Chaetodipus hispidus (Baird, 1858)
Hispid Pocket Mouse

Perognathus hispidus Baird, 1858:421. Type locality “Charco Escondido [Tamaulipas], Mexico, (24 leagues W. of Mata-moros).”

Perognathus paradoxus Merriam, 1889:24. Type locality “Trego County, Kansas.”

Perognathus latirostris Rhoads, 1894:185. Type locality “Rocky Mountains.”


CONTEXT AND CONTENT. Order Rodentia, Suborder Sciuromorpha, Infraorder Myomorpha, Superfamily Geomyoidea, Family Heteromyidae, Subfamily Perognathinae, Genus Chaetodipus. Four subspecies recognized by Glass (1947) and Hall (1981) are as follows:

C. h. hispidus Baird, 1858:421, see above.

C. h. paradoxaus Merriam, 1889:24, see above (latirostris Rhoads, conditi Allen are synonyms).

C. h. platycephala Merriam, 1899:25. Type locality “Gainesville, Cook [Cook] County, Georgia, Texas.” (maximus Ell is a synonym).

C. h. Zacatecae Osgood, 1900:45. Type locality “Valparaiso, Zacatecas, Mexico.”

Hoffmeister (1986) and Hoffmeister and Goodpasture (1954) recognized C. hispidus conditi Allen as a separate subspecies.

DIAGNOSIS. Chaetodipus hispidus (Fig. 1) is larger (total length usually 380 mm and length of hind foot usually 22 mm) than most of the pocket mice with which it occurs; total length in Perognathus amplus, P. fasciatus, P. flavus, and P. ravescens is <170 mm and length of hind foot is <22 mm. C. hispidus differs from other C. paradoxaus in having a noncrested tail equal to or shorter than the length of the head and body. Total length in C. intermedius usually is <180 mm and length of hind foot is <22 mm. The dorsal fur of C. hispidus is coarser, with more buff to ochraceous tones than that of the gray C. barbouri. The conspicuous buff to ochraceous lateral stripe in C. hispidus is lacking in C. barbouri; and C. C. penicillatus. The skull of C. hispidus has a conspicuous supraorbital head and the auditory bullae are less inflated than in other pocket mice with which it occurs. The similarly sized Liomsys irticratus has coarser pelage, is dark gray dorsally, and lacks the grooved upper incisors of pocket mice. The bacculum and glans penis of C. hispidus are distinctive; in particular, the trid ist head of the bacculum is unlike that of any other heteromyid (Burt, 1936; Hafner and Hafner, 1983).

GENERAL CHARACTERS. The pelage is harsh; upper parts ochraceous mixed with black, venter whitish. In some regions the dorsal pelage has an olive tone (Snethill, 1977). The tail is well hairied, but not crested, with a black dorsal stripe, buffy sides, and white underside. Means and ranges (in parentheses) of external and skull measurements (in mm) of 10 adult C. h. paradoxaus from western Nebraska were: total length, 220.0 (205 to 237); length of tail, 106.6 (93 to 114); length of hind foot, 26.4 (23.5 to 29.5); greatest length of skull, 32.0 (30.7 to 33.9); Jones et al., 1983). Mean body mass of seven individuals from this sample was 32.0 g. Means and ranges (in parentheses) of measurements (in mm) of 15 adult hispid pocket mice from the Chucko Mountains, Arizona, were: length of head and body, 96.9 (86 to 103); length of hind foot, 25.0 (23 to 28); occipital length, 29.4 (28 to 30); greatest breadth at mastoids, 4.2 (4.0 to 4.4); Hoffmeister, 1986). The skull is large and robust (Fig. 2); the mastoids are relatively small and do not bulge posteriorly (Hall, 1981). The species grades from smaller in the south to larger in the north, and from lighter in the west to darker in the east (Blair, 1954). Dental formula is I 1/1, C 0/0, P 4/4, M 3/3, total 20, as in other pocket mice.

DISTRIBUTION. Chaetodipus hispidus ranges from North Dakota south through the Great Plains and Texas to central Tamaulipas, Mexico, northwestern to southeastern Arizona (Fig. 3). C. h. paradoxaus occurs as an apparently distinct population in central Mexico from southern Coahuila and Durango to Hidalgo. Twelve specimens were taken from Camp Verde in central Arizona, 170 km from the nearest known record in southeastern Arizona, but there are no recent records from that area (Hoffmeister, 1986). The distributions of C. h. hispidus, C. h. paradoxaus, and C. h. spilotes shown in Fig. 3 are essentially as determined by Glass (1947) in his review of the species. C. h. Zacatecae apparently reaches its northern limit at the Rio Nazas in Durango (Peterson, 1976). Hoffmeister (1986) identified populations found in Arizona and Chihuahua as C. h. conditi.

