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DISCOVERY SCIENTIFIC SOCIETY

First report of three Oriental endemic termite species under Termitidae (Blattodea, Isoptera) from India

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ABSTRACT

The present study reports three termite species from the family Termitidae Latreille, 1802, viz. *Microcerotermes bugnioni* Holmgren, 1911 (Subfamily: Microcerotermitinae Holmgren, 1910), *Odontotermes kistneri* Manzoor & Akhtar, 2005 (Macrotermitinae Kemner, 1934), and *Pericapritermes latignathus* (Holmgren, 1914) (Microcapritermitinae Kemner, 1934) for the first time in India. All three species are Oriental endemics. The work also documents the worker caste, both major and minor, in *O. kistneri* for the first time. The present study provides the first documented evidence of *O. kistneri* and its habitation in the live trunks of acacia, sal, and kendua trees.

Keywords: New records, worker, *Microcerotermes bugnioni, Odontotermes kistneri, Pericapritermes latignathus*.

1. INTRODUCTION

Termites represent one of the oldest extant insect lineages (Krishna et al., 2013) and constitute nearly 95% of the soil insect fauna (Jones & Eggleton, 2000), and are eusocial in nature. Although regarded as serious pests of agricultural and horticultural crops due to damage to roots and shoots, termites are also recognized as important "ecosystem engineers" (Jouquet et al., 2006; Ali et al., 2013). They play a crucial role in the recycling of plant material and wood, improvement of soil structure and composition, and form an important link in food webs (Sugimoto et al., 2000; Ackerman et al., 2009). Termites feed on dead wood and plant residues, accelerating decomposition and turning debris into simpler components. Thus, they play a vital role in the ecosystem by recycling waste material such as dead wood, faeces, plants, and dead tissues at every stage of decomposition, which serve as a vital food source for numerous predators. Termites are considered important 'ecosystem engineers' (Jones et al., 1994) because they are a major group of invertebrates that play an irreplaceable role in ecosystem processes, including soil formation and conditioning and nutrient cycling (Bignell & Eggleton, 2000). They dig tunnels and move and mix large quantities of soil from different horizons during mound building; thus, they make the soil porous, enhancing water retention, and

hence improving soil quality.

In India, 330 termite species have been documented (Baraik et al., 2025; Sengupta et al., 2026; Aiswarya et al., 2026), whereas 3,176 species are known globally, including 2,976 extant and 200 fossil species (Constantino, 2021). The present study reports three species as new to India belonging to three different genera under a single family, Termitidae. Out of the three species, one belongs to *Odontotermes* Holmgren, 1910, the largest termite genus, which includes both major and minor pest species (Rajmohana et al., 2019; Shanbhag & Sundararaj, 2013), and one to *Microcerotermes* Silvestri, 1901, a genus comprising only minor pests (Shanbhag & Sundararaj, 2013; Ranjith et al., 2015). Members of both genera belong to the Type II feeding group (Donovan et al., 2001; Amina & Rajmohana, 2016), which comprises fungus-growing wood and litter feeders. The remaining species belongs to *Pericapritermes* Silvestri, 1914, a genus of soil-dwelling termites classified under the Type III feeding group (Donovan et al., 2001; Amina & Rajmohana, 2016), none of which are classified as pest species.

The present study also provides a detailed re-description of one species, along with the first description of the worker caste, and diagnostic characters of the remaining two species, all supported by high-quality digital images.

2. MATERIALS AND METHODS

Specimens were collected during a faunal survey in Jharkhand and Arunachal Pradesh, India, as detailed under Materials and Methods. The study follows the revised termite classification (Hellemans et al., 2024). Species identification follows Chhotani (1997) and Manzoor and Akhtar (2005).

All specimens were preserved in absolute alcohol. Measurements were taken under a Leica EZ4 microscope with specimens kept in absolute alcohol. Images were captured using a Leica M205A stereo microscope fitted with a Leica DFC500 camera and processed using the extended focus software LAS Version 3.6. All specimens are deposited in the National Zoological Collection, Zoological Survey of India, Kolkata.

3. RESULTS

***Microcerotermes bugnioni* Holmgren, 1911**

Subfamily: Microcerotermitinae Holmgren, 1910

Material examined. 1 vial containing 2S (soldier) from Lodh falls, Latehar District, Jharkhand (Lat. 23.48245 N; Long. 84.025495E; Alt. 667.1m), 04.11.2025, M. Roy and party, extracted from dead stump of Asan tree; 1 vial containing 3S (soldier) from Putida village, Khuntpani West Singbhum District, Jharkhand (Lat. 22.5968 N; Long. 85.75798 E; Alt. 264.5m), 12.11.2025, M. Roy and party, extracted from dead stump.

