



## Biodiversity, biogeography, and bibliography of the cicadas of Thailand (Hemiptera: Cicadoidea: Cicadidae)

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## Abstract

A total of 148 species in 35 genera of cicadas is reported for Thailand. Of these, 11 species and one genus (*Muda*) are reported for the first time from the country. Fifteen undescribed species were discovered (to be described at a later date), in our collections and among museum holdings, thereby adding to the diversity of the known cicada fauna of Thailand. Ten other species are removed from the Thai cicada fauna. Major areas of diversity are the northwestern region of the country and peninsular Thailand.

**Key words:** Biodiversity, cicadas, Cicadidae, biogeography

## Introduction

Cicadas in Southeast Asia are obvious members of the insect community because of their large size and loud and diverse acoustic signals. Of the Southeast Asian countries, Thailand in particular has been the focus of faunistic treatments for a variety of taxa of Hemiptera. In fact, an entire journal (*Amemboa*) is dedicated to the publication of papers presenting research results on the Heteroptera of Thailand. However, despite their overwhelming abundance, the cicadas of Thailand have received little taxonomic attention until recently, when Boulard (see summary in Boulard 2005a) reported the results of five years of field work studying the natural history of the Thai cicada fauna, including the description of 50 new species and five varieties.

Presented here is an annotated list of the cicada taxa of Thailand gleaned from the literature and supported with our collections and records from museum holdings. Although we have identified new species in the material available for study, the descriptions will constitute another work. Also included are distribution maps and an extensive bibliography of papers concerning the Thai cicada fauna.

## Material and methods

Our collections of cicada specimens were conducted while sampling for adults of aquatic and semiaquatic insects as part of several nationwide biogeographic and faunistic projects from 1997 to 2006. Cicadas were mostly captured in black light pan traps, although specimens were also collected by hand or with nets whenever found.

Data from additional specimens were obtained from the following museum collections: Enns Entomology Museum, University of Missouri, Columbia (UMRM); Prince of Songkla University Collection, Hat Yai, Thailand (PSUC); National Science Museum, Technopolis, Pathum Thani, Thailand (NSMT); Florida State Collection of Arthropods, Gainesville (FSCA); North Carolina State University, Raleigh (NCSU); Cornell University Insect Collection, Ithaca (CUIC); Texas A&M University, College Station (TAMU); University of California-Riverside Collection (UCRC); and the Sanborn collection (AFSC).

Specimens were identified and the literature reviewed in order to determine the known Thai cicada fauna. The bibliographies by Metcalf (1963a, b, c) and Duffels & van der Laan (1985) were consulted to identify literature which mentioned Thai cicadas. These older references, as well as the more recent literature, were then compiled and examined for Thai cicada records and associated collection localities. Higher taxonomy follows Moulds (2005).

Species distributions were mapped using the localities provided in the literature and available specimens. If not provided in the original reference, latitude and longitude information for available sites was compiled from the U.S. Geological Survey GEONet Names Server (<http://gnswww.nga.mil/GNS/index.jsp>) or from printed maps. Distribution maps for the individual species were produced using iMAP.