

FAUNA OF RAJASTHAN, INDIA

PART 4.—A CHECK-LIST OF RAJASTHAN TERMITES (INSECTA : ISOPTERA)

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(With 4 Plates)

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I—INTRODUCTION

1. *General*

The termite fauna of Rajasthan has until recently been practically unknown. Adams (1899, p. 387), in his account of the Western Rajputana States, while not mentioning the species, referred to control measures and wrote : "White ants are so very destructive that they require to be kept-down, and arsenic is the remedy." The next mention is by Pruthi and Bhatia (1952) who listed only three species in the desert region, namely, "*Hodotermes macrocephalus*, *Heterotermes* sp. and *Microtermes* sp.". Subsequently, a few species have been recorded by Roonwal & Pant (1953, p. 47), Roonwal and Sen-Sarma (1960), Kushwaha (1960*a, b*, 1961), Bhatnagar (1962), Roonwal (1962*a, b*), Roonwal & Bose (1960, 1962 *a, b*), and Roonwal, Chhotani & Bose (1962).

As a result of extensive collections made by one of us (M. L. R. in 1952) and later on (1956-61) by the field parties of the Zoological Survey of India, considerable material has accumulated from all over Rajasthan, except the extreme southern portions. This material has been studied by us and a total of 19 species and subspecies recorded, of which 3 are new. Here a check-list of these species is given, whilst a fuller account will be found elsewhere (Roonwal & Bose, 1964).

For an account of the topography, climate, vegetation, etc. of Rajasthan, see Part 1 (General Introduction) of this series of papers (Roonwal, 1968, *Rec. zool. Surv. India*, Vol. 61 (3 & 4), pp. 291-375).

2. Abbreviations used

<i>Im.</i> , Imago (winged or dealate reproductive) caste.	<i>Sm.</i> , soldier minor caste.
<i>Ny.</i> , nymph.	<i>SMd.</i> , soldier medium caste.
<i>Pw.</i> , pseudoworker caste.	<i>Syn.</i> , synonym.
<i>S.</i> , soldier caste.	<i>W.</i> , worker caste.
<i>SM.</i> , soldier major caste.	<i>WM.</i> , worker major caste.
	<i>Wm.</i> , worker minor caste.

II—A CHECK-LIST OF THE RAJASTHAN TERMITES

Family I. HODOTERMITIDAE

Subfamily (a) *Hodotermitinae*1. *Anacanthotermes macrocephalus* (Desneux)

(Plate 21, Figs. 1-3)

1906. *Hodotermes macrocephalus* J. Desneux, *Ann. Soc. ent. Belg.*, Brussels, 49(12), pp. 344-348. Im. S. and W. Type, locality : Karachi (Sind, W. Pakistan).

Castes found : Im., S. and W.

Distribution.—*Rajasthan* : Western desert area : Districts of Bikaner, Jaisalmer, Barmer and Jodhpur. *Elsewhere* : Punjab (India), W. Pakistan and S. E. Afghanistan.

Remarks.—For a detailed account of external morphology, see Gupta (1962a, b).

Family II. RHINOTERMITIDAE

Subfamily (a) *Psammotermitinae*2. *Psammotermes rajasthanicus* Roonwal & Bose

(Plate 21, Figs. 4-6)

1960. *Psammotermes rajasthanicus* M. L. Roonwal & G. Bose, *Sci. & Cult.*, Calcutta, 26(1), pp. 38-39. Sm. and W. Type-locality : India : Balana (Jaisalmer District, Rajasthan).

1962. *Psammotermes rajasthanicus* M. L. Roonwal & G. Bose, *Rec. Indian Mus.*, Delhi, 58 (3 & 4), pp. 151-158, Pls. 12(S.) and 13(W.). Fuller description with illustrations.

Castes Known : SM., SMd., Sm. and W.

Distribution.—*Rajasthan only* : Western desert area : Districts of Barmer, Jaisalmer and Bikaner.

Subfamily (b) *Heterotermitinae*3. *Heterotermes indicola* (Wasmann)

(Plate 22, Fig. 1)

1902. *Leucotermes indicola* E. Wasmann, *Zool. Jb. (Syst.)*, Jena, 17 (1), pp. 118-119, Pl. 4, Fig. 2. S. and W. Type-locality : Bombay (India).

