



DISTRIBUTION EXTENSION AND NEW RECORDS FOR *Cercosaura olivacea* (GRAY, 1845) (SQUAMATA: GYMNOPHTHALMIDAE) IN NORTHEASTERN BRAZIL

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Abstract: Here we add a new state record for *Cercosaura olivacea* in northeastern Brazil and new areas of occurrence in the state of Pernambuco and Sergipe, including the first record of this species in the Caatinga ecoregion. The new records fill a gap of more than 600 km in the distribution of this species on the east coast of Brazil and expand the geographical distribution of the species by 280 km north and 180 km south of the nearest recorded areas of occurrence.

Keywords: Alagoas state; Atlantic Forest; Caatinga; lizard; Oliva Tegu.

The genus of microteiid lizards *Cercosaura* Wagler 1830, is currently composed of 16 species widely distributed throughout South America (Sturaro *et al.* 2018, Uetz *et al.* 2020). Although the distribution of most of the taxa of the genus is restricted to the Amazon rainforest (11 species; Barreto *et al.* 2012, Cusi & Doan 2014, Sturaro *et al.* 2017, 2018), others have a wider distribution, occurring in different South American ecoregions (*e.g.* Cerrado, Atlantic Forest, Pantanal and Pampas; Doan & Lamar 2012, Sturaro *et al.* 2018).

The small lizard *Cercosaura olivacea* (Gray, 1845) (Squamata, Gymnophthalmidae; maximum SVL 56.1 mm in females and 53.0 mm in males; Sturaro *et al.* 2018) is a diurnal, heliothermic

species, with terrestrial and semi-fossorial habits and is often found in open areas, at the edge or inside forests close to watercourses (Recoder & Nogueira 2007, Macedo *et al.* 2008). This species is widely distributed across Brazil, occurring in most ecoregions, including Cerrado, Pantanal, Pampas, Atlantic Forest and some open areas in the Amazon rainforest, with some further records of occurrence in Bolivia and in northeastern Argentina (Sturaro *et al.* 2018, Uetz *et al.* 2020). Consequently, the Caatinga remains to be the only Brazilian ecoregion with no records of the species so far.

Cercosaura olivacea was described by Gray 1845 as *Emminia olivacea* (a monotypic genus)

based on a single specimen for the state of Pernambuco, northeastern Brazil, with no further specific locality. Later, the genus *Emminia* Gray (1845) was synonymized to *Cercosaura* (Peters 1862) and its only species was synonymized with *C. ocellata* Wagler, 1830 (see O'Shaughnessy 1881). The species remained in synonymy until recently when Sturaro *et al.* (2018) revalidated *C. olivacea* based on morphological and genomic data. *Cercosaura olivacea* can be easily distinguished from other species belonging to the *C. ocellata* complex (in brackets) by presenting dorsal scales arranged in regular and longitudinal lines, four pairs of chinshields and four infralabials to the posterior margin of the eye (partially regular dorsal, five pairs of chinshields and five infralabials to the posterior margin of the eye in *C. anordosquama*), single loreal scale (divided in *C. bassleri*), low values for most scale counts (higher in *C. ocellata*; see Sturaro *et al.* 2018), with the body venter and throat predominantly white or cream (different color patterns than described herein; Sturaro *et al.* 2018).

Although *C. olivacea* has been considered as the most widely distributed species of the genus, there are still many gaps throughout its areas of occurrence, mainly in northeastern Brazil (Sales *et al.* 2014, Sturaro *et al.* 2018). Thus, herein we provide a new state record for *Cercosaura olivacea* and new records for the species in the state of Pernambuco and Sergipe, including the first record of occurrence in the Caatinga ecoregion.

We documented the records of occurrence during field expeditions for the inventory of herpetofauna or during occasional encounters, with subsequent collection (license numbers: SISBIO 32920-1 and 46368-4; CPRH n° 003840/2016; Figure 1). Taxonomic identification was confirmed through the diagnoses proposed by Sturaro *et al.* (2018). Sex was determined through the presence/absence of a hemipenis or by the presence of secondary sexual characteristics (*e.g.* number of femoral pores). Twenty-six discrete and nine continuous characteristics were obtained following Sturaro *et al.* (2018) with the aid of a stereomicroscope and a digital caliper

