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Marmosa canescens.

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Marmosa canescens (J. A. Allen, 1893)

Gray Mouse Opossum

Didelphis (*Micoureus*) *canescens* Allen, 1893:235. Type locality "Santo Domingo de Guzmán, Isthmus of Tehuantepec," Oaxaca, México.

Marmosa canescens: Allen, 1897:58. First use of current name combination.

Marmosa oaxacae Merriam, 1897:43. Type locality "City of Oaxaca," vicinity of Oaxaca de Juárez, probably near slopes of the Cerro San Felipe, Oaxaca, México (Goodwin 1969).

Marmosa insularis Merriam, 1898:14. Type locality "María Madre Island, Tres Marías Islands, Nayarit."

Marmosa sinaloae Allen, 1898:143. Type locality "Tatamales, Sinaloa."

Marmosa gaumeri Osgood, 1913:175. Type locality "Yaxcaba, southwest of Chichen Itza, Yucatán, México."

CONTEXT AND CONTENT. Order Didelphimorphia, superfamily Didelphoidea, family Marmosidae, subfamily Marmosinae, genus and subgenus *Marmosa* (Gardner 1993; Hershkovitz 1992). *M. canescens* has 4 subspecies (Hall 1981):

M. c. canescens (Allen, 1893:235), see above (*gaumeri* Osgood is a synonym).
M. c. insularis Merriam, 1898:14, see above.
M. c. oaxacae Merriam, 1897:43, see above.
M. c. sinaloae Allen, 1898:143, see above.

DIAGNOSIS. *Marmosa canescens* (Fig. 1) can be differentiated from other species of the genus in Mexico by its gray pelage. This feature contrasts with the bright brick red or orange color of *M. mexicana*. The gray mouse opossum is also distinguished from *M. mexicana* by its prominent postorbital processes set off by constrictions in front and behind and by presence of an accessory fenestrate on each side of M2 (Alonso-Mejía and Medellín 1992; Hall 1981). A small diastema between I4 and C is often present in *M. canescens* but absent in *M. mexicana*. Crown of M1 is short and wide, which contrasts with a proportionately long, narrow, triangular crown on that of *M. mexicana* (Tate 1933).

GENERAL CHARACTERS. The gray mouse opossum is the smallest opossum in Mexico (Ceballos and Miranda 2000). Upperparts are pale gray or brownish gray, with white or creamy underparts and legs. Fur is soft, short, dense, and crisp to quite long and slightly woolly. Ears are broad, relatively rounded, naked, and blackish. Prominent black eye rings are present. Vibrissae are moderate to short in length. Tail is prehensile, about equal to body length, with basal portion (10–15 mm) heavily furred and remainder naked, faintly bicolored, and occasionally with a white tip (Reid 1997; Tate 1933). Ventral pelage is yellow-buff to cream-buff in both sexes, with an orange-yellow patch surrounding inguinal mammae of mature females. In insular specimens, the patch is orangish yellow, darkest at midline, and fades laterally. The patch extends anteriorly from thighs to gular region (Armstrong and Jones 1971). Feet are gray or yellow-white and thinly haired on upper surface (Tate 1933). Ranges of external and cranial measurements (in mm) of adults of both sexes are as follows (sample size in parentheses): total length, 205–350 (21); length of tail, 105–167 (23); length of hind foot, 15–22 (24); length of ear, 22–27 (9); greatest length of skull, 30.4–36.8 (15); condylobasal length, 28.6–35.3 (17); zygomatic breadth, 15.7–20.8 (20); length of nasals, 13.2–16.3 (17); length of maxillary toothrow, 11.7–14.3 (16); and length of M1–M3, 5.1–5.5 (4). P3 is larger than P1 but smaller than P2. Skull is short and broad with widely spreading zygomatic arches (Fig. 2); postorbital processes are strongly developed and extend posteriorly to converge at temporal ridges. Palate is broad (Allen 1893, 1898; Goodwin 1969; Hall 1981; Merriam 1897, 1898; Reid 1997). Adult body mass ranges from 38 to 60 g (Ceballos 1989).

