

Chaetodipus nelsoni. By Troy L. Best

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Chaetodipus nelsoni (Merriam, 1894)

Nelson's Pocket Mouse

Perognathus (*Chaetodipus*) *nelsoni* Merriam, 1894:266. Type locality "Hacienda La Parada [25 miles northwest of the city of San Luis Potosi—Elliot, 1905:313], San Luis Potosi, Mexico."

Perognathus collis Blair, 1938:1. Type locality "Limpia Canyon, about one mile northwest of Fort Davis, Davis Mountains, Jeff Davis County, Texas, altitude 4800 feet."

[*Chaetodipus*]. *nelsoni*: Hafner and Hafner, 1983:25, first use of name combination.

CONTEXT AND CONTENT. Order Rodentia, Suborder Sciuromorphi, Superfamily Geomyoidea, Family Heteromyidae, Subfamily Perognathinae, Genus *Chaetodipus*, Subgenus *Chaetodipus* (Williams et al., 1993). A key to the 14 species and two subgenera of *Chaetodipus* is presented by Williams et al. (1993) and Best (1993a). Two subspecies of *C. nelsoni* are recognized (Hall, 1981):

C. n. canescens (Merriam, 1894:267). Type locality "Jaral, Coahuila, Mexico" (*collis* Blair and *popei* Blair are synonyms).

C. n. nelsoni (Merriam, 1894:266), see above.

DIAGNOSIS. *Chaetodipus nelsoni* (Fig. 1) is sympatric with *C. hispidus*, *C. intermedius*, *C. lineatus*, and *C. penicillatus* (Hall, 1981). External features that help distinguish *C. nelsoni* from sympatric and parapatric species of *Chaetodipus* are: numerous and prominent spines on the rump; distal ends of the rump spines usually are darkly colored dorsally; entire rump spine is pale-colored laterally; no thin and elongate rump hairs; soles of the hind feet are blackish (Wilkins and Schmidly, 1979).

Compared with *C. hispidus*, *C. nelsoni* is a much smaller pocket mouse with a relatively long, crested tail, and with spines on the rump (Williams et al., 1993). Compared with *C. lineatus*, *C. nelsoni* is distinguished by its dark-brownish color, rather than dull gray, and the presence of spines in the pelage of the rump (Dalquest, 1951; Williams et al., 1993). Compared with *C. artus*, *C. nelsoni* has greater nasal projection, exoccipital width, posterior zygomatic width, interparietal length, and interorbital width. Compared with *C. goldmani*, *C. nelsoni* has greater nasal projection, greater interparietal width, greater interorbital width, shorter ears (Anderson, 1972), and relatively larger mastoid bullae (Williams et al., 1993).

Average measurements (in mm) of males and females, respectively, of *C. nelsoni*, *C. intermedius*, and *C. penicillatus*, respectively, from Trans-Pecos Texas are: total length, 180, 181, 168, 165, 170, 169; length of tail, 102, 102, 93, 93, 92, 93; length of hind foot, 21, 21, 21, 21, 22, 22; length of ear, 8, 8, 7, 7, 7, 7; greatest length of cranium, 25.3, 25.2, 24.3, 24.0, 25.2, 25.0; mastoid breadth, 13.3, 13.2, 13.0, 12.8, 12.7, 12.7; occipitobullar length, 7.7, 7.7, 7.6, 7.5, 7.5, 7.4; occipitomaxillary length, 14.4, 14.4, 12.6, 12.6, 14.3, 14.2; rostral length, 10.7, 10.7, 10.3, 10.2, 10.6, 10.4; nasal length, 9.1, 9.0, 8.7, 8.6, 9.7, 9.6; interorbital constriction, 6.2, 6.2, 6.1, 6.0, 6.2, 6.1; width of interparietal, 7.3, 7.3, 7.5, 7.3, 6.5, 6.5; length of interparietal, 3.9, 4.0, 3.1, 3.1, 3.2, 3.1; depth of cranium, 8.3, 8.3, 8.1, 8.0, 8.1, 8.1; length of maxillary tooththrow, 3.4, 3.3, 3.4, 3.4, 3.4, 3.4; width of maxillary tooththrow, 4.2, 4.2, 4.2, 4.1, 4.1, 4.1 (Wilkins and Schmidly, 1979).

