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RECORDS OF MAMMALS FROM THE LLANO ESTACADO AND ADJACENT AREAS OF TEXAS AND NEW MEXICO

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Recent field exploration on the Llano Estacado and in adjacent areas of western Texas and eastern New Mexico by field parties from The Museum of Texas Tech University has resulted in collection of several thousand specimens of mammals. Some of these provide noteworthy distributional data that establish the presence of, or better elucidate the status of, species inhabiting that region. We have summarized such information for 14 taxa in this paper.

Collecting efforts were supported by The Museum, the Department of Biological Sciences, and the Graduate School at Texas Tech University, and by the Rob and Bessie Welder Wildlife Foundation, which supported one of us (Choate) in the laboratory and in the field in 1989 and 1990 as a Welder Wildlife Foundation Fellow. This publication constitutes contribution no. 366 of that foundation.

In the following accounts, catalogue numbers refer to the collection of Recent mammals housed in The Museum at Texas Tech. Measurements are in millimeters.

Cryptotis parva parva (Say, 1823).—On 30 June 1990, a male (testes 3 × 1) least shrew (58316) was taken by J. R. Goetze in a museum special trap baited with rolled oats and set in a line along a grassy fencerow (mostly brome, white triden, and sweet clover) 12 mi. S and 1 mi. E Pampa, Gray Co., Texas. *Chaetodipus*

hispidus, Peromyscus maniculatus, Sigmodon hispidus, and *Mus musculus* were trapped at the same locality. This record adds to those published by Owen and Hamilton (1986) for the Llano Estacado, and further substantiates the general distribution of this species in the northern half of that region.

Several authors, including Owen and Hamilton (1986), have suggested that widespread irrigation on the High Plains has facilitated westward migration by *C. parva* in the past few decades. The latter authors also opined (p. 405) that this shrew "... will be found with increasing frequency ... in the vicinity of permanent playas, particularly those ... associated with substantial areas of uncultivated land supporting native vegetation." We would add that the Conservation Reserve Program, under which thousands of acres on the Llano Estacado that formerly were under cultivation have been returned to grassland, some planted to native grasses, also may result in increased populations of this shrew.

Myotis californicus californicus (Audubon and Bachman, 1842).—Two males of this small bat from nearby localities at the northwestern tip of the Llano Estacado in New Mexico, one (58707) taken 6 mi. N and 6 mi. E Newkirk, Guadalupe County, on 26 July 1990, and the other (58057) caught 3 mi. N Ima, Quay County, on 31 May 1990, provide the northeasternmost records of this species from the state and are the first to be reported from the Llano (see Findley *et al.*, 1975). Both individuals were netted over stock tanks located near the edge of the caprock in company with *M. ciliolabrum.* The tank in Quay County was surrounded by piñon and juniper, whereas the one in Guadalupe County was in a much more open area that supported mostly juniper.

Myotis ciliolabrum ciliolabrum (Merriam, 1886).—Three New Mexican specimens of this small-footed myotis, all females, two (58055–56) from 3 mi. N Ima and one (58708) from 6 mi. N and 6 mi. E Newkirk (see account above), establish new county records that help to clarify the distribution of this species in the northeastern part of that state. They also provide the second and third known localities of record for *M. ciliolabrum* on the Llano Estacado (the other being from Armstrong Co., Texas—Hollander and Jones, 1987). Two females netted on 31 May each carried a single fetus (4 in crown-rump length); one shot on 26 July evinced no reproductive activity.

Lasiurus borealis (Müller, 1776).—A few females of this migratory species rear young on the Staked Plains and in adjacent areas, but males evidently occur there only as young-of-the-year or as migrants. Specimens from four localities in western Texas better establish the red bat as seasonally widespread in the region: male (58059), 8 mi. S, 8 mi. E Claude, Armstrong County, 15 May 1990; female (56887), 10 mi. N, 35 mi. W Hereford, Deaf Smith County, 23 August 1989; male (58758), 3 mi. N, 8 mi. E South Plains, Floyd County, 29 August 1990; female (58319), 3 mi. N Jerico, Gray County, 30 June 1990. The circumstances under which the first three specimens were collected are described below. The female from Gray County, which was lactating, was netted along with two *Myotis velifer* over a water-filled overflow pit adjacent to a stock tank.

