

SHORT COMMUNICATION

Review of the distribution of *Lophostoma carrikeri* (Chiroptera: Phyllostomidae), with range extension to transitional vegetation zones in the southwestern Amazon

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ABSTRACT

Lophostoma carrikeri has been mostly recorded within the Amazon biome. There are scarce records in the northern Brazilian Amazon, but also records outside this biome, which were neglected in literature. The aim of this study was to update and extend the distribution of *L. carrikeri*. Seven new localities in Brazil were provided, including the first records for the states of Rondônia and Mato Grosso, filling a large gap in the species distribution, and three additional records for the state of Pará. Our results reinforce the notion that *L. carrikeri* is widely distributed in the Amazon, but is also present in other biomes in Brazil, such as Caatinga, Cerrado, and transitional areas.

KEYWORDS: Carriker's round-eared bat; Phyllostomini; savanna; rainforest; ecotone

Revisão da distribuição geográfica de *Lophostoma carrikeri* (Chiroptera: Phyllostomidae), com ampliação de distribuição em áreas de transição no sudoeste da Amazônia

RESUMO

Lophostoma carrikeri tem sido registrado principalmente no bioma Amazônia. Há escassos registros no norte da Amazônia brasileira, mas também há registros fora deste bioma que foram negligenciados na literatura. Nosso objetivo foi atualizar e ampliar a distribuição de *L. carrikeri*. Reportamos sete novas localidades no Brasil, incluindo os primeiros registros para Rondônia e Mato Grosso, preenchendo uma grande lacuna na distribuição desta espécie, e três registros adicionais para o Pará. Nossos resultados reforçam a noção de que *L. carrikeri* é amplamente distribuída na Amazônia, mas também está presente em outros biomas, como Caatinga e Cerrado, além de áreas de transição.

PALAVRAS-CHAVE: morcego; Phyllostomini; savana, floresta tropical; ecotono

Lophostoma carrikeri (J.A. Allen 1910), the Carriker's round-eared bat, is one of the species of round-eared bats endemic to South America (Williams and Genoways 2008; Camacho *et al.* 2014). Despite its wide distribution, only a few records of *L. carrikeri* are known from central Colombia (McCarthy

et al. 1983), Guyana (Lim *et al.* 1999), Venezuela (Allen 1910; Gardner 1988), French Guiana (Williams and Genoways 2008), Suriname (Genoways and Williams 1984; Lim *et al.* 2005), south and northeastern Ecuador (Camacho *et al.* 2014), east and northeastern Peru (Gardner 1976; Solari *et*

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al. 2006), northern Bolivia (Koopman 1976), and northern and central Brazil (Gribel and Taddei 1989; Gregorin *et al.* 2008, 2011; Sampaio *et al.* 2003; Dias *et al.* 2009; Santos *et al.* 2009; Zortéa *et al.* 2009).

Generally associated with forested habitats, most records of *L. carrikeri* are from the Amazon (Williams and Genoways 2008; Velazco and Gardner 2012). The most recent taxonomic revision and geographic distribution for the species (Camacho *et al.* 2014; Camacho *et al.* 2016) lists a single record in Brazil outside of the Amazon (from Teresina, Piauí state) (Vizotto *et al.* 1980). However, other records are known for the Cerrado savanna (Zortéa *et al.* 2009; Gregorin *et al.* 2011) and the xerophytic Caatinga region (Gregorin *et al.* 2008), in central and northeastern Brazil, respectively. Thus, most recent publications describe the distribution of *L. carrikeri* in Brazil as scattered and mostly restricted to the northern portion of the country. Here, we review the known records of *L. carrikeri* in Brazil and report a range extension to the western portion of the country, including the first record in transitional areas between the Amazon and Cerrado biomes.

Specimens analyzed here (Table 1) are deposited in Zoology Museum of Universidade de São Paulo (MZUSP), São Paulo, Brazil. We measured specimens according to Camacho *et al.* (2016). Most individuals refer to recent captures with the use of mist-nets at ground level and were handled according to Sikes *et al.* (2011), fixed in 10% formaldehyde and preserved in 70% ethanol. Some records are from faunal monitoring for a hydroelectric dam on the upper Madeira River (Rondônia state) and mining areas in the Comodoro municipality (Mato Grosso state). Other records refer to museum specimens. Voucher MZUSP 22707 (skin and skull, Figure 1) refers to the uncatalogued specimen reported by McCarthy and Handley (1987).

Lophostoma carrikeri can be distinguished from congeners by a suite of morphological characters: medium size (forearm length > 42 mm) (Table 2); lack of small wart-like granulations on head, wings, and legs; flanks, shoulders and anal region have a pale grayish-brown pelage; white hairs on the throat and chest, which may extend to the abdomen (Figure 2); basisphenoid pits well developed and divided by a median septum; sagittal crest usually high and well developed (Figure 1) (Velazco and Gardner 2012; Camacho *et al.* 2016; Díaz *et al.* 2016).

