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Neotoma martinensis.

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Neotoma martinensis Goldman, 1905

San Martin Wood Rat

Neotoma martinensis Goldman, 1905:28. Type locality "San Martin Island, Lower California [= Baja California], Mexico."

CONTEXT AND CONTENT. Order Rodentia, suborder Sciurognathi, family Muridae, subfamily Sigmodontinae, genus *Neotoma*, subgenus *Neotoma* (Musser and Carleton 1993). *Neotoma martinensis* is a member of the *N. lepida* species group (Goldman 1932; Koop et al. 1985; Mascarello 1978). The taxonomy has not been reevaluated since the original description, and species-level status has not been challenged. *N. martinensis* is monotypic (Hall 1981).

DIAGNOSIS. *Neotoma martinensis* (Fig. 1) and *N. anthonyi*, another island endemic, both have hind legs that are conspicuously black on the outer sides, and this distinguishes them from *N. intermedia* on the nearby mainland. *N. martinensis* has elongate nasal bones that extend posteriorly to plane of lachrymals, whereas in *N. anthonyi* nasals end anterior to plane of lachrymals (Goldman 1910). *N. martinensis* also has larger ears (Goldman 1910), fewer hairs on tail (Goldman 1905), and hind legs and tail are darker (E. Yensen, in litt.) than those of *N. anthonyi*. *N. bryanti* is larger (Alvarez-Castañeda and Yensen 1999); has a grayer, fluffy coat; and hind legs and tail are not darker than dorsum (E. Yensen, in litt.).

GENERAL CHARACTERS. *Neotoma martinensis* is a medium-sized wood rat, with relatively long tail and large ears. The San Martin wood rat is creamy buff in color, but darker on head and dorsum because of presence of dusky hairs and lighter on sides. Outer surface of hind legs and inner sides of ankles are black, upper sides of forelegs are dusky brown, and feet are pure white. Underparts are creamy white, and fur is dark gray at the base everywhere (Goldman 1910). Tail is black dorsally and creamy white ventrally (E. Yensen, in litt.).

Skull (Fig. 2) is of medium size, smoothly rounded, and high at anterior roots of zygomatic arches. Temporal ridges are faint and widely separated. Dorsal portions of premaxillae extend posterior to nasals and almost reach the interorbital constriction. Frontals are narrow between orbits, but expand posteriorly and are nearly flat with only weak lateral ridges. Zygomatic arches are narrower anteriorly than posteriorly. Bullae are small and pear-shaped with a very large external auditory meatus (Goldman 1910).

External measurements (in mm) of males and females, respectively, average (± *SD*, with range and sample size in parentheses): total length, 347.5 ± 11.6 (333–370, 19), 325.2 ± 11.8 (304–342, 10); length of head and body, 193.6 ± 8.4 (180–206, 19), 175.7 ± 5.4 (169–186, 10); length of tail, 154.0 ± 9.9 (130–168, 19), 149.5 ± 8.4 (135–167, 10); length of hind foot, 38.3 ± 2.8 (30–41, 14), 37.0 (36–38, 2); length of ear (males only) 31.5 ± 2.4 (29–36, 6). Body mass of males averages 246.5 ± 25.2 g (202–279 g, n = 6—Smith 1991). Cranial measurements (in mm)

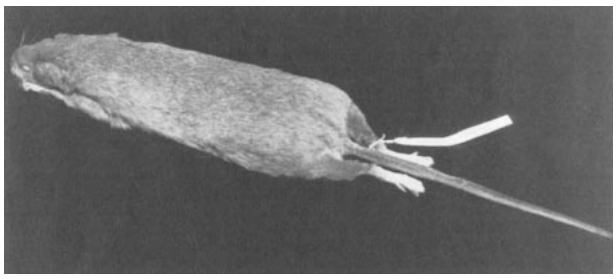

FIG. 1. *Neotoma martinensis* in the National Museum of Natural History (number 139033, male) collected in 1905. Note dark hind legs. No photographs of living *Neotoma martinensis* are known. Photograph by E. Yensen.

FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of *Neotoma martinensis* (adult female, San Martin Island, Baja California, Mexico, National Museum of Natural History number 81073). Greatest length of cranium is 43.7 mm. Photographs by A. L. Gardner.

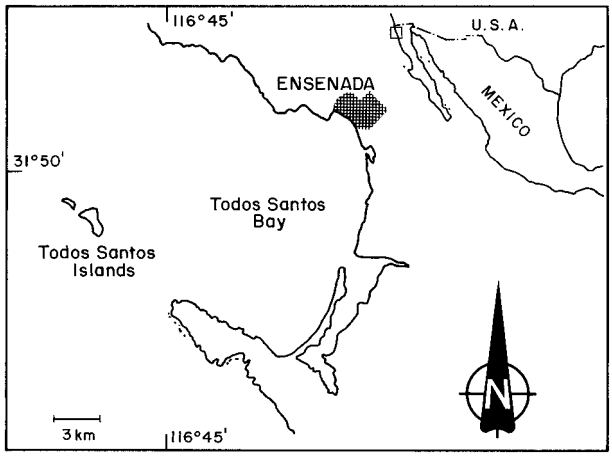

FIG. 3. Distribution of *Neotoma martinensis* in Baja California, Mexico. *N. martinensis* is endemic to San Martin Island.

