

Double trouble: *Leptodactylus latrans* (Anura: Leptodactylidae) as prey of two *Erythrolamprus miliaris* (Serpentes: Dipsadidae)

Abstract

Erythrolamprus miliaris is a Neotropical aglyph snake with a generalist feeding habit. We report herein the first observed instance of simultaneous predation on an adult *Leptodactylus latrans* by two adult individuals of *E. miliaris*. Although the ultimate outcome remains unknown, this report underscores the importance of comprehensive documentation in understanding predator-prey relationships and ecological dynamics in urban areas.

Keywords: diet, intraspecific competition, neotropics, predator-prey interaction, water snake

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Introduction

Predator-prey interactions play a central role in understanding trophic dynamics within natural ecosystems. This foundational knowledge is essential for advancing ecological and evolutionary studies, emphasizing the significance of gaining comprehensive insights into the natural history of snakes.^{1,2} However, observing these interactions in their native habitats often presents challenges, highlighting the need for meticulous documentation of predation events.³ Anurans and snakes commonly form predator-prey relationships in terrestrial ecosystems, underlining the importance of anurans as a key dietary component for many snake species.⁴⁻¹¹

Erythrolamprus miliaris,³ commonly known as the Water Snake, is a medium-sized aglyph snake from the family Dipsadidae, endemic to the Neotropical region.^{10-12,16} Reaching about 101.5 cm snout-vent length, it is widely distributed throughout South America, and is frequently spotted in the southeastern Atlantic Forest of Brazil, from preserved natural areas to anthropized ones.^{10,13-15} The species exhibits both diurnal and nocturnal behavior, and has a broad ecological niche, being associated with humid habitats and utilizing both terrestrial and aquatic environments.^{16,17} Its diet is highly diverse, including amphibians, fish, lizards, snakes, and even small mammals.¹⁸⁻²³ Amphibians constitute the primary dietary component of *E. miliaris*, accounting for approximately 77% of its total food intake, with documented reports of predation on Leptodactylidae.³ Specifically, within the genus *Leptodactylus*, encompassing at least six different species, including *L. latrans*.³

In species characterized as dietary generalists, exemplified by *E. miliaris*, individual members often specialize their dietary preferences to encompass only a fraction of the broader array of dietary items exploited by the entire species.²⁴ This complex interplay of competition underscores the intricate interactions of ecological forces within conspecific populations, as individuals of the same species commonly vie for similar resources, crucial for their survival and reproduction.²⁵ While intraspecific interactions might manifest indirectly, intraspecific competition predominantly surfaces as a

direct phenomenon, frequently involving individuals defending their territories. This phenomenon is deemed to significantly shape population dynamics and influence various facets of an organism's life history.²⁴

Material and methods

The video depicting this predation event was initially discovered on a social media platform, underscoring the growing role of social media in facilitating the rapid sharing and dissemination of scientific observations (i.e. citizen science). Subsequently, we contacted the author of the video to gain further insights and details regarding this intriguing event.

The predation event occurred within an urban area, more specifically in the municipality of Rio Bananal, situated in the state of Espírito Santo, southeastern Brazil. The incident transpired on the 29th of April, 2022, at 09:00 in the morning, with geographic coordinates of 19°14'55.6" S, 40°18'19.2" W, at an elevation of 73 meters above sea level.

Results

Upon encountering the two *Erythrolamprus miliaris*, the predation scenario unfolded as they competed to consume a *Leptodactylus latrans*, a species of anuran. One snake grasped the frog's anterior part (head), while the other focused on the hind legs, effectively immobilizing the *Leptodactylus latrans* (Figure 1).

The gripping footage of this interaction was documented for approximately three minutes and is accessible for further examination at the following link: (<https://www.herpetocapixaba.com.br/herpetovideos>). This unique recording provides valuable insights into the dynamic nature of predator-prey relationships, offering researchers an opportunity to delve into the intricacies of such interactions.

As the predation event continued, the snakes gradually moved to an area with vegetation in a marshy habitat located within the Atlantic Forest. Unfortunately, the change in location hindered further filming and it was not possible to determine the final outcome of the predation.



Figure 1 Predation of two *Erythrolamprus miliaris* on a single adult individual of *Leptodactylus latrans* at the municipality of Rio Bananal, state of Espírito Santo, southeastern Brazil.

Discussion

Conducting field research on intraspecific competition poses a distinct set of challenges, yet it has proven to be a valuable endeavor, offering illuminating insights from documented cases within specific snake genera, such as *Helicops*²⁶ and *Nerodia*.²⁷ Recently, a remarkable observation further enriched our understanding when the first documented instance of two *E. miliaris* individuals engaging in competitive interactions over a single *Chthonerpeton aff. braestrupi* (Gymnophiona: Typhlonectidae) came to light.²⁸ Given that individuals of the same species often vie for the same vital resources essential for their survival and reproduction, intraspecific competition holds the potential to profoundly affect their reproductive success.²⁴ While intraspecific interactions can sometimes assume an indirect form, more frequently, they manifest as direct competition when individuals defend territories.²⁴

“This observation aligns with the foundational tenets of competition theory, which elucidate that when potential competitors coexist in densely populated areas with limited food resources, intraspecific food competition escalates, contrasting scenarios with lower population densities.²⁴ Resource utilization diversity, also known as ‘individual specialization,’ manifests when a population comprises ecologically diverse individuals, each specializing in a distinct portion of the population’s total resource pool.²⁵ Despite the conventional ecological assumption that individuals of the same species are ecologically equivalent, certain studies have demonstrated that seemingly generalized species are, in reality, composed of relatively specialized individuals.²⁵ Delving into the study of intraspecific competition

among Neotropical snakes, especially within urban settings, unveils the intricate interplay between ecological dynamics and human impact. It is worth noting that the urban environment in which this event unfolded may have significantly altered ecological conditions due to anthropization, potentially resulting in a scarcity of resources in

the region. The study of intraspecific competition among Neotropical snakes, particularly in urban settings, sheds light on the complex interplay between ecological dynamics and human influence, further underscoring the need for ongoing research in this field.”

Conclusion

The frequency of *E. miliaris* predation events on anurans is closely linked to the snake’s habitat preferences, particularly its preference for humid and semi-aquatic environments abundant with frog populations. This underscores the significant role of amphibians as potential prey in *E. miliaris*’ diet and broader trophic dynamics. It also highlights the existing gaps in essential ecological data on intraspecific competition among Neotropical snakes. This predation event not only reveals complex predator-prey interactions in urban environments but also underscores the importance of documenting such events. This documentation contributes to ongoing ecological research and conservation efforts aimed at protecting these remarkable species and their fragile ecosystems.

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Conflicts of interest

The authors declared that there are no conflicts of interest.

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