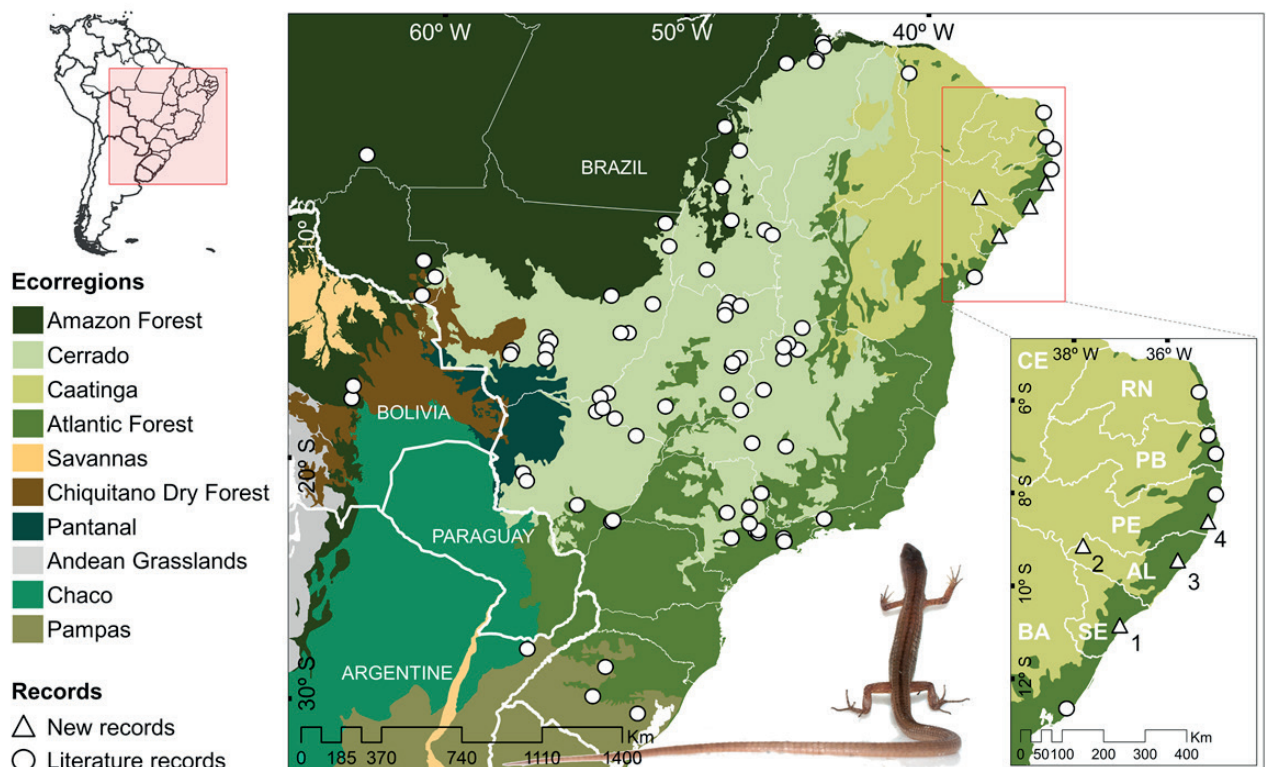


Figure 1. Distribution of *Cercosaura olivacea*, highlighting the distribution of the species in northeastern Brazil. CE: Ceará state; RN: Rio Grande do Norte state; PB: Paraíba state; PE: Pernambuco state; AL: Alagoas state; SE: Sergipe state; BA: Bahia state; 1. municipality of Aracaju, Sergipe state, Brazil; 2. municipality of Inhapi, Alagoas state, Brazil; 3. municipality of Maceió, Alagoas state, Brazil; 4. municipality of Sirinhaém, Pernambuco state, Brazil. Inset map: South America. Literature records are based on Sales *et al.* (2014) and Sturaro *et al.* (2018).

(to the nearest 0.1 mm). All specimens analyzed were incorporated in the *Coleção Herpetológica do Museu de História Natural da Universidade Federal de Alagoas* (MUFAL) and in the *Coleção Herpetológica da Universidade Federal de Pernambuco* (CHUFPE).