We obtained seven new records of *Lophostoma carrikeri* in Brazil (Table 1), three from the central and eastern Amazon (Pará state), two from the southwestern Amazon (Rondônia state), and two from transitional areas between the Amazon and Cerrado in Mato Grosso state (Figure 3). The specimens include three reproductive males, collected in July, August and November (Rondônia and Mato Grosso), two pregnant females in September and December (Mato Grosso and Pará) (Table 1). Non-reproductive females have been reported in April and November (Colombia), July (Peru) and August (Suriname); lactating females in June and September (Ecuador), May (Suriname) and October (Pará,



Figure 1. Dorsal, ventral and lateral views of the skull and lateral view of the mandible of *Lophostoma carrikeri* (MZUSP 22707).

Table 1. Data on specimens of *Lophostoma carrikeri* reported in the present study. The locality number refers to Figure 3.

Voucher	Locality	Biome	Habitat	Date of capture	Sex	Reproductive stage
MZUSP 35889	1	Amazon/Cerrado	Ecotone	06 Nov 2008	♂	Scrotal testes
Released animal	2	Amazon/Cerrado	Ecotone	04 Sep 2012	♀	Pregnant (Figure 2)
MZUSP 35887, 35888	3, 4	Amazon	Primary rainforest	29 Aug 2010 16 Jul 2015	♂	All with scrotal testes (Figure 2)
MZUSP 35890	5	Amazon	Primary rainforest	30 Mar 2008	♂	-
MZUSP 35886	6	Amazon	Primary rainforest	07 Dec 2008	♀	Pregnant
MZUSP 22707	7	Amazon	Riparian rainforest	18 Oct 1986	♀	Lactating

Table 2. External and craniodental measurements of *Lophostoma carrikeri* from this study (MZUSP 22707) and the literature (values are the mean ± SD and the range).

Measurement (in mm)	MZUSP 22707	Camacho <i>et al.</i> (2016) ² (n = 16)
Forearm length	47	45.6 ± 1.5 (42.2 – 47.7)
Greatest length of skull	23.9	24.3 ± 0.9 (23.0 – 26.6)
Metacarpal III length	36	37.7 ± 1.4 (34.1 – 40.0)
Condyloincisive length	20	21.0 ± 0.8 (19.8 – 23.0)
Condylocanine length	19.1	20.3 ± 0.7 (19.0 – 21.3)
Braincase breadth	9.5	9.6 ± 0.3 (9.0 – 10.3)
Zygomatic breadth	10.7	11.2 ± 0.6 (10.3 – 12.7)
Postorbital breadth	3.2	3.8 ± 0.2 (3.3 – 4.1)
Mastoid width	11.2	9.6 ± 0.3 (9.0 – 10.2)
Palatal length	8.9	10.5 ± 0.5 (9.2 – 11.1)
Maxillary tooththrow length	7.7	8.3 ± 0.4 (7.7 – 9.4)
Molariform tooththrow length	5	6.8 ± 0.3 (6.0 – 7.3)
Width at M2	5.6	7.6 ± 0.4 (7.1 – 8.8)
Dentary length	20	15.0 ± 0.7 (13.8 – 16.9)
Mandibular tooththrow length	9	9.3 ± 0.6 (8.6 – 11.0)
Coronoid height	5.6	5.6 ± 0.5 (5.0 – 7.0)

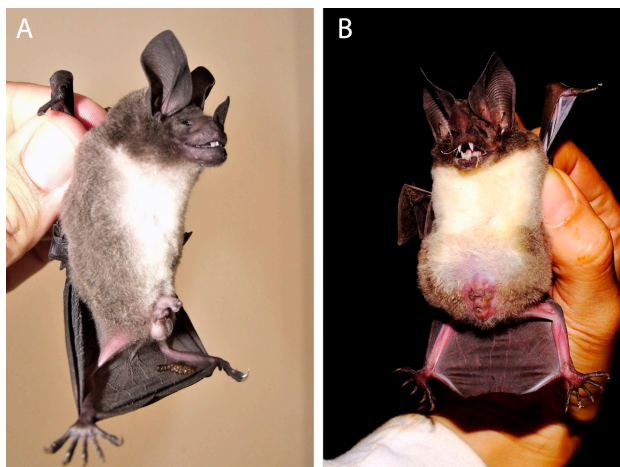


Figure 2. *Lophostoma carrikeri* captured in locality 3 (A) and 2 (B) from Figure 3. This figure is in color in the electronic version.

