

TERMITE DIVERSITY IN NORTH WESTERN HIMALAYAN REGION WITH NEW DISTRIBUTIONAL RECORDS

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ABSTRACT – Forty nine species of termites belonging to five families (Termopsidae, Kalotermitidae, Rhinotermitidae, Stylotermitidae and Termitidae) and 17 genera (*Archotermopsis*, *Neotermes*, *Glypotermes*, *Bifiditermes*, *Coptotermes*, *Heterotermes*, *Stylotermes*, *Speculitermes*, *Euhamitermes*, *Eremotermes*, *Microcerotermes*, *Angulitermes*, *Dicuspiditermes*, *Pericapritermes*, *Macrotermes*, *Odontotermes* and *Nasutitermes*) are reported here from North Western Himalayan region (Uttarakhand). Thirteen species are being reported first time from this region as new distributional records : *Stylotermes faveolus*; *Speculitermes sinhalensis*; *Eremotermes paradoxalis*; *Microcerotermes cameroni*; *M. tenuignathus*; *Angulitermes tilaki*; *Dicuspiditermes obtusus*; *Odontotermes bellahunisensis*; *O. brunneus*; *O. indicus*; *O. latiguloides*; *O. redemanni* and *O. wallonensis*.

Key words : Termites, new records, Uttarakhand, Termopsidae, Kalotermitidae, Rhinotermitidae, Stylotermitidae, Termitidae.

INTRODUCTION

Uttarakhand constitutes the north-western part of the mountain chain of the greater Himalayan region, The state of Uttarakhand comprises 13 districts, divided into two major mountain hill regions of Kumaun and Garhwal, spread over an area of 55,845 sq. km., lies approximately between Lat. 28°03' -37°02' N and Long 77°03' -81°04' E (Uniyal, 2003).. Topographically, the area is probably unparallel in whole of India, especially due to its contrasting land elevation and the diversities in the physiography, climate, vegetation, rainfall, etc. It is characterized by varied climatic conditions from temperate to tropical, and from excessively humid to semi-humid, with heavy rains in the rainy months. Considering the wide variations in the topographical, climatic and edaphic conditions, the state offers an interesting area for faunal diversity. It has not been worked out comprehensively for its termite fauna; particularly the Garhwal Himalayan region remains unexplored.

The earliest known record of termites from Uttarakhand is that of Snyder (1949) who mentioned only four genera and four species from this area. Chatterjee and Thakur (1964, 1965, 1966a, b and c) recorded two new species and a new genus from North-Western Himalayas. The first serious attempt to study the termite fauna of this region was made by Chatterjee and Thakur (1967), who reported 10 genera comprising 19 species from North-Western Himalayas, of which 9 species were from Uttarakhand. Subsequently, Chatterjee and Thakur (1969), Mathur and Sen-Sarma (1959), Mathur and Thapa

(1962), Roonwal (1953, 1962, 1978a and b), Roonwal and Chhotani (1960, 1989), Roonwal and Sen-Sarma (1960), Sen-Sarma (1962), Sen-Sarma *et al* (1975), Sen-Sarma and Thakur (1980), Thakur, (1966, 1975, 1978 and 1981), Thakur and Chatterjee (1970), Verma (1980, 1986, 1987, 1988, 1989 and 1995), Verma and Bhargava (1976) , Verma and Purohit (1993) and Verma and Thakur (1976, 1978 and 1979) have contributed to the termites of this region. The present paper is based on 233 vials of termites, collected by the authors as well as some material present in the unidentified collection of Entomology Division, Forest Research Institute, Dehradun. Some species already identified by earlier workers were also examined and included so as to get as complete a picture of whole component of the termite fauna of this region. Altogether; 52 species belonging to 17 genera and five families are reported here, of which 13 species are new distributional records: *Stylotermes faveolus* (Chatterjee and Thakur); *Speculitermes sinhalensis* (Roonwal and Sen-sarma); *Eremotermes paradoxalis* (Holmgren); *Microcerotermes cameroni* (Snyder); *M. tenuignathus* Holmgren; *Angulitermes tilaki* (Roonwal and Chhotani); *Dicuspiditermes obtusus* (Silvestri); *Odontotermes bellahunisensis* (Holmgren and Holmgren); *O. brunneus* (Hagen); *O. indicus* (Thakur); *O. latiguloides* (Roonwal and Verma); *O. redemanni* (Wasmann); and *O. wallonensis* (Wasmann).

Measurements (in mm) are given for only new records.

Abbreviations used: Ex., extracted from; Im., Imago;

S., Soldier; Ps., Psuedoworkers; sev., several; W., Worker.

MATERIAL AND METHODS

A large collection of termites (233 vials) were available in the unidentified collection of the Division of Entomology, Forest Research Institute Dehra Dun for the present studies. The specimens were preserved in alcohol, with proper label containing details of the locality, date of collection and host plant etc. For taxonomic measurements, Roonwal (1970)'s "Measurements of termites (Isoptera) for taxonomic purpose", was followed for carrying out the taxonomic studies. The termite specimens were studied under a Stereoscopic Binocular microscope with the help of ocular micrometer fitted within one eyepiece of the binocular and the measurements of various body parts of the termites (such as antennae, mandibles, labrum, pronotum, etc.) were taken. Temporary slides of the various body parts were prepared for detailed studies. For taxonomic studies, comparison with the authenticated reference collection of known species was made. Wherever necessary, "type" specimens were also referred.

