





Northern distributional extensions of *Peropteryx leucoptera* and *Peropteryx pallidoptera* (Chiroptera: Emballonuridae) from Vichada, Colombia

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Resumen

El murciélago cara de perro de alas blancas (*Peropteryx leucoptera*) y el murciélago cara de perro de alas pálidas (*Peropteryx pallidoptera*) se diferencian de otros murciélagos emballonúridos porque tienen las alas blancas o translúcidas. Su distribución y biología son poco conocidas porque no son capturados usualmente con redes de niebla en inventarios tradicionales. En esta contribución, ampliamos la distribución conocida de *P. leucoptera* 260 km al noreste y la de *P. pallidoptera* 290 km al noroeste. Nuestros registros son de tres especímenes recolectados en un inventario en el corredor ripario del río Meta en el departamento del Vichada. Esta localidad, es el límite norte de la distribución de ambas especies. Es necesario continuar el trabajo de campo e inventarios de mamíferos con recolección de especímenes a lo largo de la región de los Llanos. Llamamos la atención sobre la importancia de los troncos caídos como refugio de *P. leucoptera* y otras especies poco conocidas de murciélagos neotropicales.

Palabras clave: ecosistemas de sabanas, mamíferos, murciélagos de cola envainada, murciélagos de sacos alares, Orinoquía.

Abstract

The White-winged Dog-like Bat (*Peropteryx leucoptera*) and the Pale-winged Dog-like Bat (*Peropteryx pallidoptera*) are distinguished from the other emballonurid bats because they have white or translucent wings. Their distribution and biology are poorly known due to they are not usually captured in traditional bat inventories using mist nets. In this contribution, we extend the known distribution of *P. leucoptera* 260 km NE and *P. pallidoptera* 290 km NE. Our records are from three specimens collected in a mammal assessment at the riparian corridor of the river Meta in the Vichada department. This locality is the northern limit of the distributional range of both species. We highlight the need to continue the fieldwork on mammals inventories with specimen collections through the Colombian Llanos. We call attention to the importance of horizontal rotten logs as roost of *P. leucoptera* and other little known neotropical bats.

Keywords: mammals, Orinoquia, sac-winged bats, savanna ecosystems, sheath-tailed bats.

The Dog-like bats of the genus *Peropteryx* Peters, 1867 are widely distributed in the lowlands of the Neotropics. The genus contains five recognized species (Bonaccorso 2019): *P. macrotis* (Wagner 1843); *P. kappleri* Peters, 1867; *P. trinitatis* Miller, 1899; *P. leucoptera* Peters, 1867 and *P. pallidoptera* Lim, Engstrom, Reid, Simmons, Voss, & Fleck, 2010. These bats are small to medium-sized emballonurids (forearm 38-54 mm) and differ from other species of the family Emballonuridae because they have a small wing sac located in the leading edge of the antebrachial membrane, the skull has an expanded rostrum an undivided basisphenoid pit without a medial septum, and a spicule-like anterior upper premolar (Hood & Gardner 2008).

Among *Peropteryx* species, *P. leucoptera* and *P. pallidoptera* are distinguishable because they have translucent or white wings. These species were previously confused among them, and their distribution and biology are poorly known due to they are no commonly captured in traditional bat inventories using mist nets (Lim et al. 2010; McDonough et al. 2010). The current distribution of *P. leucoptera* comprises French Guiana, Guyana, Suriname, Venezuela, Colombia, Peru, Brazil, and Ecuador, where it inhabits tropical rainforest and riparian forest in savannas (Suarez-Castro et al. 2012; Mikalauskas et al. 2014). In Colombia, *P. leucoptera* has been reported from a riparian forest of savanna ecosystems in the Colombian Llanos and lowland tropical rainforest of La Macarena mountains, in the departments of Meta and Casanare (Suárez-Castro et al. 2012; Mantilla-Meluk et al. 2014). On the other hand, *P. pallidoptera* is known from Ecuador, Peru, Brazil, and Colombia, where inhabits the Amazonian tropical rainforests and riparian forest in savanna ecosystems in the Colombian Llanos (Lim et al. 2010; McDonough et al. 2010; Suárez-Castro et al. 2012; Morales-Martínez 2013). In Colombia, *P. pallidoptera* is known from the east versant of the Andes in the Caquetá department in a transitional forest between the Amazon and Andean regions, and from riparian forests of the Colombian Llanos in the Meta department (Suárez-Castro et al. 2012; Morales-Martínez 2013; Mantilla-Meluk et al. 2014).

