

Range extension and natural history notes of *Siphlophis leucocephalus*

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Locality.— Brazil, state of Bahia, municipality of Paulo Afonso, Estação Ecológica Raso da Catarina (ESEC-RC) (9.65°S, 38.51°W; WGS84, 593 m above sea level); area of low Caatinga vegetation. We found the specimen on September 6, 2024, during a fieldwork carried out between 2–10 of September 2024 at the ESEC-RC. This is a 99,772 ha, fully protected conservation unit, in the São Francisco River valley (Garda *et al.*, 2013). We found the adult male *Siphlophis leucocephalus* while it was moving along a branch close to the ground, collected it manually and transported it to the improvised laboratory at ICMBIO (Instituto Chico Mendes de Conservação da Biodiversidade) headquarters. There, we anesthetized and euthanized it with a lethal dose of 2% lidocaine hydrochloride. Subsequently we fixed it in 10% formalin, preserved in 70% alcohol and deposited in the herpetological collection of the Universidade Federal de Pernambuco (CHUFPE-R 1943). The morphology and pholidosis of the specimen (Fig. 1) allowed us to identify it: Snout-vent length 728 mm; tail length 185 mm. Number of supralabial scales 8; supralabial touching ocular iv + v; preocular 1; postocular 2; temporal 2+3; infralabial 9. Nasal divided. Number of dorsal body scales 19–19–17; ventral 235; subcaudal 84. Cloacal scale single. Dark body bands 17; nine dark tail bands.

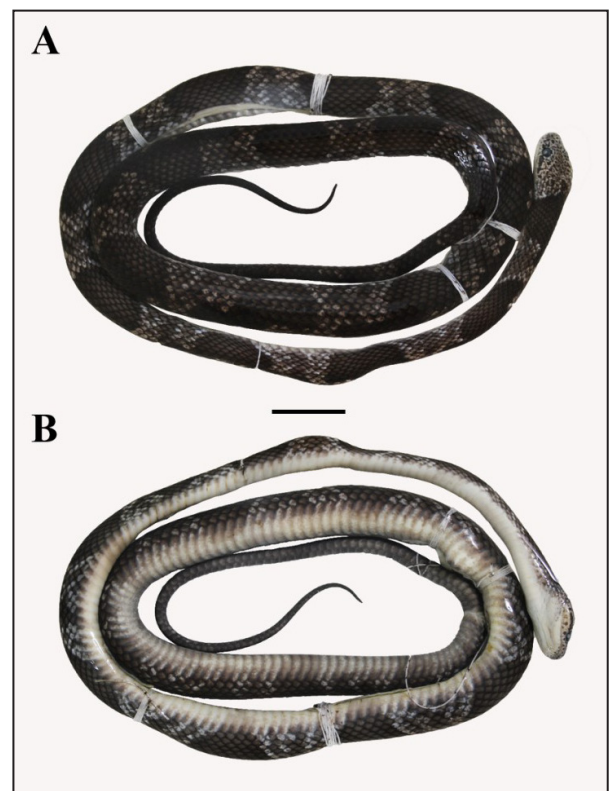


Figure 1. Specimen of *Siphlophis leucocephalus* (CHUFPE-R 1943), in dorsal (A) and ventral (B) views, collected at Estação Ecológica Raso da Catarina, Paulo Afonso, Bahia, Brazil. Scale bar = 20mm.

Comment.— Caatinga, the predominant biome in the northeast region of Brazil, covers about 70% of the territory (da Silva *et al.*, 2017) and stands out as a unique habitat for reptiles and amphibians due to its climatic and geomorphological history (Rodrigues, 2003). Among the squamate reptiles of the Caatinga, snakes are particularly notable for their moderate to high endemism. They inhabit open and forested areas, ecotones, the Borborema Plateau highlands, and lowland semiarid zones such as the paleoclimatic dunes of the São Francisco River (Guedes *et al.*, 2014). The species *Siphlophis leucocephalus* (Günther, 1863), occurs from the Atlantic Forest in Bahia westward to the Caatinga and Cerrado biomes in Minas Gerais and Tocantins (Thomassen *et al.*, 2015; Nogueira *et al.*, 2019). It is identified by its dorsal pattern of approximately 18 large dark spots or saddles, four light-scaled head and collar spots, 13 solid maxillary teeth, two postoculars, and 17 scale rows anterior to the cloaca (Bailey, 1970; Thomassen *et al.*, 2015), and has limited natural history data available (see Maia-Carneiro *et al.*, 2016). This

study expands *S. leucocephalus* range in the Caatinga, describes a new antipredator behavior, and reviews its known strategies.

