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Dipodomys elator.

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Dipodomys elator Merriam, 1894

Texas Kangaroo Rat

Dipodomys elator Merriam, 1894:109. Type locality Henrietta, Clay Co., Texas.

CONTEXT AND CONTENT. Order Rodentia, Family Heteromyidae, Subfamily Dipodomyinae. *Dipodomys elator* is a monotypic species. It probably belongs in the *D. phillipsii* group (Jannett, 1976), although there is no clear concensus as to its exact relationships.

DIAGNOSIS. This is a relatively large kangaroo rat. There are four toes on each hindfoot. The tail is relatively long with a conspicuous white tuft at the tip. The dental formula, as in all other heteromyids, is i 1/1, c 0/0, p 1/1, m 3/3, total 20. Top of cranium is broad, supraoccipital between mastoidal bullae broad, interparietal nearly as broad as long; upper premolar with well-developed anterointernal lobe; mandible small, the angle large and pointed; rostrum wide, interorbital region relative narrow, orbit and temporal fossa large; incisors thick and heavily built in relation to other species (Fig. 1).

GENERAL CHARACTERS. Tail relatively thick and long, about 160% of head and body length; body large, about 120 mm in length (Davis, 1942, 1974). Upperparts buffy, washed with blackish, underparts white (Fig. 2); white thigh patches large; facial crescents broad and indistinctly continuous to blackish nose; dorsal and ventral tail stripes barely meet in front of the terminal white tuft; ventral dark stripe pale; dorsal dark stripe pale, but becoming blackish in the crested part. Ranges of external measurements (mm) of adults are: total length, 260 to 345; tail, 161 to 205; hindfoot, 42 to 49; ear, 10 to 16; weight 65 to 90 g, but may exceed 100 g in some individuals. Means of cranial measurements (in mm) of 15 adults in The Museum, Texas Tech University, are: greatest length of skull, 37.2; maxillary breadth, 6.7; mastoid breadth, 23.7; interorbital constriction, 13.5; length of maxillary toothrow, 5.3. Color photographs of this rat are reproduced in Roberts and Mills (1983).

DISTRIBUTION. This species is known certainly from nine counties in north-central Texas and from one locality in adjacent southwestern Oklahoma (Fig. 3). The only report of *D. elator* from Oklahoma (Chattanooga, Comanche Co.) was by Bailey (1905). There are no records since early in this century of the species from Clay Co., Texas (Martin and Matocha, 1972), although Cokendolpher et al. (1979) reported two specimens from Montague Co. Texas (not mapped), immediately adjacent to Clay Co. on the east. A record of *D. elator* from near Gatesville, Coryell Co., Texas (Blair, 1954) is subject to considerable question (Dalquest and Collier, 1964; Martin and Matocha, 1972).

FORM AND FUNCTION. The base of the baculum is generally round in cross section, sometimes with irregular tuberosities on the surface; rugosity is more prominent on the dorsal surface than on the ventral side. The shaft tapers gradually from the base to the slightly upturned tip. The shaft is compressed, and on some specimens a slight keel is present near the base (Best and Schnell, 1974; Jannett, 1976). Measurements (mm) of 15 bacula (Jannett, 1976) are: length, 12.12 to 14.02; dorsoventral diameter at midshaft, 0.61 to 0.76; dorsoventral diameter of base, 1.31 to 1.75; lateral diameter of base, 1.31 to 1.74. According to Jannett (1976), the baculum of *D. elator* most closely resembles that of *D. phillipsii*.

Lewis (1970) described histological structure of the submandibular salivary gland and determined plasma calcium and plasma protein levels in *D. elator* and compared them with those in *D. ordii*. Davis (1942) compared morphological features of *D. elator* and the southern banner-tailed kangaroo rat, *D. phillipsii*, and concluded therefrom that the two were not closely related, and that *D. elator* belonged in a species group of its own.

ONTOGENY AND REPRODUCTION. Little information is available in the literature with regard to reproduction in this kangaroo rat. Four young, naked and with eyes still closed, were found in a nest of a burrow that was excavated in January (Roberts, 1969). The collection in The Museum, Texas Tech University, includes specimens of young animals taken in all months from May through November. There are records of pregnant females with two to four fetuses taken in February, June, July, and September.

ECOLOGY. The Texas kangaroo rat is found mostly in association with a habitat characterized by scattered mesquite shrubs (*Prosopis glandulosa*) and sparce, short grasses on firm, clay-loam soils. The animals have been observed and collected in dense vegetation along roadsides and the borders of cultivated fields, but always within a short distance of relatively open areas (Martin and Matocha, 1972). The latter authors did not encounter this species more than 0.8 km from mesquite.