Systematic Account

Family I Termopsidae

Subfamily Termopsinae

1. *Archotermopsis wroughtoni* (Desneux)

1913. *Archotermopsis wroughtoni*, Holmgren, *K. Svenska Akhad. Handl.*, 50 (2), pp. 31-33.

Material : One vial with S. and W from West Panwanala Block, Barechina range, Almora; 2.6. 1971; coll. B. K. Gupta; Ex. Partially dead tree of *Pinus roxburghii* (Present in the Identified National Forest Insect Collection, Forest Research Institute, Dehradun).

Distribution : Uttarakhand, Himachal Pradesh and Jammu and Kashmir. It is one of the most interesting primitive termites and is distributed in the lower level conifer forest of North Western Himalayas, up to an elevation of 9000 ft (Chatterjee and Thakur, 1967; Roonwal and Chhotani, 1989).

Family II Kalotermitidae

2. *Neotermes bosei* Snyder

1933. *Neotermes bosei* Snyder, *Proc. U.S. Nat. Mus.* 82 (16); 2-3. S. and Ny. of Im. *Type-locality:* Uttarakhand, Mathranwala, Dehradun.

Material : (i) Two vials with S. and Ps. from Mango tree near Range Office, Bageshwar, coll. B.K. Gupta. (Present in the Identified National Reference Collection, Forest Research Institute, Dehradun). (ii) One vial collected near FRI main building, Dehradun, coll. R. K.

Thakur 7. 5. 1993. Ex. *Cupressus cashmiriana*.

Distribution : It is known from Uttarakhand, West Bengal (Jalpaiguri, Samsing and Bagdogra. Also reported from Bhutan (Roonwal and Sen-Sarma, 1960; Roonwal and Chhotani, 1987).

3. *Neotermes megaoculatus megaoculatus* Roonwal and Sen-Sarma

1960. *Neotermes megaoculatus megaoculatus*, Roonwal and Sen-Sarma, *Contrib. Syst. Oriental Termites* (ICAR Ent. Monogr.): 139, 143, 214-2'7, 271, 380-381 (PL.52). S, Pw. Holotype: S, in FRI, Dehradun. *Type-locality:* Dehradun, India.

Material : Three vials with Im., S. and Ps. from (i) Kanda Dher Forest, Askot, Uttarakhand, coll. M. L. Thakur, 29.5.1971, Ex. *Mangifera indica* (ii) Askot (near market area), coll. M. L. Thakur, 29.5.1971, Ex. Dry tree of *Pieris ovalifolia* (iii) Dholakot, Askot, Uttarakhand, coll. M. L. Thakur, 30.5.1971, Ex. Green stem of *Myrica esculenta*. Present in the Identified National Reference Collection, Forest Research Institute, Dehradun.

Distribution : So far, it is known only from Dehradun, Uttarakhand (Roonwal and Sen-Sarma, 1960; Roonwal and Chhotani, 1989).

4. *Neotermes microculatus* Roonwal and Sen-Sarma

1960. *Neotermes microculatus*, Roonwal and Sen-Sarma, *Contrib. Syst. Oriental Termites*. (I.C.A.R. Monogr. No. 1): 139-142, 220-223, 270, 382-383. *Type locality:* Dehra Dun, India.

Material : One vial with S. and Ps. from Brandis Road near main gate FRI campus, Dehradun, 26.5.2004, coll. R. K. Thakur, Ex. Dead *Salix alba*.

Distribution : So far, it is known only from Dehradun, Uttarakhand (Roonwal and Sen-Sarma, 1960; Roonwal and Chhotani, 1989).

5. *Glyptotermes almoresis* Gardner

1944. *Kaloterme (Glyptotermes) almoresis* Gardner, *Indian J. Ent.*, 6: 104-105., Im, S.

Lectotype : S. in FRI, Dehradun. *Type-locality:* Bajwar (Almora, Uttarakhand).

Material : Four vials with Im., S. and Ps. from: (i) Near Range office, Bageshwar, coll. B. K. Gupta, 26-27. 5. 1971, Ex *Mangifera indica* (ii) Kanda Dhev Forest, Askot, coll. B.K. Gupta, 29.5.1971 Ex Main stem of *Rhododendron arboreum* (iii) Dholakot, 30.5.71, coll. B.K. Gupta, Ex Dry stem of *Shorea robusta* (iv) West Panwanala Block, Barechina Range, Almora, coll. B.K. Gupta, 2.6.1971, Ex Green stem of *Celtis australis*.

(Present in the Identified National Reference Collection, Forest Research Institute, Dehradun).

Distribution : So far, it was only known from Kumaon Hills in Uttarakhand (Roonwal and Chhotani, 1989). Its record from Dehradun (Garhwal) is an extension of its range to Garhwal hills.

6. *Bifiditermes besoni* (Gardner)

1945. *Kaloterme besoni* Gardner, *Indian J. Ent.*, 6 (1944): *Type-locality*: Haldwani, Uttar Pradesh, India.

Material: One vial with a cotype S. and few Ps. from Haldwani, Uttarakhand, coll. C.F.C. Beeson, February, 1933 (Material present in the Entomological Reference Collection, Forest Research Institute, Dehradun).

Distribution: Uttarakhand (Haldwani, Ramnagar), Uttar Pradesh (Gorkhpur) and Haryana (Karnal). Also reported from Pakistan (Roonwal and Chhotani, 1989).

