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New Records of Two Nasutitermitinae Termites (Isoptera: Termitidae) from Hill Evergreen Forest on Khao Kitchakut National Park in Thailand

Weerawan Amornsak, Ouab Sarnthoy and Nit Kirtibutr

ABSTRACT

Two new unidentified species of termites genera of Subfamily Nasutitermitinae (Isoptera: Termitidae), *Hospitalitermes* sp. and *Bulbitermes* sp. collected from Khao Kitchakut National Park in Thailand are reported. The taxonomic status of these unidentified termites species has not been completely resolved. Soldier bodies, head capsules, pronotum, antennae, and nasus are illustrated for undescribed *Hospitalitermes* sp. and *Bulbitermes* sp. Alate and worker of *Hospitalitermes* sp. are also shown. Morphologically, the arboreal nests of *Hospitalitermes* sp. is provided.

Key words: *Hospitalitermes* sp., *Bulbitermes* sp. Nasutitermitinae, Khao Kitchakut National Park, Eastern Thailand

INTRODUCTION

Termites have been around on this planet for over 100 million years before flowering plants, could date back to Mesozoic or late Palaezoic times (Pearce, 1997). Termites are a moderate-sized insect order (c. 2600 described species) accepted to be an extremely important part of tropical and sub-tropical ecosystems (Eggleton, 1999). The tropical rain forest is known for its rich fauna and enormous population of termites, which are supposed to play an important role in the rapid turnover of organic matter in the ecosystem (Matsumoto, 1975).

Because of its location, forest and climate, Thailand possesses one of the most diverse biota in the world as Indonesia and Malaysia. The taxonomy of the region is poorly known and sadly out of date. The only keys available are not complete and many described species exist. Yet the termites of Thailand remain poorly studied, with only significant monograph being that of Ahmad (1965) and Morimoto (1973). Assembled distribution records indicate that 90 termites species have been recorded from Thailand, 74 species representing 29 genera of which 32 new species to science described by Ahmad (1965) and 48 species of which 4 new species to science and 13 species new to fauna of Thailand reported by Morimoto (1973).

In this paper, we described open-air foraging new undescribed nasute termites genus *Hospitalitermes* sp. and *Bulbitermes* sp. found on Hill Evergreen Forest, Khao Kitchakut National Park, Chantaburi province in Thailand. The present study describes species of these genera based on the soldier caste.

The work reported here was initiated as part of a subproject on "Termites and Termites

Department of Entomology, Faculty of Agriculture, Kasetsart University, Kamphaengsaen Campus, Nakhon-Pathom. 73140. Thailand.

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Terrestrial Ecosystem of Thailand" under Thailand-Japan Cooperative Research Project: Termite-Symbionts Bio-recycle between Kasetsart University, Thailand and Japan Science and Technology Corporation (JST).

MATERIALS AND METHODS

This study was carried out from October 1999 to January 2001. The study area was centered at Hill Evergreen Forest of Khao Kitchakut National Park, Tambol Puang, Amphur Khao Kitchakut, Chantaburi in Thailand, Elevation 925 m average sea level, Latitude 12° 50′ 18″ N and Latitude 102° 09′ 12″ E, Slope 11%, Rainfall about 2886.4 mm. For field surveying, Random sampling was conducted using transect belt method, 100 m belt. Belt was divided into 20 sections. Specimens were collected in vials containing 80 % ethanol.

Identification of termites species was done primarily on the basis of the morphological criteria of termites soldiers presented by Ahmad (1965), Morimoto (1973), Thapa (1981) and Tho (1992). We also described termites characters in the present paper based on photomicrographs. The identification was confirmed by Dr. Yoko Takematsu, Laboratory of Chemical Ecology, Kyoto Institute of Technology, Matsugasashi, Sakyo-ku, Kyoto, Japan.

For stereomicroscopy, termites in ethanol 80% were examined in overview of external structure at magnification between 75X and 220X using a stereomicroscope and taken pictures using Sony 3CCD Color Video Camera Power HAD.

