

Neotoma bryanti. By Sergio Ticul Alvarez-Castañeda and Eric Yensen

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Neotoma bryanti Merriam, 1887

Cedros Island Wood Rat

Neotoma bryanti Merriam, 1887:191. Type locality "Cerros [=Cedros] Island, Lower California" [Baja California, Mexico].

CONTEXT AND CONTENT. Order Rodentia, Suborder Sciurognathi, Family Muridae, Genus *Neotoma*, Subgenus *Neotoma* (Musser and Carleton, 1993). It is a member of the *N. lepida* group (Goldman, 1932; Koop et al., 1985; Mascarello, 1978; Planz, 1992). *N. bryanti* is monotypic (Hall, 1981).

DIAGNOSIS. *Neotoma bryanti* (Fig. 1) is a large wood rat with large ears and a moderately long, bicolored tail. All hairs are plumbeous at the base. It is larger (total length usually >350 mm and hind foot >35 mm) and slightly darker than the closely related *N. intermedia* on the adjacent Baja California mainland (total length <360 mm and hind foot <37 mm). The molars are relatively larger than in *N. intermedia*, with the alveolar length of the maxillary toothrow >9.5 in *N. bryanti* and <9.5 mm in *N. intermedia* (Goldman, 1910). *N. bryanti* can be distinguished from other woodrats in Baja California and adjacent mainland Mexico as follows: *N. albigula* has hairs on the throat that are white to the base rather than plumbeous at the base, *N. fuscipes* has a tail that is not sharply bicolored, and *N. phenax* has large, semicircular auditory bullae and a unicolored dusky tail (Hall, 1981).

GENERAL CHARACTERS. Adult pelage is pale fulvous-brown dorsally with intermixed dark-tipped hairs. The head is gray-er, and the sides of the body are pale fulvous-gray with less black. The underparts are white or off-white with a buff tint. The ventral midline, from the chest to the base of the tail, has hairs that are white to the base in contrast to the more lateral ventral hairs that are gray at the base. The feet are white, and the bicolored tail is grayish brown above and lighter below (Allen, 1898; Goldman, 1910). Young are grayish brown with more black dorsally and a narrower white ventral median band than in adults, but feet and tail are similar to adults (Allen, 1898).

The skull (Fig. 2) is similar to *N. intermedia* from the adjacent mainland but is slightly larger and heavier. The frontals flare abruptly outward anteriorly between the lacrymals, the mid-line is deeply channeled, and the lateral borders form a sharp ridge that is nearly straight rather than arcuate and diverge posteriorly. The dentition is relatively heavier than in *N. intermedia* (Goldman, 1910). The dental formula is 1/1, 0/0, 0/0, 3/3, total 16. The baculum is of the "Baja-type" (Mascarello, 1978).

The means (eight adult topotypes; Goldman, 1910) and ranges for external characters, in mm (Allen, 1898; Goldman, 1910; E. Yensen, original data, $n = 11$) were as follows: total length, 377 (351–387); length of tail vertebrae, 168 (152–177); and hind foot length, 38 (36–40). The ears (from notch) measured 31.3 (31–32) mm and body masses were 160, 200, and 220 g (three subadult females; E. Yensen, original data). Mean mass of eight adults was 182 g (Mellink, 1993).

Means of skull measurements were (in mm; $n = 5$ adults; Goldman, 1910), basilar length, 40; zygomatic breadth, 24.5; interorbital breadth, 5.4; length of nasal, 18; length of incisive foramina, 9.9; length of palatal bridge, 8; and alveolar length of upper molar series, 9.8.

DISTRIBUTION. Specimens have been reported only from Cedros Island (Fig. 3) on the west coast of Baja California, Mexico (Anthony, 1925; Huey, 1964; McLellan, 1926). Cedros Island is ca. 23 km NW Punta Eugenia, the spur on the central west coast of the Baja California peninsula. The island is 39 km long, 5–15 km wide, and has an area of 360 km² (Osorio-Taffal, 1948). The highest

point on the island is Cerro de Cedros (1300 m elevation). Except for the southern end of the island, the topography is steep and rugged (Nelson, 1922). *N. bryanti* apparently occurs over most of the island (Mellink, 1993; Mellink-Bijtel, 1992). There is no fossil record.

REPRODUCTION. In February, three subadult (judged by toothwear, skull sutures, and pelage) females still had imperforate vaginae (E. Yensen, original data). In April, two females collected were pregnant (Banks, 1964). In June, juveniles were found, one female had lactated recently, three males had abdominal testes, and one male had inguinal testes (Mellink, 1993).

