

AN AFRICAN GENUS, *PSAMMOTERMES*, IN INDIAN TERMITE
FAUNA, WITH FULLER DESCRIPTION OF *P. RAJASTHANICUS*
FROM RAJASTHAN, INDIA

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(With 2 Tables, 2 Text-figures and 2 Plates)

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I—INTRODUCTION

The termite genus *Psammotermes* Desneux (Isoptera, family Rhinotermitidae, subfamily Psammotermitinae) is mainly Ethiopian. It is the only genus of the subfamily Psammotermitinae. Out of the six species so far known to exist, five are from Africa (four Ethiopian ; and one Palearctic) and one from Madagascar (Malagasy Region), as follows (*vide* Snyder, 1949, pp. 64-66) :—

(a) AFRICA

(i) Ethiopian :

P. allocerus Silverstri.—Zululand.

P. assuanensis Sjöstedt.—Upper Egypt ; Eritrea ; Zululand.

P. fuscofemoralis (Sjöstedt).—Red Sea area ; Egypt ; Nubia ; Sudan ; Senegal.

P. senegalensis Sjöstedt.—Senegal.

(ii) Palearctic :

P. hybostoma Desneux.—Algeria.

(b) MADAGASCAR (Malagasy Region) :

P. voeltzkowi Wasmann.—Madagascar.

Recently, while studying the termites of the Rajasthan desert area of western India, we came across soldiers and workers of a new species of *Psammotermes* which was briefly described recently (Roonwal & Bose, 1960), and a fuller description is given below. This is the first record of this predominantly African genus from India.

The genus *Psammotermes* is generally confined to the arid or semi-arid zones of Africa, and it is interesting that it has been found in India also in the arid zone. Since it spreads over the whole of North Africa in the west to western India in the east, its future discovery in the intervening areas of West Asia, which are ecologically more or less similar to North Africa and western India, may be expected.

II—FULLER DESCRIPTION OF THE SPECIES FROM RAJASTHAN

Psammotermes rajasthanicus Roonwal & Bose*

(Text-fig. 2 ; Pls. 12 and 13 ; and Tables 1 and 2)

(a) *Material*

All the collections listed below are from the Jaisalmer and Barmer Districts of Rajasthan, India, and were collected by *K. K. Tiwari and S. Biswas*, in January and February, 1958. This is a hot, arid, sandy area, with an annual rainfall of only about 250 mm. (10 inches) or less, and with practically no vegetation except in small irrigated patches.

(i) Three soldiers and several workers in spirit, in a vial, mixed with *Microtermes anandi* Holmg., from Balana, ca. 27° 10' N. lat. and 71° 20' E. long., about 20 miles east of Mohangarh (Jaisalmer District, Rajasthan). Field Coll. No. 2/14-1-58, 14th January, 1958, ex "below stones and cowdung".

(ii) Several soldiers and workers in spirit, in a vial, 3 miles north-east of Mohangarh, ca. 27° 20' N. lat. and 71° 15' E. long. (Jaisalmer District, Rajasthan). Field Coll. No. 4/12-1-58, 12th January, 1958, ex "below loose mounds of earth and cowdung".

(iii) Several soldiers and workers in spirit, in a vial, from Mohangarh (ca. ½ mile south-east of the Fort), ca. 27° 17' N. lat. and 71° 14' E. long. (Jaisalmer District, Rajasthan). Field Coll. No. 3/15-1-58, 15th January, 1958.

(iv) Eight soldiers and several workers in spirit, in a vial, from Tamalone village (Field Collecting Station No. 7, 13 miles from Gadra Road), ca. 25°40' N. lat. and 70°35' E. long. (Barmer District, Rajasthan). Field Coll. No. 2/3-2-58, 3rd February, 1958.

(v) One soldier and several workers in spirit, in a vial, mixed with *Microtermes anandi* Holmg., from Pachpadra Salt Depot, ca. 25° 55' N. lat. and 72° 12' E. long. (Barmer District, Rajasthan). Field Coll. No. 4/15-2-58, 15th February, 1958, ex "below dried up bark of tree".

(vi) Thirteen soldiers and several workers, in spirit, in a vial, from Pachpadra Salt Depot, Field Coll. No. 4/16-2-58, 16th February, 1958.

(b) *Description*

1. IMAGO.—

Unknown.

