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Dipodomys insularis.

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Dipodomys insularis Merriam, 1907

San José Island Kangaroo Rat

Dipodomys insularis Merriam, 1907:77. Type locality "San José Island, Gulf of California, off Lower California, Mexico."

CONTEXT AND CONTENT. Order Rodentia, Family Heteromyidae, Subfamily Dipodomyinae. The genus *Dipodomys* contains about 21 species (Honacki et al., 1982). *D. insularis* is monotypic (Hall, 1981).

DIAGNOSIS. *Dipodomys insularis* (Fig. 1) is among the smallest kangaroo rats (Best, in press). Compared with *D. merriami*, *D. insularis* has much larger ears, a generally grayer coloration, and a more robust appearance. *D. insularis* has a lower bullar index (greatest breadth of cranium/maxillary breadth) and a lower cranial index (greatest breadth of cranium/length of cranium) than any of the subspecies of *D. merriami*. The general outline of the skull of *D. insularis* is especially distinctive; the broad rostrum, broad maxillary arches, and relatively narrow braincase give it a robust appearance. Skulls of *D. merriami* have an almost triangular outline. *D. insularis* differs from its geographically closest relatives, *D. m. brunensis* and *D. m. melanurus*, by being larger in most respects, especially in rostral width, by being much paler, and in having considerably larger ears (Lidicker, 1960). In addition, the frontoparietal shield is much narrower and the mastoid bullae decidedly smaller in *D. insularis* (Merriam, 1907). No other species of *Dipodomys* occur in sympatry with *D. insularis*.

GENERAL CHARACTERS. The skull (Fig. 2) is small, rather broad, and with broad maxillary arches. The color is pale pinkish buff only lightly lined with dark hairs. The nose and whisker patches are only faintly developed. There is a vinaceous tinge on the rump and flanks (Merriam, 1907). The ears are large and light colored. Dorsal tail stripe and pencil is medium brown and the ventral tail stripe is pale to medium brown and practically always broad. The arietiform markings on the face are relatively pale, but always present. Cheeks are dusky. The plantar stripes are pale to medium brown, thin, and fully extended to the toes (Lidicker, 1960).

The length of hind foot is 39% of the length of head and body and the tail is 143% the length of head and body (Hatt, 1932). Mean measurements (in mm) of 9 adult males and 16 adult females, respectively, are: total length, 258.2 and 243.9; length of body, 108.2 and 97.3; length of tail, 150.0 and 146.6; length of hind foot, 40.1 and 38.4; length of ear, 13.0 and 13.5; basal length of cranium, 20.8 and 20.7; greatest length of cranium, 36.4 and 36.0; maxillary arch spread, 20.7 and 20.9; interorbital width, 11.1 and 11.2; nasal length, 13.4 and 13.7; intermaxillary width, 7.4 and 7.2; alveolar length, 4.9 and 4.6; lacrimal length, 3.5 and 3.6; maxillary arch width, 5.7 and 5.7; basioccipital length, 4.7 and 4.7; greatest depth of cranium, 11.6 and 11.5; greatest width of cranium, 22.8 and 22.7; zygomatic width, 17.8 and 17.6; and nasal width, 3.6 and 3.5 (Best, in press).

There is sexual dimorphism in size; females being smaller than males in practically all traits (Lidicker, 1960). Males are significantly

FIG. 1. *Dipodomys insularis* on San José Island, Baja California, Mexico.