Diagnostic characters: Soldier (Table 1): Head capsule dark brown, sparsely hairy and subrectangular in shape. Antennae with 13 segments; segment 3 smallest. Anterior margin of labrum rounded and broadly converging. Mandibles short, thick and finely serrated. Postmentum club-shaped. Pronotum saddle-shaped with weakly notched anterior margin and straight posterior margin.

Table 1. Measurements (mm) of soldiers of *Microcerotermes bugnioni* Holmgren 1911:

Characters	Chhotani, (1997)	Present Study
Head length to base of mandibles	1.30-1.63	1.45-1.50
Maximum width	0.85-0.92	0.85-0.90
Left Mandible length	0.80	0.80
Head- mandible index	0.53-0.61	0.53-0.55
Postmentum Length	0.87-0.92	0.90
Postmentum Width	0.30-0.32	0.30

Distribution: India: Latehar district, Jharkhand (present study). Elsewhere: Sri Lanka: Seenigoda Estate near Ambalangoda (Type-Locality) (Krishna et al., 2013).

Remarks: The species is common under coconut and other trees. It is also found under logs and in hollow stems of coconut palms (Hemachandra et al., 2012).

***Odontotermes kistneri* Manzoor & Akhtar, 2005**

Subfamily: Macrotermitinae Kemner, 1934

Material examined: 1 vial containing 2S from Kolhar tundi, Dhanbad district, Jharkhand (Lat. 24.00764 N; Long. 86.43332 E; Alt. 242 m), 10.03.2025, Rajmohana K. & party, extracted from Acacia tree; 1 vial containing 2S from Gajendi range, Koderma district, Jharkhand (Lat. 24.47443 N; Long. 85.48182 E; Alt. 411 m), 08.03.2025, Rajmohana K. & party, extracted from live trunk of kendua; 1 vial containing 2S from Tilaiya range, Koderma district, Jharkhand (Lat. 24.47078 N; Long. 85.48522 E; Alt. 398 m), 08.03.2025, Rajmohana K. & party, extracted from live trunk of sal.

Diagnostic characters: Soldier (Table 2): Head capsule, labrum and base of mandibles brownish yellow, head paler centrally, anteclypeus hyaline, antennae paler basally, dark anteriorly, mandible dark reddish brown. Head and body sparsely pilose. Head subrectangularly oval, longer than broad. Fontanelle, eyes, and ocelli absent. Antennae with 15-16 segments; segment 1 longest, segment 2 about half of 1; 3rd subequal to 5, segment 4 shortest in 16- segmented and segment 3 shortest in 15-segmented antennae; segment 5 onward gradually increasing in size; apical segment long, club-shaped. Anteclypeus thin, narrow, hyaline strip. Labrum tongue-shaped with 5-6 long bristle-like hairs along anterior margin. Mandibles sabre-shaped with anteriorly placed tooth on the left mandible; at apex weakly incurved. Postmentum subrectangular, a little longer than broad, slightly converging anteriorly. Pronotum saddle-shaped, much broader than long; anterior margin with deep median notch, posterior margin incurved medially.

Table 2. Measurements (mm) of soldiers of *Odontotermes kistneri* Manzoor & Akhtar, 2005:

Characters	Manzoor & Akhtar, (2005)	Present Study
Head length to base of mandibles	1.05-1.42	1.10-1.15
Maximum width	0.96-1.13	1.05-1.10
Left Mandible length	0.72-0.88	0.85
Mandible-head index	-	0.73-0.77
Tooth of left mandible from tip	0.20-0.25	0.22
Tooth mandible index	-	0.25
Postmentum length	0.65-0.87	0.75-0.80
Postmentum width	0.45-0.53	0.45

Worker: Dimorphic (Figure 3): **(***Major***):** Head capsule, labrum, bases of mandibles and thorax pale brownish yellow, mandibles brown, mandible teeth dark reddish brown, antennae paler basally and darker distally; legs and abdomen creamy yellow. Head and body sparsely hairy. Total body length 3.20-3.50. Head capsule subsquarish, sides substraight, posterior margin rounded. Antennae 17-segmented; segment 1 longest, segment 2 shorter than 1; segments 3-5 subequal & shortest; segment 5 onwards gradually increasing in size; apical segment ovate, club-shaped. Labrum broadly tongue-shaped with few hairs. Mandibles typically *Odontotermes* type. Pronotum saddle-shaped, anterior margin weakly notched and posterior margin emarginated. *Minor:* Morphologically it resembles worker major, but is distinctly smaller in body size (Table 3). Head broader than long.