Family III Rhinotermitidae

Subfamily (i). Coptotermitinae

7. *Coptotermes heimi* (Wasmann)

1902. *Arrhinotermes heimi* Wasmann, *Zool. Jahrb. Abt. Syst.*, Jena, 17(1): 104. Im. *Type-locality*: Maharashtra: Wallon (Ahmadnagar).

Material: Six vials with S. and W. from various places in Dehradun: Gularghati 26-4-1991; Malsi 14.12.1990; Vikasnagar 12.3.1993; Doiwala 28.11.1994; Jhajra 30.3.1992 and Kalsi 30.3.1992, coll R. K. Thakur.

Distribution: A widely distributed species in the Indian subcontinent, reported from India, Pakistan, Bangladesh, Bhutan and Nepal (Roonwal and Chhotani, 1989).

Subfamily (ii) Heterotermitinae

8. *Heterotermes indicola* (Wasmann)

1902. *Leucotermes indicola* Wasmann, *Zool. Jahrb. Abt. Syst.*, Jena, 17 (1): 118-119. S. and W. *Type-Locality*: Bombay (Maharashtra).

Castes Known: Imago, Soldier and Worker.

Material: Eleven vials with sev. S. and W. from New Forest Campus, coll. R. K. Thakur (During 2003-2006) from Office Buildings, Museums, Hostels, Officer Rest House and Residential quarters. (Collected from the damaged window, doors, furniture, etc.)

Distribution: A most common wood-destroying termite in the Indian sub-continent and is found all over above 20° N latitude and extends in distribution up to Afghanistan (Thakur, 1979; Roonwal and Chhotani, 1989).

Family IV Stylotermitidae

9. *Stylotermes bengalensis* Mathur and Chhotani

1959. *Stylotermes bengalensis* Mathur and Chhotani, *Zool. Anz.*, 163 (1-2): 40-46. S. and W. *Type-locality*: India: West Bengal, Darjeeling Division.

Material: Two vials with S. and W. from (i) Ranikhet, coll. B.K. Gupta, 24.5.1971, Ex. Trunk of *Alnus nitida* and *Ouercus leucotrichophora* (ii) Kanda Dher Forest, Askot, coll. B.K. Gupta, 24.5.1971, Ex. *Pieris ovaliflora*. (Present in the Identified National Reference Collection, Forest Research Institute, Dehradun).

Distribution: INDIA: Uttarakhand and West Bengal (Roonwal and Chhotani, 1989).

10. *Stylotermes chakratensis* Mathur and Thapa

1960. *Stylotermes chakratensis* Mathur and Thapa, *J. Timber Dryers & Preserv. Ass. India*, 8(4):4-8. S and W. Holotype: S, in FRI. *Type locality*: Koawa Block, Chakrata Forest Division (Dehradun Dist, Uttarakhand, India), Ca. 6000 ft (ca.1830m)

Material: One vial with S. and W. from Dakrani on Shimla Road, Herbertpur, Dist. Dehradun, coll. R. K. Thakur 22.3.1991, Ex Dead rotten stump.

Distribution: Uttarakhand: Chakrata and Dehradun (Roonwal and Chhotani, 1989).

11. *Stylotermes dunensis* Thakur

1975. *Stylotermes dunensis* Thakur, *J. Indian Acad. Wood Sci.*, 6 (2): 98-105. Im, S, W. Holotype: S, in FRI, Dehradun. *Type locality*: Dehradun (Uttarakhand, India). Paratypes examined.

Material: One vial with S. and W. from Phoolbagh, Haldwani, coll R. K. Thakur, 9.9. 1994, Ex. Poplar tree.

Distribution: Dehradun (Uttarakhand, Western Himalayas) (Roonwal and Chhotani, 1989).

12. *Stylotermes faveolus* (Chatterjee and Thakur)

1964. *Stylotermes faveolus* Chatterjee and Thakur, *Zool. Anz.*, 17 (2): 149-162. Im. S. and W. *Type-locality*: Sarvari village, notified cremation ground, near Kulu saw mill, Himachal Pradesh.

Material: One vial with S. and W. from Bauwala, Dehradun, coll. R. K. Thakur, 13.12.1990, Ex. Rotten stump.

Distribution: *Previous Record*: Himachal Pradesh: Kulu Valley (Roonwal and Chhotani, 1989). *Present Record*: Dehradun, from Uttarakhand, it is a new record.

Family V: Termitidae**Subfamily (i) Amitermitinae****13. *Speculitermes cyclops* Wasmann**

1902. *Speculitermes cyclops* Wasmann, *Zool. J.hrb. Abt. Syst., Jena*, 17 (1): 160–162. Im., W. *Type-locality*: Maharashtra: Khandala, Bombay.

Material: Ten vials with W. from Lachhiwala, Near Railway Bridge, 26-11-1990; Malsi, 14-12-1990; Doiwala, 16-11-1992, 17-2-1993, 26-5-1993, 28-7-1993, 28-11-1994, Jhajra range, 3-4-1996, Kalsi, 22-4-1996, Herbertpur, 2-2-1995, coll. R. K. Thakur, Ex. under the stone.

Distribution: Jammu and Kashmir, Gujarat, Karnataka, Orissa, Rajasthan, Madhya Pradesh, Maharashtra and Uttarakhand, also recorded from Bangladesh and Pakistan (Chhotani, 1997).

