THERYA NOTES 2023, Vol. 4 : 183-189 DOI: 10.12933/therya_notes-23-127 ISSN 2954-3614

New records and distributional extensions of *Peropteryx leucoptera*, *Gardnerycteris crenulatum*, and *Lampronycteris brachyotis* in Bolivia

Nuevos registros y ampliación de las distribuciones de *Peropteryx leucoptera*, *Gardnerycteris crenulatum* y *Lampronycteris brachyotis* en Bolivia

José L. Poma-Urey[1,2*], Luis H. Acosta Salvatierra[1,2], Nicolas Malpartida[1,2], Héctor E. Ramírez-Chaves[3,4], and José Ochoa G.[5]

[1]Museo de Historia Natural Noel Kempff Mercado, Universidad Autónoma Gabriel René Moreno. Av. Irala 565. Santa Cruz de la Sierra, Bolivia. E-mail: jose_luispoma@hotmail.com (JLP-U); l.jubatus096@gmail.com (LHAS); nmalpartidaferrero@gmail.com (NM).

[2]Fundación para la Conservación del Bosque Chiquitano. Av. Ibérica 95. Santa Cruz de la Sierra, Bolivia.

[3]Departamento de Ciencias Biológicas, Facultad de Ciencias Exactas y Naturales, Universidad de Caldas. Calle 65 No. 26-10, Manizales. Caldas, Colombia.

[4]Centro de Museos, Museo de Historia Natural, Universidad de Caldas. Carrera 23 No. 58-65, 170004, Manizales. Caldas, Colombia. E-mail: hector.ramirez@ucaldas.edu.co (HER-Ch).

[4]Centro de Estudios en Zoología Aplicada, Universidad de Carabobo. Av. Intercomunal de Bárbula. Valencia, Venezuela. E-mail: jochoabat@gmail.com (JOG).

*Corresponding author

In the last 5 years, the knowledge of bats (Chiroptera) in Bolivia has advanced significantly, adding 10 species and an updated list for the country. Still, some species are represented by a few voucher specimens ($n < 8$), such as *Peropteryx leucoptera* (Emballonuridae), *Gardnerycteris crenulatum*, and *Lampronycteris brachyotis* (Phyllostomidae). Here, we provide new records that extend the geographic distribution of these species in Bolivia, along with morphometric data. Based on specimens collected and deposited in systematic collections, we performed qualitative and quantitative comparisons of external and craniodental variables with the original taxonomic descriptions of the 3 species. We also compiled and projected in maps the localities corresponding to historical records in Bolivia. The new records represent distributional extensions to 10 biogeographic provinces in Bolivia. The specimens of *P. leucoptera* come from the southeastern region of the country. For *G. crenulatum* and *L. brachyotis* we present the southernmost and the easternmost records in Bolivia, respectively. The specimens of *P. leucoptera* tend to be smaller than others collected in the region, while the specimens of *G. crenulatum* are slightly larger than those reported from other countries. The new records extend the known geographic ranges of these species between 197 and 736 km in Bolivia. We recommend increasing efforts to update the geographic distributions of other species with scarce records in Bolivia.

Key words: Chiroptera; Emballonuridae; geographic distribution; mammals; Phyllostomidae; South America.

En los últimos 5 años, el conocimiento de los murciélagos (Chiroptera) de Bolivia ha avanzado significativamente, adicionándose 10 especies y una lista actualizada para el país. A pesar de los avances en el conocimiento de la fauna de murciélagos, algunas especies han sido registradas por pocos especímenes de referencia ($n < 8$), tales como *Peropteryx leucoptera* (Emballonuridae), *Gardnerycteris crenulatum* y *Lampronycteris brachyotis* (Phyllostomidae). Aquí reportamos nuevos registros para estas especies que amplían sus distribuciones en Bolivia y señalamos datos morfométricos adicionales. La revisión incluye especímenes colectados y depositados en colecciones sistemáticas, realizamos comparaciones cualitativas y cuantitativas de variables externas y cráneo-dentales con las descripciones taxonómicas originales de las 3 especies. También compilamos y proyectamos en mapas las localidades correspondientes a registros históricos en Bolivia. Los nuevos registros representan extensiones de distribución a 10 provincias biogeográficas dentro de Bolivia. Los especímenes de *P. leucoptera* provienen de la región sureste del país. Para *G. crenulatum* y *L. brachyotis* presentamos el registro más austral y oriental en Bolivia, respectivamente. Los especímenes de *P. leucoptera* tienden a ser más pequeños que otros colectados en la región, mientras que los especímenes de *G. crenulatum* son ligeramente mayores que aquellos reportados en otros países. Los nuevos registros extienden entre 197 y 736 km los rangos geográficos conocidos para estas especies en Bolivia. Recomendamos incrementar los esfuerzos orientados a la actualización de las distribuciones de otras especies con escasos registros en Bolivia.

Palabras clave: Chiroptera; distribución geográfica; Emballonuridae; mamíferos; Phyllostomidae; Sudamérica.

In Bolivia, the study of bats has shown important advances in the last 5 years as a product of research carried out by a group of mammalogists associated to different national and international institutions. The results include the first records of 10 species (*Peropteryx leucoptera*, *P. pallidoptera*, *Anoura latidens*, *Micronycteris sanborni*, *Gardnerycteris koepckeae*, *Sturnira giannae*, *Molossus fluminensis*, *Eptesicus langeri*, *E. brasiliensis*, *E. diminutus*) and an updated check list of bats known in the country (Poma-Urey *et al.* 2019; Velazco and Patterson 2019; Calderón-Acevedo and

Muchhala 2020; Loureiro *et al.* 2020; Poma-Urey *et al.* 2020, 2021; Acosta *et al.* 2021a; Siles *et al.* 2021; Siles and Wallace 2021; Poma-Urey *et al.* 2023). Some bat species have been reported in Bolivia in very restricted geographic areas or by few voucher specimens. This is particularly true for *Peropteryx leucoptera* (Emballonuridae; 5 specimens), *Gardnerycteris crenulatum* (Phyllostomidae; 7 specimens), and *Lampronycteris brachyotis* (Phyllostomidae; 2 specimens; Aguirre and Urioste 1994; Anderson 1997; Acosta *et al.* 2021b; Poma-Urey *et al.* 2021).

