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UNDERWOOD'S BONNETED BAT (*EUMOPS UNDERWOODI*): FIRST RECORD IN THE BAJA CALIFORNIA PENINSULA

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ABSTRACT.—This paper reports the first record of *Eumops underwoodi* in the Baja California peninsula. This record expands the species' distributional range in Mexico along the peninsula. We propose 2 plausible biogeographical explanations. First, the species has the ability to travel across the Gulf of California from the coast of Sonora to the eastern side of the Baja California peninsula and there establish. Second, there is a continuous distribution of the species throughout the mountain ranges that run longitudinally along the Baja California peninsula from the United States border down to the southern tip. We collected one male specimen of *E. underwoodi* in xeric-riparian habitat. We suggest a continuous distribution pattern of this species along the cliffs in the Baja California peninsula.

RESUMEN.—Se realiza el primer registro de *Eumops underwoodi* en la península de Baja California, con lo que se amplía su intervalo de distribución a lo largo de la península y para México. Se proponen dos explicaciones biogeográficas para este registro. La primera analiza la capacidad de viajar a través del Golfo de California, desde la costa de Sonora hasta la península de Baja California. La segunda, considera que existe una distribución continua de *E. underwoodi* a través de las cadenas montañosas presentes longitudinalmente a lo largo de la península de Baja California, desde la frontera de Estados Unidos hasta el extremo sur. Se colectó un ejemplar macho de *E. underwoodi* en hábitat xérico ripario. Se considera que esta especie tiene un patrón de distribución continuo a lo largo de los acantilados de la península de Baja California.

The genus *Eumops* (family Molossidae) includes 14 species (Eger 2007, McDonough et al. 2008, Baker et al. 2009, Gregorin 2009), 6 of which are distributed in Mexico: *Eumops auripendulus* (Best et al. 2002), *E. nanus* (Eger 2007), *E. ferox* (Baker et al. 2009), *E. hansae* (Best et al. 2001), *E. perotis* (Best et al. 2001), and *E. underwoodi* (Kiser 1995).

The distribution of the genus *Eumops* comprises a variety of habitats—coastal, xeric, mesic, and forest (Kiser 1995, Best et al. 1996, 2001, 2002, Hunt et al. 2003)—occurring at elevations ranging from sea level to 3000 m (Eger 1977). Specimens of *Eumops*, and other bats associated with xeric habitats, have been collected over artificial water bodies (Cockrum and Gardner 1960, Barbour and Davis 1969).

Two *Eumops* species, *E. perotis* and *E. underwoodi*, have been recorded in the states of Sinaloa and Sonora on the eastern side of the Gulf of California basin (Hall 1981, Arroyo-Cabrales 1999). *Eumops perotis* was recently recorded in Sierra de Juárez, Baja California (Martínez-Gallardo et al. 2008), which is the species' southernmost recorded location. The distribution of *E. underwoodi* stretches from Arizona to Nicaragua (Hall 1981, Kiser 1995, Sánchez and Romero 1995, Medellín et al. 1997, Mac-Swiney González et al. 2003, Simmons 2005).

We sampled for bats in the "La Ascension" wetland located 18 km N and 19 km W of San Bruno, Baja California Sur (26°23′14.95″ N, 111°36′3.51″ W; Fig. 1), on 13 July 2010. We placed 2 mist nets (8 × 2.5 m) over the water for 5 hours and monitored them regularly. The water body is a permanent spring with a depth ranging between 20 and 40 cm and with the presence of small fish and some beetles. The vegetation near the collection site is dominated by date palm tree (*Phoenix dactylifera*), tree tobacco (*Nicotiana glauca*), cattail (*Typha* sp.), and palo blanco (*Lysiloma candidum*), with an average height of 240 cm, as well as apan (*Apan bebbia*), eucnide (*Eucnide* sp.), yellow orchid vine (*Callaeum macropterum*), and heliotropium (*Heliotropium curassavium*), with an average height of 150 cm. The surrounding vegetation consists of thorn scrub including cacti (*Pachycereus pringlei*), mesquite (*Prosopis*

