

# Distribution extension of a rare species, *Eumops auripendulus* in the province of Santa Fe, Argentina

## Extensión de la distribución de una especie rara, *Eumops auripendulus* en la provincia de Santa Fe, Argentina

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The presence of *Eumops auripendulus* (Chiroptera, Molossidae) in the province of Santa Fe, Argentina, is recorded. Until now, this species in Santa Fe was known from a single record from Esperanza in 1978. A new specimen was obtained in the town of Florencia, located about 400 km NE of Esperanza, near the border with the province of Chaco. This new record corresponds to an animal that was found dead and sent to the Laboratorio Central de la Dirección General de Bioquímica y Farmacia of Santa Fe in 2019 as part of the rabies virus surveillance protocol. The species was identified based on its morphometric variables and its general aspect. On the other hand, its geographical location was plotted on a map together with the rest of the records of this species in the country; the ecoregional context was also considered. This new record confirms the current presence of the species in the province and helps to clarify its geographic distribution range as well as its ecological preferences, considering that both localities are situated in different ecoregions: Espinal (Esperanza) and Humid Chaco (Florencia). It is important to mention that *E. auripendulus* has been poorly studied in Argentina, being known only from 10 records in 3 provinces: Chaco, Misiones, and Santa Fe.

**Key words:** Argentina; New record; Santa Fe; Shaw's Mastiff Bat.

Se registra la presencia de *Eumops auripendulus* (Chiroptera, Molossidae) en la provincia de Santa Fe, Argentina. Hasta ahora, esta especie era conocida en la provincia de Santa Fe a partir de un solo registro en la localidad de Esperanza en 1978. Se obtuvo un nuevo ejemplar en la localidad de Florencia, ubicada a unos 400 km al NE de Esperanza, cerca del límite con la provincia del Chaco. Este nuevo registro corresponde a un animal encontrado muerto y enviado al Laboratorio Central de la Dirección General de Bioquímica y Farmacia de Santa Fe en 2019 como parte del protocolo de vigilancia del virus de la rabia. La especie fue identificada con base en sus variables morfométricas y por su aspecto general. Por otro lado, la ubicación geográfica del registro fue trazada en un mapa junto al resto de los registros de la especie en el país; también se consideró el contexto ecorregional. Este nuevo registro confirma la presencia actual de la especie en la provincia y ayuda a esclarecer su rango de distribución geográfica así como sus preferencias ecológicas, considerando que ambas localidades se encuentran en diferentes ecoregiones: Espinal (Esperanza) y Chaco Húmedo (Florencia). Es importante mencionar que *E. auripendulus* ha sido poco estudiada en Argentina, siendo conocida a partir de 10 registros en 3 provincias: Chaco, Misiones y Santa Fe.

**Palabras claves:** Argentina; nuevo registro; Santa Fe; moloso oscuro.

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Santa Fe province occupies the central region of Argentina. It covers an area of 132,638 km<sup>2</sup> and includes 5 ecoregions: Humid and Dry Chaco, Espinal, Pampas, and Delta and Islands of Paraná (Burkart *et al.* 1999; Biasatti *et al.* 2015). Out of the 69 species of bats recorded in Argentina (Barquez and Díaz 2020; Montani *et al.* 2021; Novaes *et al.* 2022), 28 (40 %) are found in the province of Santa Fe (Barquez and Díaz 2020; Montani *et al.* 2021; Pavé *et al.* 2021; Pavé and Gavazza 2022).

Among the molossid bats, the genus *Eumops* Miller, 1906, is the most diverse in the New World, exhibiting many shapes and sizes (Eger 1977) in its 17 recognized species (Gregorin *et*

*al.* 2016). Sixteen of these are found in the Neotropics (Eger 2007; Díaz *et al.* 2021), all of them are fast-flying insectivorous species that forage above the forest canopy (Sodré *et al.* 2008), and occupies a wide range of environments, from natural to urban (Eger 1977; Best *et al.* 2002).