Compared with *C. intermedius*, *C. nelsoni* has more conspicuous rump spines, coarser pelage, larger size, shorter tooththrow (Anderson, 1972), wider rostrum (Williams et al., 1993), greater posterior zygomatic width, interparietal length (Anderson, 1972), length of cranium, occipitomaxillary length, rostral length, nasal length, and length of interparietal. The difference in average length of interparietal is due to the pentagonal shape of the interparietal in *C. nelsoni* (Fig. 2) and the roughly ellipsoidal shape of this bone

in *C. intermedius*. External features that also serve to distinguish *C. intermedius* from *C. nelsoni* are few spines on the rump, entire rump spines usually are pale-colored dorsally and laterally, numerous thin and elongate rump hairs that are about the same length as the rump spines, and soles of the hind feet are whitish (Wilkins and Schmidly, 1979).

Chaetodipus nelsoni may be confused with *C. penicillatus*, which is similar in size and proportions and with which *C. nelsoni* is broadly sympatric. Compared with *C. penicillatus*, *C. nelsoni* has rump spines, greater nasal projection, exoccipital width, interparietal length, and interparietal width, and lesser anterior zygomatic width and premaxillonasal length (Anderson, 1972). *C. nelsoni* is significantly larger than *C. penicillatus* in total length, length of tail, length of ear, mastoid breadth, occipitobullar length, occipitomaxillary length, rostral length, width of interparietal, length of interparietal, depth of cranium, and width of maxillary tooththrow. The greater dimensions of the interparietal in *C. nelsoni* reflect a frequently more pronounced forward displacement of the anterior border of the interparietal (Wilkins and Schmidly, 1979). The characteristic rump spines of *C. nelsoni* may not be evident in young or molting animals (Findley, 1987). However, young *C. nelsoni* that lack rump spines may be distinguished from young or adult *C. penicillatus* by the presence of white subauricular spots and dusky plantar surfaces of the hind feet (Porter, 1962).

GENERAL CHARACTERS. *Chaetodipus nelsoni* is a medium-sized pocket mouse with coarse pelage, numerous black-tipped spines on the rump (Davis, 1974), and external fur-lined cheek-pouches (Dalquest, 1953). The ears are small and oval, the body is elongate and slim, the forefeet are small, and the hind feet are large. The pelage is long on the middorsal region, and the rump has numerous long and grooved spines. The spines of the rump are best seen by pressing down the skin of the rump, causing the hairs and spines to rise (Dalquest, 1953). The tail is longer than the head and body, sparsely haired on the basal one-half, the terminal one-half is crested, penicillate, indistinctly bicolored, and darker above than below. The soles of the hind feet are blackish (Davis, 1974). Dorsally and laterally, the pelage is brown. The hairs there are dark plumbeous basally, with a narrow grayish-fawn zone and a dark black tip. The orbital region is slightly paler than the dorsum and sides. The lateral line is fawn in color and well defined. The underparts are whitish, and the ears are dusky and slightly hoary on the margins (Osgood, 1900).



FIG. 1. A *Chaetodipus n. canescens* on the east slope of King Mountain, near McCamey, Upton Co., Texas.

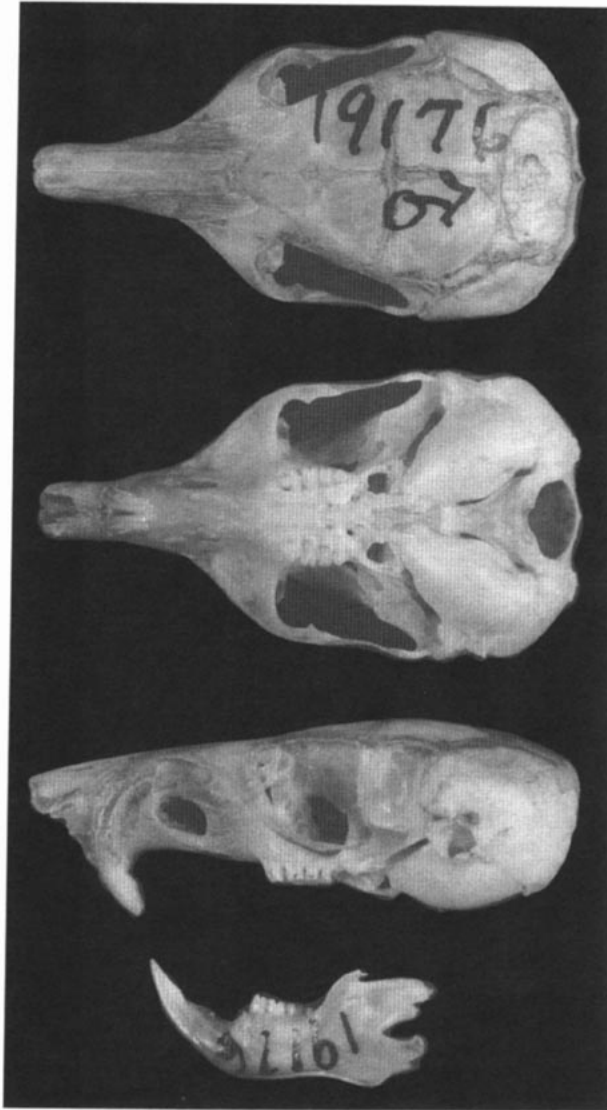


FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of *Chaetodipus n. nelsoni* from 16 km S Matehuala, San Luis Potosí, Mexico (male, University of New Mexico Museum of Southwestern Biology 19176). Greatest length of cranium is 26.1 mm. Photographs by T. H. Henry.