14. *Speculitermes sinhalensis* Roonwal and Sen-Sarma

1960. *Speculitermes cyclops sinhalensis* Roonwal and Sen-Sarma, *Contrib. Syst. Orient. Termites* (ICAR, Entom. Mongor. No. 1): 23-26. W. *Type-locality*: Sri Lanka: Vavuniya (North Province).

Material: One vial with sev. W. from Satowala, Dist. Dehradun, coll. R. K. Thakur, 30-11-1994.

Distribution: *Previous Records:* Andra Pradesh, Tamil Nadu, Kerala & Karnataka (Fairly distributed in South India), Gujarat, Maharashtra, Orissa and Madhya Pradesh, also recorded from Sri Lanka (Chhotani, 1997). *Present Record:* Dehradun, from Uttarakhand, it is a new record.

15. *Speculitermes triangularis* Roonwal and Sen-sarma

1960. *Speculitermes triangularis* Roonwal and Sen-Sarma, *Cont. Syst. Orient. Termites* (ICAR, Entom. Mongor. No. 1): 26–28. W. *Type-locality*: Uttarakhand: Dehradun (ca. 610 meter above sea-level).

Material: One vial with sev. W. from Beriwal, Dist. Dehradun, coll. R.K. Thakur, 30.11.1994.

Distribution: Uttarakhand and Gujarat (Thakur, 1989). Earlier, it was known only from Kumaon Hills and its present record from Garhwal is an extension of its distributional ranges.

16. *Euhamitermes lighti* Snyder

1933. *Amitermes (Euhamitermes) lighti* Snyder, *Proc. biol. Soc.*, 46: 93. S. only. *Type-Localities*: Uttarakhand : Dehradun.

Material: One vial with sev. S and W. from Ranipur, Dehradun, 23-8-2005, coll. R. K. Thakur.

Distribution: So far, it is known only from Dehradun, Uttarakhand (Chhotani, 1997).

17. *Eremotermes dehraduni* Roonwal and Sen-Sarma

1960. *Eremotermes dehraduni* Roonwal and Sen-Sarma, *Contributions to the Systematic of Oriental Termites*. (ICAR, Entom. Mongor. No. 1): Xiv+407 pp.

Material: One vial with two S. and W. from New Forest Campus, Dehradun, Uttarakhand, 7.4.2003, coll. R.K. Thakur.

Distribution: So far, it is known only from Dehradun, Uttarakhand (Chhotani, 1997).

18. *Eremotermes paradoxalis* Holmgren

1912. *Eremotermes paradoxalis* Holmgren, *K. Svenska Vetensk. Akad. Handl.*, 48 (4): 95. S. *Type – locality*: Karnataka: Bangalore.

Material: One vial with three S. and W. from Lalkua, Haldwani, Uttarakhand, 4.10.1993, coll. R.K. Thakur.

Distribution: *Previous Records:* Punjab, Delhi, Bihar, Gujarat, Madhya Pradesh, Karnataka and Tamil Nadu, also known from Pakistan. *Present Records:* Haldwani, it is reported first time from Uttarakhand.

19. *Microcerotermes beelsoni* Snyder

1933. *Microtermes beelsoni* Snyder, *Proc. U. S. Nat. Mus.*, 82 (16): 12-14. Im. *Type-locality*: India: Chakarata range, Haldwani, U.P.

Material: Twenty six vials with sev. S and W. from Sal forest at Choharpur, Shaspur, Asarori, Langa, Phanduwala, Thanu, Lachhiwala, 29.4.1992. (Collected between 2003-2006 in connection with the research project on the “Evaluation of Natural Termite resistance in timber against termites”), coll. R. K. Thakur. Ex. Carton nests.

Distribution: Delhi, Haryana, Punjab, Madhya Pradesh, Orissa, Uttarakhand, West Bengal and Assam, also known from Bhutan, Pakistan and Bangladesh (Chhotani, 1997).

20. *Microcerotermes cameroni* Snyder

1934. *Microcerotermes cameroni* Snyder, *Indian For. Rec.* 20 (1): 21-22. Im. and S. *Type-locality*: Tamil Nadu: North Vellore.

Material: Two vials with S. and W. from Tejpura nursery, Thanu Forest Range, Dehradun, Uttarakhand, coll. R.K. Thakur, 30.3.1992.

Distribution: *Previous Records:* Tamil Nadu, Andhra Pradesh and West Bengal (Chhotani, 1997). *Present Record:* Dehradun, from Uttarakhand it is

reported for the first time.

21. *Microcerotermes tenuignathus* Holmgren

1913. *Microcerotermes tenuignathus* Holmgren, *J. Bombay. Nat. Hist. Soc.*, Bombay, 22 (1): 116–117. S. and W. (major and minor). *Type-locality*: Gujarat: Vadtal.

Material: One vial with S. and W from Sanjayvan poplar nursery, Haldwani, 5.10.1993, coll. R. K. Thakur, Ex. Poplar roots.

Distribution: *Previous Records*: Gujarat, Maharashtra, Rajasthan, also known from Pakistan (Chhotani, 1997). *Present Record*: Haldwani, it is new record from Uttarakhand.

Subfamily (ii) Termitinae

22. *Angulitermes acutus* Mathur and Sen-Sarma

1960. *Angulitermes acutus* Mathur and Sen-Sarma, *Ann. Mag. Nat. Hist.*, (13) 3(31): 401-406. W. *Type-locality*: Pallaymcottach, Tinnevely District, Tamil Nadu.