Within the genus *Eumops*, species can be divided into small, medium, and large, according to their body size (Gregorin *et al.* 2016). In Argentina, this genus is represented by 6 species; small: *E. bonariensis* (Peters, 1874) and *E. patagonicus* Thomas, 1924; medium: *E. auripendulus* (Shaw, 1800) and *E. glaucinus* (Wagner, 1843); large: *E. dabenei* Thomas, 1914 and *E. perotis* (Schinz, 1821).

*Eumops auripendulus* is distributed in Argentina, Brasil, Bolivia, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Perú, Surinam, and Venezuela (Díaz *et al.* 2021). Two subspecies are currently recognized, *E. a. auripendulus* distributed from central Bolivia northward to Central America, and *E. a. major*, in eastern Brazil, southern Paraguay, and northeastern Argentina (Eger 1977, 2007; Barquez *et al.* 1999, Best *et al.* 2002; Barquez and Díaz 2020).

In Argentina, *Eumops auripendulus* is poorly known due to the scarcity of available data, with only 10 historical records from 3 provinces: Chaco, Misiones, and Santa Fe, comprising 3 ecoregions, respectively: Delta and Islands of Paraná, Paranaense Forests, and Espinal (Burkart *et al.* 1999; Morello *et al.* 2018). In Chaco it was collected in the town of Resistencia in 1937 ( $n = 1$ ; pers. comm. I. Olivares); in Misiones ( $n = 8$ ), 2 specimens in Campo Viera locality in 1968, 1 specimen from an unknown locality in 1968, 1 specimen in Bompland locality in 1969, 3 specimens in Colonia Mártires locality in 1969, and 1 specimen in El Dorado locality (prior to 1974; pers. comm. S. Bogan and B. K. Lim); and 1 specimen in the town of Esperanza in Santa Fe ( $n = 1$ ; pers. comm. P. Teta; Figure 1).

Besides its medium body size within the genus, there are other morphological features that characterize this species. Ranging between 61 to 69 mm (Barquez *et al.* 1999), the

length of the forearm of *E. auripendulus* is similar to that of the other medium-sized species present in Argentina, such as *E. glaucinus* (between 61–68 mm), but the darker pelage and membranes of the former, easily differentiates it from the latter. The dorsal pelage is blackish brown or blackish cinnamon, with hairs lighter at their bases (Barquez *et al.* 1999; Best *et al.* 2002).

The previous locality cited of *E. auripendulus* in Santa Fe province (Esperanza) corresponds to the Espinal ecoregion, characterized by a flat to slightly undulating lowland landscape, composed of low and non-stratified xerophytic forests, savannas, and grasslands, which have now been largely replaced by croplands. This zone of the ecoregion has a humid temperate plain climate, characterized by abrupt weather changes, and cold air saturated with moisture (Burkart *et al.* 1999; Matteucci 2018).

The specimen was collected on May 14, 1978, by the Instituto de Virología de Córdoba and deposited in the Mammals collection of the Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” (MACN-Ma 16547; Teta and Rodríguez 2021).

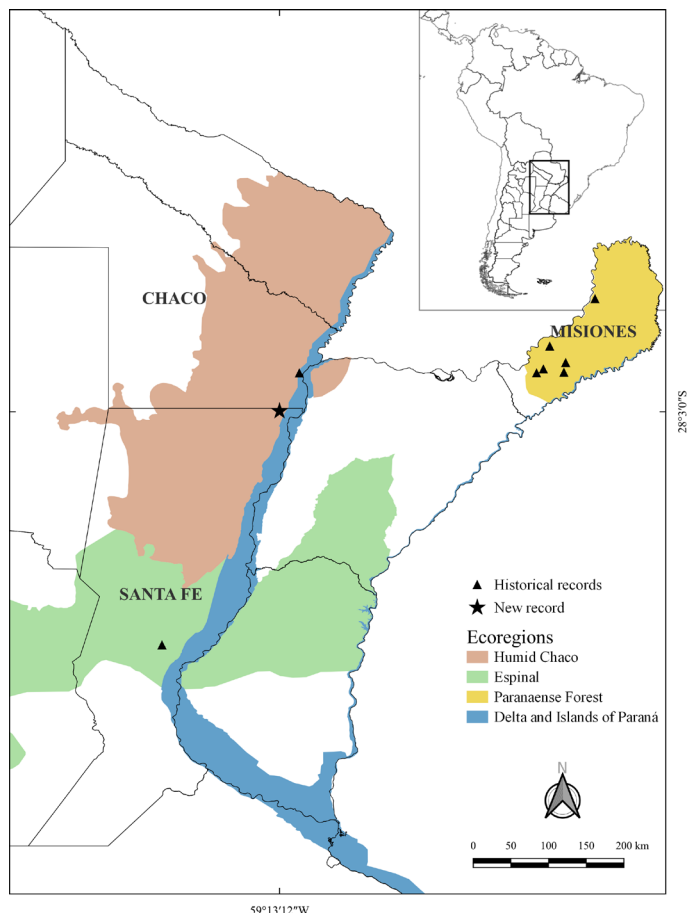
*Eumops auripendulus* was globally categorized as Least Concern (LC; Barquez *et al.* 2015), while at local scale, the species was categorized as Data Deficient (Díaz and Barquez 2019), due to the scarcity of records as mentioned above.

