANI

Issued separately March 20, 1962
THE TERMITE MACROTERMES GILVUS MALAYANUS (HAVILAND) (TERMITIDAE) IN BURMA

by M. L. ROOOWAL, F.N.I., Director, and O. B. CHHOTANI, Junior Research Officer, Zoological Survey of India, Calcutta 12

(Received February 21, 1961)

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ABSTRACT

Macrotermes gilvus (Hagen) is a common mound-building termite in South-East Asia, but was hitherto not known from Burma and further west (i.e. India). The present record from Rangoon is the first one from Burma. These specimens belong to the subspecies M. g. malayanus (Haviland).

Brief descriptions of the soldiers (major and minor), workers (major and minor), dealate male (king), female (physogastric queen), eggs and nymphs are given.

The mounds are quite common in Rangoon University campus and are made of brownish earth. They are irregularly dome-shaped to subconical, with a maximum height of about 90-120 cm and a basal diameter of about 100-200 cm.

Two royal chambers were found in the mound examined—a functional one (with a king and a queen) and a deserted one. Each royal chamber is an irregular, flat mass of earth, with a more or less spindle-shaped central royal cell.

The fungus combs are irregularly-shaped masses of greyish colour and have a cellular structure.

I. INTRODUCTION

Macrotermes gilvus (Hagen) (order Isoptera, family Termitidae, subfamily Macrotermitinae) is a common mound-building termite in the whole of South-East Asia, from Malaya and Indo-China to Indonesia (Sumatra, Java, Borneo, etc.) and the Philippines. It was hitherto not recorded from Burma and further west (i.e. India).

During a recent visit (September, 1960) to Burma by one of us (M. L. R.), a good collection of the species was made from a mound in Rangoon, and is described here. This constitutes the first record from Burma. It may be stated that the species has been divided into several forms or subspecies (nine are listed by Snyder 1949, pp. 212-213), and our specimens belong to the
II. **Macrotermes gilvus malayanus in Rangoon**

(Pls. XX and XXI; and Text-figs. 1–4)

Macrotermes gilvus (Hagen)

1858. *Termes gilvus* Hagen, *Linn. Ent.*, 12, pp. 148-151 (imago, queen, soldier); PI. 3, Fig. 14. Type-locality: Java.


Macrotermes gilvus malayanus (Haviland)


(a) **Material**

The entire collection was made from the Rangoon University Campus, Rangoon, in September, 1960, as follows:

No. R1/20.9.60.—Several soldiers (major and minor) and workers (major and minor); and 1 adult dealated male (king) and female (physogastric queen) from the royal chamber; also a few eggs and nymphs. Ex a mound, 20. ix. 1960, M. L. Roonwal coll.

**Table 1**

*Measurements (in mm), etc., of soldiers of Macrotermes gilvus malayanus (Haviland) from Rangoon, Burma*

<table>
<thead>
<tr>
<th>Body-part</th>
<th>Soldiers major (5 examples)</th>
<th>Soldiers minor (5 examples)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Total length (without antennae) cm.</td>
<td>8.63-9.20</td>
<td>6.57-6.80</td>
</tr>
<tr>
<td>2. Length of head (to lateral base of mandibles)</td>
<td>3.75-4.00</td>
<td>2.33-2.43</td>
</tr>
<tr>
<td>3. Maximum width of head</td>
<td>3.30-3.43</td>
<td>1.50-2.00</td>
</tr>
<tr>
<td>4. Height of head</td>
<td>2.23-2.46</td>
<td>1.13-1.18</td>
</tr>
<tr>
<td>5. Length of mandibles (from upper base of condyle to tip) :</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Left mandible</td>
<td>1.65-1.73</td>
<td>1.40-1.47</td>
</tr>
<tr>
<td>(b) Right mandible</td>
<td>1.70-1.80</td>
<td>1.43-1.47</td>
</tr>
<tr>
<td>6. Median length of postmentum</td>
<td>2.73-2.90</td>
<td>1.53-1.66</td>
</tr>
<tr>
<td>7. Length of pronotum</td>
<td>1.33-1.40</td>
<td>0.80-0.86</td>
</tr>
<tr>
<td>8. Width of pronotum</td>
<td>2.60-2.80</td>
<td>1.33-1.40</td>
</tr>
<tr>
<td>9. Number of antennal segments</td>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>
(b) Brief description of specimens

1. Soldier major (Pl. XX, Fig. a; and Text-fig. 1, Fig. a):

   Large forms with a large, golden brown, subrectangular head, with a pair of powerful jaws and a triangularly hyaline-tipped labrum. Eyes and occelli absent. Antennae with 17-18 segments. Thorax and abdomen brownish and with very few hairs; thoracic tergites large, shield-like and with broadly-rounded corners; legs thin and long; apical tibial spur formula 3 : 2 : 2 ; abdomen short, globular.

