

# First records for *Lasiurus blossevillii*, *Histiotus humboldti* and *Enchisthenes hartii* (Mammalia: Chiroptera) in an urban region in Southern Ecuador

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**Abstract.** Currently in Ecuador there are 171 bats species, however little is known of their presence in urban and peri-urban areas. These information gaps make it difficult to know the distribution of the species, as well as the ecosystems they are occupying. In this work we report for the first time three bats species in the urban and peri-urban area of Cuenca City which is located in the south of the Inter-Andean Valley. The individuals were identified taxonomically by morphological and morphometric characters, these were deposited in the Zoological Collection of the University of Azuay. The specimens reported in this work are: an adult male of *Lasiurus blossevillii*, a juvenile female of *Histiotus humboldti*, and an adult male of *Enchisthenes hartii*. These new records allow us to contribute with information on the distribution of these species, as well as raise new questions about the use of present resources by these bats in the urban and peri-urban environments of the city.

**Keywords:** Cuenca; Inter-Andean Valley; Peri-urban area; Stenodermatinae; Zoogeographic region.

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The Chiroptera order is abundantly and widely distributed in the Neotropics, being the second most diverse group after rodents. (Simmons, 2005; Meyer et al., 2008). In Ecuador there are 171 bats species (Tirira, 2017; Moras et al., 2018), where several of these have a well-known distribution, as is the case of the *Carollia* and *Sturnira* genus that are present in Tropical, Subtropical and Temperate forests throughout the country (Tirira, 2017). So also, species like: *Artibeus fraterculus* Anthony, 1924 (Fraternal fruit-eating bat), *Artibeus lituratus* Olfers, 1818 (Great fruit-eating bat), *Desmodus rotundus* Geoffroy, 1810 (Vampire bat) y *Phyllostomus hastatus* Pallas, 1767 (Greater spear-nosed bat) have a well-documented distribution (Tirira, 2017). However, in Ecuador there is few information about the distribution in natural and urban areas of species such as: *Nyctinomops macrotis* Gray, 1839 (Big free-tailed bat), *Lasiurus blossevillii* Lesson, 1826 (Southern red bat), *Histiotus humboldti* Handely, 1996 (Humboldt's leaf-eared bat) and *Enchisthenes hartii* Thomas, 1892 (Velvety fruit-eating bat) (Sánchez-Karste et al., 2017; Boada and Romero, 2018; Romero and Vallejo, 2018). Thus, this lack of information on ecology and records of bats in urban and peri-urban areas makes difficult to establish accurately the ecosystems that occupy and the distribution for bat species in these areas.

In the present work we report for the first time three bats species in the urban and peri-urban areas of the Cuenca city, Azuay province, southern Ecuador (Figure 1). The city is located in the inter-Andean valley, on the Temperate zoogeographic region (Albuja et al., 2012). Cuenca is a city crossed by 4 rivers and on its shores, there are native species such as: *Prunus serotina*, *Myrcianthes rhopaloides*, *Myrrhimum atropurpureum*, *Solanum oblongifolium* and *Rubus floribundus* that have fleshy

fruits and represent an important food source for wildlife (Minga and Verdugo, 2016).