ECOLOGY. Cedros Island is in the Vizcaño subdivision of the Sonoran Desert (Turner and Brown, 1994), often referred to as the "Central Desert" (Coyle and Roberts, 1975), although Hafner and Riddle (1997) considered the Peninsular Desert of the Baja California Peninsula to be distinct from the Sonoran Desert. The principal habitat types are coastal scrub, sand dune scrub, chaparral, juniper scrub, and pine forest (Moran, 1972; Rzedowski, 1978). *Neotoma bryanti* occurs in all vegetation zones and habitat types except sand dunes and the barren slopes near the town of Cedros (McLellan, 1926; Mellink, 1993; Mellink-Bijtel, 1992).

The type specimen was collected from a nest in a maguey plant (*Agave*). This large nest was 120 cm high and ca. 120 cm in diameter at the base and composed of dry leaves wedged so tightly into the living leaves that the collector was unable to overturn the nest (Merriam, 1887). Nest materials and construction styles (Fig. 4) vary greatly in different parts of the island depending upon the plant species available (Mellink, 1993). Of 97 nests observed on Cedros Island in February 1996, 47 were under prickly pear cacti (*Opuntia*), 27 were in rock crevices or between boulders, 13 were built in magueys, two were under jojoba (*Simmondsia chinensis*), one was under a low torote or elephant tree (*Pachycormis discolor*), two were in *Pachycormis* stumps, two were under cholla cacti (*Opuntia*), and three were in small caves (E. Yensen, original data).

At Punta Norte, nests were 1–2 m in diameter and 0.5–1 m in height and built of *Simmondsia* sticks, *Opuntia* spines and pads, and *Agave* fruits. Prickly pears were abundant at this site. In a 2-ha plot with 59 prickly pear patches, 43 had *Neotoma* nests, 15 had *Neotoma* runways and feces, and only one had no apparent use by *N. bryanti*. The largest prickly pear patch (10 m diameter) had three nests (E. Yensen, original data).

Based upon trapping results, the greatest observed density of *N. bryanti* was in the dense prickly pear "orchard" at Punta Norte (Mellink-Bijtel, 1992). Ten individuals were captured in 560 trap



FIG. 1. Adult female Cedros Island wood rat, *Neotoma bryanti*, from near Cerro Solo, Cedros Island, Baja California, Mexico. Photograph by Sherilyn Robison.

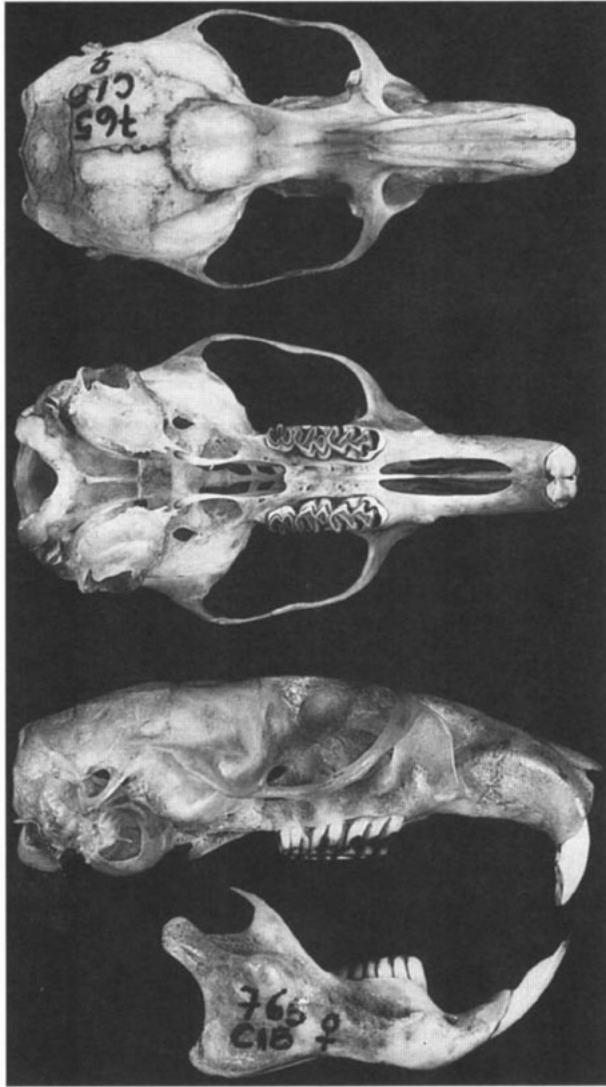


FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of *Neotoma bryanti* (adult female, from Cedros Island, Baja California, Mexico, number 765 in Mammal Collection of the Centro de Investigaciones Biológicas del Noroeste). Greatest length of cranium is 44.6 mm.

nights of general trapping (Mellink, 1993). Trapping near nests resulted in seven captures in 97 trap nights (E. Yensen, original data).

