

Morphometric Analysis of *Nasutitermes* (Termitidae: Nasutitermitinae) from Sarawak, Malaysian Borneo

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This study aims to analyse the soldier's morphological variation of *Nasutitermes*. In this study, a total of 107 individuals representing six species were appropriately measured and recorded, in which 12 morphometric measurements were used. The morphological comparison was made among six *Nasutitermes* species used in this study based on the head capsule and shape of rostrum, pronotum and postmentum. Following the comparison between six *Nasutitermes* species, we suggest that *N. regularis* and *N. longinasus* were closely resembled to each other than to the remaining four species; *N. havilandi*, *N. matangensis*, *N. matangensisformis* and *N. fuscipennis* based on the external morphological characteristics. The cluster analysis shows by the dendrogram resulted in two major clades; clade 1 grouped almost individuals of *N. longinasus* while clade 2 consists of the remaining five species. Accordingly, this study may serve as a baseline reference for the morphological characteristics that can be used in resolving taxonomic issues for *Nasutitermes* species.

Keywords: nasute termites; morphological variation; Sarawak

I. INTRODUCTION

Soldier caste in termite social system is very important for identification (Miura and Matsumoto 2000) since it is the only caste that highly sclerotised and easily differentiates among the others. *Nasutitermes* species or well known as nasute termites is the largest genus lies under subfamily Nasutitermitinae (Syaukani and Thompson 2011). Subfamily Nasutitermitinae holds a unique characteristic that distinguishes them from other families which is the frontal projection (nasus or rostrum) on the head (Thapa 1981; Tho 1992). The utilisation of morphometric in phylogenetic studies can be one of the contributions to increase the understanding regarding termite taxonomy generally (Lee *et al.* 2005).

According to Syaukani and Thompson (2011), this genus usually possesses the conical to cylindrical shape of nasus which differentiate them from other genera. Besides, rostrum

is specialised to secrete protection fluid to avoid predation for termites' colonies (Thapa 1981). Tho (1992) acknowledged that members of this genus are the most difficult to be distinguished when it relies on their morphological characters. Thus, people usually confused with the other genus within the subfamily. However, there are only a few studies conducted for the past years on the morphological variations.

The main problem faced in *Nasutitermes* is the species delimitation, and the taxonomic status among members of *Nasutitermes* is intensely confusing, which always lead to misidentification. Unfortunately, there are limited studies on morphological variation of subfamily Nasutitermitinae notably under genus *Nasutitermes* (Syaukani and Thompson 2011). In addition, there are several studies of morphometric analysis for other species of termites such as in the genus *Odontotermes* (i.e. Manzoor & Akhtar 2006a;

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