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CHARACTERISTICS OF TERMITES SUBFAMILY Nasutitermitinae (Isoptera, Termitidae) ON SIMEULUE ISLAND

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ABSTRACT

Termites consist of many subfamilies, one of which is the Nasutitermitinae subfamily. Research on the characteristics of the termite subfamily Nasutitermitinae on Simeulue Island was carried out from July 2020 to July 2021 using termite samples collected by Syaukani and the team at the Lab. Of Zoology, Faculty of Mathematics and Natural Sciences, Syiah Kuala University. This study aims to describe the various types of termites in the Nasutitermitinae subfamily originating from Simeulue Island by finding the characters for each type and analyzing the clusters on the characteristics of each species. The results of this study found 6 species and 19 colonies based on the morphological characters found in soldier termites. The morphological characters of the head, rostrum, and antennae as well as the size of the soldier caste are important characteristics in identification.

Keywords: Characteristics, Nasutitermitinae, termites, Simeulue.

INTRODUCTION

Termites are social insects that belong to the Order Isoptera group [10]. Termites have a very abundant species diversity; as many as 2,900 species have been identified which are divided into 281 genera, 9 families, and 14 subfamilies [2][9][16]. The Nasutitermitinae subfamily is the dominant subfamily in the Termitidae family, the species of which have been found and identified in as many as 80 genera and 650 species [9][13][14].

Great termite diversity is found in tropical forests (10,000

individuals/m^2). The Sumatra Primary Forest is the habitat most inhabited by termites of the Nasutitermitinae subfamily [6][11][15]. Subfamily Nasutitermitinae is one of the dominant termite families found in the Oriental Region [13]. The genus in the Nasutitermitinae subfamily is included in several genera that are most debated by termite researchers in terms of taxonomy and systematics [7]. Termites can be found in almost the entire tropics, one of which is on Simeulue Island.

Simeulue Island is a part of Sumatra Island; currently, Simeulue Island is one of the small islands on the west side of Sumatra Island besides Nias Island, Mentawai Island, and others. One of the causes of the separation of this island from Sumatra Island is the high level of sedimentation in this area, so that it can distinguish the Sumatran subduction zone from other parts of the Sunda arc [8].

The condition of the forests on Simeulue Island is similar to that of the forests in Sumatra, but Simeulue Island is unique in the variety of living things because this island was previously separated from Sumatra Island.

Reports on the characteristics of termites of the Nasutitermitinae subfamily on Simeulue Island are still very limited. Therefore, this research was carried out to look at the characteristics of the termites from the Unsyiah Zoology Laboratory collection from Simeulue Island and to add new information about the termites of the Nasutitermitinae subfamily on Simeulue Island. This research was conducted by describing the species collected by looking at the character of each species through the morphological characteristics of termites of the Nasutitermitinae subfamily on Simeulue Island.

RESEARCH METHOD

This research was conducted from June 2020 to July 2021. This research used termite specimens that had been collected by Syaukani and the team on Simeulue Island, Aceh Province, from 2012 to 2014 (Figure 1). Data identification and analysis were carried out at the Zoology Laboratory, Department of Biology, Faculty of Mathematics and Natural

Sciences (FMIPA), Syiah Kuala University.

