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***Wallacellus* is *Euwallacea*: molecular phylogenetics settles generic relationships (Coleoptera: Curculionidae: Scolytinae: Xyleborini)**

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Abstract

Euwallacea Hopkins and *Wallacellus* Hulcr & Cognato are ambrosia beetle genera within the tribe Xyleborini (Coleoptera: Curculionidae: Scolytinae). Several species have recently received attention due to their establishment in non-native regions with serious ecological and economic consequences. To clarify generic placement of these species, we tested reciprocal monophyly of the two genera and the placement of several species using molecular phylogenetics. We sequenced, or re-used published sequences of, three markers (COI mtDNA, 28S nuclear rDNA and ArgK single-copy nuclear) from representatives of *Euwallacea*, *Wallacellus*, the *Ambrosiodmus* clade, and the clade containing *Xyleborus s. str.*, and inferred their relationships with a Bayesian approach. We also tested explicit alternative topologies, and examined taxonomic utility of characters used for the delimitation of the genera.

All species of *Euwallacea*, *Wallacellus*, and two species of *Xyleborus* were monophyletic with high phylogenetic support. Based on the analysis and shared morphological characters, we transferred the following species to *Euwallacea*: *Xyleborus declivispinatus* (Schedl), *Wallacellus piceus* (Motschulsky), *Xyleborus posticus* (Eichhoff), *Wallacellus similis* (Ferrari), and *Wallacellus striatulus* (Browne). The genus *Wallacellus* was made a junior synonym of *Euwallacea* and morphological diagnosis of *Euwallacea* was updated. The results demonstrated that *Euwallacea* has a pantropical distribution.

Key words: *Wallacellus*, *Euwallacea*, ambrosia beetles, phylogenetic, taxonomic revisions

Introduction

Xyleborini is a diverse and globally distributed tribe of fungus-farming ambrosia beetles (Coleoptera: Curculionidae: Scolytinae). The group has received increased attention due to the growing importance of some of its species as invasive pests (Hulcr & Dunn 2011). In addition to fungus farming, all beetles in this tribe have a unique reproductive systems. A single female produces a single haploid male and multiple diploid females. Newly hatched males then mate with their sisters. This capacity to mate within a family, together with their food source—symbiotic fungus—allowed ambrosia beetles to be ecological generalists and colonize most of the world (Jordal *et al.* 2001).

A xyleborine genus that has recently received particular attention due to worldwide invasions is *Euwallacea* Hopkins (1915). This genus of over 50 species, originally distributed in the Old World tropics and subtropics, includes several highly invasive species. For example, *Euwallacea validus* Eichhoff (1875) and *Euwallacea interjectus* Blandford (1894), respectively a temperate and a tropical species, are two of the most common ambrosia beetles in Eastern North America (Atkinson 2014; Kasson *et al.* 2013). Of even greater concern are several populations within the *E. fornicatus* Eichhoff (1868) complex. Representatives of several populations from SE Asia are aggressively spreading through Israel and California, severely impacting urban trees and fruit industries (Eskalen *et al.* 2012; Mendel *et al.* 2012). Additional non-aggressive populations of the *E. fornicatus* complex are spreading through Eastern US and Central America (Kirkendall & Odegaard 2007). The exact identity of these beetles has not been clarified; they may represent a complex of cryptic species (O'Donnel *et al.* 2014).