NOTES

SHREWS (MAMMALIA, SORICOMORPHA) FROM COLIMA, MEXICO

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ABSTRACT—This paper reports shrews (Soricidae, Soricomorpha) in Colima, Mexico, namely, *Cryptotis parva*, *Sorex saussurei* and the threatened *Megasorex gigas*. They were recorded in cloud, pine, and pine-oak forests. Voucher specimens were catalogued in the Colección Nacional de Mamíferos (CNMA), Instituto de Biología de la Universidad Nacional Autónoma de México (UNAM), in Mexico City. This research contributes to the knowledge of the biodiversity of western Mexico, provides the first museum specimens of these taxa in the CNMA and confirms the presence of taxa of conservation concern.

RESUMEN—Este estudio registra la presencia de musarañas (Soricidae, Soricomorpha) en el estado de Colima, México, y son: *Cryptotis parva*, *Sorex saussurei* y *Megasorex gigas*, ésta última amenazada de extinción. Estas especies se encontraron en bosques de pino, de pino-encino y mesófilo de montaña. Los ejemplares de referencia se depositaron en la Colección Nacional de Mamíferos (CNMA), Instituto de Biología de la Universidad Nacional Autónoma de México (UNAM), en la Ciudad de México. Esta investigación contribuye al conocimiento de la biodiversidad del occidente de México, genera los primeros ejemplares de museo de los taxa en cuestión para la CNMA y confirma la presencia de taxa de interés en conservación.

It recently has been reported that 30 species of shrews occur in Mexico (Ramírez-Pulido et al., 2005). This makes soricomorphs the fourth most important mammalian order in Mexico based on number of species, following rodents, bats, and carnivores. However, shrews occurring in Mexico are poorly known (Villa and Cervantes, 2003). Few museum specimens and scarce research projects on shrews make it difficult to assess this mammalian component of biodiversity in Mexico. Although some papers have contributed data on their morphology and relationships (Ramírez-Pulido et al., 2004; Carraway, 2005; Woodman, 2005), basic information about their taxonomy, geographical distribution, and natural history is scarce. However, shrews are of great concern in conservation matters because they play an important role in ecosystems and several species are listed by the Mexican government as in risk of extinction (Luiselli Fernández, 2002).

Many regions of Mexico have not been explored for shrews. Despite high species richness and levels of endemism of both the temperate mountains of the Eje Neovolcánico in central Mexico and the dry tropical forests of western Mexico (Ceballos and Navarro, 1991), the occurrence of shrews in these regions has been poorly recorded. Colima is a small state that lies at the boundary of both of these ecological regions. Despite the diversity of tropical and temperate habitats occurring in this state, only one species of shrew (*Megasorex gigas*) has been reported (Reppening, 1967). Of the four genera of shrews occurring in Mexico, three (*Cryptotis*, *Megasorex*, and *Sorex*) are expected to occur in Colima. Therefore, the aim of this research was to document the presence of these genera of shrews in Colima.

We visited selected mountain forests in Colima, corresponding to the most western part of

TABLE 1—Collection records of shrews (Soricidae, Soricomorpha) from the state of Colima, Mexico, at Colección Nacional de Mamíferos (CNMA) of Instituto de Biología, Universidad Nacional Autónoma de México (UNAM), in Mexico City.

Catalog number	Taxon	Collecting locality	Elevation (m)
CNMA 43078–43085	*Cryptotis parva berlandieri*	16.4–19 km NNE Comala, Municipio Comala	1,290–1,687
CNMA 43086–43087	*Cryptotis parva berlandieri*	3 km W de la María, Municipio Comala	1,392
CNMA 43088	*Cryptotis parva berlandieri*	6 km SE El Sauz, Municipio Minatilán	1,108
CNMA 43089–43095	*Megasorex gigas*	Rancho La Mora, 16.7–16.8 km NNE Comala, Municipio Comala	1,290–1,322
CNMA 43096–43098	*Megasorex gigas*	Rancho El Guayabal, 16.5–16.6 km NNE Comala, Municipio Comala	1,348–1,361
CNMA 43099–43100	*Megasorex gigas*	6 km SE El Sauz, Municipio Minatilán	1,108
CNMA 43101–43120	*Sorex saussurei saussurei*	0.8–1.4 km NE El Terrero, Municipio Minatitlán	2,135–2,391

