

## Discovery of a new basal relict lineage of Madagascan frogs and its implications for mantellid evolution

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### Abstract

Frogs of the subfamily Mantellinae (Amphibia: Anura: Mantellidae) are a species-rich and diverse lineage endemic to the Madagascan region. The major synapomorphy of this clade is a derived reproductive mode including an unusual mating behaviour (loss of strong mating amplexus, egg deposition outside of water) and associated morphological adaptations (evolution of femoral glands, loss of nuptial pads). However, the evolutionary steps towards this unique character complex remain obscure. We here describe a recently discovered new frog, *Tsingymantis antitra* **gen. nov., sp. nov.** from the moderately dry karstic massif Tsingy de Ankarana in northern Madagascar. The new species is not referable to any existing genus or species groups. A phylogenetic analysis, based on DNA sequences of four mitochondrial genes (12S and 16S rRNA, tRNA<sup>Val</sup>, cytochrome b) and one nuclear gene (rhodopsin) placed *Tsingymantis* without significant support as sister taxon of the Mantellinae which was found to be a well-defined monophyletic group (100% Bayesian and 99% bootstrap support). The position of *Tsingymantis* as the most basal clade of the Mantellinae is in agreement with several morphological and osteological characters, suggesting that this subfamily including *Tsingymantis* may be a monophyletic group whereas the Boophinae could represent the most basal clade of the Mantellidae. We therefore include *Tsingymantis* in the Mantellinae in a preliminary way, pending further study. In contrast to the large majority of recent mantellid species which are adapted to humid rainforests, the most basal clades of the three subfamilies show adaptations to relatively dry conditions, indicating that the climate during the early radiation of mantellids (probably in the Eocene) may have been drier than in recent times.

**Key words:** Anura, Mantellidae, *Tsingymantis antitra* **gen. nov., sp. nov.**, molecular phylogeny, Madagascar