Average measurements (in mm) of adult males and females, respectively, from throughout the range of Nelson's pocket mouse are: total length, 179.2, 176.4; length of body, 80.7, 78.4; length of tail, 98.6, 98.1; length of hind foot, 21.2, 21.0; length of ear, 8.0, 7.8; basal length of cranium, 15.9, 15.7; greatest length of cranium, 25.5, 25.2; spread of maxillary arch, 11.8, 11.5; interorbital width, 6.4, 6.4; nasal length, 10.0, 9.7; intermaxillary width, 4.6, 4.6; alveolar length, 3.7, 3.7; lacrimal length, 1.7, 1.8; width of maxillary arch, 1.3, 1.4; basioccipital length, 3.8, 3.9; greatest depth of cranium, 8.3, 8.3; greatest width of cranium, 13.5, 13.2; zygomatic width, 13.1, 12.8; nasal width, 2.8, 2.7 (Best, 1993b). In Tamaulipas, average mass (in g) for males and females, respectively, in southern localities is 14.7 (range, 12.0–16.5) and 13.8 (range, 12.0–15.5), and in northern localities average mass is 18.5 (17.0–20.0) and 17.0 (range 15.0–18.0—Alvarez, 1963). In Texas, average mass of adult males (16.1 g) is significantly larger than that of non-pregnant adult females (14.4 g), but there is no significant difference in length of body (males 82.5 mm, females 81.9 mm—Porter, 1962). Males are significantly larger than females in spread of maxillary arch and greatest width of cranium (Best, 1993b).

Compared with *C. n. nelsoni*, *C. n. canescens* has more slender nasals, constricted interorbital space, and slightly smaller mastoids (Osgood, 1900). In Coahuila, *C. n. canescens* is paler and has a

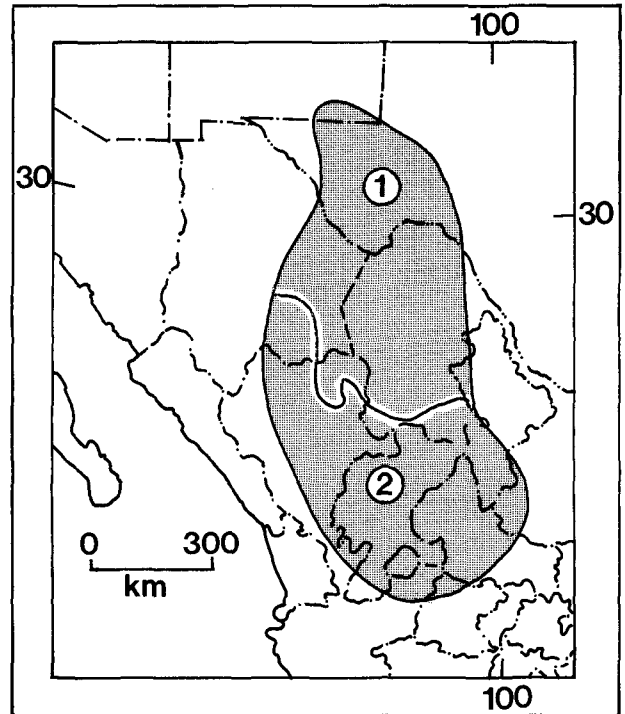


FIG. 3. Distribution of *Chaetodipus nelsoni* in western North America (Hall, 1981): 1, *C. n. canescens*; 2, *C. n. nelsoni*.

smaller rostrum and larger mastoids than *C. n. nelsoni* (Baker, 1956). In northeastern Durango, *C. n. canescens* is pale colored, and has slender nasal bones and small mastoids. In central and southern Durango, *C. n. nelsoni* is darker, and has a broad rostrum and large mastoids (Baker and Greer, 1962).

DISTRIBUTION. Nelson's pocket mouse occurs in southeastern New Mexico, western Texas, and northcentral Mexico (Fig. 3; Hall, 1981). Within this range, *C. nelsoni* occupies upper and lower Sonoran life zones (Osgood, 1900) at 365–2,025 m elev. (Baker, 1956). In Texas, the maximum elevation occupied seems to coincide with the ecotone between the desert-shrub vegetation and the pine-oak-juniper (*Pinus-Quercus-Juniperus*) woodlands (Porter, 1962). In Durango, the canyon of the Río Nazas does not seem to be a barrier to *C. nelsoni*, as it is for some other species of small mammals (Baker and Greer, 1962; Petersen, 1976).