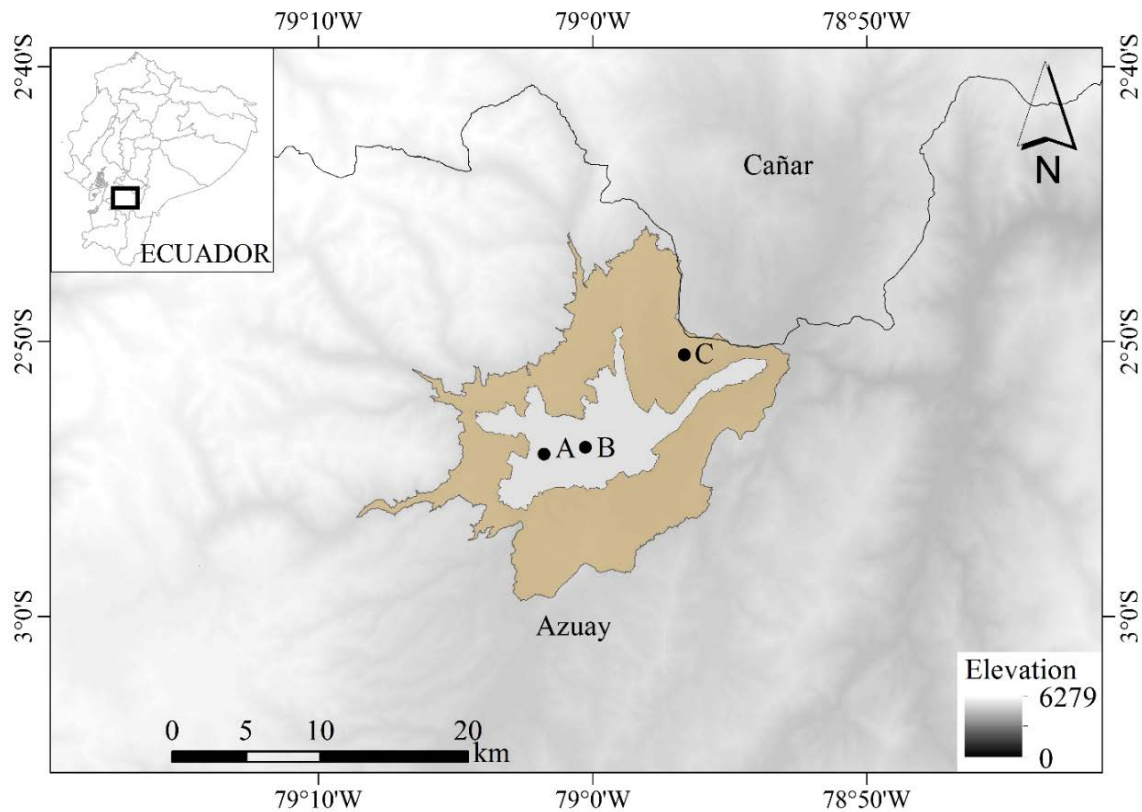
The specimens collected were identified taxonomically according to Handley (1996), Arroyo-Cabrales and Owen (1997), Gardner (2007) and Tirira (2017). Morphological and morphometric characters were used for the identification (Table 1), measurements were taken with a Vernier caliper ( $\pm 0.1$  mm) and the age was determinate considering the epiphyseal gap of the finger joints. The specimens were deposited in the Mammals collection of the Zoology Museum of Universidad del Azuay (MZUA).

The specimens reported in this work are: an adult male individual of *Lasiurus blossevillii* collected on March 15, 2016 (MZUA.MA140) on the roof of a house near a park in the urban area (Figure 1), western of city ( $2^{\circ} 54.09' S$ ,  $79^{\circ} 1.76' W$ ; 2,580 m). The specimen has soft and dense fur with bright red coloring on the back, the ventral fur is lighter with gray tones. The caudal membrane is long and with abundant hair on the dorsal side (Figure 2). This species in Ecuador has been reported in tropical, dry and temperate forests between 10 and 2900 meters at sea level. (Tirira, 2017), is very distinctive and hardly can be confused with other bats in the Ecuadorian territory.

A juvenile female specimen of *Histiotus humboldti* (MZUA.MA302) captured on September 26, 2016, on the roof of a house located in the sector of Llaqueo in a peri-urban area 9 km northeast from city ( $2^{\circ} 50.48' S$ ,  $78^{\circ} 56.65' W$ , 2,650 m), bordering the Cañar Province (Figure 1). This specimen is yellowish brown on the back and the ventral region is light gray. The ears are large and separated at the base (Figure 2), and a long calcaneus (Table 1). These characteristics distinguish it from *Histiotus montanus* that has the ventral fur with yellowish tones, shorter calcaneus and the ears joined at the base.

