



**First record of predation of *Helicops leopardinus* (Squamata: Dipsadidae) by a
pitviper *Bothrops* gr. *atrox* (Squamata: Viperidae) in the Parnaíba River Delta,
Piauí, Northeastern Brazil**

**Sâmia Caroline Melo Araújo^{1,4}, Kássio Castro Araújo², Pedro da Costa Silva³, Etielle Barroso de Andrade⁴,
Mirco Solé^{1,5}**

¹Programa de Pós-graduação em Zoologia, Departamento de Ciências Biológicas, Universidade Estadual de Santa Cruz - UESC, Ilhéus, Bahia, Brasil.

²Universidade Estadual do Maranhão - UEMA, São Luís, Maranhão, Brasil.

³Núcleo de Pesquisa em Biodiversidade e Biotecnologia (BIOTEC), Campus Ministro Reis Velloso, Parnaíba, Piauí, Brasil.

⁴Grupo de Pesquisa em Biodiversidade e Biotecnologia do Centro-Norte Piauiense - BIOTECPI, Instituto Federal de Educação, Ciência e Tecnologia do Piauí - IFPI, Pedro II, Piauí, Brasil.

⁵Tropical Herpetology Lab, Universidade Estadual de Santa Cruz - UESC, Ilhéus, Bahia, Brasil.

ABSTRACT

The genus *Bothrops* exhibits a generalist and opportunistic diet, with some records of ophiophagy. In this study, we describe the first record of predation of the water snake *Helicops leopardinus* by the pitviper *Bothrops* gr. *atrox* in the Parnaíba River Delta, Piauí, Brazil. A female *Bothrops* gr. *atrox* was collected on September 27, 2025, in a transition area between flooded sandbanks and sandy dunes, Ilha Grande municipality, Piauí. The stomachal content analysis revealed the presence of a water snake *H. leopardinus*, partially digested. This report expands knowledge about the diet of snakes of the *B. atrox* group, reinforcing their ecological plasticity and opportunistic behavior. It also suggests a greater chance of predation on aquatic species during their migration between bodies of water.

KEYWORDS: Ophiophagy. Delta of Parnaíba. Predation. Lancehead.

**Primeiro registro de predação de *Helicops leopardinus* (Squamata: Dipsadidae) por uma
jararaca *Bothrops* gr. *atrox* (Squamata: Viperidae) no Delta do Parnaíba, Piauí, Nordeste
do Brasil**

RESUMO

O gênero *Bothrops* apresenta dieta generalista e oportunista, com alguns registros de ofiofagia. Neste estudo, descrevemos o primeiro registro de predação da cobra d'água *Helicops leopardinus* pela jararaca *Bothrops* gr. *atrox* no Delta do Rio Parnaíba, Piauí, Brasil. Uma fêmea de *Bothrops* gr. *atrox* foi coletada em 27 de setembro de 2025, em uma área de transição entre restingas alagadas e dunas arenosas, município de Ilha Grande, Piauí. A análise do conteúdo estomacal revelou a presença de uma cobra d'água *H. leopardinus*, parcialmente digerida. Este relato amplia o conhecimento sobre a dieta de serpentes do grupo *B. atrox*, reforçando sua plasticidade ecológica e comportamento

Correspondência dos Autores

¹ORCID: [0000-0002-8817-8406](https://orcid.org/0000-0002-8817-8406). Email: carolinesamia93@gmail.com (Autor correspondente)

²ORCID: [0000-0003-4091-8521](https://orcid.org/0000-0003-4091-8521). Email: kassio.ufpi@gmail.com

³ORCID: [0000-0002-7795-0309](https://orcid.org/0000-0002-7795-0309). Email: waterwaytour@gmail.com

⁴ORCID: [0000-0002-5030-1675](https://orcid.org/0000-0002-5030-1675). Email: etlandrade@hotmail.com

⁵ORCID: [0000-0001-7881-6227](https://orcid.org/0000-0001-7881-6227). Email: mksol@uesc.br

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oportunista. Também sugere uma maior chance de predação de espécies aquáticas durante a sua migração entre corpos d'água.

PALAVRAS-CHAVE: Ofiofagia. Delta do Parnaíba. Predação. Jararaca.

