Phyllomedusa 17(1):131–134, 2018

ISSN 1519-1397 (print) / ISSN 2316-9079 (online)
doi: http://dx.doi.org/10.11606/issn.2316-9079.v17i1p131-134

SHORT COMMUNICATION

Predation of glass frog (Anura: Centrolenidae) eggs by a ground beetle (Coleoptera: Carabidae) in Colombia

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Keywords: amphibians, behavior, brook, invertebrates, lowland.

Palabras clave: anfibios, comportamiento, invertebrados, quebrada, tierras bajas.

Palavras-chave: anfíbios, comportamento, invertebrados, planície, riacho.

Invertebrates at all stages of development prey on anurans. Toledo (2005) reported 57 invertebrate taxa that preyed on post-metamorphic anurans of 68 species; other studies have supplemented this list (Menin *et al.* 2005, Wells 2010, Batista *et al.* 2013). Some species of predatory invertebrates specialize on anurans. For example, fly larvae live in egg masses of frogs (Villa 1980) and the larvae of a terrestrial beetle prey primarily on post-metamorphic frogs (Elron *et al.* 2007).

Glass frogs and their eggs are susceptible to attacks from a variety of invertebrates, including flies, small crabs, spiders, and insects (Toledo 2005), all of which primarily affect the egg and larval stages of amphibians (Wells 2010). Within Arthropoda, carabid beetles prey on anurans eggs and post-metamorphic stages (Elron *et al.* 2007, Wizen and Gasith 2011a, b, Carvalho *et al.* 2012).

Glass frogs commonly are found in the environs of streams and rivers in the tropical Andes, where in Colombia, the family is represented by 11 genera and 81 species (Frost 2018). They deposit their eggs out of the water on exposed surfaces of leaves or rocks overhanging lotic water. Emerging larvae fall into the water to continue their development (Guayasamin *et al.* 2009). Males of several species guard their eggs and defend their sites against conspecifics (Wells 2010). It is likely that egg attendance also is a defense against egg predators (Vockenhuber *et al.* 2009), but details on predation of glass frog eggs are poorly documented (Villa 1984).

The frog genus *Sachatamia* (Guayasamin *et al.* 2009) occurs in rainforest at elevations below 1500 m a.s.l. in Central America (Honduras, Nicaragua, Costa Rica, Panama) and South

Received 28 July 2017
Accepted 08 March 2018
Distributed June 2018

America (Colombia, northwestern Ecuador) (Guayasamin *et al.* 2009). All known species of this genus occur in Colombia (Frost 2018)—viz., *S. albomaculata* (Taylor, 1949); *S. electrops* Rada, Jeckel, Caorsi, Barrientos, Rivera-Correa, and Grant, 2017; *S. ilex* (Savage, 1967); *S. orejuela* (Duellman and Burrowes, 1989); and *S. punctulata* (Ruiz-Carranza and Lynch, 1995). *Sachatamia punctulata* occurs on the eastern flank of the Central Cordillera in the Colombian departments of Tolima, Antioquia, and Caldas; it is listed as Endangered (EN) by IUCN Red List owingt to habitat fragmentation and the sensitivity of the species to habitat disturbance (IUCN SSC 2014).

During a field trip to forest remains (San Roque, Antioquia, 1029 m a.s.l., 06°27'27.68" N, 74°51'28.12" W; Figure 1A), we observed several *Sachatamia punctulata* in a ravine that traverses the forest remains near El Diamante ravine, (Figure 1B). In one of the clutch, a ground beetle was observed feeding on the eggs of *S. punctulata* (Figure 1C) for 30 min on 22 October 2014 between 22:00 and 00:00 hr. The beetle consumed approximately 78 eggs. The beetle was collected and deposited in the Entomology Museum at Universidad del Valle (Cali, Valle del Cauca, catalog number: MUSENUV-28726), and placed in *Dyscolus* by Martínez (2005); subsequently, the beetle was identified it as *Dyscolus* (*Dyscolidion*) cf. *punctatostriatum* (Figure 2).

Including the carabid egg predation event observed at San Roque (Carvalho *et al.* 2012), there are at least 15 invertebrate families known to be predators on eggs and postmetamorphic