In Ecuador *H. humboldti* has been reported in humid, primary and secondary forests little disturbed

between 1,650 and 2,650 m at sea level (Tirira, 2017).



**Figure 1.** Localities of record for bats in urban (solid gray) and peri-urban (light brown) areas of Cuenca, southern Ecuador A) *Lasiurus blossevillii*, B) *Enchisthenes hartii*, C) *Histiotus humboldti*.

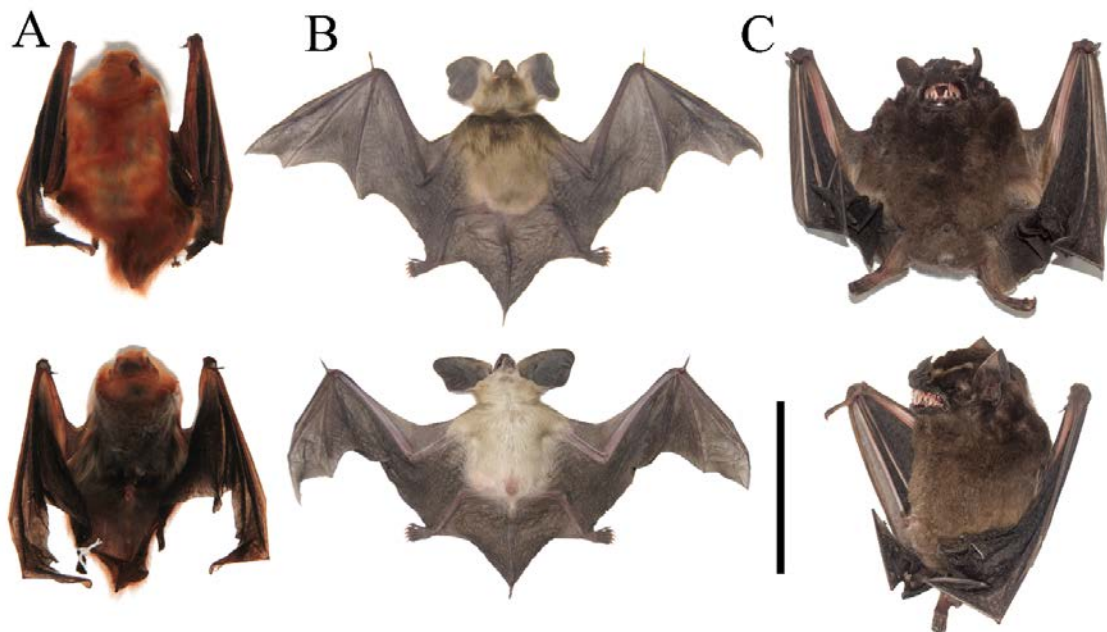
A male adult specimen of *Enchisthenes hartii* (MZUA-MA366) found on March 20, 2018 at Calderón Park (Figure 1), located in the historic center of the city ( $2^{\circ} 53.84' S$ ,  $79^{\circ} 0.25' W$ , 2,551 m). This specimen was identified by velvet fur, throat and chin with chocolate color hairs that becomes more intense toward the head and shoulders. The face has four well defined whitish lines. The caudal membrane is

narrow and lack of fur (Table 1, Figure 2). This monotypic species has a characteristic coloration patterns that easily distinguish it from other similar species of the Subfamily Stenodermatinae. In Ecuador is distributed from the foothills of the Andes to high Andean areas between 100 and 3,160 m, generally below 1,700 m at sea level (Tirira, 2017).