Previous records of *P. leucoptera* in Bolivia are limited to 3 localities in 2 biogeographic provinces: 1) Southeastern Amazon, and 2) Beniana (Navarro 2011; Poma-Urey *et al.* 2021). *Lampronycteris brachyotis* has been recorded in 2 localities in 2 biogeographic provinces: 1) Beniana, and 2) Southwestern Amazon (Navarro 2011; Acosta *et al.* 2021b). *Gardnerycteris crenulatum* has been recorded in 13 localities (some records without voucher specimen) in 4 biogeographic provinces: 1) Southwestern Amazon, 2) South-Central Amazon, 3) Beniana, and 4) Peruvian-Bolivian Yungueña (Anderson 1997; Emmons 1998; Terán 2010; Navarro 2011).

Here, we provide new records and distributional extensions of *P. leucoptera*, *G. crenulatum*, and *L. brachyotis* in Bolivia. To this end, we based our analysis in the recognition of diagnostic characters and morphometric data and compared this information with that of other specimens collected in the region. Finally, we spatially projected the records to provide a geographical context.

The new records of *P. leucoptera*, *G. crenulatum*, and *L. brachyotis* in Bolivia are based on 18 specimens deposited at the Museo Noel Kempff Mercado (MNKM), Santa Cruz, Bolivia. For each individual examined we took external measurements (in mm), including total length (TL), tail length (T), hindfoot length (HF), forearm length (FA), and weight (W) in g. We also took 12 cranio-dental measurements, based on the criteria proposed by Simmons and Voss (1998), Barquez *et al.* (1999) and Díaz *et al.* (2021): greatest length of skull (GLS), condyloincisive length (CIL), condylocanine length (CCL), postorbital breadth (PB), braincase breadth (BB), mastoid breadth (MB), zygomatic breadth (ZB), maxillary toothrow length (MTL), across molars breadth (BAM), across canines breadth (BAC), mandibular toothrow length (LMT), and mandible length (LM).

To identify the specimens, we used the external and cranio-dental measurements, in addition to diagnostic characters. We based the identification on the following authors: *Peropteryx*.- Hood and Gardner (2008), Lim *et al.* (2010), and Velazco *et al.* (2021); *Gardnerycteris*.- Hurtado and Pacheco (2014), Hurtado and D'Elía (2018), and Díaz *et al.* (2021); *Lampronycteris*.- Williams and Genoways (2008), Rocha *et al.* (2013), and Díaz *et al.* (2021). Finally, we compiled the geographic information of the specimens analyzed and documented in the literature, to confirm additional localities of *P. leucoptera* (*e.g.*, Poma-Urey *et al.* 2021), *G. crenulatum* (*e.g.*, Anderson 1997; Emmons 1998; Aguirre 2002; Terán 2010; Siles and Wallace 2021), and *L. brachyotis* (*e.g.*, Acosta *et al.* 2021b). We projected the new records and the historical collection localities in maps and listed the corresponding biogeographic provinces (Appendix 1). The provinces biogeographic are based on Navarro (2011).

We reviewed 18 museum specimens corresponding to *P. leucoptera* (1), *G. crenulatum* (16), and *L. brachyotis* (1); of these, 1 specimen of *G. crenulatum* and 1 of *L. brachyotis* were collected in January 2023 at the Centro de Estudios Alta Vista (Knowledge Bases for Restoration Project).

The new record of *P. leucoptera* (Figure 1a), collected in June 2021, corresponds to an adult male (MNKM 5826; Appendix 1), for which the diagnostic and external morphological characters match: size (FA 39 mm - 48 mm; Hood and Gardner 2008; Lim *et al.* 2010; Velazco *et al.* 2021); translucent wings, gradually darkening to brown from tips to body; and large pterygoid pits (Velazco *et al.* 2021; Figure 1b). In contrast, *P. pallidoptera*, similar to *P. leucoptera*, exhibits translucent and evenly tinged pale brown wings, and smaller pterygoid pits separated by the presphenoid bone (Lim *et al.* 2010; Velazco *et al.* 2021). The external measurements are within the interval of variation of *P. leucoptera*, while cranio-dental measurements tend to be smaller with respect to other specimens in the region (specifically GLS, CIL, CCL, ZB, MTL, and LM; Table 1). The specimen, 1 adult male, MNKM 5826, was collected by L. H. Acosta Salvatierra and J. L. Poma-Urey in July 19, 2021, using mist nets at the entrance of a cave at the department Santa Cruz, San José de Chiquitos, Taturuquí (17° 54´ 25.65" S, 60° 40´38.19" W, 480 m), where the predominant vegetation corresponds to Chiquitano Forest (Figure 2). Other species found in the same cave were *Peropteryx macrotis* and *Glossophaga soricina*. This locality belongs to the Western Cerradense biogeographic province (Figure 2).

