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THE BANNER-TAILED KANGAROO RAT, *DIPODOMYS SPECTABILIS*  
(RODENTIA: HETEROMYIDAE), IN UTAH

George V. Oliver<sup>1</sup> and Anthony L. Wright<sup>2</sup>

ABSTRACT.—We report the discovery in Utah of *Dipodomys spectabilis*, a species previously unknown to occur in the state. We searched for *D. spectabilis* in extreme southeastern Utah, south of the San Juan River, and were successful in finding mounds and burrows characteristic of the species and in capturing one individual. This is the northernmost record for *D. spectabilis* and extends its known range ~84 km northwest of the nearest previously reported locality (Fruitland, San Juan County, New Mexico). A flea, *Meringis rectus*, collected from *D. spectabilis*, is also the first record of its species in Utah.

*Key words:* *Dipodomys spectabilis*, banner-tailed kangaroo rat, *Meringis rectus*, Utah, mammals, fleas, Siphonaptera.

RESUMEN.—Reportamos el descubrimiento en Utah de *Dipodomys spectabilis*, una especie cuya presencia en el estado no había sido observada previamente. Buscamos *D. spectabilis* en el extremo sureste de Utah, al sur del Río San Juan, y logramos encontrar montículos y túneles típicos de esta especie y capturar un espécimen. Este es el registro más al norte para *D. spectabilis* y se extiende su rango de distribución conocida a ~84 km al noroeste de la localidad más cercana previamente reportada (Fruitland, condado de San Juan, Nuevo Mexico). Es también el primer registro en Utah para *Meringis rectus*, una pulga recolectada en *D. spectabilis*.

*Dipodomys spectabilis* Merriam, 1890, the banner-tailed kangaroo rat, is known from New Mexico, Arizona, Texas, Sonora, Chihuahua, and Durango, and is disjunct in Zacatecas, San Luis Potosí, and Aguascalientes (Nader 1978, Williams et al. 1993)—markedly so, if *nelsoni* of Chihuahua, Durango, Coahuila, Zacatecas, San Luis Potosí, and Nuevo Leon is considered a full species rather than a subspecies of *D. spectabilis*, a matter that has not been satisfactorily resolved (Williams et al. 1993). *Dipodomys spectabilis* was known, historically, from a few specimens taken in north-central and northeastern Arizona (Hoffmeister and Nader 1963, Hoffmeister 1977, 1986). The possibility of its occurrence in southern Utah was mentioned by Goldman (1933), but, except for Miller and Kellogg (1955) and Nader (1978), this possibility has been overlooked. Setzer (1944) and Durrant and Setzer (1945), in their review of the genus *Dipodomys* in Utah, made no mention of *D. spectabilis*, nor did Durrant (1952), not even in his list of mammals of possible or hypothetical occurrence in the state.

Hoffmeister and Nader (1963) and Hoffmeister (1977, 1986) discussed records of *D.*

*spectabilis* from northern Arizona. Hoffmeister referred to 2 specimens (Hoffmeister 1977) or to 2 or 3 specimens (Hoffmeister 1986; 2 in his main text, 3 under “specimens examined”) collected in 1933 from “5 mi E Rainbow Lodge, 6000 ft,” Coconino County, a locality that he regarded as being “on the flats southeast of Navajo Mountain near the Navajo–Coconino county boundary line” (Hoffmeister 1986, p. 309). Hoffmeister and Nader (1963) and Hoffmeister (1986) also discussed 1 specimen collected in 1937 from “8 miles south of Chin Lee (= Chinle), Apache County”, the latter locality being near an area where E.W. Nelson had observed mounds and burrows of this species in 1909 or earlier (Goldman 1933). Hoffmeister (1977, 1986) reported that his attempts to find the species at both of these locations were unsuccessful. Hoffmeister (1986, p. 309) referred the 3 or 4 northern-Arizona specimens tentatively to the subspecies *D. s. baileyi* Goldman, 1923, with this comment: “if present in mid-1980s, range unknown in Arizona.” Williams et al. (1993), citing Hoffmeister (1986), stated that *D. s. baileyi* no longer occurs in northeastern Arizona.

