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Short Communication

New record of *Cryptotermes bengalensis* (Snyder, 1934) (Isoptera: Blattodea) from Nagaland along with an unusual instance of association

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Abstract

The drywood termite *Cryptotermes bengalensis* (Snyder, 1934) of family Kalotermitidae is reported for the first time from Nagaland. An unusual instance of association of this species along with *Nasutitermes garoensis* Roonwal and Chhotani and *Odontotermes obesus* (Rambur) of family Termitidae was observed. The occurrence of Kalotermitidae and Termitidae together in the same nest as reported in this study is quite intriguing.

Keywords: Association, *Cryptotermes bengalensis*, Kalotermitidae, Nagaland, New record, Termitidae

Introduction

Nagaland, one of the Northeastern states of India, is largely mountainous; the forests are partly sub-alpine, evergreen and deciduous (Ramakrishna & Alfred, 2006). Very little is known about the termite fauna of the state. Verma (1984) had given an account on the termite diversity, with 12 species under 5 genera, while Bose (1999) recorded 11 species and Saha *et al*. (2016) reported 3 species. In total, 16 species are known from Nagaland so far. In a recent exploration of Intangki National Park Nagaland, during March 2017, 10 species were recorded, along with an addition of 1 species, *Cryptotermes bengalensis* (Snyder), also forming the first record of the species, from the state (Table 1). This study also presents an interesting and unusual association between two families of termites, Kalotermitidae and Termitidae.

Material and Methods

Specimens were collected by brush soaked in alcohol and preserved in 80% alcohol. Measurements were made with the help of Leica EZ4HD microscope and identified after Roonwal and Chhotani (1989).

Systematic Account

Family KALOTERMITIDAE, Froggatt, 1897
Genus ***Cryptotermes*** Banks, 1906
Cryptotermes bengalensis (Snyder, 1934)
Kalotermes (Cryptotermes) bengalensis Snyder

Snyder, 1934. *Indian For. Rec.*, **20**(11): 4-6.1m., S. Syntypes: In British Museum, London and Forest Research Institute, Dehra Dun, India. Type-locality: Sundarbans, West Bengal, India.

Cryptotermes havilandi (Sjostedt) (Part)

Moszkowski, 1955. *Mem. Inst. Sci.* Madagascar, (E) **6**: 5-29 (Indian records only).

Cryptotermes bengalensis (Snyder)

Sen-Sarma *et al*., 1975. Wood destroying Termites of India. (Final Tech. Rep. PL-480 Proj.) : 10, 19-21.

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Diagnostic Characters: *Imago* (Figure 1): Head capsule light brown. Total body length with wings 8.0-10.1 mm, without wings 4.7-6.4 mm. Head length to base of mandibles 0.87-1.03 mm, width including eyes 0.90-1.07 mm. Antennae with 13-17 segments, 4th shortest. Labrum tongue shaped (length 0.23-0.40 mm and width 0.33-0.40 mm), tip with hair, Wings hyaline with a faint brownish tinge. Forewing: Radial sector with 5-7 branches to costa; Cubitus with 10-14 branches to posterior margin. Hindwing: Radial sector with 3-6 branches to costa; cubitus with 13-15 branches, cerci 2 jointed.

Figure 1. Imago of *Cryptotermes bengalensis* (Dorsolateral View).

Soldier (Figure 2): Head dark brownish to black anteriorly; head length to base of mandibles 1.13-1.47 mm, width 1.08-1.35 mm; Frons inclining in front, frontal ridge prominent; both tubercles large and prominent; vertex with medial shallow depression. Antennae 11-15 segmented, 3 either shortest or sub-equal to 2, sometimes subdivided. Labrum triangular with a broad base (length 0.10-0.19 mm, width 0.20-0.27 mm) Mandibles humped above outer condyle (length 0.44-060 mm). Each mandible with 2 weak to prominent marginal teeth. 2nd marginal tooth of left mandible sometimes absent. Postmentum short, posteriorly broader. Anterior margin of pronotum deeply notched, posterior margin either substraight or slightly curved outward.

Type data: Lectotype: British Museum of Natural History soldier. Type locality: India: West Bengal: Sunderbans.

Distribution: India: Andaman and Nicobar Islands, Andhra Pradesh, Assam, Gujarat, Karnataka, Madhya Pradesh, Orissa, Rajasthan, Tripura, Uttar Pradesh, West Bengal and Nagaland (Mukherjee *et al.,* 2008; Krishna *et al.,* 2013). *Elsewhere*: Bangladesh, China, Sri Lanka (Mukherjee, *et al.,* 2008; Krishna *et al.,* 2013).

Figure 2. Soldier of *Cryptotermes bengalensis* (Dorsolateral View).