   For measurements, etc., see Table 1.

   ![Diagram](image.jpg)

   **Text-fig. 1.** *Macrotermes piceus malayanus* (Haviland). Soldier. (Drawings from specimens from a mound in Rangoon, Burma, coll. M. L. Roonwal, 20th September, 1960.)

   (a) Soldier major. Head and thorax, in dorsal view; (b) ditto, soldier minor.

   *ant., antenna; ft., fontanelle; hd., head-capasule; lr., labrum; md., mandibles; mst., mesonotum; mtt., metanotum; prl., pronotum.*
2. **Soldier minor** (Pl. XX, Fig. b; and Text-fig. 1, Fig. b):

   Similar to soldier major, but smaller paler and with mandibles comparatively thinner and longer. Antennae with 17 segments.
   For measurements, etc., see Table 1.

3. **Worker major** (Pl. XX, Fig. c; and Text-fig. 2):

   Head-capulse yellowish brown, with a hyaline, circular, mid-dorsal fontanelle and two lateral, hyaline rudimentary eyes; ocelli absent; mandibles with an apical and two marginal teeth each. Thorax and abdomen much paler, but fairly hairy; pronotum strongly saddle-shaped; apical tibial spur formula 3 : 2 : 2.
   For measurements, etc., see Table 2.

   ![Text-fig. 2. Macrotermes gilvus malayanus (Haviland). Mandibles of worker major, (Specimen from same mound as in Text-fig. 1.)](image)
   (a) Left mandible, in dorsal view; (b) ditto, right mandible.
   sp.t., apical tooth; lt., left; m1, m2, m3, first and second marginal teeth; rt., right.

4. **Worker minor** (Pl. XX, Fig. d):

   Similar to worker major, but smaller and paler in colour.
   For measurements, etc., see Table 2.

5. **Deated male** (*king, from royal chamber*) (Pl. XX, Fig. e):

   Head-capulse dark, reddish brown with a pair of large black eyes and hyaline ocelli; fontanelle median and slightly raised. Thoracic and abdominal tegites and legs brown; sternites yellowish brown; pronotum subtrapezoidal, with a T-shaped median and two lateral paler spots; legs thin and long, apical tibial spur formula 3 : 2 : 2; abdomen elongate, short.
   For measurements, etc., see Table 2.
### Table 2

Measurements (in mm), etc., of imagos (dealated male and female from royal chamber) and workers of Macrotermes gilvus malayanus (Haviland) from Rangoon, Burma.

Table 2

<table>
<thead>
<tr>
<th>Body-part</th>
<th>Dealated Imagos</th>
<th>Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>King</td>
<td>Physogastric queen</td>
</tr>
<tr>
<td>1. Total length (without antennae) etc.</td>
<td>12.03</td>
<td>34.86</td>
</tr>
<tr>
<td>2. Length of head (to lateral base of mandibles)</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>3. Maximum width of head (with eyes)</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>4. Height of head</td>
<td>1.30</td>
<td>1.33</td>
</tr>
<tr>
<td>5. Maximum diameter of compound eye</td>
<td>0.93</td>
<td>0.93</td>
</tr>
<tr>
<td>6. Minimum eye-ocellus distance</td>
<td>0.06</td>
<td>0.04</td>
</tr>
<tr>
<td>7. Maximum eye-ocellus distance</td>
<td>2.48</td>
<td>2.66</td>
</tr>
<tr>
<td>8. Number of antennal segments</td>
<td>Broken (8 segments present)</td>
<td>Broken (15 segments present)</td>
</tr>
</tbody>
</table>

6. **Dealated female** (physogastric queen, from royal chamber) (Pl. XX, Fig. 1; and Text-fig. 3):  
   Head and thorax as in dealated male; abdomen greatly distended and whitish, with the original tergites and sternites as small, dark, rectangular chitinised islands.

For measurements, etc., see Table 2.