Lasiurus cinereus cinereus (Palisot de Beauvois, 1796).—The hoary bat evidently is not resident in western Texas and eastern New Mexico, but migrates through the area both to and from summer haunts farther northward. Texas records that help to document the seasonal occurrence of this species are as follows: female (58060, two fetuses 12 in crown-rump length), 8 mi. S, 8 mi. E Claude, Armstrong County, 15 May 1990; four specimens (56888–91) from 10 mi. N, 35 mi. W Hereford (=14 mi. S, 2 mi. E Glenrio), Deaf Smith County, a male (testes 7 × 3) on 16 August 1989, and two males (testes of both 5 × 2) and a female on 23 August 1989; male (58759, testes 6 × 3), 3 mi. N, 8 mi. E South Plains, Floyd County, 29 August 1990; male (57202, testes 7 × 4), Muleshoe National Wildlife Refuge, Bailey County, 10 September 1989.

The bat from Armstrong County was netted over Mulberry Creek under cottonwoods and other deciduous trees; those from Deaf Smith County were taken in a net stretched over a stock tank not too distant from the edge of the caprock, whereas one from Floyd County was netted over an impoundment fed by a natural spring at the base of the Llano escarpment (*Eptesicus fuscus, Lasiurus borealis, Antrozous pallidus,* and *Tadarida brasiliensis* were taken in the same net and *Pipistrellus hesperus* was shot over the spring). The male from Bailey County was one of two (the other escaped our net) trapped in a net over a small, water-filled, concrete tank near a residence.

Antrozous pallidus bunkeri Hibbard, 1934.—A male (52941, testes 11 × 6) pallid bat from 7 mi. W Justiceburg, Garza Co.,

Texas, captured on 10 September 1988, extends the known range of this subspecies almost 100 miles southward along the eastern edge of the Llano Estacado, a distributional pattern predicted by Manning *et al.* (1988). The large size of the specimen (forearm 55.4) clearly aligns it with *bunkeri.*

Spermophilus variegatus buckleyi Slack, 1861.—A male (6678) from 10 mi. E Eldorado, Schleicher Co., Texas, obtained by R. W. Wiley on 23 February 1968, represents a northern marginal record for this ground squirrel on the Edwards Plateau. We tentatively refer this specimen to the subspecies *buckleyi* because of the blackish coloration on the head, shoulders, and middorsum, which is typical of these squirrels in south-central Texas. However, color varies greatly in some populations of *S. variegatus* (Schmidly, 1977), and the species clearly is in need of systematic scrutiny with respect to intraspecific variation.

Spermophilus variegatus grammurus (Say, 1823).—A lactating female (58102) and adult male (58721, testes 28 × 13) taken 1 mi. N and 1 mi. W Ima, Quay Co., New Mexico, on 30 May and 24 July 1990, respectively, not only fill a distributional gap (see Findley *et al.*, 1975) in the northeastern part of the state, but are the first specimens of this species to be recorded from the Llano Estacado. The squirrels were shot on a west-facing, brushy slope strewn with large boulders. Scrub oak and skunkbush along with yucca and grasses comprised the dominate vegetation. Each squirrel was perched atop a boulder when shot, and the cheek pouches of both were filled with skunkbush seeds. The breaks along the extreme northwestern edge of the Llano Estacado well may be the only place where this species occurs in that region.