Material: One vial with S. and W. from *Acacia* plantation near the Bridge, Doiwala, coll. R.K. Thakur, 28.7.93.

Distribution: Tamil Nadu and Uttarakhand (Sen-Sarma, *et. al.*, 1975, Chhotani, 1997).

23. *Angulitermes akhorisainensis* Chatterjee and Thakur

1964. *Angulitermes akhorisainensis* Chatterjee and Thakur, *J. Bombay Nat. Hist. Soc.*, 61 (2): 348-353. Im., S. and W. *Type-locality*: Akhorisain Block, Tehri range (Garhwal For. Div.), Uttarakhand.

Material: One vial with S. and W. from Phool Bagh near Lalkua, Haldwani, Uttarakhand, 6.9.1994, coll. R. K. Thakur, Ex. under stone

Distribution: So far, it was known only from Garhwal Hills, Uttarakhand (Chhotani, 1997). Its record from Haldwani, Kumaon Hills is an extension of its range.

24. *Angulitermes dehraensis* (Gardner)

1945. *Mirotermes dehraensis* Gardner, *Indian J. Ent.*, 108-110. Im., S. and W. *Type-locality*: Uttarakhand; Dehradun.

Material: One vial with S. and W. from Brandis Road, New Forest Campus, Dehradun, Uttarakhand, , 3.4.2005, coll. R.K. Thakur. Ex. Under fallen logs.

Distribution: Uttarakhand. Also known from Afghanistan and Pakistan (Chhotani, 1997).

25. *Angulitermes tilaki* Roonwal and Chhotani

1971. *Angulitermes tilaki* Roonwal and Chhotani, *Rec. Zool. Surv. India*, 63 (1-4): 213-217, 220-222. S

and W. *Type-locality*: Chineni, Dist. Udhampur (J & K).

Material: One vial with S. and W. from Malsi Deer Park, Dehradun, Uttarakhand, coll. R.K. Thakur, 14.12.1990.

Distribution: *Previous Record*: Jammu & Kashmir (Roonwal and Chhotani, 1989). *Present Record*: Dehradun, it is new record from Uttarakhand.

26. *Dicuspitermes obtusus* (Silvestri)

1923. *Capritermes obtusus* Silvestri, *Rec. Indian Mus.*, Calcutta, 25 (2) : 229-231. *Type-locality*: Orissa: Barkuda Island, Chilikalake.

Material: One vial with S. and W. from Bauwala, Dist. Dehradun, Uttarakhand, 13.12.1990, coll. R.K. Thakur. Ex. Inside lying log of unknown wood.

Distribution: *Previous Records*: Orissa, Madhya Pradesh and Karnataka (Chhotani, 1997). *Present Record*: Dehradun, it is new record from Uttarakhand.

27. *Pericapritermes dunensis* (Roonwal and Sen-Sarma)

1960. *Capritermes dunensis* Roonwal and Sen-Sarma, *Indian Counc. agric. Res. (Ent. Monogr.)* No. 1, pp. 28-33, S. and W. *Type-locality*: Uttarakhand: Dehradun.

Material: One vial with S. and W. from Vikasnagar, Uttarakhand, 30.8.1993, coll. R.K. Thakur.

Distribution: Arunachal Pradesh, Meghalaya, Uttarakhand and West Bengal (Chhotani, 1997).

Sub-family (iii) Macrotermitinae

28. *Odontotermes assmuthi* Holmgren

1913. *Odontotermes (Odontotermes) assmuthi* Holmgren, *J. Bombay Nat. Hist. Soc.*, Bombay, 32 (1): 112-113. S. and W. *Type-locality*: Bombay: Borivili jungles.

Material: Three vials with sev. S., W. and Im. from (i) Jhajra Range, Dehradun, 3.5.1996 (ii) Vikasnagar, Dehradun, coll. R. K. Thakur, 7.5.1992 (iii) Doiwala, Dehradun, coll. R.K. Thakur, 29.4.1992 (iv) Laurie Road, New Forest, Dehradun, coll. M.L. Thakur, 13.6.1970.

Distribution: A very widely distributed species, occurring in Assam, Bihar, Gujarat, Jammu and Kashmir, Karnataka, Maharashtra, Madhya Pradesh, Punjab, Tamil Nadu and Uttarakhand in India. From Pakistan, it is reported only from Kangu (Kohat District) and from Bangladesh from drier areas of Dinajpur and Rajshahi (Chhotani, 1997).

29. *Odontotermes bellahunisensis* Holmgren and Holmgren

1917. *Odontotermes (Cyclotermes) bellahunisensis* Holmgren and Holmgren, *Mem., Dept. Agric. India (Ent.)*, 5(3): 150-151. Im., S. and W. *Type-locality*: Karnataka: Bellahunsi, Bellary district.

Material: Six vials with S. and W. from Mohand, 7.2.1990, Lachhiwala, 26.12.1990; Vikasnagar, 12.3.1993, 30.8.1993, 27.1.1995; Jhajra range, Uttarakhand, 15.5.1996, coll. R.K. Thakur.

Distribution: *Previous Records:* Assam, Bihar, Gujarat, Karnataka, Kerala, Orissa, Rajasthan, Tamil Nadu and West Bengal (Chhotani, 1997). *Present Record:* It is new record from Uttarakhand.

