CHÆTOTAXY OF THE TERMITE, ODONTOTERMES ASSMUTHI HOLMGREN (ISOPTERA : TERMITIDÆ)

Part I. Soldier

BY K. S. KUSHWAHA, M.Sc., PH.D.

(Department of Zoology and Entomology, Rajasthan College of Agriculture, Udaipur)

Received June 1, 1960

(Communicated by Y. Ramchandra Rao, F.A.Sc.)

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I. INTRODUCTION

The author (Kushwaha, 1959 ; 1960 c) has already made a detailed study of the chætotaxy (i.e., the system of arrangement of the differentiated bristles or macrochætæ on the various body-parts) of all the castes, viz., soldier, worker
and alate, of the common mound-building termite, *Odontotermes* (Odontotermes) *obesus* (Rambur) and of the soldier caste of *Odontotermes* (Odontotermes) *horni* (Wasmann) (Isoptera, family Termitidae), and has discussed the taxonomic differentiation of these species on the basis of the distribution of bristles, particularly on the labrum, labium and the thoracic tergites. The present account deals with the chaetotaxy of the soldier caste of a third species, namely, *Odontotermes* (Odontotermes) *assmuthi* Holmgren, which appears to differ from the above two species in the arrangement of bristles, especially on the labrum and the thoracic tergites.

For details of the nomenclature used in these studies, please see Kushwaha (1960 c).

II. MATERIAL AND METHODS

The material for the present study was kindly provided by Dr. M. L. Roonwal, Director, Zoological Survey of India, Calcutta. The exact location of the bristles as well as their general distribution on the various body-parts was studied under high magnification from permanent preparations made on slides. All the diagrams were drawn under camera lucida. In case any bristle was found missing, leaving the disc-like base behind, the latter was taken into account according to its size to put in a bristle of appropriate size in that area. Arabic numerals have been used to denominate various labral bristles, but in most cases the bristles have been named in accordance with their location on various parts of the body.

III. HEAD

(a) Chaetotaxy of the head-capsule (Text-Fig. 1, a–c).—Dorsally, the head-capsule is sparsely bristled; the clypeal (cly.) and the frontal (frnt.) pairs of bristles show bilateral symmetry and are located in the same relative position as noted in *O. obesus* and *O. horni*. All the other cranial pairs of bristles, in the present species, seem to be distributed more irregularly than in the above two species.

Ventrally, the areas are void of bristles as in the above two species (Text-Figs. 4 and 5).

(b) Chaetotaxy of the head-appendages (Text-Fig. 2, a–c and f–i).—The head-appendages in *O. assmuthi* show a considerable similarity in the arrangement of bristles to that of the other two species except in the case of the labrum, where the conspicuously smaller number of pairs of labral bristles serves to distinguish it from both of them.
Text-Fig. 1. *Odontotermes asmuti* Holmgren, soldier caste (cranial and thorax). (a and b) Dorsal view of the cranium, showing irregular distribution of bristles except for a few regular pairs joined by dotted lines; rounded dots indicate only the bases of bristles. (c) Ventral view of the cranium, showing postmental and medio-postmental bristles; postgenal areas show only a few bristles. Premenium and palpi, etc., are thickly bristled but the bristles have not been shown here. (d and e) Pro-, meso- and metanotum, showing distribution of bristles; only meso- and metanotum show some paired bristles (joined by dotted lines). It may be noted that the mesonoto-medial (*mst.m.* ) pair is rather conspicuously located.
The *labrum* (*lr.*) in the present species has been found to bear not more than 6 or 7 pairs of labral bristles including the *apical pair* (*ap.*), whereas in *O. obesus* the number varies from 8 to 12 pairs (*vide* Table I), and in *O. horni* not less than 7 pairs have been found in every individual examined. Bilateral symmetry has been observed in all the three species discussed so far (Text-Figs. 4 and 5).

**Table I**

*Percentage of individuals of the soldier caste of Odontotermes (Odontotermes) obesus (Rambur), showing total count of bristles on the labrum.*

*Based on 40 specimens examined*

<table>
<thead>
<tr>
<th>Sl. No. of categories</th>
<th>Total count of labral bristles</th>
<th>Number of the individuals</th>
<th>Percentage of the individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>2</td>
<td>17</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>19</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>21</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>7</td>
<td>22</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>23</td>
<td>1</td>
<td>2.5</td>
</tr>
</tbody>
</table>

The *scape* (*s.*) of the *antenna* (*ant.*) is devoid of bristles, as also observed in the other two species.