FIG. 4. Habitat of *Neotoma martinensis* on San Martin Island, Baja California, Mexico. Photograph by E. Mellink.

average (± *SD*, with range and sample size in parentheses): length of skull, males 45.1 ± 1.7 (42–48, 17), females 42.4 ± 1.3 (40–44, 9); width of skull, males 23.4 ± 1.05 (21–25, 15), females 21.7 ± 0.6 (21–23, 9—Smith 1991); basilar length, 37.4; zygomatic breadth, 23.2; interorbital breadth, 5.5; length of nasals, 17.9; length of incisive foramen, 9.7; length of palatal bridge, 7.4; alveolar length of maxillary tooth row, 8.3 (n = 4 adults—Goldman 1910).

DISTRIBUTION. *Neotoma martinensis* is known only from the type locality, San Martin Island, 5 km offshore from San Quintin on the west coast of Baja California, Mexico (Fig. 3—Goldman 1910, 1932; Hall 1981; Huey 1964). The island is ca. 1.5 km in diameter with an area of 318 ha and is surrounded by cliffs up to 45 m tall, except on the northeast where a small sandy beach and tidal lagoon occur. San Martin Island is in a volcanic belt, and is composed of Tertiary andesite and basalt. The taller of 2 volcanic peaks in the center of the island reaches 151 m elevation and has a small crater ca. 60 m wide and 20 m deep. Slopes of the volcanoes extend down to cliffs and rugged lava beds (Fig. 4) cover the island (Goldman 1951; Mellink 1992; Nelson 1922; Wiggins 1980).

San Martin Island is a land bridge island. It was connected to the mainland during the Pleistocene (Hafner and Riddle 1997), but has been isolated for 7,500 years (Smith 1992). Three other wood rats, *N. anthonyi*, *N. bryanti*, and *N. bunkeri*, are endemic to land bridge islands off the coast of Baja California, and all are derivatives of *Neotoma intermedia* on the Baja California mainland (Orr 1960). No fossils of *N. martinensis* are known.

FORM AND FUNCTION. *Neotoma martinensis* exhibits gigantism like other wood rats on land bridge islands off the Baja California mainland (Lawlor 1982, 1983; Smith 1992), being 6.2% larger in length of head and body than *N. intermedia egressa* on the adjacent mainland (Smith 1991, 1992).

Wood rats endemic to land bridge islands also exhibit increased sexual dimorphism compared to mainland populations. Male *N. martinensis* are about 10% larger in length of head and body than females. This is an increase of 8.5% over the amount of sexual dimorphism in *N. intermedia egressa*, the most probable source population on the adjacent mainland (Smith 1992).

ECOLOGY. The island is in the Upper Sonoran life zone, and the dense Californian coastal scrub vegetation (Pase and Brown 1994) includes the succulent *Dudleya anthonyi* (Crassulaceae), *Lycium*, lichens, and cacti (Goldman 1951; Nelson 1922; Shultz et al. 1970). The island has no fresh water (Nelson 1922). The rough volcanic surface of the island (Fig. 4) has numerous caves, crevices, and cavities that are, or were, occupied by wood rats (Hanna 1925).

San Martin Island is a coastal guano island used by nesting seabirds, especially brown pelicans (*Pelecanus occidentalis*) and cormorants (*Phalacrocorax*). Marine mammals, including sea lions (*Zalophus californianus*), leopard seals (*Hydrurga leptonyx*), and, at least formerly, elephant seals (*Mirounga angustirostris*), breed on the island (Goldman 1951). The only land mammals are *N. martinensis*, *Notiosorex crawfordi*, and *Peromyscus maniculatus exiguus*, an endemic deer mouse (Hall 1981; Lawlor 1983). Nelson (1922) listed the latter for San Martin Island as *P. m. geronimensis*. *N. martinensis* is the only herbivore, and the island has no native terrestrial predators.

Japanese fishermen living on the island tried to control the wood rats by systematically burning brush and introducing cats (Hanna 1925). Hanna (1925), who spent only a few hours on the island in 1922, judged the cats were not effective and thought that they apparently fed upon birds and beach debris. He judged the wood rats were "numerous." In 1925, McLellan (1926) found abundant wood rat bones in barn owl (*Tyto alba*) pellets from the island and concluded that the species was "fairly common." L. Huey visited the island in 1926 (field notes at San Diego Natural History Museum) and W. H. Burt visited in 1938 (field notes at University of Michigan), and neither mammalogist mentioned wood rats, although Burt mentioned that mice were very abundant.

In 1963, *Peromyscus* was abundant, but Banks (1964) did not capture wood rats in 2 nights of trapping, although his field notes mention wood rat signs. In April 1968, Schultz et al. (1970) trapped two nights on the southeastern quarter of the island (466 trap nights) but did not collect any wood rats and found only old *Neotoma* signs. Fisherman told them that wood rats were abundant before introduction of cats 10 years earlier. They concluded that wood rats were extirpated on all or at least part of the island.

Mellink-Bijtel (1992) visited the island in 1989, 1991, and 1992, and although unable to trap any specimens, encountered some signs. He judged the San Martin wood rat extinct, or very near extinction, and recommended that extirpation of cats would benefit other species even if it were too late for wood rats.

REMARKS. The San Martin Island wood rat is listed as "endangered" by International Union for Conservation of Nature (World Conservation Monitoring Center 1990). The Mexican government considers it "threatened" (Norma Oficial Mexicana 1994).

Populations on mainland Baja California, referred to as *N. intermedia* following Planz (1992), are treated as *N. lepida* in many standard works (Hall 1981; Musser and Carleton 1993). *N. martinesis* was named for San Martin Island. *Neotoma* comes from the Greek *neos* for new and the Greek *tomos* for cut or slice, apparently in reference to a new division of the rodents (Alvarez-Castañeda and Alvarez Solórzano 1996).

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