

DISTRIBUTION EXTENSION AND PARENTAL CARE IN *LEPTODACTYLUS BREVIPES* COPE, 1887 (ANURA: LEPTODACTYLIDAE)

EXTENSIÓN DE DISTRIBUCIÓN Y CUIDADO PARENTAL EN *LEPTODACTYLUS BREVIPES* COPE, 1887 (ANURA: LEPTODACTYLIDAE)

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Resumen. – El cuidado parental tiene un importante papel para la sobrevivencia de la descendencia en varias especies de anfibios, incluyendo especies de ranas de la familia Leptodactylidae. Aquí reportamos una nueva localidad de ocurrencia para *Leptodactylus brevipes* en el Cerrado brasileño y describimos su comportamiento de cuidado parental. Observamos una hembra de *L. brevipes* cuidando de un cardumen de renacuajos y realizando el comportamiento de "pumping". Los renacuajos se mantuvieron cerca a la hembra cuidadora, raspando sus piernas y espalda varias veces. No registramos comportamiento agresivo por parte de la hembra. Nuestros resultados están de acuerdo con las observaciones de cuidado maternal en otras especies del grupo de *L. melanonotus*, incluyendo *L. melanonotus*, *L. natalensis*, *L. podicipinus* y *L. pustulatus*.

Palabras claves. – Amphibia, inversión parental, cardumen de renacuajos.

Abstract. – Parental care plays an important role in offspring survival in many amphibians, including frog species of the family Leptodactylidae. Here, we report a new locality of occurrence for *Leptodactylus brevipes* in the Brazilian Cerrado and describe its parental care behaviour. We observed a female of *L. brevipes* guarding a school of tadpoles and performing pumping behaviour. The tadpoles remained close to the attending female, scraping her legs and dorsal region several times. We did not record female aggressive behaviour. Our results agree with observations of maternal care in other species of the *L. melanonotus* group, such as *L. melanonotus*, *L. natalensis*, *L. podicipinus*, and *L. pustulatus*.

Key words. – Amphibia, parental investment, tadpole school.

Parental care is an important component of the life history of many species of amphibians (Wells, 2007), with approximately 66% of the anuran families presenting some form of parental care, including the family Leptodactylidae (Schulte et al., 2020). Although parenting may impose costs to caregivers (Trivers, 1972; Valencia-Aguilar et al., 2020a; Carrillo et al., 2022), studies with different frog species have shown that parental care behaviour plays an important role in offspring survival and reproductive success (Townsend et al., 1984; Valencia-Aguilar et al., 2020b).

Leptodactylus brevipes is a small to middle size Neotropical frog, with females larger (snout-vent length - SVL= 42.4 ± 4.2 mm) than males (SVL= 36.9 ± 1.6 mm) (Gazoni et al., 2021).

Leptodactylus brevipes belongs to the *L. melanonotus* group and was recently removed from the synonymy of *L. petersii* (Gazoni et al., 2021). Species in the *L. melanonotus* group are known to lay eggs in foam nests in lentic water bodies, sometimes inside basins constructed by males (Prado et al., 2002; Santos & Amorim, 2006). Little is known about the geographic distribution and natural history of *L. brevipes* (Gazoni et al., 2021), thus herein we report the occurrence of the species in a new locality and describe its parental care behaviour.

We made observations during fieldwork conducted at the Parque Estadual das Nascentes do Rio Taquari, Mato Grosso do Sul state, central Brazil, at a permanent pond (1.9 m²), next



Figura 1. Cardumen de renacuajos (izquierda) y hembra asistente de *Leptodactylus brevipes* en el Parque Estadual das Nascentes do Rio Taquari, estado de Mato Grosso do Sul, centro de Brasil.

Figure 1. Tadpole school (left) and attending female of *Leptodactylus brevipes* at the Parque Estadual das Nascentes do Rio Taquari, Mato Grosso do Sul state, central Brazil.

to a soy plantation area (-53.299553, -18.237839) surrounded by grass and Cerrado vegetation. After observations, the attending female and tadpole school were collected (IMASUL 71/400151/2018 and SISBIO 49080-5 licenses) and deposited at the Coleção Zoológica, Universidade Federal de Mato Grosso do Sul (ZUFMS-AMP14653 and ZUFMS-AMP14706, respectively).

