



Dead or alive?

Antipredatory mechanism of *Adenomera hylaedactyla* (Cope, 1868) (Anura: Leptodactylidae) in northeastern Brazil

Jussara da Conceição Eduardo¹, Samuel Lopes Pereira¹, Etiele Barroso de Andrade¹,
Clayton de Abreu Costa^{1,2}

¹Grupo de Pesquisa em Biodiversidade e Biotecnologia do Centro-Norte Piauiense, Instituto Federal de Educação, Ciência e Tecnologia do Piauí, Campus Pedro II, Pedro II, Piauí 64255-000, Brazil.

²Programa de Pós-graduação em Zoologia, Instituto de Ciências Biológicas, Universidade de Brasília-UnB, Asa Norte, Brasília, Distrito Federal 70910-900, Brazil.

ABSTRACT

Anurans inhabit different types of environments, so these animals have developed a wide variety of defense mechanisms throughout evolutionary processes. During fieldwork in Serra dos Matões, municipality of Pedro II, state of Piauí, northeastern Brazil, we found an individual of *Adenomera hylaedactyla* on the edge of a permanent watercourse, in a transition area between Cerrado and Caatinga. Upon contact, the specimen exhibited "limb interweave" behavior, in which the individual extends and intertwines the hind limbs as a defense mechanism. There are no records of this defense mechanism in *Adenomera* species, making this work the first documented record of "limb interweave" for this genus. It should be emphasized that the evolution of species is closely related to the different types of behavior exhibited during interspecific interactions, therefore, such behaviors can influence speciation processes.

KEYWORDS: Interspecific interactions. Defense behavior. Limb interweave. Transitional area.

Morto ou vivo?

Mecanismo antipredatório de *Adenomera hylaedactyla* (Cope, 1868) (Anura: Leptodactylidae) no nordeste do Brasil

RESUMO

Os anuros habitam diferentes tipos de ambientes, assim esses animais desenvolveram uma grande variedade de mecanismos de defesa ao longo do processo evolutivo. Durante um trabalho de campo na Serra dos Matões, município de Pedro II, estado do Piauí, nordeste do Brasil, encontramos um indivíduo de *Adenomera hylaedactyla* às margens de um curso d'água permanente, em uma área de transição entre Cerrado e Caatinga. Ao contato, o espécime apresentou o comportamento "limb interweave", no qual o indivíduo estende e entrelaça os membros posteriores como mecanismo de defesa. Não há registros deste mecanismo defensivo em espécies de *Adenomera*, tornando este

Author Correspondence

^{1a}ORCID: [0009-0005-1233-0220](https://orcid.org/0009-0005-1233-0220).

Email: jussaraeduardo82@gmail.com

^{1b}ORCID: [0009-0008-7618-4535](https://orcid.org/0009-0008-7618-4535).

Email: samukapereira888@gmail.com

^{1c}ORCID: [0000-0002-5030-1675](https://orcid.org/0000-0002-5030-1675).

Email: etlandrade@hotmail.com

²ORCID: [0000-0001-8643-1132](https://orcid.org/0000-0001-8643-1132).

Email: claytonbiop2@gmail.com (Corresponding author)

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trabalho o primeiro registro documentado de "limb interweave" para este gênero. É importante ressaltar que a evolução das espécies está intimamente relacionada aos diferentes tipos de comportamento exibidos durante as interações interespecíficas, portanto, tais comportamentos podem ter influência em processos de especiação.

PALAVRAS-CHAVE: Interações interespecíficas. Comportamento de defesa. Membros entrelaçados. Área de transição.

Amphibians play a fundamental role in trophic interactions (López; Scarabotti; Ghirardi, 2015; Cloyed; Eason, 2017) and serve as prey for several groups of vertebrates (Poulin *et al.*, 2001; Parreira *et al.*, 2023) and invertebrates (Barbo *et al.*, 2009; Pacheco *et al.*, 2016). Anurans represent the largest and most diverse order among amphibians, inhabiting different types of environments, thus these animals have developed a wide variety of defense mechanisms over evolutionary process (Dodd Jr, 1976; Mathielo *et al.*, 2022), possibly due to intense pressure from their natural predators (Vamosi, 2005; Ferreira *et al.*, 2019).

Adenomera hylaedactyla (Cope, 1868) is a small leptodactylid that belongs to the species group *Adenomera marmorata* (Sanches; Santos; Costa-Campos, 2019; Frost, 2024) and is widely distributed throughout South America (Guianas, Colombia, Venezuela, Ecuador, Peru, Bolivia, and Brazil) (Frost, 2024). It is found in areas of open vegetation, near riverbanks, at the edges of primary and secondary forests, forest edges, and savannas (Kokubum; Sousa, 2008; Frost, 2024).