Perognathus flavescens copei Rhoads, 1894.—In their study of geographic variation in this pocket mouse on the Great Plains, Reed and Choate (1986) examined a number of specimens from eastern New Mexico and western Texas, but the distributional pattern revealed was decidedly spotty. Reed and Choate inferred that additional collecting efforts concentrated in areas of sandy soil would establish that the species, although probably not continuously distributed through the region, was more widespread than their records indicated. Over the past three years, we have collected *P. flavescens* on sandy or sandy loam soils at a number of places in western Texas where it previously was unknown. Some of these records were reported by Pesaturo *et al.* (1990); the others follow: *Andrews Co.*: 4 mi. N, 5

mi. E Andrews (56821); 3 mi. N, 6 mi. W Andrews (56822); 8.5 mi. S, 4 mi. E Andrews (56823–24); 9.5 mi. S, 5 mi. E Andrews (56825). *Gaines Co.*: 10 mi. S, 20 mi. W Seminole (58732). *Lynn Co.*: 4 mi. N, 3 mi. W New Home (58754). *Yoakum Co.*: 8 mi. N Bronco (58346); 13–14 mi. N Plains (56921–22, 58344–45).

Records of occurrence of *P. f. copei* on the Llano Estacado and in adjacent areas are mapped in Figure 1. The eastern margin of the range in Texas evidently is just east of the border of the map in Callahan (Davis, 1974) and Wilbarger (Dalquest and Horner, 1984) counties; the northernmost records are in adjacent Oklahoma. Otherwise, the known distribution of the subspecies is depicted in the figure.

Reithrodontomys fulvescens laceyi J. A. Allen, 1896.—Three adults of this harvest mouse from Wheeler County establish the northernmost localities of record in the Texas Panhandle. Davis (1974) previously mapped *R. fulvescens* as occurring in Armstrong County, to the southwest, but we do not know on what evidence that record was based. Two males (52218–19) were collected 2.5 mi. N and 9 mi. E Wheeler on 8 May 1990 in dense grass (mostly *Andropogon*) on the first terrace above Sweetwater Creek. On the following day, a nonpregnant female (58775) was trapped on sandy soil, in a low-lying, brushy habitat with rank bluestem, in the floodplain of the North Fork of the Red River at a place 2 mi. N Shamrock.

Peromyscus nasutus nasutus (J. A. Allen, 1891).—This rock mouse has been reported previously from the Llano Estacado in Quay County, New Mexico, by Tamsitt (1959) from 8.5 mi. S San Jon and by Aday and Gennaro (1973) from 3 mi. E and 2 mi. N Ragland. Three specimens from 9 mi. N and 3 mi. E Broadview, Curry County (56994–96), expand the known range a few miles farther eastward along the margin of the caprock from the former locality to within approximately 6.5 miles of the border with the Texas Panhandle (where *P. nasutus* has yet to be recorded). Unfortunately, we found no piñon extending along the edge of the Llano Estacado into Texas.

Our specimens, all adult females, were trapped on 16 August 1989 in rocky situations at the break of the Llano in piñon-juniper-scrub oak, and in the same general area as *P. boylii, P. leucopus,* and *P. truei.* One animal carried four fetuses (4 in crown-rump length), another was gravid with three (6 in length), whereas the third dropped two young in a live trap and

