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Scientific Note

Predation of *Rhinella crucifer* (Wied-Neuwied, 1821) (Anura: Bufonidae) by *Helicops angulatus* (Linnaeus, 1758) (Squamata: Dipsadidae) in the northeast of Brazil

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Abstract: We report a predation event in which the semi-aquatic snake *Helicops angulatus* preyed upon the bufonid frog *Rhinella crucifer* in a lentic water body within the APA Aldeia-Beberibe, Pernambuco, Brazil. The event was observed in its entirety, from the initial strike to complete ingestion, which lasted 23 minutes. This constitutes the first documented trophic interaction between *H. angulatus* and *R. crucifer*, as well as the first record of *H. angulatus* feeding on anurans in the state of Pernambuco, expanding current knowledge on the species' diet and predator–prey relationships.

Keywords: trophic relationship, anuran, watersnake, feeding behavior.

Resumo: (Predação de *Rhinella crucifer* (Wied-Neuwied, 1821) (Anura: Bufonidae) por *Helicops angulatus* (Linnaeus, 1758) (Squamata: Dipsadidae) no nordeste do Brasil.) Relatamos um evento de predação no qual a serpente semiaquática *Helicops angulatus* predou o sapo bufonídeo, *Rhinella crucifer*, em um corpo d'água lêntico na APA Aldeia-Beberibe, Pernambuco, Brasil. O evento foi observado em sua totalidade, desde o bote inicial até a ingestão completa, que durou 23 minutos. Este é o primeiro registro documentado de interação trófica entre *H. angulatus* e *R. crucifer*, bem como o primeiro registro de *H. angulatus* se alimentando de anuros no estado de Pernambuco, ampliando o conhecimento atual sobre a dieta da espécie e as relações predador-presa.

Palavras-chave: relação trófica, anuro, cobra d'água, comportamento alimentar.

Predation is an event defined as the consumption of one organism (prey) by another (predator) where the prey is alive when it suffers the first attack (Begon & Townsend, 2021). Although it is an ecologically relevant process, predation is poorly documented in field studies due to the rarity of direct observations of such events (Shepard, 2007). Anurans are commonly preyed upon by a wide spectrum of vertebrates, including birds, reptiles and mammals, and snakes are one of their main predators (Toledo et al., 2007).

Rhinella crucifer (Wied-Neuwied, 1821) is a frog endemic to Brazil belonging to the family Bufonidae, which comprises 98 species in the country (Drummond et al., 2026; Frost, 2026). It is a large species distributed throughout the Brazilian Atlantic Forest biome, occurring in the states of Ceará, Alagoas, Paraíba, Pernambuco, Sergipe, Bahia, Minas Gerais, Espírito Santo and Rio de Janeiro, but it also inhabits, adjacent to biome, in semiarid areas (Baldissera et al., 2004; Frost, 2026). The species can be found in central forest zone as well as more open areas at forest edges and in anthropogenic regions (Pereira et al., 2016).

Helicops angulatus (Linnaeus, 1758) is a aglyphous snake although it possesses a Duvernoy's gland that produces toxic substances and contributes to its classification as moderately venomous (Silva et al., 2019). It is a semiaquatic snake widely distributed in South America with records in Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, Trinidad, and Venezuela (Nogueira et al., 2019). In Brazil, it is dis-

tributed throughout the North, Northeast and Central-West regions (Acre, Amazonas, Pará, Rondônia, Roraima, Amapá, Maranhão, Tocantins, Distrito Federal, Goiás, Mato Grosso, Sergipe, Ceará, Bahia, Alagoas, Piauí, Paraíba and Pernambuco states) (Nogueira et al., 2019; Uetz et al., 2026). This snake inhabits lotic and lentic water bodies, such as streams and ponds, and due to its semi-aquatic habits its diet consists mainly of animals associated with this habitats such as fishes, anurans, and lizards (Martins & Oliveira, 1998; Teixeira et al., 2017). In this way, anuran amphibians are considered a frequent component of the diet of *Helicops angulatus* (Martins & Oliveira, 1998; Teixeira et al., 2017). Here, we present the first reported trophic interaction between *H. angulatus* and *R. crucifer*, representing the first record of *H. angulatus* consuming anurans in Pernambuco.