Burrows usually were found in firm, clay-loam soils (soil texture analysis at one site 59.5% sand, 39.4% silt, 1.1% clay) frequently associated with a small mound of dirt at the base of a mesquite shrub (Roberts and Packard, 1973), or along fence lines (Lewis, 1970). Sandy soils (more than 91.0% sand) and flat areas are not used for burrowing by these animals (Roberts and Packard, 1973). Burrow systems average about 2.5 m in length, with at least six interwoven tunnels; the tunnels are 5 to 12.5 cm in diameter, and average about 45 cm in depth below the surface of the ground in firm soil (Lewis, 1970; Roberts and Packard, 1973). A single nest chamber, which usually contains shredded grass, is located close to the bottom of the complex of tunnels. Food storage tunnels occur throughout the burrow system. The burrow has at least two openings; these are usually left open, but plugged burrow openings have been observed.

Analysis of contents of cheek pouches of *D. elator* by Chapman (1972) revealed grass seeds in about 70% of the pouches, with cultivated plants (*Avena sativa, Sorghum halepense*) the most common items. Annual forbs were represented in approximately 40% of the pouches; leaves and immature fruits of *Erodium circutarium* seemingly were favored. Perennials (*Opuntia* sp., *Aphanostephus* sp., *Prosopis glandulosa*) were found in only 15% of the cheek pouches. A few parts of insects were found. There were some seasonal shifts in food preferences in accordance with availability of seeds and green vegetation. Dalquest and Collier (1964) found seeds of *Tribulus terrestris* in cheek pouches. In addition, food storage tunnels of this species contained seeds of the cocklebur (*Xanthium* sp.), *Avena sativa*, and cut stems and pieces of grass (Lewis, 1970; Roberts, 1969).

Other mammals either observed or collected (mostly gleaned from field notes) in the same general areas occupied by *D. elator* include *Didelphis virginiana, Cryptotis parva, Sylvilagus floridanus, Lepus californicus, Spermophilus tridecemlineatus, Geomys bursarius, Perognathus flavus, P. hispidus, Reithrodontomys montanus, Peromyscus leucopus, P. maniculatus, Sigmodon hispidus, Neotoma micropus, Mus musculus, Mephitis mephitis, Taxidea taxus, Canis latrans, Procyon lotor*, and *Dasypus novemcinctus*. Roberts and Packard (1973) found seasonal decreases in

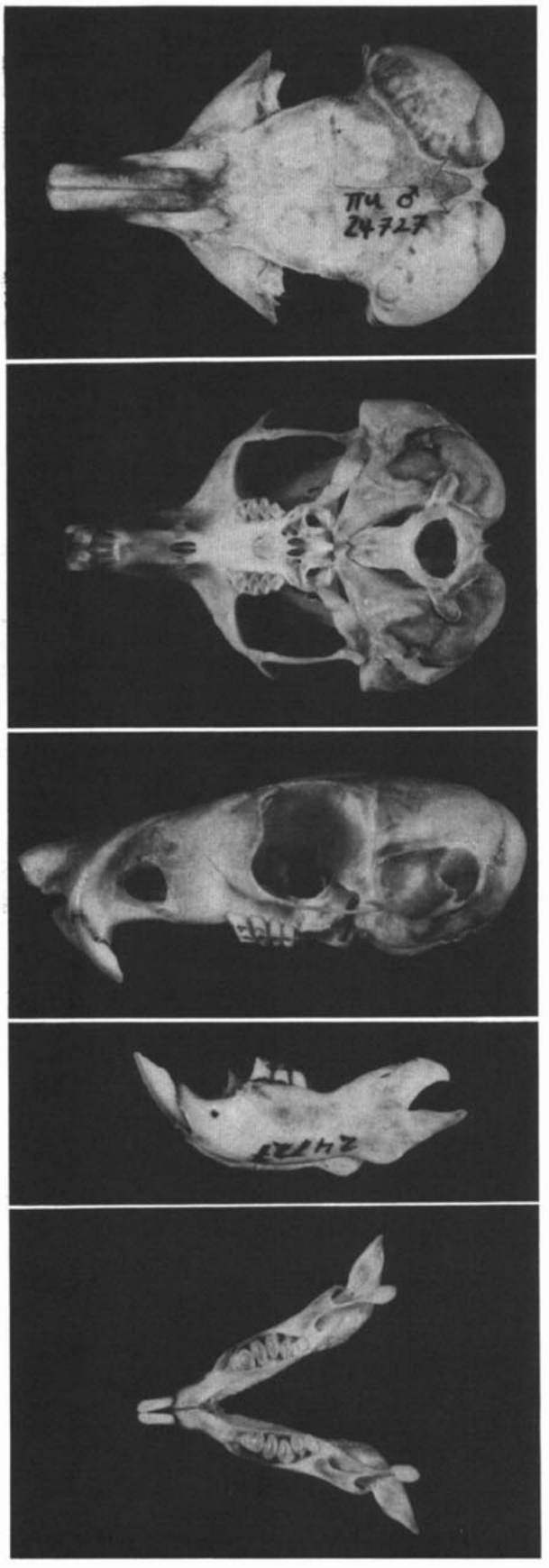

FIG. 1. Dorsal, ventral, and lateral views of the cranium, and lateral and dorsal views of lower jaw of *Dipodomys elator* (TTU 24727, ♂), from Hardeman Co., Texas. Greatest length of skull is 40.3 mm.