7. **Eggs and nymphs** (Pl. XX, Figs. g-i):  
The eggs are small (length 0.77-0.87 mm; maximum width 0.36-0.43 mm), oval (slightly kidney-shaped) and translucent white. They were found in bunches of several hundreds inside the fungus combs.

The young nymphs (Pl. XX, Fig. i) are pure white.

(c) **Mounds, royal chamber and fungus combs**

(i) **The mounds** (Text-fig. 4):  
Mounds are quite common in the campus of the Rangoon University, Rangoon. They are irregularly dome-shaped to subconical structures of brownish earth, and are not infrequently found near the base of trees and 50
(ii) The royal chambers (Pl. XXI, Figs. a, b; and Text-fig. 4):

In one mound which was well examined and from which the collection was made, two royal chambers were found—one (functional) in the centre of the mound just below ground-level; and the second (deserted), a little lower down (ca. 10 cm below ground-level) and more laterally placed, and lying at a distance of about 15 cm from the first. Both were almost similar in size, shape and construction, and were composed of an irregular, flat mass of earth with a central cell which, in vertical section, was partly spindle-shaped—with a flat floor and a curved, dome-shaped roof. One of the royal chambers contained only soldiers, workers and nymphs, but no king and queen, while the other (the functional one) contained a dealated male (king), a dealated physogastric female (queen), and several major and minor soldiers and major and minor workers. Both the royal cells were quite clean inside, without a...
speck of dirt or excreta. Several small holes (2-7 mm in diameter) led from the surface of the royal chamber to the royal cell, but not directly—in the functional royal chamber itself, only 14 holes were seen to open in the royal cell (9 on the roof and 5 on the floor).

The approximate dimensions and weight of the functional royal chamber are as follows:

1. Outer diameters
   (i) Min. 184 mm
   (ii) Max. 215 mm
2. Max. height
   (i) 93 mm
3. Thickness of wall in middle
   (i) Roof 29 mm
   (ii) Floor 27.5 mm
4. Max. diameter of royal cell
   (i) 102 mm
5. Min. diameter of royal cell
   (i) 81 mm
6. Height of royal cell
   (i) 29 mm
7. Diameter of holes
   (i) 2-7 mm
8. Dry weight of royal chamber
   2,412 g
The existence of a deserted royal chamber in *M. gilvus malayanus* recalls the occurrence of a similar phenomenon in *Odontotermes obesus* (Rambur) in India, as reported by Gupta (1953) who suggested that the location of the queen is changed from one royal chamber to a new one in the same mound (also vide Roonwal 1958, p. 86, for further discussion). In the cases recorded by Gupta, the two royal chambers in a mound were always connected with each other by a thick wall. In the case of *M. gilvus malayanus* reported here, however, the two royal chambers were entirely separated from each other, by a distance of about 20 cm, and there was no connecting wall or gallery.

(iii) The fungus combs (Pl. XXI. Figs. c-e; and Text-fig. 4):

As stated above, the fungus combs are lodged in the vaults in the mound above the ground-level; none was found much below the ground-level. The fungus combs are largely irregularly-shaped masses of greyish colour and have a cellular structure as shown in Plate XXI.

ACKNOWLEDGEMENTS

The authors are grateful to Prof. Mrs. J. A. Lynsdale and Mr. Koko Gyi, of the Zoology Department, Rangoon University, Rangoon, for kindly providing transport and other assistance during the collection of specimens in Burma. To the Director, Geological Survey of India, Calcutta, the authors are indebted for kindly taking the dry weight of the royal chamber.

DESCRIPTION OF PLATES

**PLATE XX:** *Macrotermes gilvus malayanus* (Haviland)


(a) Soldier major, in dorsal view. (b) Ditto, soldier minor. (c) Worker major, in dorsal view. (d) Ditto, worker minor. (e) Dealated male (king), in dorsal view. (f) Dealated female (physogastric queen), in dorsal view. (g) Eggs. (h) Ditto, three eggs, enlarged. (i) Five nymphs in various stages of development.

**PLATE XXI:** *Macrotermes gilvus malayanus* (Haviland)

Royal chamber and fungus combs. Photographs of specimens from a mound in Rangoon, Burma, coll. M. L. Roonwal, 20th September, 1960. (From same mound as in Plate XX.)

(a) Royal chamber as a whole, in dorsal view. (The vertical line in the middle indicates the line along which the chamber was sawn by us into two halves for study of the internal structure.)

(b) Ditto, in vertical section, showing the royal cell.