DISTRIBUTION. *Marmosa canescens* is endemic to Mexico (Fig. 3). It is a Neotropical species, with the northernmost distribution in its genus. It occurs along the tropical lowlands of the Pacific coast, from the tip of the Baja California Peninsula and southern Sonora to south-central Sinaloa, western Durango, and a small part of Zacatecas, southward to Chiapas. The geographic range extends to central Mexico through the Balsas river basin from the Michoacán coast to Puebla. Isolated populations occur in the Yucatán Peninsula and the Tres Marías Islands off Nayarit coast. In the Yucatán Peninsula, it occurs in northern dry forest. *M. canescens* has been recorded in the states of Baja California Sur, Chiapas, Colima, Durango, Guerrero, Jalisco, Michoacán, México, Morelos, Nayarit, Oaxaca, Puebla, Quintana Roo, Sonora, Sinaloa, Yucatán, and Zacatecas (Álvarez del Toro 1977; Armstrong and Jones 1971; Ceballos and Miranda 2000; Hall 1981; Matson 1977; Nelson 1899; Sánchez-Hernández and Gaviño de la Torre 1988). In the Baja California Peninsula, a single record is from an owl pellet from the dry tropical forest in the southernmost tip of the peninsula (López-Forment and Urbano-V. 1977). The gray mouse opossum is generally found from sea level to 2,100 m, but most localities are below 1,000 m (Reid 1997).

FIG. 1. *Marmosa canescens* from Chamela, Jalisco, Mexico. Photograph by G. Ceballos.

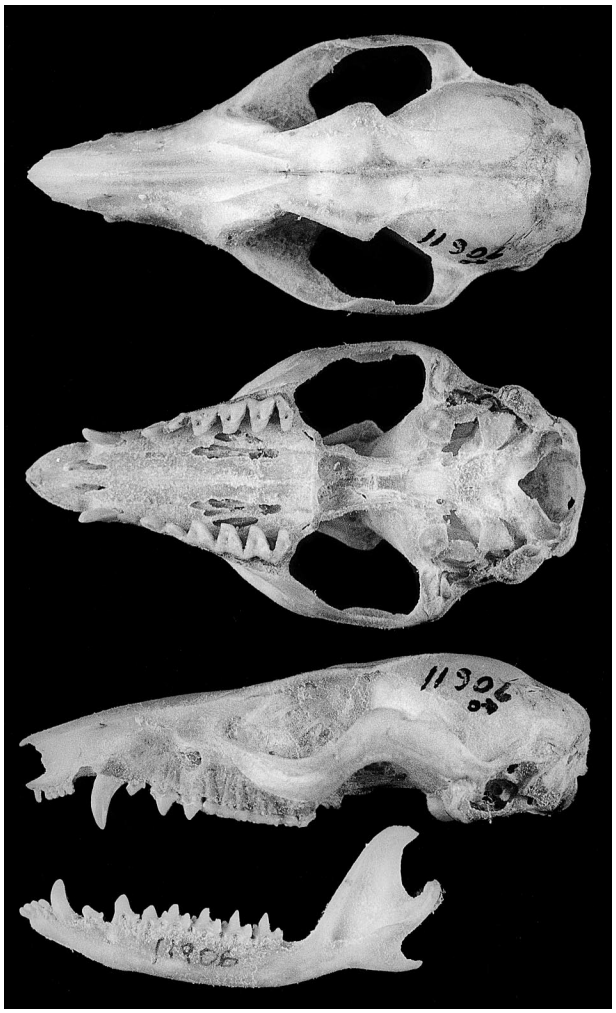

FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of *Marmosa canescens* from Chamela, Jalisco, Mexico (Instituto de Biología, Universidad Nacional Autónoma de México). Greatest length of skull is 35.5 mm.

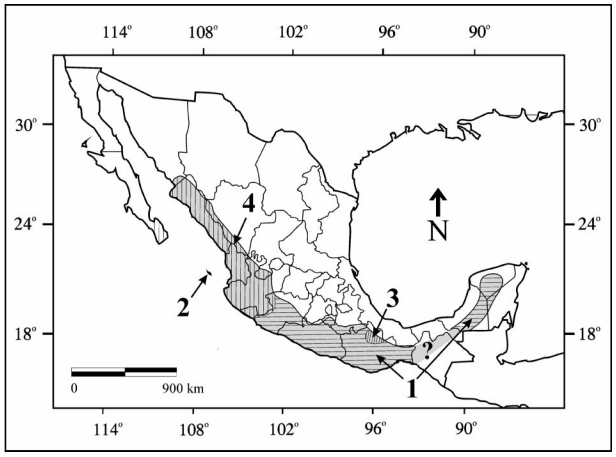

FIG. 3. Distribution of *Marmosa canescens* in Mexico: 1, *M. c. canescens*; 2, *M. c. insularis*; 3, *M. c. oaxacae*; and 4, *M. c. sinaloae*.