For *G. crenulatum*, the new records correspond to adult males (8) and adult females (8); this species differs from other phyllostomids by the following combination of characters: medium size (FA 45 mm - 51 mm); wing membrane attached to the metatarsals; nasal blade with crenulations and hairs; dorsal fur with a faint or marked white line; and presence of 2 lower incisors and 2 lower premolars (Hurtado *et al.* 2014; Hurtado and Pacheco 2014; Díaz *et al.* 2021). It can be differentiated among its congeners by the grayish to blackish brown color of the dorsal fur (reddish or golden brown in *G. koepckeae*) and thin, whitish dorsal line (broad and yellowish in *G. keenani*). *Gardnerycteris crenulatum* exhibits a narrow basioccipital bone at cochlear level and superficial basisphenoid pits, while *G. keenani* exhibits a broad basioccipital and shallow basisphenoid pits (Hurtado and D'Elía 2018). All the specimens reviewed here match the previously described diagnostic characters (Figure 1c). The external and cranio-dental measurements are included in Table 2, all of them within the interval of variation for this species, although Bolivian specimens tend to be larger both externally and cranially with respect to other specimens in the region (Table 2). The specimens were captured with mist nets in 8 lowland localities: Department Santa Cruz:

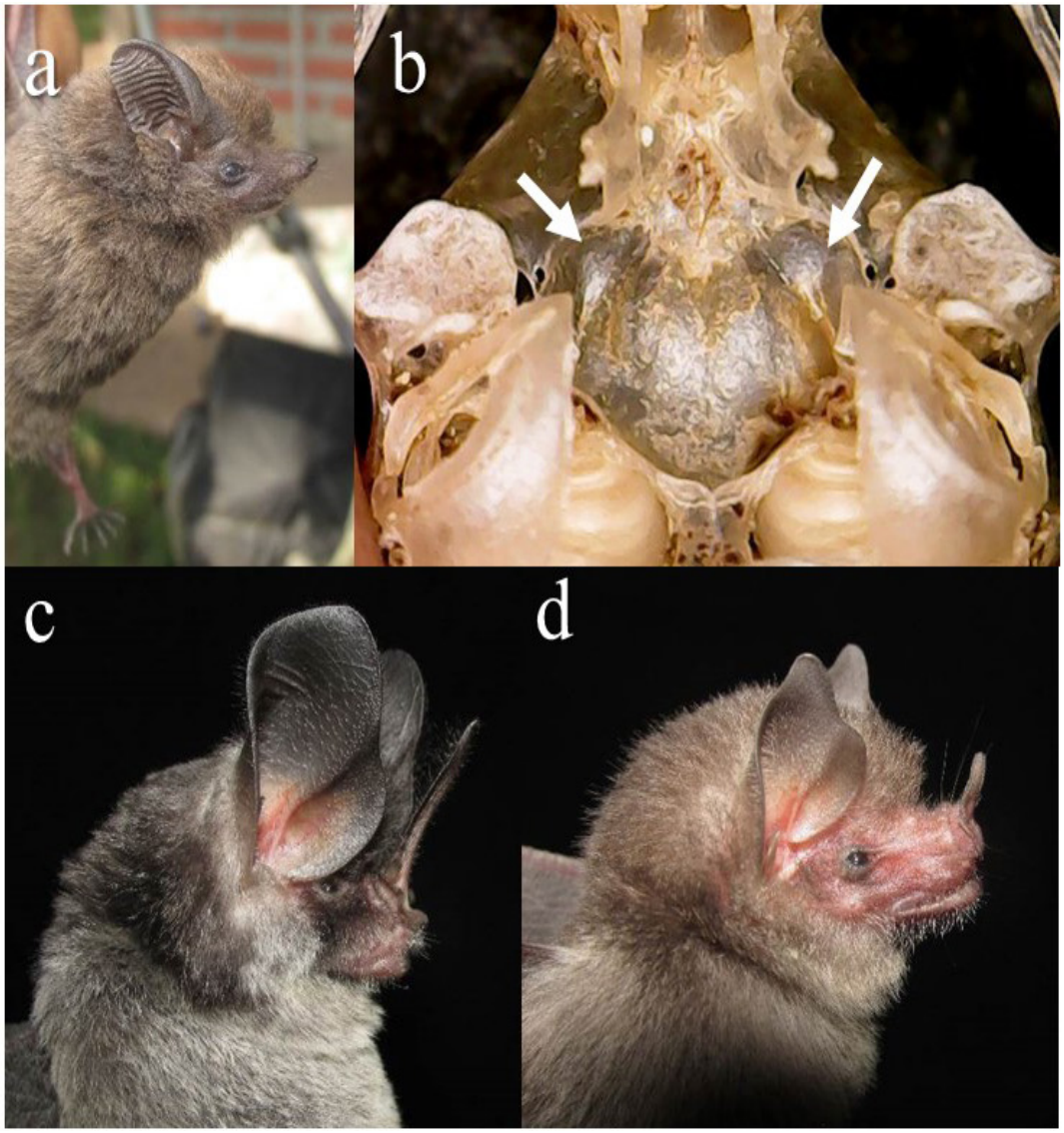

Figure 1. Appearance and morphological characters of bats in Bolivia: a) *Peropteryx leucoptera* (MNKM 5826); b) pterygoid pits (pointed out by white arrows) of *P. leucoptera* (MNKM 5826); c) *Gardnerycteris crenulatum* (MNKM 5823); d) *Lampronycteris brachyotis* (MNKM 5824).

Concepción, Centro de Estudios Alta Vista (16° 5' 29.76" S, 61° 50' 18.79" W, 433 m). January 22, 2023. 1 adult male, MNKM 5823. Laguna Marfil (15° 25' 36.54" S, 60° 18' 22.92" W, 213 m). October 24, 2019. 1 adult female, MNKM 5815. Área Protegida Municipal Bajo Paragua (14° 0' 36.1" S, 62° 1' 21.78" W, 207 m). August 19, 2021. 1 adult male, MNKM 5825. Parque Noel Kempff Mercado, Flor de Oro (13° 33' 10" S, 61° 0' 51" W, 172 m). September 21, 1995. 1 adult female, MNKM 1911. Parque Noel Kempff Mercado, Pampa de Termiteros (14° 40' 38.1" S, 60° 54' 46.22" W, 189 m). October 11, 2002. 2 adult females, MNKM 3281, 3282. September 13, 2017. 1 adult male, MNKM 5586. Department Beni: Comunidad Maravilla, Lago Largo (12° 54' 44.15" S, 65° 46' 20.22" W, 154 m). June 5, 2016. 1 adult male, MNKM 5611. Quiquibey, Tierra Comunitaria de Origen Pilón Lajas (14° 38' 15.7" S, 67° 30' 38.8" W, 242 m). June 24, 1999. 1 adult male, MNKM 2845. Reserva Paraba Barba Azul (13° 44' 51.9" S, 66° 5' 56.9" W, 156 m). July – Augut, 2010. L. H. Acosta Salvatierra, captured and released 7 specimens, 3 males and 4 females. The specimen MNKM 5823, was collected between 0.5 and 3 m above the ground in Centro de Estudios Alta Vista, in the Western Cerradense Occidental biogeographic province (Figure 2), where the vegetation corresponds to a semi-dry sub-humid forest of Chiquitanía and Beni, affected in 2019 by fires. Other species captured were *Artibeus lituratus*, *A. obscurus*, *Desmodus rotundus*, *L. brachyotis*, and *G. soricina*.

