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Hidden among bromeliads in the Brazilian semiarid: first records of *Phyllopezus lutzae* for the Caatinga domain and its predation by *Tropidurus hispidus*

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ABSTRACT

During wildlife rescue and monitoring activities, we recorded 142 individuals of *Phyllopezus lutzae* in the municipalities of Tucano and Nova Soure, state of Bahia, Northeastern Brazil. These records are the first of this species in the Caatinga domain. Moreover, an adult individual of *Tropidurus hispidus* was recorded attempting to subdue an adult *P. lutzae*. Beyond to expand the known distribution range of the species, our records show that *P. lutzae* inhabits an ecological and climate domain different from Atlantic Forest where it was previously known, and that it is a potential prey of *T. hispidus*.

Key Words: Caatinga; Distribution; Predator-prey interaction; Squamata.

The Caatinga domain (Queiroz *et al.*, 2017) was recognized as little diverse in Squamata reptiles, being represented by a set of species shared with other domains of the diagonal of open formations in South America (Vanzolini, 1974, 1988). In recent years, this comprehension has changed, with an increase in the number of known species and endemisms for Caatinga (Guedes *et al.*, 2014; Mesquita *et al.*, 2017). Currently, it is known that the heterogeneity of vegetation types and morphoclimatic conditions within the Brazilian semiarid region contribute to a representative diversity, one of the most important among semiarid areas around the world (Silva *et al.*, 2017a). However, there are still deep scientific gaps about the composition and geographic distribution of species, the Wallacean Shortfall (Lomolino, 2004), including regarding reptiles.

Phyllodactylidae comprises 160 species belonging to 10 genera (Dubeux *et al.*, 2022; Uetz *et al.*, 2022), of which 14 species are recorded in Brazil (Costa *et al.*, 2022 "2021"; Dubeux *et al.*, 2022). *Phyllopezus* comprises eight species distributed throughout South America (Dubeux *et al.*, 2022; Gamble *et al.*, 2012; Uetz *et al.*, 2022), six of which occur in the Brazilian territory (Costa *et al.*, 2022 "2021"; Dubeux *et al.*, 2022). *Phyllopezus lutzae* (Loveridge, 1941) (Fig. 1A) is endemic to Brazil and has its distribution restricted to the Northeastern

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Figure 1. A. Adult individual of *Phyllopezus lutzae* registered in Tucano, Bahia, Nortehastern Brazil; B. Clump of *Aechmea* bromeliads in the studied area; C. Adult male of *Tropidurus hispidus* approaching of an adult *P. lutzae*; D. A *T. hispidus* biting *P. lutzae* on the head in an attempted predation.

Atlantic Forest, occurring from the state of Paraíba to Southern Bahia (Albuquerque *et al.*, 2019) (Table 1, Fig. 2). This species inhabits rainforests and restinga habitats (vegetation types with marine influence and associated with coastal sand deposits; Costa *et al.*, 2018), intimately associated with bromeliads (Albuquerque *et al.*, 2019; Loveridge, 1941). Here, we report the first records of this species in the Brazilian semiarid and its attempted predation by the lizard *Tropidurus hispidus* (Spix, 1825).

During wildlife rescue and monitoring activities for the installation of wind power plants (Complexo Eólico Tucano) between February and November 2021, 141 individuals of *P. lutzae* were registered in the municipality of Tucano (11°11' 58.80" S, 38°46'57.02' ' W, 405 m elevation) and one in the municipality of Nova Soure (11°17'04.67" S, 38°28'07.14" W, 239 m elevation), in the Raso da Catarina ecoregion (Veloso *et al.*, 2002; Silva *et al.*, 2017b), Bahia, Brazil. The region is located in the part of Brazil most affected by drought, known as the "Polygon of Droughts" (Ab'Sáber, 2003). The climate of both municipalities is classified as DdA´a´ according Thornthwaite (1948), with average annual rainfall of 561.2 mm in Tucano and 891 mm in Nova Soure (SEI, 1999). During the wildlife rescue, the individuals were captured manually during vegetation suppression activities, and later they were released in areas close to the activity sites. For wildlife monitoring activity, individuals were recorded during nocturnal searches. The specimens were always found associated to ground bromeliads, on the leaves, inside rosettes or in the vicinities of them when felled during vegetation removal.