Near Cerro Solo, nests were composed of sticks of *Pachycormis* and dead *Mammalaria* cacti. Seven of 14 nests were active in a 10-ha study area (density 1.4 nests/ha) as indicated by fresh feces, and all nests were associated with boulders and rock outcroppings. The nests were constructed of *Pachycormis*, desert thorn (*Lycium*), *Franseria*, and *Simmondsia* sticks and dead *Mammalaria* cacti. *Opuntia* were rare at this site, and many of the nests were partially covered (0–90%, mean = 44%) with rocks on top of the sticks. Randomly selected rocks from the nests measured 30–90 mm (mean = 56) by 21–57 mm (mean = 36) by 11–38 mm (mean = 24) and weighed 9–99 g (mean = 46— $n = 57$; E. Yensen, original data).

All native land mammals that occur on Cedros Island are endemic. In addition to *N. bryanti*, these include *Sylvilagus bachmani cerrosensis*, *Perognathus fallax anthonyi*, *Peromyscus eremicus cerrosensis*, and *Odocoileus hemionus cerrosensis* (Hafner and Riddle, 1997; Mellink, 1993). Potential native predators of *N. bryanti* include *Polyborus plancus*, *Bubo virginianus*, *Tyto alba*, *Parabuteo unicinctus*, and *Buteo jamaicensis* (Ricardo Rodriguez, in litt.). No ectoparasites have been reported for *N. bryanti*. None of 10 *N. bryanti* captured in 1990 had ectoparasites (Mellink,

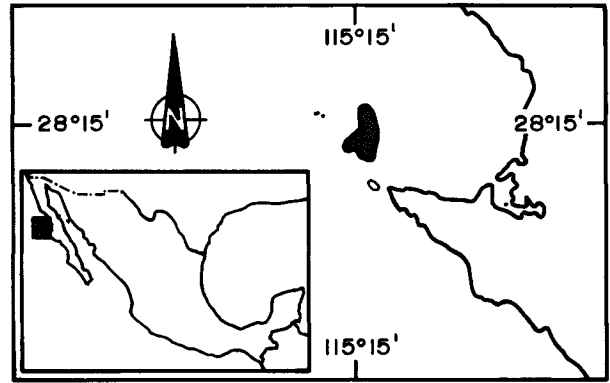


FIG. 3. Distribution of *Neotoma bryanti* in Baja California, Mexico. *N. bryanti* is endemic to Cedros Island.

1993), and three specimens examined in 1996 also were apparently free of larger ectoparasites (E. Yensen, original data).

Goats (*Capra hircus*) were introduced to Cedros Island prior to 1850 by whalers, and rats (*Rattus norvegicus*), mice (*Mus musculus*), cats (*Felis catus*), and burros (*Equus asinus*) were feral on the island before the end of the century (Browne, 1869; Bryant, 1886; Slevin, 1940). In the 1940s, cattle (*Bos taurus*), more burros, sheep (*Ovis aries*), and more goats were introduced (Mellink, 1993). Feral dogs (*Canis*) are said to be a serious problem for native wildlife (Mellink, 1993) and could negatively effect wood rat populations. However, there is also evidence that illegal deer hunting on the island has reduced deer and goat populations, and that dogs are being blamed to hide this activity (M. Valdés, in litt.).

GENETICS. Phylogenetic analyses using mtDNA sequences and allozyme data have shown that wood rats in the *N. lepida* group form a distinct clade which may deserve subgeneric recognition. The group consists of at least three species, *N. lepida*, *N. devia*,