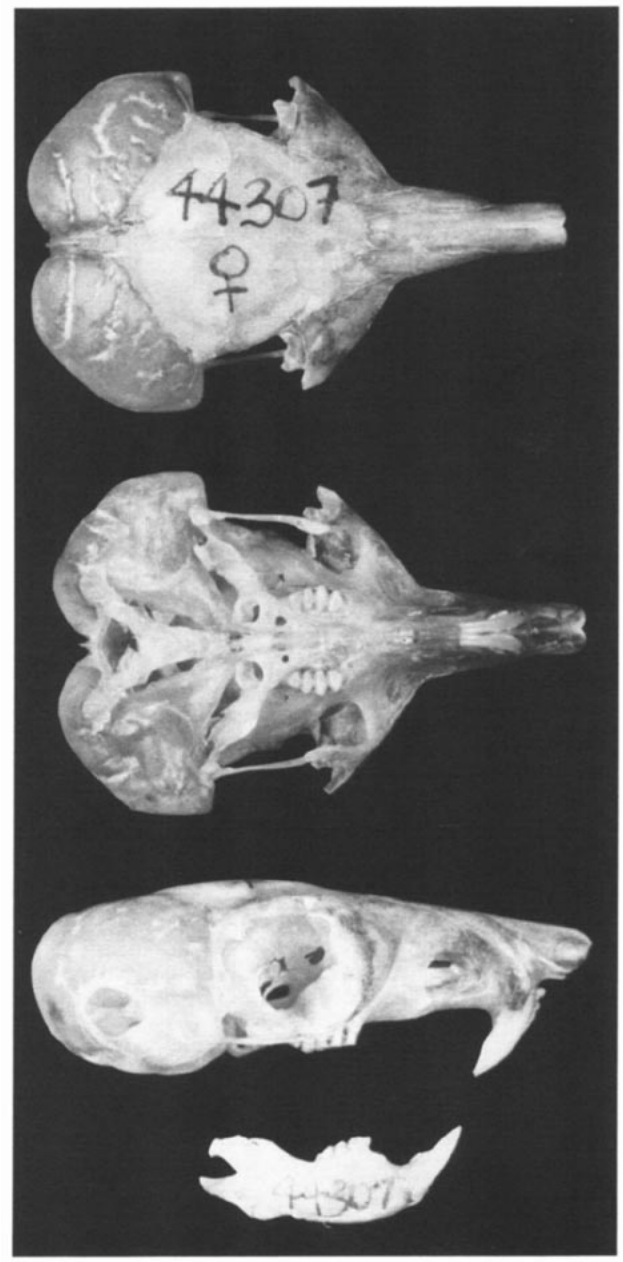

FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of *Dipodomys insularis* (female, Museum of Southwestern Biology 44307, from San José Island, Baja California, Mexico). Greatest length of cranium is 36.8 mm. Photographs by T. L. Best and J. L. Dobie.

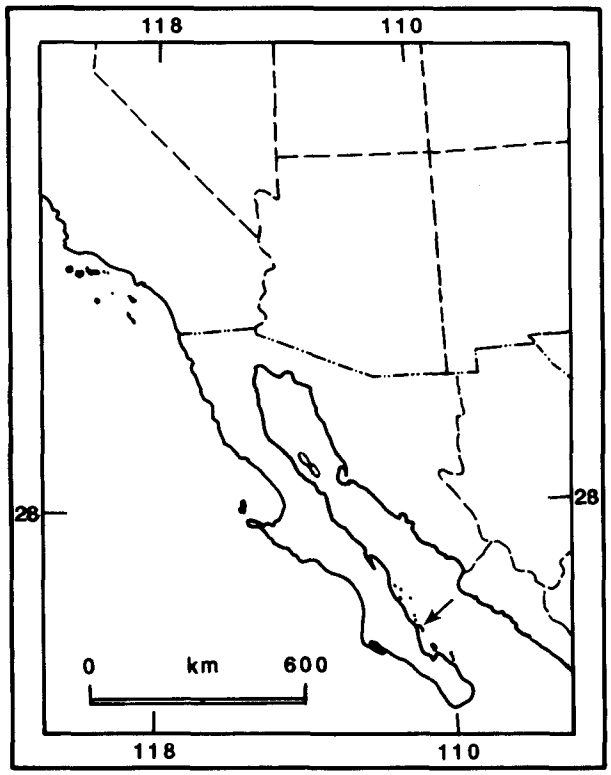

FIG. 3. The distribution of *Dipodomys insularis* is restricted to San José Island, Baja California, Mexico (arrow).

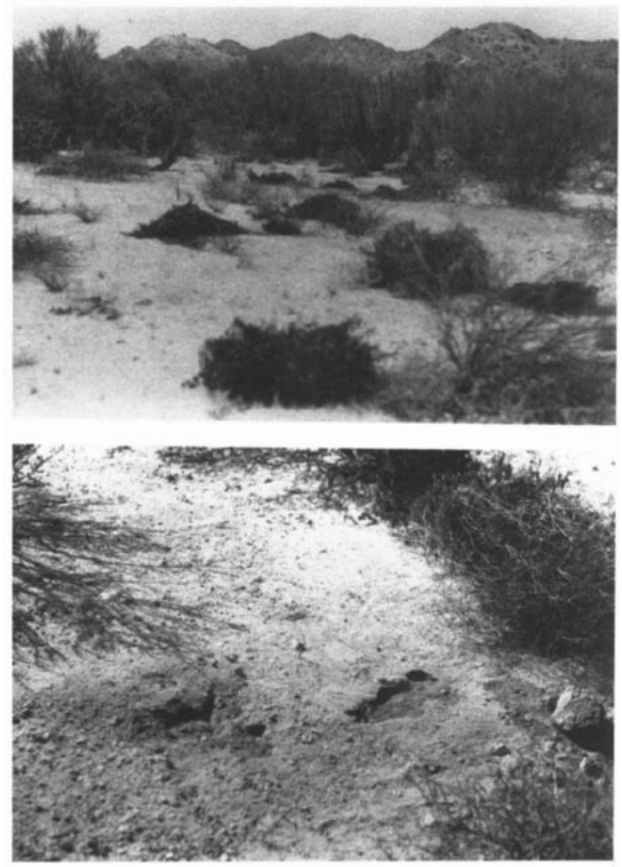

FIG. 4. Habitat occupied (top) and burrow entrance used (bottom) by *Dipodomys insularis* on San José Island, Baja California, Mexico.

larger in length of body, intermaxillary width, and alveolar length (Best, in press). Average body mass (in g) of seven adult males was 42.2 (range, 36.3–47.0) and of seven adult females was 34.3 (range, 32.0–37.6).