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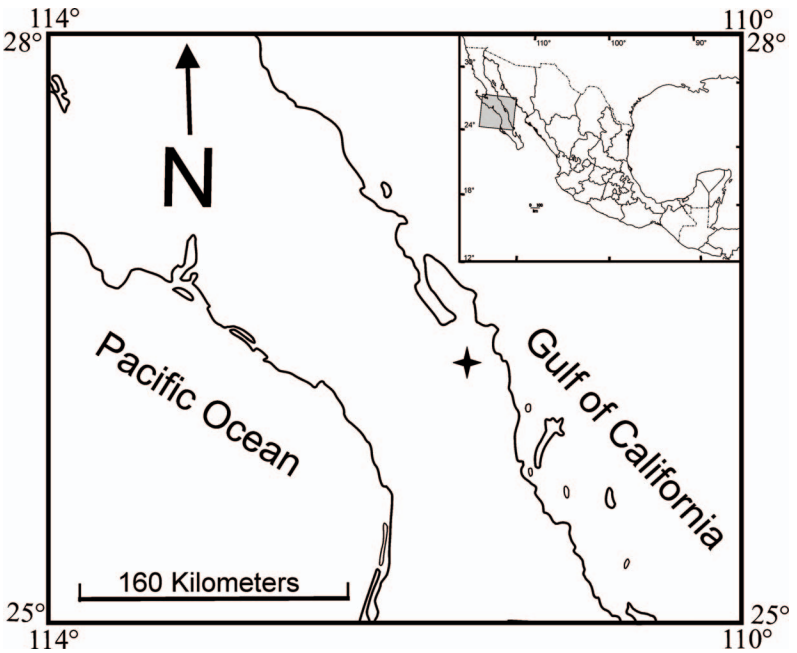

Fig. 1. Map of the Baja California Peninsula showing the collection site (star).

palmeri), cholla (*Cylindropuntia cholla*), Palo Verde (*Cercidium microphyllum*), limberbush (*Jatropha cuneata*), and sweet acacia (*Acacia farnesiana*), with an average height of 250 cm.

We collected one *E. underwoodi* male (CIB catalog number 18139) on the xeric-riparian habitat along the watercourses. It was captured at 23:40 (4 hours after sunset) on the second line (top) of the net placed on the river bed. The scrotum was not evident, but the throat gland was evident and gave off a slightly musky odor. In the laboratory, we recorded morphometric measurements of the skull and established the pelage color according to the Munsell color system (Munsell 2000).

External measurements (mm) of the specimen were as follows: total length 153.0, tail 55.0, hindfoot 12.0, ear 26.0, and forearm 66.0; body mass was 44.0 g. Cranial measurements (mm) for the specimen were as follows: greatest length of skull 28.30, condylobasal length 26.30, zygomatic breadth 17.30, mastoid breadth 13.46, braincase breadth 14.45, braincase depth 11.50, palatal length 11.22, breadth across upper molars 11.13, maxillary tooth row length 11.66, width across upper canines 6.19, postorbital constriction 5.60, mandible length 21.20, and mandibular tooth row length 12.60.

The dorsal color was a grayish brown (10YR5/2) with a white hair base (10YR8/1). The ventral color was light gray (10YR7/2). The dorsal hair was soft and short compared to hair on the hindquarters, which was longer (approximately 12.8 mm). The ears were long and when pushed forward reached the tip of the nose. The specimen had short hairs on the edge of the calcaneus.

The *E. underwoodi* specimen and tissue were deposited in the Centro de Investigaciones Biologicas del Noroeste (CIB Mammal Collection), as per the recommendations of the Animal Care and Use Committee of the American Society of Mammalogists (1998).