The characteristic bristles on the *galea* (*g.*) and *lacinia* (*lcn.*) of the *maxilla* (*mx.*) in the present species also present a similar arrangement as in *O. obesus* and *O. horni*. There is a pair of prominent *disto-galeal bristles* (*dgall.*) on the galea and the lacinia is fringed along its inner margin with 8 or 9 *lacinio-marginal bristles* (*lcymnl.*). In the other two species, on the other hand, the total number of bristles varies from 9 to 11 or 12 (Text-Figs. 4 and 5).

The *labium* (*lb.*) in the present species bears about 3 or 4 *postmental pairs of bristles* (*pmtl. 1, pmtl. 2, pmtl. 3, pmtl. 4*) in addition to a *medio-postmental pair* (*mmpmtl.*) ; all these are located more or less in the same relative...
TEXT-FIG. 2. Odontotermes assimilis Holmgren, soldier caste (antenna and mouth-parts). (a) Left antenna, showing no bristles on the scape (s.) and pedicel (p.). (b and c) Labrum together with clypeus (also frontal area in c), showing regular bilaterally symmetrical arrangement of bristles. (d and e) Left and right mandibles respectively. (f and g) Maxillae, showing disto-galeal pair of bristles (dgall.) on the galea, and the lacinia showing 9 and 8 lacinio-marginal bristles (lcnml.) respectively. (h) Labium, showing 3 or 4 postmental (pmtl.) bristles on either side together with medio-postmental pair (mpmtl.). (i) Part of labium, showing postmental and medio-postmental bristles.
position as in *O. obesus*. Thus *O. assmuthi* more or less resembles *O. obesus*, both in the total number of postmental pairs as well as in their location. *O. horni*, on the other hand, carries a larger number of bristles—there being up to 7 or 8 postmental bristles located latero-marginally on each side in addition to the medio-postmental pair—though except in the case of a few anterior ones, no bilateral symmetry is noticeable (Text-Figs. 4 and 5).

IV. THORAX

(a) Chaetotaxy of the thoracic tergites (Text-Fig. 1, d and e).—In the present species most of the bristles are large and distributed more or less regularly, particularly on the mesonotum and the metanotum.

The pronotum (prt.) carries bristles which are distributed irregularly, whereas the mesonotum (mst.) and the metanotum (mtt.) show large bristles, located mostly on the posterior margin, of which pairs showing bilateral symmetry have been joined together by dotted lines. No particular nomenclature has been assigned to these symmetrical pairs so as to obviate confusion with certain characteristic bristles known to be present on these sclerites in other species. Significant amongst the mesonotal bristles is a medial bilaterally symmetrical pair of bristles—the mesonoto-medial (mst.m.). No such distinct pair has been observed, in the other two species. Though the mesonoto-posterior pair (mst.p.) in *O. obesus* is located more or less in a similar position, the bristles, in that species, are situated wide apart, whereas in the present case they are closer together and thus occupy a medial position on the sclerite.

Differing distinctly from *O. assmuthi*, *O. obesus* carries 3 pairs of distinctly large and characteristically located bristles on the pronotum and 2 pairs each on the mesonotum and the metanotum (vide Table II). In *O. horni*, on the other hand, there is no such differentiation amongst the bristles either in size or location (Text-Figs. 4 and 5).

(b) Chaetotaxy of the legs (Text-Fig. 3, a–c).—Fore-, middle- and hind-legs in the present species show the number of apical tibial spurs as follows:—Fore-tibia 3; middle-tibia 2; and hind-tibia 2. All the legs possess a pair of ventral tibial spurs (v.tb.sr.) but the fore-leg is, in addition, provided with a dorsal tibial spur (d.tb.sr.) also. Thus the spur formula in all the three species, namely, *O. obesus*, *O. horni* and *O. assmuthi* is 3:2:2.