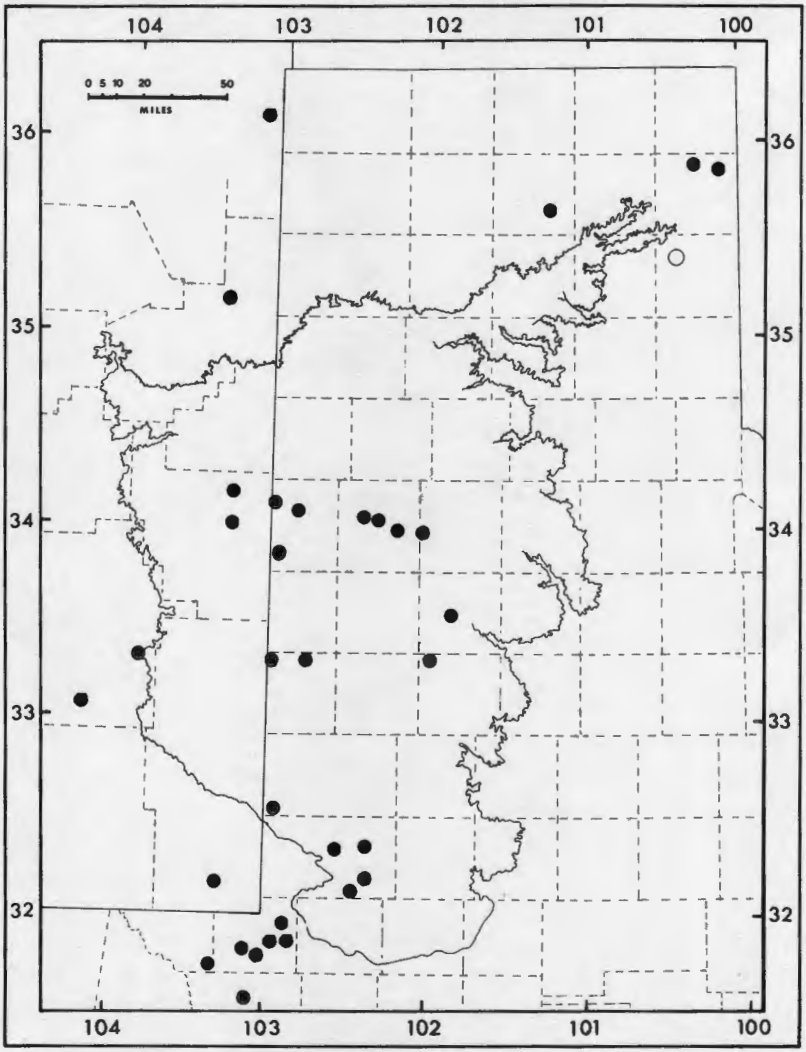

FIG. 1.—Known records of occurrence of *Perognathus flavescens copei* on the Llano Estacado and in adjacent areas of Texas and New Mexico after Findley *et al.* (1975), Jones *et al.* (1988), Pesaturo *et al.* (1990), and Reed and Choate (1986). Some records are not plotted because undue crowing of symbols would have resulted. The open symbol in Wheeler Co., Texas, is the type locality of the subspecies. The extent of the Llano Estacado is outlined on the map.

retained a fetus measuring 28. One was completely in worn pelage, but the other two were molting.

Respective external measurements are: total length, 191, 184, 191; length of tail, 94, 92, 92; length of hind foot, 23, 22, 22;

FIG. 2.—Juniper-clad break of Llano Estacado, 8 mi. S and 2 mi. E Glenrio, Deaf Smith Co., Texas. Two *Peromyscus truei truei* were trapped at the location in foreground.

length of ear, 21, 21, 21. From the sympatric and morphologically similar *P. t. truei*, the three *nasutus* differ in being somewhat darker dorsally, and in having ears that are shorter (rather than longer) than the hind feet and slightly smaller auditory bullae. They differ also in cusp morphology of the lower molars (see Hoffmeister, 1986). Cranial measurements are given in Table 1. We follow Carleton (1989) in regarding *P. nasutus* as a species distinct from *P. difficilis* (but see Janecek, 1990).

Peromyscus truei truei (Shufeldt, 1885).—Five piñon mice collected along the edge of the Llano to the south of Glenrio, Deaf Smith County, are the first of this subspecies to be reported from the Texas Panhandle. Previously, *P. t. truei* was known from the state only on the basis of four specimens from Guadalupe Mountains National Park, Culberson County (Cornely *et al.*, 1981), far to the southwest. All five specimens were trapped in association with *P. leucopus* on rock ledges beneath or near junipers (Fig. 2) as follows: two males (58043–44, testes 14 × 8 and 12 × 7), 8 mi. S, 2 mi. E Glenrio, 21 March 1990; male (58045, testes 12 × 7), 11 mi. S, 2 mi. E Glenrio, 22 March 1990; female (57015, lactating) and male (57016, testes 14 × 8), 10 mi. N, 35 mi. W Hereford (=14 mi. S, 2 mi. E Glenrio), 24 August and 14 August 1989, respectively.