(c-e) Fungus combs. (Photographed after being partially dried up.) r.c., royal cell.
III. Bibliography


Printed at the Baptist Mission Press, 41a Acharyya Jagadish Bose Road, Calcutta 16, India
22. TERMITES 'ODONTOTERMES OBESUS (RAMBUR)': ROYAL CHAMBER WITH FOUR QUEENS AND TWO KINGS (With two plates). By M. L. ROONWAL AND O. B. CHHOTANI (p. 975).

Published: 25 March, 1963.

Pages 975-976, 2 plates.
MISCELLANEOUS NOTE

22. TERMITE 'ODONTOTERMES OBEUS (RAMBUR)': ROYAL CHAMBER WITH FOUR QUEENS AND TWO KINGS

(With two plates)

The occurrence of more than one king and one queen in the royal chamber in mounds of species of Odontotermes has occasionally been reported. Thus, two queens were reported in O. obesus (Ramb.) by Holmgren (1912) and by Roonwal & Gupta (1952), three queens in O. wallonensis Wasm. by Mathur & Chhotani (1960), and as many as six queens in O. bangalorensis Holmg. by Holmgren (1913).

Recently we came across several mounds of 'Odontotermes obesus (Rambur)' on the roadside in the Balukhand Forest Range near Puri (Orissa), which were of the type described by Holmgren (1912, Pl. A, Fig. 1).

The mounds were relatively small (c. 70-120 cm. high, with a slightly larger diameter), somewhat dome-shaped (Pl. I, Fig. a) and with several short (c. 10-20 cm. high). blind turrets arising all over the mound-surface. The fungus-combs (Pls. I and II) lie in small vaults distributed throughout the mound. The royal chamber (r.c.), lies near ground-level (in Pl. I, Fig. b it seems to be situated higher up, but this is because this mound is on sloping ground, and hence the impression in the photograph), and is difficult to separate from the earthen mound-material. The royal cell is rather large, more or less spindle-shaped in cross-section, and has smooth inside walls.

In one of these mounds (Pl. I), the royal cell (maximum dimensions: length 25, width 15, and height 4 cm.) contained four

\[\text{The mounds of this species seem to be variable, but soldiers from different kinds of mounds are indistinguishable. Thus, in the north (Uttar Pradesh and Bihar) the mounds are of high, fluted type with buttresses (see Roonwal, 1962, for a detailed description and discussion), and elsewhere somewhat dome-shaped and low as described in the present account. Pending a suitable revision, termites from both these types of mounds may be regarded as belonging to 'Odontotermes obesus (Rambur)' - [1]}\]
large physogastric queens (de-alated females) and two kings (de-alated males) (Pl. II, Fig. a) and several soldiers and workers. The queens were lying in pairs—one pair lying north-south and the other pair west-southeast, with the heads of the pairs facing in opposite directions. All the queens were large, with long, swollen abdomens, while the kings were, as usual, smaller. The dimensions were:

<table>
<thead>
<tr>
<th></th>
<th>Queens (4)</th>
<th>Kings (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mm.</td>
<td>mm.</td>
</tr>
<tr>
<td>1. Total length (excluding antennae)</td>
<td>52.2-62.8</td>
<td>11.3-11.5</td>
</tr>
<tr>
<td>2. Length of abdomen</td>
<td>50.5-58.0</td>
<td>5.7-6.0</td>
</tr>
<tr>
<td>3. Max. width of abdomen</td>
<td>13.2-17.2</td>
<td>3.5-4.0</td>
</tr>
</tbody>
</table>

Zoological Survey of India,
34, Chittaranjan Avenue,
Calcutta-12,
September 28, 1962.

References


——— (1913) : Termites from British India (near Bombay, in Gujerat, and Bangalore), collected by Dr. J. Assmuth, s.j. ibid. 22 (1) : 101-117, 3 pls.