Table 3. Measurements (mm) of workers (major and minor) of *Odontotermes kistneri* Manzoor and Akhtar 2005:

Characters	Major	Minor
Total body length	3.20-3.50	2.15-2.20
Head length to base of mandibles	1.20-1.30	0.65-0.70
Maximum width	1.20-1.25	0.85
Max. length of pronotum	0.27	0.25
Max. width of pronotum	0.65-0.70	0.50-0.60

Distribution: India: Jharkhand (Dhanbad, Koderma) (Present study); Type Locality: Malaysia (Manzoor and Akhtar 2005). Elsewhere: Malaysia: Terengganu (Type locality) (Krishna et al. 2013).

Remarks: The genus *Odontotermes* comprises numerous species recognized both as major and minor pests; however, no published records indicate the pest status for *O. kistneri*. This work serves as the first documented evidence of *O. kistneri* inhabiting the live trunks of acacia, sal, and kendua trees, pointing to its potential role at least as a minor pest. The worker caste of the species, both major and minor, is reported and described for the first time.

***Pericapritermes latignathus* (Holmgren, 1914)**
Subfamily: Mirocapritermitinae Kemner, 1934
Material examined: 1 vial containing 2S from Dumling area, 3 km to Yingkiong district (Lat. 28.629264 N; Long. 95.0353E; Alt. 500 m), Upper Siang, Arunachal Pradesh, 28.10.2025, Rajmohana, K., extracted from decayed wood in soil.

Diagnostic characters: Soldier (Table 4): Head capsule yellowish to yellowish-brown, fairly densely hairy and subrectangular in shape. Antennae with 14 segments; segment 3 a little longer than 2. Anterior margin of labrum straight or weakly incurved; antero-lateral corners with short, pointed processes. Left mandible strongly twisted in the middle; right blade-like. Postmentum long, club-shaped. Pronotum saddle-shaped.

Table 4. Measurements (mm) of soldiers of *Pericapritermes latignathus* (Holmgren, 1914)**:**

Characters	Chhotani, 1997	Present Study
Head length to base of mandibles	2.39-3.17	2.50
Maximum width	1.40-1.72	1.50
Left Mandible length	1.76-2.08	1.80
Head- mandible index	0.65-0.77	0.72
Postmentum length	1.76-1.97	1.85
Postmentum width	0.46-0.55	0.50

Distribution: India: Upper Siang, Arunachal Pradesh (Present study); Elsewhere: Indonesia: Tjibodas, Java (Type Locality); Bangladesh, Thailand, Kampuchea, Vietnam, Malaysia and China (Krishna et al., 2013); Type Locality: Tjibodas, Java, Indonesia (Chhotani, 1997).

Remarks: The species belongs to the type III feeding group. They consume dead plant material, soil organic matter, and leaf litter. They are not known to cause damage to live crops, wood structures, or buildings. These ecological activities are often beneficial from a soil health perspective and do not inherently categorize them as pest insects (Anugerah et al., 2021).

4. DISCUSSION

All three termite species—*Microcerotermes bugnioni* Holmgren, 1911; *Pericapritermes latignathus* (Holmgren, 1914); and *Odontotermes kistneri* Manzoor & Akhtar, 2005—reported here as new to India are morphometrically distinct from all their previously known congeners. It is interesting to note that all three species are Oriental endemics (Krishna et al. 2013).

Microcerotermes Silvestri, 1901, is the third-largest termite genus (Setter and Myles, 2005), with 42 species known from the Oriental region (Krishna et al., 2013), of which 27 are found in India (Baraik et al., 2025). *Microcerotermes bugnioni* belongs to the species group characterized by finely serrated mandibles. The species is closely related to *M. rambanensis* Chatterjee and Thakur, 1964, but the mandibles of *M. bugnioni* are evenly serrated (Figure 1), while the mandibles of *M. rambanensis* are irregularly serrated. Further, their mandibles are longer (0.88 - 0.90) than those of *M. bugnioni* (0.80) (Table 1). It was previously known only from Sri Lanka. The occurrence of the species in India reflects the possible role of historical and biogeographical connections between Sri Lanka and the Indian mainland, including the late Pleistocene land bridge, in shaping the present-day distribution of termite fauna. This raises the possibility that other species currently known only from Sri Lanka may also occur in India.

