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SHORT COMMUNICATION

NEW RECORDS OF SIX TERMITE (BLATTODEA: TERMITIDAE) SPECIES FROM KERALA, INDIA

Poovoli Amina & K. Rajmohana,

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New records of six termite (Blattodea: Termitidae) species from Kerala, India

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Abstract: The present paper reports new records of six species of termites (Blattodea: Termitidae), viz., *Angulitermes acutus* Mathur & Sen-Sarma, *Dicuspitermes obtusus* (Silvestri), *Pericapritermes dunensis* (Roonwal & Sen-Sarma), *Pericapritermes topslipensis* Thakur, *Nasutitermes cherraensis* Roonwal & Chhotani, and *Nasutitermes kali* Roonwal & Chhotani from Kerala. Three species *P. dunensis*, *N. cherraensis* and *N. kali* are reported for the first time from the Western Ghats. The details of materials collected, diagnostic characters and distribution data in India are provided.

Keywords: *Angulitermes acutus*, *Dicuspitermes obtusus*, *Pericapritermes dunensis*, *Pericapritermes topslipensis*, *Nasutitermes cherraensis*, *Nasutitermes kali*.

Termites are fully social insects, with an extraordinary range of morphological forms (Eggleton 2011). They are a familiar group to common man, directly or indirectly due to their abundance, fascinating characteristic features and due to their pest status. Being decomposers and recyclers, they are also ecologically important (Wood & Sands 1972).

The family Termitidae is the most highly evolved of all the families of Isoptera and are known to occur in all zoogeographical regions of the world. It is the largest family in termites. Among the total 2,937 living species of the world, 2,072 (nearly 71%) belong to this single family under 238 genera (Krishna et al. 2013). In India,

there are 208 species under 35 genera belonging to four subfamilies of Termitidae (71%) (Amina et al. 2013; Amina & Rajmohana 2013; Krishna et al. 2013).

As a part of our taxonomic studies on the termites of Kerala (Amina & Rajmohana 2013, 2016; Amina et al. 2013, 2016a,b), six species under four genera *Angulitermes acutus* Mathur & Sen-Sarma, *Dicuspitermes obtusus* (Silvestri), *Pericapritermes dunensis* (Roonwal & Sen-Sarma), *Pericapritermes topslipensis* Thakur, *Nasutitermes cherraensis* Roonwal & Chhotani, and *Nasutitermes kali* Roonwal & Chhotani (Family: Termitidae) are hereby reported as new records from Kerala. Three species namely *N. cherraensis*, *N. kali*, and *P. dunensis* are reported for the first time from the Western Ghat segment of Kerala.

Termites in particular have a very strong impact on soil environment with a significant role in maintenance of soil fertility and productivity of ecosystem. Among them, soil feeders have a positive impact on overall organic matter cycling (Brauman 2000). In termite groups, soil feeding termites are a less studied group. More taxonomic explorations are needed to understand the diversity and as well as the bioecological features of this group. In the above six species, *A. acutus*, *D. obtusus*, *P. dunensis*, and *P. topslipensis* are soil feeders and *N. cherraensis* and *N. kali*

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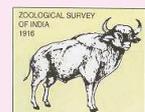
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are wood feeders.

MATERIALS AND METHODS

All the specimens were collected from the part of colonies, during field surveys undertaken in the Kerala part of the Western Ghats from 2013 to 2016. This southwestern state of India, has a very pleasant and equable climate throughout the year. The normal temperature of Kerala ranges from 28–32 °C on the plains, but in the highlands it drops to a low level. The average annual rainfall is 3,000mm, 70% of it is received during June to August (the period of the south-west monsoon), 20% during October to December (the north-east monsoon) and 10% during pre-monsoon period, i.e., April and May. The mean relative humidity value ranges from 60–90 % and the maximum being during the rainy season (June–September).

The specimens were preserved in 80% alcohol. Measurements were made in 80% alcohol under a stereozoom microscope, Leica EZ4HD, at magnifications between 8–35x. Images were taken using Leica 205-A stereomicroscope fitted with a DFC 500 camera, and processed with the help of extended focus software, LAS version 3.6.

The species identifications were made using Chhotani (1997). All specimens are deposited in the national zoological collections of the Zoological Survey of India (ZSI), at Kozhikode, Kerala, India.

RESULT AND DISCUSSION

As a part of the inventory on the termite fauna of Kerala, Amina & Rajmohana (2014) reported 60 species of termites from Kerala under 28 genera and three families. In addition to this, nine more species were reported (Amina & Rajmohana 2016; Amina et al. 2016a,b; Ipe &

Mathew 2019). With the present report, an additional six species, within four genera under the family Termitidae are hereby documented as new records from the state.