The specimen was collected on December 3, 2019 by personnel of the Central Laboratory of the Dirección General de Bioquímica y Farmacia of Santa Fe and donated to the Museo Provincial de Ciencias Naturales “Dr. Ángel Gallardo” (MG-ZV-M), Rosario, Argentina. The specimen was stored in the mammal collection in accordance with a license to collect dead animal and their parts granted by the Ministerio de Ambiente y Cambio Climático of Santa Fe (Resolution N° 466/2019). It was preserved as stuffed skin, skull, and complete skeleton.

Because the specimen was previously dissected to extract brain samples for rabies virus analysis, some measurements of the skull, such as the height of the sagittal crest, were missing. External and cranial measurements were taken following Barquez *et al.* (1999, 2021), systematic identification followed Díaz *et al.* (2021) and description followed Barquez *et al.* (1999) and Best *et al.* (2002).

The new record of *E. auripendulus* comes from Florencia city (28° 3' 0" S; 59° 13' 12" W; 54 m). This locality is included in the Humid Chaco ecoregion (Burkart *et al.* 1999), subdivision Complejo Dorsal Oriental. The climate is sub-humid with low thermal amplitude. The annual mean precipitation ranges from 1000 - 1050 mm and the annual mean temperature is 18 °C. Different types of vegetation alternate in the region: floodable palm groves of *Copernicia alba* (Aracaceae), forests of *Schinopsis balansae* (Anacardiaceae; willow-leaf red quebracho or Quebracho Colorado) and ancient floodplain xeric forests (Rodríguez *et al.* 2018).

The specimen (MG-ZV-M:415) was an adult female (Anthony 1988; Brunet-Rossinni and Austad 2004), with



**Figure 1.** Records of *Eumops auripendulus* from Santa Fe province, Argentina. Triangles = records listed in Barquez and Díaz (2020); star = new locality (Florencia, General Obligado department, Santa Fe province).

perforated vagina (Barquez et al. 2021), active mammary glands, and distended uterus at the time of dissection. The distinctive character of this species is the length of the forearm, which reaches 68.20 mm (Table 1). The general coloration is blackish brown and membranes are dark, almost black. The plagiopatagium is attached at the medial part of the tibia (Figure 2). The ears are shorter than the length of the head, and do not surpass the tip of the snout when laid forward. The antitragus has a semicircular shape and is wider than high. The tragus is small and pointed, unlike to that of *Eumops glaucinus* in which it is bigger and square. The dental formula is I 1/2, C 1/1, P 2/2, M 3/3 (Figure 3).

**Table 1.** Mean, standard deviation and number of specimens (*n*) of the external and cranial measurements (mm) of *E. auripendulus major* from Argentina (Barquez et al. 1999), and the new record from Santa Fe province (MG-ZV-M:415).