Other bats captured included 3 N*yctinomops femorosaccus*, 1 *Mormoops megalophylla*, 4 *Leptonycteris yerbabuenae*, 22 *Antrozous pallidus*, 1 *Corynorhinus townsendii*, 4 *Eptesicus fuscus*, 4 *Myotis volans*, and 6 *Parastrellus hesperus*. These 8 species represent 4 families: Molossidae, Mormoopidae, Phyllostomidae, and Vespertilionidae. The first species collected were *Parastrellus* and *Myotis* (1 hour after sunset), followed by *Nyctinomops*, *Corynorhinus*, and *Leptonycteris* (2 hours after sunset). From 22:30 (3 hours after sunset) the most abundant species were *Antrozous pallidus* and *Parastrellus*

hesperus. Capture success was 6 bats per m^2 of net per hour per night.

Eumops underwoodi is widely distributed from Arizona (USA) to Nicaragua (Simmons 2005). The specimen we collected is the only known record in the Baja California peninsula (Villa-R. 1967, Hall 1981, Arroyo-Cabrales 1999). Our capture of *E. underwoodi* is biogeographically important because the closest known record is 1 km W of San José de Guaymas, Sonora (Hall 1981), approximately 175 km across the Gulf of California. According to the original description (Benson 1947) and systematics studies made by Eger (1977), the specimen we collected corresponds to *E. underwoodi sonoriensis*. This subspecies is smaller (body, forearm, and skull) than *E. u. underwoodi* and shows some differences in pelage color, in addition to its allopatric distribution (Gregorin 2009). The specimen collected in the Baja California peninsula had a coloration slightly paler than *E. u. underwoodi* and similar to Benson's (1947) original description of pelage color (brown). It had a small skull with measurements near the minimums given by Benson (1947).

We propose 2 explanations for the presence of *E. underwoodi* in the Baja California peninsula. First, this species presumably is capable of traveling the 150–200-km width across the Gulf of California from the coast of Sonora to the eastern side of the Baja California peninsula. Some bat species migrate and travel great distances in the breeding season (Ceballos et al. 1997, Hedenström 2009), and some molossids migrate long distances (Cockrum 1969).

The second explanation, and in our opinion the most parsimonious one, proposes a continuous distribution of *E. underwoodi* through the Sierra de Juárez, Sierra San Pedro Mártir, Sierra Guadalupe, and Sierra de la Giganta, which run longitudinally along the Baja California peninsula from the U.S. border to the southern tip. Recent records of congener *E. perotis* on the Baja California peninsula (Martinez-Gallardo et al. 2008) lend supporting evidence to the idea of a continuous distribution of *E. underwoodi* through the peninsula. We also suggest that the heterogeneity that characterizes the Baja California desert environment (Riddle and Hafner 2006) favors the occurrence of *Eumops* (and other bat genera) in this region, given the ecological plasticity of this genus in selecting roosts, foraging place, and food availability (Fenton 1989, 1990, Siemers et al. 2001, Pio et al. 2010). Slopes and physiography in these mountain ranges are optimal for initiating flight into the open spaces high above the ground where molossid bats typially hunt (Iñiguez-Dávalos 2005). Also, vegetation types and structure are present for roosting and for feeding on arthropods, as well as nectar, pollen, and flowers (Cockrum 1960, Schnitzler and Kalko 2001, Tibbitts et al. 2002). More specifically, *Eumops underwoodi* is associated with mountain cliffs and possibly uses cactus cavities as roost sites, as reported for *Eumops* in Sonoyta where this species occupied cavities in saguaro cacti (Tibbitts et al. 2002).

Also, our data on bat species richness and total number of bats on "La Ascension" indicate that this place on the Baja Peninsula is a "hot spot," with resources (roosts, foraging places, and food availability) important in supporting bat fauna. These wetland environments could provide vegetation types optimal for refuges or roosting.

In conclusion, the biogeographic implications of the record we present herein are critical because *E. underwoodi* likely has a wider distribution throughout the Baja California peninsula than the few records indicate. *Eumops underwoodi* is a large and conspicuous species, but one that is difficult to collect due to its habits of using cliffs for refuge and flying at high altitudes above the substrate (Schmidly 1991). Additionally, specific natural history studies in the Baja California peninsula have not focused on bats, and monitoring and collection efforts are scant. This first record confirms the importance of wetlands in desert environments, since *E. underwoodi* has been reported as having a wet-tropical distribution (Arroyo-Cabrales 1999).

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