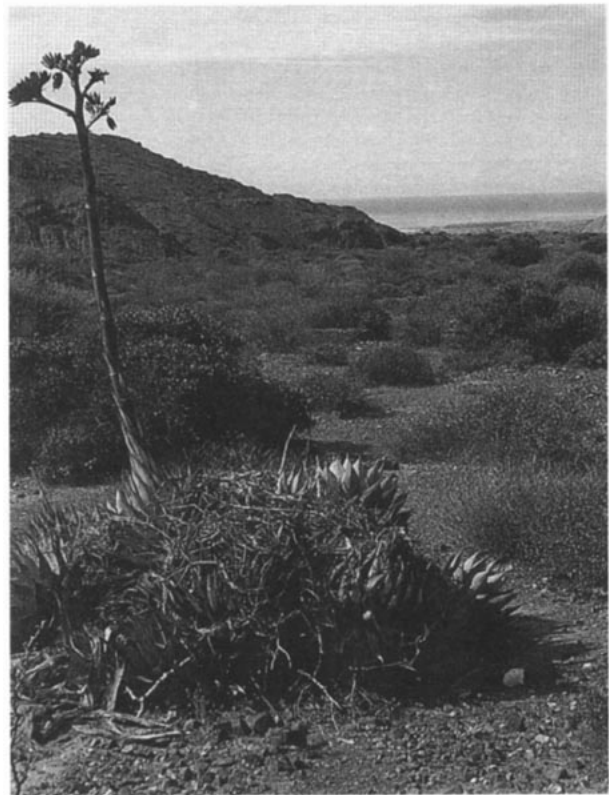


FIG. 4. Nest of *Neotoma bryanti* in a maguey (*Agave*) and habitat on Cedros Island, Baja California, Mexico. Photograph by Eric Yensen.

and *N. intermedia*, with the latter in the Baja California peninsula (Planz, 1992). *N. bryanti* was not included in the analysis, but Planz (1992) considered it closely related to mainland *N. intermedia*. Cedros Island is a late Pleistocene land-bridge island which was connected with the mainland of the peninsula as recently as 15,000 years ago. *Crotalus exsul*, a rattlesnake, is the only Cedros Island endemic vertebrate thus far examined at the molecular level (mtDNA sequence and allozyme analyses), and it differed only marginally at the subspecific level from mainland *C. ruber* (Murphy et al., 1995), suggesting that *N. bryanti* likewise may be little differentiated from mainland *N. intermedia*.

CONSERVATION STATUS. *Neotoma bryanti* was judged "scarce" in 1963 (Banks, 1964). In 1990, it was considered endangered or critically endangered (Mellink-Bijtel, 1992) due to elimination of shrubs for firewood on the southern part of the island and because of predation by domestic cats and dogs. Mellink-Bijtel (1992) recommended elimination of introduced predators. Cats and the depletion of resources are blamed for the extinction or near extinction of three wood rats endemic to islands off Baja California, *Neotoma bunker* (Smith et al., 1993), *N. anthonyi*, and *N. martinensis* (Mellink-Bijtel, 1993). However, no data on overall abundance or population trends are available for *N. bryanti*.

REMARKS. Mainland Baja California populations treated herein as *N. intermedia* following Planz (1992) are considered *N. lepida* in many standard works (Hall, 1981; Musser and Carleton, 1993). In the original description, Goldman (1910:51) compared *Neotoma bryanti* with *N. intermedia cursoria*, but this subspecies is not listed in Hall (1981), Hall and Kelson (1959), Huey (1964), Goldman (1910, 1932), Merriam (1894), or Musser and Carleton (1993), even as a synonym. *Neotoma bryanti* was named in honor of its discoverer, Walter E. Bryant (Merriam, 1887). The common name "Bryant's wood rat" has been used for this species (Goldman, 1910; Hall, 1981), but Cedros Island wood rat (Huey, 1964; McLellan, 1926) is more descriptive.