Specifically, the species has been previously recorded in tropical and semideciduous forests in southeastern Bahia (Bahia Coastal Forests ecoregion), in the semideciduous forests of Chapada Diamantina, also in Bahia state (Caatinga ecoregion), in gallery forests in the Cerrado biome in the Arraías (Cana Brava) ecoregion in the state of Tocantins, and in Minas Gerais (Thomassen *et al.*, 2015) (Fig. 2, Table 1). In addition, the species occurs on both sides of the São Francisco River (see Prudente, 1998; Zaher & Prudente, 1999; Argôlo, 2004; Costa *et al.*, 2007; Freitas *et al.*, 2012; Thomassen *et al.*, 2015). Our new record at ESEC-RC extends the range of the species to lowland Caatinga forests, about 500 km north from the closest geographic record, in Mucugê, state of Bahia (Fig. 2). The map presented in Nogueira *et al.* (2019, Plate 340) mistakenly locates a record in northern Goiás state, which actually corresponds to the locality in Arraías, southern

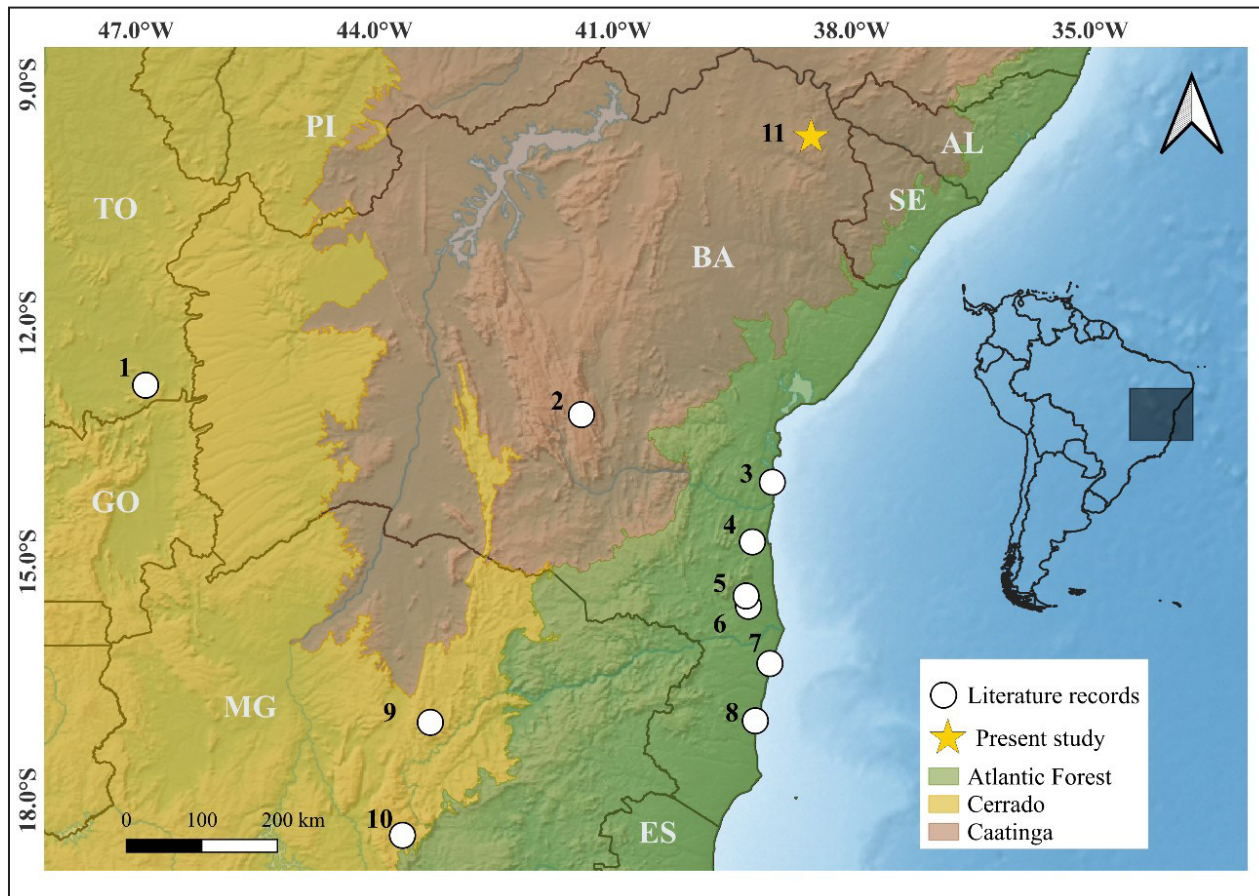


Figure 2. Geographic distribution records of *Siphlophis leucocephalus* across northeast Brazil's main phytogeographic regions. AL = Alagoas; BA = Bahia; ES = Espírito Santo; GO = Goiás; MG = Minas Gerais; PI = Piauí; SE = Sergipe; TO = Tocantins.

Table 1. Geographic records of *Siphlophis leucocephalus* (adapted from Thomassen *et al.*, 2015). For records lacking geographic coordinates, information was obtained from Paynter and Taylor (1991), IBGE (2011) or software Google Earth™. Latitude (Lat.) and longitude (Long.) in decimal degrees. * = present study. BA = Bahia; MG = Minas Gerais; TO = Tocantins.

