



Taxonomic revision of one of the Old World's smallest frogs, with description of a new Bornean *Microhyla* (Amphibia, Microhylidae)

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Abstract

An examination of the holotype of *Microhyla borneensis* Parker 1928 revealed that this nomen applies to a miniaturized narrow-mouthed frog from Borneo that recently was described as *Microhyla nepenthicola* Das & Haas 2010. This is confirmed concordantly by body size of the female holotype of *M. borneensis*, and by its reduced extent of toe webbing and rather rounded, short snout profile. Consequently, the name *M. nepenthicola* is to be considered as a junior synonym of *M. borneensis*, and an old report of nepenthophilous breeding habits of *M. borneensis* is therefore justified. A sympatric larger species usually treated as *M. borneensis* has no scientific name and is described here as *M. malang* sp. nov. The new species and *M. borneensis* are sister to each other, and together are closely related to *M. mantheyi* from Peninsular Malaysia. These three species are morphologically very similar, but can be distinguished by body size, color pattern, and extent of toe webbing. Phylogenetic relationships, miniaturization, and larval oral morphology in the genus *Microhyla* are discussed.

Key words: *Microhyla*, new species, synonymy, mitochondrial DNA, phylogeny, body size, Borneo, miniaturization

Introduction

The genus *Microhyla* Tschudi has a wide range of distribution from the Ryukyu Archipelago of Japan through Taiwan, southern China, Southeast Asia, and much of South Asia including Sri Lanka, and encompasses about 30 species (Frost 2010). Within Southeast Asia, Borneo is renowned for its high diversity of amphibian species (Inger & Tan 1996; Matsui 2006), but diversity of *Microhyla* on the island is not high, with only five species (*M. berdmorei* [Blyth], *M. borneensis* Parker, *M. perparva* Inger and Frogner, *M. petrigena* Inger and Frogner, and *M. maculifera* Inger) recorded over the past two decades (Frost 2010).

Das & Haas (2010) recently described *M. nepenthicola* from Sarawak, emphasizing its small size as the Old World's smallest frog, and recorded its unique nepenthophilous breeding habits as their original finding. In the description of *M. nepenthicola* they treated a sympatric, and sometimes syntopic, larger sized species as *M. borneensis*. Recognition of the larger species as *M. borneensis* by these authors began when Das *et al.* (2007a) separated the Malay Peninsula population (Berry 1975; Chan-ard 2003) from the Bornean population as a distinct species *M. mantheyi*, and Das & Haas (2007b) reviewed the amphibian fauna of the Matang Range, Sarawak, and briefly introduced *M. nepenthicola* as an undescribed species.

Parker (1934) identified a nepenthophilous larva from Kuching, near the type locality of *M. borneensis*, Bidi (Kidi in the original description), as that species. Inger (1966), however, doubted the species identification and assigned the unique larvae to another microhylid genus *Kalophrynus*. Inger (1966) instead described larvae from isolated pools of Third and Fourth Divisions of Sarawak as *M. borneensis* and most subsequent authors (e.g. Malkmus *et al.* 2002; Das *et al.* 2007a, b) followed this view.

During herpetological fieldwork in Sarawak, I have been studying nepenthophilous larvae and their parental species at various altitudes of Gunung (= Mt.) Serapi, including the type locality of *M. nepenthicola* (Das & Haas 2010). The species is identified as *M. borneensis* by Inger's (1966) key, except for definitely smaller adult body size. At the same locality, I found specimens of *Microhyla* sympatric with the small form (Fig. 4). They also keyed