For scanning electron microscopy, lived termites were chilled in the freezer for 10 minutes and cleaned with distilled water. Specimens were then fixed in 2.5% glutaraldehyde in 0.1 M phosphate buffer at pH 7.0 overnight at 4°C and washed in buffer 3 times, 15 minutes each. Termites in ethanol 80% were transferred in series of ethanol down to 30 % before post fixation. All specimens from lived termites and termites in 80% ethanol then were post fixed in 2 % osmium tetroxide in 0.1 M phosphate buffer at pH 7.0 overnight at 4° C. Specimens were washed with distilled water and dehydrated in a graded series of ethanol before critical point drying. Samples were mounted on stubs using carbon tape or silver paint and sputter coated with gold. JEOL JSM-35 CF scanning electron microscope, operated at 15 kV, was used to observe the specimens. Photomicrographs were taken using Kodak Verichrome Pan Black & White Negative Film VP120 ISO125/22°.

Nest architecture: Arboreal carton nests of *Hospitalitermes* sp. were examined externally when collections of termites were taken.

Voucher specimens have been kept at Department of Entomology, Kasetsart University, Kamphaengsaen Campus, Nakhon-Pathom, Thailand.

Abbreviations used in the text and figures of this paper are:

F_1 = flagellar segment 1
MsT = mesonotum
MtT = metanotum
P = pedicel
PT = pronotum
Sc = scape

RESULTS AND DISCUSSION

The termites collected from October 1999 to January 2001 were identified into 20 species and 2 undescribed species. The dominant termites were in family Termitidae. Two unidentified species are genera *Hospitalitermes* sp. and *Bulbitermes* sp (Isoptera: Termitidae, Nasutitermitinae). These two unidentified species are probably new records in Thailand.

Hospitalitermes sp.

Nest. The carton nest is built in an exposed area attached to the tree branches (Figures 1-3). Arboreal carton nest varies in size. The exterior of nests is typically irregularly spherical and brown

Figures 1-2 Showing exposed nest of *Hospitalitermes* sp.

color. Nests are located about 1 meter up to 4 meters from the ground level. Nest is made of fragile materials and arranged in layer (Figure 3). Numerous nasute soldiers are found on papery nest (Figure 3).

Alate. The head and thorax are brown or dark brown while the abdomen is very dark in color (Figures 4-5). Compound eyes are big (Figures 4-5). Pronotum width is wider than length (Figure 5).

Soldier. Soldiers are active species. Their dark abdomen and brownish head characterize the soldiers. Soldiers have a pear-shaped, nasutiform head (Figures 6-8). Nasus is ellipsoid with 4 long setae and many short bristles around apex (Figure 9). Mandibles are reduced and pointed. Antennae are filiform type with 14 segments (Figures 10-12). Flagellar segments cover with numerous of trichoid sensilla (Figures 11-12). Pronotum is saddle shaped (Figure 7). *Hospitalitermes* sp. has long legs in brown color (Figure 6). Cerci are bottle-like and tubular to terminal with irregularly cuticle with specialized socketed long setae at the basal part but the tip of cerci is scale like with long hair (Figure 13).

Figure 3 Showing *Hospitalitermes* sp. nest of Figure 2 with removed part of outer layer.

Figure 4 Lateral body of a alate of *Hospitalitermes* sp. X75.

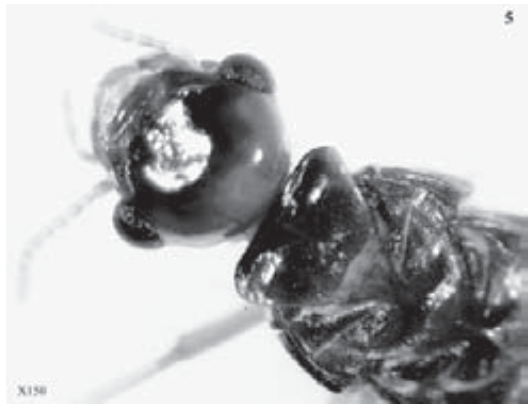

Figure 5 Dorsal view of head and pronotum of *Hospitalitermes* sp. alate. X150.

