

## First record of *Schedorhinotermes makassarensis* Kemner (Isoptera: Rhinotermitidae) from India

Jayati Basak<sup>1</sup>, Rituparna Sengupta<sup>1</sup>, \*K. Rajmohana<sup>1</sup>, Balmohan Baraik<sup>1</sup> and C. Sivaperuman<sup>2</sup>

<sup>1</sup>Zoological Survey of India, M Block, New Alipore, Kolkata- 700053, India.

<sup>2</sup>Zoological Survey of India, Andaman and Nicobar Regional Centre, Port Blair- 744102, Andaman and Nicobar Islands, India.

(Email: mohana.skumar@gmail.com)

### Abstract

The present study reports *Schedorhinotermes makassarensis* Kemner, 1934 (Rhinotermitidae) for the first time in India, from Great Nicobar Island. Earlier the species was known only from Indonesia. A dichotomous identification key to all the 8 species of *Schedorhinotermes* Silvestri 1909 present in India is provided based on both soldier major and soldier minor castes.

**Keywords:** *Schedorhinotermes makassarensis*, Termite, India, identification key, dimorphic, Great Nicobar Island.

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### Introduction

Termites are truly social insects with distinct division of labour among different castes- soldiers, workers and imagoes (Noirot, 2000). They play a major role in cellulose decomposition and are thereby of immense ecological significance (Pearce, 1997). Although their feeding habit helps in recycling nutrients in the ecosystem, they also damage structural wood, furniture and wood panels (Su and Scheffrahn, 1990). Subterranean termites having association with soil are the most widespread and destructive (Potter, 1997; Su and Scheffrahn, 1998). Genus *Schedorhinotermes* is such a subterranean termite genus. Silvestri (1909) fixed *Schedorhinotermes* as a subgenus of *Rhinotermes*, with type species *R. intermedius* Brauer, 1865 from Australia. It continued to remain as a subgenus (Holmgren, 1911, 1913; Hill, 1942), till Snyder (1949) raised it to generic status. It is phylogenetically closest to *Rhinotermes* Hagen, 1858 (Krishna *et al.*, 2013). Globally, as many as 34 species have been described under the genus- 22 spp. from Oriental and 7 spp. from India are known, till date (Krishna *et al.*, 2013), the species being *S. longirostris* (Brauer, 1866), *S. eleanorae* Roonwal and Bose, 1970, *S. tiwarii* Roonwal and Thakur, 1963, *S. nancowriensis* Maiti and

Chakraborty, 1994, *S. medioobscurus* (Holmgren, 1914), *S. translucens* (Haviland, 1898) and *S. malaccensis* (Holmgren, 1913).

The soldier caste of all *Schedorhinotermes* species are dimorphic, with major and minor forms, the minor is common, and known for all the species present in India (Roonwal and Chhotani, 1989). Genus *Schedorhinotermes* being subterranean, nests in root stumps, weak trees and also in buried timber. They feed on woods, leaves, barks and grasses; the cellulose is digested by their intestinal protozoan symbionts. Two species in India, under this genus, *S. translucens* (Haviland) and *S. longirostris* (Brauer) are minor pests (Krishna *et al.*, 2013). The present study reports, *S. makassarensis* Kemner for the first time in India, from Great Nicobar Island. The species originally described from Indonesia, was known only from the type locality, Celebes, Macassar till date. All the 8 species from India are keyed and a redescription of *S. makassarensis*, along with digital images are provided.

### Materials and Methods

1 vial with 2 soldier major, 2 soldier minor and 1 worker, collected from Great Nicobar Island were studied. The specimens

were preserved in 70% alcohol. All studies were made using the Leica 205-A stereomicroscope fitted with DFC 500 camera. The identification and measurements were taken in accordance with Maiti (2006). Morphological terminology for describing soldier follows Roonwal and Chhotani (1989) and Maiti (2006). The specimens are deposited in the National Zoological Collection (NZC) of Zoological Survey of India (ZSI), Kolkata.

**Taxonomy:**

*Schedorhinotermes makassarensis* Kemner, 1934

Syn: *Rhinotermes* (*Schedorhinotermes*) *longirostris* Oshima, 1914: 562.

*Rhinotermes* (*Schedorhinotermes*) *translucens* Holmgren, 1913: 83.

**Redescription:**

**Soldier (Major) (Fig. 1)**

Head yellowish to light brown, subsquarish, lateral margins slightly outcurved and posterior margin rounded. Head in dorsal view depressed behind antennae (Fig. 2). Lateral margin of head angularly rounded. Fontanelle round with furrow running in front.