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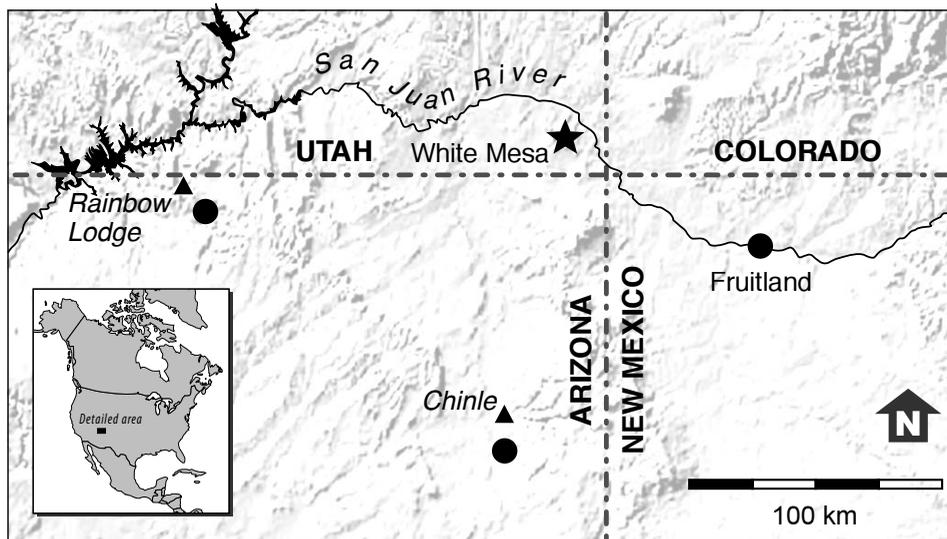


Fig. 1. The Four Corners area of Utah, Colorado, Arizona, and New Mexico showing the Utah capture site of *Dipodomys spectabilis* on White Mesa and 3 other localities mentioned in the text. The new locality reported here is shown as a solid star (★); 3 historical localities are shown as solid circles (●); and 2 reference locations, near 2 of the historical localities, are shown as solid triangles (▲) and labeled in italic type.

We searched for *D. spectabilis* in extreme southeastern Utah, in San Juan County, south of the San Juan River on the Navajo Nation, and were successful in finding a population on White Mesa, 2.1 km S, 4.4 km E of White Mesa Village, elevation 1702 m; 37°6'53"N latitude, 109° 13'17"W longitude (WGS 84) (Fig. 1). At this locality we found  $\geq 6$  large mounds characteristic of this species in a span of  $\sim 200$  m. On 9 June 2009, we captured an adult female with the following measurements, which were taken from the live animal and involved reconstruction of the tail measurement: total length, 346 mm; tail length, 210 mm; length of hind foot, 56 mm; and height of ear from notch, 17 mm; mass, 112 g. We released this individual, but we retained the terminal 70 mm of its tail, which was broken by the door of the live trap. The tail tip, with its terminal white tuft and subterminal black band, provides a diagnostic character of the species. The tail tip, preserved in 70% ethanol—as well as a separate 20-mm section of the tail, consisting of several caudal vertebrae, muscle, and connective tissue (apparently gnawed off by the animal), separately preserved in 95% ethanol (and now held in a cryovial in a freezer) for potential molecular analysis—have been deposited in the mammal collection of the Utah Museum of

Natural History, University of Utah (UMNH 32693).

Ectoparasites that we found on this animal were 3 fleas, 2 of which escaped. The single specimen collected was a male *Meringis rectus* Morlan, 1953, which, like its host, is a species previously unknown to occur in Utah. *Meringis rectus* has been reported from New Mexico and Texas, its primary host being *D. spectabilis* (Morlan 1953, Eads et al. 1987).

The mound from which *D. spectabilis* was trapped (Fig. 2) was approximately round,  $\sim 5$  m in diameter and  $\sim 0.67$  m high, and had  $\geq 20$  burrow entrances. The site had no slope, and the substratum was sandy loam. Vegetative ground cover was  $\sim 50$ –70%, the dominant plant species being *Bromus tectorum* and seedlings of *Salsola tragus*; these 2 nonnative, invasive annuals represented  $>95\%$  of all plant cover. Other plants present included *Sphaeralcea* sp., *Gutierrezia sarothrae*, *Ephedra viridis*, and *Atriplex canescens*. Almost all vegetation was  $<1$  m high, and most was  $<0.25$  m high. The seeds and seed heads of *Salsola* and *Gutierrezia* and the flowers of *Ephedra* are among the known foods of *D. spectabilis* (Bailey 1931, Wood 1969, Schroder 1979, Reichman 1983). It is likely that *Bromus* also is an important food source, since the seeds and leaves of grasses (see review in Best 1999),



Fig. 2. Mound from which *Dipodomys spectabilis* was trapped, 9 June 2009, White Mesa, San Juan County, Utah.

especially annual grasses (Wood 1969), are known to be major components of the diet of *D. spectabilis*.