A mound of *Odontotermes obesus* (Rambur)
Balukhand Forest Range, Puri (Orissa)

(a) The mound. Note the numerous turrets; (b) Same, in vertical section. *f. c.* fungus-comb; *r. c.* royal cell
Oclontotennes ohcesus (Rambur)

Royal pairs and fungus-comb from mound in Plate I

(a) Four queens (below) and two kings (above) from the royal cell:
(b) a fungus-comb
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THE MOUND OF THE TERMITE ODONTOTERMES FEX IN INDIA

by

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and

C. S. CHIQUITANI, M.Sc. (Hons.), Assistant Zoologist

Zoological Survey of India, Calcutta - 12

(With 1 Text-figure and 2 Plates)

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I - INTRODUCTION

The termite Odontotermes fema (Wasmann) (Isoptera, family Termitidae, subfamily Macrotermiteinae) is one of the larger members of genus Odontotermes in India and is a serious wood-destroying species. Hitherto it has been regarded as a purely subterranean and non-wound building species. Annandale (1933), who studies its habits in the Barkuda Island in the Chilka Lake (Orissa, India), wrote as follows (p. 245):

"The real nest of Odontotermes fema is always underground and even when excavated earth is piled up among the roots of trees, the pile contains only passage-ways and small irregular chambers."

Holmgren (1913, p. 110) described the swarming of this species through a few holes on the ground-surface, thus indicating that it nests underground. Jones (1941, p. 551) also described the nests of this species as entirely underground, and wrote as follow :

"Termes fema is one of the most important termites infesting buildings in India and Burma. It lives in large communities in complex nests entirely underground [fig. 133]; in the excavation of the underground chambers large quantities of earth are thrown out in a shapeless mass often piled up against the roots of trees or filling up hollow tree-trunks. In these cavities are often constructed irregular, ovoid, vertical chambers with thick rough walls formed of pellets of excavated earth; the
colour of these fillings is that of the surrounding soil; they break easily when dry. No true mound is formed."

Recently we found a true mound of this species which is described below.

II - MOUND OF ODONTOTERMES FRAE
(Text-fig. 1; and Pl. 1)

A single mound was found, in July, 1961, on the Barkuda Island (Chilka Lake, Orissa), the same little island where Annandale (1923) had studied its habits, and is described here. The fact that only a single mound was found although the species is common on the island shows that a mound is built only occasionally, the species being habitually subterranean. The mound was made of soft, reddish earth and stood in an open space near a pipal tree (Ficus religiosa Linn.). It was a low, sprawling, roughly dome-shaped structure with a few low prominences. The dimensions were:

- Maximum height ... ... ... 65 mm.
- Maximum diameter at base ... 300 cm.
- Circumference at base ... ... 365 cm.

Several large roundish holes, ca. 5-10 cm. in diameter, were seen on the mound-surface and led into tunnels where fungus-combs lay in vaults. The mound is, thus, of the multilocular type, as in Odontotermes rademani (Wasm.) and in Macrotermes gilvus malavaius (Havil.) (vide Roonwal & Chhotani, 1962).
The vaults which lodge the fungus-combs are quite numerous and vary from 8-30 cm. in diameter. The fungus-combs themselves (Pl. 1, Fig. g) are small (ca. 60-130 mm. in diameter), rounded, soft, fragile and spongy structures which are pale brown, mottled with greyish spots. They are convex above and either flat or slightly concave below, and their entire mass is honey-combed with irregular, wavy cavities.

The royal "chamber" lies eccentrically in the mound about ground-level, and is not separable from the mound-material. The royal cell is narrow in cross-section, with a flat floor and an arched roof, and lies with its longer axis north-south; the inside walls are smooth. The dimensions of the royal cell are: Length, 150; width, 100; and height, 35 mm. It contained a large physogastric queen (which lay with its head pointing south), a small king (dealated male) and a few soldiers and workers. Soldiers and workers were also found throughout the mound, and nymphs and eggs were generally present in the fungus gardens in the vicinity of the royal chamber.

The various castes are shown in Plate 2, and their dimensions are as follows :-

1. Length of queen (physogastric) ... ... ? (damaged)
2. Length of king ... ... ... ... 13.0 mm.
3. Length of soldiers (including mandibles) ... ... ... ... 8.5 - 9.4 mm.
4. Length of workers major ... ... 6.3 - 7.0 mm.
5. " " " minor ... ... 5.4 - 5.6 mm.
6. Length of eggs ... ... ... ... 0.66 - 0.73 mm.

7. Length of nymphs ... ... ... ... 2.4 - 3.0 mm.

III - SUMMARY

1. Hitherto, Odontotermes feae (Wasmann) has been regarded as a purely subterranean, non-mound-building termite.

2. Recently, however, we discovered its mound on the Barkuda Island in the Chilka Lake, Orissa. A single mound was found although the species was common, thus showing that the species is habitually subterranean and builds a mound only occasionally.

