

MORPHOMETRIC VARIATION AND GENETIC RELATIONSHIP OF *Coptotermes* spp. (BLATTODEA: RHINOTERMITIDAE) IN SARAWAK, MALAYSIA

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ABSTRACT

Amongst the termite genera within Rhinotermitidae, the genus *Coptotermes* is probably regarded as one of the most destructive pest in Malaysia as it contributes to more than 90% of the damages in buildings and structures. In this study, 17 parameters were used for morphometric analysis. Partial sequence of mitochondrial DNA cytochrome oxidase subunit II (COII) was obtained from 21 populations of *C. curvignathus*, seven populations of *C. sepangensis* and two populations of *C. kalshoveni* in Sarawak. In addition, 11 sequences of *Coptotermes* spp. were obtained from GenBank and included in the analysis. Based on Discriminant Function Analyses (DFA), the maximum width of postmentum (MxWPt) is identified as the best morphological character for differentiating the four species of *Coptotermes* in this study, proved by canonical discriminant function. Phylogenetic analyses of COII found that *C. sepangensis* and *C. kalshoveni* are nested within a single clade. Morphological comparison also showed these two species to be identical in terms of body measurements and diagnostic features. These evidence indicates that *C. sepangensis* and *C. kalshoveni* are the same species, thus we suggest *C. sepangensis* is a junior synonym of *C. kalshoveni*.

Key words: *Coptotermes*, synonym, morphometric variation, molecular phylogenetics

INTRODUCTION

The termite genus of *Coptotermes* from the family of Rhinotermitidae is an invasive pest in urban and suburban areas. The genus is very destructive to wood and wooden materials in the world (Takematsu *et al.*, 2000) and has a wide distribution throughout Asia, Australia, Africa and the New World. In Peninsular Malaysia, widespread infestation of the termite was reported on rubber trees (*Hevea brasiliensis*) before it was considered as a serious pest in the early 1900s. Today, the species is highly regarded as a destructive pest as it is highly destructive to buildings and its furnishings. It is also an agricultural nuisance in places such as oil palm plantations, garden landscapes and dwellings (Lee, 2002a) and brings damage to any cellulosic materials such as books, papers, blankets, window frames and furniture (Chao *et al.*, 1989).

A *Coptotermes* species is a global taxonomic challenge. The validity of each *Coptotermes* species name as a valid status differs tremendously in many level of support, from species synonymies (Yeap *et al.*, 2009; Krishna *et al.*, 2013), discoveries of potentially new cryptic species (Lee *et al.*, 2015), an intraspecific soldier morphological variability (Chouvenc *et al.*, 2016), a limited caste samples for species identification (Li, 2000), and a little molecular evidence to provide robust recognition of a single species of termites (Chouvenc *et al.*, 2016).

The issues of species synonymies for *Coptotermes* spp. had risen enormously over the past centuries. Since 2000s, an extensive study and efforts has been made either by morphological comparison, morphometric, molecular, taxonomic and phylogenetic revision (Miura *et al.*, 1998; Austin *et al.*, 2004; Szalanski *et al.*, 2004) to resolve many synonyms in *Coptotermes*. The advances in molecular tools and comprehensive taxonomic revision in *Coptotermes* spp. has provide a possible

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