2. SOLDIER (Table 1 ; Pl. 12 ; and Text-fig. 2).—

General.—Head-capsule pale yellow with a brownish streak running from fontanelle to base of anteclypeus ; anterior part brownish yellow ; postclypeus, edges of antennal sockets and labium, brownish yellow

*For a preliminary description, see Roonwal and Bose, *Sci. & Cult.*, Calcutta, 26 (1), 1960, pp. 38-39.

anteclypeus whitish ; mandibles brown, basally yellowish brown ; teeth dark brown ; thorax, legs and body yellowish white. Head sparsely, and body densely, pilose. Total length (without antennae) *ca.* 4.0—5.35 mm.

TABLE 1.—*Body measurements (in mm.) and indices of Psammotermes rajasthanicus Roonwal & Bose. (10 specimens measured.)*

Caste.—Soldier.

Body-parts	Range (in mm.)	Holotype
I—GENERAL		
1. Total body-length (excluding antennae) (approx.)	4.0—5.35	5.35
II—HEAD		
2. Head-length upto base of mandibles .	1.08—1.40	1.40
3. Max. width of head .	0.85—1.05	1.05
4. Max. height of head .	0.63—0.75	0.70
5. Head Index I. (Width/Length) . .	0.75—0.80	0.75
6. Head Index II. (Height/Width) .	0.67—0.80	0.67
7. Head Index III. (Height/Length) .	0.50—0.60	0.50
8. Median length of labrum . . .	0.30—0.43	0.38
9. Max. width of labrum . . .	0.30—0.43	0.36
10. Minimum length of mandibles :		
(a) Left mandible	0.75—0.98	0.93
(b) Right mandible	0.75—0.98	0.93
11. Minimum median length of postmentum .	0.80—1.05	1.05
12. Max. width of postmentum . .	0.33—0.45	0.43
13. Width, at waist, of postmentum . .	0.25—0.30	0.28
14. Width, at anterior margin, of postmentum	0.25—0.28	0.28
III—THORAX		
15. Max. length of pronotum .	0.38—0.53	0.50
16. Max. width of pronotum .	0.63—0.83	0.78
17. Max. width of mesonotum . .	0.63—0.73	0.73
18. Max. width of metanotum . .	0.65—0.75	0.73

Head.—Head-capsule subrectangular with rounded corners, rather flat; longer than broad (index Head-width/Head-length 0.75—0.80); sides substraight, posterior margin rounded. *Fontanelle*: Prominent, round, with a brown chitinous border and lying a little above the middle of head; with a tube running upto base of labrum. *Eyes and ocelli*: Absent. *Antennae*: With 14 segments; segment 1 longest, cylindrical; 2 shortest; 3 larger than remainder; 4 markedly smaller than 3 and slightly smaller than 5; 5 to penultimate one gradually decreasing in length; last (14th) ovate, longer than penultimate one. (For abnormalities in the antennae, *vide infra*). *Clypeus*: Postclypeus flat, subtrapezoidal, with convex posterior margin; weakly pilose. Anteclypeus narrow, apilose, subtrapezoidal. *Labrum*: Large, pear-shaped, proximal part broad, with subparallel sides, and distal part subtriangular, with a fairly pointed tip; broadest a little above the middle; with 2 long and about 4 short setae at apex on either side; and another group of shorter hairs on body near middle and base. *Mandibles*: Long, sabre-shaped, broad basally; weakly incurved at apex. Right mandible with inner margin bearing teeth as follows:—One pointed apical; one large tooth at distal third and 3-6 smaller teeth in middle one-third; 1 or 2 small teeth usually present (rarely absent) distally to the large one (Text-fig. 2*b*). Left mandible with the inner margin bearing teeth as follows:—One pointed apical; one large tooth (shorter than the one in right mandible) a little above the distal third; and 6-8 smaller teeth (usually 1 distal and 4-6 proximal to the large one). *Postmentum*: Club-shaped; widest in the distal one-fourth, whence the sides gradually narrowing both in front and behind; narrowest (waist-like) a little below the middle-point between the level of maximum width and the hind-margin; anterior margin substraight; posterior margin concave.

Thorax.—*Pronotum*: Flat, pilose, narrower than head-capsule; subtrapezoidal, with rounded corners; broader than long (width 0.63—0.83 mm.; length 0.38—0.53 mm.); anterior margin weakly concave, with a weak median depression; posterior margin straight. *Mesonotum*: Slightly narrower than pronotum; sides rounded; posterior margin straight. *Metanotum*: As wide as mesonotum, but shorter in length; sides rounded; posterior margin straight. *Legs*: Moderately long, pilose. *Tarsi* 4-segmented; apical tibial spur-formula 3: 2: 2.

Abdomen.—Oblong, moderately pilose; 10-segmented. *Cerci* 2-jointed; 0.08—0.10 mm. long. *Styli* short, finger-like, 1-jointed; 0.05—0.08 mm. long.

