



## Review and analysis of altitudinal distribution of the Andean anurans in Colombia

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### Abstract

In the following work we examine the richness and altitudinal distribution of Colombian Andean anurans trying to emphasize patterns of distribution. We also supply an updated checklist of Andean anurans in Colombia. At present, Colombian harbors about 396 Andean frogs: 153 species in the Cordillera Occidental, 187 species in the Cordillera Central, and 131 species in the Cordillera Oriental. Of these, the Cordillera Oriental presents the higher number and percentage of endemic species. The frequency distribution of altitudinal ranges for Colombian Andean frogs shows that the majority of species have narrow altitudinal ranges, less than 500 m altitude, and only a few species have broad altitudinal distributions. On the other hand, lowland species have broader altitudinal ranges than do highland species. The hypothesis of a wider altitudinal range of highland anurans is therefore not supported. Finally, the averages of the Jaccard similarity indices for the Andean anurans along altitudinal gradients in Colombian are approximately similar to those of other tropical anurans reported by Huey (1978), but notably lower than those of anurans of temperate localities. Thus, these results are in concordance with Janzen's hypothesis (1967) about a broader altitudinal range for temperate species, likely because of their higher thermal tolerance.

**Key words:** Checklist, richness, altitude, temperature, Janzen's hypothesis

### Introduction

Tropical zone-species have been suggested to be more habitat specific and to have narrower thermal tolerance ranges than do temperate zone-species, because of the relative uniformity of their local environmental conditions (Janzen 1967, Huey 1978). As a consequence, faunal turnover along altitudinal gradients should be rapid in the tropics, and tropical species should have relatively restricted altitudinal ranges, such that between altitudinal faunal and floral units overlaps would be reduced (Olson 1994, Ghalambor *et al.* 2005). Also, it is generally acknowledged that biological diversity is higher in the tropics than in temperate zones (Janzen 1967, Huey 1978, Ghalambor *et al.* 2005) and that along elevational gradients, species richness decreases with altitude toward a faunal minimum at very high elevations, in both vertebrates and invertebrates (Bernal 2005, Navas 2003, Poynton 2003, Bruhl *et al.* 1999, Patterson *et al.* 1996, McCoy 1990). Several biotic and abiotic factors, as well as historical events, have been attributed to these differences in species richness and biodiversity along latitudinal and altitudinal gradients. One of these was Janzen's (1967) hypothesis: that altitudinally separated populations in the tropics will experience reduced gene flow, because the "mountain passes should be physiologically higher in the tropics", leading to greater genetic divergence that favour the allopatric speciation and higher tropical biodiversity (Ghalambor *et al.* 2005). Navas (2003, 2005) reviewed factors influencing herpetological diversity in Andean high-elevations. Navas (2003) argued that temperature should be the