Zootaxa 2574: 55–68 (2010)
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

Genetic differentiation in the nearly extinct harlequin frogs (Bufonidae: *Atelopus*), with emphasis on the Andean *Atelopus ignescens* and *A. bomolochos* species complexes

JUAN M. GUAYASAMIN[1,3], ELISA BONACCORSO[1,2], WILLIAM E. DUELLMAN[3] & LUIS A. COLOMA[1]

[1] *Museo de Zoología, Escuela de Biología, Pontificia Universidad Católica del Ecuador, Av. 12 de Octubre y Roca, Aptdo. 17-01-2184, Quito, Ecuador.*
[2] *Biodiversity Institute, The University of Kansas, Lawrence, KS 66045, USA.*
[3] *Corresponding author: e-mail: jmguayasamin@gmail.com*

Abstract

The evolutionary relationships of Andean harlequin frogs were studied, with emphasis on the *Atelopus ignescens* and *A. bomolochos* species complexes. Sampling included 53 individuals belonging to eight taxa and several unidentified species, for which a mitochondrial fragment (16S, tRNA-Leu, ND1, and tRNA-Ile; 1294 bp) was amplified. Bayesian and Maximum Likelihood analyses were used to obtain hypotheses of relationships. The resulting phylogeny indicates that the species complexes are non-monophyletic. Additionally, analyses support the presence of four or five undescribed species. Most of these populations and newly discovered lineages have not been recorded in several years and are presumed extinct, the exception being two populations of probably new taxa from mid-elevations in southeastern Ecuador found during recent field surveys. Although sampling is limited, geographic isolation is the most plausible cause of differentiation among populations and taxa.

Keywords: Andes, *Atelopus ignescens, bomolochos,* jambato, phylogeny, phylogeography, genetic differentiation

Resumen

Se estudiaron las relaciones evolutivas de las ranas arlequines, con énfasis en los complejos de especies *Atelopus ignescens* y *A. bomolochos*. El muestreo incluyó 53 individuos pertenecientes a ocho especies descritas y varias aparentemente sin describir. Se secuenció un fragmento mitochondrial (16S, tRNA-Leu, ND1, tRNA-Ile) de aproximadamente 1294 pares de bases. Para obtener las hipótesis de las relaciones entre especies, se utilizaron los criterios Bayesianos y de Máxima Verosimilitud. Las filogenias resultantes indican que los complejos de especies *A. ignescens* y *A. bomolochos* no son monofiléticos. Adicionalmente, los análisis indican la presencia de cuatro o cinco especies no descritas. La mayoría de las poblaciones y linajes descubiertos no han sido observados en la naturaleza durante muchos años, por lo que se presumen extintos, aunque existen algunas excepciones (i.e., poblaciones del sureste de Ecuador encontradas recientemente). A pesar de que el muestreo de especies es limitado, el aislamiento geográfico es la alternativa más probable para explicar la divergencia genética entre poblaciones y linajes.

Palabras claves: Andes, *Atelopus ignescens, bomolochos,* jambato, diferenciación genética, filogenia, filogeografía

Introduction

Bufonids originated in South America and rapidly dispersed to all major landmasses (Pramuk *et al.* 2008). Although some genera have large distributional ranges, which have been associated with the presence of certain morphological and reproductive traits (Van Bocxlaer *et al.* 2010), species in *Atelopus* remain endemic to the Neotropics and, most of them, are critically endangered (La Marca *et al.* 2005). Until the early 1980s, Harlequin frogs (genus *Atelopus*) were conspicuous components of the Neotropical fauna because of their

Accepted by M. Veneces: 8 May 2010; published: 23 Aug. 2010