Variable	Barquez et al. (1999)	MG-ZV-M:415
Total length	138.60 ± 8.38 ( <i>n</i> = 5) 125.00 - 148.00	139.00
Tail length	50.8 ± 4.54 ( <i>n</i> = 5) 47.00 - 58.00	53.00
Hindfoot length	10.80 ± 2.04 ( <i>n</i> = 5) 9.00 - 13.00	14.00
Ear length	19.80 ± 4.08 ( <i>n</i> = 5) 13.00 - 23.00	21.00
Forearm length	65.00 ± 3.08 (5) 61.00 - 69.00	68.20
Weight		36.00
Condylbasal length	26.10 ± 5.10 ( <i>n</i> = 4) 23.50 - 33.80	25.20
Least interorbital breadth	8.20 ± 0.05 ( <i>n</i> = 3) 8.20 - 8.30	7.88
Zygomatic breadth	15.50 ± 0.50 ( <i>n</i> = 5) 14.90 - 16.20	15.50
Greatest length of skull	25.30 ± 0.45 ( <i>n</i> = 5) 24.60 - 25.70	25.66
Postorbital constriction	5.10 ± 0.15 ( <i>n</i> = 5) 5.00 - 5.30	5.16
Breadth of braincase	12.00 ± 0.15 ( <i>n</i> = 3) 11.90 - 12.20	12.00
Length of maxillary toothrow	9.90 ± 0.28 ( <i>n</i> = 3) 9.60 - 10.10	10.20
Palatal length	9.90 ± 0.41 ( <i>n</i> = 3) 9.50 - 10.30	10.64
Mastoidal breadth	13.40 ± 0.45 ( <i>n</i> = 3) 13.00 - 13.90	13.22
Length of mandibular toothrow	10.90 ± 0.35 ( <i>n</i> = 3) 10.60 - 11.30	11.10
Length of mandible	19.30 ± 0.84 ( <i>n</i> = 5) 18.20 - 20.30	19.72
C-C (width across canines)	6.50 ± 0.37 ( <i>n</i> = 3) 6.30 - 7.00	6.62
M-M (width across molars)	10.50 ± 0.15 ( <i>n</i> = 3) 10.40 - 10.70	10.06



**Figure 2.** Ventral and dorsal view of the skin of *Eumops auripendulus* (MG-ZV-M:415) from Florencia, General Obligado department, Santa Fe province, Argentina. Scale bar = 10 mm.

Due to their similar sizes, *E. glaucinus* is the only species that can be confused with *E. auripendulus*. This new record matches with the descriptions made by Barquez et al. (1999) and Best et al. (2002) for *E. auripendulus*, both in external and cranial measurements (Table 1). In contrast to *E. glaucinus*, which has a paler fur coloration, this specimen has a dark brown color, and the ears are shorter than the length of the head when laid forward, not exceeding in length the tip of the snout. The skull, although similar to that of *E. glaucinus*, shows a more developed sagittal crest (Eger 1977; Barquez et al. 1999; Best et al. 1997, 2002), which was evident although it could not be measured due to the fracture of the upper part of the skull for rabies virus analysis.

*Eumops auripendulus* is a species poorly known in Argentina, only 10 historical records between 1968 and 1978. This new record of *E. auripendulus* in Santa Fe province is particularly important, partly because this species has not been reported for 41 years in Argentina, but also because it occurs within the southernmost limits of the known distribution of the species. In addition, the species is added to an ecoregion where it was not previously reported (Humid Chaco), about 400 km NE of the southernmost known record (Esperanza - Santa Fe - Espinal ecoregion), 70 km S of the Chaco province record (Delta and Islands of Paraná ecoregion), and 395 km SW of the closest Misiones province record (Paranaense Forests ecoregion).

Although the knowledge about the richness and distribution of these mammals in Santa Fe has increased in recent years (Barquez et al. 1999, Barquez 2006; Pautasso 2008; Pautasso and Arnaudo 2009; Pautasso et al. 2009; Pavé et al. 2017, 2021; Montani et al. 2018, 2020, 2021; Pavé and Gavazza 2022), most of the specimens were collected



**Figure 3.** Lateral, dorsal, and ventral views of the skull and lateral view of the mandible of *Eumops auripendulus* (MG-ZV-M:415) from Florencia, General Obligado department, Santa Fe province, Argentina. Scale bar = 10 mm.

accidentally. Consequently, there is still an important lack of information related to the knowledge of bats in the province, so field work and cooperation between institutions and researchers, as is the case of this research, are essential tools to achieve a deeper understanding of the bat fauna of Santa Fe province.

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