Eje Neovolcánico in central Mexico, including: 1) Zona de Protección de Flora y Fauna El Jabalí, Municipio de Comala (northern Colima); 2) Reserva de la Biósfera Sierra de Manantlán, Municipio de Minatitlán (northwestern Colima); 3) a locality 6 km SE El Sauz, Municipio Minatitlán. These localities are in regions where the dominant vegetation is cloud forest, pine forest, and pine–oak forest (Rzedowski, 1983). Study sites 1 and 2 are protected areas, and parts of site 2 are located within the state of Jalisco.

We carried out seven field trips during September 2004–June 2005. Shrews were captured using both Sherman (7.5 by 8.8 by 22.5 cm) and pitfall traps (1, 3, and 20-L volume) set in the litter of the forest floor under dense forest canopy. Shrews were prepared as museum specimens and deposited in the Colección Nacional de Mamíferos of the Instituto de Biología, Universidad Nacional Autónoma de México, in Mexico City. We used georeferenced points from our field work and collection data associated with museum specimens to compute distances between localitities. Geographical coordinates (decimal degrees) were estimated for the locality ''Sierra de Colima'' cited by Merriam (1895) as 19.55°N, 103.65°W. Taxonomy, nomenclature, and distributions follow Choate (1970); Hall (1981); Woodman and Timm (1999), and Ramírez-Pulido et al. (2005). Common names of mammals follow Wilson and Cole (2000).

Our field work yielded 43 specimens of shrews allocated as follows: 11 *Cryptotis parva*, 20 *Sorex saussurei*, and 12 *Megasorex gigas* (Table 1). In addition, our search of mammalian collections revealed additional museum specimens of *S. saussurei* and *M. gigas* from Colima in two mammalian collections; Escuela Nacional de Ciencias Biológicas, Instituto Politécnico Nacional in Mexico City, and Natural History Museum of Los Angeles County in Los Angeles.

The least shrew (*Cryptotis parva*) is a soricid of wide distribution in Mexico. Primarily a grassland species, it commonly is found in mesic habitats near permanent sources of water (Choate, 1970). Our specimens were caught in pitfalls (1-L volume) set in litter of dense oak and cloud forests near the small town of El Sauz, and in Zona de Protección de Flora y Fauna El Jabalí, respectively (Table 1). The nearest locality to El Sauz previously reported for least shrews is Ocotlán, Jalisco (Choate, 1970). Therefore, our field record is a range extension of 165.3 km southwest. Other mammals captured in the same areas as the least shrew were Mexican shrew (*Megasorex gigas*), ring-tailed ground squirrel (*Spermophilus annulatus*), painted spiny pocket mouse (*Liomys pictus*), southern pygmy mouse (*Baiomys musculus*), Mexican woodrat (*Neotoma mexicana*), fulvous pygmy rice rat (*Oligoryzomys fulvescens*), black-eared rice rat (*Oryzomys melanotis*), nimble-footed mouse (*Peromyscus levipes*), gleaning mouse (*P. spicilegus*), and nine-banded armadillo (*Dasypus novemcinctus*).

The specimens of *C. parva* we report herein are the first museum specimens known of the genus for the state of Colima. Although Woodman and

Timm (1999) reported *C. alticola* from Volcán de Fuego (also known as Volcán de Colima), 8,800 feet (Natural History Museum of Los Angeles County 29058), collected by Percy Clifton, the corresponding collection data (field notes and catalog) show that the geographical location of the collecting site lies within the state of Jalisco (north face of Volcán de Fuego, geographical coordinates 19.5127808°N, 103.6173089°W).