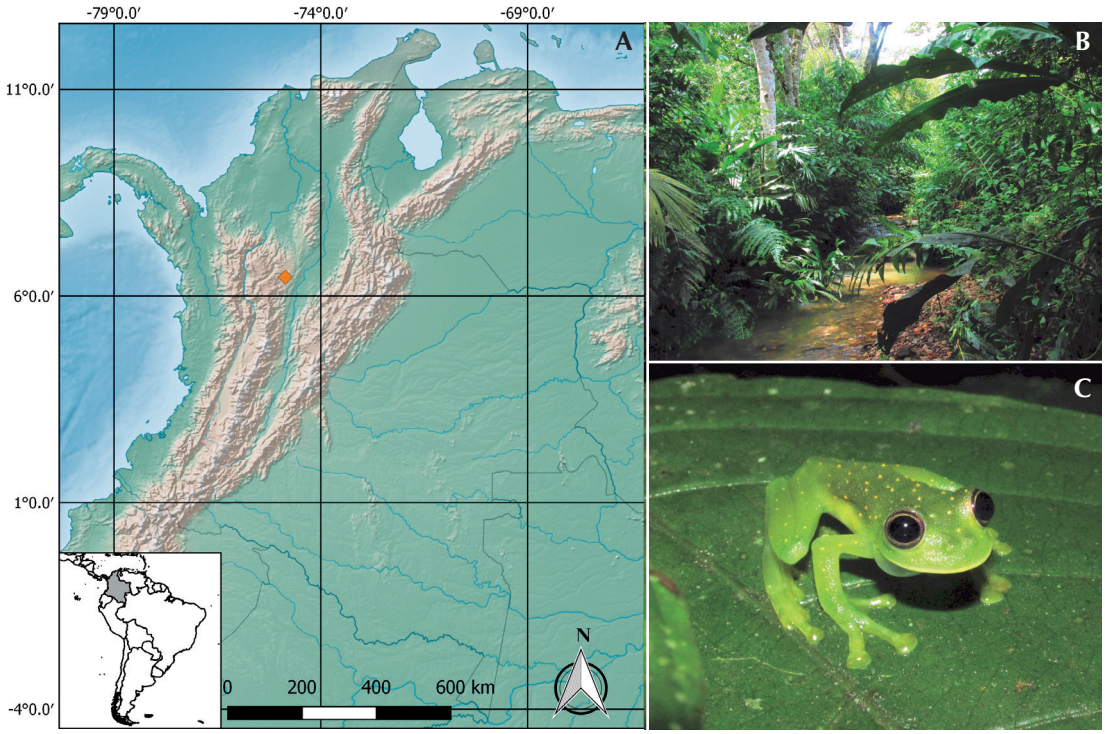

Figure 1. (**A**) Location of the predation event at San Roque, Antioquia, Colombia. (**B**) General aspect of the habitat where the predation event occurred. (**C**) Individual of *Sachatamia punctulata*.

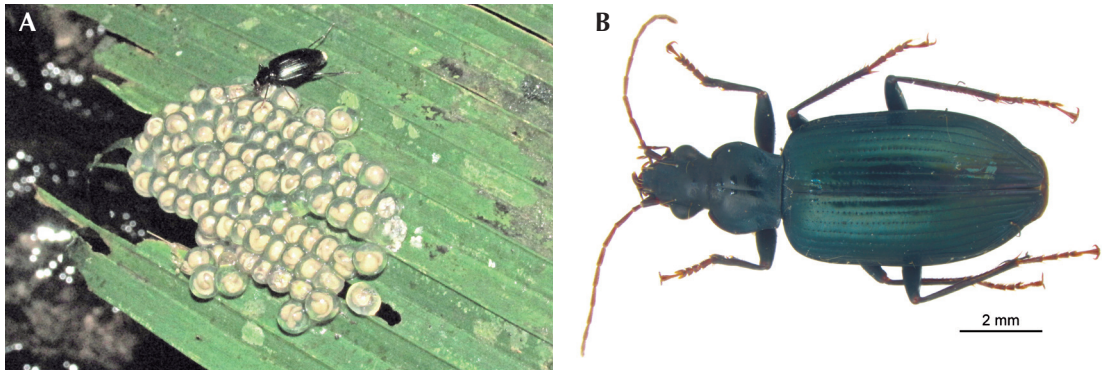

Figure 2. (**A**) *Dyscolus* (*Dyscolidion*) cf. *punctatostriatum* feeding on egg mass of *Sachatamia punctulata*. (**B**) Detail of the same specimen.

stages of glass frogs (Wells 2010). Wells (2010) documented that most invertebrates are generalists that feed opportunistically on amphibians if they are available, and shift to other types of food when they are not. Unfortunately, there is little information on the relative importance of glass frogs in the diets of most arthropod species (Villa and Towsend 1983). Because invertebrates usually feed by sucking or chewing their prey, it is difficult to analyze stomach contents (Wells 2010). The few tests that have been done indicate that arthropod predation primarily affects anuran eggs clutches and offspring (Villa and Towsend 1983). For example, Vockenhuber *et al.* (2009) showed that in *Hyalinobatrachium colymbiphyllum* (Taylor, 1949), predation by arthropods caused the most mortality in egg clutches, both those with and without attending males. Accounts of glass frogs often include invertebrates in lists of natural enemies, but lack detailed documentation because most information on predation by invertebrates is anecdotal (Toledo 2005). Nevertheless, even limited information is relevant because the assemblage of invertebrate predators present in particular habitats can be one of the most important determinants of the structure and dynamics of amphibian communities (Wells 2010). In glass frogs, this predation certainly contributed to the evolution of various features and anti-predatory behaviors (Escobar-Lasso and Rojas-Morales 2012).

Acknowledgments.—We want to thank Pierre Moret (Université Toulouse, Jean Jaurès) for his expertise on Carabidae taxonomy and David Pearson (Arizona State University) and Linda Trueb (University of Kansas) for comments on English syntax.

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Editor: Jaime Bertoluci