Castes found : S. and W.

Distribution.—*Rajasthan* : District of Jodhpur, Bikaner and Siroh so far, but no doubt widespread. *Elsewhere* : Throughout India and W. Pakistan.

Remarks.—A species which is highly destructive to wood-work in houses, etc. A whole township may thus be ruined, as was the case in Sri Hargobindpur in the Punjab (*vide* Roonwal, 1955).

Subfamily (c) *Coptotermitinae*

4. *Coptotermes heimi* (Wasmann)

(Plate 22, Fig. 2)

(Synonym : *Coptotermes parvulus* Holmgren, *vide* Roonwal & Chhotani, 1962, *infra*.)

1902. (Oct.) *Arrhinotermes heimi* E. Wasmann, *Zool. Jb. (Syst.)*, Jena, 17 (1), p. 104, Pl. 4, Figs. 1 a-f (Im.) ; p. 160 (Syn.). Im. *Type-locality* : India : Wallon (Ahmadnagar Dist., Maharashtra).
1913. (21st Apr.) *Coptotermes parvulus* N. Holmgren, *J. Bombay nat. Hist. Soc.*, Bombay, 22 (1), pp. 102 and 104. S. and W. *Type-localities* : India : Anand and Wadtal (both in Gujarat State—formerly in Bombay Presidency).
1962. *Coptotermes heimi* (Wasm.), M. L. Roonwal and O. B. Chhotani, *Monogr. Indian Species of Termite Genus Coptotermes*, New Delhi (Indian Counc. Agric. Res., Ent. Monogr. No. 2).

Castes found : Im., S. and W.

Distribution.—*Rajasthan* : Western and central Rajasthan : Districts of Jodhpur, Nagaur, Jaipur, Pali and Jaisalmer ; most probably all over. *Elsewhere* : All over India and West Pakistan.

Remarks.—A very variable species. Also one of the most destructive species to wood-work. For a summary of its biology, *vide* Roonwal (1959).

Family III—TERMITIDAE

Subfamily (a) *Amitermitinae*

5. *Speculitermes cyclops* Wasmann

1902. *Speculitermes cyclops* E. Wasmann, *Zool. Jb. (Syst.)*, Jena, 17 (1), pp. 160-162, Im. and W. *Type-locality* : India : Khandala near Bombay (Maharashtra).

5(a). *Speculitermes cyclops cyclops* Wasmann

1902. As above.
1960. *Speculitermes cyclops cyclops* Wasm., Roonwal and Sen Sarma, *Contrib. Syst. Orient. Termites*, New Delhi (Indian Counc. Agric. Res., Ent. Monogr. No. 1), pp. 16-23, Pl. 1 (Im.).

Castes found : Im. and W.

Distribution.—*Rajasthan* : Kotah District (Kolipura). Absent in the drier parts. *Elsewhere* : India : Uttar Pradesh, Madhya Pradesh and Maharashtra. Burma : Dawna Hills, Lower Burma (needs confirmation).

Remarks.—The soldier caste was, until recently, believed to be absent in the genus *Speculitermes* as well as in the allied genus *Anoplotermes*. Recently, however, Roonwal and Chhotani (1960b) have reported the occurrence of the soldier caste in *S. cyclops sinhalensis*, Roonwal & Sen-Sarma, collected from southern India.

6. *Amitermes belli* (Desneux)

(Plate 22, Fig. 3)

1906. *Termes belli* J. Desneux, *Ann. Soc. ent. Belg.*, Brussels, 49 (12), pp. 352-354. Im., S. and W. *Type-locality* : Karachi (Sind, West Pakistan).

Castes found : Im., S. and W.

Distribution.—*Rajasthan* : Districts of Jodhpur, Jaipur, Kotah and Bundi. *Elsewhere* : West Pakistan (Baluchistan, Sind and Punjab).

7. *Synhamitermes quadriceps* (Wasmann)

1902. *Amitermes quadriceps* E. Wasmann, *Zool. Jb. (Syst.)*, Jena, 17 (1), p. 123, Pl. 4, Fig. 5. S., W. and Ny. *Type-locality* : India : Kbandala near Bombay (Maharashtra).