Abnormalities in antennae of soldiers (Text-fig. 2*c*).—Some abnormalities noticed in the antennae of soldiers are described below:—(a) In a specimen collected 3 miles north-east of Mohanagarh (*vide* "Material" (i) above) the left antennae has only 11 segments (as against the normal 14), and a small additional segment is seen sprouting from the junction of segments 8 and 9 (Text-fig. 2*c*). The right antenna is normal, with 14-segments. (b) In another soldier, from the same lot as No.(a) above, the right antenna is abnormal—segment 3 is smaller and more slender than 4, and the remaining distal segments become increasingly longer. The left antenna is normal. Both the antennae are damaged—the right one has only 8 segments left, and the left one 9. (c) In a soldier collected near Mohanagarh, *vide* "Material" (iii) above, the left antenna (which is broken and has only 11 segments left) is abnor.

mal—segment 3 is shorter than usual, and segments 5-8 longer than usual. The right antenna is normal, with 14 segments. (d) In a fourth soldier, from the same lot as No. (c), the right antenna is abnormal segments from 3 onward are more slender and longer than usual. The right antenna is normal. Both the antennae are partly damaged, with only 8 segments left in the right antenna and 11 in the left. (e) One specimen from 'Material' (v) and two from Material (vi) above have either the right or the left antenna abnormal. The 3rd segment is shorter than the 4th (usually the 4th is shorter than the 3rd), and the remaining distal segments are comparatively much longer than the corresponding ones in the normal antennae.

3. WORKER (Table 2 ; and Pl. 13).—

General.—Head-capsule pale yellow, frons whitish ; anteclypeus and postclypeus pale yellowish white ; labrum yellowish, medially white ; antennae whitish, apically pale yellowish white ; mandibles pale yellow with brownish teeth ; thorax and body white. Head and body moderately pilose. Total length (without antennae) *ca.* 3.30—3.90 mm.

Head.—Head-capsule rounded, with subparallel sides ; broader than its length to base of mandibles (width 0.93—1.03 ; length 0.80—0.88 mm.) ; broadest anteriorly a little above the antennae ; posterior margin convex, rounded. *Fontanelle* : Indistinct. *Eyes and ocelli* : Absent. *Antennae* : With 14 segments ; pilosity increasing distally ; segment 1 cylindrical, longest ; 2 cylindrical, about half of 1 ; 3 shorter than 2 ; 4 smallest ; 5 shorter than 3 and 6 ; 6 to penultimate one progressively increasing in length ; last (14th) longer than penultimate one and ovate. *Clypeus* : Postclypeus swollen, with a few hairs ; divided into right and left halves by an incomplete, median suture. Anteclypeus narrow, a little projecting in front ; apilose. *Labrum* : Short and broad ; narrower basally, broader anteriorly and narrowing to a rounded pointed tip ; with several short hairs ; no long setae present. *Mandibles* : Of typically *Psammotermes*-type. Right mandible with an apical and 3 marginal teeth ; apical large, finger-like ; 1st marginal small, rudimentary ; 2nd slightly larger than apical ; 3rd short, blunt and widely separated from molar area. Left mandible with an apical and 3 marginal teeth ; apical large, finger-like ; 1st marginal small but well marked ; 2nd large, straight, subequal to apical ; 3rd large, pointed downwards separated from molar area by a narrow gap.

TABLE 2.—*Measurements (in mm.) of workers of Psammotermes rajasthanicus Roonwal & Bose. (10 specimens measured.)*

Body-parts	Range (in mm.)
1. Total body-length (without antennae) (approx.)	3.30—3.90
2. Length of head upto base of mandibles	0.80—0.88
3. Maximum width of head	0.93—1.03
4. Maximum height of head	0.48—0.53
5. Maximum length of pronotum	0.30—0.40
6. Maximum width of pronotum	0.53—0.63

Thorax.—*Pronotum*: Flat, trapezoidal, much narrower than head-capsule; broader than long (width 0.53—0.63 mm.; length 0.30—0.40 mm.); sides straight, converging posteriorly; corners rounded; anterior margin with a weak median notch, posterior margin straight. *Mesonotum*: Broader than pronotum; sides rounded; posterior margin straight. *Metanotum*: Similar to but broader than mesonotum; posterior margin straight. *Legs*: Long, slender; moderately hairy; apical tibial spur-formula 3 : 2 : 2. Tarsi 4-segmented.