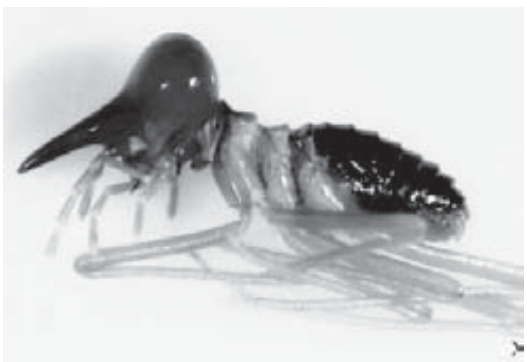

Figure 6 Lateral body of *Hospitalitermes* sp. soldier. X140.

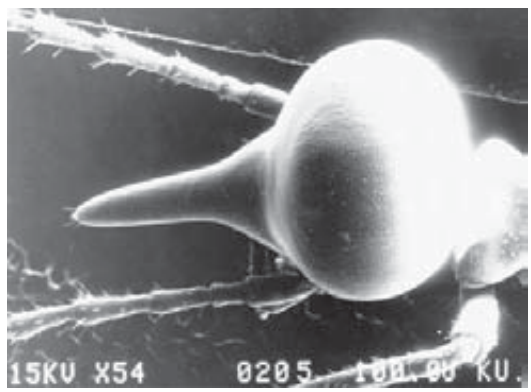

Figure 7 SEM dorsal view of head and pronotum of *Hospitalitermes* sp. soldier. Bar = 100 μm.

Figure 8 SEM lateral view of head and pronotum of *Hospitalitermes* sp. soldier. Bar = 100 μm.

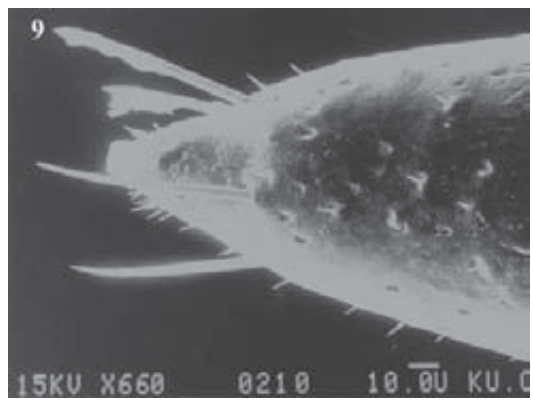

Figure 9 SEM magnification of tip of the nose (nasus) of *Hospitalitermes* sp. soldier. Bar = 10 μm.

Figure 10 SEM scape and pedicel segments of left antenna of *Hospitalitermes* sp. soldier. Bar = 100 μm.

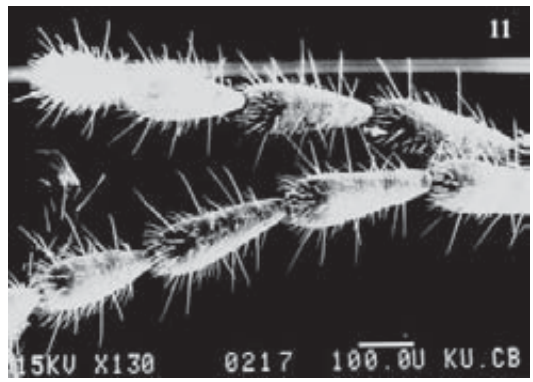

Figure 11 SEM flagellar segments of antennae of *Hospitalitermes* sp. soldier. Bar = 100 μm.

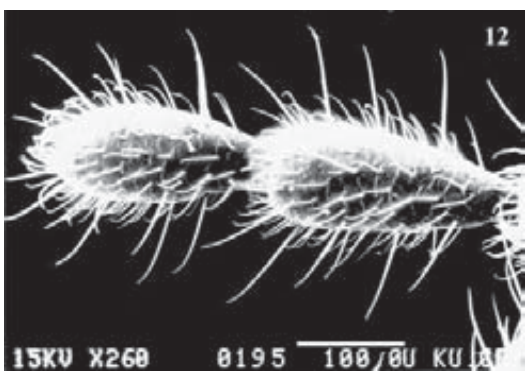

Figure 12 SEM dorsal view of apex of left antennae of *Hospitalitermes* sp. soldier. Bar = 100 μm.