During a nocturnal active search in February 2021, we found a female of *L. brevipes* (SVL = 37.7 mm) taking care of a school of approximately 240 tadpoles at stage 26 (sensu Gosner, 1960). The attending female had an upper lip stripe under the eye and a light mottled belly coloration (Heyer, 1994; Gazoni et al., 2021; Carvalho et al., 2022), which helped with the identification. The attending female was close to the school (less than 30 mm) with half of her body submerged and facing toward the opposite direction of the offspring, while tadpoles were feeding from organic material (Fig. 1). When we simulated an attack attempt by approaching the observer hand (see Sestito et al., 2016), the attending female hid, never facing the threat or showing aggressive behaviour. Later, after a short period of time (<10 minutes), the attending female returned and stayed close to the school (< 30 mm). Additionally, we observed the attending female performing pumping behaviour twice (sensu Wells & Bard, 1988); the first pumping was short with only one pelvic hit on the water and the second one was longer with seven pelvic

hits. The school of tadpoles was dense with a non-polarized shape, and followed the attending female only after the second pumping behaviour. The school reached the attending female after less than two minutes and some of the tadpoles scraped the posterior dorsal surface of the back and legs of the attending female. Total time of our observations lasted approximately 20 minutes.

Based on morphological, acoustic, molecular and cytogenetic analyses, Gazoni et al. (2021) revalidated the name *L. brevipes*, previously considered a junior synonym of *L. petersii*. The species was described from Chapada dos Guimarões and is currently known to occur in the state of Mato Grosso, in the Cerrado domain, central Brazil, possibly into adjacent Bolivia (Frost, 2021; Gazoni et al., 2021). We recorded the species in the neighbour state of Mato Grosso do Sul (Fig. 2), in the municipality of Costa Rica, extending its geographic distribution ca. 140 km south from the municipality of Alto Garças, Mato Grosso state (Gazoni et al., 2021).

Females of *L. brevipes* exhibited parental care behaviour, including tadpole attendance, pumping behaviour and guidance of tadpoles, similar to other species within the *L. melanotus* group (e.g., Downie et al., 1996; Rodrigues et al., 2011; Castro et al., 2013). Some species in this group known to exhibit these

