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A new microhylid frog, genus *Rhombophryne*, from northeastern Madagascar, and a re-description of *R. serratopalpebrosa* using micro-computed tomography

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Abstract

The rainforests of the Marojejy massif in northern Madagascar are a well-known hotspot of amphibian species diversity and endemism. In the present paper, we re-describe *Rhombophryne serratopalpebrosa* (Guibé 1975), a cophyline microhylid frog from high altitude on this massif, based on a re-examination of its holotype, and describe *Rhombophryne vaventy* **sp. nov.** using characters of external morphology and osteology, illustrated by pdf-embedded comparative 3D models of their skeletons. *Rhombophryne serratopalpebrosa* differs from *R. vaventy* **sp. nov.** by smaller size (28 mm snout-vent length vs. 52.9 mm), skin texture (granular vs. rough and tubercular skin respectively), supratympanic fold shape (strong, long and straight reaching the eye vs. curved and not extending anteriorly beyond the tympanum), relative tympanum diameter (78% vs. 41% of eye diameter), shape of the postchoanal prevomerine palate, shape of the footplate of the columella, length of prepollex, and by other subtle osteological features. Morphological comparisons suggest that a specimen from Ambolokopatrika assigned to *R. serratopalpebrosa* in previous genetic studies might belong to yet another undescribed species, closely related to *R. vaventy* **sp. nov.**, whereas DNA sequences of the topotypic *R. serratopalpebrosa* remain unknown. We therefore emphasise the need for collecting additional material from high altitudes of the Marojejy massif to understand the systematics, as well as the natural history, of this poorly known species. For the new species described herein, we propose a Red List threat status of Vulnerable, in line with other Marojejy endemics from a similar altitude.

Key words: Amphibia, Anura, Microhylidae, *Rhombophryne vaventy* **sp. nov.**, Madagascar, micro-computed tomography

Introduction

Microhylid frogs are one of the most successful anuran lineages, consisting of more than 500 species distributed broadly across tropical and subtropical regions of the planet (Köhler & Günther 2008; de Sá *et al.* 2012; Frost 2014). Their diversity is unevenly distributed, however; more than half of all known microhylid species are endemic to just two large islands: New Guinea and Madagascar. Three of the eleven currently recognised microhylid subfamilies are endemic to Madagascar: Cophylinae, Dyscophinae, and Scaphiophryninae (Blommers-Schlösser & Blanc 1991). Of these three subfamilies, the Cophylinae are by far the most diverse, consisting of around 50 described species in seven genera (in contrast to the 3 and 11 species of Dyscophinae and Scaphiophryninae respectively, see Raselimanana *et al*. 2014). Several additional candidate species of cophylines have been identified by recent molecular studies (Andreone *et al.* 2005; Wollenberg *et al.* 2008; Vieites *et al.* 2009; Perl *et al.* 2014), and await formal description.

The centre of diversity of the Cophylinae is in the moist north of Madagascar (Wollenberg *et al.* 2008). While several species of cophyline frogs have recently been discovered from arid parts of western Madagascar (Glaw *et al.* 2007; Andreone & Randrianirina 2008; Raselimanana 2013), the majority of species are restricted to rainforests or moist high-altitude areas along the east coast. These frogs exhibit a wide range of habits, from entirely arboreal frogs possessing terminal discs on the phalanges, to terrestrial and fossorial frogs lacking these terminal discs. This

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