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First record of the Lesser Long-nosed Bat, *Leptonycteris yerbabuenae* Martinez & Villa-R., 1940 (Chiroptera, Phyllostomidae), in Nicaragua

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Abstract
We report the first record of the Lesser long-nosed Bat, *Leptonycteris yerbabuenae* Martinez & Villa-R., 1940 in Nicaragua based on a specimen from San Nicolas, Estelí Department, north-central Nicaragua. The new record extends the known range of this large, migratory, nectar-feeding species 100 km southeast from the closest previous record in western Honduras.

Keywords
Estelí, Glossophaginae, mammals, range extension, Tisey-Estanzuela.

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Introduction

The Lesser Long-nosed Bat, *Leptonycteris yerbabuenae* Martinez & Villa-R., 1940, is one of the largest nectar-feeding bat species in the Americas (Medellín et al. 2018; Solari et al. 2019). For many decades, *L. yerbabuenae* was confused with *L. nivalis* and *L. curasoae*; now they are recognized as three separate species, with *L. sanborni* considered a junior synonym of *L. yerbabuenae* (Simmons 2005; Solari et al. 2019). *Leptonycteris yerbabuenae* is characterized by its relatively large size, overall yellow-brown coloration of upper parts, white basal 2 mm of dorsal hairs, relatively long snout, small nose-leaf, absence of tail, and reduced, U-shaped, and lightly haired uropatagium (Reid 2009; Solari et al. 2019).

The known range of *L. yerbabuenae* spans from southern Arizona, New Mexico, and Texas, in the United States, to El Salvador and Honduras at elevations below 1800 m (Jones and Bleier 1974; Arita and Humphrey 1988; Arita 1991; Lee and Bradley 1992; Powell et al. 1993; Cole and Wilson 2006; Owen and Girón 2012). The species inhabits a variety of habitats, including desert and dry forest. Its distribution in Mexico is associated with columnar cacti and agaves (Arita 1991; Buker et al. 2019). However, its diet also consists of nectar from other species in the families Agavaceae, Cactaceae, Convolvulaceae, Malvaceae, and Fabaceae (Hayward and Cockrum 1971; Fleming et al. 1993; Cole and Wilson 2006).

Specimens of *L. yerbabuenae* have been collected near the border with Nicaragua in southwestern Honduras and El Salvador (Lee and Bradley 1992; Garner 2016; Prestridge 2019). There is, however, no voucher specimens of this species from Nicaragua. Medina-Fitoria (2014) and York et al. (2019) considered presence of this species as probable in Nicaragua, based on

the proximity of its confirmed range and the vegetative formations that occur in the dry northern mid-elevation areas of Nicaragua.

Here we report a new locality for the Lesser Long-nosed Bat from the north-central highlands of Nicaragua, outside its current known geographical distribution. This represents a new species for the country according to the last published Nicaraguan checklist (Medina-Fitoria and Saldaña 2012), which does not include several other mammal species that have been recently recorded in the country (Medina-Fitoria et al. 2015; Loza et al. 2018; Martínez-Fonseca et al. 2018).

Methods

The bat was captured, photographed, and collected during a survey of a forested area in the village of El Barro, San Nicolas, Estelí Department, Nicaragua. The specimen was euthanized by thoracic compression and intracardiac injection of chlorobuthanol following recommendations of the guidelines of the American Society of Mammalogists (Sikes et al. 2016), fixed in a solution of 4% formaldehyde, and preserved in 70% ethanol. The specimen's identification was verified with the descriptions and morphometric measurements provided by Reid (2009), Morgan et al (2019), and Solari et al. (2019). The specimen was collected under the permit DGPNB-IC-025-2018 provided by the personnel at MARENA (Ministerio de Recursos Naturales), Managua, Nicaragua, and was deposited at Angelo State Natural History Collection under the number ASNHC-19951. Institutional acronyms for museum collections follow those of Sabaj-Perez (2016).

Localities of other records of *L. yerbabuenae* in Central America were obtained from relevant scientific literature as well from the Global Biodiversity Information Facility webpage (http://www.gbif.org).

Results

New record. NICARAGUA • 1 specimen, adult female; Estelí Department: 4.8 km east of San Nicolas Municipality, village of El Barro, Cerro El Barro; 12.9244°N, 086.3123°W, WGS 84; 1291 m a.s.l.; 28 Mar. 2019; Milton Ñamendy collector; ASNHC 19951 (Fig. 1).

