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Comunicação Científica

Predation of the hylid frog *Bokermannohyla alvarengai* (Bokermann, 1956) by the colubrid snake *Chironius flavolineatus* (Jan, 1863) in a montane rocky grassland

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Abstract. We reported the predation record of the hylid frog *Bokermannohyla alvarengai* by the colubrid snake *Chironius flavolineatus* in a montane rocky grassland in Santana do Riacho municipality, Minas Gerais state, southeastern Brazil. Our findings contribute to the biological knowledge of *B. alvarengai* through identification of one of its natural predators, and of *C. flavolineatus* by adding an anuran species to its diet, data not previously available in the scientific literature.

Keywords: diet, predator, prey.

Resumo: Predação da perereca *Bokermannohyla alvarengai* pela serpente *Chironius flavolineatus* em um campo rupestre de altitude. Nós relatamos o registro de predação da perereca *Bokermannohyla alvarengai* pela serpente *Chironius flavolineatus* em um campo rupestre de altitude no município de Santana do Riacho, estado de Minas Gerais, sudeste do Brasil. Nossos achados contribuem para o conhecimento da biologia de *B. alvarengai* pela identificação de um de seus predadores naturais, e de *C. flavolineatus* por adicionar uma espécie de anuro à sua dieta, dados até então não disponíveis na literatura científica.

Palavras-chave: dieta, predador, presa.

The record of predatory events allows accurate identification of predators and preys, while provides a key information to understand the complex arrangement of interactions of trophic webs. However, interactions of predation are not easily observed in nature, stressing the importance to provide such naturalistic information. Herein we report, for the first time, the predation of the stone frog *Bokermannohyla alvarengai* (Bokermann, 1956) by the vine snake *Chironius flavolineatus* (Jan, 1863).

Bokermannohyla alvarengai (Figure 1) is a large bodied hylid frog (adult snout-vent length ranging from 60.7 to 140.9 mm; Leite *et al.*, 2011), endemic to the high rocky habitats of the Espin-

haço Mountain Range, Southeastern Brazil. In spite of the species is listed by International Union for Conservation of Nature as "least concern", one should regard that its habitat is under degradation as a consequence of disorderly recreational tourism, livestocks and non-natural fires (Bertoluci & Silvano, 2010). The defensive strategies of *B. alvarengai* has been poorly studied, but it is known that both tadpoles (Eterovick *et al.*, 2010) and adults (Toledo & Haddad, 2009) make use of cryptic behavior to avoid their detection by predators.

Figure 1. Inactive *Bokermannohyla alvarengai* exposed on rocky surface during sunlight period in Santana do Riacho municipality, Minas Gerais state, southeastern Brazil. Photograph: Daniel Passos.

Chironius flavolineatus (Figure 2) is a medium sized colubrid snake (adult snout-vent length ranging from 507 to 894 mm; Pinto *et al.*, 2008), distributed over savannic formations of South America. Although some information on natural history of *Chironius* species from Atlantic Forest is available, only few studies has focused on its ecology. This snake feed on anurans, mainly hylid frogs (Dixon *et al.*, 1993, Pinto *et al.*, 2008), and its diet seems to be predominantly composed by *Hypsiboas* Wagler, 1830 and *Scinax* Wagler, 1830 species (Pombal Jr., 2007; Pinto *et al.*, 2008).

Figure 2. *Chironius flavolineatus* during defensive display, exhibiting lateral compression of anterior body portion, in Santana do Riacho municipality, Minas Gerais state, southeastern Brazil. Scale bar = 10 mm. Photograph: Daniel Passos.

Our casual sampling took place in the montane rocky outcrop habitat in Serra do Cipó (19º17' S, 43º35' W, Datum: WGS 1984), Santana do Riacho municipality, Minas Gerais state, Brazil. On 04 July 2013, at 14:00 h we found an individual of *C. flavolineatus* presenting a marked medial dilatation of its abdomen. We then, captured the snake and induced it to regurgitate by careful pressing its abdomen with anti-peristaltic movements (Shine, 1995; Mesquita *et al.*, 2013). The individual *C. flavolineatus* measured 33.0 cm for the snout-vent length, 20.0 cm for the tail length, 13.5 mm for the head length, 8.6 mm for the head width, 5.9 mm for the head height, and had fed on a small *B. alvarengai* with 23.8 mm of snout-vent length, swallowed headfirst (Figure 3). After the morphometric measurements, the snake was induced to eat the frog again and was released in the site of its capture.