FOSSIL RECORD. The fossil history of Perognathinae begins in the Miocene (Kurtén and Anderson, 1980; Wood, 1935). Remains that may be those of *C. nelsoni* have been found in late Pleistocene deposits from Cueva Quebrada, Val Verde Co., Texas (Lundelius, 1984), and remains of Recent age have been found in a cave in central Coahuila (Gilmore, 1947).

FORM AND FUNCTION. Compared with other *Chaetodipus*, the hair of *C. nelsoni* is shortest in length (average, 6.5 mm; range, 6.3–6.7) and medium in width (0.07–0.09 mm). The base of hairs flares rapidly, the shaft is straight, the tip is abrupt, and in cross section the trough is shallow and wide. The medulla has five or six oval to flattened cells across, the rows are irregular, and there is some fusion of cells (Homan and Genoways, 1978).

Rump spines are absent in young *C. nelsoni* and at times during the molt. Summer pelage is coarse and upperparts are grizzled yellowish-brown from admixture of coarse buffy and black hairs; winter pelage is finer and grayish black (Merriam, 1894). Worn pelage is paler than unworn pelage (Osgood, 1900). In Texas, pelage is palest in April and becomes progressively darker until September (Borell and Bryant, 1942).

The one annual molt (May–October) is ≤ 1 month for most adults. Molt progresses from the nose posteriorly and terminates at the ankle. The venter usually lacks an evident molt line and the rate of molt appears to be slower there than on the dorsum. Consequently, by the time the dorsal molt line reaches the rump, the ventral molt still is confined to the belly region. As a result, the final

stages of molt are characterized by a molt line extending from the rump laterally and anteriorly across the thighs and sides. The molt then progresses posteriorly on the belly and down the hind legs. The last stage of molt is indicated by the presence of molt lines near the ankles (Porter, 1962). In Jalisco on 18 July, one adult was molting on the posterior part of the back and on the flanks (Genoways and Jones, 1973). In Texas, several had distinct molt lines, and some appeared to lack guard hairs (Tamsitt, 1954).

In Durango, *C. n. nelsoni* from the dark, volcanic soils of the Guadiana lava field have distinctly blackish upperparts and buffy underparts, while those on adjacent pale soils are less dark. Specimens from the middle of the lava field are darker than those at the periphery (Baker, 1960; Baker and Greer, 1962). In Texas, there is no significant difference in coloration of Nelson's pocket mouse between limestone and lava habitats (Tamsitt, 1954).

The dental formula of Nelson's pocket mouse is $i\ 1/1, c\ 0/0, p\ 1/1, m\ 3/3$, total 20 (Nowak, 1991). The skull (Fig. 2) is moderately narrow across the anterior portion of the zygomatic arches (Williams et al., 1993), the nasal branches of the premaxillae are longer than the nasals, and the ascending branches of the supraorbitals are heavy (Osgood, 1900). The interparietals are relatively long (Williams et al., 1993) and vary from strap to pentagonal in shape (Borell and Bryant, 1942).

The hind foot is 30% of the length of head and body, the tail is 133% of the length of head and body, and the tail has a penicillate tip (Hatt, 1932). The sebaceous caudal glands are small, unmodified, and larger in males than females (Quay, 1965).

The baculum is elongate and slender, it tapers gradually from the bulbous base to the angled tip, and it is typical of *Chaetodipus*. Measurements of two bacula from Texas are: length, 12.0, 12.3; height of base, 0.8, 0.9 (Burt, 1960).

ONTOGENY AND REPRODUCTION. The length of the breeding season is ≥ 5 months (March–July—Baker, 1956; Conley et al., 1977). In Texas, the breeding season begins in February and the peak of pregnancy is reached in March (Davis, 1974). In Coahuila, pregnant females were present 29 March, 18 April, 28 April, 27 June, 7 July, and 21 July. Non-pregnant females occurred in January–April, July, November, and December (Baker, 1956). In Durango on 26 June, one *C. nelsoni* had two embryos and one on 16 August had three embryos, but 32 females examined 10 June to 30 July showed no evidence of breeding (Baker and Greer, 1962). In San Luis Potosí, few pregnant females have been found before July. Litters are born in August, and in August and early September most females are lactating (Dalquest, 1953).