DISTRIBUTION. The distribution of *D. insularis* (Fig. 3) is restricted to San José Island, Baja California, Mexico (Hall, 1981).

FOSSIL RECORD. No fossils are known. However, *D. insularis* presumably differentiated from an ancestral stock inhabiting the mainland of Baja California. If no crustal activity has occurred, decreased sea levels could account for a land connection between San José Island and the mainland 12,000 years ago. However, in this actively diastrophic region, this assumption may not be warranted. In fact, there is evidence that the southern part of the peninsula underwent a major submergence during the Pleistocene. If true, the island may have maintained its isolation through the later Pleistocene drops in sea level. Subsequent emergence of the coast coincided with rises in sea level, so that the island continued to maintain its integrity. Therefore, if kangaroo rats were present on San José Island at the time of the general submergence, they may have been isolated for as much as 100,000 years (Lidicker, 1960).

FORM AND FUNCTION. No data on bacular morphology of *D. insularis* previously were available (Best and Schnell, 1974). However, measurements (in mm) for an adult and a subadult male, respectively, are: length, 12.4, 10.7; height of base, 1.4, 1.4; and width of base, 1.2, 1.3.

The interparietal is composed of one bone (Beer, 1965). Indices of specialization for *D. insularis* are: bullar (greatest breadth of cranium/maxillary breadth), 1.08; cranial (greatest breadth of cranium/length of cranium), 0.63; pedal (length of hind foot/length of body), 0.38; and total ([(bullar + 2 cranial + pedal) − 2] 100), 72 (Lidicker, 1960).

ONTOGENY AND REPRODUCTION. No embryos were present in an adult female (34.5 g) collected 23 May. Testes of an adult male (47.0 g) collected 24 May were 11 mm in length. A subadult male (38.0 g) was collected 24 May and a subadult female (24.5 g) was collected 25 May, indicating young may be born in late February or March. Nothing is known regarding the ontogeny of *D. insularis*.

ECOLOGY. San José Island is located immediately north of La Paz Bay and is separated from the mainland by a narrow channel. It is about 30 km in length from northwest to southeast and about 10 km in greatest breadth. The island is covered with hills and low mountains reaching an elevation of >600 m. The shoreline is rocky, and the mountain slopes rise from the sea except on the southern end, where the hills become low and the coast is mainly bordered by a sandy beach. Sand beaches occur at several points along the west coast. The vegetation of San José Island is practically the same as that of the adjacent mainland, but averages smaller in size. Vegetation is most plentiful in the canyons and drainages and the rocky higher slopes are extremely barren (Nelson, 1922).

During May, four *D. insularis* were collected in open habitat about 100 m from the beach (Fig. 4). Plant transects at sites of capture revealed that vegetative cover was 65.5%; the remaining 34.5% was bare ground with desert pavement. The only ectoparasites recovered from these animals were mites of the genus *Geomylichus*.

The mammal fauna of San José Island is more extensive than on any other island of the coast of Baja California, except Cedros. In addition to *D. insularis*, it includes *Odocoileus hemionus*, *Sylvilagus mansuetus*, *Chaetodipus spinatus*, *Neotoma lepida*, *Bassariscus astutus* (Nelson, 1922), and *Peromyscus eremicus* (Hall, 1981). Common reptiles on the island include *Cnemidophorus tigris*, *Callisaurus draconoides*, and *Masticophis flagellum*.

REMARKS. *Dipodomys insularis* shows greater divergence from other populations of *D. merriami* than is found among any of the subspecies of *D. merriami*. In addition, it is sufficiently distinct so that all individuals can be readily recognized (Lidicker, 1960).

Attempts have been made to arrange species of kangaroo rats into groups that are intended to show relationships. Grinnell (1921) placed *D. insularis* in the *merriami* group with *D. merriami*, *D. nitratoides*, and *D. margaritae*. Subsequent studies to elucidate relationships between *D. insularis* and other species of *Dipodomys*

have examined: skeletal and visceral measurements (closest affinities are with *D. merriami, D. nitratoides, D. margaritae, D. phillipsii,* and *D. elator*; Setzer, 1949); field experience (*D. merriami, D. margaritae,* and *D. nitratoides*; Lidicker, 1960); phenetic analyses of skeletal characters (*D. phillipsii;* Schnell et al., 1978); and phenetic analyses of cranial characters (*D. phillipsii*; Best, in press). *Dipodomys* is from the Greek words *di* (two), *podos* (foot), and *myos* (mouse) that refer to its enlarged hind feet and bipedal mode of locomotion. The specific epithet *insularis* is derived from *insula* indicating its island range (Jaeger, 1955).

H. T. Haagenstad prepared Fig. 3. We thank J. B. Armstrong, F. S. Dobson, and G. R. Hepp for reviewing early drafts of the manuscript. This is journal article no. 15-902572P of the Alabama Agricultural Experiment Station.

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