The bat was captured early in the night (20:00 h), in a mist net set in the forest with no water bodies or creeks in the surrounding area. The night of the capture there was no cloud-cover and almost no wind, typical weather for the end of the dry season, which occurs around mid-May. The vegetation at the site was composed mostly of *Pinus oocarpa* (Pinaceae) and, to a lesser degree, other species including *Quercus* sp. (Fagaceae) and *Acacia pennatula* (Fabaceae). The site is not part of a natural reserve: the closest one is approximately 20 km north (Reserva Natural Cerro Tisey-Estanzuela).

Identification. ASNHC 19951 has the following characteristics: adult female; uropatagium reduced and almost naked, long and narrow snout (18.5 mm from the eyes to the tip of the snout); fur on the back reddish brown with paler brown venter; forearm 54 mm; ear 16 mm; third phalanx on the third digit 14 mm; median gap between upper incisor present; weight 23 g. Through its range, *L. nivalis* is the only species that would overlap in forearm size with *L. yerbabuenae,* but the former can be easily distinguished by the length of the third phalanx on the third digit to be greater than 15 mm, fringed uropatagium, and frequently larger forearm length (Bogan et al. 2017; Morgan et al. 2019). Additionally, there are no records of *L. nivalis* sensu stricto south of Mexico (Medellín 2016; Solari et al. 2019). Measurements from ASNHC 19951 fit the ranges provided for this species by Medellín et al. (2008), Reid (2009), Morgan et al (2019), and Solari et al. (2019) and sets it apart from other large nectar-feeding bat species present in the Central American region (e.g., *Choeronycteris mexicana* and *Leptonycteris nivalis*). Other species of bats captured in the same area during the survey include: *Artibeus jamaicensis*, *A. lituratus*, *Sturnira parvidens*, and *Desmodus rotundus.* Additionally, two more species (*Pteronotus davyi* and *Pteronotus personatus*) were detected in the area with the use of an acoustic bat detector (Wildlife Acoustics EM3).

Discussion

Records of *Leptonycteris yerbabuenae* in Central America have been deficient and uncertain. Hall and Kelson (1959) regarded *L. nivalis yerbabuenae* as indistinct from *L. nivalis nivalis* and presented a range map that extended into Central America based on references from Guatemala and Nicaragua (Allen 1910; Goodwin 1942). Goodwin (1942) mentioned a single specimen from "Dueñas, Guatemala," but did not provide a voucher number. Dobson (1878) mention two specimens from "Dueñas, Guatemala" and "Cuidad Vieja" (NHMUK 65.5.18.70; 75.12.27.38) collected by O. Salvin who directed some collecting in Central America at the end of the 19th century (Medina-Fitoria and Martinez-Fonseca 2019). Allen (1910) considered *L. nivalis* to be present in Nicaragua "on the basis of its general range" without referencing any specimen.

The new record represents the first definite occurrence of this species in Nicaragua and is the southernmost record of the species. This record extends the known range of the species 100 km southeast from the closest record near the Gulf of Fonseca in Honduras (Medellín 2016; Garner 2016; Prestige 2019; Natural History Museum (2020); Fig. 2; Appendix Table A1).

Leptonycteris yerbabuenae is known to move long distances every night to forage from their communal roosts which are commonly in caves (Medellín et al. 2018). We assume that the individual here may find suitable roosting sites in the rocky outcrops common in the area, but we also know that this species is capable of long single-night flights and seasonal migrations after the blooming of the agaves, columnar cacti, and other food

Figure 1. An adult female *Leptonycteris yerbabuenae* (ASNHC 19951, live specimen) from San Nicolas, Estelí Department, Nicaragua. Photo: MÑ.

sources (Rojas-Martinez et al. 1999; Tellez et al. 2000; Peñalba et al. 2006; Medellín et al. 2018).