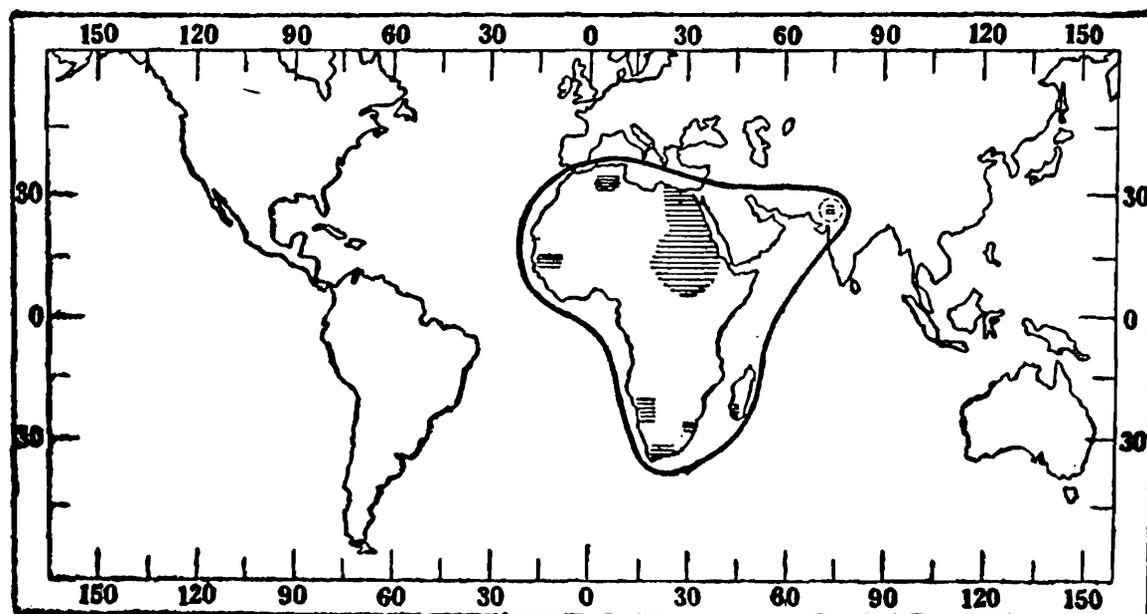
Abdomen.—Elongate, densely pilose. Cerci short, finger-like, 2-jointed; 0.1 mm. long. Styli short, 1-jointed; 0.1 mm. long.

(c) *Type-specimens*

Holotype (*vide* "Material" (i) above).—One soldier, Z.S.I. Reg. No. 2447/H8, in spirit, in a vial, from Balana, approximately 27°10' N. latitude and 71° 20'E. longitude, about 20 miles East of Mohangarh (Jaisalmer District, Rajasthan, India), coll. K. K. Tiwari and S. Biswas, 14th Jan., 1958. Deposited in the National Zoological Collections with the Zoological Survey of India, Calcutta.

Morphotype.—One worker, Z.S.I. Reg. No. 2450/H8, deposited in the National Zoological Collections with the Zoological Survey of India, Calcutta. Other data as in holotype.

Paratype and Paramorphotypes.—Deposited as follows:—(i) Two paratype soldiers and 2 paramorphotype workers (*vide* "Material",



TEXT-FIG. 1.—Map of the world, to show the distribution (areas shaded in horizontal lines) of the genus *Psammotermes* Desneux.

(i) above), in a vial, Z. S. I. Reg. No. 2448/H8; and three paratype soldiers and four paramorphotype workers (*vide* Material (ii) above), in a vial, Z. S. I. Reg. No. 2449/H8, all with the Zoological Survey of India, Calcutta. (ii) Two paratype soldiers and two paramorphotype workers, in a vial, with Prof. A. E. Emerson, University of Chicago, Chicago, U. S. A. (iii) One paratype soldier and 2 paramorphotype workers, in a vial, in Entomological Collections, Forest Research Institute, Dehra Dun.

(d) *Type-locality*

INDIA : Rajasthan : Balana (approx. 27°10' N. lat. and 21° 20' E. long.), ca. 20 miles east of Mohangarh (Jaisalmer District, Rajasthan).

