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Predation on a conspecific by *Leptodactylus macrosternum* Miranda-Ribeiro, 1926 (Anura: Leptodactylidae) in the southern Pantanal, Brazil

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Resumo

Os anuros são importantes na cadeia alimentar, fazendo parte da dieta de vários animais. Devido ao hábito alimentar oportunista, os anuros podem ter um amplo nicho trófico, que pode ser influenciado, por exemplo, pela disponibilidade de alimento. A quantidade e a qualidade do alimento são afetadas por diferentes variáveis ambientais, como o regime de cheias na região do Pantanal. Na estação seca, espécies de anuros podem enfrentar uma diminuição em seus recursos tróficos, o que pode levar à predação de coespecíficos menores. Aqui, relatamos um comportamento de predação *in situ* por um adulto de *Leptodactylus macrosternum* em um juvenil da mesma espécie no Pantanal sul. O adulto se aproximou e tentou engolir a parte anterior do corpo do juvenil, deixando apenas as pernas do juvenil para fora de sua boca. Esses comportamentos oportunistas e canibais podem estar relacionados a vantagens na diminuição da competição intraespecífica e no aumento do ganho de energia.

Palavras-chave

Batracofagia; canibalismo; relação predador-presa; teia alimentar.

ABSTRACT

Anurans are important in the food chain, being part of several animals' diets. Due to their opportunistic feeding habit, anurans may have a wide trophic niche, which can be influenced by factors such as food availability. The quantity and quality of food are affected by different environmental variables, such as the flood regime in the Pantanal region. In the dry season, frog species may face a decrease in their trophic resources, which may lead to predation on smaller conspecifics. Here, we report an *in situ* predation behavior of an adult *Leptodactylus macrosternum* on a conspecific juvenile in the southern Pantanal. The adult approached and tried to swallow the anterior part of the juvenile's body, leaving only the juvenile's legs protruding from its mouth. These opportunistic and cannibalistic behaviors may be related to advantages in decreasing intraspecific competition and increasing energy gain.

Keywords

Batrachophagy; cannibalism; food web; predator-prey relationship.

Anuran amphibians are preyed on by many animal groups, including invertebrates, vertebrates, and even plants (i.e., carnivorous plants; Duellman & Trueb, 1994; Toledo et al., 2007; Loebmann, 2013). Therefore, anurans play an important role in the food chain both as predators and prey (McCormick & Polis, 1982; Werner & McPeek, 1994; Adams, 2000; Chivers & Mirza, 2001; Poulin et al., 2001; Toledo, 2005; Watanabe et al., 2005; Toledo et al., 2007; Haddad et al., 2008).

Due to the opportunistic feeding habit of some species, cannibalism is frequent among anurans, in which they may consume individuals in different life stages, such as eggs, tadpoles, and post-metamorphic frogs (McDiarmid & Altig, 1999; Silva et al., 2005; Pirani et al., 2010; Jancowski & Orchard, 2013; Sousa et al., 2016).

Herein, we report an *in situ* predation behavior by an adult of *Leptodactylus macrosternum* Miranda-Ribeiro, 1926 on a conspecific juvenile in the southern Pantanal, Mato Grosso do Sul state, central Brazil, and it is the first record of cannibalism in this species from this region. This episode was observed during a field trip on 21 May 2024, at 00:21 h. On the right bank of the Miranda River (-19.577º, -57.019º, elevation ca. 118 m; Fig. 1), near the research station Base de Estudos do Pantanal (BEP), municipality of Corumbá, we found an adult of *L. macrosternum* next to a conspecific juvenile. The adult approached and tried to swallow the anterior part of the juvenile's body, leaving only the juvenile's legs protruding from its mouth (Fig. 2; Video S1). Due to our presence, the adult released the juvenile, and both fled toward the river, making it impossible to collect the individuals.

