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Zorotypus in Peninsular Malaysia (Zoraptera: Zorotypidae), with the description of three new species

YUTA MASHIMO^{1,7}, KAZUNORI YOSHIZAWA², MICHAEL S. ENGEL³, IDRIS ABD. GHANI⁴,
ROMANO DALLAI⁵, ROLF G. BEUTEL⁶ & RYUICHIRO MACHIDA^{1,7}

¹*Sugadaira Montane Research Center, University of Tsukuba, Sugadaira Kogen, Ueda, Nagano 386-2204, Japan*
E-mail: mashimo@sugadaira.tsukuba.ac.jp (YM), machida@sugadaira.tsukuba.ac.jp (RM)

²*Systematic Entomology, Hokkaido University, Sapporo, Hokkaido 060-8589, Japan*

³*Division of Invertebrate Zoology, American Museum of Natural History; Division of Entomology (Paleoentomology), Natural History Museum, and Department of Ecology & Evolutionary Biology, 1501 Crestline Drive – Suite 140, University of Kansas, Lawrence, Kansas 66045, U.S.A.*

⁴*School of Environmental and Natural Resource Sciences, Faculty of Sciences and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia*

⁵*Department of Life Sciences, University of Siena, Via A. Moro 2, I-53100 Siena, Italy*

⁶*Institut für Spezielle Zoologie und Evolutionsbiologie mit Phyletischem Museum, Friedrich-Schiller-Universität Jena, Erbertstraße 1, 07743 Jena, Germany*

⁷*Corresponding authors*

Abstract

Three new species of the uncommonly encountered insect order Zoraptera are described and figured from Peninsular Malaysia—*Zorotypus magnicaudelli* sp. n., *Zorotypus cervicornis* sp. n., and *Zorotypus impolitus* sp. n. Another species from the region, identified as *Zorotypus caudelli* Karny, 1927, was also collected and is reevaluated herein based on new material. A brief discussion of characters used in zorapteran systematics is provided, and a key to the species of Peninsular Malaysia provided. This is the first report for the order Zoraptera from Peninsular Malaysia.

Key words: Zoraptera, Zorotypidae, new species

Introduction

Few insect lineages are more generally unfamiliar than those species comprising the order Zoraptera. Zorapterans are small, generally less than 4 mm in length, and inconspicuous, living subcortically in decaying logs throughout the tropical and subtropical zones. Species superficially resemble barklice (Psocoptera) or even termites (Isoptera) and are gregarious, often living in loose colonies of up to 150 individuals (Engel 2009, 2012, in press). Serious inquiry into the order has been long neglected, although some significant advances have been made during the turn of the century, particularly in terms of their paleontology (*e.g.*, Engel & Grimaldi 2000, 2002, Grimaldi & Engel 2005, Engel 2008), morphology (*e.g.*, Beutel & Weide 2005, Friedrich & Beutel 2008, Dallai *et al.* 2011, 2012a, b, 2013, Mashimo *et al.* 2011), and taxonomy (*e.g.*, Engel 2000, 2003, 2007, Engel & Grimaldi 2000, 2002, Rafael & Engel 2006, Rafael *et al.* 2008). Although the phylogenetic relationship of Zoraptera to other insects remains controversial, their polyneopteran affinities are largely confirmed (*e.g.*, Yoshizawa & Johnson 2005, Yoshizawa 2007, 2011, Ishiwata *et al.* 2011, Letsch *et al.* 2012, Simon *et al.* 2012, Wang *et al.* 2013).

There is little doubt that the diversity of these cryptic insects remains underexplored. Prior to the present study, 36 extant species of Zoraptera have been described (Terry & Whiting 2012, Engel in press), all classified in the genus *Zorotypus* Silvestri (Engel & Grimaldi 2000). Some authors have favored the use of a multigeneric system for living zorapterans and for which various names are available (*e.g.*, Chao & Chen 2000, Kukalová-Peck & Peck 1993); however, the validity of these groups is disputable (*e.g.*, Engel & Grimaldi 2000). Moreover, the extreme