3. The mound is a low, earthen, sprawling, roughly dome-shaped structure. Several holes open on the surface and lead into tunnels where fungus-combs lie in vaults. The mound is, thus, of the multilocular type.

4. The royal chamber is eccentric and lies near the ground level. It contains a king and a queen.

5. The other castes are also illustrated.

IV - REFERENCES


ELSON, C.F.C. 1941. The Ecology and Control of the Forest Insects of India and the Neighbouring Countries. 11 + 1007 pp., many figs. - Dehra Dun (Vasant Press).


fas, fungus-com; gta, ground-level; ha, hole; fsg, royal cell.
PLATE 1


(a) A mound, as seen from outside.

(b) Same, in vertical section.

(c) Two fungus-combs.

*d.c.* fungus-comb.
**PLATE 2**

*Odontotermes foveolatus* (Wasmann). Various castes from a mound (shown in Pl. 1), Barkuda Island, Chilka Lake (Orissa, India).

(a) Soldier.

(b) Worker major.

(c) Worker minor.

(d) Physogastric queen. (Only head and anterior part of abdomen shown.)

(e) King (dealeurated male).

(f) Eggs.

(g) Five nymphs, in various stages of growth.
THREE QUEENS IN MOUNDS OF *ODONTOTERMES WALLOVENSIS* (WASMANN) (TERMITIDAE, ISOPTERA).

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Reprinted from:

*Indian forester*, Dehra Dun,
Volume 86, No. 10, pp. 623-624.

1960
THREE QUEENS IN MOUNDS OF ODONTOTERMES WALLONENSIS (WASMAN)
(TERMITIDAE, ISOPTERA).

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Very few records are available referring to the presence of two or more queens in a royal chamber. Holmgren (1913) has mentioned that 2 kings and 2 queens in the royal cell about 2 feet below surface of the mound of *Odontotermes wallonensis* (Wasmann) were found by Dr. Assmuth at Bangalore in October 1911. Mukerji and Ray Chaudhuri (1942) have recorded two or more queens of *O. redemanni* Wasmann in royal chamber. Roonwal and Gupta (1952) have reported 2 kings and 2 queens of *O. abeus* (Ramnur) at New Forest, Dehra Dun. This is another interesting record of *O. wallonensis* (Wasm.) in the mound of which three queens were present. The mound of *O. wallonensis* were noticed in great abundance in the vicinity of Sambalpur (Orissa) when visits were made in February 1954 and 1957. This species has a wide distribution and has been recorded from Chepauk, Coimbatore (Madras); Nandyal (Andhra Pradesh); Nagpur, Wallon (Bombay); Shakurbasti (Delhi); Bhulaneawar, Sambalpur (Orissa); Bangalore, Kishnaarapuram (Mysore). The mounds vary both in size and height and the latter ranges from 0.609 to 1.346 metres (2—4.5 ft.). They are of solid mass of earth, with number of projecting chimneys as high as 15 to 25 cm, and with 5 to 7.5 cm. wide mouth openings. The chimneys extend deep vertically downwards inside the mound.

Five mounds were dug out in an attempt to find the queen, and in two cases, the royal chambers were successfully located in moist ground, about half a metre deep from the ground level. These chambers were surrounded by several fungus combs of various dimensions and shape. The two royal cells were flat with low domed roofs and were placed in the direction of east-west, and their dimensions are as follows:

1. Length 15 cm, width 10 cm, and height 4 cm, and housed by 3 queens and 2 kings.
2. Length 18 cm, width 12.5 cm, and height 5 cm, and occupied by 3 queens and 1 king.

In one cell, the queens were lying side by side but not touching one another and their heads were facing north, while in the other chamber, the queens were found in a somewhat triangular fashion, the heads of 2 queens were towards the east and that of 1 queen towards the north. The queens and kings varied in size, their dimensions being:

- **Queens**: Total length, 5.4 to 5.8 cm; length of abdomen 5.0 to 5.5 cm; greatest width of abdomen 1.20 to 1.40 cm.
- **Kings**: Total length, 1.35 to 1.40 cm.

In addition to the royal pairs, some workers were also present inside these chambers. The queens were sluggish but the kings were very active in their movements and perhaps one king escaped through the holes due to his agility.

References


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Explanation of Plate

Fig. 1. Mound of *Odontotermes walloniensis* Wasm.

Fig. 2. Mound of *O. walloniensis* Wasm., exposed to show long chimneys.

Fig. 3. Mound of *O. walloniensis* Wasm., exposed with three queens.