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Updated checklist of the ice-crawlers (Insecta: Grylloblattodea: Grylloblattidae) of North America, with notes on their natural history, biogeography and conservation

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Abstract

We provide an updated checklist and comprehensive distributional record of *Grylloblatta* (Grylloblattodea: Grylloblattidae) in North America. These distribution records are based upon a thorough review of the literature, as well as unpublished data of the authors and colleagues. Thirteen species of *Grylloblatta* are currently described, with up to 16 additional taxa awaiting formal description. Distributional data shows that endemism of *Grylloblatta* is high and geographic range size is typically small: the median geographical area of 13 species and six putative species is 179 km^2. It is clear that there is a general lack of knowledge of species range limits and local population sizes; for example, three *Grylloblatta* species are known from just a single locality and less than 15 specimens each. Conservation status ranks are suggested in order to update the IUCN Red List and national Natural Heritage Network Database. Finally, we describe the natural history and seasonality of *Grylloblatta,* discuss their unique biogeography, and provide recommendations for future surveys of grylloblattid species by highlighting known distributional gaps.

Key words: biodiversity, conservation, endemic, biogeography, grylloblattid

Introduction

The enigmatic members of the insect family Grylloblattidae have recently received attention from entomologists after a lapse of formal study for nearly three decades. New species of grylloblattids have been described in China (Bai *et al.* 2010), South Korea (Kim & Lee 2007), and the United States (Schoville 2012), bringing the total to 32 species in five genera. Surveys conducted throughout their range in northeast Asia and North America have identified new localities and filled distribution gaps (Schoville 2010). Genetic analyses have provided novel insights to the evolutionary biology of Grylloblattidae, providing the first phylogenetic analysis of generic relationships (Jarvis & Whiting 2006), new hypotheses for phylogenetic relationships to other insect orders (Terry & Whiting 2005), and an awareness of the utility of grylloblattid biogeography for understanding regional geological and climatic change (Schoville & Kim 2011, Schoville & Roderick 2010, Schoville *et al.* 2013). The accumulation of this information suggests that grylloblattid species diversity has been underestimated and will likely increase in both Asia and North America.

Current taxonomy recognizes four "rock-crawler" genera in northeastern Asia, *Galloisiana* (Caudell & King 1924) from China, North and South Korea, and Japan, *Grylloblattina* (Bey-Bienko 1951) from far-eastern Russia, *Grylloblattella* (Storozhenko 1988) from south-central Siberia, and *Namkungia* (Storozhenko & Park 2002) from South Korea. However, phylogenetic analyses have shown that *Galloisiana* and *Namkungia* are not monophyletic clades (Schoville & Kim 2011, Schoville *et al.* 2013), and *Galloisiana yezoensis* (Asahina 1961) from Hokkaido may be sufficiently divergent to warrant generic status. In contrast, North American grylloblattids (ice-crawlers) are strongly supported as comprising the monophyletic genus *Grylloblatta* Walker, 1914 based on genetic analyses

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