1960. *Synhamitermes quadriceps*, M. L. Roonwal and P. K. Sen-Sarma, *Contrib. Syst. Orient. Termites*, New Delhi, (Indian Counc. Agric. Res., Ent. Monogr. No. 1), New Delhi. pp. 7-14.

Castes found : Im. (not Rajasthan), S. and W.

Distribution.—*Rajasthan* : Kotah District. *Elsewhere* : Maharashtra (India).

Remarks.—The imago was described by Roonwal and Sen-Sarma (1960, pp. 7-14).

8. *Eremotermes neoparadoxalis* Ahmad

1955. *Eremotermes neoparadoxalis* M. Ahmad, *Biologia*, Lahore, 1 (2), pp. 252-253, Fig. 38 (S). *Type-locality* : West Pakistan : Shahdadpur (Sind).

1960. *Eremotermes neoparadoxalis*, Roonwal and Sen Sarma, *Contrib. Syst. Orient. Termites* (Indian Counc. Agric. Res., Ent. Monogr. No. 1), New Delhi, pp. 79-83 ; Pls. 15 and 16.

Castes found : S. and W.

Distribution.—*Rajasthan* : Districts of Jaipur and Bikaner. *Elsewhere* : Sind (West Pakistan).

9. *Eremoterme paradoxalis* Holmgren

(Plate 22, Fig. 4)

1913. *Eremoterme paradoxalis* N. Holmgren, *J. Bombay nat. Hist. Soc.*, Bombay, 22(1), pp. 115-116. S., WM., Wm. *Type-locality* : India : Bangalore (Mysore State).
1960. *Eremoterme paradoxalis* Holmg., Roonwal and Sen-Sarma, *Contrib. Syst. Orient. Termites* (Indian Counc. Agric. Res., Ent. Monogr. No. 1), New Delhi, pp. 83-92 ; Pls. 17 and 18.

Castes found : Im. (not Rajasthan), S. and W.*Distribution*.—*Rajasthan* : Districts of Jaipur and Kotah. *Elsewhere* : India (Punjab, Madhya Pradesh, Bihar, Mysore, Kerala). West Pakistan (Punjab, Sind and N. W. F. P.).10. *Microceroterme championi* Snyder

1933. *Microceroterme championi* T. E. Snyder, *Proc. U. S. nation. Mus.* Washington, 82 (art. 16), pp. 14-15. *Type-locality* : India : Haldwan, (Uttar Pradesh).

10(a). *Microceroterme championi raja* Roonwal and Bose

(Plate 22, Fig. 5)

1964. *Microceroterme championi raja* M. L. Roonwal and G. Bose, *Zoologica*, Stuttgart, 40 (113), pp. 26-28. *Type-locality* : India : Balsamand (near Jodhpur, Jodhpur District, Rajasthan).

Castes found : S. and W.*Distribution*.—*Rajasthan* : Jodhpur District.*Remarks*.—The typical subspecies, *M. c. championi*, is found in Uttar Pradesh (India) and Sind (W. Pakistan).11. *Microceroterme tenuignathus* Holmgren

1913. *Microceroterme tenuignathus* N. Holmgren, *J. Bombay nat. Hist. Soc.*, Bombay, 22 (1), pp. 116-117. S., WM., Wm. *Type-locality* : India : Vidtal (Gujarat).

11(a). *Microceroterme tenuignathus tenuignathus* Holmgren

(Plate 23, Fig. 1)

1913. As above.

Castes found : S. and WM. and Wm.*Distribution*.—*Rajasthan* : Districts Jaisalmer, Barmer, Jodhpur, Jaipur and Kotah. *Elsewhere* : India (Gujarat). West Pakistan (Sind and Baluchistan).11(b). *Microceroterme tenuignathus laxmi* Roonwal & Bose

(Plate 22, Fig. 6)

1964. *Microceroterme tenuignathus laxmi* M. L. Roonwal and G. Bose, *Zoological Stuttgart*, 40(113). pp. 29-31, *Type-locality* : India : Kolayat (Bikaner District, Rajasthan).

Castes found : S. and W.*Distribution*.—*Rajasthan only* : Bikaner District (Kolayat).

12. *Microcerotermes* sp.

Some Rajasthan collections of this genus are represented by workers only and cannot, therefore, be identified specifically with certainty. They are from the districts of Jaisalmer, Bikaner, Jaipur and Kotah.