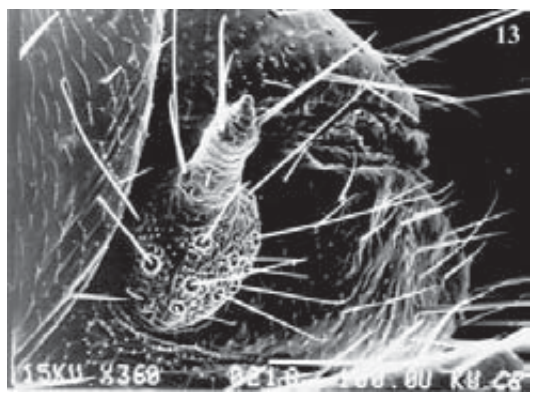

Figure 13 SEM left cerci of *Hospitalitermes* sp. soldier. Bar = 100 μm.

Worker. Workers are identical coloration of both alate and soldiers (Figure 14). Pronotum is saddle shaped with very short hairs along anterior margin and some distributed on above notum (Figure 15).

The genus *Hospitalitermes* is distributed over tropical rainforest in Southeast Asia, from Indian to Papuan region and is one such open-air foraging genus (Miura and Matsumoto, 1995, 1998; Pearce, 1997). Morphological structure of unidentified *Hospitalitermes* sp. like of previous described *Hospitalitermes* spp. is not recorded. (Ahmad 1965; Morimoto, 1973; Tho, 1992). Miura and Matsumoto (1998) reported that during foraging, *Hospitalitermes* soldiers play the roles of scouts and defenders protecting workers against predaters using terpenic substances secreted from their nasus. Unidentified *Hospitalitermes* sp. soldiers were collected in ethanol, specific odor was smelled. This scent may be either terpenic or specific substances of this termite species. Pearce (1977) stated that in rainforest, where runoff rain could destroy nests, some termites have developed rain-shading structures. The materials made for

Hospitalitermes sp. carton nest probably is modified for colony protection. The micromorphology of nest material can also be used for identification purpose (Pearce 1997). Knowledge of the composition of the nest is fundamental in determining origin of nesting materials, cost of construction, variation among colonies and species and ability of the termites to allocate components of their diet for nest construction (Thorne *et al*., 1996).

***Bulbitermes* sp.**

Soldiers were found on small tree branches on the ground. Head of a soldier constricted behind antennal socket characterizes *Bulbitermes* sp. Head and thorax is orangey brown; abdomen is light brown (Figures 16- 17). Nasus is shorter than head (Figures 16- 18). Nasus has no long setae and short bristles near apex but short setae distributed over it (Figure 19).

The nest of undescribed *Bulbitermes* sp. was not fond. Krishna and Wessner (1970) said *Bulbitermes* sp. that is entirely oriental and includes some 23 species occurring in Celon, Burma, the Malay Peninsula, Thailand Vietnam and Indonesia. Unidentified *Bulbitermes* sp. found at Hill Evergreen Forest of Khao Kitchakut National Park is similar to *Bulbitermes parapusillus* reported by

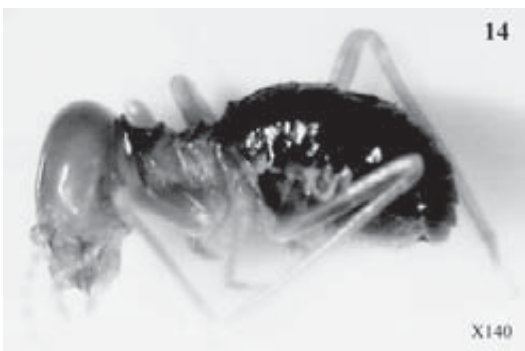

Figure 14 Lateral body of *Hospitalitermes* sp. worker 140X.