The taxonomic determination of individuals was based on the following diagnostic characters: presence of undivided interdigital lamellae, absence of dorsal tubercles, rudimentary or absent pollex, and the dorsal typical color pattern of the species (gray to orange dorsal background with darker small marks, almost regular in size and spacing; Loveridge, 1941; Dubeux *et al.*, 2022). We collected five individuals between 20 and 22 November 2021 in the municipality of Tucano as voucher specimens. They

Table 1. Details of the geographic records of *Phyllopezus lutzae*. The present record is highlighted in bold. * Type Locality.

Municipality	State	Latitude (S)	Longitude (W)	Reference
Flexeiras	Alagoas	09°22'00.0"	035°45'00.0"	Avila et al., 2010
Ibateguara	Alagoas	09°00'02.0"	035°51'12.0"	Silva, 2008
Quebrangulo/Chã Preta/Lagoa do Ouro	Alagoas/Pernambuco	9°13'54.37"	36°25'38.6"	Roberto et al., 2015
Cairú	Bahia	13°36'47.1"	038°56'11.6"	Dias and Rocha, 2014
Camaçari	Bahia	12°38'03.0"	038°04'32.0"	Dias and Rocha, 2014
Cruz das Almas	Bahia	12°40'25"	39°06'05"	Protázio et al., 2021
Cumuruxatiba	Bahia	17°06'00.0"	039°11'00.0"	Rodrigues, 1987
Jandaíra	Bahia	11°40'28.0"	037°29'03.0"	Dias and Rocha, 2014
Lauro de Freitas	Bahia	12°53'9.6"	38°18'30.0"	Freitas, 2014
Maraú	Bahia	14°06'22.6"	038°59'23.0"	Dias and Rocha, 2014
Mata de São João	Bahia	12°31'40.9"	038°18'03.1"	Couto-Ferreira et al., 2011; Freitas, 2014; Gamble et al., 2012
Prado	Bahia	17°19'56.6"	039°13'31.1"	Vrcibradic et al., 2000
Salvador*	Bahia	12°38'03.0"	038°04'32.0"	Loveridge, 1941; Dias and Rocha, 2014; Freitas, 2014
Santa Cruz Cabrália/Porto Seguro	Bahia	16°23'13.0"	039°10'11.4"	Franco et al., 1998; Reis, 2017
Saubara	Bahia	12°50'00.0"	038°49'00.0"	Soeiro, 2013
Simões Filho	Bahia	12°50'00.0"	038°25'00.0"	Vrcibradic et al., 2000
Trancoso	Bahia	16°39'00.0"	039°06'00.0"	Vrcibradic et al., 2000
Nova Soure	**Bahia**	**11°17'4.67"**	**38°28'7.14"**	**Present study**
Tucano	**Bahia**	**11°11'58.80"**	**38°46'57.03"**	**Present study**
Caaporã	Paraíba	07°25'40.2"	34°57'51.6"	Albuquerque et al., 2019
Pedras de Fogo	Paraíba	07°24'53.2"	34°57'56.3"	Albuquerque et al., 2019
Iguarassu	Pernambuco	07°50'00.0"	34°54'00.0"	Vanzolini, 1972
Recife	Pernambuco	08°05'45.6"	34°57'04.9"	Oliveira et al., 2016; Santos et al., 2017
São Lourenço da Mata	Pernambuco	08°02'09.6"	35°11'56.4"	Albertim et al., 2010; Teixeira et al., 2013
Areia Branca	Sergipe	10°45'54.6"	037°20'19.4"	Carvalho et al., 2005

were euthanized with lidocaine injection, had muscle tissue samples preserved in 100% alcohol, were fixed in 10% formalin and are preserved in 70% alcohol at the Coleção Herpetológica do Semiárido, Universidade Federal Rural do Semi-Árido, Mossoró, Rio Grande do Norte, Brazil, under following identification codes: CRSAR 1870 (38.7 mm snout-vent length [SVL]), 1871 (44.3 mm SVL), 1872 (60.6 mm SVL), 1874 (39.0 mm SVL) and 1876 (50.5 mm SVL).

