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Predation of a Barker Frog, *Physalaemus cuvieri* Fitzinger, 1826, by a Giant Water Bug, genus *Belostoma*, in a Cerrado pond in Minas Gerais, Brazil

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Amphibians play a crucial role in ecosystems, due to their biphasic life cycle. They connect aquatic and terrestrial communities, where they serve as both predators and prey (Ceron et al., 2024). In aquatic environments, amphibian larvae are often herbivorous or planktivorous, and they help regulate the abundance and biomass of aquatic flora, including phytoplankton (West, 2018). Tadpoles have a significant impact as bioturbators, organisms that modify sediment distribution, stimulate microbial activity and nutrient absorption, and promote trophic dynamics and energy flow in an environment (Montaña et al., 2019). Adult frogs are also extremely important to the ecosystem, because they help regulate agricultural pest populations and human disease vectors (e.g., Peltzer and Lajmanovich, 2002; Valencia-Aguilar et al., 2013; Ceron et al., 2024). However, despite being predators in both aquatic and terrestrial environments, frogs are also prey for various groups of organisms, including carnivorous plants, vertebrates, and invertebrates (Duellman and Trueb, 1994; Toledo, 2007). Among invertebrates, frogs are known as prey for spiders (Barbo et al., 2009), ants (Kaczmarski et al., 2019), and water bugs (Hernández-Ruz et al., 2022), as well as other organisms.

Physalaemus cuvieri is a leptodactylid frog widely distributed in South America, with records from northern Uruguay, Argentina, eastern and northern Paraguay, Bolivia, Venezuela, and northeastern, central, and southern Brazil (Frost, 2025). This species can be found in lentic and/or temporary waterbodies, and females are larger than males (Da Silva and Rossa-Feres, 2010). This widely distributed species has been reported as prey for diverse groups of animals, including spiders (e.g., genus *Ancylometes*; Maffei et al., 2010), water bugs (e.g., *Belostoma elongatum*; Toledo, 2003), snakes (e.g., *Erythrolamprus poecilogyrus*; Andrade et al., 2020), and another frogs (e.g., *Aquarana catesbeiana*; Boelter et al., 2012).

During a field expedition on 27 November 2019 to a Cerrado domain at Parque Nacional da Serra da Canastra, São Roque de Minas Municipality, Minas Gerais State, Brazil (20.2422°S, 46.5116°W; elevation 1386 m), we observed a giant water bug preying on a *P. cuvieri* in a perennial pond (Fig. 1A). Both specimens were collected and preserved in 70% ethanol (Fig. 1B). The frog was deposited in the Zoological Collection of the Mato Grosso do Sul Federal University in Campo Grande, Mato Grosso do Sul, Brazil (ZUFMS-AMP1743). The frog had a body length of 35.3 mm and the giant water bug, identified as a member of the genus *Belostoma* (Ribeiro, 1999) measured 35.3 mm. *Physalaemus cuvieri* can be identified by its dorsal coloration, which ranges from brownish to gray and features alternating light and dark stripes. A distinctive round light spot is present between the shoulders, along with a thick, dark band extending from the snout to the forelimbs; this band gradually narrows toward the inguinal region. The species also exhibits reddish inguinal and axillary regions. Males have a black gular region, while the venter is cream-colored or dark anteriorly, with cream vermiform markings (Uetanabaro et al., 2008). *Belostoma* was diagnosed by the following characters: the first rostral segment significantly longer than its greatest width and subequal in length to the second segment; a two-segmented foretarsus; and a well-developed hemelytral membrane with uniformly elongated narrow rectangular cells (Ribeiro, 1999; Estévez and Ribeiro, 2011).