We were able to precisely identify both snake and frog species in view of their diagnostic

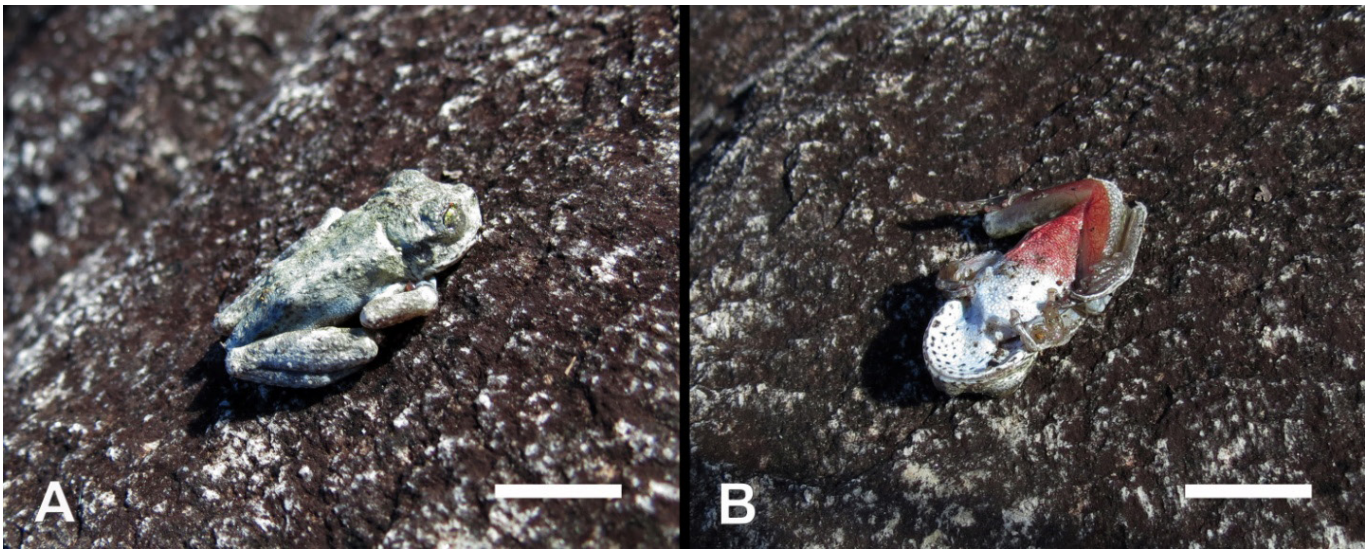

Figure 3. Dorsal (A) and ventral (B) views of *Bokermannohyla alvarengai* regurgitated by *Chironius flavolineatus* in Santana do Riacho municipality, Minas Gerais state, southeastern Brazil. Scale bar = 10 mm. Photographs: Daniel Passos.

characters and geographic distribution. *Chironius flavolineatus* presents a yellow vertebral stripe along the two anterior thirds of the body (Dixon *et al.*, 1993; Hamdan *et al.*, 2014), and was already recorded to the Serra do Cipó (Assis, 1999). *Bokermannohyla alvarengai* has a dorsal color pattern that resembles lichens on rocks, with dark brown blotches on a gray background (Bokermann, 1956; Leite *et al.*, 2011), and also has been previously recorded to the Serra do Cipó (Machado & Galdino, 2005).

Individuals *B. alvarengai* remain motionless thermoregulating unsheltered above the rocks during the daytime period (Tattersall *et al.*, 2006), this fact is notable for the juveniles (CABG *obs. pers.*). Despite *B. alvarengai* is criptic against the rocks with lichens (Sazima & Bokermann, 1977), its termoregulatory behavior might exposes individuals to visually oriented predators, as already was confirmed with the predation record by the Chimango Hawk *Milvago chimachima* (Machado & Galdino, 2005). The case herein reported presents a chemical oriented predator, *C. flavolineatus*, preying upon *B. alvarengai* during the sunlight period. Our findings expand the knowledge on biology of *B. alvarengai* by the identification of other kind of natural predator for the species.

The diet of *C. flavolineatus* is similar to that from other congeneric species (Dixon *et al.*, 1993). Hylid frogs are the most common preys of *Chironius* snakes, for instance, *Dendropsophus* Fitzinger, 1843 (Nascimento *et al.*, 2013), *Itapotihyla* Faivovich, Haddad, Garcia, Frost, Campbell & Wheeler, 2005 (Marques & Sazima, 2004; Bovo & Sueiro, 2012), *Hypsiboas* (Pombal Jr., 2007; Oliveira, 2008; Pinto *et al.*, 2008; Nascimento *et al.*, 2013), *Phyllomedusa* Wagler, 1830 (Castanho, 1996; Bernarde & Abe, 2010), *Scinax* (Pinto *et al.*, 2008; Hartmann *et al.*, 2009; Bernarde & Abe, 2010; Nascimento *et al.*, 2013), and including *Bokermannohyla* Faivovich, Haddad, Garcia, Frost, Campbell & Wheeler, 2005 species (Rocha *et al.*, 1999). Notwithstanding, the previous case of a *Chironius* snake preying upon *Bokermannohyla* (*B. circumdata* (Cope, 1871)) was

observed for *C. multiventris* Schmidt & Walker, 1943 (Rocha *et al.*, 1999). Therefore, our report is the first to record *B. alvarengai* as prey of *C. flavolineatus*, adding a frog species to consumed preys by this snake.

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