(e) *Geographical Distribution*

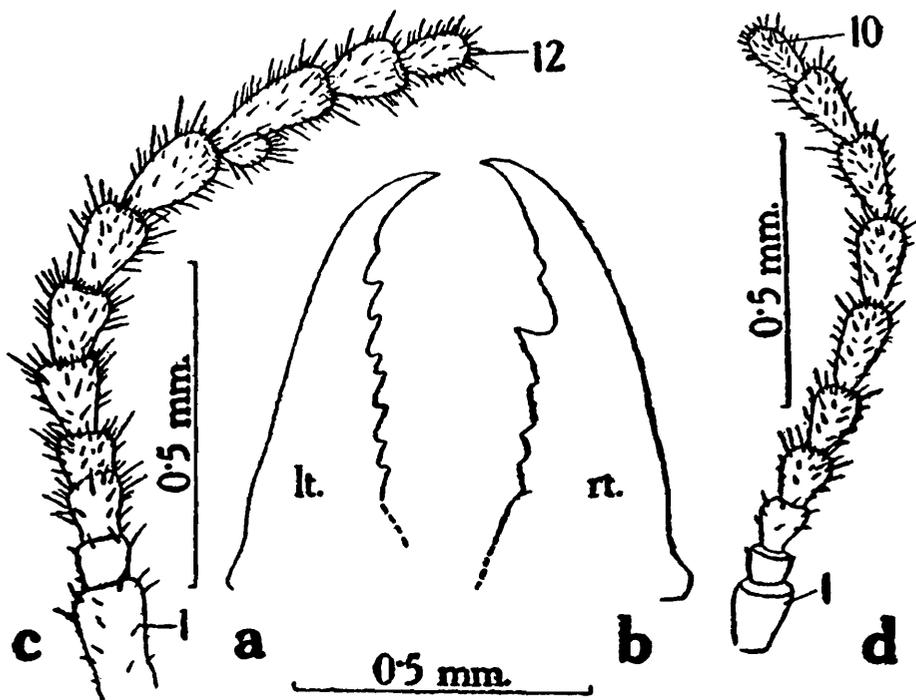
INDIA : Rajasthan : Balana (type-locality) (ca. 20 miles east of Mohangarh) and Mohangarh (both in Jaisalmer District). Pachpadra (Barmer District).

This is the first record of the genus *Psammotermes* from India. The genus was hitherto recorded only from Africa and Madagascar (*vide* discussion in Introduction above ; and Text-fig. 1).

(f) *Comparison*

Psammotermes rajasthanicus Roonwal & Bose, is closest to *P. fuscofemoralis* Sjöstedt, of North Africa, but differs from it as follows :—

(a) *Soldier*.—Has 7-9 teeth on left mandible, and 4-7 teeth on right mandible (*vs.* 8 on left and 5 on right in *P. fuscofemoralis*). (ii) The



TEXT-FIG. 2—*Psammotermes rajasthanicus* Roonwal & Bose. Soldiers (collected 3 miles N.-E. of Mohangarh, Jaisalmer District, Rajasthan) showing abnormalities.

(a). Left mandible (*cf.* variations from Pl. 12, Fig. e). (b). Right mandible (*cf.* variations from Pl. 12, Fig. f). (c). Left antenna, showing an abnormal segment protruding at the junction of segments 8 and 9. Also note that the total number of segments (apart from the abnormal one) is only 11 as against the normal number 14 : the right antenna of this specimen is normal. (d). Right antenna, showing the following abnormalities :—(i) Only 10 segments present, as against the normal 14 ; (ii) 3rd segment shorter than 4th (normally it is longer).

lt., left ; *rt.*, right.

smaller teeth usually lying towards distal end of both mandibles (in *P. fuscofemoralis*, only the larger teeth lying distally). (iii) Two groups of hairs, each with several hairs, present on labrum (only a few scattered hairs present on tip of labrum, in *P. fuscofemoralis*). (iv) Labrum

broadest distally to middle (broadest in middle in *P. fuscofemoralis*). (v) Antennal segments not appreciably slender towards apex (slender in *P. fuscofemoralis*). (iv) Antennae 14- segmented (15- segmented in *P. fuscofemoralis*).

(b) *Worker*.—Antennae 14- segmented (16- segmented in *P. fuscofemoralis*).

III—SUMMARY

1. The termite genus *Psammotermes* Desneux (Isoptera, family Rhinotermitidae, subfamily Psammotermitinae) has hitherto been recorded only from Africa and Madagascar.

2. The genus is now recorded for the first time from India (western Rajasthan) where it is represented by a new species, *Psammotermes rajasthanicus* Roonwal & Bose, which is fully described. (A preliminary description was published earlier.)

3. *Psammotermes rajasthanicus* is closely allied to *P. fuscofemoralis* Sjöstedt of N. Africa, but differs as follows :—(a) *Soldier* : (i) 7-9 teeth on left mandible and 4-7 on right (vs. 8 on left and 5 on right). (ii) The smaller mandibular teeth present distally (only larger teeth present distally in *P. fuscofemoralis*). (iii) Several hairs present distally on labrum (vs. only a few scattered hairs on tip). (iv) Labrum broadest distally to middle (vs. broadest in middle). (v) Antennae 14- segmented (vs. 15- segmented). (b) *Worker* : Antennae 14-segmented (vs. 16. segmented).

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