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## Phylogeography of the reed frog *Hyperolius castaneus* (Anura: Hyperoliidae) from the Albertine Rift of Central Africa: Implications for taxonomy, biogeography and conservation

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### Abstract

We examine the systematics of multiple populations of the Albertine Rift endemic amphibian *Hyperolius castaneus*, which currently incorporates four subspecies. Standard morphometric data were analyzed with principal components analyses and analyses of covariance. Phylogenetic analyses of two mitochondrial (16S, *cyt b*) and one nuclear (RAG1) genes were analyzed from 41 samples representing three subspecies. Results indicated some significant morphometric differences between the nominate subspecies *H. c. castaneus* and the Itombwe Plateau subspecies *H. c. constellatus*, and phylogenetic analyses of molecular data recovered these taxa as reciprocally monophyletic groups. We recognize these two allopatric populations as recently diverged, but distinct species, *H. castaneus* and *H. constellatus*. The subspecies *H. c. submarginatus* from the Kabobo Plateau is transferred to the synonymy of *H. constellatus*, but the status of the unsampled subspecies *H. c. rhodogaster*, described from mid-elevations of the western Itombwe Plateau, remains problematic. The phylogeographic pattern of our study resembles some, but not all, Albertine Rift vertebrates that have been examined with molecular data. *Hyperolius constellatus* is restricted to the Itombwe and Kabobo plateaus, which are of special conservation concern because of high levels of amphibian diversity and endemism, and multiple threats from deforestation, mining activities and road construction.

**Key words:** Montane forest, molecular phylogenetics, morphology, phylogeny, taxonomy, *Hyperolius constellatus*

### Introduction

The Albertine Rift (AR) is a region in Central Africa that extends from 30 km north of Lake Albert to the southern tip of Lake Tanganyika, including the western rift valley and flanks of the escarpment within 100 km east of the border of Democratic Republic of the Congo (DRC), and follows the 900 m contour line in eastern DRC, including protected areas in northern Zambia. This area encompasses 313,000 km<sup>2</sup>, and the AR has been called the most species-rich region for vertebrates on the African continent. The AR is especially rich in amphibian diversity and endemism, and approximately 20% of Africa's amphibians are found in the rift (Plumtre *et al.* 2003, 2007). Recent species descriptions in the genera *Hyperolius* (Dehling 2012, Channing *et al.* 2013), *Xenopus* (Evans *et al.* 2008, 2011) and *Leptopelis* (Portillo & Greenbaum submitted, a,b) have added to the known amphibian diversity of the AR. Moreover, Greenbaum & Kusamba (2012) noted that ongoing analyses of molecular data suggested that the amphibian diversity of the Itombwe and Kabobo plateaus, two of the largest and most poorly explored montane regions of the AR, contain a significant amount of cryptic diversity that will undoubtedly lead to additional species descriptions in the future.

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