We also obtained six specimens of this subspecies along the margin of the caprock in adjacent eastern New Mexico as follows: *Curry Co.*: three females (57013–14, 57471), 9 mi. N, 3 mi. E Broadview, two on 16 August (one with three fetuses measuring 10 in crown-rump length) and one (lactating) on 11 November 1989. *Quay Co.*: subadult female (56737), 5 mi. N Wheatland, 15 June 1989; female (58216, five fetuses 4 in length), 2 mi. N Ima, 31 May 1990; lactating female (58217), 4 mi. S, 3 mi. E Ima, 23 May 1990.

Average external measurements of nine adults (one individual with incomplete tail not included), four males and five females, from New Mexico and Texas (extremes in parentheses) are as follows: total length, 189.7 (180–205); length of tail, 90.2 (82–106); length of hind foot, 22.6 (22–24); length of ear, 23.8 (23–25). Length of ear was equal to that of hind foot in one specimen and greater in the other eight. See Table 1 for cranial measurements.

The specimens reported here of *P. t. truei* from Texas reduce the known diastema between the distribution of that subspecies and the isolated *P. t. comanche* to approximately 75 miles, albeit directly across inhospitable habitat. If the ranges of these two races meet, which we doubt, it will be along the circuitous northern margin of the Llano Estacado. However, significant rocky habitats and stands of juniper are lacking at some places in this area. As presently known, *comanche* is restricted to suitable outcroppings that support juniper along the eastern escarpment of the High Plains in Armstrong, Briscoe, and Randall counties. *P. t. comanche* differs from *P. t. truei* as described by Schmidly (1973), principally in having a longer tail on the average, measurably shorter ears that are about the same length as the hind feet, a flatter skull, and slightly smaller auditory bullae. See Table 1 for comparative cranial measurements of the two subspecies. In some features, *comanche* differs from *truei* in the same way as does *P. nasutus*, explaining why some previous authors aligned *comanche* with the latter. Our specimens of both subspecies of *truei* differ from *nasutus* in lacking well-developed accessory stylids and lophids on the first two lower molars. The two species also are known to differ chromosomally and electrophoretically.

External measurements taken by different collectors sometimes vary, causing difficulties in making critical comparisons among specimens. The larger ear of *P. t. truei* is aptly illustrated

TABLE 1.—*Cranial measurments of* Peromyscus nasutus *and* Peromyscus truei. *One standard deviation, extremes, and coefficient of variation are given for samples of* P. truei.