During a mammal's rapid assessment in the floodplain forest of the Meta river in the Vichada department, we recorded three bats identified as *P. leucoptera* and *P. pallidoptera*. Here, we report these records that significantly extend the range of distribution of both species.

The mammal's rapid assessment was conducted in June 2017 during the rainy season at La Bendición Farm (6°04'7,3"N, 69°10'30,4"W WGS84 Elevation 90 - 110 m.a.s.l.), located in the north of the Vichada department (Figure 1). This locality is in the Llanos ecoregion, in the Tropical and subtropical grasslands, savannas, and shrublands Biome (Dinerstein et al. 2017), and the flat high plain savannas ecosystem (Romero-Ruiz et al. 2010). The area comprises the riparian corridor of the Meta River. Sampled habitats comprise: 1. Meta river's floodplain forest, 2. gallery forest of streams that empty into the Meta river, and 3. open savannas with spread shrubs. The weather is mega-thermal and wet, the mean temperature varies between 27 and 28 °C. Seasonality of precipitation is monomodal with two seasons, the dry season is between December and March and the wet between April and November, with annual precipitation between 2.000 and 2.500 mm, and the wettest month is June (Minorta-Cely & Rangel-Ch 2014).

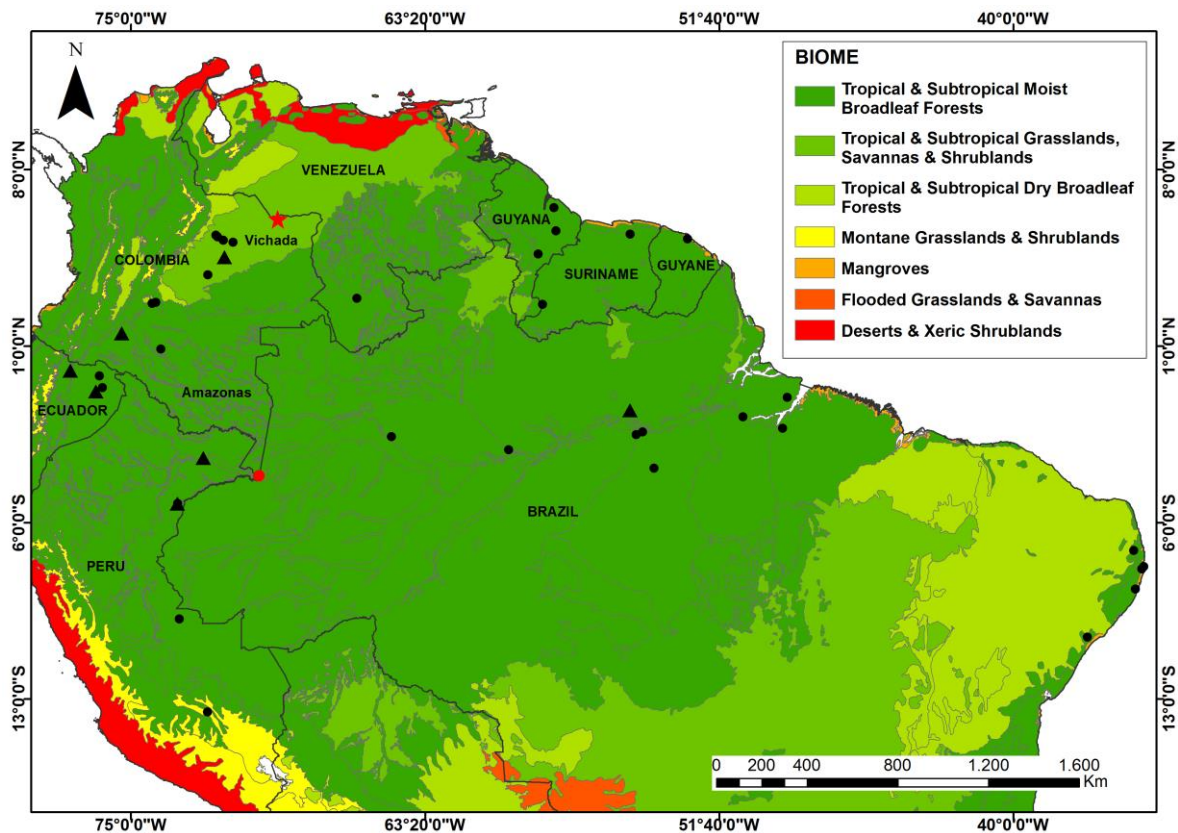


FIGURE 1. Geographic distribution of *Peropteryx leucoptera* (black circles) and *Peropteryx pallidoptera* (black triangles). New records (red star) in the La Bendición farm, in the municipality of La Primavera, department of Vichada, and (red circle) indigenous community Hitoma in the municipality of Leticia, department of Amazonas. For other records, see McDonough et al. (2010), Suárez-Castro et al. (2012), Morales-Martínez (2013), Mikalauskas et al. (2014).

Bats were caught using mist nets at ground level. The nets were opened before sunset and closed after midnight (17h00 – 00h00). We had a sampling effort per night of 288 meters per night per hour (m.n.h) and a total sampling effort of 1.152 m.n.h. All captured bats were handled based on the animal care and guidelines of the American Society of Mammalogists (Sikes et al. 2016). We checked captured bats for identification, sex, and reproductive