These present records constitute the first occurrence of *P. lutzae* outside the Atlantic Forest and the first record for the Caatinga domain. Our records in Tucano and Nova Soure municipalities extend the species distribution range 151 and 116 km, respectively, Northwest of Jandaíra, Bahia, the closest record reported in the literature (Dias and Rocha, 2014). The area where *P. lutzae* was found can be defined as a mosaic of Caatinga and Cerrado vegetation and has a high density of bromeliads of the genus *Aechmea* Ruiz & Pav. (Fig. 1B). The majority of records were made in Tucano because most of the wildlife rescue and monitoring activities are focused there, but the species can also be abundant in Nova Soure and other sites in the region with high density of bromeliads.

Bromeliads are recognized as a suitable environment for shelter and foraging for many species, as the arrangement of their leaves allows the accumulation of water and form a microenvironment that supports the development of invertebrates and

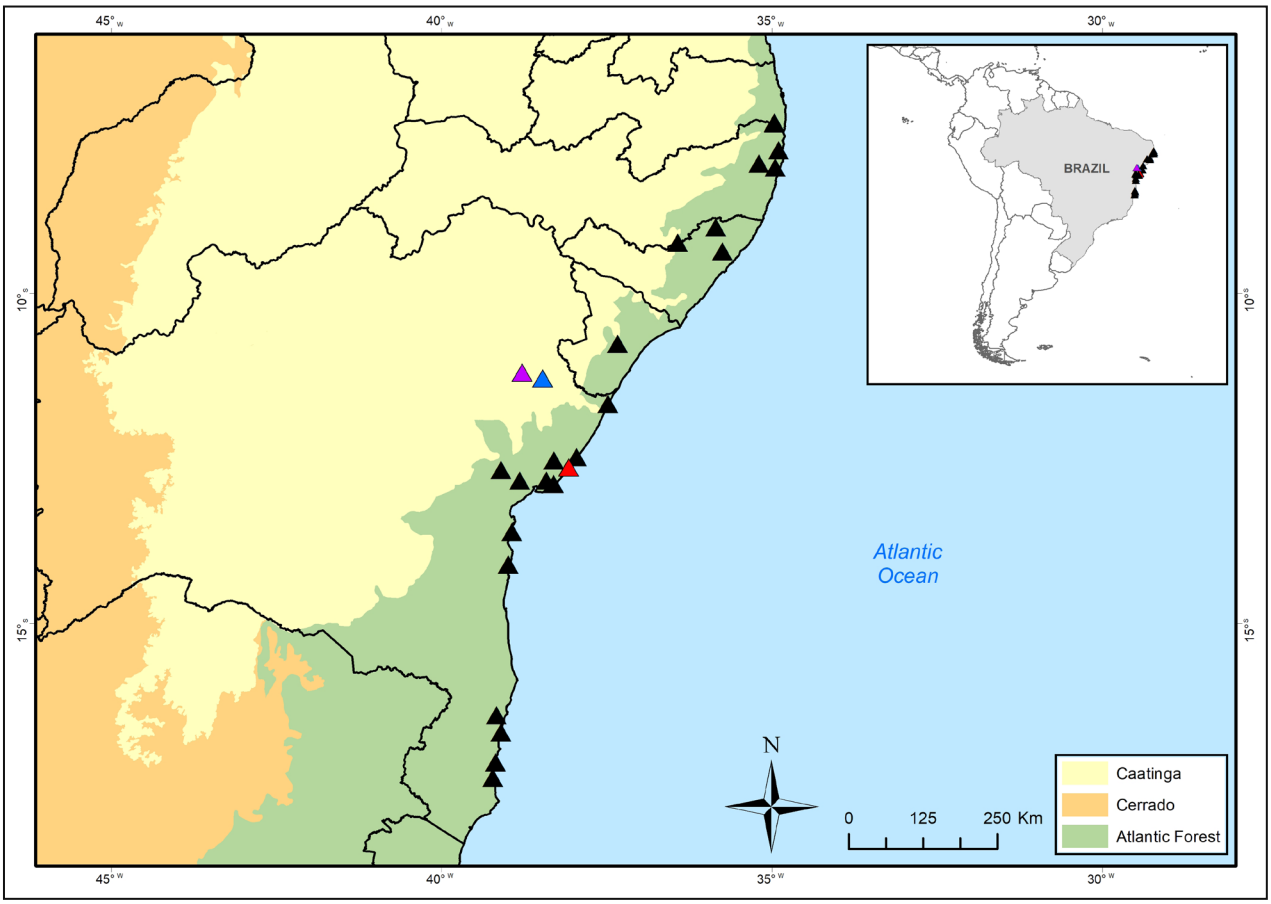

Figure 2. Updated distribution map of *Phyllopezus lutzae*. Red triangle = Type locality, black triangles = previously known records, purple triangle = new record in Tucano municipality, blue triangle = new record in Nova Soure municipality.

vertebrates (Rocha *et al.*, 2000; Jorge *et al.*, 2020; Jorge *et al.*, 2021a; Jorge *et al.*, 2021b). As *P. lutzae* was always recorded in association with bromeliads, we suggest that the presence and high population density of bromeliads in the sampled area is the main factor that allows the species inhabiting this semiarid region. These findings highlight the importance of bromeliads irrespective the considered domain (Schineider and Teixeira, 2001; Sabagh *et al.*, 2017; Jorge *et al.*, 2021a), and show how the suitable management of fauna during licensing activities can be important sources of knowledge about biodiversity.