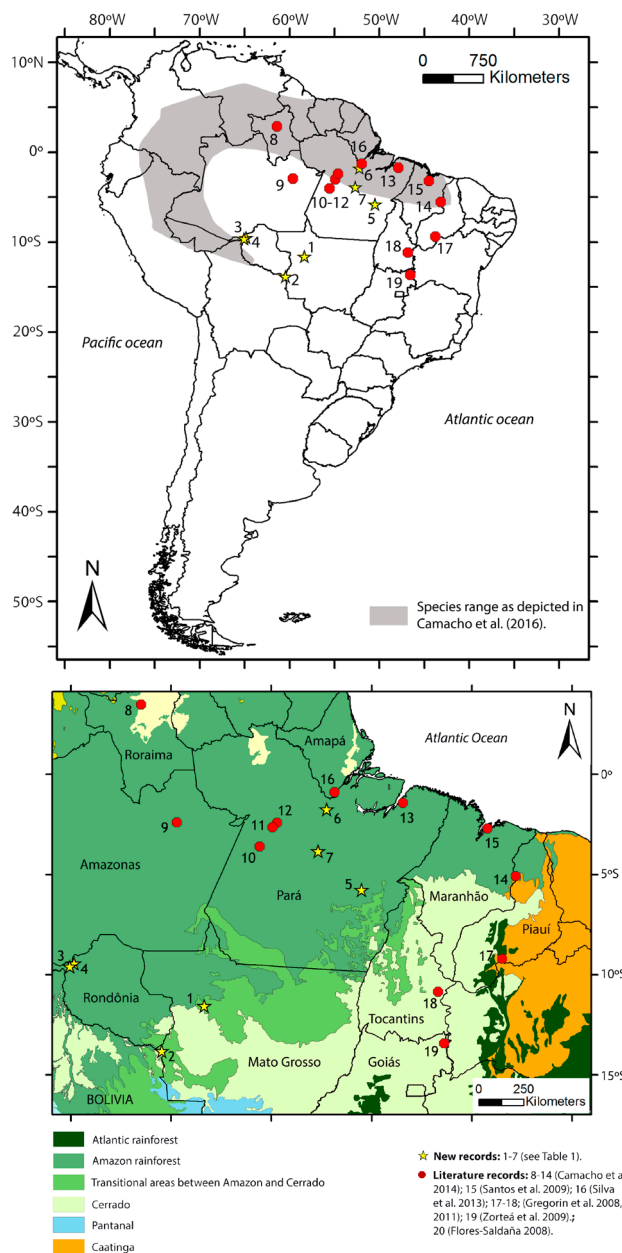


Figure 3. Geographic distribution of *Lophostoma carrikeri* in South America and Brazil (detailed map). Present records: BRAZIL: Mato Grosso state: (1) Juína (-11.553055, -58.3425), (2) Comodoro (-13.79772, -60.457181); Rondônia state: (3, 4) Madeira River, Mutum Paraná (-9.43694, -64.830432; -9.591301, -65.048552); Pará state: (5) FLONA Tapirapé-Aquiri, Marabá (-5.7666, -50.5000), (6) Porto de Moz (-1.735591, -52.235599), (7) Iriri River, Altamira (-3.8333, -52.6666). Coordinates datum SAD 69. Literature records: BRAZIL: Roraima state: (8) Ilha de Maracá, Amaraji; Amazonas state: (9) Biological Dynamics of Forest Fragments Project site, 80 km N of Manaus; Pará state: (10) Floresta Nacional do Tapajós, (11) Belterra, 30 km SW of Santarém, (12) Parque Nacional da Amazônia, Santarém; (13) Utinga, Belém; Piauí state: (14) Teresina, (17) Parque Nacional da Serra das Confusões, Guaribas; Maranhão state: (15) Povoado Quebra-Pote, São Luís; Amapá state: (16) Highway BR-156, Reserva Extrativista do Rio Cajari; Tocantins state: (18) Estação Ecológica Serra Geral do Tocantins, Jalapão; Goiás state: (19) São Domingo. Vegetation distribution according to Olson *et al.* (2001). This figure is in color in the electronic version.

Brazil) (Williams and Genoways 2008; Camacho *et al.* 2014). Although limited, our data fit the bimodal reproduction pattern for *L. carrikeri* suggested by McCarthy *et al.* (1992).

The new records presented herein help to fill a large gap between the southern records known for the species in northern Bolivia to those in northern Pará and Amazonas states (Velazco and Gardner 2012; Camacho *et al.* 2014), extending 750 km eastwards from the nearest record in northern Bolivia and to the southeastern range of the species in the Amazon (Figure 3). Most of the new records are in the Amazon, but two are from transitional areas between the Amazon and Cerrado in Mato Grosso state. Such areas are characterized by a mosaic of phytophysionomies, where savannas and forests mingle and the climate is markedly seasonal (Velo *et al.* 1991). In dry forests of Cerrado and Caatinga (Zortéa *et al.* 2009; Gregorin *et al.* 2008; 2011) most *L. carrikeri* specimens were captured in Cerrado riparian forests, or near wet areas in Caatinga. Thus, the recent records indicate that *L. carrikeri* can dwell in dry forests near mesic areas.

The new records from Mato Grosso and Rondônia lie in an area where several new records of bat species have been recently reported (e.g. Rocha *et al.* 2015; Brandão *et al.* 2016; Dalponte *et al.* 2016; Pedrosa *et al.* 2018). Western Brazil is a highly diverse area, not only for bats but for other mammals as well (Brandão *et al.* 2019), where field-survey efforts should be increased and fauna conservation deserves higher attention.

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