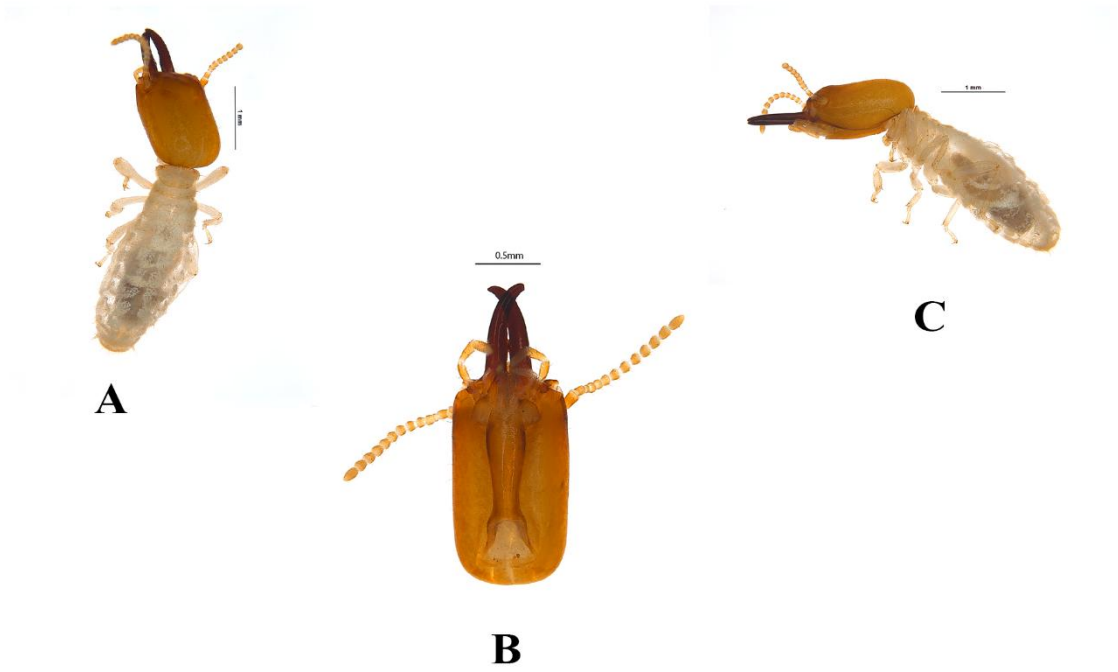


Figure 1. *Microcerotermes bugnioni* Holmgren, 1911. **A**. Soldier, body dorsal view; **B.** Head, ventral view; **C.** Soldier, body lateral view.