New reports:

Family: Termitidae

Subfamily: Nasutitermitinae

1. *Nasutitermes cherraensis* Roonwal & Chhotani, 1962

Material examined: ZSI/WGRC/IR/INV/5474, 11-ii-1988, one colony, India, Kerala, Palakkad (Silent Valley), coll. ZSI collection. ZSI/WGRC/IR/INV/5475, 24-ii-2013, one colony, India, Kerala, Palakkad (Keralamedu) 10.6467N, 76.8072E, coll. Sureshan & party. ZSI/WGRC/IR/INV/5476, 22-ii-2013, one colony, India, Kerala, Palakkad (Poochippara), 10.7867N, 76.6548E, coll. Sureshan and team. ZSI/WGRC/IR/INV/5477, 22-ii-2013, one colony, India, Kerala, Palakkad (Varadimala), 10.7867N, 76.6546E, coll. Sureshan & team.

Distribution in India: Arunachal Pradesh, Meghalaya (Krishna et al. 2013), Kerala (Palakkad) (present study),

Diagnostic features: Soldier Caste (Image 1). Dimorphic. *Major soldier:* Total body length 3.50–4.60 mm. Head capsule without nasus pear shaped (head length with nasus 1.50–1.80 mm, head length without nasus 0.90–1.13 mm, head width 0.80–1.07 mm, head width index 0.87–0.93). Head in profile incurved behind nasus, nasus long (nasus length 0.60–0.77 mm, nasus/head length index 0.65–0.79) narrow, thin and cylindrical. Antennae 12–14 (mostly 12) segmented, segment 3 longer than (1.5 times) 2 in 12 segmented conditions and shorter in 14 segmented condition. Mandible without or with a very small spine like process. Pronotum saddle shaped. *Minor Soldier:* (Adapted from Chhotani 1997). Rare occurrence. Small. Head narrow (head length with nasus



Image 1. *Nasutitermes cherraensis* Roonwal & Chhotani: A—Soldier | B—Dorsal view of mandibular region. © Authors



1.25–1.40 mm; head length without nasus 0.68–0.80 mm; maximum head width 0.60–0.67 mm; head width index is 0.84–0.88). Head behind antennae constricted. Antennae 11–12 segmented. *Worker*: monomorphic. Total body length 4.30–5.90 mm, head capsule subcircular (length to tip of labrum 1.30–1.40 mm, length to base of mandible 0.92–1.20 mm and maximum width 1.00–1.33 mm). Antennae 13–15 segmented, segment 3 shortest in 13 segmented conditions and segment 4 shortest in 14 segmented antennae.

Remarks: Of the total 250 world species of *Nasutitermes*, 23 species are reported from India (among them 18 species are endemic to India) and three are known from Kerala. *N. cherraensis* is a species endemic to India and has a limited distribution, known hitherto only from northeastern India. This species is documented for the first time from the Western ghats of Kerala. As per Chhotani (1997), the worker caste is with 14–15 antennal segments and pronotum with a prominent notch at anterior margin. In the present collections, workers with 13 segmented antennae were also present. Soldier minor was not represented in the present collection, hence the attributes of the soldier minors given above are from Chhotani (1997).

2. *Nasutitermes kali* Roonwal & Chhotani, 1962

Material examined: ZSI/WGRC/IR/INV/5537, ZSI/WGRC/IR/INV/5538, ZSI/WGRC/IR/INV/5539, 06-i-2015, three colony, India, Kerala, Ernakulum: Thattekad (Urulamthanni) 10.1281N, 76.7552E, coll. Amina Poovoli.

Distribution in India: Assam, Meghalaya (Krishna et al. 2013), Kerala (Ernakulum) (present study)

Diagnostic features: Soldier (Image 2): Monomorphic. Head capsule without nasus pear shaped; head length without nasus a little longer than head width (head length with nasus 1.30–1.58 mm, head length without nasus,

0.78–0.86 mm, head width 0.73–0.90 mm, head width index 0.93–0.97, nasus length 0.50–0.55 mm, nasus/head length index 0.60–0.63). Head in profile straight with a weak hump behind nasus. Nasus short and conical. Antennae 11–12 segmented, segment 3 slightly shorter and narrower than 2 in 12 segmented antennae and subdivided in 11-segmented antennae. Mandibles with long prominent spine. Pronotum saddle shaped. Cerci short; 2 segmented. *Worker*. Dimorphic. *Major worker*: Total body length 3.4–3.70 mm. In dorsal view, head capsule subcircular, epicranial suture distinct. Antennae 13 segmented, 3 shortest. Post clypeus slightly swollen, length less than half of width (length 0.18–0.22 mm, width 0.43–0.46 mm). *Minor worker*: Similar to major worker, varying in their size and slightly in their colour. Total body length 2.60–3.00 mm.

