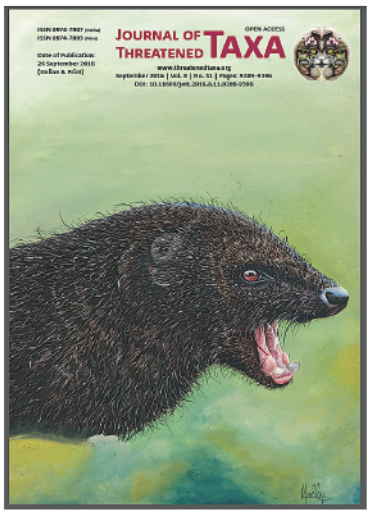

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SHORT COMMUNICATION

NEW RECORDS OF TERMITE SPECIES FROM KERALA (ISOPTERA: TERMITIDAE)

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New records of Termite species from Kerala (Isoptera: Termitidae)

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Abstract: The present taxonomic study on the termites of Kerala, reports six species and one genus for the first time from the state. They are *Odontotermes yadevi* Thakur, *Microtermes unicolor* Snyder *Grallatotermes niger* Chatterjee and Thapa, *Nasutitermes matangensis matangensis* (Haviland), *Dicuspiditermes gravelyi* (Silvestri) and *Microcerotermes minor* Holmgren. The Genus *Grallatotermes* Holmgren is documented for the first time from Kerala. *O. yadevi* recovered from firewood is hereby added to the list of wood destroying termites of India.

Keywords: *Dicuspiditermes gravelyi, Grallatotermes niger, Microcerotermes minor, Microtermes unicolor, Nasutitermes matangensis matangensis, Odontotermes yadevi*.

Termites have been around on this planet for over 100 million years before flowering plants (Pearce 1997). They are ecologically important, as mediators of ecosystem processes such as soil turnover (Lee & Wood 1971) and nutrient cycling (Wood & Sands 1978). They gain economic importance, being the most destructive insect pests of wood and other cellulose products (Shanbhag et al. 2013). In man dominated ecosystems, such as agricultural and forest plantations as well as in urban and rural areas, a number of termite species can be important pests, feeding primarily on wood (Cowie et al. 1989).

As a part of our taxonomic studies on the Termites of Kerala (Amina & Rajmohana 2013; Amina et al. 2013), we hereby report six species under six genera, as new records from Kerala. They are *Odontotermes yadevi* Thakur, *Microtermes unicolor* Snyder (subfamily Macrotermitinae), *Grallatotermes niger* Chatterjee and Thapa, *Nasutitermes matangensis matangensis* (Haviland) (subfamily Nasutitermitinae) *Dicuspiditermes gravelyi* (Silvestri) and *Microcerotermes minor* Holmgren (subfamily Termitinae). Of these, the genus *Grallatotermes* Holmgren is reported from Kerala for the first time.

Materials and Methods

The specimens collected were preserved in 80% alcohol. Measurements were also made in 80% alcohol under the stereo zoom microscope, Leica EZ4 HD, at magnifications between 8-35X.

The species identifications were made using Chhotani (1997). The Functional group classification was based on Donovan et al. (2001). All specimens are deposited in the National Zoological Collections of the Zoological

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Conflict of Interest: The authors declare no conflict of interest

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Survey of India (ZSI), at Kozhikode, Kerala, India.

Results and Discussion

Amina & Rajmohana (2014) reported 60 species of termites from Kerala. With the present report, an additional six species, within six genera are hereby documented as new records from the state. Details of the newly recorded species are as follows:

Family: Termitidae
Subfamily: Macrotermitinae

1. *Odontotermes yadevi* Thakur, 1981

Material examined: ZSI/WGRC/IR/INV/7472-7504, 26.ix.2013, 29.x.2013, 33 colonies, India, Kerala, Wayanad: Keenchukadavu (11.7411°N & 76.0706°E), Parakkuni ward (11.7419°N & 76.0811°E), coll. P.P Rabeeha. ZSI/WGRC/IR/INV/3454, 10.ix.2013, one colony, India, Kerala, Wayanad: Kartikulam (11.8695° N and 76.0729° E), coll. K.V. Bhavana. ZSI/WGRC/IR/INV/7505-7510, 8.xi.2013, 15.xi.2013 & 27.xi.2013, six colonies, India, Kerala, Wayanad: Tholpetti (11.8695°N & 76.0729°E), coll. K.V Bhavana. ZSI/WGRC/IR/INV/7511-7512, 3.vii.2014, two colonies, India: Kerala, Kozhikode: Madappally (11.6486°N & 75.5695°E), coll. Fasla.