On 24 February, 2021, at around 10 a.m., during a wildlife rescue in the municipality of Tucano, an adult male of *Tropidurus hispidus* was found approaching an adult of *P. lutzae* disturbed after vegetation removal (Fig. 1C). The *T. hispidus* began to subdue *P. lutzae* with bites on the head (Fig. 1D), but released the prey and ran away after perceiving the approach of observers.

Tropidurus hispidus is one of the most common Squamata species in the Brazilian semiarid region (Passos *et al.*, 2016a). It is a diurnal sit-and-wait predator with a primarily insectivorous but generalist diet (Kolodiuk *et al.*, 2010; Ribeiro and Freire, 2011), including many vertebrate prey. For instance, anurans (Beltrão-Mendes, 2017), birds (Guedes *et al.*, 2017), mammals (Virgínio *et al.*, 2017), snakes (Santos *et al.*, 2017), and lizards (Zanchi *et al.*, 2012; Passos *et al.*, 2016b; Pergentino *et al.*, 2017), including conspecifics (Sales *et al.*, 2011; Sousa *et al.*, 2021) are among the documented prey of *T. hispidus*. Despite the behavioral interaction observed was an unsuccessful predation attempt, this finding provides evidence that *P. lutzae* also composes the list of potential prey of *T. hispidus*. In this regard, other phyllodactylid lizards as *Gymnodactylus geckoides* and *Phyllopezus pollicaris* were already consumed by *T. hispidus* (Pergentino *et al.*, 2017; Dubeux *et al.*, 2020).

Our new records of *P. lutzae* not only expand its known distribution range, but demonstrate that it may inhabit an ecological and climate dominion different than was reported in the scientific literature

so far. The prey-predator interaction reported also highlights the predator potential of *T. hispidus*, reinforcing this species is able to prey upon any smaller vertebrate. The semiarid of North of the state of Bahia still has areas with little known biodiversity and our findings constitute one of the first works on reptiles from this region.

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