Average litter size is about three (range, one to five—Baker, 1956; Conley et al., 1977; Davis, 1974; Jones, 1985; Matson and Baker, 1986; Porter, 1962), and the gestation period is ca. 30 days (Davis, 1974; Jones, 1985). In Texas, subadults are present March–July (Davis, 1974), and in Coahuila, young appear in spring and summer (Baker, 1956). In Zacatecas, females are lactating from 13 July to 18 August (Matson and Baker, 1986).

Young grow rapidly, and by late August and September Nelson's pocket mouse is among the most common desert mammals (Dalquest, 1953). Subadults in molt are intermediate in size between subadults not in molt and adults. Subadults apparently complete the postjuvenile molt before they have acquired their mature mass and length of body. For most subadults, duration of molt is ≤ 1 month, but one subadult examined in late May had not completed this molt by 9 July. Most subadults complete the postjuvenile molt by September (Porter, 1962).

Chaetodipus nelsoni molts into adult pelage and probably is capable of reproducing before it acquires adult mass. Average mass of adults with spermatozoa is significantly greater during July and August than that of subadults with spermatozoa captured during the same period. For one sample of subadult females in the Big Bend region of Texas, 10% were pregnant and 5% had placental scars (Porter, 1962).

In the Big Bend region, a greater percentage of subadults (25%) than adults (12%) survive from one July to the next (Porter, 1962). Two *C. nelsoni* that were first captured as subadults were alive in the wild for ≥ 30 months, another for 24 months, and two others for ca. 20 months (Davis, 1974; Porter, 1962).

ECOLOGY. In Texas, Nelson's pocket mouse occurs on steep rocky slopes (Fig. 4), on sandy flats, around old stone buildings, and in piles of rocks (Bailey, 1905; Blair, 1940; Blair and Miller, 1949; Davis, 1974; Denyes, 1956; Hollander et al., 1987; Tamsitt, 1954).



FIG. 4. Habitat occupied by *Chaetodipus n. canescens* on the east slope of King Mountain near McCamey, Upton Co., Texas.

Because of its ecological association with mountains in Texas, *C. nelsoni* exists in numerous semi-isolated populations; desert basins are at least partial barriers to the interchange of individuals among populations (Blair, 1950). In the Big Bend region, Nelson's pocket mouse occurs in the riparian corridor (Boer and Schmidly, 1977), but is most common on rocky slopes (30–40% slope). The soil, which often is shallow, contains 80–90% rocks. In this habitat, there are 500–>14,500 rocks >40 cm in diameter/ha. Size of rocks probably is of greater importance in determining the abundance and distribution of *C. nelsoni* than slope or density of vegetation (Porter, 1962). *C. nelsoni* occurs in habitats having prickly pear (*Opuntia engelmannii* and *O. macrocentra*—Dixon, 1959), persimmon–shin-oak (*Diospyros–Quercus*—Hermann, 1950), creosotebush (*Larrea tridentata*), ocotillo (*Fouquieria splendens*), honey mesquite (*Prosopis glandulosa*), sotol (*Dasyllirion leiophyllum*), lechuguilla (*Agave lechuguilla*), catclaw (*Acacia berlandieri*, *A. greggii*), purple threeawn (*Aristida purpurea*), grama grass (*Bouteloua breviflora*), *B. curtipendula*, *B. gracilis*, *B. hirsuta*), doveweed (*Croton neomexicana*), prairie clover (*Dalea wrightii*), hedge-hog cactus (*Echinocereus enneacanthus*, *E. stramineus*), ephedra (*Ephedra antisyphilitica*, *E. trifurcata*), lovegrass (*Eragrostis intermedia*), candelilla (*Euphorbia antisyphilitica*), *Hechtia scariosa*, bluet (*Hedyotis polypremoides*), galletagrass (*Hilaria berlandieri*), leather weed (*Jatropha spathulata*), *Leucophyllum minus*, prickly pear (*Opuntia grahami*, *O. rufida*, *O. leptocaulis*, *O. phaeacantha*), aromatic shrub (*Parthenium incanum*, *P. lyratum*, *P. argentatum*), red-flowered beardtongue (*Pentstemon baccharifolius*), *Portulicaria angustifolia*, sumac (*Rhus microphylla*), sage (*Salvia roemeriana*), spikemoss (*Selaginella rupestris*), snowberry (*Symphoricarpos*), fluffgrass (*Triodia pilosa*, *T. pulchella*), *Ungnadia speciosa*, and Torrey yucca (*Yucca torreyi*). The greatest amount of ground cover is from colonies of lechuguilla, grass clumps, and scattered thick growths of *Euphorbia antisyphilitica* and *Hechtia scariosa* (Denyes, 1956; Hermann, 1950; Tamsitt, 1954). Vegetative cover usually is dense (>22,500 plants/ha; >60% of the

surface is covered by vegetation. The understory plants usually are 30–50 cm in height (Porter, 1962).