State	Municipality/ Locality	Lat.	Long.	Elevation (m a.s.l.)	Source of Record	Source of coordinate
BA	Ilhéus (4 on the map)	14°45'00.0"S	39°15'00.0"W	90	Freitas 2003, Argôlo, 2004	County seat
BA	Mascote (6 on the map)	15°33'36.0"S	39°18'00.0"W	80	Argôlo, 2004	County seat
BA	Mucugê / distrito de Cascavel, Caraíbas (2 on the map)	13°09'00.0"S	41°24'00.0"W	1160	Freitas et al., 2012	Freitas et al. 2012
BA	Santa Cruz Cabrália (7 on the map)	16°16'48.0"S	39°01'48.0"W	80	Prudente, 1998	County seat
BA	Uruçuca / close to Serra Grande (4 on the map)	14°00'00.0"S	39°00'00.0"W	70	Rodrigo C. G. de Souza (Fig. 1 in Thomassen et al., 2015)	GPS
BA	Prado / Parque Nacional do Descobrimento (8 on the map)	17°00'00.0"S	39°00'00.0"W	75	Uetz, 2014 (photograph)	Approximate
BA	Santa Luzia (5 on the map)	15°25'48.0"S	39°19'48.0"W	290	Argôlo, 2004	County seat
BA *	Paulo Afonso / Estação Ecológica Raso da Catarina (11 on the map)	9°39'25.6"S	38°30'36.0"W	593	CHUFPE-R 1943	GPS
MG	Dantas (10 on the map)	18°26'24.0"S	43°39'00.0"W	1280	UFMG-R 197 (Thomassen et al., 2015)	County seat
MG	Itacambira / Serra de Itacambira, Tamanduá Village (9 on the map)	17°01'12.0"S	43°18'00.0"W	1230	UFMG-R 1020 (Tho- massen et al., 2015)	GPS
TO	Arraias / Cana Brava (1 on the map)	12°46'48.0"S	46°52'48.0"W	600	Amaral, 1935 (as <i>S. cervinus</i> , <i>S. geminatus</i>), Prudente et al., 1998	Approximate

Tocantins state (Thomassen *et al.*, 2015). So far, there are no published records of this species in the state of Goiás.