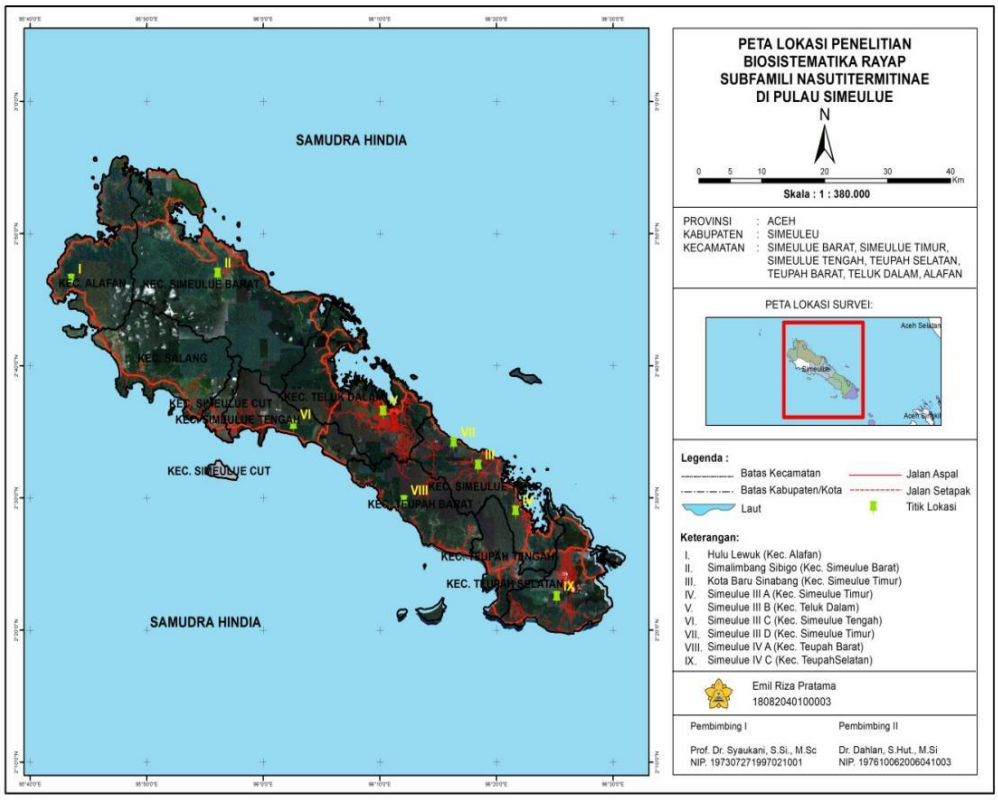

Figure 1. Map of Sampling Locations on Simeulue Island

Termite sample sorting

Each specimen collected from the field was sorted using the warrior caste morphology approach. This sorting was done by looking at the morphology of the warrior caste subfamily Nasutitermitinae, which has a very conspicuous rostrum (nasut) on the head. Individuals with a rostrum (nasut) are separated and grouped for further identification at the genus and species levels.

Termite sample identification

Observation of termite species was carried out using an ocular microscope with 10x magnification by looking at the termite morphology in the form of the head, rostrum, antennae, and the whole body. Each individual termite was photographed by submerging part of the termite's body into silica and 70% alcohol to make the termite stay in the desired position.

Morphometric measurements were made on head-to-rostrum and rostrum length. Individual termites that have been positioned and photographed for their morphology. Then, morphometric measurements were carried out using the ZEISS Zen Blue application on a computer connected to the microscope. The ZEISS Zen Blue application is first calibrated to ensure accuracy when measuring morphometric. The identification process uses a guidebook that refers to [17][10][3][18][12].

RESULTS

Termite genus description

The six genera obtained from the identification results were there are 17 species obtained, with the names and numbers of colonies as follows.

Table 1. Subfamily Nasutitermitinae found

Genera	Colony	Numbers of Colonies
Nasutitermes	*N. proatripennis*	8 colonies
	N. neoparvus	3 colonies
	N. roboratus	3 colonies
	N. longinasaoides	3 colonies
	N. matangensis	1 colony
	N. longinasus	1 colony
Bulbitermes	*B. constrictiformis*	2 colonies
	B. neopusillus	2 colonies
	B. flavicans	1 colony
	B. constrictus	1 colony
	B. sp.D	1 colony
Hospitalitermes	*H. hospitalis*	5 colonies
	H. sp.A	5 colonies
	H. sp.B	4 colonies
Hirtitermes	*Hirtitermes hirtiventris*	2 colonies
Leucopitermes	*Leucopitermes leucops*	1 colony
Malaysiotermes	*Malaysiotermes* sp.A	1 colony
Total Colony Subfamily Nasutitermitinae		**44 Colonies**

Termite cluster analysis

The cluster analysis that has been carried out shows several groups of termite species. Similarities in character traits between species can be seen in the following figure