Diagnostic features: (modified description of Chhotani 1997). Soldier Caste (Image 1), a large species; head broad and oval, head length to the base of mandible 1.88–2.35 mm, maximum head width 1.70–2.00 mm, head width index 0.82–0.92 mm; tooth index 0.41–0.50 mm. Antennae with 17 segments, segment 2 longer than 3, 4 longer than 3 and 5 shortest. Postmentum wide, length 1.25–1.55 mm, postmentum width 0.70–0.90 mm, postmentum width index 0.53–0.61 (Detailed illustrations given in Chhotani, 1997).

Worker caste monomorphic; head capsule subcircular (length to the base of mandibles 1.50–1.80, head width 1.80–2.00 mm). Antennae with 19 segments, segment 3, 4 and 5 variable in size.

Distribution: India: Karnataka, Kerala (Wayanad, Kozhikode)

Remarks: *O. yadevi* is a fungus growing wood/litter feeder of type II functional group. Shanbhag et al. 2013, reported 92 species of wood destroying termites under 22 genera from India, among which the genus *Odontotermes* Holmgren is the largest and most widespread. Since the present study could recover *O. yadevi* from firewood, it is hereby added to the list of wood destroyers. Since the species is so far reported only from Karnataka, this forms the first report from Kerala.

Image 1. *Odontotermes yadevi*, soldier in dorsal view. © Authors

2. *Microtermes unicolor* Snyder, 1933

Material examined: ZSI/WGRC/IR/INV/3439, 25.x.2013, one colony, India, Kerala, Wayanad, Tholpetti (11.8695°N & 76.0729°E), coll. K.V. Bhavana.

Diagnostic features: (Adapted from Chhotani 1997). Soldier (Image 2) - Head capsule oval (head length to the base of mandible 0.82–0.96 mm, maximum head width 0.75–0.86 mm). Labrum long, tip of labrum comparatively wider (length 0.30–0.37mm, maximum width 0.23–0.25 mm). Antennae with 14 segments, segment 2 slightly smaller than 3+4 (Detailed illustrations given in Chhotani, 1997).

In the worker caste, the head capsule is subsquarish (length to the base of mandibles 0.78–0.85 mm, maximum width 0.85–0.95mm). Antennae with 14–15 segments, segment 2 subequal to 3+4.

Distribution: India: Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Punjab, Rajasthan, Uttarakhand, Uttar Pradesh, and Kerala (Wayanad)

Remarks: *M. unicolor* is a fungus growing wood/litter feeder of type II functional group. This species is reported for the first time from Kerala State as well as from the whole of southern India.

Family: Termitidae
Subfamily: Nasutitermitinae

3. *Grallatotermes niger* Chatterjee and Thapa, 1964

Materials examined: ZSI/WGRC/IR/INV/5414, 7513,

Image 2. *M. unicolor*, soldier in dorsal view. © Authors

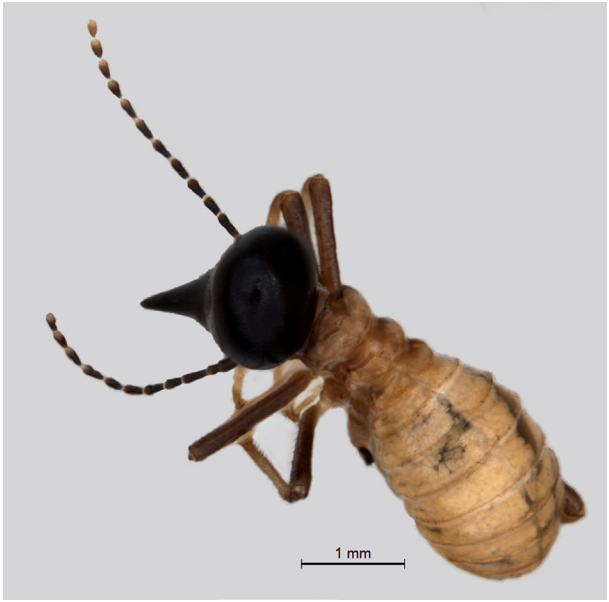

Image 3. *Grallatotermes niger*, soldier in dorsal view. © Authors

7514, 9.iv.2013, three colonies, India: Kerala, Idukki, Thekkady, Kokkare (9.5754°N & 76.9888°E), coll. K. Rajmohana & party. ZSI/WGRC/IR/INV/5413, 5416, 6300, 6301, 7515-7519, 17.v.2013, nine colonies, India: Kerala, Wayanad: Kuruva Island (11.8266°N & 76.0928°E), Amina Poovoli. ZSI/WGRC/IR/INV/3436, 7520, 8.xi.2013, two colonies, India: Kerala, Wayanad: Tholpetti (11·8695°N & 76·0729°E), coll. K.V. Bhavana.