The 2 other mammal species that were trapped in association with *D. spectabilis* were *Dipodomys ordii* (1 individual, 46 m away) and *Perognathus flavus* (4 individuals, the closest 23 m away). A dead *P. flavus* also was found near our trap line and was salvaged as a specimen (UMNH 32694). Additionally, *Cynomys gunnisoni* was observed in the vicinity and was heard ~100 m from the mound where we captured *D. spectabilis*.

On the basis of its large size (Goldman 1923, Bailey 1931, Nader 1978, Best 1988), the Utah specimen is assignable, at least provisionally, to the race *D. s. baileyi*, which is here considered to include nominal *D. s. clarencei* Goldman, 1933, of the San Juan River basin, as a synonym. Harris (1965) did not find *D. s. clarencei* of the San Juan basin to be separable from *D. s. baileyi* of the Rio Grande drainage in New Mexico, but it should be noted that his sample sizes were small; average size of the 2 nominal taxa differed in some measurements, but the differences were not statistically significant. Findley et al. (1975, p. 182) observed that “geographic variation

throughout the range of the species in New Mexico is negligible.” Nader (1978), in a study of morphological variation in *D. spectabilis* and a revision of the species, examined 1187 specimens of *D. spectabilis* (including *nelsoni*) from 368 localities throughout its range; he found no consistent or meaningful differences between *baileyi* and *clarencei* and considered *clarencei* to be a synonym of *baileyi*. This arrangement was followed by Hoffmeister (1986), Williams et al. (1993), and Patton (2005). However, Hall (1981) and Best (1988, 1999) continued to recognize *D. s. clarencei*. Although Hall (1981) may not have seen the publication by Nader (1978), Best (1988, 1999) was aware of Nader’s (1978) work, which he cited (Best 1988).

The Utah locality is the northernmost locality record for *D. spectabilis* and extends the known range of the species ~84 km northwest of the nearest previously reported locality, Fruitland, San Juan County, New Mexico (Goldman 1933, Findley et al. 1975, Hall 1981); ~125 km north-northeast of the locality south of Chinle, Apache County, Arizona (Hoffmeister and Nader 1963, Hall 1981, Hoffmeister 1986); and ~141 km east-northeast of the locality near Rainbow Lodge, Coconino County, Arizona (Hoffmeister

1977, 1986, Hall 1981). A query of museum collections (Arctos, 11 August 2009; MaNIS, 8 September 2009) did not reveal any locality closer than Fruitland, San Juan County, New Mexico.

In addition to expanding the known range of *D. spectabilis* and augmenting knowledge of the mammalian fauna of Utah, the discovery of *D. spectabilis* in southeastern Utah (12.8 km north of the Arizona boundary) suggested to us that this species may still exist in parts of northeastern Arizona, where it was known historically but had not, so far as we knew, been detected since the 1930s (Hoffmeister 1986) and was considered extirpated (Williams et al. 1993). After we captured *D. spectabilis* in Utah, we learned from David Mikesic (personal communication, 22 June 2009) that he recently has found *D. spectabilis* in Chinle Valley, Apache County, Arizona, >100 km south of the Utah boundary, but has not found it in areas south of Navajo Mountain, Coconino County, Arizona, nearer the Utah boundary.

The discovery of *D. spectabilis* in Utah also suggests the possibility of its occurrence in Colorado. Goldman (1933) stated that *D. spectabilis* probably occurs in southwestern Colorado, and this was repeated by Miller and Kellogg (1955), Armstrong (1972), Nader (1978), and Fitzgerald et al. (1994). The Utah locality reported here is the closest to Colorado of any known occurrence of *D. spectabilis*, being only 16.6 km west of the Colorado boundary. Bailey (1931, p. 260), discussing *D. spectabilis* in New Mexico, mentioned that “[a] few burrows and tracks were . . . seen near Bloomfield on the north side of the San Juan River.” If the San Juan River has not been a barrier to the distribution of this species in New Mexico, or in Utah, then Goldman’s prediction of its occurrence in Colorado may be correct. Stock (1972) demonstrated that *D. spectabilis* and 8 other species of *Dipodomys* are excellent swimmers and observed that some of the species that he tested entered water of their own volition. Stock (1972) advised: “The willful entering of water, at least under stress, demonstrated by these heteromyids, indicates that the ability to cross small rivers, particularly the shallow, warm streams usually found in desert areas, should be taken into consideration in interpreting their distribution.” Thus the San Juan River itself would not appear to be a barrier to dispersal of *D. spectabilis*, although unsuitable riparian habitat (dense vegetation) and, in

some places, unfavorable topography (steep banks or canyon walls) could represent barriers.

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