The new record, collected in January 2023, of *L. brachyotis* corresponds to a subadult female (MNKM 5824; Figure 1d). This species exhibits the following diagnostic and external morphological characters: medium size (FA 38.3 mm - 42.5 mm); ears pointed with concave upper outer edge and lacking a connecting skin band; lower lip with a pair of "V"-shaped tubercles; metacarpals gradually variable in length, fifth being shortest; length of the calcaneus equal to or greater than the length of the feet (Williams and Genoways 2008; Díaz *et al.* 2021); GLS between 20.2 mm - 22.8 mm; and upper incisors of chisel-shaped with length less than half the height of the canines (Rocha *et al.* 2013). The most similar species in Bolivia belongs to the

Table 1. Comparisons of external and cranio-dental measurements (mm) and weight (g) of *Peropteryx leucoptera* from Bolivia (MNKM 5826, this study*) with specimens previously recorded in South America: Bolivia (Poma-Urey *et al.* 2021), Brazil (Mikalauskas *et al.* 2014), Colombia (Suárez-Castro *et al.* 2012), Ecuador (McDonough *et al.* 2010), Perú, Guyana, and French Guiana (Lim *et al.* 2010). The values correspond to mean, (interval), and sample size.

	Bolivia*	Bolivia	Brazil	Colombia	Ecuador	Perú	Guyana	French Guiana
TL	62	64.8 (62 - 73) 5	-	67.8 (60 - 82) 5	58 (54 - 62) 2	67 (65 - 69) 5	60 (56 - 66) 6	64 (61 - 66) 6
T	14.5	16.1 (14.5 - 19.0) 4	14.2 (13.4 - 14.8) 3	13.5 (11 - 17) 4	12.3 (12.0 - 12.5) 2	14.6 (13 - 16) 5	10.2 (5 - 13) 6	14 (12 - 17) 6
HF	9	8.4 (5.0 - 10.0) 5	7.6 (6.7 - 8.5) 3	8 (7 - 9) 5	8.5 (7 - 10) 2	9.8 (9 - 10) 4	8.3 (7 - 9) 6	8.9 (8.0 - 10.0) 6
E	16	14.3 (8.5 - 19) 5	15.4 (14.3 - 17.6) 3	16.6 (13 - 18) 5	17.5 (17 - 18) 2	19 (17 - 20) 5	15.5 (13 - 16) 6	16.6 (15.0 - 18.5) 6
FA	42.7	46.4 (44.6 - 48.5) 5	43.5 (42.9 - 44.1) 3	42.4 (39.9 - 44.3) 5	44.3 (42.2 - 46.4) 2	45.4 (45 - 46) 5	42.8 (42 - 44) 6	43.8 (42 - 45) 6
W	5.5	-	8.5 (8.2 - 9.0) 3	-	-	8.3 (8.0 - 8.5) 4	5.6 (4 - 7) 5	6.5 (5.5 - 7.8) 6
GLS	14.59	14.9 (14.4 - 16.4) 5	15.6 (15.4 - 15.7) 3	15.6 (15.1 - 16.1) 2	15.8	-	15.3 (14.9 - 15.6) 3	-
CIL	13.32	-	14.6 (14.2 - 14.9) 3	14.3 (13.8 - 14.7) 2	14.8	-	14.0 (13.9 - 14.1) 3	-
CCL	12.64	14.1 (13.9 - 14.3) 5	-	-	-	-	-	-
PB	3.10	3.4 (2.9 - 3.7) 5	3.4 (3.3 - 3.6) 3	3.5 (3.4 - 3.6) 2	3.4	-	3.3 (3.1 - 3.3) 4	-
BB	6.99	6.8 (6.4 - 7.6) 5	7.4 (7.3 - 7.5) 3	7.1 (6.8 - 7.4) 2	7.1	-	7.2 (7.0 - 7.3) 4	-
MB	7.67	7.9 (7.7 - 8.3) 5	8.1 (8.0 - 8.2) 3	8.0 (7.9 - 8) 2	7.9	-	7.8 (7.6 - 8.0) 4	-
ZB	8.70	-	9.8 (9.5 - 9.9) 3	10.1	10.2	-	9.5 (9.3 - 9.6) 4	-
MTL	5.62	6.3 (6.0 - 6.6) 5	6.3 (6.2 - 6.4) 3	6.5 (6.3 - 6.6) 2	6.5	-	6.1 (6.1 - 6.2) 4	-
BAM	6.36	5.8 (5.3 - 7.6) 5	7.2 (7.1 - 7.2) 3	7.2 (6.9 - 7.5) 2	7.4	-	6.9 (6.7 - 7.0) 4	-
BAC	3.75	3.7 (3.4 - 3.9-9 5	4.2 (4.1 - 4.3) 3	-	-	-	-	-
LMT	5.80	6.5 (5.4 - 7.1) 5	6.5 (6.4 - 6.6) 3	-	-	-	-	-
LM	9.22	10.2 (9.8 - 10.7) 5	11.2 (11.1 - 11.3) 3	-	-	-	-	-

genus *Micronycteris*, and they can be differentiated from *L. brachyotis* by the presence of a skin band between the ears (Williams and Genoways 2008). Another similar species is *Trinycteris nicefori*, but with a body size slightly smaller (FA 37.1 mm - 40.2 mm; GLS 19.5 mm - 20.2 mm), the calcar smaller than the foot, and the upper incisors not chisel-shaped (Rocha *et al.* 2013; Acosta *et al.* 2021b). The specimen MNKM 5824 matches all the diagnostic characters of *L. brachyotis*. However, the external and cranial measurements are outside the lower limit of the interval reported for this species because it corresponds to a subadult (Table 2), with unfused phalanges epiphysis. In addition, it exhibited a soft-textured fur with a chromatic pattern where grayish brown predominates, different from the yellowish color frequently indicated for adult specimens (Figure 1d; Table 1; Williams and Genoways 2008). The specimen MNKM 5824