Diagnostic features: (Modified description of Chhotani 1997). Soldier (Image 3) - Head capsule thick, pyriform, very narrowly constricted behind antennae, posteriorly rounded and strongly produced behind (head length with nasus 1.87–2.05 mm, head length without nasus 1.26–1.37 mm, maximum head width 1.20–1.28 mm, posterior bulge 0.72–0.75 mm and head bulge index 0.54–0.58 mm). Nasus conical, shorter than half to about half of head length (nasus length 0.55–0.68 mm, nasus length/head length index 0.41–0.52 mm). Antennae with 13 segments, segment 2 shortest, segment 3 about 2.1–2.5 times that of 2, 4 and 5 shorter than 3. Mandible with long prominent spine like processes (Detailed illustrations given in Chhotani, 1997).

The Head capsule of workers is subcircular (length to base of mandible 1.12–1.37 mm, max. width 1.17–1.40 mm). Epicranial suture prominent, antennae with 14 segments, segment 3 sometime sub dividing and almost about 1.5 times of 2 (0.106: 0.077mm), segment 4 subequal to or a little shorter than 2.

Distribution: India: Tamil Nadu, Kerala (Wayanad, Idukki)

Remarks: Genus *Grallatotermes* is reported for the first time from Kerala through the species *G. niger*. They belong to the type II functional group. They are among a few unique termites, foraging in columns in open air for epiphytes like lichens, blue green algae growing on the surface of tree trunks (personal observation). Till date, the species is reported only from Tamil Nadu.

4. *Nasutitermes matangensis matangensis* (Haviland), 1898

Material examined: ZSI/WGRC/IR/INV/3433-3434, 19.ix.2013, two colonies, India: Kerala, Wayanad, Kartikulam (11·8695°N & 76·0729°E), coll. K.V Bhavana.

Diagnostic features: (Modified description of Chhotani 1997). Soldier (Image 4) - Head capsule thick, almost circular (head length with nasus 1.4–1.92 mm, head length without nasus 0.83–1.20, maximum head width 0.83–1.20). Head in profile not depressed, basal hump slightly distinct. Nasus conical (length 0.55–0.70). Antennae with 13-14 segments, in 13 segmented antennae segment 3, 1.5–1.2 times as long as 2, segment 4 shortest. In 14 segmented ones, 3 as long as 2. Mandible with short spine like processes (Detailed illustrations given in Chhotani, 1997).

Worker caste dimorphic. Worker major: head capsule squarish (width 1.08–1.25 mm), epicranial suture and fontanelle distinct. Antennae with 14 segments, segment 3 subequal to a little longer than 2, 4 shortest. Worker minor: head capsule small (width 0.95–1.14

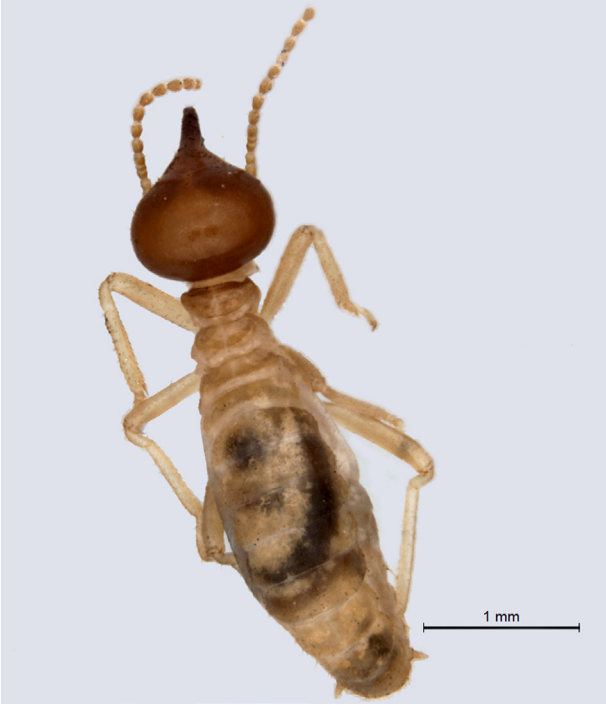

Image 4. *Nasutitermes matangensis matangensis*, soldier in dorsal view. © Authors

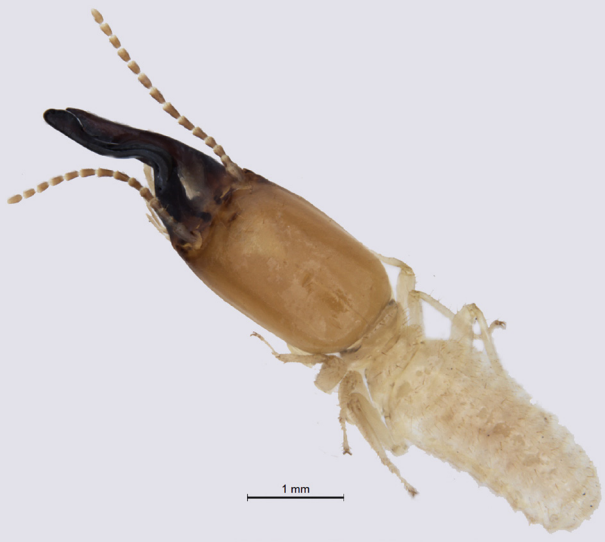

Image 5. *Dicuspiditermes gravelyi*, soldier in dorsal view. © Authors

mm). Antennae with 13 segments, segment 3 almost subequal to segment 2.