V. ABDOMEN

(a) Chaetotaxy of the abdominal sclerites (Text-Fig. 3, d and e).—The abdominal tergites (T. I–T. X.) and sternites (S. 1–S. 10) show a more or less
**Table II**

*Characteristic differentiation between the soldier caste of three species of the genus and subgenus *Odontotermes* (Isoptera: Termitidae), in respect of the bristles on the thoracic tergites*

<table>
<thead>
<tr>
<th>Species</th>
<th>Characteristic bristles on the thoracic tergites</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pronotum</td>
<td>Mesonotum</td>
</tr>
<tr>
<td><em>O. obesus</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pronoto-ante-</td>
<td>..</td>
<td>..</td>
</tr>
<tr>
<td>rior (pr.a.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pronoto-late-</td>
<td>Mesonoto-</td>
<td>Metanoto-</td>
</tr>
<tr>
<td>ral (pr.l.)</td>
<td>lateral</td>
<td>lateral</td>
</tr>
<tr>
<td></td>
<td>(mst.l.)</td>
<td>(mtt.l.)</td>
</tr>
<tr>
<td>Pronoto-poste-</td>
<td>Mesonoto-</td>
<td>Metanoto-</td>
</tr>
<tr>
<td>rior (pr.p.)</td>
<td>posterior</td>
<td>posterior</td>
</tr>
<tr>
<td></td>
<td>(mst.p.)</td>
<td>(mtt.p.)</td>
</tr>
<tr>
<td><em>O. horni</em></td>
<td>..</td>
<td>..</td>
</tr>
<tr>
<td><em>O. assmuthi</em></td>
<td>..</td>
<td>Mesonoto-</td>
</tr>
<tr>
<td></td>
<td>medial</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(mstml.)</td>
<td></td>
</tr>
</tbody>
</table>

The tergites are irregularly bristled, while the sternites show a bilaterally symmetrical arrangement of the larger bristles which have been named *sterno-posteromedial* (spml.), *sterno-posterosublateral* (spsl.), etc., as in the other two species (Text-Figs. 4 and 5).

*(b) Chaeotaxy of the abdominal appendages* (Text-Fig. 3, d and e).—The bristles on the *anal cerci* (cer.) and the *subanal styles* (sa.sty.) show no characteristic differences between the three species discussed so far.
TEXT-FIG. 3. Odontotermes assimuthi Holmgren, soldier caste (abdomen and legs). (a) Left fore-leg, showing a single dorsal tibial spur (d.tb.sr.) and a pair of ventral tibial spurs (v.tb.sr.). (b and c) Left middle- and hind-leg show only a pair of ventral tibial spurs (v.tb.sr.). (d) Abdominal tergites (T. I—T. X), showing irregular distribution of bristles. (e) Abdominal sternites (S. 1—S. 10), showing the paired sterno-posteromedial (spml.) and sterno-posterosublateral (spsl.) setæ.
Text-Fig. 4. *Odontotermes obesus* (Rambur), soldier caste. (1) Dorsal view of the cranium, showing nearly all symmetrical pairs of large bristles. (2) Ditto, showing all the symmetrical pairs medially but with some lateral bristles missing. (3) Ventral view of the cranium, showing lateral postmental (pmt.l.) and medio-postmental (mpmt.l.) bristles; the left bristle of the fourth postmental pair (pmt.l. 4) being absent. (4) Labrum, together with clypeal region, showing the paired bristles except for the 8th bristle on the left which is missing; "G" indicates gap observed between the bristles. (5) Ditto, showing a median bristle (mn.) present; right 4th, and left 9th, 10th and 11th bristles missing. (6) Labium, showing postmental (pmt.l.) and medio-postmental (mpmt.l.) bristles joined by dotted lines. (7 and 8) Three thoracic tergites; the pronotum showing three symmetrical pairs of large bristles, i.e., pronoto-anterior (pr.a.), pronoto-lateral (pr.l.) and pronoto-posterior (pr.p.); the meso- and metanotum showing only two pairs each, i.e., mesonoto-lateral (mst.l.) and metanoto-lateral (mtt.l.). (9) Abdominal sternites 1–10 (S.1–S.10 = pd.pl.) showing a row of large sterno-posterosublateral (spsl.), sterno-posteromedial (spm.l.) and a few other paired bristles laterally; first three rows of symmetrical bristles on the right joined by dotted lines.
Chaetotaxy of the Termite, Odontotermes assmuthi Holmgren—I