30. *Odontotermes bhagwatii* Chatterjee and Thakur

1967. *Odontotermes bhagwatii* Chatterjee and Thakur, *Indian Forest Rec.*, New Delhi, 11 (1): 33-35. *Type Locality:* Punjab: New Railway Station, Pathankot.

Material: One vial with S. and W. from Tanda near Lalkua, Haldwani, coll. R. K. Thakur, 5.10.1993.

Distribution: Recorded from Jammu & Kashmir, Gujarat, Karnataka, Madhya Pradesh, Punjab and Uttarakhand (Chhotani, 1997).

31. *Odontotermes boveni* Thakur

1981. *Odontotermes boveni* Thakur, *Indian For. Rec.*, 14(2): 30-33. S. and W. *Type-locality:* Uttarakhand: Gwaldam (Garhwal Hills).

Material: One vial with S. and W. from Shimla Road near Dakrani, Dehradun, Uttarakhand, coll. R. K. Thakur, 22.3.1991.

Distribution: Uttarakhand and Madhya Pradesh. Also known from Nepal (Chhotani, 1997).

32. *Odontotermes brunneus* (Hagen)

1858. *Termes brunneus* Hagen, *Linn. Entomol.*, London., 12:133. Im. and S. *Type-locality:* Bengal.

Material: Four vials with S. and W. from Bauwala, Dehradun, 13.12.1990, Doiwala, Dehradun, 16.11.1992, 28.7.1993, 28.11.1994, coll. R.K. Thakur.

Distribution: *Previous Records:* A Widely distribution mostly from Peninsular India; also Gujarat, Maharashtra, Orissa and Uttarakhand (Chhotani, 1997). *Present Record:* Dehradun, it is new record from Uttarakhand.

33. *Odontotermes dehraduni* (Wasmann)

1933. *Termes (Termes) dehraduni* Snyder, *Proc. U. S. Nat. Hist.*, Washington, 82(16): 6-7. *Type-locality:*

Uttarakhand: Dehradun,

Material: One vial with six Im. from New Forest Campus (Canning Road), Dehradun, Uttarakhand, 11.03.2005 (Alates collected at 6.30 P.M.)

Distribution: Uttarakhand: Doon Valley. Also known from Pakistan (Jhelum, Lahore and Rawalpindi) (Ahmad, 1955).

34. *Odontotermes distans* Holmgren and Holmgren

1917. *Odontotermes (Odontotermes) distans* Holmgren and Holmgren, *Mem. Dept. Agric. India (Ent.)*, Calcutta, 5(3): 153. Im. *Type-locality:* India: Shevarory Hills, Kedar Rocks (ca. 1200m)

Material: Four vials with S. and W. from (i) New Forest Campus, Dehradun, coll. R. K. Thakur, 13.11.1990. (ii) Gularghati, 26.4.1991. (iii) Vikasnagar 21.11.1994, coll. R. K. Thakur (iv) Sanjayvan Nursery, Haldwani, coll. R.K. Thakur, 8.9.1994.

Distribution: This species is widely distributed throughout India up to an elevation of about 2100 m. in the Himalayas. Thakur (1989) reported it from Gujarat (Banasakantha, Junagarh Valsad and Bharuch). Also known from Bhutan (Roonwal and Chottani, 1977) and Pakistan (Ahmad, 1955).

35. *Odontotermes giriensis* Roonwal and Chhotani

1964. *Odontotermes giriensis* Roonwal and Chhotani, *Proc. Nat. Inst. Sci India*, (4): 341-345. S. and W. *Type-locality:* Meghalaya: Rongrengiri, Garo Hills district.

Material: Three vials with S. and W. from (i) Lalkua, Haldwani, 4.10.1993, coll. R. K. Thakur (ii) Herbertpur, Dehradun 4.2.1993, coll. R. K. Thakur (iii) Tejpura Nursery, Dehradun, 30.3.1992, coll. R. K. Thakur.

Distribution: Arunachal Pradesh, Assam, Gujarat, Manipur, Meghalaya, Orissa, Tripura and Uttarakhand (Thakur, 1981). Also known from Bangladesh (Chhotani, 1997).

36. *Odontotermes gurdaspurensis* Holmgren and Holmgren

1917. *Odontotermes obesus f. gurdaspurensis* Holmgren and Holmgren, *Mem. Dept. Agric. (Ent.)*, 5 (3): 149-150. Im., S. and W. *Type-locality* Punjab: Gurdaspur.

Material: Six vials with S. and W. from Vikasnagar, 12.3.1993; Herbertpur, 29.7.1993; Doiwala 28.11.1994; Beriwalla, 30.11.1994; Jhajra Range 13.3.1993 and Kalsi, 16.5.1996, coll. R. K. Thakur.

Distribution: Widely distributed in India (Jammu & Kashmir, Punjab, Himachal Pradesh, Haryana, Uttarakhand, Madhya Pradesh, West Bengal, Rajasthan and Maharashtra) and Pakistan (Chhotani, 1997).

37. *Odontotermes horai* Roonwal and Chhotani

1962. *Odontotermes horai*, Roonwal and Chhotani, *Proc. Nat. Inst. Sci. India*, Allahabad, (B) 28 (4): 346-349. *Type-locality:* Arunachal Pradesh: Nong- Priang Stream, Khasi Hills.

