

Article

Neighbor-joining analysis of morphological characters and DNA barcodes of COI sequences of rice black bugs from the Philippines

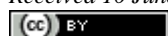
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Abstract

The rice black bugs (RBB) from the Philippines are argued to be comprised of many cryptic species. Still, they are also claimed to be only one species having many morphological variant forms. Arguably, RBBs are regarded as a ‘problem species’ with a ‘species problem’. To be able to understand the nature of the complexities observed in this group of insect pests, the Paleontological Statistics Software (PAST) was used to perform neighbor-joining analysis of thirty morphological characters, and DNA barcodes of COI sequences. The data matrix subjected to the Neighbor-Joining Method of analysis used the Kimura parameter bootstrapped 1000 times to determine the nature of morphological diversity. Genomic DNA (gDNA) from different RBBs extracted from the leg and head tissues, sequenced, and processed were also subjected to neighbor-joining analysis to determine how the different RBBs were phylogenetically related. Based on the analysis of morphological data, 11 out of 30 characters were consistent across all the RBB groups examined. Three morphologically differentiated groups were observed to differ from the standard taxonomic character traits of *S. coarctata*. The results of DNA barcoding for the RBB COI sequences showed only RBB Palawan was the only one to differ from the other RBB populations, thus indicating RBB Palawan could be a new species of *Scotinophara*. While morphometric variations were observed, the two Mindanao groups could be due to phenotypic plasticity, which may be attributed to adaptation in different environmental conditions.

Keywords congeneric; conspecific; phylogeny; taxonomy.

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1 Introduction

The predominantly invasive insect pest, *Scotinophara coarctata* (Fabricius) (Miyamoto et al., 1983) is argued to be composed of many cryptic species (Barrion et al., 2008). It is considered a species complex because RBB behaved differently in feeding habits, especially those collected from different rice hosts (Cruz et al., 2013;

of *S. coarctata*. However, the results of DNA barcoding for the RBB COI sequences showed identical nucleotide sequences in all groups except for RBB Palawan, which showed two nucleotide differences from the other groups. It can be concluded that RBB in the Philippines are phenotypically plastic except for RBB Palawan. The plasticity could result from the differences in adaptation of the species in response to variations in environmental conditions where they inhabit and may be undergoing evolutionary shifts, which could lead to speciation.

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