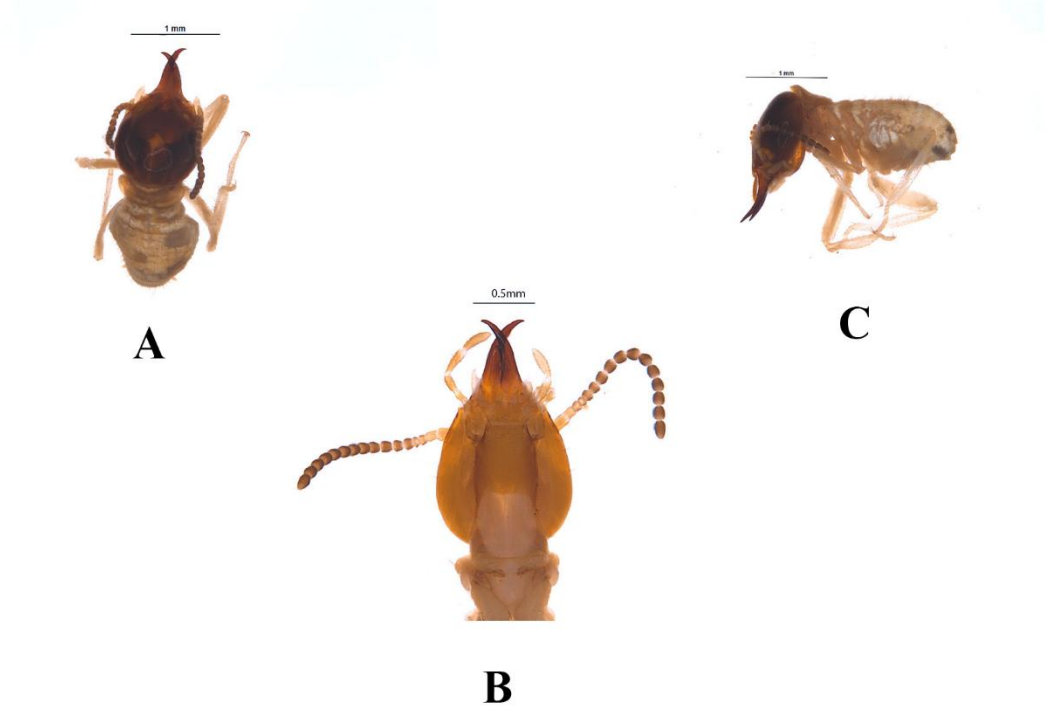


Figure 2. *Odontotermes kistneri* Manzoor and Akhtar 2005: **A**. Soldier, body dorsal view; **B.** Head, ventral view; **C.** Soldier, body lateral view.

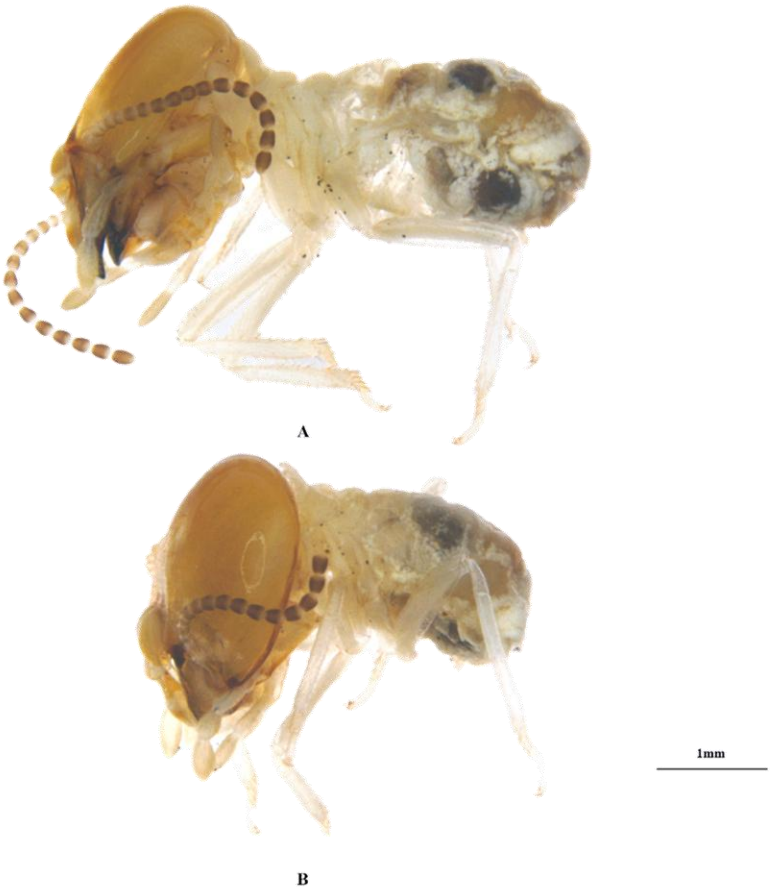


Figure 3. Worker caste of *Odontotermes kistneri* Manzoor and Akhtar 2005: **A**. Major Worker; **B**. Minor Worker.