Overall, *Leptodactylus* Fitzinger, 1826, species have a generalist diet, composed mainly of arthropods (Sanabria et al., 2005; Ceron et al., 2018) and a few small mammals (Filho et al., 2014). However, other amphibians are also part of their diet (Maneyro et al., 2004; Oda et al., 2016; Ceron et al., 2018; Escalante & Sanches, 2021; Coelho et al., 2022; Cavalheri et al., 2023), with batrachophagy being very common mainly in "greedy" leptodactylids (see Coelho et al., 2022; Cavalheri et al., 2023; Souza et al., 2023). Batrachophagy has been observed in *L. fuscus* (Schneider, 1799) (Novaes-e-Fagundes & Zina, 2017), *L.* aff. *luctator* (Hudson, 1892) (referred as *L.* aff. *latrans* (Steffen, 1815); Ferreira et al., 2011); *L. luctator* (referred as *L. ocellatus*; Teixeira & Vrcibradic, 2003; França et al., 2004; Maneyro et al., 2004; Kokobum and Rodrigues, 2005), *L. podicipinus* (Cope, 1862) (Ceron et al., 2018), *L. insularum* (Barbour, 1906) (Escalante & Sanches, 2021),

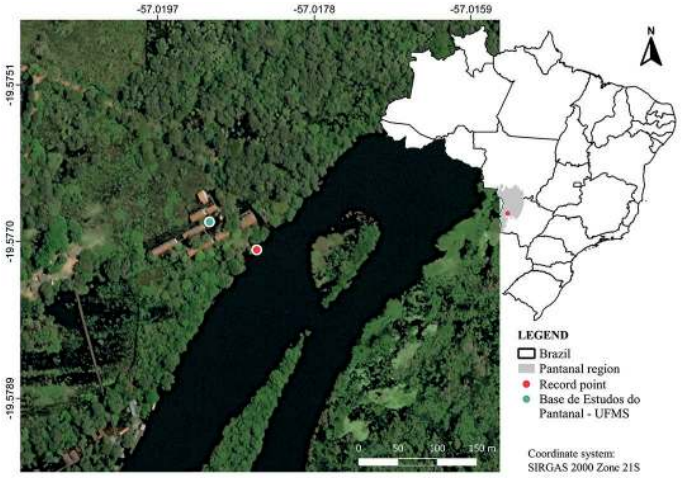

Figure 1. Locality of cannibalistic behavior in *Leptodactylus macrosternum* in the southern Pantanal, Corumbá, Mato Grosso do Sul state, Brazil.



Figure 2. Cannibalistic behavior in *Leptodactylus macrosternum* in the Pantanal region. (A) Juvenile being preyed upon by an adult (B).

L. vastus (Lutz, 1930) (Santana et al., 2012; Coelho et al., 2022), including *L. macrosternum* (Costa-Pereira et al., 2015; Sales et al., 2015; Oda et al., 2016; Sousa et al., 2016; Forti et al., 2017; Costa & Trevelin, 2020; Cavalheri et al., 2023).

Cannibalistic behavior may be related to advantages in decreasing intraspecific competition and increasing energy gain (Toledo et al., 2007; Pizzato and Shine, 2008). Sousa et al. (2016) proposed that the cannibalistic behavior in *L. macrosternum* may be explained by the opportunistic feeding habit of the species and large numbers of available juveniles. *Leptodactylus macrosternum* occurs in high population density in the Pantanal (F. Messias and C.P.A. Prado, pers. obs.). We further suggest that such behavior may occur due to reduced food availability at this time of the year, when the dry season begins in the Pantanal and food availability may decrease, as well as changes in nutrient enrichment (see Alho, 2008; Silva et al., 2012). This record represents the second case of cannibalism for *L. macrosternum* in Brazil.

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Equity, Diversity and Inclusion (EDI) Declaration
We declare that this work was done taking into account issues of diversity, equity and inclusion.

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Online Support Information

The following Supporting Information is available for this article online:

Video S1.

Video showing cannibalistic behavior in *Leptodactylus macrosternum*.

Link: Cannibalism *L. macrosternum.*



Felipe Messias. I am a biologist with a degree from UNESP Botucatu and a Master's degree in Ecology, Evolution, and Biodiversity from UNESP Rio Claro, where I developed a research project related to reproductive investment in *Bokermannohyla* species from Ibitipoca State Park, Minas Gerais state. Besides having a strong interest in reproductive behavior, I also greatly appreciate the areas of morphological character evolution, ecology, and biogeography.



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