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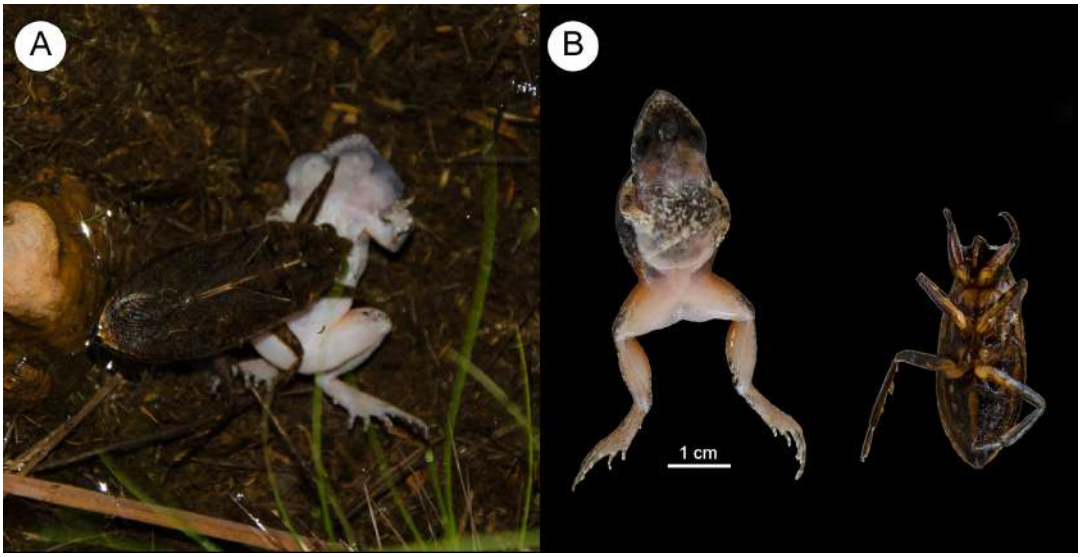

Figure 1. (A) A giant water bug (genus *Belostoma*) preying on a Barker Frog (*Physalaemus cuvieri*) at Parque Nacional da Serra da Canastra, São Roque de Minas, Minas Gerais, Brazil. (B) Collected specimens and their relative sizes. Photos by Karoline Ceron (A) and Priscila S. Carvalho (B).

Our present observation reaffirms the potential of water bugs to prey on adult anurans, especially on males during their calling activity. In South America, the genus *Belostoma* comprises approximately 74 species, 40 of them recorded in Brazil (Ribeiro, 2007), in the states of Mato Grosso, Minas Gerais, Goiás, Santa Catarina, São Paulo, Rio de Janeiro, and Rio Grande do Sul (Figueiredo-de-Andrade et al., 2010). These aquatic insects regulate prey populations and serve as food source for various predators, also acting as bioindicators of environmental quality (Oliveira, 2019; Valbon et al., 2019; Hernández-Ruz et al., 2022). *Belostoma* species can act as natural biological control agents for disease vectors, such as the mosquitoes *Anopheles gambiae* (malaria vector), *Aedes aegypti* (dengue vector), and *Culex quinquefasciatus* (filariasis vector). These cosmopolitan bugs prey on both vertebrates and invertebrates (Valbon et al., 2019), often capturing organisms larger than themselves (Armúa and Estévez, 2006).

Giant water bugs are widely recognized as significant predators of anurans, preying on both larval and adult stages (Tobler and Plath, 2007). Studies have documented their predation on adult anurans, including adult treefrogs (genera *Dendropsophus* and *Scinax*), and juveniles of *Dendropsophus branneri*, *Leptodactylus pustulatus*, *L. pentadactylus*, and *L. labyrinthicus* (Toledo, 2003; Baracho et al., 2014; Fadel et al., 2019; Hernández-Ruz et al., 2022). Despite the well-established predation pressure exerted by giant water bugs on tadpoles, little is known about whether the risk of predation from these insects shapes behavioural and morphological adaptations in adult anurans in aquatic environments, and the cues used by anurans to avoid predation. Assessing both consumptive and non-consumptive effects enhances our understanding of how giant water bugs shape anuran populations.

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