Distribution: India: Andaman Islands, Arunachal Pradesh, Nicobar Islands, and Kerala (Wayanad)

Remarks: They are wood feeding termites belongings to the type II functional group. The specimens treated here are morphologically similar to *N. matangensiformis* as per Chhotani 1997. However as per the world catalogue (Krishna et al. 2013), *Nasutitermes matangensiformis* (Holmgren) is now a junior synonym of *N. matangensis matangensis*. This species is reported for the first time from the Western Ghats, Kerala state as well as from the whole of southern India.

Family: Termitidae
Subfamily: Termitinae

5. *Dicuspiditermes gravelyi* (Silvestri), 1922

Material examined: ZSI/WGRC/IR/INV/3456, 5583-5584, 5587-5591, 7521-7522, 3.ix.2013 & 1.x.2013, 10 colonies, India, Kerala, Wayanad, Muneeswarankunnu (11.8639°N & 75.9102°E), coll. K.V Bhavana. ZSI/WGRC/IR/INV/5596, 3.vii.2014, one colony, India, Kerala, Kozhikode, Madappally (11.6486°N & 75.5695°E), coll. Fasla.

Diagnostic features: (Adapted from Chhottani 1997). Soldier (Image 5)- Head capsule subrectangular, head length to the base of mandible 1.57–1.65 times that of head width (head length with mandible 3.60–3.80 mm, head length without mandibles 1.85–2.10 mm, maximum head width 1.15–1.30 mm); frons weakly to sharply inclined in front, angle of inclination 50^0–60^0; antero- lateral corners weakly to fairly well projected in front as tubercles. Antennae 14 segmented, segment 2, 3 and 4 subequal and sometimes segment 2 shortest. Mandible a little shorter than or as long as head without mandible, left mandible twisted at middle and with a weak beak at tip (left mandible length 1.5–2.10 mm), index left mandible length/head length to the base of mandibles 0.80-100mm, right mandible slightly shorter than left (length 1.50–1.70 mm) (Detailed illustrations given in Chhotani, 1997).

In worker caste, head subcircular, length to tip of labrum 1.18–1.30 mm; length to base of mandibles 0.75–0.90 mm; maximum width 0.93–1.05 mm. Antennae with 14 segments; segment 3 shorter than 2; segment 3 and 4 subequal, segment 4 sometimes shortest.

Distribution: India: Karnataka, Maharashtra, and Kerala (Wayanad, Kozhikode)

Remarks: *D. gravelyi* are organic rich soil/humus feeders belonging to the type III functional group and are reported for the first time from Kerala.

6. *Microcerotermes minor* Holmgren, 1914

Material examined: ZSI/WGRC/IR/INV/3813, 6224-6227, 7523-7525, 3.ix.2013, 11.ix.2013 & 1.x.2013, eight colonies, India, Kerala, Wayanad, Muneeswarankunnu (11.8639°N & 75.9102°E), coll. K.V. Bhavana.

Diagnostic features: (Adapted from Chhottani 1997).

Image 6. *Microcerotermes minor*, soldier in dorsal view. © Authors

Soldier (Image 6) - Head capsule subrectangular, sides subparallal (length to the base of mandibles 1.12–1.29 mm, maximum width 0.75–0.80 mm). Fontanalle as a minute and circular whitish spot, situated at anterior third of head. Antennae with 13 segments, segment 3 smallest. Labrum with subparallal sides upto middle and then connecting anteriorly into somewhat pointed tip. Mandible coarsely serrated (Detailed illustrations given in Chhotani, 1997).

In worker caste, head capsule subsquarish (length to the base of mandible 0.82–0.87 mm, width 0.77–0.80 mm). Antennae with 13 segments, segment 3 smallest.

Distribution: India: Andhra Pradesh, Karnataka, Tamil Nadu and Kerala (Wayanad).

Remarks: *M. minor* is documented for the first time from the state. They are wood feeders and belong to Type II functional group, and are listed among the 92 species of wood destroying termites reported from India, by Shanbhag et al. 2013.

Conclusion

Our information on the diversity of termite fauna of Kerala is far from complete. New species occurrences and documentation of range extensions of many genera and species from the area in the recent, have been beneficial in narrowing this knowledge gap. However more extensive and intensive inventorying is recommended.

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