In Mexico, Nelson's pocket mouse usually occupies rocky soils on slopes (Baker, 1956; Baker and Greer, 1962; Dalquest, 1953; Hooper, 1955), but it may occur on sandy or other fine soils (Baker, 1956). An important habitat of *C. nelsoni* seems to be stone walls (Baker, 1960; Dalquest, 1953; Genoways and Jones, 1973), which were constructed in colonial days and extend over the desert for great distances (Dalquest, 1953). *C. nelsoni* lives in bajada habitats of the Chihuahuan Desert that are characterized by *Opuntia ras-trata*, *Larrea*, *Castella*, *Cordia*, *Krameria* (Rogovin et al., 1991), *Agave asperima*, *Euphorbia antisiphilitica*, and *Jatropha* (Grenot and Serrano, 1980, 1982; Serrano, 1987). In Aguascalientes, *C. nelsoni* occurs on cactus and mesquite-studded rocky hills (Hooper, 1955). In Coahuila, Nelson's pocket mouse occurs on slopes where cactus, creosotebush, sotol, and lechuguilla provide scattered cover (Baker, 1956). In Durango, *C. nelsoni* is present in grasslands, rocks, mixed grass and shrub, and desert shrub (Baker and Greer, 1962), as well as arid grasslands with scattered catclaws, junipers, and mesquites on the east-facing foothills of the Sierra Madre Occidental (Baker, 1966). In the Guadiana lava field, Nelson's pocket mouse occurs in open grass, on bare areas, and near clumps of brush and cacti (Baker, 1960). In Jalisco, *C. nelsoni* occurred under dense growth of deciduous bushes and cacti bordering a dry stream bed, and around cornfields, stone fences, and where mesquite grew along riverbanks (Genoways and Jones, 1973). In San Luis Potosí, Nelson's pocket mouse occurs in desert areas, and is most abundant in brush and near rocks (Dalquest, 1953). In Tamaulipas, *C. nelsoni* occupies semi-arid habitats where the dominant plants are cactus, weeds, and bushes (Alvarez, 1963). In Zacatecas, *C. nelsoni* is absent only from montane forests in the western part of the state (Matson and Baker, 1986).

In Jalisco, and other parts of Mexico, Nelson's pocket mouse occupies habitats that have been disturbed by agricultural practices (Genoways and Jones, 1973). In Durango, *C. nelsoni* may have become more abundant or even extended its range in the grassland habitat as a result of severe grazing by livestock (Baker, 1960; Baker and Greer, 1962). In Zacatecas, *C. nelsoni* occurs where much of the land is under cultivation, but there may be clumps of grass and nopal cactus (*Opuntia*) in ravines that serve as suitable habitat (Genoways and Jones, 1971).

Throughout its range, Nelson's pocket mouse is one of the commonest pocket mice (Baker, 1960; Baker and Greer, 1962; Hall, 1981; Matson and Baker, 1986; Osgood, 1900; Tamsitt, 1954). In Texas, the annual turnover is ca. 75–86% (Porter, 1962), and there is much fluctuation of population size (Tamsitt, 1954). In Mexico, densities often are 1–8/ha (Rogovin et al., 1991), but may reach 60.9/ha in late spring–early summer when ca. 65% of the population may be young-of-the-year (Serrano, 1987).

In Mexico, size of home range is 0.14–0.45 ha (range, 0.04–0.86 ha—Grenot and Serrano, 1982). In Texas, home ranges of males (0.31 ha) are larger than those of females (0.26 ha—Porter, 1962), and there is a tendency for home ranges of males to overlap (Dixon, 1959). Home ranges of adult males are complementary during periods when population density is low (July and September) with the exception of March. The overlapping in March probably is attributable to the greater movement of adult males as a result of increased breeding activities during that period. During December and May, when population densities are high, home ranges of adult males overlap to a greater extent than when populations are low. Home ranges of adult females are exclusive of each other during March and September, and slightly overlap during July, December, and May (Porter, 1962).

In Texas, one burrow of *C. nelsoni* opened in the cut-bank face of an arroyo. There were several openings adjacent to the burrow that were 3–4 cm in diameter. The burrow extended straight back into the wall of the cut-bank 30 cm. At this point, four tunnels converged, three of which opened in the face of the arroyo. The main tunnel turned to the right at the point of convergence and sloped slightly downward continuing on for 30 cm before terminating in a large chamber 7 cm high and 13 cm wide. One tunnel extended upward to the surface opening ca. 15 cm from the edge of the arroyo. The nest primarily consisted of shredded grasses, was 14 cm long and 6.5 cm wide, and was 5 cm from the point of convergence along this tunnel. No feces, parasites, or food caches were present in the burrow system (Judd, 1967).