FIG. 2. Photograph of *Dipodomys elator* (from Roberts and Mills, 1983).

the trapping rates of *D. elator* associated with increases in the capture rates of other rodents, but there was no evidence of interspecific competition. These authors also noted that *D. elator* avoided dense stands of grasses occupied by *S. hispidus*.

Based on trapping records of marked animals, the home range size for adults averaged about 0.08 ha for both sexes. Individuals were recorded as having moved more than 300 m along roads at night by Roberts and Packard (1973); their estimates of population density ranged from 8.6 to 24.7 residents per ha.

The United States "Red Data Book" designated *D. elator* as a "status-undetermined" species (Anonymous, 1973). Thornback and Jenkins (1982) included the Texas kangaroo rat in their list of rare mammals. This species is listed as threatened by the Texas Organization for Endangered Species and as protected by the Texas Department of Parks and Wildlife (Roberts and Mills, 1983). Threats to the survival of *D. elator* are its restricted distribution and apparent dependence on mesquite grasslands, which are rapidly being subjected to habitat modification for agricultural purposes. There is a need for additional basic biological information about this rodent.

Ectoparasites found on the Texas kangaroo rat include mites (*Androlaelaps* sp.), sucking lice (*Fahrenholzia pinnata*), ticks (*Amblyoma anicanum*) (Lewis, 1970), and fleas (*Meringis arachis*) (Hedeen, 1953).

BEHAVIOR. This species makes considerable use of scratching and dust-bathing areas, which frequently are found near burrow entrances. Open runways between burrow openings and mesquite shrubs are made and maintained. *D. elator* is nocturnal, with the peak in activity 2 to 3 h after dark, and is active throughout the year. Thumping noises, similar to those described for other species of *Dipodomys*, are produced by *D. elator* (Packard and Roberts, 1973).

GENETICS. *Dipodomys elator* has a diploid number of 72

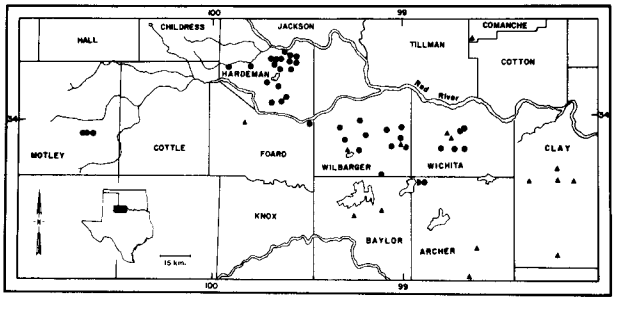

FIG. 3. Geographic distribution of *Dipodomys elator* in north-central Texas and adjacent Oklahoma. Triangles refer to older (before 1969) distributional records and dots refer to more recent records of the species. Map from Martin and Matocha (1972).

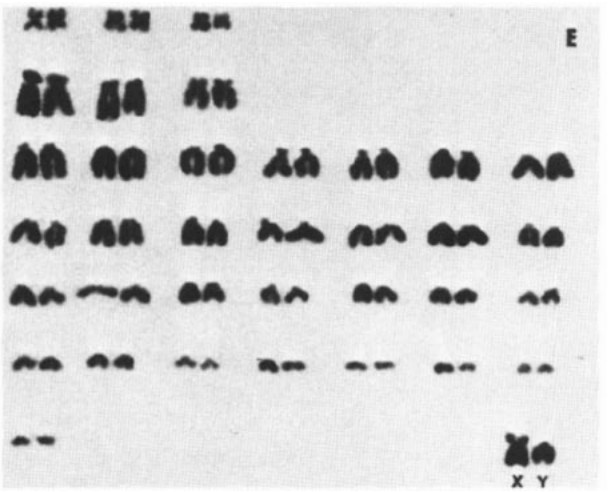

FIG. 4. Karyotype of *Dipodomys elator* (Stock, 1974).

chromosomes and a fundamental number of 82 (Fig. 4). There are three pairs of submetacentric chromosomes in the autosomal complement, three pairs of subtelocentrics, and 29 telocentric pairs. The X-chromosome is submetacentric and the Y-chromosome is telocentric (Stock, 1974).

Mazrimas and Hatch (1972) provided information on the amounts of satellite DNA in *D. elator*, made some comparisons with 11 other species of *Dipodomys*, but drew no meaningful conclusions from their data. Results of electrophoretic analysis of 17 enzymes and other proteins in the Texas kangaroo rat and 10 other species were presented by Johnson and Selander (1971); their "analysis of protein variation demonstrates that *D. elator* is not closely similar genetically to any of the other species examined," but they had no material from *D. phillipsii* available for comparison.

REMARKS. Sometimes this species is referred to in the vernacular as Loring's kangaroo rat. We follow Jones et al. (1982) in use of the vernacular name Texas kangaroo rat for *D. elator*. The generic name *Dipodomys* is a combination of two Greek words, *dipodos* (two-footed) and *mys* (mouse), and refers to the bipedal mode of locomotion of this mammal. The specific name *elator* is a Greek word referring to the springing capabilities of the animal.

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