Material: Seven vials with S. and W. from Uttarakhand (i) Malsi, 14.12.1990; Doiwala, 16.11.1992; Vikasnagar, 30.7.1993; Herbertpur, 24.11.1994; District Dehradun, coll. R. K. Thakur (ii). Phoolbagh, 7.10.1993; Tanda, 7.9.1994; Lalkuwa, 14.11.1994; District. Nainital, coll. R. K. Thakur.

Distribution: Meghalaya, Nagaland, West Bengal, Uttarakhand and Madhya Pradesh. Also known from Nepal (Chhotani, 1997).

38. *Odontotermes indicus* Thakur

1981. *Odontotermes indicus* Thakur, *Indian For. Rec.*, 14 (2): 70-75. Im., S. and W. *Type-locality:* Bombay.

Material: Five vials with S. and W. from Kalsi, 30.3.1992; Herbertpur, 29.7.1993, Vikasnagar, 30.8.1993; Bhaniawala, 7.2.1996; Jhajra Range, 3.4.1996, Dehradun, coll. R. K. Thakur.

Distribution: *Previous Records:* Widely Distributed species, found throughout India except the Eastern Zone (Thakur, 1981, 1989). *Present Record:* Dehradun, it is new record from Uttarakhand.

39. *Odontotermes latiguloides* Roonwal and Verma

1973. *Odontotermes latiguloides* Roonwal and Verma, *J. Indian Acad. Wood. Sci.*, 4(2): 81-91. S. and W. *Type-locality:* Rajasthan: Mandalgarh (Bhilwara district).

Material: One vial S. and W. from Mango Orchard, Vikasnagar, coll. R. K. Thakur, 12.3.93, Ex. Mango Tree trunk.

Distribution: *Previous Records:* Gujarat and Rajasthan (Chhotani, 1997). *Present Record:* Vikas nagar, Dehradun, it is new record from Uttarakhand.

40. *Odontotermes lokanandi* Chatterjee and Thakur

1967. *Odontotermes lokanandi* Chatterjee and Thakur, *Indian For. Rec.*, 11 (1): 38-41. S. and W. *Type-locality:* INDIA: Jammu and Kashmir; Residential plot area No. 6, near River Tawi, Jammu.

Material: Eleven vials with S. and W. from Haldwani: Tanda, 7.9.1994; Lalkua, 14.11.1994; Herbertpur 4.2.1993, Doiwala 28.11.1994, Jhajra, 1.2.1996; Kalsi, 16.5.1996) Dehradun, coll. R. K. Thakur.

Distribution: Gujarat, Himachal Pradesh, Jammu & Kashmir and Uttarakhand. Also known from Pakistan (Choudhary *et al.*, 1972) and Bangladesh (Akhtar, 1977).

41. *Odontotermes microdentatus* Roonwal and Sen-Sarma

1960. *Odontotermes microdentatus* Roonwal and Sen-Sarma, (I.C.AR. Ent. Monogr. No. 1: 33-39). Im., S. and W. *Type-locality:* Uttarakhand: Dehradun.

Material: Eight Vials with S. and W. from New Forest on Brandis road, 7.9.2003 and near Deemed University. Ex. *Eucalyptus* sp., 11.3.2004; Vikasnagar, 29.4.1991; Herbertpur, 4.2.1993, coll. R. K. Thakur.

Distribution: Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Madhya Pradesh and Bihar (Chhotani, 1997). This species is widely distributed throughout India, extending to the temperate climate in the lower Himalayas (Thakur, 1981; Roonwal and Chhotani, 1997).

42. *Odontotermes obesus* (Rambur)

1842. *Termes obesus* Rambur, *Hist. Nature. Insects Neuroptera*, Paris: 304. Im. *Type-locality:* Bombay.

Material: Forty vials with sev. S. and W from (i) Doiwala, 31.1.1995, 20.3.1996, 20.5.1995, 26.5.1996, 28.12.1992 (ii) Herbertpur, 22.3.1991, 22.2.1991, 4.2.1993, 2.2-1995, 29.3.1993, 22.4.1996, 20.11.1992, 23.12.1992, 18.12.1993 (iii) Lambiorao, 22.2.1996 (iv) Jhanjra, 13.3.1996, 21.3.1996, 2.2.1996, 7.2.1996, 24.4.1996, 15.4.1996 (v) Bansiwala, 7.2.1996 (vi) Kalsi, 8.2.1996, 16.5.1996 (vii) Vikasnagar, 12.3.1993, 29.4.1991, 12.11.1992, 7.4.1992, 30.7.1992, 12.11.1992, 30.11.1992, 21.11.1994, 3.12.1992, 7.12.1992 (viii) Sahaspur, 23.4.1991, 13.4.1992 (ix) Gularghati, 29.4.1991 (x) Dak Pathar, 29.7.1993 (xi) Satowala, 16.11.1992 (xii) Malsi, 14.12.1992.

Distribution: This is the most widely distributed and common mound building termite species, occurring all over India, Bangladesh, Myanmar and Pakistan (Thakur, 1981; Chhotani, 1997).

43. *Odontotermes redemanni* (Wasmann)

1893. *Termes redemanni* Wasmann, *Wein. Ent. Zeitg.*, 12 (7): 239. W. qu., S. and W. *Type-locality:* Sri Lanka: Colombo.

Material: Eight vials with S. and W. from Dehradun: Gularghati, 26.4.1991; Herbertpur, 22.4.1992; Doiwala, 16.11.1992; Vikasnagar 12.3.1993; Thano, 29.11.1994;

Mohund, 30.11.1994; Baniawala, 7.2.1996; Kalsi, 16.5.1996.