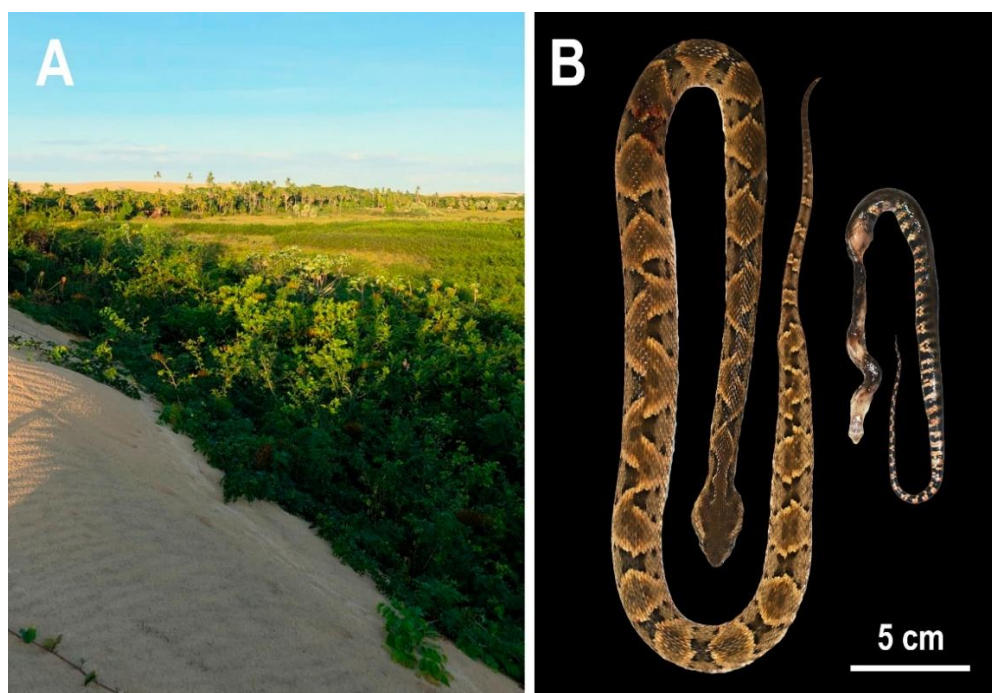
The genus *Bothrops* Wagler, 1824 currently includes 48 species (Uetz *et al.*, 2025), distributed from Central America to South America, occupying habitats ranging from tropical forests to xeric areas and urban environments (Borges; Araújo, 1998; Nogueira *et al.*, 2019; Wasko; Sasa, 2010). In Brazil, species of the genus *Bothrops* are widespread and are found in a variety of habitats, such as primary forests, flooded areas, open and xeric vegetation, sandy savannas, pastures, and areas altered by human activity (Guedes; Nogueira; Marques, 2014; Nogueira; Sawaya; Martins, 2003; Nogueira *et al.*, 2019). Species within this genus may exhibit a generalist diet with ontogenetic shifts that occur throughout their development. Juveniles consume primarily ectothermic prey, such as amphibians and lizards, and, less frequently, mammals, birds, and arthropods. Adults generally prey on endothermic animals, including birds and mammals (Martins; Marques; Sazima, 2002; Sousa; Bezerra, 2021). Furthermore, recent studies have shown that other snakes may also be part of their diet, with records of ophiophagy in the genus *Bothrops* in several Brazilian regions (Starace; Ferrieux; Ineich, 2021; Golobovante; Mourão; Santos-Jr, 2024; Eversole; Rivas; Powell, 2025). Herein, we report the first record of predation by a *Bothrops* on the water snake *Helicops leopardinus* (Schlegel, 1837).

During fieldwork carried out on September 27, 2025, at 7:42 p.m., in the region known as Azedo (2°48'20.86" S; 41°49'50.50" W, 5 m a.l.s), located on Ilha Grande de Santa Isabel, Parnaíba River Delta, state Piauí, we collected a female of *Bothrops gr. atrox* perched approximately 60 cm high on a cashew tree branch (*Anacardium occidentale* L., 1753). The cashew tree, partially buried by a sandy dune, is located in a transition area between dunes and a flooded restinga environment. The specimen was euthanized following the Brazilian Guide for the Production, Maintenance, or Use of Animals in Teaching or Scientific Research Activities (Jared *et al.*, 2023) and later housed in the Biological Collection of the Instituto Federal de Educação, Ciência e Tecnologia Piauí – IFPI Campus Pedro II (CBPII 747). The Parnaíba River Delta, located between states Piauí and Maranhão, in Northeastern Brazil, is a complex geological formation characterized by the presence of several islands formed by the mouth of the Parnaíba River. Ilha Grande de Santa Isabel, which includes the municipalities of Ilha Grande and Parnaíba in Piauí, is the largest island in the delta, being characterized by mosaics of mangroves, wetlands, dunes, and restingas (Santos-Filho *et al.*, 2010; Rocha *et al.*, 2012).