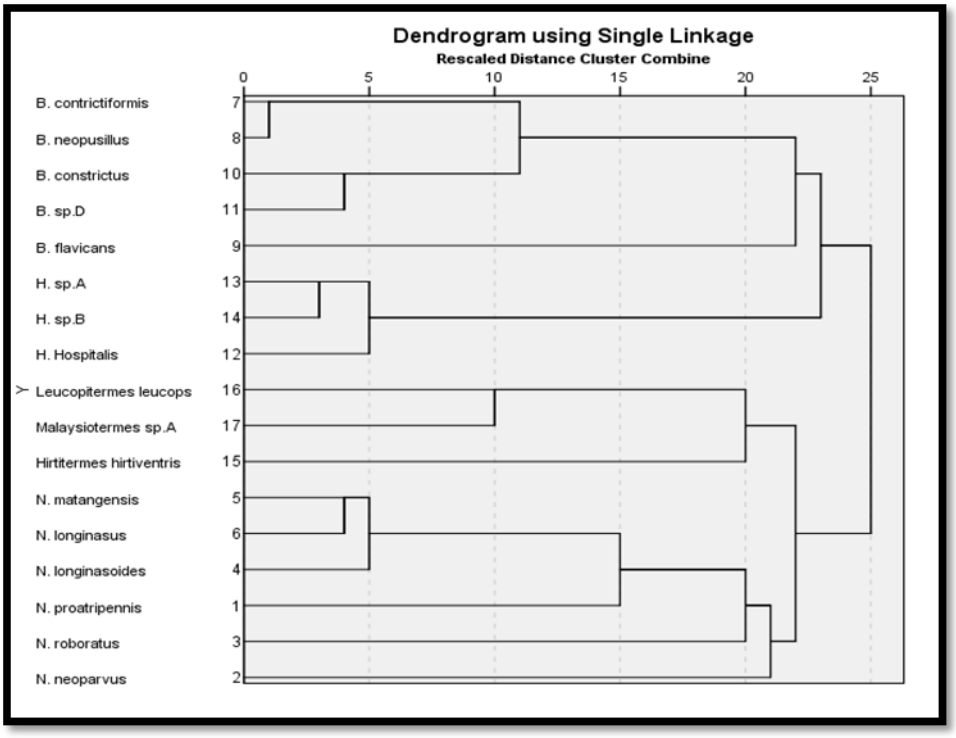

Figure 2. Dendogram of cluster analysis results for termite subfamily Nasutitermitinae in Simeulue Island.

DISCUSSION

Termite genus description

Identification results indicate the genus *Nasutitermes* The most commonly found were 6 species with 19 termite colonies. This genus is also the most commonly found in the Seulawah Ecosystem Area [1]. Then genus *Bulbitermes* found as many as 5 species with 7 colonies, and genus *Hospitalitermes* found as many as 3 species with a total of 14 colonies. While genus *Hirtitermes* found 2 colonies with 1 species. Lastly, genus *Leucopitermes* and genus *Malaysiotermes* each have 1 species and 1 colony (table 1).

Genus *Nasutitermes* Dudley

Genus *Nasutitermes* is generally monomorphic [12]. In the soldier caste, the size and shape of the head capsule vary widely; without constriction behind the antennae, the

rostrum is conical to cylindrical, the legs are short, the abdomen is elongated, and the number of antennae ranges from 11 to 14 segments (figure 3). This study found as many as 6 species of the termite genus *Nasutitermes* in 19 colonies. This genus is found in several districts, including Alafan District (5 species with 6 colonies), West Simeulue District (4 species with 5 colonies), East Simeulue District (4 species with 7 colonies), and Teluk Dalam District (1 species with 1 colony).

Figure 3. General morphological characters of termite dorsal heads in species *N. proatripennis*warrior caste (ocular zoom 10x)

Genus Bulbitermes Emerson

This genus was found with as many as 5 species and 7 colonies scattered in several sub-districts, including Alafan District (1 species with 1 colony), West Simeulue District (3 species with 4 colonies), and Teupah Selatan District (1 species with 1 colony). This genus has an abundance in various research areas, such as the research conducted by Syaukani [12] in the Kerinci Seblat National Park, which found the genus *Bulbitermes* to have as many as 12 species. The species of this genus that are most frequently found are species *B. contrictiformis* (picture 4), *B. neopusillus, B. flavicans, B. constrictus* and *B.* sp.D**.**

Figure 4. General morphological characters of the dorsal head of termite's *B. constrictiformis* warrior caste (ocular magnification 10x).