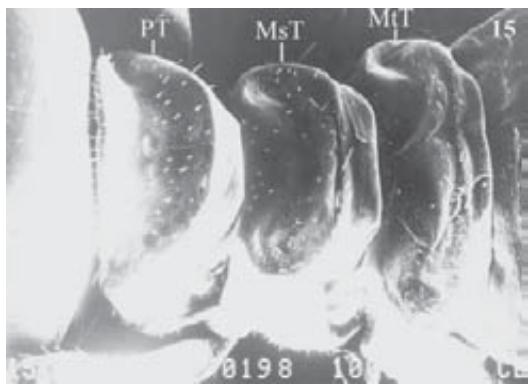

Figure 15 SEM dorsal view of thorax segments of *Hospitalitermes* sp. soldier Bar = 100 mm. PT = pronotum; MsT = mesonotum; MtT = metanotum.

Figure 16 Dorsal body of *Bulbitermes* sp. soldier. 220X.

Figure 17 Lateral view of *Bulbitermes* sp. soldier. 175X.

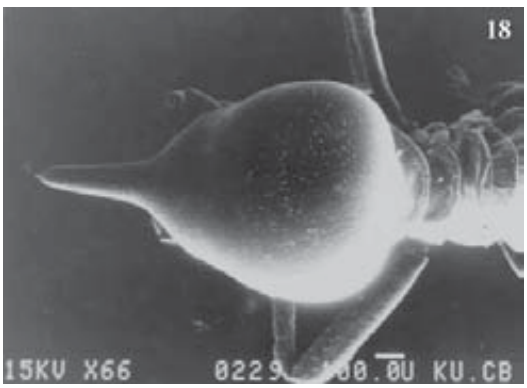

Figure 18 SEM dorsal view of head and thorax segments of *Bulbitermes* sp. soldier Bar = 100 mm.

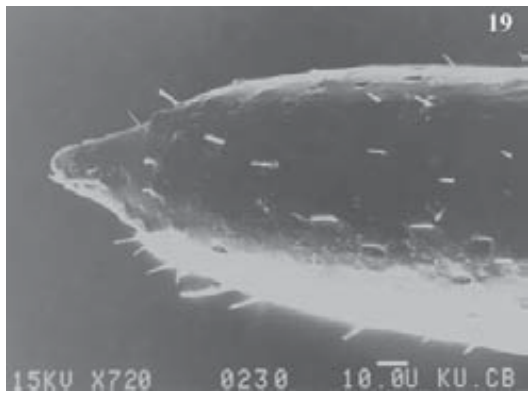

Figure 19 SEM magnification of tip of the nose (nasus) of *Bulbitermes* sp. soldier Bar = 10 mm.

Ahmad (1965) but *Bulbitermes* sp. reported in this paper has longer head.

Five genera, *Bulbitermes*, *Grallatotermes*, *Hospitalitermes*, *Lacessititermes* and *Longipeditermes*, are closely related (Tho, 1992). Among these species, *Lacessititermes* is confused with *Hospitalitermes* because they closely resemble particularly (Tho, 1992). In addition, Tho (1992) reported *Hospitalitermes* and *Lacessititermes* are free ranging in foraging habits and the morphological differences between both genera have never been discussed.

To confirm whether undescribed *Hospitalitermes* sp. and *Bulbitermes* sp. reported in this paper are new species or new records in Thailand, termite specimens must be examined in more details and compared with specimens kept in other museums in or outside Thailand. Samples should be sent to termite taxonomists to confirm the species identification.

In addition, morphological variation of termites species has been recorded and we purpose to use cerci structure, hair densities on nasus and cuticular pattern potentially involved in termites identification. Shape and size of the nasus are good character for identification. These will provide more data on which to classify termites. Thai termite taxonomy is urgently in need of revision. Eggleton (1999) stated that International termite taxonomy is in severe decline.

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