Table 2. External and cranio-dental measurements (mm) and weight (g) of *Gardnerycteris crenulatum* from Bolivia (this study*), Colombia (Morales-Martínez *et al.* 2020) and other countries of the Neotropics (Brazil, Ecuador, French Guiana, Guatemala, Panama, Perú, Suriname, Trinidad and Tobago, Venezuela; Hurtado *et al.* 2014). The values correspond to mean, (± standard deviation), and sample size. For *Lampronycteris brachyotis*, the values include the data here reported (MNKM 5824, this study*) and those of previous records from Brazil and Bolivia (Brandão *et al.* 2016; Acosta *et al.* 2021b). The values correspond to mean, (interval), and sample size.

	Gardnerycteris crenulatum			***Lampronycteris brachyotis***		
	Bolivia*	**Colombia**	**Neotropics**	**Bolivia***	**Bolivia**	**Brazil**
TL	90.0 (± 12.26) 9	79.7 (± 6.64) 18	84.1 (± 3.80) 95	63	74.3 (64.5 - 84.1) 2	63.1 (54.7 - 68.1) 5
T	24.2 (± 1.66) 9	23.2 (± 2.86) 19	23.3 (± 2.54) 96	11	10.8 (10.0 - 11.6) 2	10.7 (8.2 - 12.0) 5
HF	11.9 (± 1.59) 9	10.5 (± 0.90) 12	11.6 (± 1.30) 96	12	12.2 (12.0 - 12.4) 2	11.0 (10.0 - 12.0) 5
E	26.6 (± 1.59) 9	23.4 (± 1.98) 19	24.0 (± 1.57) 96	16	14.4 (11.5 - 17.3) 2	14.9 (13.9 - 18.0) 5
FA	50.0 (± 1.68) 16	47.6 (± 1.79) 19	48.0 (±3.39) 96	38.23	41.8 (41.5 - 42.1) 2	40.7 (39.8 - 42.3) 5
W	15.1 (± 3.35) 7	-	-	8	13.3 (12.5 - 14.0) 2	14.1 (12 - 18) 4
GLS	21.9 (± 0.46) 6	21.8 (± 0.55) 26	21.5 (± 0.68) 92	20.20	21.5 (21.4 - 21.6) 2	21.2 (21.1 - 21.3) 2
CIL	19.7 (± 0.38) 6	19.3 (± 0.47) 26	19.1 (± 0.61) 91	17.83	19.6	-
CCL	19.0 (± 0.45) 6	-	-	17.01	18.9 (18.9 - 19.0) 2	-
PB	4.1 (± 0.15) 6	4.2 (± 0.14) 26	4.3 (± 0.16) 91	5.24	5.1 (5.1 - 5.2) 2	5.1 (5.0 - 5.1) 2
BB	8.7 (± 0.32) 6	8.2 (± 0.21) 26	8.7 (± 0.38) 91	8.56	8.9 (8.7 - 9.1) 2	8.9 (8.8 - 9.1) 2
MB	11.9 (± 0.39) 6	11.2 (± 0.37) 26	9.7 (± 0.35) 92	9.20	9.8 (9.5 - 10.1) 2	10.1 (10.1 - 10.1) 2
ZB	12.2 (± 0.42) 6	11.8 (± 0.32) 25	12.1 (± 0.46) 90	9.05	10.8 (10.7 - 10.9) 2	11.0 (10.7 - 11.2) 2
MTL	7.9 (± 0.14) 6	7.8 (± 0.21) 26	7.9 (± 0.23) 92	7.55	8.6 (8.4 - 8.8) 2	8.3 (8.3 - 8.3) 2
BAM	8.6 (± 0.15) 6	8.1 (± 0.17) 26	8.3 (± 0.30) 92	6.40	7.2 (7.1 - 7.3) 2	7.1 (6.9 - 7.3) 2
BAC	5.3 (± 0.23) 6	5.3 (± 0.16) 26	5.3 (± 0.22) 92	3.80	3.9 (3.6 - 4.2) 2	4.1 (4.0 - 4.3) 2
LMT	8.7 (± 0.17) 6	-	8.9 (± 0.27) 91	7.68	8.8 (8.6 - 9.0) 2	-
LM	13.5 (± 0.31) 6	-	13.9 (± 0.50) 91	12.79	14.3 (14.0 - 14.6) 2	14.1 (13.9 - 14.2) 2