FOSSIL RECORD. Late Pleistocene remains of *M. canescens* (29 mandibles) have been found in Cueva de Loltún, Yucatán, with an increasing abundance in more recent deposits (Álvarez and Arroyo-Cabrales 1990). Other caves in the Yucatán with fossil material (mandibles) are Actun Lara, Actun Has, Actun Coyok, and Actun Spukil (Tate 1933). A left mandible from a Pleistocene site in Zacoalco, Jalisco, was assigned to *M. mexicana* on the basis of measurements (Alvarez and Ferrusquía 1967). However, based on the known distribution of *M. mexicana*, this was probably *M. canescens*.

FORM AND FUNCTION. The 9 mammae of the gray mouse opossum are arranged bilaterally, with a prime formula of 4-1-4; the functional formula may be the same (Hershkovitz 1992; Tate 1933). Females do not possess a pouch but have a ventral layer of hair reminiscent of a pouch in which newborn young finish their development. Testes are anterior to penis (Ceballos and Miranda 2000). Testes size of 1 male in July was 10 by 13 mm (Loomis and Stephens 1962). Dental formula is i 5/4, c 1/1, p 3/3, m 4/4, total 50 (Ceballos and Miranda 2000).

ONTOGENY AND REPRODUCTION. *Marmosa canescens* is reported to reproduce throughout the year (Ceballos 1990; Ceballos and Miranda 1986). Number of young in 3 litters from Jalisco averaged 11 and ranged from 8 to 14 (Ceballos 1990). A gravid female captured in September carried 13 embryos (crown–rump length, $\bar{X}$ = 6 mm, range not provided), and another female was accompanied by 8 nursing young (Armstrong and Jones 1971). One individual removed from the nest of an oriole had 8 young (total length, $\bar{X}$ = 50 mm, range not provided) attached to the mammae (Armstrong and Jones 1971). Females with young have been found from July to September and males with scrotal testes from January to August. Juveniles have been captured from February to September (Armstrong and Jones 1971; Ceballos 1990; Davis and Lukens 1958). Two lactating females were in postpartum molt, with new hair generally continuous on the dorsum except for small patches there and on the hindquarters (Armstrong and Jones 1971). Dispersal from the nest is reported to occur when juveniles attain a mass of ca. 20 g. A juvenile captured in deciduous forest increased 0.22 g/day in body mass in 66 days, from 20 to 35 g (Ceballos 1989).

ECOLOGY. *Marmosa canescens* normally inhabits tropical and semideciduous forests along the Pacific coast, in regions characterized by a dry–wet seasonality, where most rainfall is concentrated from July to October. It has been recorded in evergreen forest, deciduous forest, scrublands, savanna-like grasslands, and secondary-growth forests. It is also found in croplands and orchards, including sugarcane fields, banana groves, and papaya and mango plantations (Ceballos and Miranda 2000; Hall and Villa-R. 1949).

The gray mouse opossum is omnivorous, and its diet consists principally of insects such as bugs (Hemiptera); cockroaches and preying mantises (Orthoptera); moths (Lepidoptera); and scarabiid, bruchid, and cerambycid beetles (Coleoptera—Ceballos and Miranda 2000; Collins 1973). Occasionally, it preys on geckos (Squamata: Reptilia), birds' eggs, and chicks (Ceballos 1989; Gaumer 1917; Reid 1997). It also feeds on fruits such as banana, coconut, figs, and orange (Ceballos and Miranda 2000; Gaumer 1917). In captivity, it survived well on a diet of insects and bird eggs but rejected fruits and seeds (Ceballos 1990; Gaviño and Vargas 1993a). *M. canescens* has been captured in Sherman Traps and Museum Special Mammal Traps baited with a mixture of crushed oats and coconut and oats and peanut butter (Ceballos 1989; López-Forment et al. 1971).