FOSSIL RECORD. The earliest fossil record is from the late Irvingianian (Yarmouthian interglacial period) Karapoli fauna in Ellsworth Co., Kansas (Hibbard et al., 1978). Perognathus rectro- exanthrus of the Blancan Blanco and Fox Canyon faunas of Texas and Kansas is the probable ancestor of C. hispidus (Kurten and Anderson, 1986). The Pleistocene fossils of C. hispidus are widespread over its present range and are indistinguishable from living subspecies (Dalquest, 1965; Dalquest and Stangl, 1984; Hibbard, 1952; Kennerly, 1956). Late Pleistocene or early Holocene remains have been found as far east as Jefferson Co., Missouri (Parnalee et al., 1909), but there are no records from north or east of the Missouri River (Hoffmann and Jones, 1970). Kennerly (1956) studied fossils from the late Rancholabrean (Wisconsini) Friesenbach Cave fauna of southern Texas and concluded that those are those of C. h. paradoxaus or C. h. spilotes, subspecies which now reach their southern limits in northern Texas. Dalquest and Roth (1970) found Pleistocene remains of C. hispidus in Tamaulipas, Mexico, between the present ranges of C. h. hispidus and C. h. Zacatecae.

FORM. The hair of C. hispidus is averages in length (7.8 to 9.1 mm) and width (0.07 to 0.10 mm) for Chaetodipus; the tip tapers gradually from a wide shaft and the base flares rapidly. A trough is present on the dorsal surface of the hair of all chaetodipines, but only two perognathines. This trough is especially deep and wide in C. hispidus. Medulla cells are fused and branched (Homan and Genoways, 1978).

A well-developed sebaceous glandular area, believed to function in olfactory communication, is present on the ventral surface of the tail. The gland is more developed in Chaetodipus than in Perog-
nathus. Unlike other pocket mice, C. hispidus shows greater development of the gland in females than in males (Quay, 1965).

The teeth of C. hispidus have several distinguishing features. Unlike most other pocket mice, C. h. paradoxus has a postero-median cuspule on the lower premolar in addition to the usual four cusps. The lower first and second molars of this subspecies also differ from those of most other pocket mice in showing a well-developed union of the lophs between the protoconid and the hypoconid (Wood, 1935).

The deciduous lower premolar of C. h. paradoxus showed the greatest forward displacement of the anterocone of any species studied by Wood (1935). The same tooth in C. h. hispidus is unusual in that the posterior cingulum gives rise to four small cuspules (Wood, 1935).

The sperm of C. hispidus is unlike that of any other pocket mice. The tail of the sperm is very long and the neck region is indiscernible (Hafner and Hafner, 1983).

FUNCTION. Normothermic minimal heart and respiratory rates are 250 beats/min and 50 breaths/min, respectively (Wang and Hudson, 1979). The basal metabolic rate, 1.25 to 1.28 cc O₂ g⁻¹ h⁻¹, is 4 to 25% lower than the rate predicted on the basis of body mass (Morrison and Ryser, 1962; Wang and Hudson, 1970). A normothermic body temperature of 36.8 to 38.7°C is maintained at ambient temperatures of 5 to 34°C, but animals become hyperthermic at ambient temperatures above 34°C (Wang and Hudson, 1970). The latter authors found the thermal conductance to be 0.201 cc O₂ g⁻¹ h⁻¹ C⁻¹, 26% higher than predicted on the basis of body mass.

As in other pocket mice, temperatures at which C. hispidus enters torpor vary with availability of food. Provided unlimited food and water, four of five individuals remained normothermic for 30 days at 5°C, but torpor was induced by food shortage at higher temperatures (Wang and Hudson, 1970). These authors found the body temperature in torpor to be 12 to 20.3°C with the heart rate falling to 6 to 14% and oxygen consumption to 3.5 to 13% of normothermic rates. They noted the lowest temperature from which individuals could be aroused is 8°C. The maximum spontaneous arousal rate is 0.47°C/min. During arousal, oxygen consumption is...
twice the normothermic rate. Hudson (1967) found the "cut-out" temperature for an isolated heart to be 2.1°C, lower than in Mus and several species of Peromyscus tested.

In C. hispidus, the production of metabolic water equals evaporative water loss at a lower ambient temperature (16.0°C) than in other pocket mice studied (MacMillen and Hinds, 1983), indicating relatively low efficiency in regulating water. This observation is consistent with MacMillen and Hinds' (1983) model predicting efficiency in regulating water as a negative function of body mass in pocket mice.

ONTOGENY AND REPRODUCTION. Jones et al. (1983) reported that in the northern Great Plains, adult females may bear two or more litters annually from spring through late summer. They also stated that number of young are reported to range from two to nine. Nothing has been published about growth and development.