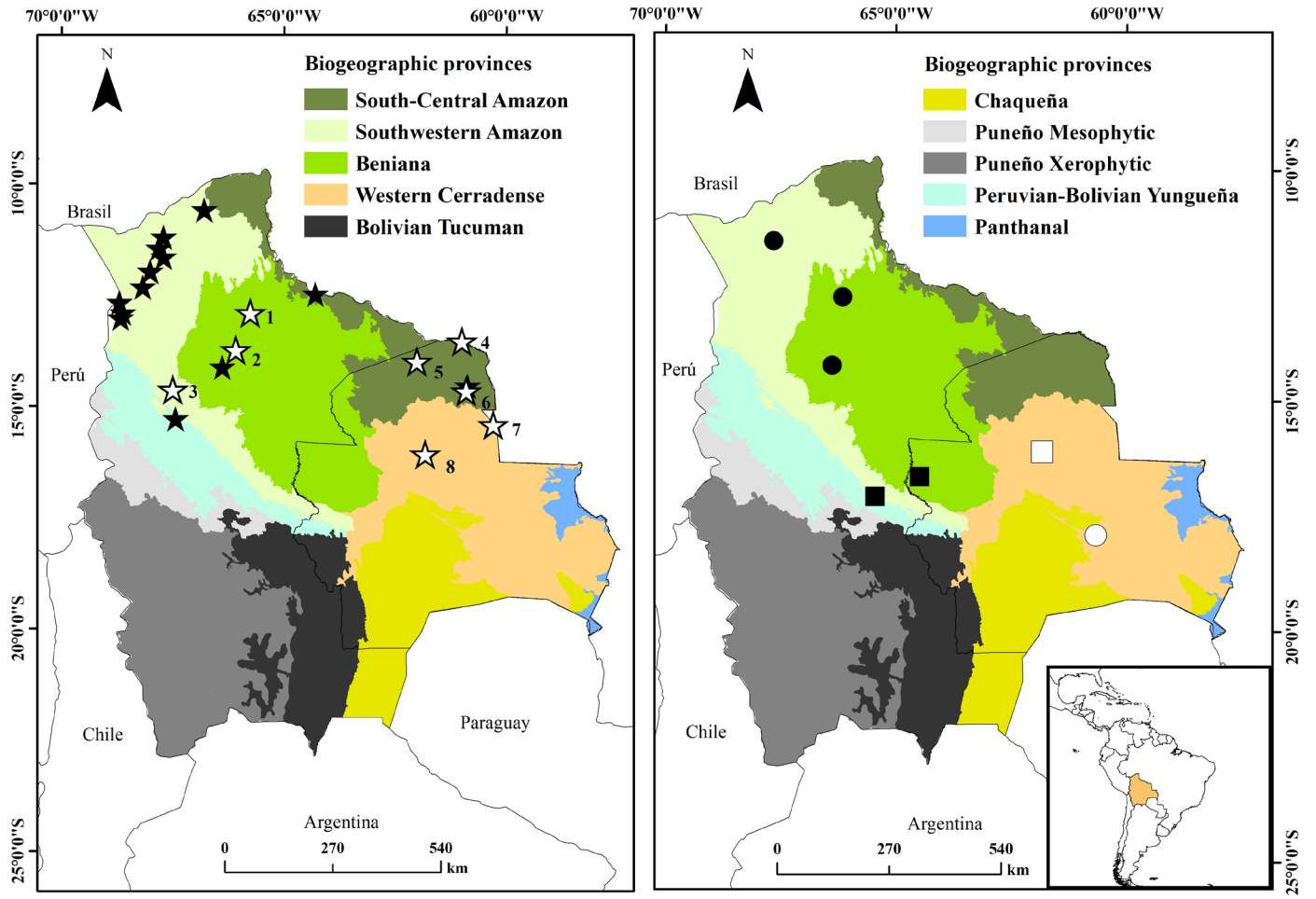

Figure 2. Collection localities in Bolivia of *Gardnerycteris crenulatum* (left; white stars = new record, black stars = previous records), *Peropteryx leucoptera* (right; white circle = new record, black circles = previous records), and *Lampronycteris brachyotis* (right; white square = new record, black squares = previous records). The biogeographic provinces were defined according to Navarro (2011). The new localities of the 3 species are, for *G. crenulatum*: 1) Comunidad Maravilla, Lago Largo, 2) Reserva Paraba Barba Azul, 3) Tierra Comunitaria de Origen Pilón Lajas, 4) Parque Noel Kempff Mercado, Flor de Oro, 5) Área Protegida Municipal Bajo Paragua, 6) Parque Noel Kempff Mercado, Pampas de Termiteros, 7) Laguna Marfil, and 8) Centro de Estudio Alta Vista; *P. leucoptera*: Taturuquí, San José de Chiquitos; and *L. brachyotis*: Centro de Estudio Alta Vista.

was captured with mist nets in Centro de Estudios Alta Vista (16° 5´ 29.7" S, 61° 50´ 18.8"W, 433 m). Mist nest was located on the banks of a water dam where dominant vegetation is Chiquitano Forest, corresponding to the Western Cerradense biogeographical province. Other species captured were *A. lituratus*, *A. obscurus*, *D. rotundus*, *G. crenulatum*, and *G. soricina*.

The new records increase the knowledge on the current distribution of bat species poorly documented in Bolivia and scarcely represented in national systematic collections. In the case of *P. leucoptera* MNKM 5826, the new record (fourth for Bolivia and first for the department of Santa Cruz), extends its geographic range 736 km south of its nearest record in the department of Beni: Refugio de Vida Silvestre "Espíritu" (Appendix 1), and to a new biogeographic province, the Western Cerradense (Figure 2; Navarro 2011; Poma-Urey *et al.* 2021). Similarly, in the case of *G. crenulatum* MNKM 5823, the new records extend its geographic range 197 km south of its nearest record in the Parque Noel Kempff Mercado, Pampas de Termiteros (Appendix 1), including the province Western Cerradense (Figure 2); and the southernmost known record slightly increases the elevational limits reported for this species in the country to 433 m (330 m; Siles and Wallace 2021). In the case of *L. brachyotis* MNKM 5824, the new locality extends its geographic range in the country 290 km to the east of the closest record and includes a new biogeographic province Cerradense Occidental (Figure 2; Navarro 2011; Acosta *et al.* 2021b).

We highlight the importance of these new records as a source of information to evaluate morphological variations, mainly in the case of *G. crenulatum*. The morphometry of this taxon has been scarcely documented in Bolivia and to date is restricted to some external and cranial measurements of 3 specimens (FA 51 mm - 53 mm; Aguirre and Urioste 1994; Anderson 1997). In addition, is important to continue documenting the diversity of bats in Bolivia, and in this sense, systematic collections play a very important role in preserving voucher specimens. We recommend the review of specimens deposited in the systematic collections of the country, especially in the cases of those taxa little studied or documented (*e.g.*, *Promops* spp. or *Eumops* spp.; Anderson 1997), to have a better understanding of their distributional patterns, habitat preferences, and abundance.