Subfamily (b) *Macrotermitinae*13. *Odontotermes bellahunisensis* Holmgren & Holmgren

1917. *Odontotermes bellahunisensis* K. Holmgren & N. Holmgren, *Mem. Dept. Agric. India*, Calcutta, 5 (3), pp. 150-151 (*Im.*, S., W.)
Type-localities : India : Mysore State : Bellahunisi (Bellary District*) and Bangalore.
1962. *Odontotermes bellahunisensis*, M. L. Roonwal and G. Bose, *J. Bombay nat. Hist. Soc.*, Bombay, 58 (3), pp. 580-594, Pl. 1. (S.) and Text-fig. 1 (WM.). Redescription of species.

13(a). *Odontotermes bellahunisensis guptai* Roonwal & Bose
(Plate 23, Fig. 2)

1962. *Odontotermes bellahunisensis guptai* Roonwal and Bose, *J. Bombay nat. Hist. Soc.*, Bombay, 58 (3), pp. 588-593, Text-fig. 2(S.). *Type-locality* : India : Near Gudah village (Nagaur District, Rajasthan).

Castes found : S. and W.

Distribution.—*Rajasthan* : Districts of Bikaner, Nagaur, Jhunjhunu, Sikar and Udaipur. *Elsewhere* : West Pakistan (Karachi, Sind).

Remarks.—The typical subspecies, *O.b. bellahunisensis*, is known only from the Mysore State (Bellahunisi and Bangalore), S. India.

14. *Odontotermes brunneus* (Hagen)

1858. *Termes brunneus* H. Hagen, *Linn. Entom.*, 12, pp. 133-136, Pl. 3, Fig. 3 (*Im.*). *Im.* & S. *Type-locality* : India : "Bengalen". [A cotype imago stated to be in Berlin Museum is not traceable now. A second cotype imago in the Museum of Comparative Zoology, Harvard College, Cambridge (Mass., U.S.A.) was examined by us. Soldier of Hagen does not evidently belong to genus *Odontotermes*.]

14(a). *Odontotermes brunneus kushwahi* Roonwal & Bose
(Plate 23, Fig. 3)

1964. *Odontotermes brunneus kushwahi*, M. L. Roonwal and G. Bose, *Zoological Stuttgart*, 40 (113), pp. 33-36. *Type-locality* : India : Bhupalsagar (Udaipur District, Rajasthan).

Castes found : S. and W.

Distribution.—*Rajasthan* : Udaipur District. *Elsewhere* : India : Kaira District (Gujarat) and Salem District (Madras State).

* Bellary District was formerly in the Madras State but was transferred to Mysore State during the reorganisation of States in 1957.

15. *Odontotermes obesus* (Rambur)

(Plate 23, Fig. 4)

1842. *Termes obesus* Rambur, *Hist. nat. Insectes, Neuropteres*, Paris, p. 304, (Im.). *Type-locality* : India : Bombay (Maharashtra).

Castes found : Im., S. and W.

Distribution.—*Rajasthan* : Districts of Ajmer, Barmer, Bikaner, Bundi, Ganganagar, Jaipur, Jaisalmer, Jalore, Jodhpur, Kotah, Nagaur, Pali, Sikar, Sawai Madhopur and Udaipur. Likely to occur all over. *Elsewhere* : India : All-India, except Kashmir (where *Od. ob. gurdaspurensis* H. & H. is said to occur), West Bengal and probably the southern portion of the Peninsula. Also, West Pakistan and Burma, the last being doubtful.

Remarks.—In size this is a very variable species (soldiers : head-length 1.00—1.53 mm.). In suitable niches it forms relatively small (ca. 100 cm. high) earthen mounds in Rajasthan. Elsewhere its mounds go up as high as about 2.6 metres.

16. *Microtermes anandi* Holmgren(Synonym : *Microtermes obesi* Holmgren)

(Plate 23, Fig. 5)

1913. (April 21). *Microtermes anandi* N. Holmgren, *J. Bombay nat. Hist. Soc.* Bombay, 22 (1), p. 114. S. and W. *Type-locality* : India : Anand (Gujarat).

1913. (May 23). *Microtermes obesi* N. Holmgren, *K. Sv. Vet. Akad. Handl.* Stockholm, 50 (2), p. 150, Pl. 6, Fig. 4. Im. *Type-locality* : India : Khandala (Maharashtra).