Genus *Hospitalitermes* Holmgren

This genus is one of the most frequently found genera in this study.

Figure 5. General morphological characters of the dorsal head of termites *H. hospital* warrior caste (ocular magnification 10x).

There are as many as 3 species with 14 colonies spread throughout the district. Those are Alafan district (2 species with 5 colonies), West Simeulue district (1 species with 1 colony), East Simeulue district (1 species with 1 colony), Teluk Dalam district (1 species with 1 colony), Simeulue Tengah district (2 species with 2 colonies), West Teupah district (1 species with 2 colonies), and Teupah Selatan district (1 species with 2 colonies). This species is spread throughout the districts in this study. The morphology of one species has a dark brown color (Figure 5) [12].

Genus *Hirtitermes* Holmgren

Genus Hirtitermes is another genus in the subfamily Nasutitermitinae. Soldier caste. The head is brownish yellow (Fig. 6), the rostrum is longer than the head, it is monomorphic, and the head does not constrict behind the antennae.

Figure 6. General morphological characters of the dorsal head of termites *Hirtitermes hirtiventris* warrior caste (ocular magnification 10x).

Genus *Leucopitermes* (Holmgren)

Leucopitermes Leucops is a termite species that belongs to the soil-feeding Nasute group or the Subulitermes-group, namely, termite species that eat soil material. These termites have an important role in the decomposition of soil organic matter. The termite taxonomy of the Subulitermes group has so far been

elusive and has undergone a number of revisions [4]. Genus *Leucopitermes* in the soldier caste are generally monomorphic; the head shape is rather square; the abdomen is transparent; the pronotum is in the form of an indentation; and the antennae have 12 segments [12]. The morphology of one of the species has a faded brown color (Figure 7).

Figure 7. General morphological characters of the dorsal head of termites *Leucopitermes leucops*, warrior caste (ocular magnification 10x).

Genus *Malaysiotermes* (Ahmad)

Genus *Malaysiotermes* is a genus belonging to the Subulitermes group, or termites that eat soil material [5]. This group has an important role in the decomposition of litter on the tropical forest floor. Genus *Malaysiotermes* in the soldier caste are generally monomorphic; the head is somewhat pear-shaped (figure 8), the abdomen is transparent, the pronotum is in the shape of an indentation, and the antennae have 12 segments [12].

Figure 8. General morphological characteristics of termites' dorsal heads *Malaysiotermes* sp. A warrior caste (ocular magnification 10x).

Cluster Analysis of Termite Subfamilies

The yield data in group 1 showed that 5 clusters were formed. This group is the one that has the closest species similarity in each of its clusters (Figure 2). Cluster 1 is 6 species of termites from the genus *Nasutitermes.* These 6 species have similar characteristics in their head shapes. Species *N. Matangensis* and *N. longinasus* have the closest resemblance and species *N. neoparvus*

has the furthest resemblance. Cluster 2 is the species of the genus *Bulbitermes*. These cluster species have similarities in shape and are relatively the same morphometric size. Cluster 3 is a species *B. flavicans.* This species is separated from the species in Cluster 2 due to its relatively smaller size and the difference in the number of antennae. Cluster 4 is the species of the genus *Hospitalitermes.* These species form clusters due to the striking color of the head capsule, which is blackish brown. Finally, cluster 5 is from termites, which are classified as deep-*soil feeding* or earth eaters.

Group 2 formed 4 clusters, namely cluster 1 consisting of the genus *Nasutitermes* and termites *soil feeding.* This is because the general shape of the head has similarities. Cluster 2, cluster 3 and cluster 4 still have the same resemblance to group 1. Group 3 formed a cluster separation due to the striking head shape and color of the head. While Group 4 formed a cluster separation due to the shape of the head with an indentation under the antenna.

CONCLUSION

Total colonies of the Nasutitermitinae subfamily found in this research are 44, consisting of 6 genera based on the morphological characters found in the warrior caste termites. Morphological characters of the head, rostrum, and antennae as well as the size of the warrior's caste are important characteristics in identification.

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