During the study, we observed four specimens. The first record was on 20 June 1992 in Campus São Cristóvão of Universidade Federal de Sergipe, municipality of Aracaju, in the Atlantic Forest ecoregion in Sergipe state, Brazil (10°55'26.4"S; 37°06'00.0"W; 7 m above sea level [a.s.l.]; DATUM WGS84), an adult male (MUFAL 336; SVL = 41.83; Figure 2a), found by Jorge Lopes, no habitat information. The second record was on 01 December 2013 close to the Canal do Sertão hydraulic development (a transposition of the São Francisco River), municipality of Inhapi, in the Caatinga ecoregion in Alagoas state, Brazil (9°19'00.2"S; 37°44'13.3"W; 278 m a.s.l.), an adult male (MUFAL 11669; SVL = 39.32; Figure 2b) found by Ubiratan Gonçalves, in a shrubby Caatinga area, with a dense layer of leaf litter. The third record occurred on 25 July 2018 in Campus A.C. Simões of Universidade Federal de Alagoas, municipality of Maceió, in the Atlantic Forest ecoregion in Alagoas state, Brazil (9°33'28.8"S; 35°46'30.0"W; 90 m a.s.l.). A juvenile female (MUFAL 15488; SVL = 22.76; Figure 2c), found by Marcos Dubeux, in the garden of the Instituto de Ciências Biológicas e da Saúde (ICBS), the individual was under the grass, associated with a thin layer of leaf litter. The fourth record occurred on 31 January 2020 in Mata do Tauá, a remnant of Atlantic forest, municipality of Sirinhaém, in the Atlantic Forest ecoregion in Pernambuco state, Brazil (8°34'08.4"S; 35°09'46.8"W; 87 m a.s.l.), an adult male (CHUFPE-R 970; SVL = 37.22; Figure 2d), found by Natallia Silva, in wet leaf litter close to the edge of the forest. This specimen had the frontonasal scale in contact with the frontal, separating the pair of prefrontal scales (Figure 2d), differing from the other specimens. Such variation has already been observed in other specimens of *C. olivacea* (Sturaro *et al.* 2018). All discrete and continuous characteristics of the specimens analyzed (Table 1) fall within the counts and measurement ranges previously registered for this species (see Sturaro *et al.* 2018).

Cercosaura olivacea is widely distributed

throughout South America and many distributional gaps remained to be fulfilled (e.g. Oliveira & Moura 2013, Sales *et al.* 2014, Sturaro *et al.* 2018). In the Caatinga ecoregion, a tropical dry forest with a dry climate and xeromorphic vegetation endemic to Brazil (Assis 2000), the species was known to occur in *brejo de altitude* (highland humid forest remnants scattered throughout the semiarid lowlands) in the *Planalto de Ibiapaba*, state of Ceará (Borges-Nojosa & Caramaschi 2003). Herein, among other records, we provide the first registration of *C. olivacea* for the Caatinga of Alagoas state (municipality of Inhapi).

Despite being commonly found in open areas and close to urbanized regions (Recoder & Nogueira 2007, Oliveira & Moura 2013), *C. olivacea* has environmental preferences for regions with minimal vegetation cover, as do other species of the genus (Cunha *et al.* 1985). In all collection areas, the specimens were found sheltering or foraging under the leaf litter, in areas where the soil was more humid. Even in the third identified area of occurrence (municipality of Maceió, state of Alagoas), the most urbanized area of all the four areas, the species was observed in an area which had vegetation that was used as shelter. The *Universidade Federal de Alagoas* is located in one of the largest enclaves of Cerrado in the Atlantic Forest of Alagoas state (Assis 2000) and features of savannah can still be found in some areas, such as sandy soil and low and twisted vegetation, which provide shade and consequently aid in retaining soil moisture (Assis 2000).

Although we are aware that the existing record of *C. o. ocellata* for the state of Sergipe (Costa & Bérnils 2018), prior to the taxonomic proposal by Sturaro *et al.* (2018), likely corresponds to a specimen of *C. olivacea*, there is no information on the ecoregion and location of the observed occurrence or associated voucher or pictures to confirm the identity of the species. Therefore, as far as we know, herein we define the first specific location with collected voucher for Sergipe state. The records provided here help to fill a gap of more than 600 km in our knowledge of the occurrence areas of *C. olivacea* on the east coast of Brazil (between the states of Pernambuco and Bahia). These new records expand the geographical distribution of this species by 280 km north of the nearest location in the municipality of Camaçari,

Table 1. Meristic and morphometric (in mm) characters obtained of the four *Cercosaura olivacea* individuals collected in northeastern Brazil. SAM (scales around midbody), DLR (dorsals in a longitudinal row), DTR (dorsals in a transverse row), LTS (lateral scales), VLR (ventrals in a longitudinal row), VTR (ventrals in a transverse row), FN (frontonasals), FR (frenoculars), LO (loreal), OC (occipitals), SL (supralabials), PSL (post-supralabials), IL (infralabials), PIL (post-infralabials), SO (supraoculars), PRO (preoculars), SBO (suboculars), PO (post-oculars), PS (palpebrals), CI (supraciliaries), ST (supratemporals), TEV (temporals in a vertical row bordering postoculars), CS (pairs of chinshields), GL (gulars in a longitudinal row), PG (paired enlarged gulars in the medial region of the throat), FP (number of femoral pores), SVL (snout-vent length), TL (tail length, only for individuals with intact tail), HL (head length), HW (head width), HD (head depth), LAL (lower arm length), HaL (hand length), LLL (lower leg length), FoL (foot length).