Although ASNHC 19951 was found outside a protected area, there is similar vegetation in reserves in proximity to the site in the north-central highlands of the country. Based on vegetation and elevation similarities, we suggest that the species likely occurs in Reserva Natural Cerro Tisey-Estanzuela, Miraflor-Moropotente, Reserva Natural Tepesomoto-La Pataste, and Monumento Nacional Cañon de Somoto, all of which are located between our new locality and other records of the species in Honduras and El Salvador. The species is listed as Near Threatened by IUCN due to habitat destruction and human disturbance of their roosting sites (Medellín 2016). It is listed as Endangered in the United States despite a proposal to remove it from listing in 2017 (USFWS 2017). The inclusion of this species in the Nicaraguan mammal fauna might allow its inclusion on the Nicaraguan Red List of mammals and help protect additional habitat where the species likely occurs.

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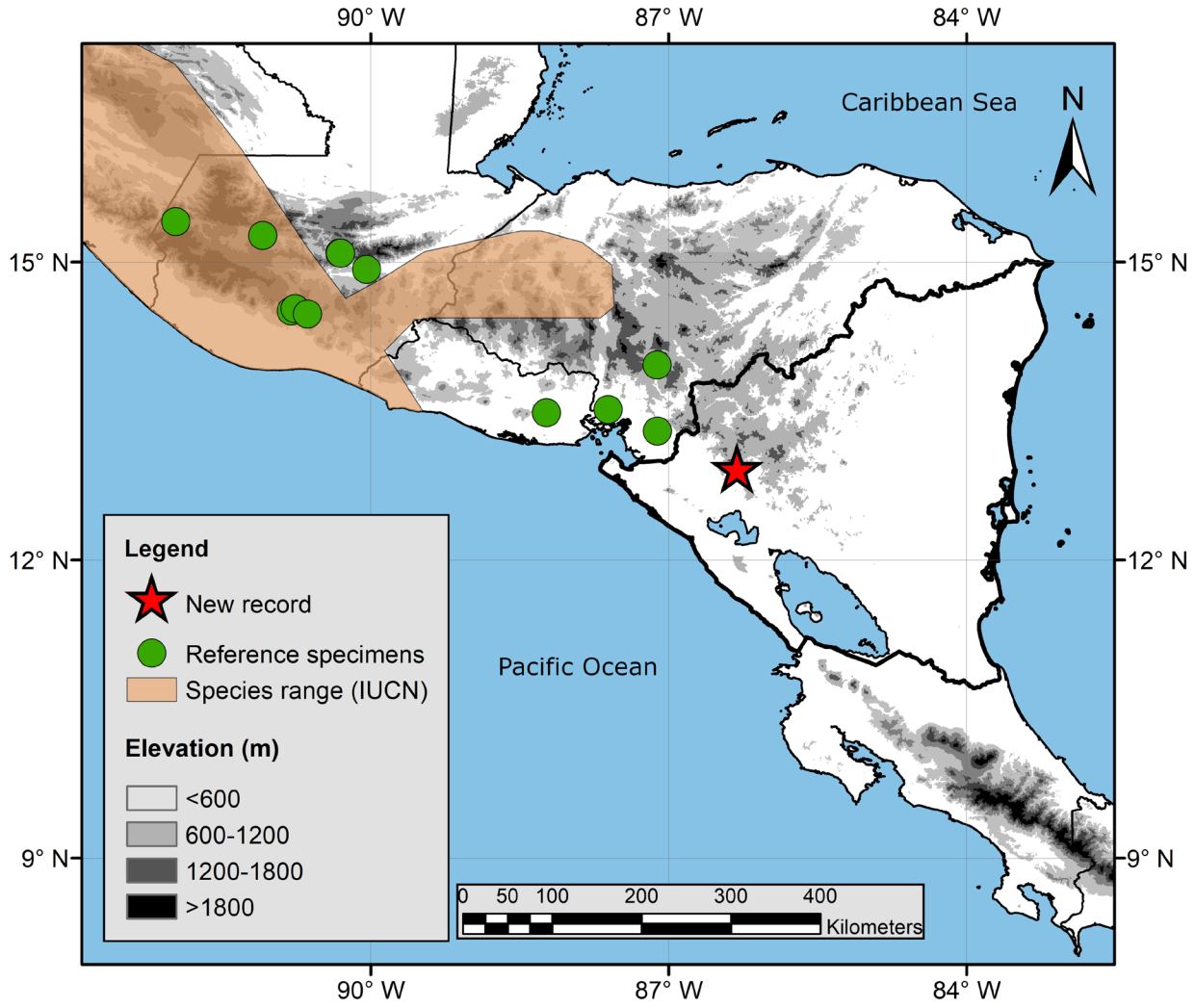

Figure 2. Distribution map of *Leptonycteris yerbabuenae* in Central America, with Nicaragua highlighted in bold. Individual records for Mexico are not shown.

