

Melanophryniscus moreirae (Amphibia, Anura, Bufonidae): Dormancy and hibernacula use during cold season

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Seasonality is an environmental factor that modulates circannual and circadian rhythms and, hence, the population dynamics of most species outside of equatorial zone (Visser *et al.*, 2010). In anurans, seasonal changes in biology are well documented in the northern hemisphere (Schmid, 1982; Cunjak, 1986; Light, 1991), but little information is available for species in temperate zones in South America, especially in the coldest and driest season defined as “winter” (approximately from May to August) due to the difficulty in detecting organisms in field (Sluys and Guido-Castro, 2011).

One anuran genus with an extensive radiation in middle to high latitudinal zones of South America is *Melanophryniscus*

(Bufonidae). It includes 27 species of small diurnal frogs (Santos and Grant, 2011; Peloso *et al.*, 2012) distributed in southern and southeastern Brazil, inter-Andean valleys of southern Bolivia, Paraguay, Uruguay, and northern Argentina (Frost, 2013). The activity of some species of this genus is interrupted during cold seasons (as it is in most anurofauna in these latitudinal zones) and the animals are extremely difficult to detect in the field (Vaira, 2005; Santos and Grant, 2011; Sluys and Guido-Castro, 2011).

Melanophryniscus moreirae (Miranda-Ribeiro, 1920), is a strongly seasonal species. Reproductive activity in *M. moreirae* occurs during the wet season (September-April), and Sluys and Guido-Castro (2011) failed to detect any specimens



Figure 1: Localities of *Melanophryniscus moreirae* individuals found in dormancy in the Natural Park Itatiaia (Brazil).



Figure 2: *Melanophryniscus moreirae* in dormancy. Individual found in the hibernaculum at a depth of 5-15 cm.

during the dry and cold season (“winter”). *Melanophryniscus moreirae* is endemic to the Serra da Mantiqueira, a high altitude (1800-2400 m) area (Bookerman, 1967; Marques *et al.*, 2006; Weber *et al.*, 2007).

Here we report the first record of *Melanophryniscus moreirae* found in dormancy during winter. This record was made in through visual encounter surveys (VES; Crump and Scott 1994; Lips *et al.* 2001) on 17 July 2013 in two areas of high altitude grasslands, Parque Nacional do Itatiaia, in the municipality of Resende (22°23'432”S; 44°40'117”W Prateleiras trail; 22°22'569”S; 44°40'093”W Pedra do Altar trail; Fig. 1), Rio de Janeiro. We found seven specimens, each in a different hibernaculum with a depth 5-15 cm in the soil and ravines (Fig. 2). The frogs were immobile and took 12-15 min to gain locomotor capacity (Fig. 3).

This behavior is consistent with a dormancy state at low temperatures, possibility related to torpor because an apparent metabolic depression associated with the loss of locomotion capacity for a considerable time was identified. As Light (1991) reported for Neartic species, temperature in winter may be a cue triggering selection of microhabitat. This factor is important for the minimum air temperature was -7°C in July (Steremberg, 2013). In this case, the hibernacula might be used as a buffer from the extreme cold in this locality (Segadas-Vianna and Dau, 1965). However, although this report suggests the existence of a dormancy state and behavioral avoidance of environmental conditions during the winter, it does not rule out the possibility of physiological adaptation to low temperature or dry conditions of the season.

ACKNOWLEDGMENTS

We thank João Paulo P. P. Barbosa and Flávio U. Yamamoto (Universidade de São Paulo, São Paulo) for their help in field-work. We also thank to T. Grant and C. Navas for comments on the manuscript. JMC was supported by CNPq (142096/2012) and FAPESP (2008/57687-0). AMJ was supported by FAPESP (2012/10000-5; 2013/14061-1).



Figure 3: *Melanophryniscus moreirae* in a torpor behavior without locomotion capacity.

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