**Table 1.** Morphometric measurements of the specimens reported in this study.

Character	In this study			Literature		
	<i>Enchisthenes hartii</i> MZUA. MA366	<i>Lasiurus blossevillii</i> MZUA. MA140	<i>Histiotus humboldti</i> MZUA. MA302	<i>Enchisthenes hartii</i>	<i>Lasiurus blossevillii</i>	<i>Histiotus humboldti</i>
Sex	M	M	F	-	-	-
Age	Adult	Adult	Juvenile	-	-	-
HBL	51	48.6	51.1	51-64	38-65	50-56
TL	0	50.8	32.8	0	37-54	47-56
HFL	9.8	7.27	10.35	8-14	7-10	8-10
FL	41.1	41.2	40.15	34-43	37-46	44-49
EL	13.2	7.8	21.5	14-18	8-13	28-32
CL	6.1	13.5	17	-	-	22.8-26.3
CM	5	48	28.35	4-6	-	-
Tib	13	20.2	15.5	-	-	-
ICL	21.5	12.25	14.9	-	11-13.02	-
ZW	12.3	8.8	8.8	12.4	8.34-9	-
MW	10.6	7.55	8.7	10.7	-	-
BC	10.1	7.25	8.3	9.6	5.96-10.2	-
IW	5.8	4.3	4.7	6	3.83-4.7	-
Pal	8.2	5.8	6.4	-	-	-
C-M <sup>3</sup>	7	4.1	-	6.9	-	-
C-M <sub>3</sub>	7.1	4.9	-	7.2	-	-
ML	13.05	8.55	10.45	-	-	-
RL	7.4	5.4	6.4	-	-	-

Literature data was taken from: Arroyo-Cabrerales and Owen (1997), Morales-Martínez and Ramírez-Chaves (2015) and Tirira (2017). Definition of the characters: Head and body length (HBL), tail length (TL), hind foot length (HFL), forearm length (FL), ear length (EL), calcar length (CL), caudal membrane length (CM), tibia length (Tib), incisive condyle length (ICL), zygomatic width (ZW), mastoidal width (MW), width of the brain case (BC), interorbital width (IW), palatal length (Pal), upper tooth row (C-M<sup>3</sup>), lower tooth row (C-M<sub>3</sub>), mandibular length (ML), rostral length (RL).



**Figure 2.** Specimens recorded in the urban and peri-urban area in Cuenca. A) *Lasiurus blossevillii* (MAZUA-MA140); B) *Histiotus humboldti* (MAZUA-MA302); and C) *Enchisthenes hartii* (MZUA-MA366). Scale bar = 5 cm.

These new records allow to fill gaps in information about distribution of bat species in Ecuador, they too contribute to the knowledge in bat diversity of the fauna in Cuenca and show that the set of characteristics of an urban and peri-urban area such as: infrastructure, green areas and riparian vegetation gives opportunities for development of bats communities; in this way Cuenca has important refuges for wildlife, especially on the banks of its rivers (Fernández de Córdova-Torres and Niveló, 2016; Minga and Verdugo, 2016; Sánchez-Karste et al., 2017).

The presence of *Lasiurus blossevillii* in urban environments has been previously reported (Trujillo and Albuja, 2005; Rodrigues and Ribas, 2011; Ballesteros and Racero-Casarrubia, 2012). However, this species has not been recorded in urban areas of the temperate zoogeographic region in southern Ecuador. This record is to 91 km from the nearest record in "Manglares Churete" Reserve, Guayas Province. So also, the record of *Histiotus humboldti* in Cuenca, where *Histiotus montanus* is distributed (Fernández de Córdova-Torres and Niveló, 2016), shows that at least locally, these species share habitats, differing with Handley (1996) which mentions that altitudinally *H. humboldti* is distributed below *H. montanus*. This record increases the range distribution almost 100 km to south Ecuador, the nearest record is in Sangay National Park, Morona Santiago Province. Finally, the record of *Enchisthenes hartii* reveals for first time the presence for a species of the Subfamily Stenodermatinae in the urban area of Cuenca City to 50 km from the nearest record in Cerro Bosco, Morona Santiago Province, which could suggest that flora native species as of the urban serve as a resource for this and other frugivorous bats species.

Knowledge about the presence of these species in the city is a starting point to generate future researches, as it

is likely that there are more bat species inhabiting the urban and peri-urban environments of the city, where they can be taking advantage of the resources present in these areas.

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## Conflicts of interest

Authors declare that they have no conflict of interests.

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