Author's Contributions

MÑ conducted the survey and took photographs. OS and JGMF wrote the manuscript. JGMF made the map. All authors read and approved the final manuscript.

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Appendix

Table A1. Locality records of *Leptonycteris yerbabuenae* in Central America. Specimens listed as *L. curasoae* from Central America where also included since these records correspond with *L. yerbabuenae*. Records are ordered alphabetically by locality for each country, with countries listed from north to south. Elevation was obtained from coordinates. Specific localities for Mexico are not included because the species is well documented in that range.

Country	Locality	Reference	Voucher	Latitude	Longitude	Elev. (m)
Guatemala	Guatemala, Baja Verapaz, 1 km SE Salama	Arita and Humphrey (1988); Prestridge (2019); https://www.gbif.org/occurrence/675798945; https://www.gbif.org/occurrence/675798949; https://www.gbif.org/occurrence/675798952; https://www.gbif.org/occurrence/675798955	TCWC 17260; 17261; 17262; 17263	15.0926	−090.3093	950
	Quiche, 1 km WNW Sacapulas	Arita and Humphrey (1988); Prestridge (2019); https://www.gbif.org/occurrence/675798942	TCWC 17259	15.2673	−091.0865	1200
	Amatitlan	Arita and Humphrey (1988); Prestridge (2019); https://www.gbif.org/occurrence/675805948; https://www.gbif.org/occurrence/675805951	TCWC 18330; 18331	14.4756	−090.6356	1150
	Huehuetenango, Sosí Chiquito, La Isla	Cajas-Castillo (2005); Cajas-Castillo et al. (2015); Pérez Consuegra (2016); https://www.gbif.org/occurrence/859263509; https://www.gbif.org/occurrence/859263164; https://www.gbif.org/occurrence/859263167; https://www.gbif.org/occurrence/859263418	USAC 637, 565, 566, 573	15.4053	−091.9625	1129
	El Progreso, San Agustin de Acasaguastlan	Cajas-Castillo (2005); Cajas-Castillo et al. (2015); Pérez Consuegra (2016); https://www.gbif.org/occurrence/859263175	USAC 568	14.9256	−090.0403	350
	Baja Verapaz, Salamá	Cajas-Castillo (2005); Cajas-Castillo et al. (2015); Pérez-Consuegra (2016) https://www.gbif.org/occurrence/859263521	USAC 647	15.0881	−090.3017	1072
	[Dueñas] Duenas*	Dobson (1878); Goodwin (1942); Hoffmeister (1957); Natural History Museum (2020); https://www.gbif.org/occurrence/1919796474	NHMUK 65.5.18.70	14.5062	−090.7975	1500
	[Ciudad Vieja] Cuidad Viega, Dueñas*	Dobson (1878); Hoffmeister (1957); Natural History Museum (2020); https://www.gbif.org/occurrence/1919796557	NHMUK 75.12.27.38	14.5300	−090.7606	1500
Honduras	Yusguasre, Choluteca*	Natural History Museum (2020); https://www.gbif.org/occurrence/1919791635	NHMUK 1999.194	13.2967	−087.1146	110
	Valle, Nacaome	Lee and Bradley (1992); Garner (2016); Prestridge (2019); https://www.gbif.org/occurrence/911692088; https://www.gbif.org/occurrence/911692134; https://www.gbif.org/occurrence/675909062; https://www.gbif.org/occurrence/675909066; https://www.gbif.org/occurrence/675909069;	TTU 61087; 61088; TCWC 49747; 49748; 49749	13.5144	−087.6082	30
El Salvador	San Miguel, San Miguel	Arita and Humphrey (1988); Garner H (2016); https://www.gbif.org/occurrence/911648175	TTU 16865	13.4833	−088.2294	120
Nicaragua	El Barro, San Nicolas, Estelí	Current contribution	ASNHC 19951	12.9244	−086.3123	1291

*Coordinates and elevation were assigned from the locality description.