Nelson's pocket mouse is a granivore (Grenot and Serrano,

1982; Packard, 1977), but it also may eat insects and other parts of plants (Grenot and Serrano, 1982). Cheekpouches often contain 5 ml of seeds, usually of similar size, sometimes tiny, sometimes the size of peas. Some leaves and green vegetation also are found in cheekpouches (Dalquest, 1953). In Texas, cheekpouch contents included seeds of honey mesquite, creosotebush, prickly pear, spurge (*Euphorbia*), and buckwheat (*Eriogonum*—Judd, 1967).

Chaetodipus nelsoni, *C. lineatus*, and *C. penicillatus* occupy the same habitat in San Luis Potosí (Dalquest, 1951). In Texas, the range of *C. nelsoni* broadly overlaps that of *C. penicillatus*, but the two occupy different habitats; *C. nelsoni* lives in rocky habitats and *C. penicillatus* occupies sandy habitats (Borell and Bryant, 1942; Porter, 1962; Wilkins and Schmidly, 1979). However, *C. nelsoni* occasionally occurs with *C. penicillatus* on fine sandy loams (few rocks >8 cm in size, loose powdery soil) when vegetation consists of sparse stands of lechuguilla (Porter, 1962). The ranges of *C. nelsoni* and *C. intermedius* (both saxicolous species) are known to overlap only in the Trans-Pecos region of Texas (Stangl et al., 1993; Wilkins and Schmidly, 1979), but their ranges are parapatric over a broad area (Anderson, 1972; Findley, 1969; Wilkins and Schmidly, 1979). In Culberson Co., Texas, a population of *C. nelsoni* in the Beach Mountains appears to be surrounded by populations of *C. intermedius* (Stangl et al., 1993).

In Zacatecas, *C. nelsoni* is sympatric with seven species of heteromyids; *Perognathus flavus*, *Chaetodipus hispidus*, *Dipodomys merriami*, *D. ordii*, *D. phillipsii*, *D. spectabilis*, and *Liomys irroratus* (Genoways and Jones, 1971). *C. nelsoni* also is sympatric with *Notiosorex crawfordi* (Dalby and Baker, 1967), *Lepus californicus*, *L. callotis*, *Sylvilagus audubonii* (Goldman, 1951), *Spermophilus mexicanus* (Genoways and Jones, 1973), *Spermophilus variegatus*, *S. spilosoma*, *Ammospermophilus interpres*, *Thomomys*, *Cratogeomys castanops* (Goldman, 1951), *Liomys pictus* (Crossin et al., 1973), *Perognathus merriami* (Tamsitt, 1954), *Chaetodipus lineatus* (Dalquest, 1951), *C. penicillatus*, *Dipodomys nelsoni* (Goldman, 1951), *Sigmodon arizonae* (Crossin et al., 1973), *S. fulviventris* (Baker, 1966), *S. hispidus* (Goldman, 1951), *S. ochrogathus* (Blair, 1950), *Onychomys leucogaster*, *O. torridus* (Goldman, 1951), *Reithrodontomys fulvescens* (Genoways and Jones, 1973), *R. megalotis* (Goldman, 1951), *Baiomys taylori* (Baker, 1966), *Peromyscus boylii*, *P. eremicus* (Blair, 1950), *P. maniculatus*, *P. leucopus* (Goldman, 1951), *P. melanophrys* (Genoways and Jones, 1971), *P. pectoralis* (Goldman, 1951), *P. truei* (Genoways and Jones, 1973), *Neotoma albigula*, *N. mexicana*, *Procyon lotor*, *Bassariscus astutus*, *Spilogale putorius*, *Taxidea taxus*, *Vulpes macrotis*, *Urocyon cinereoargenteus*, *Canis latrans*, *Lynx rufus*, *Odocoileus hemionus*, *Antilocapra americana*, and *Ovis canadensis* (Goldman, 1951).

Predators of *C. nelsoni* include the western diamondback rattlesnake (*Crotalus atrox*—Beavers, 1976) and owls (*Bubo virginianus* and *Tyto alba*—Baker, 1953). Ectoparasites include the chiggers *Euschoengastoides arizonae*, *E. hoplax*, *E. loomisi*, *E. neotomae*, *Hexidionis allredi*, *Hyponeocula*, *Kayella lacerta*, *Leptotrombidium panamense*, *Otorhinophila buccisi*, *Pseudoschoengastia hungerfordi* (Whitaker et al., 1993), *Androlaelaps grandiculatus*, *Haemolaelaps glasgowi*, *Hirstonyssus incomptus*, *Euschoengastia lacerta*, and *Trombicula*, the tick *Dermacentor variabilis*, and the fleas *Echidnophaga gallinacea* and *Meringos agilis* (Porter, 1962). No endoparasites are known (Whitaker et al., 1993).