Castes found : Im., (not Rajasthan), S. and W.

Distribution.—*Rajasthan* : Districts of Barmer, Jaisalmer, Jodhpur, Jaipur and Kotah. *Elsewhere* : India : All-India, except the extreme north (Kashmir). West Pakistan (Sind, Punjab and N. W. F. P.).

17. *Microtermes mycophagus* (Desneux)

(Plate 23, Fig. 6)

1906. *Termes mycophagus* J. Desneux, *Ann. Soc. Ent. Belg.*, Brussels, 49, pp. 348-352. Im., S. and W. *Type-locality* : Karachi (Sind, West Pakistan).

Castes found : Im., S. and W.

Distribution.—*Rajasthan* : Widespread : Districts of Jaipur, Jaisalmer, Jodhpur, Bikaner, Ganganagar, Churu, Jaipur and Nagaur. *Elsewhere* : West Pakistan (Punjab, Sind and Baluchistan).

Remarks.—The species appears to be confined to the arid areas.

18. *Microtermes* sp.

A few Rajasthan collections of this genus are represented by workers only and cannot, therefore, be identified specifically with certainty. They are from the districts of Barmer, Jodhpur, Bikaner and Churu.

Subfamily (c) *Nasutitermitinae*.19. *Trinervitermes biformis* (Wasmann)

(Plate 24, Figs. 1 and 2)

1902. *Eutermes biformis* E. Wasmann, *Zool. Jb. (Syst.)*, Jena, 17 (1), pp. 133-135. Pl. 4, Figs. 10, 10a. Im., SM., Sm., W. *Type-localities* : Ceylon : Bandarawalla. India : Khandala (near Bombay, Maharashtra).

Castes found : Im. (not Rajasthan), SM., Sm., and W.

Distribution.—*Rajasthan* : Districts of Jaipur and Udaipur. *Elsewhere* : India (Maharashtra and Madhya Pradesh) ; and Ceylon.

20. *Trinervitermes heimi* (Wasmann)

(Plate 24, Figs. 3 and 4)

1902. *Eutermes heimi* E. Wasmann, *Zool. Jb. (Syst.)*, Jena, 17 (1), pp. 133 ; and 135-137. Im., SM., Sm., W. *Type-locality* : India ; Wallon (Ahmednagar District, Maharashtra).

Castes found : Im., SM., Sm., and W.

Distribution.—*Rajasthan* : Districts of Nagaur and Kotah. *Elsewhere* : Peninsular India (Maharashtra, Madras and Mysore States).

III—KEY TO THE GENERA AND SPECIES OF RAJASTHAN TERMITES (BASED ON SOLDIERS)

The following key (based on the soldier caste), together with the illustrations provided here, will, it is hoped, assist in the easy identification of Rajasthan termites. Workers do not, as a rule, provide easy differentiating characters, and alates are known in too few species from Rajasthan to make the preparation of a key worthwhile. Unless otherwise stated, the total length includes the mandibles, but excludes the antennae.

Key to termite soldiers from Rajasthan

1(2) Soldier caste generally absent (rarely found in genus*, but none so far in Rajasthan). (Workers and alates with a large circular, mid-dorsal ocellus-like spot on head).

...*Speculitermes cyclops cyclops*.

2(1). Soldier caste present. (Workers and alates with no such mid-dorsal spot on head.)

3(6). Mandibles non-functional and reduced to minute structures ; head rounded and prolonged into a median forwardly pointed horn (nasus). Two types of soldiers (large and small) present.

...*Trinervitermes*.

4(5). Antennae 13-segmented ; segment 3 more than twice as long as 2.

...*Trinervitermes biformis*.

5(4). Antennae 14-segmented ; segment 3 only slightly longer than 2.

...*Trinervitermes heimi*.

* Found in genus *Speculitermes* by Roonural and Chhotami (*Sci. 4 culture*, Calcutta, 26 (3) pp. 143-144, 1960), in *S. cyclops sinhalensis* from Southern India.