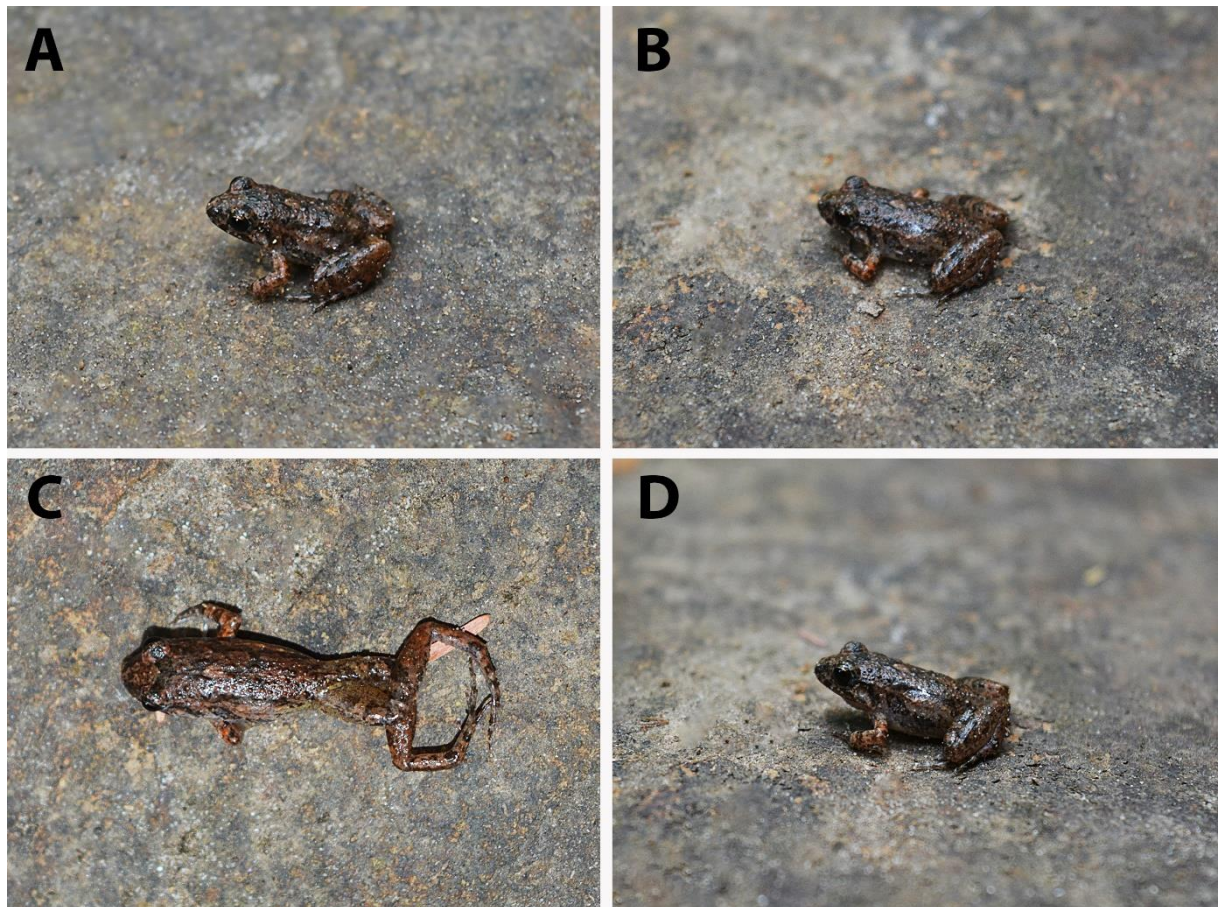
On 30 October 2020 at 15:00 h, during fieldwork in Serra dos Matões, municipality of Pedro II, state of Piauí, northeastern Brazil (4°19'46.36"S; 41°27'43.50"W; Datum WGS84; 560 m a.s.l), we found an individual of *A. hylaedactyla* at the edge of a permanent watercourse, near the Samambaia waterfall, in a transitional area between Cerrado and Caatinga. After being manually captured and placed on the ground to be photographed, the animal showed an immobility mechanism and remained with its head close to the ground. Upon contact, the specimen exhibited the "limb interweave" behavior, in which the individual extends and intertwines the hind limbs as a defensive mechanism. The individual exhibited this behavior for approximately 2 minutes, holding the left hind limb over the right, holding both hind limbs in S-shape, relaxing the forelimbs (Figure 1) and making no sounds. After being photographed, the animal managed to escape into the leaf litter and was not seen again.

Although predation defense behaviors are well documented for some genera of Leptodactylidae (Motte; Martínez; Cacciali, 2018; Ferreira *et al.*, 2019; Sena *et al.*, 2021) including "limb interweave" (Santiago, 2021; Mathielo *et al.*, 2022), there are no records of this defense mechanism in *Adenomera* species, making this work the first documented record of "limb interweave" for this genus. Given the evolutionary proximity between *Adenomera* and *Leptodactylus* (Pyron; Wiens, 2011) and the plesiomorphic character of most antipredation mechanisms (Ferreira *et al.*, 2019) it is expected that they share the "limb interweave" behavior, as well as other mechanisms. However, the lack of information on defense mechanisms in *Adenomera* may be related to the cryptic diversity of their species (Cassini *et al.*, 2020), in addition to body shape and coloration that can be easily confused with the environment, making occasional records difficult.

In recent years, there have been increasing reports of antipredatory mechanisms in anurans (Ferreira *et al.*, 2019). Although most of these records are opportunistic in nature, they are crucial for ethological studies as they allow understanding behavior and various interactions between species (Well, 2007). Although contact with humans is almost inevitable for most amphibians, the antipredatory mechanisms demonstrated can serve as a mirror to understand how these animals respond to their natural predators. Furthermore, it should be emphasized that species evolution is closely related to the different types of behavior exhibited during interspecific interactions (Toledo; Sazima; Haddad, 2011), so,

such behaviors may control or even influence the speciation processes.

Figure 1: Specimen of *Adenomera hylaedactyla* exhibiting defensive behavior of “limb interweave” in Serra dos Matões, municipality of Pedro II, Piauí, Brazil.



Source: Research Data, 2024.

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

ETHICAL APPROVAL. Not applicable.

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