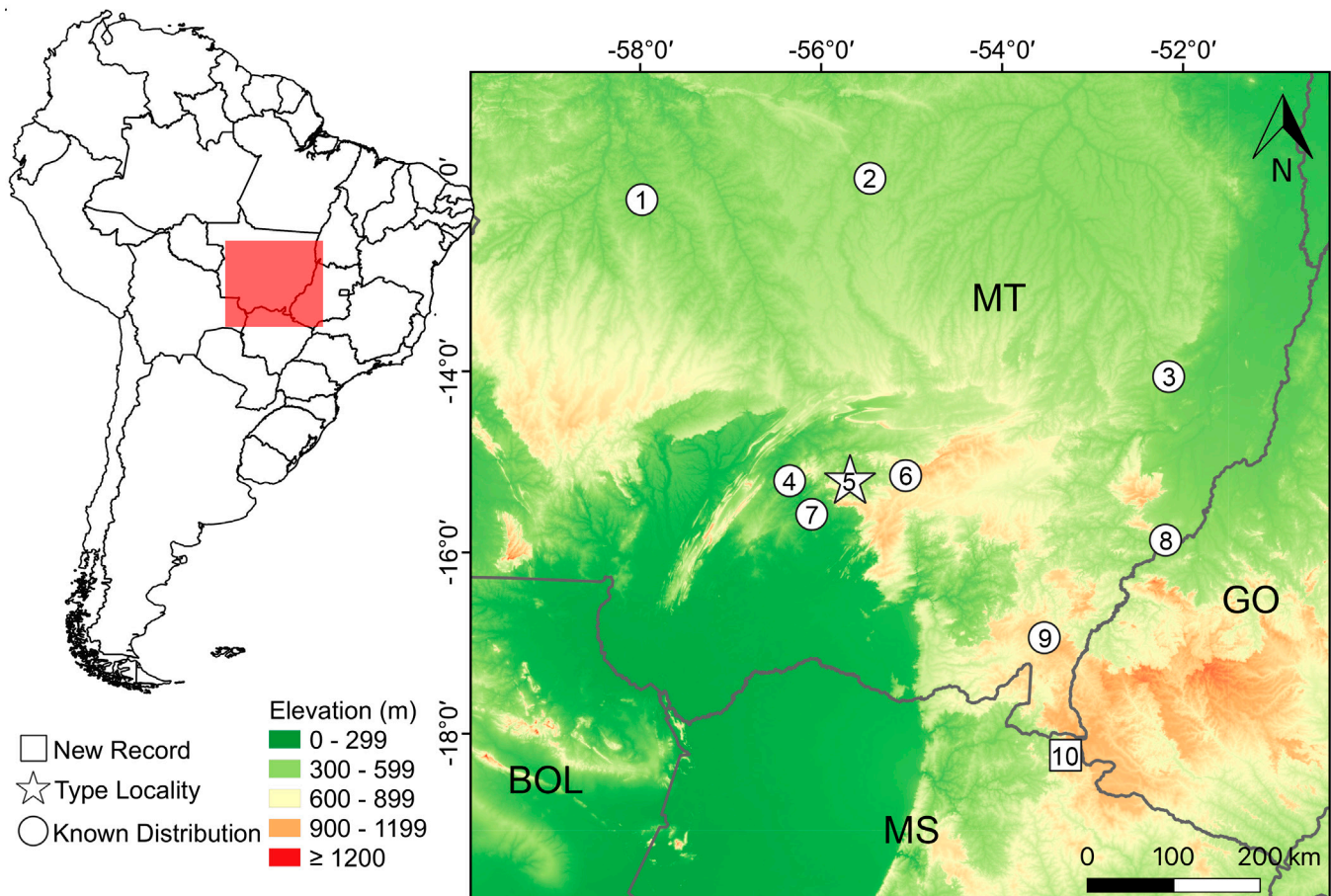


Figura 2. Mapa que muestra las localidades donde se ha registrado *Leptodactylus brevipes*. Localidades del estado de Mato Grosso: 1 = Brasnorte, 2 = Sinop, 3 = Água Boa, 4 = Acorizal, 5 = Chapada dos Guimarães (localidad tipo), 6 = APM Manso, 7 = Cuiabá, 8 = Barra do Garças, 9 = Alto Garças (de Gazoni et al., 2021). Nueva localidad en el estado de Mato Grosso do Sul: 10 = Costa Rica, Parque Estadual das Nascentes do Rio Taquari. Bol: Bolivia, MT: Estado de Mato Grosso, GO: Estado de Goiás, MS: Estado de Mato Grosso do Sul.

Figure 2. Map showing the localities where *Leptodactylus brevipes* has been registered. Localities in Mato Grosso state: 1 = Brasnorte, 2 = Sinop, 3 = Água Boa, 4 = Acorizal, 5 = Chapada dos Guimarães (type locality), 6 = APM Manso, 7 = Cuiabá, 8 = Barra do Garças, 9 = Alto Garças (from Gazoni et al., 2021). New locality in Mato Grosso do Sul state: 10 = Costa Rica, Parque Estadual das Nascentes do Rio Taquari. Bol: Bolivia, MT: Estado de Mato Grosso, GO: Estado de Goiás, MS: Estado de Mato Grosso do Sul.

behaviours are *L. melanonotus*, *L. natalensis*, *L. podicipinus* and *L. pustulatus* (Prado et al., 2000; Martins, 2001; Hoffmann, 2006; Santos & Amorim, 2006; Castro et al., 2013). *Leptodactylus* species in the *L. latrans* group exhibit similar maternal care behaviours, including *L. insularum*, *L. luctator*, and *L. macrosternum* (Wells & Bar, 1988; Rodrigues et al., 2011; Castro et al., 2013). We did not register aggressive behaviour for *L. brevipes*, which seems to be a less common behaviour among attending females of the *L. melanonotus* group, except for *L. podicipinus* (Prado et al., 2000). Conversely, female aggressive behaviour has been documented for species of the *L. latrans* group (Vaz-Ferreira & Gehrau, 1975; Rodrigues et al., 2011; Sestito et al. 2016), which are larger in body size compared to females in the *L. melanonotus* group. Tadpoles

were attracted to the female by the pumping behaviour and in response they scraped attending female's back and legs. The behaviour of scraping females' back has also been observed in tadpoles of *L. latrans*, *L. macrosternum*, *L. melanonotus*, *L. natalensis*, and *L. podicipinus* (Vaz-Ferreira & Gehrau 1975; Martins, 2001; Hoffmann, 2006; Santos & Amorim, 2006; Rodrigues et al., 2011). Nest attendance by the female is common for species of the *L. melanonotus* group, including *L. natalensis*, *L. podicipinus*, and *L. validus*, based on direct observations of egg attendance (Downie et al., 1996; Prado et al., 2000; Martins, 2001; Santos & Amorim, 2006). We were unable to observe the nest of *L. brevipes*; however, as tadpole attendance was registered, we believe that egg attendance might also be present.

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