status. We preserved almost one voucher specimen per species, fixed in 10 % formalin, and preserved in 90 % ethanol to confirm the identification and build a reference collection. Collected bats were euthanized using the thoracic compression procedure (Sikes et al. 2016). We took tissue samples and preserved these in 96 % ethanol. We extracted and cleaned the specimen's skulls using dermestids. The specimens were processed and deposited in the collection of Mammals "Alberto Cadena García" of Instituto de Ciencias Naturales, Universidad Nacional de Colombia (ICN). Specimens were collected under a research license as per Resolution No 500.41-16-0884 dated July 19th, 2016 granted by CORPORINOQUIA.

We based the *P. leucoptera* records on two females (ICN 24290, 24291). ICN 24290 is a juvenile with no completely ossified phalanx and translucent dactylopatagium, and the ICN 24291 was lactating. Our specimens coincide in all characteristics with previous descriptions of *P. leucoptera* (Hood & Gardner 2008; Lim et al. 2010; Suarez-Castro et al.

2012): Wings white beyond of forearm and attached to the inferior extremities at the metatarsals. Ears joined above the forehead with a band of skin. The skull has a basisphenoid pit deep, with two large and deep lateral pterygoid pits (Figure 2a – 2c). Skull measurements are in the known range (Table 1). We captured these specimens in a net installed next to a horizontal rotten log (length= 3 m x high = 1,5 m), near a creek in the floodplain forest. We observed three additional bats, apparently of the same species, at the interior of the same horizontal rotten log but we were unable to catch them.

We based the *P. pallidoptera* record on one female (ICN 24292). Our specimen coincides in all characteristics with previous descriptions of *P. pallidoptera* (Lim et al. 2010): Ears separated. Translucent wings (plagiopatagium, dactylopatagium, and propatagium) attached to the inferior extremities at the ankle. The skull has the lateral pterygoid pits small and separated by a mesopterygoid extension between them (Figure 2d – 2f). The skull measurements are in the known range. (Table 1). This specimen was capture using mist-nets at one side of a stream in the gallery forest.