Finally, although the species studied are classified of "Least Concern" according to the International Union for Conservation of Nature (IUCN), their presence in the sampling localities and their preferences for primary forests (Solari *et al.* 2019), and taking into account other bioindicator species, could, together with these bats, suggest satisfactory ecological conditions (Schulze *et al.* 2000).

Acknowledgements

We would like to express our special thanks to the Fundación para la Conservación del Bosque Chiquitano (Knowledge Bases for Restoration Project, funded by the Government of Canadá), for providing the funds that made this research possible. H. Azurduy, R. Arispe, R. Montaño, S. Gutiérrez, and D. García provided valuable support during the execution of this project and facilitated our stay at the Centro de Estudios Alta Vista. K. Rivero, allowed access to the specimens preserved in the zoological collection at the Museo Noel Kempff Mercado. Finally, we thank 2 anonymous reviewers who helped us to improve this manuscript.

Literature cited

Acosta, S. L. H., *et al.* 2021a. A new species of *Eptesicus* (Mammalia: Chiroptera: Vespertilionidae), from the sub-Andean Forest of Santa Cruz, Bolivia. Therya 12:391-409.

Acosta, S. L. H., *et al.* 2021b. Distribución y estado de conocimiento de dos especies de Phyllostomidae (Chiroptera) en Bolivia. Ecología en Bolivia 56:29-35.

Aguirre, L. F. 2002. Structure of a Neotropical Savanna Bat community. Journal of Mammalogy 83:775-784.

Aguirre, L. F., and R. J. Urioste. 1994. Nuevos registros de murciélagos para Bolivia y los departamentos de Beni y Pando. Ecología en Bolivia 23:71-76.

Anderson, S. 1997. Mammals of Bolivia, taxonomy, and distribution. Bulletin of the American Museum of Natural History 231:1-652.

Barquez, R. M., M. A. Mares, and J. K. Braun. 1999. The bats of Argentina. Special Publication, Museum of Texas Tech University 42:1-275.

Brandão, M. V., *et al.* 2016. New records of *Lampronycteris brachyotis* in Brazil. Mastozoología Neotropical 23:147-155.

Calderón-Acevedo, C. A., and N. Muchhala. 2020. First report of the Broad-toothed Tailless Bat, *Anoura latidens* Handley, 1984 (Chiroptera, Phyllostomidae), in Bolivia. Check List 15:1545-1550.

Díaz, M., *et al.* 2021. Clave de identificación de los murciélagos neotropicales/Chave de indentifição dos morcegos Neotropicais. Publicación Especial N° 2. Programa de Conservación de los Murciélagos de Argentina. Tucumán, Argentina.

Emmons, L. H. 1998. Mammal Fauna of Parque Noel Kempff Mercado. Pp. 129-143, *in* A biological assessment of Parque Nacional Noel Kempff Mercado, Bolivia (Killeen, T. J, and T. S. Schulenberg, eds.). RAP Working Papers 10. Washington, D. C., U.S.A.

Hood, C. S., and A. L. Gardner. 2008. Family Emballonuridae Gervais, 1856. Pp. 188-207 *in* Mammals of South America: marsupials, xenarthrans, shrews, and bats (Gardner, A. L., ed.). University of Chicago Press. Chicago, U.S.A.

Hurtado, N., E. Arias, and V. Pacheco. 2014. Redescription of *Mimon koepckeae* (Chiroptera: Phyllostomidae). Zoologia 31:377-388.

Hurtado, N., and G. D'Elía. 2018. Taxonomy of the genus *Gardnerycteris* (Chiroptera: Phyllostomidae). Acta Chiropterologica 20:99-115.

Hurtado, N., and V. Pacheco. 2014. Análisis filogenético del género *Mimon* Gray, 1847 (Mammalia, Chiroptera, Phyllostomidae) con la descripción de un nuevo género. Therya 5:751-791.

Lim, B. K., *et al.* 2010. A new species of *Peropteryx* (Chiroptera: Emballonuridae) from western Amazonia with comments on phylogenetic relationships within the genus. American Museum Novitates 3686:1-20.

Loureiro, L.O., M. D. Engstrom, and B. K. Lim. 2020. Single nucleotide polymorphisms (SNPs) provide unprecedented resolution of species boundaries, phylogenetic relationships, and genetic diversity in the mastiff bats (*Molossus*). Molecular Phylogenetics and Evolution 143:106690.

McDonough, M. M., *et al.* 2010. Mammalia, Chiroptera, Emballonuridae, *Peropteryx leucoptera* Peters, 1867 and *Peropteryx pallidoptera* Lim, Engstrom, Reid, Simmons, Voss and Fleck, 2010: Distributional range extensions in Ecuador. Check List 6:639-643.

Mikalauskas, J., *et al.* 2014. Update on the distribution of *Peropteryx leucoptera* Peters, 1867 (Mammalia, Chiroptera, Emballonuridae): first record for the state of Sergipe, northeastern Brazil. Check List 10:402-406.

Morales-Martínez, D. M., *et al.* 2020. The Koepcke's spear-nosed bat, *Gardnerycteris koepckeae* (Gardner and Patton, 1972) (Chiroptera: Phyllostomidae), is not endemic to Peru: first record from the Amazon foothills of Colombia. Mammalia 84:439-447.

Navarro, G. 2011. Clasificación de la vegetación de Bolivia. Centro de Ecología Difusión Simón I. Patiño. Santa Cruz, Bolivia.

Poma-Urey, J. L., L. H. Acosta, and M. R. Ingala. 2019. Dos especies de *Eptesicus* Rafinesque, 1820 (Chiroptera, Vespertilionidae) registradas por primera vez en Bolivia. Ecología en Bolivia 54:155-161.