Distribution: *Previous Records:* A widely distributed termite species in Sri Lanka. In India, it has been reported from Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu and West Bengal (Chhotani, 1997). *Present Record:* Dehradun, it is a new record from Uttarakhand.

44. *Odontotermes wallonensis* (Wasmann)

1902. *Termes obesus* sub sp. *wallonensis* Wasmann, *Zool. Jahrb. Abt. Syst., Jena*, 17 (1): 106. Im., S. and W. *Type-locality:* Wallon, Sangamner (Ahmednagar district).

Material: Eight vials with S. and W. from district Dehradun; Herbertpur, 18.8.1993; Doiwala, 28.11.1994; Lambirao and Satowala 30.11.1994, near Thanu Rest House, 29.11.1994; Jhajra, 31.3.1996; Kalsi, 22.4.1996; Haldwani, Tanda, 5.11.1993; Sanjayvan Nursery 15.11.1994, coll. R. K. Thakur.

Distribution: *Previous Records:* Maharashtra, Gujarat, Karnataka, Andhra Pradesh, Tamil Nadu, Madhya Pradesh, Bihar and Orissa (Chhotani 1997). *Present Records:* Dehradun and Haldwani, it is a new record from Uttarakhand.

45. *Microtermes incertoides* Holmgren

1913. *Microtermes incertoides* Holmgren, *J. Bombay Nat. Hist. Soc.*, 22 (1): 113-114. S. and W. *Type-locality:* Wallon (Ahmednagar district).

Material: Two vials with S. and W. from Two vials with S. and W. from Malsi Deer Park, 14.12.1990; Bauwala, 13.12.1990, Dehradun, coll. R. K. Thakur.

Distribution: Andhra Pradesh, Daman, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Tamil Nadu and Uttarakhand. Also known from Pakistan (Chhotani, 1997).

46. *Microtermes obesi* Holmgren

1912. *Microtermes obesi* Holmgren, *J. Bombay Nat. Hist. Soc.*, 21 (1): 787-788. Im. only. *Type-locality:* Maharashtra: Khanadala (near Bombay).

Material: Twenty three vials from (i) Doiwala, 31.1.1995, 20.3.1996, 20.5.1995, 26.5.1996, 28.12.1992 (ii) Herbertpur, 22.3.1991, 22.2.1991, 4.2.1993, 2.2.1995, 29.3.1993, 22.4.1996, 20.11.1992, 23.12.1992, 18.12.1993 (iii) Lambiorao, 22.2.1996 (iv) Jhanjra, 13.3.1996, 21.3.1996, 2.2.1996, 7.2.1996, 24.4.1996, 15.4.1996 (v) Bansiwala, 7.2.1996 (vi) Kalsi, 8.2.1996, 16.5.1996 (vii) Vikasnagar, 12.3.1993, 29.4.1991, 12.11.1992, 7.4.1992, 30.7.1992, 12.11.1992, 30.11.1992, 21.11.1994, 3.12.1992,

7.12.1992 (viii) Sahaspur, 23.4.1991, 13.4.1992 (ix) Gularghati, 29.4.1991 (x) Dak Pathar, 29.7.1993 (xi) Satowala, 16.11.1992 (xii) Malsi, 14.12.1992.

Distribution: It is one of the most common and widely distributed species of Genus *Microtermes* and has been recorded from all over India, Pakistan Bangladesh and Sri Lanka. Also reported from Bhutan, Myanmar, Thailand, Kampuchea and Vietnam (Chhotani, 1997).

47. *Microtermes unicolor* Snyder

1933. *Microtermes unicolor* Snyder, *Proc. Biol. Soc.*, 46: 92-93. Im. (deleted King and queen). *Type-locality:* Uttarakhand: Dehradun.

Material: Four vials with S. and W. from different places in the New Forest Campus, Dehradun, 15.10.2004, coll. R. K. Thakur.

Distribution: It is known from Western and North-Western India: Punjab, Himachal Pradesh, Jammu & Kashmir, Rajasthan, Gujarat, Uttarakhand and Uttar Pradesh. It is also known from Pakistan and Bangladesh (Chhotani, 1997).

Sub-family (iv) Nasutitermitinae

48. *Nasutitermes dunensis* Chatterjee and Thakur

1969. *Nasutitermes dunensis* Chatterjee and Thakur, *Bull. Syst. Zool.*, 1(2): 57-65. Im., S. and W. *Type-locality:* Uttarakhand: Asarori Forest, Dehradun.

Material: Two vials with S. and W. from (i) Dhulkot, Askot, coll. B. K. Gupta, 20.5.1971, Ex. Galleries on *Shorea robusta*. (ii) Mango garden, Herbertpur, 4.2.1993, coll. R. K. Thakur, Ex. Mango Tree.

Distribution: So far, it is known only from Dehradun, Uttarakhand (Chhotani, 1997).

49. *Nasutitermes thanensis* Prashad and Sen-Sarma

1959. *Nasutitermes thanensis* Prashad and Sen-Sarma I.C.A.R. Ent. Monogr. 10(4): 61-63. S. and W. *Type-locality:* Uttarakhand: Thanu, Dehradun.

Material: One vial with S. and W. from thanu Forests, Dehradun. 29.11.1994, coll. R. K. Thakur.

Distribution: So far, it is known only from Dehradun, Uttarakhand (Chhotani, 1997).

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