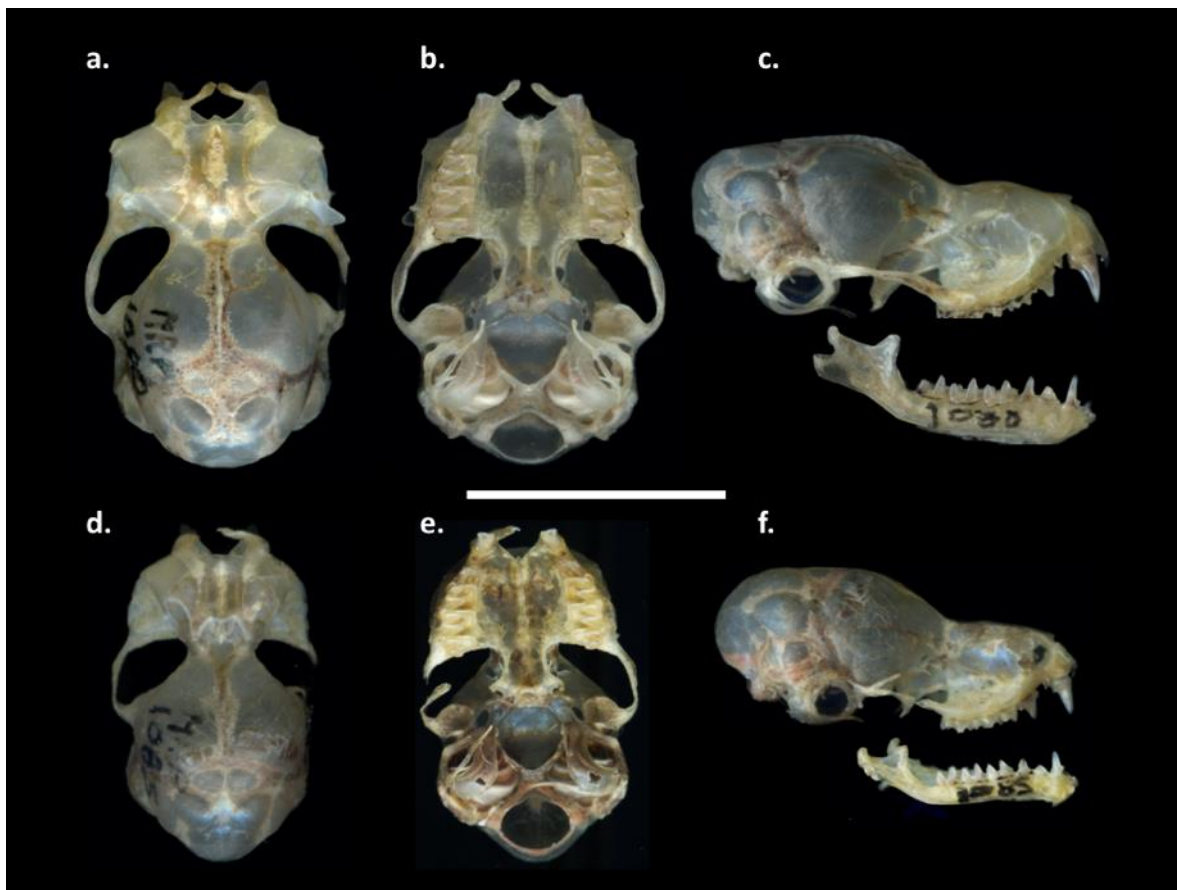


FIGURE 2. Dorsal (a) and ventral (b) views of skull and lateral view of skull and mandible (c) of *Peropteryx leucoptera* (ICN 24291), and dorsal (d) and ventral (e) views of skull and lateral view of skull and mandible (f) of *Peropteryx pallidoptera* (ICN 24292). Scale bar = 10 mm.

Our records extend the known distribution ranges of *P. pallidoptera* 290 km NE (Morales-Martínez 2013) and *P. leucoptera* 260 km NE (Suárez-Castro et al. 2012), comprising the current northern limit of the distributional range of both species (Bonaccorso 2019). Additionally, these records are the first reports of both species for the Vichada department

(Solari et al. 2013; Mosquera-Guerra et al. 2017). Our records suggest that these species could be distributed along riparian forests in the Orinoco Llanos as Mantilla-Meluk et al. (2014) suggested in their potential distribution models of emballonurid species in Colombia.

The bat fauna of the Colombian Llanos has been considered little diverse (Rodríguez-Mahecha et al. 2005; Mantilla-Meluk et al. 2009; 2014), but recent studies on bat assemblages (Estrada-Villegas & Ramírez 2013; Morales-Martínez et al. 2018) and new records of bat species in the region (Calderón-Capote et al. 2016; Rodríguez-Posada et al. 2017), draw attention to a potential higher diversity, underestimated by the low number of studies in the region.