Our observation took place on March 1, 2025 at night (23:56) in the Condomínio Mirante da Aldeia adjacent to the Área de Proteção Ambiental (APA) Aldeia Beberibe (-7.9157125 S, -35.0690997 W, 62 m elevation), Camaragibe municipality, Pernambuco state. The predation event was observed from its onset, beginning with the strike of *H. angulatus* until its completion. The strike occurred in the water and was directed toward the head of the frog (Figure 1A). The snake used constriction to immobilize the prey (Fig. 1B) and initiated ingestion head-first, consistent with the initial attack. The entire process was monitored and the time required for the frog to be completely swallowed (Fig. 1C) was recorded as 23 minutes. The prey had an estimated snout–vent length (SVL measured from the tip of the snout to the cloaca) of approximately 13 cm, whereas the snake had an estimated total length of about 60 cm. The observation took place in a lentic water body measuring approximately 21 m in length and 12 m in width, characterized by stagnant water and surrounded by herbaceous vegetation. This habitat is primarily filled during the rainy season and had an estimated depth of about 60 cm at the time of the record. Throughout the ingestion process, the snake remained at the water surface, and after completely swallowing the prey it moved toward the bottom of the water body. The air temperature during the event was 24.4°C.



Figure 1: *Helicops angulatus* preying on *Rhinella crucifer*. (A) Strike by *Helicops angulatus*; (B) *H. angulatus* coiled around and immobilizing *R. crucifer*; (C) Completion of ingestion of *Rhinella crucifer*.

Although no vouchers were collected, species identification was possible given that in the study area the only similar bufonid species is *R. diptycha* (Cope, 1862) which can be easily distinguished by body size and coloration, the shape of the parotoid glands and number and distribution of warts (Pramuk, 2006). The identification of *H. angulatus* was based on its distinctive banded dorsal color pattern (Kawashita-Ribeiro et al., 2013).

Predation by *H. angulatus* includes anurans from the families Aromobatidae, Bufonidae, Hylidae, Leptodactylidae, and Microhylidae as summarized by Acosta-Ortiz & Vos 2023, who reviewed the available records for the species in South America. In Brazil, three bufonid species have been recorded as preyed upon by *H. angulatus* (based on content): *Rhinella margaritifera* (Laurenti, 1768) (Bahia State; Reis et al., 2010), *R. marina* (Linnaeus, 1758) (Amazonas State; Kaefer & Montanarin, 2011; Teixeira et al., 2017) and *R. mirandaribeiroi* (Gallardo, 1965) (Pará State; Teixeira et al., 2017). The record presented here expands this list by documenting *R. crucifer* as a food item for the snake, something that had not

previously been reported for Pernambuco or the northeastern region of Brazil.

Direct observations of predation in snakes are rare, making this record particularly relevant for clarifying the trophic relationship between both species within the food web. The complete event documented a head-directed strike followed by constriction and head-first ingestion. Although these specific behaviors have not been previously detailed for *H. angulatus* they are consistent with species semi-aquatic lifestyle and predatory habits described for the genus (Martins & Oliveira, 1998; Teixeira et al., 2017). The use of constriction may represent an effective strategy for subduing large and potentially toxic prey such as bufonids, in addiction to suggesting that sizeable amphibians may constitute an important energetic resource during periods of high prey availability (Teixeira et al., 2017). Taken together, this record not only adds *R. crucifer* to the list of prey of *H. angulatus* but also highlights poorly documented behavioral and ecological aspects of the species in the northern Atlantic Forest. Considering the scarcity of direct observations of predation events involving semi-aquatic snakes, this type of contributions are essential to broadening our understanding of trophic relationships between anurans and their predators, especially in regions with historical information gaps such as northeastern Brazil.

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