Estimated densities of the gray mouse opossum in deciduous forest and semideciduous ("arroyo") forest of the Chamela-Cuixmala Biosphere Reserve in Jalisco ranged from 0.4 to 4.5 individuals/ha (Ceballos 1989, 1990). Individuals moved on average 35.2 m (range not provided) between successive captures, and the longest recorded distance was 72 m. On Isla Maria Madre in the Tres Marías Archipelago off Nayarit, they were abundant in fig (*Ficus*) forests (Nelson 1899). Throughout their geographic range, they are sympatric and syntopic with several other small mammals including *Baiomys taylori*, *Hodomys alleni*, *Liomys pictus*, *Megasorex gigas*, *Neotoma mexicana*, *Oryzomys palustris*, *Osgoodomys banderanus*, *Peromyscus perfulvus*, and *Reithrodontomys megalotis* (Ceballos 1990; Genoways and Jones 1973; Sánchez-Hernández and Romero 1995).

Bone remains of the gray mouse opossum have been found in barn owl (*Tyto alba*) pellets in caves in the states of México, Jalisco, and Guerrero (Ceballos and Miranda 2000; López-Forment and Urbano 1977) and in feces of cougar (*Puma con-*

color) in Jalisco (Núñez et al. 2000). The chigger *Eutrombicula batatas* (Acarina) is the only parasite recorded from *M. canescens* (Loomis and Stephens 1962).

BEHAVIOR. The gray mouse opossum is solitary, semiarboreal, and nocturnal and may spend more time on the ground than other species of mouse opossum (Reid 1997). In a study in the Chamela-Cuixmala Biosphere Reserve, 55% of captures were made on the ground (Ceballos 1989, 1990).

Nests are located in tree hollows, under rocks and fallen logs, and in abandoned bird nests of species such as orioles (*Icterus*), white-billed wrens (*Uropsila leucogastra*), and banded wrens (*Thryothorus pleurostictus*), all of which build hanging nests (Ceballos 1990; Gaviño and Vargas 1993b). In the Chamela-Cuixmala region in western Mexico, 25 nests were found in trees, cacti, and shrubs of the following species: *Caesalpinia eriostachys*, *Jacquinia pungens*, *Opuntia excelsa*, and *Prosopis juliflora* at heights from 70 to 500 cm; only 1 nest was found on the ground beneath a pile of brush (Ceballos 1990). An additional 10 nests were found in abandoned nests of the white-bellied wren (Márquez 1987). In Morelos, a nest was found inside a hollow in a *Brosimum* tree (Sánchez-Hernández and Romero 1995). In the Tres Marías Islands, nests were found in bushes between 1 and 3 m aboveground (Nelson 1899). Globular nests are built with masses of dry leaves and small stems and are lined with grasses and "hairy" plant fibers of *Ceiba pentandra* and similar species (Armstrong and Jones 1971; Ceballos 1990; Nelson 1899).

Mating behavior of *M. canescens* was recorded by Valtierra-Azotla and García (1998). They described that the 2 gray mouse opossums made loud noises for ca. 3 min. Then they suspended themselves upside down using their tails, and the male grabbed the female with a strong neck-bite during the entire copulation. The male introduced its penis up to 3 times for ca. 2 min each time. After the last copulation, the female rejected the male aggressively, and then both moved away.

GENETICS. The 2n = 22 for the gray mouse opossum is unique among didelphid marsupials. The karyotype consists of 3 pairs of large chromosomes and a graded series of 7 pairs of medium-sized to small chromosomes, all acrocentric. The X chromosome is small and acrocentric; the Y chromosome is minute and submetacentric (Engstrom and Gardner 1988). The 2n = 22 probably is independently derived from a primitive 2n = 14 karyotype and is convergent on that of other didelphids (Engstrom and Gardner 1988).

REMARKS. *Marmosa canescens* is a common species that is not at risk of extinction. In the Maria Madre Island, however, Wilson (1991) found it to be rare and suggested that it probably declined due to the abundance of the introduced *Rattus rattus*. The gray mouse opossum (*canescens* is Latin for becoming gray—Borror 1960) is called tlacuachín (Chiapas—Ingles 1958), tlacuatzin (Jalisco—Ceballos and Miranda 2000; López-Forment et al. 1971), and holioch (Mayan-Gaumer 1917). The subspecies *M. c. oaxacae* is known only from the type series, an adult female and a young male, taken near Oaxaca City; no additional specimens have been collected in that region.

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