TABLE 1. Skin and skull measurements (in mm) and weight (in grams) of specimens of *Peropteryx leucoptera* and *Peropteryx pallidoptera* reported in this study. *Range of each species reported by Lim et al. (2010), McDonough et al. (2010), Suárez-Castro et al. (2012), and Morales-Martínez (2013). Measurements were taken according to Lim et al. (2010) and McDonough et al. (2010).

Measurements	<i>Peropteryx leucoptera</i>							<i>Peropteryx pallidoptera</i>		
	ICN 24290	ICN 24291	YMS 708	YMS 709	YMS 711	range from literature*		ICN 24292	range from literature*	
	female	female	female	female	male	males	female	female	male	female
Mass	5	8	8	8	7,5	–	–	5	–	–
Total length	60	74	66	68	69	56-69	54-82	58	54-62	52-67
Tail	10	12	11	13	13	5-16	12-17	13	11-15	11-14
Hind Foot	9	8	7	8	8	7-10	7-10	8	7-9	8-10
Ear	19	21	15	18	15	13-20	15-19	16	13-15	14-17
Forearm length	40,9	45,2	45,6	46,9	43,9	39-46	42-46,4	38,9	39-42	37-43
Greatest length of skull	–	15,55	16,44	16,5	15,87	14,9-15,6	16,1	13,41	13,6-14,1	13,6-14,1
Condylolincisive length	–	14,63	14,91	15	14,89	13,8-14,5	14,7	12,45	12-12,5	12,2-12,8
Condyle canine length	–	14	14,33	14,51	14,41	–	–	11,92	–	–
Zygomatic breadth	–	10,2	10,14	10,21	10,58	9,3-9,6	10,1	8,07	8,1-8,2	7,9-8,7
Mastoid breadth	–	8,27	7,98	7,89	8,11	7,6-8,0	8,0	7,04	7,1-7,3	6,9-7,4
Breadth of braincase	–	7,25	7,18	7,15	7,07	6,8-7,3	7,4	6,24	6,3-6,5	6,2-6,7
Post orbital constriction breadth	–	3,64	3,46	3,3	3,23	3,1-3,6	3,4	2,6	2,2-2,9	2,4-2,9
Maxillary toothrow	–	6,48	6,77	6,77	6,66	6,1-6,4	6,6	5,3	5,0-5,4	5,0-5,5
Breadth across upper molars	–	7,51	7,38	7,32	7,88	6,7-7,0	7,5	6	5,8-5,9	5,7-6,4
Breadth across upper canines	–	4,24	4,26	4,28	4,27	–	–	3,22	–	–

The knowledge about mammals in the Orinoco Llanos is low due to the sampling is small and disperse geographically and temporally with spread inventories in specific localities (Ferrer-Pérez et al. 2009; Trujillo et al. 2010). Even though the Llanos region has continuous oil exploitation, there are plenty of environmental impact studies with information about mammals, unfortunately, this information is hard to access, and their quality is uncertain (Trujillo et al. 2010; Gómez-Sandoval et al. 2017). Then, we highlight the urgent need to increase the study and to inventory biodiversity along this extensive natural region, which comprises 30,4 % of the Colombian territory.

Additionally, we report three *P. leucoptera* specimens captured in a primary rainforest within a fallen trunk (collected by Yaneth Muñoz-Saba, field numbers YMS 708, 709, 711,

deposited at ICN but uncatalogued) from the indigenous community Hitoma (Figure 1), in the municipality of Leticia, department of Amazonas (4°08'S, 69°55'W WGS84 Elevation 82 m.a.s.l.). These records fill a gap in the previously known distribution of *P. leucoptera* in the Amazon region (Mikalauskas et al. 2014). Our records and other *P. leucoptera* reports suggest that this species is strongly associated to use dark horizontal chambers of horizontal rotten logs (Simmons & Voss 1988; Mikalauskas et al. 2014). It calls attention to the importance of fallen tree trunks as the main roost resource for *P. leucoptera* and other neotropical bats, mainly emballonurids. This represents an opportunity to focus research on the ecology and natural history of little-known bat species.

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