Voucher	Sex	SAM	DLR	DTR	LTS	VLR	VTR	FN	FR	LO	OC	SL
MUFAL 336	♂	26	29	8	6	21	6	1	1	1	3	5
MUFAL 11669	♂	25	30	7	6	19	6	1	1	1	3	5
MUFAL 15488	♀	25	29	7	6	19	6	1	1	1	3	5
CHUFPE-R 970	♂	26	31	8	6	20	6	1	1	1	3	6
Voucher	PSL	IL	PIL	SO	PRO	SBO	PO	PS	CI	ST	TEV	CS
MUFAL 336	1	5	2	3	3	4	3	2	5	2	4	4
MUFAL 11669	1	5	2	3	3	4	3	2	5	2	5	4
MUFAL 15488	1	6	2	3	2	5	3	3	6	1	3	4
CHUFPE-R 970	1	7	2	3	2	5	3	2	5	2	4	4
Voucher	GL	PG	FP	SVL	TL	HL	HW	HD	LAL	HaL	LLL	FoL
MUFAL 336	8	6	2	41.83	-	9.42	5.46	4.02	3.39	4.07	3.83	5.99
MUFAL 11669	8	6	2	39.32	-	8.01	5.07	3.29	4.17	3.77	5.49	8.62
MUFAL 15488	7	5	0	22.76	-	7.05	4.02	2.89	2.45	2.93	3.23	5.21
CHUFPE-R 970	8	6	4	37.22	125	10.5	5.5	4.28	4.77	5.08	6.27	8.68

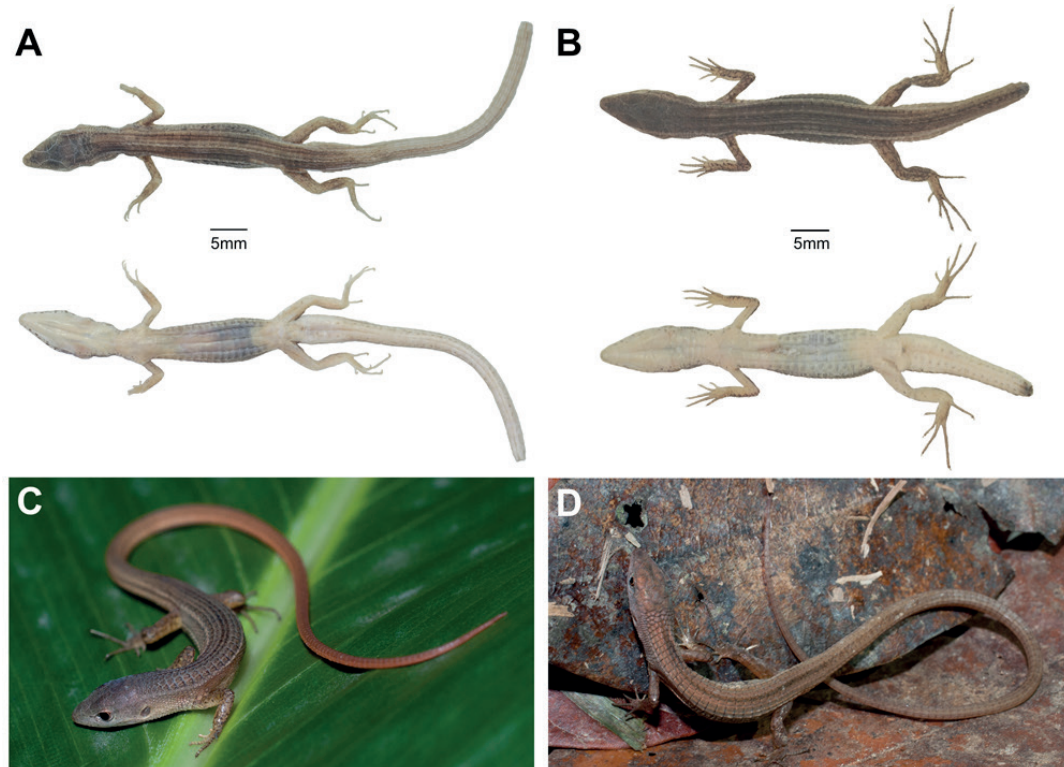


Figure 2. New records of *Cercosaura olivacea* for northeastern Brazil. a) MUFAL 336 (municipality of Aracaju, Sergipe state, Brazil); b) MUFAL 11669 (municipality of Inhapi, Alagoas state, Brazil); c) MUFAL 15488 (municipality of Maceió, Alagoas state, Brazil); d) CHUFPE-R 970 (municipality of Sirinhaém, Pernambuco state, Brazil).

Bahia state (Couto-Ferreira *et al.* 2011) and 180 km south of the nearest location in the municipality of Recife, Pernambuco state (Oliveira & Moura 2013), filling an important gap in the knowledge of this enigmatic species of lizard in northeastern Brazil.

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