Remarks: *N. kali* is an Indian endemic species and they were confined to the northeastern part of India and now this species is reported from Kerala, from Western Ghats. The samples were collected from trees.

Subfamily: Termitinae

3. *Angulitermes acutus* Mathur & Sen-Sarma, 1961

Material examined: ZSI/WGRC/IR/4652, 18-ix-2013, India: Kerala: Palakkad (Walayar Deer Park) 10.834N, 76.8461E, coll. Amina Poovoli.

Distribution in India: Tamil Nadu, Uttar Pradesh (Krishna et al. 2013), Kerala (Palakkad) (Present study)

Diagnostic features: Soldier (Image 3). Head capsule subrectangular with wavy sides; maximum width at anterior part Head capsule comparatively large and more wide (head length to the base of mandibles 1.20–1.35 mm; head length to tip of frontal projection 1.35–1.45 mm; maximum head width 0.95–1.00 mm); antero-lateral point of head not prominent. Left mandible comparatively longer than head length to base of mandible (1.35–1.40



Image 2. *Nasutitermes kali* Roonwal & Chhotani: A—Soldier | B—Dorsal view of mandibular spine. © Authors



Image 3. *Angulitermes acutus* Mathur & Sen-Sarma: A—Soldier | B—Dorsal view of head. © Authors

mm). Frontal projection short and pointed, with slightly raised tip, extending beyond the base of mandibles and covering part of labrum. Antennae 14 segmented; segment 3 a little longer than 2; 4 shortest or sometimes subequal to 2. Labrum asymmetrical, mandibles slightly snapping type; slender, long and rode-like. Postmentum short and club shaped, pronotum saddle shaped. *Worker*: Total body length 3.00–4.10 mm, head subcircular, antennae 14 segmented, segment 3 shorter than 2; 4 shortest.

Remarks: *A. acutus* is an Indian endemic species and it was formerly reported only from Tamil Nadu and Uttar Pradesh. Now the species is reported from Kerala for the first time. The colonies of this species have been collected from under boulders.

4. *Dicuspitermes obtusus* (Silvestri, 1923)

Material examined: ZSI/WGRC/IR/5616, 18-ix-2013, one colony, India: Kerala: Palakkad (Walayar) 10.834N, 76.8461E, coll. Amina Poovoli. ZSI/WGRC/IR/5617, 17-v-2013, one colony, India, Kerala, Wayanad (Kuruva Dweep), 11.8217N, 76.0922E, coll. Amina Poovoli. ZSI/WGRC/IR/5618, 26-xi-2014, one colony, India, Kerala, Ernakulum (Thoppimudi-Thattekkad), 10.1319N, 76.7071E, coll. Jafer Palot. ZSI/WGRC/IR/5619, 27-xi-2014, one colony, India, Kerala, Ernakulum (Kolumba-Thattekkad), 10.1039N, 76.7004E, coll. Jafer Palot. ZSI/WGRC/IR/5620, 5-i-2015, one colony, India, Kerala, Ernakulum (Kootikkal-Thattekkad), 10.075N, 76.7495E, coll. Amina Poovoli.

Distribution in India: Karnataka, Madhya Pradesh, Orissa (Krishna et al. 2013), Kerala (Palakkad, Wayanad, Ernakulum) (present study)

Diagnostic features: Soldier (Image 4). Head capsule subrectangular, Frons inclined at angle of 45°, antero-lateral tubercle of head short and blunt; median suture of head extending up to half of head length, fontanelle

transverse, situated at frontal inclination. Antennae 14 segmented; segment 2–4 subequal, sometimes 3 slightly longer than 2 or 4. Labrum asymmetrical, anterior margin deeply incurved; lateral margin produced into long, thin spine like processes and with a few serrations on antero-lateral margin at the base of spines. Mandibles asymmetrical; left mandible strongly twisted at middle and with beak at tip; sometimes point-tip seen damaged. Right mandible blade like, apical blade elongate and highly incurved on inner margin, postmentum club shaped, waist narrow and long, lying at posterior end, pronotum saddle shaped. *Worker*: Total body length 4.00–5.10 mm, head capsule subcircular and wider than head length, antennae 14 segmented, segment 3 and 4 subequal and segment 2 slightly longer than 3 and 4.