Poma-Urey, J. L., L. H. Acosta, and R. C. Paca. 2020. Presencia de *Micronycteris sanborni* Simmons, 1996 (Chiroptera, Phyllostomidae) en Bolivia. Kempffiana 16:49-59.

Poma-Urey, J. L., *et al.* 2021. Nueva especie de *Peropteryx* (Chiroptera: Emballonuridae) para Bolivia. Notas sobre Mamíferos Sudamericanos 3:e21.2.5.

Poma-Urey, J. L., *et al.* 2023. Taxonomic revision and additional comments of some bats (Mammalia, Chiroptera) reported from Bolivia, with an updated checklist based on voucher material with verified identities. Check List 19:409-427.

Rocha, P. A., G. S. T. Garbino, and C. C. Aires. 2013. Update on the distribution of *Trinycteris nicefori* Sanborn, 1949 (Chiroptera: Phyllostomidae): new record for the Amazonia of Brazil. Check List 9:785-789.

Schulze, M. D., *et al.* 2000. A comparison of the Phyllostomid bat assemblages in undisturbed neotropical forest and in forest fragments of a slash-and-burn farming mosaic in Peten, Guatemala. Biotropica 32:174-184.

Siles, L., and R. Wallace. 2021. First record of the rare bat *Gardnerycteris koepckeae* (Gardner and Patton, 1972) (Chiroptera, Phyllostomidae) in Bolivia. Check List 17:1-6.

Siles, L., *et al.* 2021. First record of *Peropteryx pallidoptera* (Chiroptera: Emballonuridae) in Bolivia. Therya Notes 2:51-55.

Simmons, N. B., and R. S. Voss. 1998. The mammals of Paracou, French Guiana: a Neotropical lowland rainforest fauna. Part 1. Bats. Bulletin of the American Museum of Natural History 237:1-219.

Solari, S. *et al*. 2019. Family Phyllostomidae (New World leaf-nosed bats). Pp. 444-583 *in* Handbook of the mammals of the world, bats, volume 9 (Wilson, D. E., and R. A. Mittermeier, eds.). Lynx Edicions. Barcelona, Spain.

Suárez-Castro, A. F., *et al*. 2012. New records of *Peropteryx leucoptera* and first record of *Peropteryx pallidoptera* (Chiroptera-Emballonuridae) from Colombia. Mastozoología Neotropical 19:165-171.

Terán, M. F. 2010. Nuevos registros de murciélagos (Chiroptera: Phyllostomidae: Phyllostominae) para el Departamento de La Paz, Bolivia. Revista Boliviana de Ecología y Conservación Ambiental 27:85-91.

Velazco, P. M., and B. D. Patterson. 2019. Small mammals of the Mayo River Basin in northern Peru, with the description of a new species of *Sturnira* (Chiroptera: Phyllostomidae). Bulletin of the American Museum of Natural History 429:1-67.

Velazco, P. M., *et al*. 2021. Mammalian Diversity and Matses Ethnomammalogy in Amazonian Peru Part 4: Bats. Bulletin of the American Museum of Natural History 451:1-200.

Williams, S. L., and H. H. Genoways. 2008. Subfamily Phyllostominae Gray, 1825. Pp. 255-300 *in* Mammals of South America: marsupials, xenarthrans, shrews, and bats (Gardner, A. L. ed.). University of Chicago Press. Chicago, U.S.A.

Associated editor: Cristian Kraker Castañeda.

Submitted: April 22, 2023; Reviewed: September 5, 2023.

Accepted: September 14, 2023; Published on line: September 26, 2023.

Appendix 1

Locations of previous records of the bats examined.

Family Emballonuridae

Peropteryx leucoptera

Bolivia. Beni: Versalles (12° 44' S, 66° 10' W, 168 m). Refugio de Vida Silvestre "Espíritu" (14° 13' S, 66° 24' W, 162 m). Pando: Reserva Nacional Amazónica Manuripi-Heath, San Miguel (11° 31' S, 67° 40' W, 171 m); (Poma-Urey *et al.* 2021).

Family Phyllostomidae

Gardnerycteris crenulatum

Bolivia. Beni: mouth of the río Baures (12° 30' S, 64° 18' W, 139 m); (Anderson 1997). Espíritu (14° 8' S, 66° 24' W, 170 m); (Aguirre 2002). La Paz: Bajo Inicua (15° 17' 51" S, 67° 26' 44" W, 330 m); (Siles and Wallace 2021). Parque Nacional y Área de Natural de Manejo Integrado Madidi, sabanas de Antas (12° 55' 9.44" S, 68° 38' 0.70" W, 211 m). Puerto Moscoso (13° 2' 4.81" S, 68° 41' 0.69" W, 227 m). Pampas del Heath (12° 40' 48.24" S, 68° 42' 42.52" W, 184 m). Comunidad Toromonas (12° 20' 20.9" S, 68° 10' 55.8" W, 216 m). Comunidad El Tigre (11° 58' 58.4" S, 68° 0' 51.6" W, 180 m); (Terán 2010). Pando: Centro Dieciocho (10° 36' S, 66° 47' W, 163 m). Arroyo Hermoso (11° 13' S, 67° 42' W, 192 m). 15 km NW of Puerto Camacho (11° 28' S, 67° 50' W, 236 m). San Miguel (11° 40' S, 67° 43' W, 206 m); (Anderson 1997). Santa Cruz, Parque Nacional Noel Kempff Mercado, Los Fierros (14° 34' S, 60° 52' W, 218 m); (Emmons 1998).

Lampronycteris brachyotis

Bolivia. Cochabamba, Santuario de Vida Silvestre Cavernas de Repechón (17° 3' 39.60" S, 65° 28' 26.40" W, 491 m). Santa Cruz, Bosque Experimental Elías Meneses (16° 38' S, 64° 30' W, 191 m); (Acosta *et al.* 2021b).