ECOLOGY AND BEHAVIOR. The hispid pocket mouse inhabits a variety of dry, grassland habitats. Across much of its range it is most common in shortgrass and open bunchgrass prairie (Armstrong, 1972, 1974; Fehlhearty, 1974; Moulton et al., 1981; Schmidt, 1977). It occupies drier mesic to tall-grass prairie and areas of dense annual forbs in Arizona (Hoffmeister and Goodpaster, 1954; Rosenzweig and Winakur, 1969) and New Mexico (Findley et al., 1975). In parts of the Great Plains and Texas it often occurs in habitats with one or more of the following shrubs or trees: Yucca, ocotillo (Fouquieria), juniper (Juniperus), mesquite (Prosopis juliflora), and Opuntia (Jones et al., 1983; Schmidt, 1977). C. hispidus is tolerant of a wide variety of grassland vegetation in Texas and Oklahoma (Blair, 1938, 1939, 1954) and eastern Wyoming (Maxwell and Brown, 1968). Fehlhearty and Nava (1983) found it breeding at low densities in irrigated cornfields, but not in the surrounding sand sage (Artemisia filifolia) prairie of western Kansas. C. hispidus apparently is not dependent on sandy soils as are other plains pocket mice (Armstrong, 1972) and can be found in rocky or gravelly areas with heavy soils (Blair, 1937; Hoffmeister and Goodpaster, 1954).

The burrows of C. hispidus vary from simple tunnels, by immature animals, to branched tunnel systems with two or three entrances by older animals (Blair, 1937). Blair (1937) noted that there occur more than one individual in a burrow system. In northeastern Oklahoma, Blair (1938) found all burrows of C. hispidus under slabs of limestone and suggested that the distribution of the species might be limited in part by the availability of such slabs in this region.

In the mesquite plains of Texas, seeds comprised 81% of the diet. The mice strongly selected certain seeds and diet changed with season. Major foods in winter were seeds of mesquite, sunflower (Helianthus annuus), cacti (Mammillaria and Opuntia), and sagebrush (Artemisia ludoviciana). In spring, the most common foods (by volume) were seeds and leaves of mesquite, blanket flower (Gaillardia puchella), Opuntia and bluestem (Andropogon glomeratus), and insects. The diet overlapped considerably with that of coexisting Dipodomys oris, but the two species were found in microhabitats with different soil types (Aloeze and Zimmerman, 1973). Blair (1957) found blanket flower and Opunia to be the most frequently occurring foods in the burrows of hispid pocket mice in northeastern Oklahoma. Hispid pocket mice may store large quantities of seeds whenever they are available (Blair, 1937). Check-pouch volume is 1.42 cm³, large enough to meet the daily energy requirements in one maximum seed load (Morton et al., 1968).

C. hispidus probably does not store fat for the winter, or hibernate (Blair, 1937). Even in the northern Great Plains, where habitation would be most likely, Jones et al. (1983) believed C. hispidus subsisted through the winter on stores of seeds.

Predators of C. hispidus include carnivorous mammals, snakes, and owls. The western diamondback rattlesnake (Crotalus atrox) preys heavily on pocket mice; they ate more C. hispidus (by weight) than they ate any other species in Texas (Beavers, 1976). C. hispidus also was a major food item of great horned owls (Bubo virginianus) in Oklahoma (Tyler and Jensen, 1958).

Sixteen percent of the hispid pocket mouse examined in the lower Rio Grande Valley, Texas, carried Trypanosoma cruzi, the protozoan that causes Chagas disease (Burkholder et al., 1980). These authors suggested that the mouse may be a reservoir for this protozoon. Bloodlike sporichetes, but no trypomastigotes, were present in blood of C. hispidus from southwestern Texas (Eades and Hightower, 1952). In New Mexico, Rail et al. (1969) found that hispid pocket mice carried few fleas; the one species found was Tarsius fowls, the flea that carries bubonic plague (Francisella pestis). Plague-infested fleas were not found on the animals, however.

Turner (1974) found one male infested by ticks (Ixodes spinulatus) in western South Dakota.

Pocket mice generally are highly aggressive, solitary animals, and cannot be kept together in a small enclosure (Williams, 1968). However, Williams (1968) succeeded in keeping seven hispid pocket mice in a small cage for over a year. The mice tended to nest together even when separate nest boxes were provided. However, some males were aggressive, especially when food was restricted.

GENETICS. Diploid number of chromosomes is 34 and includes 3 pairs of large to medium metacentrics, 10 pairs of large to medium submetacentrics, 3 pairs of medium subtelocentrics, 1 large submetacentric X- and 1 small acrocentric Y-chromosome. The number of autosome pairs (fundamentarium) is 64 (Patton, 1967a). Patton et al. (1981) examined electrophoretic biochemical characters at 22 gene loci for most members of Cheoetopus. They found C. hispidus to be the most divergent member of the genus (although still clearly within Cheoetopus) and calculated a middle to late Miocene (18 mya) split of this species from the ancestral line.

REMARKS. There is some confusion about the type specimen described by Baird. Merritt (1889) accepted specimen No. 1696 (USNM) to the type specimen, though the skull was broken. He rejected Baird's second specimen, No. 1695 (USNM), stating it was possibly another species, and indicated that it was collected at Matamoras, Mexico. Osogood (1909) believed the holotype and specimen No. 1696 (USNM) to be a composite of two individuals, possibly two species. He found specimen No. 1695 (USNM) to be "nearly perfect," however, and, based on that specimen, accepted the skin and posterior skull segment of specimen No. 1696 as the type specimen.


LITERATURE CITED


Burkholder, J. E., T. C. Allson, and V. P. Kelly. 1980.


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