Remarks: Of the 20 known species of *Dicuspitermes*, *D. obtusus* has very distinctive characters from other species. They have very short and blunt antero-lateral processes on head. This species is recorded for the first time from Kerala and were collected from the soil underneath boulders

5. *Pericapritermes dunensis* (Roonwal & Sen-Sarma, 1960)

Material examined: ZSI/WGRC/IR/INV/5717, 21-ix-2014, one colony, India: Kerala: Idukki (Chinnar WS), 10.3068N, 77.2060E, coll. Emiliyamma & party. ZSI/WGRC/IR/INV/5715, 10-iv-2013, one colony, India, Kerala, Pathanamthitta (Gavi) 9.4358N, 77.1657E, coll. Rajmohana & party. ZSI/WGRC/IR/INV/5718, 23-ix-2014, one colony, India, Kerala, Idukki (Erachipara-Munnar), 9.8479N, 77.1464E, coll. Emiliyamma & party. ZSI/WGRC/IR/INV/5719, 7-i-2015, one colony, India, Kerala, Ernakulam (Thattekkadu Bird Sanctuary- Kallippara), 10.0749N, 76.4551E coll. Amina Poovoli. ZSI/WGRC/IR/INV/5716,



Image 4. *Dicuspiditermes obtusus* (Silvestri): A—Soldier | B—Dorsal view of head. © Authors



Image 5. *Pericapritermes dunensis* (Roonwal & Sen-Sarma): A—Soldier | B—Dorsal view of head. © Authors

23-i-2014, one colony, India, Kerala, Pathanamthitta (Pekkavu), 9.4916N, 76.666E, coll. Sureshan & party. ZSI/WGRC/IR/INV/5720, 10-ix-2015, one colony, India, Kerala, Idukki (Uppupara-PTR), 9.5262N, 77.2368E, coll. Sureshan & party.

Distribution in India: Arunachal Pradesh, Meghalaya, Uttarakhand, Uttar Pradesh and West Bengal (Krishna et al. 2013), Kerala (Ernakulam, Idukki, and Pathanamthitta) (present study)

Diagnostic features: Soldier (Image 5). Head capsule elongate, subrectangular, sides slightly narrowing anteriorly (head length with mandibles 3.95–4.25 mm, head length to base of mandibles 2.30–2.50 mm, maximum head width 1.28–1.48 mm), frons weakly inclined in front; median suture of head distinct, extending from posterior margin to fontanelle, fontanelle small, circular, fontanelle gland small in size, sometimes indistinct. Antennae 14 segmented; segment 3 a little longer than 2 or 4, segment 4-shortest, labrum asymmetrical; anterior margin weakly incurved, with short, horn-like antero-lateral points, mandibles strongly asymmetrical, shorter than

head length (left mandible length 1.43–1.70 mm, right mandible length 1.37–1.50 mm), postmentum long and club shaped, narrowed at waist. *Worker:* Total body length 3.2–4.00 mm, head capsule subcircular, broader than long. Antennae 14 segmented, segment 3 shorter than 2 and a little longer than 4, segment 4 shortest.

Remarks: This species is documented for the first time from Kerala as well as from Western Ghats. The colonies of this species have been collected from under boulders.

6. *Pericapritermes toplipensis* Thakur, 1976

Material examined: ZSI/WGRC/IR/INV/5721, ZSI/WGRC/IR/INV/5728, 11-ix-2013, 2 colonies, India: Kerala: Wayanad (Muneeswarankunnu), 11.7032N, 76.0834E, coll. Bhavana. ZSI/WGRC/IR/INV/5733, 31-vii-2015, one colony, India: Kerala: Wayanad (Thalappuzha), 11.8403N, 75.9492E, coll. Shili. ZSI/WGRC/IR/INV/5734, 15-vii-2015, India: Kerala: Wayanad (Vythiri), 11.5516N, 76.0403E, coll. Shili.

Distribution in India: Karnataka, Tamil Nadu (Krishna et al. 2013), Kerala (Wayanad) (present study)



Image 6. *Pericapritermes topslipensis* Thakur: A—Soldier | B—Dorsal view of head. © Authors

Diagnostic features: Soldier (Image 6). Head capsule elongated subrectangular, sides substraight (head length with mandibles 4.00–4.25 mm, head length to base of mandibles 2.50–2.70 mm, maximum head width 1.30–1.45 mm) frons weakly inclined in front; median suture of head distinct, extending from posterior margin to almost up to fontanelle, fontanelle small, circular, fontanelle gland small in size, antennae 14 segmented; segment 3 subequal to slightly longer than 2; segment 4—shortest, labrum asymmetrical; anterior margin substraight, with very short antero-lateral points, mandibles asymmetrical, shorter than head length (left mandible length 1.39–1.48 mm, right mandible length 1.36–1.45 mm), postmentum long and club shaped, pronotum strongly saddle shaped. *Worker*. Total body length 4.00–4.60 mm, head capsule subcircular, broader than long, antennae 14 segmented, segment 3 shorter than 2 and a little longer than 4, segment 4 shortest.

Remarks: The median suture of Y-arm is well distinct in some specimens and in some it is indistinct. *P. topslipensis* is a southern Indian endemic species from Kerala. It is reported only from the high elevation zones.

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