During the analysis of the digestive tract of the collected specimen (total length = 80 cm), we found an individual of *H. leopardinus* (total length = 34 cm; CBPII 746; Figure 1). The prey was ingested first by the head, which was partially digested. *Helicops leopardinus* is an aquatic and nocturnal species, often found in flooded areas (Fiorillo; Souza; Martins, 2013), that feeds on fish, tadpoles, and occasionally adult amphibians (Marques; Eterovic; Sazima, 2019; Sousa *et al.*, 2025). The species is a common prey item for birds, mammals, and other snakes; however, there are no confirmed records of *Bothrops* acting as its predator to date (Marques *et al.*, 2016; Bisneto; Kaefer, 2019; Starace; Ferrieux; Ineich, 2021; Eversole; Rivas; Powell, 2025). The *Bothrops* species are known for their generalist feeding habits (Bernarde; Abe 2010; Oliveira-Jr *et al.*, 2020), with a growing number of records of ophiophagy in the genus (Monteiro *et al.*, 2006; Fiorillo; Souza; Martins, 2013; Guedes; Nogueira; Marques, 2014; Bisneto; Kaefer, 2019; Golobovante; Mourão; Santos-Jr, 2024). Recent studies have recorded the occurrence of other snakes in the diet of *Bothrops*, such as *Imantodes cenchoa* (Linnaeus, 1758), *Tantilla melanocephala* (Linnaeus, 1758), *Micrurus corallinus* (Merrem, 1820), *Amerotyphlops brongersmianus*

(Vanzolini, 1976), *Anilius scytale* (Linnaeus, 1758), *Drymarchon corais* (Boie, 1827), *Oxyrhopus melanogenys* (Tschudi, 1845), *O. trigeminus* Duméril, Bibron e Duméril, 1854, *Mastigodryas boddaerti* (Sentzen, 1796), *Atractus torquatus* (Duméril, Bibron e Duméril, 1854), including other *Helicops*, such as *H. angulatus* (Linnaeus, 1758) and *H. polyleps* Günther, 1861 (Fagundes *et al.*, 2009; Gavira; Loebmann, 2011; Bisneto; Kaefer, 2019; Pelegrini; Venâncio; Kuniy, 2019; Silva *et al.*, 2015; Oliveira-Jr *et al.*, 2020; Sousa; Bezerra, 2021; Starace; Ferrieux; Ineich, 2021; 2024; Eversole; Rivas; Powell, 2025).

Figure 1: A – Representation of the collection environment. B - *Helicops leopardinus* (CBPIL 746) preyed on by a *Bothrops gr. atrox* (CBPIL 747) collected in the Parnaíba River Delta, Parnaíba municipality, Piauí, Brazil.



Source: Research data, 2025.

The predation record occurred in a transitional environment between sandy dunes and flooded restinga habitats. The extensive use of heterogeneous environments by *Bothrops* may influence the diet of the genus, favoring opportunistic predation on prey from different ecological niches, which corroborates the high ecological plasticity reported for these snakes (Monteiro *et al.*, 2006; Fiorillo; Souza; Martins, 2013; Guedes; Nogueira; Marques, 2014; Bisneto; Kaefer, 2019; Golobovante; Mourão; Santos-Jr, 2024). Head-ingestion is a common behavior in viperids, reinforcing the typical subjugation pattern of *Bothrops*, already described in other feeding observations (Sazima 1992; Golobovante; Mourão; Santos-Jr, 2024; Eversole; Rivas; Powell, 2025). This record expands knowledge about the diet of species of the genus *Bothrops*, highlighting their generalist behavior and their ability to prey on other snakes, including aquatic ones. Finally, this predation may indicate the potential vulnerability of aquatic snakes during periods of migration or movement between bodies of water (Fiorillo; Souza; Martins, 2013). Additional observations and analyses of stomach contents may better elucidate the frequency and importance of this type of interaction in the ecology of the species.

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MS: Methodology, Software, Data curation, Formal analysis, Writing-original draft, Visualization, Investigation; **SCMA:** Writing-review & editing, Funding acquisition, Supervision. All authors actively participated in the discussion of the results and reviewed and approved the final version of the article.

CONFLICT OF INTEREST. The authors declare that they have no commercial or associative interests that represent a conflict of interest in relation to the manuscript.

ETHICAL APPROVAL. This research was evaluated and approved by the Animal Use Ethics Committee of the Universidade Estadual de Santa Cruz (CEUA/UESC) – 45.662-000 (process No. 008/24).

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