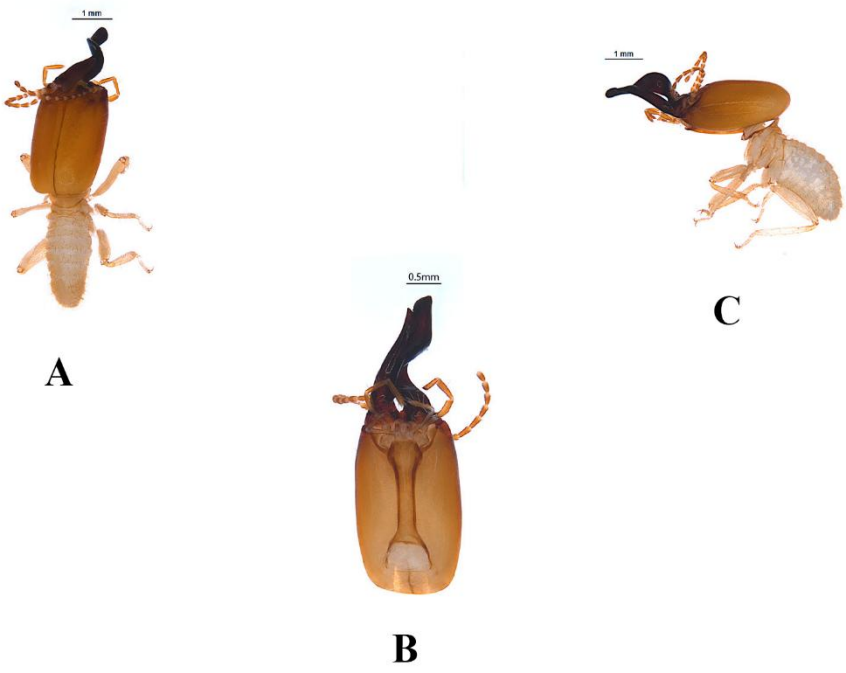


Figure 4. *Pericapritermes latignathus* (Holmgren, 1914)**: A**. Soldier, body dorsal view; **B.** Head, ventral view; **C.** Soldier, body lateral view.

Odontotermes Holmgren, 1910, the most widely distributed termite genus (Anushya & Swaran, 2024), comprises about 200 species globally, and nearly half of them occur in the Oriental region (Ranjith et al., 2025), with 43 species in the Indian region (Chhotani 1997). The genus has 45 species in India (Baraik et al., 2025), of which 18 species are reported as wood-destroying termites (Shanbhag & Sundararaj, 2013), and 8 species are recorded as pests of sugarcane (Sushil et al., 2021). *Odontotermes kistneri* is close to *Odontotermes obesus* (Rambur, 1842) but differs in having the tooth of the left mandible more anteriorly located (0.25-0.38 vs 0.22 in *O. obesus*) (Figure 2). The tooth-mandible index in *O. kistneri* in the present study is 0.25, while in *O. obesus*, it is 0.31-0.40 (Table 2).

The genus *Pericapritermes* has 24 species reported from the Oriental region (Krishna et al., 2013). Of these, 10 species are known from India (Maiti & Chakraborty, 1994; Mathew & Ipe, 2018 & Aishwarya et al., 2025). *Pericapritermes latignathus* is close to *P. durga* (Roonwal and Chhotani, 1962) and *P. tetraphilus* (Silvestri, 1922), with differences in labrum morphology and mandible-head index (Figure 4). In the present study, the mandible-head index of *Pericapritermes* is 0.72, whereas that of *P. durga* is 0.65-0.68, and *P. tetraphilus* is 0.55-0.61 (Chhotani, 1997) (Table 4). A combination of thorough taxonomic exploration along with detailed ecological data provides better insight into the diversity, distribution, and functional roles of termites. Integrative methods combined with molecular profiling will further strengthen taxonomic hypotheses and refine species classification.

5. CONCLUSION

The current study adds three termite species belonging to three genera of the family Termitidae to the already documented fauna of India. In addition, it also contributes to the taxonomic information through re-descriptions, worker caste description, and detailed diagnostic characters. These findings enhance our knowledge of diversity, distribution, taxonomy, and ecological significance of Indian termites, thereby supporting future studies.

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Author contributions

Author 1: Species identification, data analysis, and manuscript preparation.
Author 2: Species identification, data analysis, and data curation.
Author 3: Field investigation, specimen collection, Data analysis, Photomicrography, interpretation of results, and manuscript editing.
Author 4: Field investigation, specimen collection, conceptualization, study design, data analysis, supervision, validation, and critical revision of the manuscript.
All authors: Reviewed and approved the final manuscript.

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Conflict of Interest

The authors declare that they have no conflicts of interest, competing financial interest or personal relationship that could have influenced the work reported in this paper.

Informed consent

Not applicable.

Ethical approval & declaration

In this article, the animal regulations are followed as per the ethical committee guidelines of Zoological Survey of India, M Block, New Alipore, Kolkata, 700053, India; the authors observed and reported three Oriental endemic termite species under Termitidae (Blattodea, Isoptera) from India. The Animal ethical guidelines are followed in the study for species observation, identification & experimentation.

Data and materials availability

All data associated with this study are present in the paper.

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