Remarks: *C. bengalensis* is a drywood termite (Maiti, 1983), of Kalotermitidae family and is cryptic in nature. They make interconnected tunnels within wood, not visible from outside and are mostly detected by their faecal pellets outside their nest. They are economically important, posing threat to wood works in buildings. The species infests live Paudok, Raintree and Lalchini trees and felled logs of many trees including white Dhup and also the extremely dry dead tree stumps or wooden structures (Maiti and Saha, 2008). Shanbhag and Sundararaj (2013) mentioned this species as a major pest damaging a number of trees like *Adina cordifolia, Artocarpus heterophyllus, Carapamo luccensis, Ficus benghalensis, Ficus palmata, Mangifera indica, Shorea robusta* of Assam, Gujarat, Karnataka, Madhya Pradesh, Orissa, Tripura and West Bengal. They are common in Andaman and Nicobar Islands too and is the lone representative of the genus known from western Himalaya and foot-hills of Eastern Himalaya (Mukherjee *et al.*, 2008). *C. bengalensis* survive best at 92% relative humidity (Sen-Sarma, 1974), swarming period is during May to June (Maiti & Saha, 2008).

Unusual Association Recorded in the Study

Approximately >500 individuals of termites were found inside a carton nest, lying on the forest floor at Intangki National Park of Nagaland, of which a few were collected and preserved in alcohol. The specimens collected were later identified into 3 species under 3 genera and 2 families - soldier and imagoes of *Cryptotermes bengalensis* (Kalotermitidae), soldiers and workers of *Nasutitermes garoensis* Roonwal and Chhotani (Figure 3) and soldiers and workers of *Odontotermes obesus* (Rambur) (Figure 4), both under Termitidae.

Figure 3. Soldier of *Nasutitermes garoensis* (Lateral View).

Figure 4. Soldier of *Odontotermes obesus* (Dorsal View).

Carton nests are usually arboreal, but in this instance, the nest was seen lying loose on the forest floor. *Nasutitermes* are reported to build arboreal carton nest by wood mixed with saliva and faecal fluid (Light, 1933). Hence in this instance too, it can be assumed that the nest builder would be *Nasutitermes garoensis*. *Odontotermes obesus* is one of the most common mound building and subterranean species (Mukherjee *et al.*, 2008) and its presence inside the carton nest is quite interesting. The presence of more than one caste inside the nest usually denotes a successful breeding colony. Since Kalotermitidae are usually single piece wood nesters, the presence of a soldier and imago inside the carton nest is highly intriguing. Both the species can be inquilines. Though there are ample records (Holmgren, 1912; Assmuth, 1913, 1915; Annandale, 1923; Roonwal, 1954, 1970, 1976, 1978; Mathur & Sen-Sarma, 1960, 1962; Basalingappa, 1971; Verma, 1986) of association of Termitidae with Rhinotermitidae, an association of Kalotermitidae and Termitidae as reported in this study is an extremely rare occurrence.

Materials studied

Cryptotermes bengalensis

1 Soldier, 2 Imagoes (ZSI/HQ/4635/H_{11}), India: Nagaland: Peren District: Intangki National Park (25°41′57" N & 93°32′23" E), Coll. Rituparna Sengupta, 24.iii.2017, ex. 'Carton Nest'.

Nasutitermes garoensis

2 Soldiers, 4 Workers (ZSI/HQ/4636/H_{11}), India: Nagaland: Peren District: Intangki National Park (25°41′57" N & 93°32′23" E), Coll. Rituparna Sengupta, 24.iii.2017, ex. 'Carton Nest'.

Odontotermes obesus

2 Soldiers, 2 Workers (ZSI/HQ/4637/H_{11}), India: Nagaland: Peren District: Intangki National Park (25°41′57" N & 93°32′23" E), Coll. Rituparna Sengupta, 24.iii.2017, ex. 'Carton Nest'.

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Table 1. List of termites recorded from Nagaland

Sl. No.	Species	Reference
1	*Ancistrotermes pakistanicus*# Ahmad	Verma (1984)
2	*Coptotermes heimi*# (Wasmann)	Bose (1999)
3	*Coptotermes kishori* Roonwal and Chhotani	Bose (1999), Verma (1984)
4	*Cryptotermes bengalensis*#(Snyder)	Present Study
5	*Hypotermes xenotermitis*# Wasmann	Bose (1999)
6	*Microcerotermes annandalei* Silvestri	Bose (1999), Verma (1984)
7	*Microcerotermes labioangulatus* Sen-Sarma and Thakur	Bose (1999), Verma (1984)
8	*Microtermes obesi*# Holmgren	Verma (1984)
9	*Nasutitermes garoensis*# Roonwal and Chhotani	Verma (1984)
10	*Odontotermes distans* Holmgren and Holmgren	Verma (1984)
11	*Odontotermes feae*#(Wasmann)	Bose (1999),Verma (1984)
12	*Odontotermes globicola* Roonwal and Sen-Sarma	Verma (1984)
13	*Odontotermes horai* Roonwal and Chhotani	Bose (1999), Verma (1984)
14	*Odontotermes horni*# (Wasmann)	Saha *et al.*(2016)
15	*Odontotermes obesus*#(Rambur)	Bose (1999), Verma (1984)
16	*Odontotermes parvidens*# Holmgren and Holmgren	Bose (1999)
17	*Odontotermes profeae* Akhtar	Bose (1999), Verma (1984)

Species collected in the present study is marked with a hash sign (#)

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