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LITERATURE CITED

- ALLEN, J. A. 1898. Descriptions of new mammals from western Mexico and Lower California. Bulletin of the American Museum of Natural History, 10:143–158.
- ANTHONY, A. W. 1925. The birds and mammals. Expedition to Guadalupe Island, México, in 1922. Proceedings of the California Academy of Science, Series 4, 14:277–320.
- BANKS, R. C. 1964. Birds and mammals of the voyage of the "Gringa." Transactions of the San Diego Society of Natural History, 13:177–184.
- BROWNE, J. R. 1869. Resources of the Pacific slope. Appleton, New York.
- BRYANT, W. E. 1886. Cerros Island. Stream, 19:62–64.
- COYLE, J., AND N. C. ROBERTS. 1975. A field guide to the common and interesting plants of Baja California. Natural History Publishing Co., La Jolla, California, 206 pp.
- GOLDMAN, E. A. 1910. Revision of the wood rats of the genus *Neotoma*. North American Fauna, 31:1–124.
- . 1932. Review of wood rats of *Neotoma lepida* group. Journal of Mammalogy, 13:59–67.
- HAFNER, D. J., AND B. R. RIDDLE. 1997. Biogeography of Baja California peninsular desert mammals. Pp. 39–68, in Life among the muses: papers in honor of James S. Findley. (T. L. Yates, W. L. Gannon, and D. E. Wilson, eds.). Special Publication, The Museum of Southwestern Biology, 3:1–290.
- HALL, E. R. 1981. The mammals of North America. John Wiley & Sons, New York, 2:601–1181 + 90.
- HALL, E. R., AND K. R. KELSON. 1959. The mammals of North America. Ronald Press, New York, 2:547–1083 + 79.
- HUEY, L. M. 1964. The mammals of Baja California, Mexico. Transactions of the San Diego Society of Natural History, 13: 85–168.
- KOOP, B. F., R. J. BAKER, AND J. T. MASCARELLO. 1985. Cladistical analysis of chromosomal evolution within the genus *Neotoma*. Occasional Papers, The Museum, Texas Tech University, 96:1–9.
- MASCARELLO, J. T. 1978. Chromosomal, biochemical, mensural, penile, and cranial variation in desert woodrats (*Neotoma lepida*). Journal of Mammalogy, 59:477–495.
- MCLELLAN, M. E. 1926. Expedition to the Revillagigedo Islands, Mexico, in 1925, VI. The birds and mammals. Proceedings of the California Academy of Sciences, Series 4, 15:279–322.
- MELLINK-BIJTEL, E. 1993. Biological conservation of Isla de Cedros, Baja California, Mexico: assessing multiple threats. Biodiversity and Conservation, 2:62–69.
- MELLINK-BIJTEL, E. 1992. Estatus de los heterómidos y cricétidos endémicos del Estado de Baja California. Informe Técnico. Comunicaciones Académicas, Serie Ecología, Centro de Investigación Científica y de Educación Superior de Ensenada, pp. 1–10.
- MERRIAM, C. H. 1887. Description of a new species of wood-rat from Cerros Island, off Lower California (*Neotoma bryanti* sp. nov.). American Naturalist, 21:191–193.
- . 1894. Abstract of a study of the American wood rats, with descriptions of fourteen new species and subspecies of the genus *Neotoma*. Proceedings of the Biological Society of Washington, 9:117–128.
- MORAN, R. 1972. Las plantas vasculares de Isla Cedros. Calafia, 2:34–36.
- MURPHY, R. W., V. KOVAK, O. HADDRATH, G. S. ALLEN, A. FISHBEIN, AND N. E. MANDRAK. 1995. MtDNA gene sequence, allozyme, and morphological uniformity among red diamond rattlesnakes, *Crotalus ruber* and *Crotalus exsul*. Canadian Journal of Zoology, 73:270–281.
- MUSSER, G. G., AND M. D. CARLETON. 1993. Family Muridae. Pp. 501–755, in Mammal species of the world: a taxonomic and geographic reference. Second ed. (D. E. Wilson and D. M. Reeder, eds.). Smithsonian Institution Press, Washington, District of Columbia, 1206 pp.
- NELSON, E. W. 1922. Lower California and its natural resources. National Academy of Sciences, 16:1–194.
- OSORIO-TAFFAL, B. F. 1948. La Isla Cedros, Baja California. Boletín de la Sociedad Mexicana de Geografía y Estadística, 66: 317–402.
- PLANZ, J. V. 1992. Molecular phylogeny and evolution of the American woodrats, genus *Neotoma* (Muridae). Ph.D. dissertation. University of North Texas, Denton, 164 pp.
- RZEDOWSKI, J. 1978. Vegetación de México. Limusa, México, D. F., 431 pp.
- SLEVIN, J. R. 1940. Wildlife disappearing from Cedros. Bulletin of New York Zoological Society, 43:478–480.
- SMITH, F. A., B. T. BESTELMEYER, J. BIARDI, AND M. STRONG. 1993. Anthropogenic extinction of the endemic woodrat, *Neotoma bunker* Burt. Biodiversity Letters, 1:149–155.
- TURNER, R. M., AND D. E. BROWN. 1994. Sonoran deserts scrub. Pp. 181–221, in Biotic communities: southwestern United States and northwestern Mexico (D. E. Brown, ed.). University of Utah Press, Salt Lake City, 342 pp.

Editor for this account was LESLIE N. CARRAWAY. Managing editor was BARBARA H. BLAKE.

S. T. ALVAREZ-CASTAÑEDA, CENTRO DE INVESTIGACIONES BIOLÓGICAS DEL NOROESTE, A. C., APARTADO POSTAL 128, LA PAZ, BAJA CALIFORNIA SUR, C.P. 23000, MEXICO; and E. YENSEN, MUSEUM OF NATURAL HISTORY, ALBERTSON COLLEGE OF IDAHO, CALDWELL, IDAHO 83605.