



Advertisement and release calls in Neotropical toads of the *Rhinella granulosa* group and evidence of natural hybridization between *R. bergi* and *R. major* (Anura: Bufonidae)

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Abstract

The *Rhinella granulosa* group currently includes 12 species distributed eastern to the Andes, from Panama to central Argentina. We studied bioacoustic features of the advertisement calls in seven of these species: *Rhinella azarai*, *R. bergi*, *R. centralis*, *R. dorbignyi*, *R. fernandezae*, *R. major*, and *R. merianae*. In addition, we analyzed the release calls of *R. azarai*, *R. bergi*, *R. dorbignyi*, and *R. fernandezae*. The advertisement calls consisted of long trills, composed by notes with a variable pulse number (2–8) that was characteristic of each species. The release calls consisted of a single note, pulsed or not. Both advertisement and release calls clearly varied between species, except for *R. dorbignyi* and *R. fernandezae*. The study of specimens sharing exosomatic characters with *R. bergi* and *R. major* from a syntopy area, which presented intermediate spectral and temporal call parameters, confirmed natural hybridization between these two species.

Key words: anuran vocalization, mating call, hybrids, South America

Introduction

Vocalization is a significant means of communication in anuran amphibians, mainly because of the relevance of the acoustic signals emitted by reproductive males to attract conspecific females (Blair 1958; Bogert 1960; Blair 1958; Wells 2007). These signals, known as advertisement calls, are usually species-specific therefore being one of the main premating isolating mechanisms. For this reason, advertisement calls have long been used in taxonomic studies on many anuran groups (Blair 1941; 1972). Another relevant acoustic signal related to anuran reproduction is the release call. This particular call is emitted by non-reproductive females or males, when attempted to mate by another male, either conspecific or not (Aronson 1944; Wells 2007). Like advertisement calls, release calls may vary between species and would aid in distinguishing between closely related taxa (Brown & Littlejohn 1972; Sullivan 1989).

Vocalizations in toads of the family Bufonidae were extensively studied mainly in the Holarctic Region (e.g. Brown & Littlejohn 1972; Martin 1972; Castellano *et al.* 2002); and to a lesser extent in the Neotropical Region (e.g. Di Tada *et al.* 2001; Alonso & Rodríguez 2003). A group of small toads scarcely studied to this respect are those included in the *Rhinella granulosa* group. Twelve taxa are currently recognized in this group, which is distributed in open habitats eastern to the Andes, from Panama to central Argentina (Narvaes & Trefaut Rodrigues 2009): *R. azarai* (Gallardo), *R. bergi* (Céspedes), *R. centralis* (Narvaes & Trefaut Rodrigues), *R. dorbignyi* (Duméril & Bibron), *R. fernandezae* (Gallardo), *R. granulosa* (Spix), *R. humboldti* (Gallardo), *R. major* (Müller &