Saussure's shrew (*Sorex saussurei*) is widespread in the mountains of Mexico and occurs in a variety of habitats. The type locality of this shrew is the north slope of Sierra Nevada de Colima, in the state of Jalisco, at 8,000 feet (Merriam, 1895), near the Colima border. We located additional specimens of *S. saussurei* from Jalisco (Natural History Museum of Los Angeles County 29061–29091, 37704–37715) from the north face of Volcán de Fuego, Jalisco, were collected by the same collector (P. Clifton) that trapped the *C. parva* previously mentioned. We also found museum specimens (Natural History Museum of Los Angeles County 55078, 55082, from 7 miles NE La Cofradía; Escuela Nacional de Ciencias Biológicas 29112, from 7.5 km N, 4 km W Quesería, Municipio Comala, 1,820 m) that further confirm *S. saussurei* in the state of Colima.

We trapped Saussures shrews in the Colima region of the Reserva de la Biósfera Sierra de Manantlán in pitfalls (1-L volume) set in heavy litter of cloud, pine, and pine-oak forests (Table 1). These records represent a range extension of nearly 32.0 km SSW from the north face of Volcán del Fuego, Jalisco.

The Saussure's shrew has a large body and well-developed postmandibular foramina compared to the Mexican long-tailed shrew (*Sorex oreopolus*), the only other shrew of the genus occurring near the range of Saussure's shrew in high elevations of southwestern Jalisco (Junge and Hoffmann, 1981). Other small mammals collected inside Reserva de la Biósfera Sierra de Manantlán were red-bellied squirrel (*Sciurus aureogaster*), painted spiny pocket mouse (*Liomys pictus*), nimble-footed mouse (*Peromyscus levipes*), and gleaning mouse (*P. spicilegus*). Therefore, the previous unpublished museum records reported herein and our collected specimens represent the first documented evidence of the genus *Sorex* in the state of Colima.

The Mexican shrew (*Megasorex gigas*) is a poorly known shrew belonging to a monotypic genus, endemic to the Pacific lowlands of Mexico (Armstrong and Jones, 1972), and it is listed as threatened by the Mexican government (Luiselli Fernández, 2002). This soricid is a fairly large shrew with a relatively short tail and conspicuous pinnae; it bears three subequal unicuspid teeth and displays unpigmented dentition. The holotype was captured within floor litter next to logs of a shrubby spot, near to a stream, in Jalisco (Armstrong and Jones, 1972).

There are previous mentions of *M. gigas* in Colima (Repenning, 1967; Téllez-Girón et al., 1997). However, lack of documented records in mammalian collections, except that by Reppening (1967; Natural History Museum of Los Angeles County 13568), has precluded confirmation of the taxonomic identity of the Mexican shrew and its presence in Colima. However, we found museum specimens of the Mexican shrew (Natural History Museum of Los Angeles County 13568, 29059–29060, 33815, 55074–55084, 55131–55133, from 5 miles NE La Cofradía; 7 miles NE La Cofradía; 14.5 miles N Colima, on Comala road) that confirm its occurrence in Colima. The most recent date of collection of these specimens was 1975.

Our specimens were caught in Sherman traps and 20-L pitfall traps in litter at the edge of coffee plantations and in cloud forests in the midlands of Volcán de Fuego (also known as Volcán de Colima) in Zona de Protección de Flora y Fauna El Jabalí at higher elevations than those previously reported (Table 1). Similarly, one Mexican shrew was taken at 5,000 feet in deciduos forest about 65 km E of the type locality at Milpillas, Jalisco (Jones, 1966). Other specimens have been reported from the floor of tropical dry forests below 1,000 m elevation (Jones, 1966; Armstrong and Jones, 1972). We also trapped one specimen in a 20-L pitfall trap in a less-mesic habitat in an oak (*Quercus*) forest near El Sauz (Table 1). This record represents a range extension of 38.3 km WSW from where the specimen reported by Reppening (1967) was collected. Other mammals captured with the Mexican shrew are the same as those mentioned above for the least shrew. Thus, the cited museum specimens and our records confirm the report by Reppening (1967); this shrew of conservation concern still occurs in Colima.

We conclude that three species of shrews occur in forests of protected areas in the northern territory of Colima, namely *C. parva*, *M. gigas*, and *S. saussurei*; *C. parva* and *S. saussurei* being documented for the first time from Colima. We

found museum specimens previously unreported and we contributed information to the knowledge of the biodiversity of western Mexico.

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