We also recorded some natural history observations (Fig. 3). The individual was found at night moving along a branch 40 cm above sandy soil. Upon capture, it displayed erratic movements as antipredator behavior. The next day, under daylight (Fig. 3A), we recorded additional strategies, such as coiling the body as a ball and hiding the head under or within coils. While being photographed, previously unreported displays were noted, including tail vibration, mouth strikes, head flattening and elevation, head triangulation (Figure 3B), and “S”-shaped neck cur-

ves (Fig. 3B and C). Cloacal discharge also occurred during handling.

Siphlophis leucocephalus is globally listed as Least Concern (LC) due to its large geographic distribution (Silveira *et al.*, 2020) in the Atlantic Forest of Brazil and in transition areas between Atlantic Forest, Cerrado and Caatinga biomes. Our record is the second within the Caatinga biome, expanding the geographic distribution of this snake northwards, close to the mid-course of the São Francisco River. Records in different biomes and ecoregions suggest that the species is a habitat generalist, occupying habitats with very distinct vegetation structure and subject to different climatic regimes —particularly



Figure 3. Male specimen of *Siphlophis leucocephalus* (CHUFPE-R 1943) photographed in life at rest (A) and while displaying anti-predator behaviors: flattening and elevation of anterior part of the body and head (B) and triangulation of the head (C). Photographs by Ubiratã Souza.

regarding annual rainfall. Additionally, *S. leucocephalus* was previously reported in two conservation areas (Reserva Particular do Patrimônio Natural Fazenda Araçari and Área de Proteção Ambiental Costa de Itacaré/Serra Grande) (Silveira *et al.*, 2020) and our record also occurred in a conservation area,

underscoring the importance of protected areas for its conservation.

Behaviors such as adopting an S-shaped neck, triangulating the head, and tail shaking are associated with predator intimidation (Tozetti *et al.*, 2009), signaling potential danger—possibly mimicking the

Table 2. Antipredator behavioral data for species of the genus *Siphlophis*, based on new records and literature data. * = behaviors recorded in this study.

Species	<i>S. cervinus</i>	<i>S. compressus</i>	<i>S. leucocephalus</i>	<i>S. longicaudatus</i>	<i>S. pulcher</i>	<i>S. worontzowi</i>
Forming a ball	X	X	X	X	X	X
Cloacal discharge	X	X	X*	X		
Flattening			X*			
Hiding head between body	X	X	X	X	X	
Tail vibration		X	X*	X		
S-shaped neck		X	X*	X	X	
Erratic movements			X*	X		
Head triangulation		X	X*			
Elevation of the head and anterior portion of the body	X	X	X*	X	X	
Striking			X*	X		
Rotation of the body		X				
Mimetism		X		X	X	
Literature data	Martins <i>et al.</i> , 2008; Fraga <i>et al.</i> , 2013; Tozetti <i>et al.</i> , 2021	Martins <i>et al.</i> , 2008; Fraga <i>et al.</i> , 2013; Tozetti <i>et al.</i> , 2021	Carvalho <i>et al.</i> , 2017; present study	Martins <i>et al.</i> , 2008; Pereira <i>et al.</i> , 2018	Martins <i>et al.</i> , 2008; Tozetti <i>et al.</i> , 2021	Tozetti <i>et al.</i> , 2021

behavioral and morphological traits of pitvipers in the genus *Bothrops* (Martins *et al.*, 2008). A strategy that may be effective against visually guided predators (Dell'Aglio *et al.*, 2012). Literature reports information on the behavior of six representatives of the genus *Siphlophis* (Table 2), including anti-predator repertoire (Laurenti, 1768; Daudin, 1803; Raddi, 1820; Prado, 1940; Martins *et al.*, 2008; Fraga *et al.*, 2013; De Carvalho *et al.*, 2017; Pereira *et al.*, 2018; Tozetti *et al.*, 2021). Our findings on defensive behavior of *S. leucocephalus* expand the knowledge on the defensive repertoire in *Siphlophis* snakes, revealing patterns in this genus and reporting new defensive strategies.

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