



## Two new species of *Theلودerma* (Anura: Rhacophoridae) from Vietnam

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### Abstract

Two new species of rhacophorid frogs in the genus *Theلودerma* are described from high-elevation montane forest on the Kon Tum and Langbian Plateaus in Vietnam, on the basis of morphological and molecular evidence. Both new species are differentiated morphologically from their congeners by their small body size (<30 mm SVL); absence of vomerine teeth; rugose skin texture with minute, calcified dorsal asperities; no webbing on hands; brownish dorsum; and a bicoloured iris (pale gold in upper third and reddish brown in lower two-thirds). Molecular evidence supports that both new species are members of genus *Theلودerma*, and are distinct from all congeners sampled (uncorrected sequence divergences at the 16S rRNA gene of >8.5% for all *Theلودerma* for which homologous 16S rRNA sequences are available). The new species are differentiated from each other by dorsal pattern, extent of dorsal asperities, and by mitochondrial DNA.

**Key words:** Anura, Rhacophoridae, Southeast Asia, Vietnam

### Introduction

The family Rhacophoridae is a largely arboreal group of frogs containing approximately 320 species and distributed throughout subsaharan Africa, China, Southeast Asia, Japan, Taiwan, the Philippines, and the Greater Sunda Islands (Frost 2011). Due to their high level of diversification, limited number of morphological synapomorphies within groups and unresolved molecular phylogenies, generic allocation within the family is often difficult, and is currently in a state of flux (Li *et al.* 2008, 2009; Yu *et al.* 2009).

Frogs within the rhacophorid genus *Theلودerma* (Tschudi 1838) are small to medium sized and highly arboreal, and grouped mainly on the basis of their tuberculate dorsal skin or presence of dorsal asperities. The genus currently contains 17 species distributed throughout Southeast Asia, southern China and northeastern India, but new species in the genus continue to be discovered, and five have been described in the last decade (Frost 2011).

During recent field surveys in Vietnam, we encountered several small rhacophorid specimens from high elevation forest in both the Kon Tum and Langbian Plateaus (Figure 1). Specimens from both sites were identified morphologically as members of the genus *Theلودerma* on the basis of having tuberculate skin with calcified dorsal asperities on the dorsum, a distinct tympanum, rounded canthus rostralis (versus sharp in *Nyctixalus*), bony ridges from canthus rostralis to occiput absent (versus present in *Nyctixalus*), terminal phalanx with a Y-shaped distal end (versus simple or bifurcate in *Philautus*), and skin of head not co-ossified to the skull (versus skin of head co-ossified to skull in *Nyctixalus*) (Liem 1970; McLeod & Norhayati 2007). However, because no morphological synapomorphy is known for the genus *Theلودerma*, and its monophyly is not certain (Liem 1970; Li *et al.* 2009) we use preliminary molecular evidence to provide independent support of our generic assignment and describe these species as new. Our preliminary molecular phylogeny also provides an opportunity to further examine the genus *Theلودerma*.