Nelson's pocket mouse can be captured in Sherman live-traps (Petersen, 1980) placed under brush or other plant cover, and baited with maize, wheat, barley, and corn (Baker, 1956; Dixon, 1959; Porter, 1962). *C. nelsoni* has been marked for identification with ear tags and by amputation of toes (Dixon, 1959).

BEHAVIOR. Nelson's pocket mouse is nocturnal and does not emerge from its burrow before dusk. It usually travels on all four feet, it runs rather than hops, and its movements are slow, except when frightened. The small burrows of *C. nelsoni* are dug at the bases of desert shrubs, especially thorny species like catclaw. *C. nelsoni* rarely strays far from the shelter of bushes or rocks, into which it creeps at the approach of danger, and does not travel any great distance in the open. More are active at the bases of bushes than in open areas, away from bushes (Dalquest, 1953).

Chaetodipus nelsoni does not hibernate (Porter, 1962), and it is more active in winter (December) than either *Perognathus merriami* or *C. penicillatus* (Davis, 1974). However, Nelson's pocket mouse may be more (Porter, 1962) or less active in winter and

early spring months than during the remainder of the year. Apparently, the social system of adults has an important bearing on the pattern of dispersal of immatures (Dixon, 1959).

GENETICS. Nelson's pocket mouse has two cytotypes ($2n = 46$ and 48); each cytotype has a fundamental number of 58 autosomal arms, and both occur within the range of *C. n. canescens*. The difference between the cytotypes probably is due to a Robertsonian fusion (Patton, 1970). The $2n = 48$ cytotype probably is isolated in the Trans-Pecos region of Texas, north of the Rio Grande and west of the Pecos River. Specimens from near Langtry, Val Verde Co., and Marathon, Brewster Co., west of the Pecos River had $2n = 48$, whereas a specimen from Comstock, Val Verde Co., east of the Pecos River, had $2n = 46$. The distance between Langtry ($2n = 48$) and Comstock ($2n = 46$) is ca. 50 km (Lee, 1990). The $2n = 46$ cytotype also is present in southern Coahuila (Patton, 1970). There may be a narrow contact zone between cytotypes in Val Verde Co., Texas, and northern Coahuila (Lee, 1990). The seven largest pairs of autosomes are banded with centromere position varying from metacentric to subtelocentric; the rest are acrocentric. The X chromosome is medium-sized and metacentric, and the Y chromosome is small and acrocentric (Lee et al., 1991).

For 28 genic loci examined, the average number of alleles/locus was 1.250, the average number of loci polymorphic/population was 0.143, and the average number of loci that were heterozygous/individual was 0.022 (range, 0.018–0.026). The subspecies of *C. nelsoni* have a similarity value of 0.869; for most other species of *Chaetodipus* the similarity values between subspecies are >0.9 (Patton et al., 1981).

REMARKS. The relationship between *C. nelsoni* and *C. lineatus* appears to be close. *C. lineatus* may not be a valid species, but rather a name applied to variant specimens of *C. nelsoni*. Aside from *C. lineatus*, *C. nelsoni* appears to be most closely related to *C. artus*, *C. goldmani*, and *C. intermedius*, the former two having allopatric geographic ranges to *C. nelsoni* (Williams et al., 1993). No hybrids are known between *C. nelsoni* and *C. goldmani* or between *C. nelsoni* and *C. intermedius* (Hall and Ogilvie, 1960).

One phenetic analysis of *Chaetodipus* placed *C. nelsoni* closest to *C. fallax*, but in the same larger cluster as *C. arenarius*, *C. intermedius*, and *C. penicillatus* (Caire, 1976). In another phenetic analyses of morphologic characters, *C. nelsoni* was most similar to *C. intermedius*, *C. lineatus*, and *C. penicillatus* (Best, 1993b).

Chaetodipus is from the Greek *chaeta* referring to bristle-like hairs, *di* meaning two, and *podos* alluding to feet. The specific epithet *nelsoni* is in honor of E. W. Nelson (1855–1934—Jaeger, 1955). Additional common names are gray (Osgood, 1900), gray brush-tailed (Bailey, 1905), Jaral (Elliot, 1905), and upland pocket mouse (Blair, 1940).

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T. L. BEST, DEPARTMENT OF ZOOLOGY AND WILDLIFE SCIENCE AND ALABAMA AGRICULTURAL EXPERIMENT STATION, 331 FUNCHESS HALL, AUBURN UNIVERSITY, ALABAMA 36849-5414.