- 6(3). Mandibles well developed and functional.
- 7(14) Pronotum flat.
- 8(9) Large species (10-15 mm. long) ; antennae with 25-29 segments ; eye-spots prominent.
...*Anacanthotermes macrocephalus*.
- 9(8). Smaller species. Antennae with not over 17 segments ; eye-spots absent.
- 10(11). Soldiers of 3 types (major, medium and minor). Mandibles with several large to small well defined teeth on inner margin.
...*Psammotermes rajasthanicus*.
- 11(10). Soldiers of one type; mandibles with only a few crenulations in basal half.
- 12(13). Head subrectangular ; fontanelle small and lying about middle of head.
...*Heterotermes indicola*.
- 13(12). Head oval or subcircular ; fontanelle large and lying far forward on head (just behind clypeus).
...*Coptotermes helmi*.
- 14(7). Pronotum saddle-shaped.
- 15(20). Mandibles with inner margin finely serrated.
...*Microcerotermes*.
- 16(19). Mandibular serrations weak and indistinct.
- 17(18). Mandibles shorter (0.70-0.88 mm.).
...*Microcerotermes tenuignathus tenuignathus*.
- 18(17). Mandibles longer (1.13—1.15 mm.).
...*Microcerotermes tenuignathus laxmi*.
- 19(16). Mandibular serrations distinct.
...*Microcerotermes championi raja*.
- 20(15). Mandibles not finely serrated, and with or without definite teeth on inner margin.
- 21(24). Small species (3—5 mm. long) ; mandibles without teeth.
...*Microtermes*.
- 22(23). Antennae 14-segmented; smaller species (3.1—4.2 mm.).
...*Microtermes anand*
- 23(22). Antennae 15-segmented ; larger species (3.2—4.8 mm.).
...*Microtermes mycophagus*.
- 24(21). Larger species ; mandibles usually with a tooth on inner margin.
- 25(30). Mandibles asymmetrical (left mandible with a prominent tooth in varying positions ; right mandible with only a vestigial tooth).
...*Odontotermes*.
- 26(29). Smaller species (head-length, to base of mandibles, 1.00—1.53 mm. ; maximum head-width 0.90—1.33 mm.) ; antennae with distal one-third brown to dark brown, rest paler.
- 27(28). Mandibles shorter stouter and more incurved (ratio Mandible-length/Head-length 0.52—0.57) ; posterior margin of pronotum with only a weak median notch (absent in the typical subspecies).
...*Odontotermes bellahunisensis guptai*.

28(27). Mandibles longer, more slender and less incurved (ratio Mandible-length/Head-length 0.59—0.70); posterior margin of pronotum with a well-marked median notch.

...*Odontotermes obesus*.

29(26). Larger species (head-length, to base of mandibles, 1.75—1.90 mm.; maximum head-width 1.40 mm.); antennae brownish throughout.

...*Odontotermes brunneus kushwahai*.

30(25). Mandibles symmetrical or nearly so, with a tooth lying near middle of inner margin.

31(32). Clypeus bilobed; mandibles stout, strongly incurved, and with a large tooth.

...*Amitermes belli*.

32(31). Clypeus not bilobed.

33(34). Mandibles short, stout, strongly incurved, and with a prominent tooth on inner margin.

...*Synhamitermes quadriceps*.

34(33). Mandibles long, slender, pointed and only weakly incurved (almost straight); tooth on inner margin either weak or prominent.

...*Eremotermes*.

35(36). Mandibular tooth strong and prominent; labrum longer (0.10—0.15 mm.).

...*Eremotermes paradoxalis*.

36(35). Mandibular tooth minute; labrum shorter (0.75—0.10 mm.).

...*Eremotermes neoparadoxalis*.

IV—SUMMARY

1. The termite fauna of Rajasthan has been studied adequately only during the last few years.

2. A list of the known species from Rajasthan, together with their distribution, etc., is given.

3. About 19 species are known from the region. They belong to 3 families and 12 genera as follows:—

Fam. I. HODOTERMITIDAE : *Anacanthotermes*.

Fam. II. RHINOTERMITIDAE : *Psammotermes*, *Heterotermes* and *Coptotermes*.

Fam. III. TERMITIDAE : *Speculitermes*, *Amitermes*, *Synhamitermes*, *Eremotermes*, *Microcerotermes*, *Odontotermes*, *Microtermes* and *Trinervitermes*.

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*References dealing either wholly or partly with Rajasthan termites are marked with an asterisk.

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