Labrum broad with wavy anterior margin with minute hairs. Mandibles short and robust; left mandible with two and right mandible with a single marginal tooth. Antennae 15-16 segmented; segment 2 shorter than 3<sup>rd</sup>, 4<sup>th</sup> shortest. Postmentum waist not much narrow; sufficiently more than half of its maximum width (Fig. 3). Pronotum narrower than head, with outcurved anterior margin and medially emarginate posterior margin.

**Soldier (Minor) (Fig. 4)**

Head paler and much smaller than of soldier (major) and oval in shape (Fig. 5). Labrum bilobed with fringes of hair along anterior margin, very long almost reaching to tip of mandibles. Mandibles thin and delicate, left mandible with two and right mandible with a single marginal tooth (Fig. 5 and 6; tips broken). Postmentum and pronotum similar to soldier (major), but smaller in size (Fig. 6).

**Measurements**

Measurements are provided for soldier (major) and soldier (minor) from present study and from Maiti (2006) (Table 1).

**Table 1: Measurements (in mm) of soldiers of *S. makassarensis* Kemner**

Characters	Measurements of soldiers from present study (n=2)		Measurements of soldiers as per Maiti (2006)	
	Soldier (major)	Soldier (minor)	Soldier (major)	Soldier (minor)
Length of head to lateral base of mandibles	1.34	0.80	1.34-1.52	0.80-0.92
Max. width of head	1.33	0.77	1.38-1.50	0.77-0.81
Head Index (width/length)	0.99	0.96	0.99-1.00	-
Length of mandible	0.84	0.46	0.84	-
Head-mandibular length index (mandible length/head length)	0.62	0.58	0.54	-
Median length of postmentum	1.00	0.57	-	0
Max. width of postmentum	0.42	0.28	0.28*	0.28
Min. width of postmentum	0.26	0.21	-	-
Max. length of pronotum	-	-	0.49-0.55	0.37-0.40
Max. width of pronotum	-	-	0.67-0.72	0.54-0.57

\*both the major and minor postmentum cannot have the same width, the value given is probably an error.



**Figures 1-6.** *Schedorhinotermes makassarensis* Kemner: **1.** Soldier Major: whole body; **2.** Soldier Major: Dorsal view of head; **3.** Soldier Major: Ventral view of head; **4.** Soldier Minor: whole body; **5.** Soldier Minor: Dorsal view of head; **6.** Soldier Minor: Ventral view of head.

**Materials examined:** 1 vial of specimens Reg. No. 4707/H11: 2 soldier major, 2 soldier minor and 1 worker; INDIA: Andaman and Nicobar: Great Nicobar Island: East-West Road (07°01.079' N 93°55.323' E): 20.viii. 2016, Coll. C. Sivaperuman.

#### Discussions

From Andaman and Nicobar islands, a total of 36 species of termites have been reported with 27 spp. from Andaman and 25 spp. in Nicobar (Sengupta *et al.*, 2018). This study adds one more species, viz., *S. makassarensis* to the list and genus *Schedorhinotermes* is now known from India

by 8 species. A global level identification key to soldier major for all species of *Schedorhinotermes* was given by Maiti (2006), while Roonwal and Chottani (1989) keyed both the soldier major as well as soldier minor of the species, then known from the Indian region.

*Schedorhinotermes* has most of its species distributed in Oriental Region (Krishna *et al.*, 2013). In India, 6 species are known from Andaman and Nicobar islands only, and are absent in India mainland. However two species, *S. translucens* (Haviland) and *S. malaccensis* (Holmgren) are reported from Meghalaya (Maiti, 2006). All species seen in

the Indian region, except *S. longirostris* (Brauer), *S. malaccensis* (Holmgren), and *S. translucens* (Haviland) are exclusively Oriental in distribution, the above 3 species are reported from the neighbouring Papua Region also.

Two species, *S. eleanorae* Roonwal and Bose and *S. tiwarii* Roonwal and Thakur are endemic to Andamans, while *S. nancowriensis* Maiti and Chakraborty is known only from Nicobar. The remaining 5 species *S. longirostris* (Brauer), *S. makassarensis* Kemner, *S. malaccensis* (Holmgren), *S. medioobscurus* (Holmgren), *S. translucens* (Haviland) have their strong presence in Southeast Asia, falling under Sunda Region biodiversity hotspot (Krishna *et al.*, 2013).