Text-Fig. 5. Odontotermes horni (Wasmann), soldier caste. (1) Dorsal view of the cranium, showing an irregular distribution of bristles except for a few pairs joined by dotted lines. (2) Ventral view of the cranium, showing characteristic postmental and medio-postmental bristles; postgenal area is naked, having no bristles. The prementum and palpi, etc., are thickly bristled but the bristles not shown here. (3 and 4) Labrum together with clypeus, showing a regular bilaterally symmetrical arrangement of bristles. (5 and 6) Left and right mandibles respectively. (7) Maxilla, showing disto-galeal pair (dgall.) of bristles on the galea, and the lacinia showing 11 lacinio-marginal bristles (lcnml.). (8) Labium, showing postmental and medio-postmental (mpint.) bristles.
VI. SUMMARY

1. Chaetotaxy of the soldier of the termite, *Odontotermes (Odontotermes) assmuthi* Holmgren, is described.

2. The arrangement of bristles on the head and the abdomen in *O. assmuthi* closely resembles that of *O. obesus* and *O. horni*.

3. The labrum in the present species carries fewer pairs of labral bristles than in *O. obesus* and *O. horni*.

4. The mesonotum and the metanotum in the present species show a more regular arrangement of bristles than in *O. obesus*; in *O. horni* the bristles are distributed irregularly.

VII. ACKNOWLEDGMENTS

My sincere thanks are due to Dr. M. L. Roonwal, Director, Zoological Survey of India, Calcutta, for kindly providing the material, and for constant encouragement. I am also very grateful to Shri Y. Ramchandra Rao for kindly going through the manuscript, and Dr. A. Rathore, Principal, Rajasthan College of Agriculture, Udaipur, for laboratory facilities.

VIII. REFERENCES

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IX. ABBREVIATIONS USED IN TEXT-FIGURES

 Abd., abdomen; acl., anteclypeus; ant., antenna; ap., apical bristle of labrum; at.a.md., anterior articulation of mandible; b.c.cd., basal condyle of cardo; b.pmt., blade of postmentum; c., condyle of cardo; cd., cardo; cer., cercus; cl., clypeus; cll., clypeal bristle; cr.a.md., cranial articulation of mandible; cx., coxa; dgall., disto-galeal bristle; d.tb.sr., dorsal tibial spur; epcl.1, epcl.2, epcl.3, etc., epicranial bristles 1, 2, 3, etc.; ep.r., epicranial region; ex., extra bristle; fe., femur; ft., flagellum; f.l., fore-leg; fr., frons; frtl., frontal bristles; g., galea; gl., glossa; gm., ginglymus; gn., gena; gpgl.1, gpgl.2, gpgl.3, geno-postgenal bristles 1, 2, 3 respectively; g.s., gular suture; hd., head; hd.c., head-capsule; h.t., hind-leg; lb., labium; lb.p., labial palp; lb.s., labial suture; len., lacinia; lcnml., lacinio-marginal bristle; lgl., lingula (hyaline tip of labrum); lr., labrum; lr.s., labral suture; lt., left; m., marginal tooth of mandible; md., mandible; mdl., mandibularia (or trochantin of mandible); m.l., middle-leg; m.pl., molar
Plate; *mpml*, medio-postmental bristle; *mst.l.*, mesonoto-lateral bristle; *mst.m.*, mesonoto-medial bristle; *mst.p.*, mesonoto-posterior bristle; *mtt.*, metanotum; *mtt.l.*, metanoto-lateral bristle; *mtt.p.*, metanoto-posterior bristle; *mx.*, maxilla; *mx.p.*, maxillary palp; *oct.*, occiput; *oct.f.*, occipital foramen; *p.*, pedicel; *pcl.*, postclypeus; *pd.pl.*, podical plates; *pgl.*, paraglossa; *pgn.*, postgena; *prt.*, pronotum; *pmml.*, postmental bristle; *pr.a.*, pronoto-anterior bristle; *prgl.*, proximo-genal bristle; *pr.l.*, pronoto-lateral bristle; *prmt.*, prementum; *pr.p.*, pronoto-posterior bristle; *rt.*, right; *S. 1, S. 2, ..., S. 10*, sterna first, second, ..., tenth; *s.*, scape; *sa.sty.*, subanal styles; *st.*, stipes; *T. I, T. II, ..., T. X*, terga first, second, ..., tenth; *tar.*, tarsus; *tar.c.*, tarsal claw; *tb.*, tibia; *tb.sr.*, tibial spur; *th.*, thorax; *v.*, vertex; *v.tbsr.*, ventral tibial spur.