According to the key to the soldier major, *S. makassarensis* comes near to *S. medioobscurus* in couplet No. 6 (Maiti, 2006). *S. makassarensis* is distinguished from all the other species, in having angularly rounded lateral margins at the widest width of head (Maiti, 2006), while *S. medioobscurus* is having faintly rounded lateral margin of head. In the key to minor soldiers of the genus, *S. makassarensis* is close to three species: *S. tiwarii*, *S. translucens* and *S. medioobscurus*. *S. tiwarii* has comparatively larger head length (0.90-1.07 mm) than *S. makassarensis* (0.80-0.92 mm). *S. translucens* is different in having much higher head mandibular index (0.82) than that of *S. makassarensis* (0.58) and head of *S. makassarensis* is distinctly wider (0.77-0.81 mm) than the head of *S. medioobscurus* (0.66-0.72 mm).

**Key to the species of Genus  
*Schedorhinotermes* in India**

**Soldier Major** (except *S. eleanorae* as description is unknown)

1. Head larger with narrowed anterior end (head length: 2.28-2.34 mm; head width: 2.14-2.34 mm).....***S. malaccensis* (Holmgren)**
- Head comparatively smaller (head length: 1.34-2.08 mm; head width: 1.33-1.84 mm).....2
2. Head subsquarish; mandibles longer (0.84-1.12 mm).....3
- Head oval, mandibles shorter (0.80 mm)....  
.....***S. longirostris* (Brauer)**
3. Mandibles somewhat thinner and less hooked at tip; 3<sup>rd</sup> segment of antenna

- slightly longer than 2<sup>nd</sup>.....***S. tiwarii* Roonwal and Thakur**
- Mandibles robust and strongly hooked at tip; 3<sup>rd</sup> segment of antenna much longer (almost 1.5 times) than 2<sup>nd</sup>/4<sup>th</sup>.....4
4. Postmentum broader in width (minimum width of postmentum 0.26-0.28 mm; maximum width of postmentum 0.56-0.63 mm).....***S. nancowriensis* Maiti and Chakraborty**
- Postmentum narrower in width (minimum width of postmentum 0.23-0.33 mm; maximum width of postmentum less than 0.46 mm).....5
5. Head in profile not so depressed behind antennae; postmentum comparatively broader at waist (postmentum waist 0.28-0.33 mm).....***S. translucens* (Haviland)**
- Head in profile depressed behind antennae; postmentum comparatively narrower at waist (postmentum waist 0.26-0.28 mm)...6
6. Pronotum smaller; maximum length of pronotum < 0.55 mm (0.49-0.55 mm); width of pronotum 0.67-0.72 mm; pronotum head index (pronotum width/head width) 0.55. Lateral margin of head angularly rounded...***S. makassarensis* Kemner**
- Pronotum larger; maximum length of pronotum > 0.55 mm (0.55-0.60 mm); width of pronotum 0.85-0.95 mm; pronotum head index (pronotum width/head width) 0.59. Lateral margins of head faintly rounded.....***S. medioobscurus* (Holmgren)**

**Soldier Minor**

1. Head larger (head length to base of mandible 1.04-1.26 mm; head width 0.91-1.02 mm).....***S. malaccensis* (Holmgren)**
- Head comparatively smaller (head length to base of mandible 0.73-1.07 mm; head width 0.66-0.98 mm).....2
2. Head hexagonal, maximum width of postmentum 0.34-0.37 mm.....  
.....***S. nancowriensis* Maiti and Chakraborty**
- Head oval, maximum width of postmentum 0.27-0.34 mm.....3
3. Head oval, sides not sharply bulging out behind antenna.....4
- Head broadly oval, sides sharply bulging out behind antenna.....5
4. Postmentum minimum width < 0.20 mm. antenna with 14 segments....***S. eleanorae* Roonwal and Bose**

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- Postmentum minimum width > 0.20 mm (0.23-0.25 mm); antenna with 15 to 16 segments.....*S. longirostris* (Brauer)
- 5. Mandible length < 0.50 mm; head mandibular index (mandible length/head length) 0.58.....*S. makassarensis* Kemner
- Mandible length > 0.50 mm; head mandibular index (mandible length/head length) 0.59-0.82.....6
- 6 Head mandibular index 0.82.....*S. translucens* (Haviland)
- Head mandibular index 0.59-0.69.....7
- 7. Head mandibular index 0.69.....*S. medioobscurus* (Holmgren)
- Head mandibular index 0.59-0.64.....*S. tiwarii* Roonwal and Thakur

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