Specimen no. or number of specimens averaged, and sex	Greatest length of skull	Condylo-incisive length	Length of nasals	Rostral length	Rostral breadth	Interorbital constriction	Zygomatic breadth	Breadth of braincase	Mastoid breadth	Depth of skull	Length of incisive foramina	Length of bony palate	Length of max toothrow	Breadth across M1–M1	Length of man. toothrow
Peromyscus nasutus nasutus, Curry County, New Mexcio															
56994, ♀	27.47	24.74	10.32	10.49	4.30	4.36	13.29	13.00	12.73	10.21	5.44	3.95	4.42	5.01	4.39
56995, ♀	27.50	24.34	10.05	10.51	4.50	4.54	13.91	13.20	12.31	10.49	5.34	3.77	4.21	5.12	4.09
56996, ♀	28.22	25.05	10.61	10.77	4.78	4.38	13.59	12.98	12.57	10.55	5.46	3.98	4.30	5.25	4.05
Peromyscus truei truei, New Mexico and Texas															
Average 7 (4 ♂, 3 ♀)	28.3±0.4	25.2±0.6	10.8±0.3	11.1±0.2	4.9±0.2	4.5±0.1	13.9±0.3	13.0±0.3	12.4±0.3	10.5±0.1	5.5±0.1	4.1±0.2	4.3±0.1	5.3±0.2	4.1±0.2
Minimum	27.71	24.57	10.41	10.80	4.63	4.39	13.33	12.59	12.08	10.33	5.27	3.80	4.14	5.03	3.87
Maximum	29.01	25.99	11.02	11.37	5.19	4.63	14.30	13.25	12.72	10.68	5.65	4.39	4.39	5.49	4.34
C. V.	1.5	2.3	2.3	2.2	4.2	2.0	2.4	2.0	2.0	1.2	2.3	5.5	2.5	3.0	4.3
Peromyscus truei comanche, Briscoe County, Texas															
Average 7 (2 ♂, 5 ♀)	27.6±0.6	24.5±0.4	10.8±0.6	10.9±0.3	4.8±0.2	4.4±0.1	13.4±0.6	12.5±0.3	11.9±0.3	9.9±0.1	5.4±0.3	4.1±0.5	4.3±0.2	5.2±0.2	4.0±0.1
Minimum	27.18	23.95	10.32	10.61	4.52	4.30	12.59	12.24	11.44	9.64	4.91	3.73	4.07	4.87	3.89
Maximum	28.91	25.20	11.65	11.53	4.95	4.54	14.47	12.90	12.42	10.04	6.00	4.20	4.56	5.36	4.23
C. V.	2.1	1.8	5.1	3.0	3.4	2.0	4.6	2.1	2.8	1.5	6.4	12.1	4.3	3.5	2.5
Randall County, Texas															
Average 16 (10 ♂, 6 ♀)	27.5±0.7	24.4±0.6	10.5±0.4	10.7±0.3	4.8±0.7	4.4±0.2	13.6±0.4	12.7±0.3	11.9±0.2	9.9±0.2	5.5±0.3	3.9±0.3	4.2±0.1	5.3±0.2	4.1±0.1
Minimum	26.63	23.64	9.79	10.29	4.38	4.26	13.11	12.15	11.60	9.52	5.11	3.60	4.02	4.93	3.91
Maximum	28.87	25.80	11.28	11.27	5.13	4.92	14.54	13.32	12.32	10.47	6.04	4.54	4.38	5.55	4.25
C. V.	2.4	2.4	4.3	3.2	4.4	3.6	3.2	2.5	1.8	2.3	4.6	6.4	2.4	3.1	2.6

in comparison to that of *P. t. comanche* by dry measurements, however: 20.8 (19.1–21.8) in 10 adult specimens of the former listed above as opposed to 18.5 (17.3–20.4) in 22 specimens of *comanche* from Brisco Co., Texas.

Baiomys taylori taylori (Thomas, 1887).—Northward and westward dispersal of the northern pygmy mouse in northwestern Texas was documented by Choate *et al.* (1990), a paper in which habitats were described and mammalian associates listed. Specimens of *B. taylori* obtained in 1990 that extend the known range on the Llano Estacado beyond a line drawn through the northwesternmost localities of occurrence mapped by Choate *et al.* are as follows: *Armstrong Co.*: 1 mi. S, 7 mi. E Claude (58390–91). *Carson Co.*: 1 mi. S, 3 mi. W Groom (58119). *Lubbock Co.*: 5 mi. S, 3 mi. W Shallowater (58737). *Swisher Co.*: 1 mi. N, 2 mi. W Vigo Park (58393–94). *Terry Co.*: 3.5 mi. N, 10.5 mi. W Meadow (58392). *Yoakum Co.*: 5 mi. S, 13 mi. E Plains (58129). The last-listed locality is only approximately 20 miles east of the New Mexican border.

A female trapped in Swisher County on 18 June carried four fetuses (4 in crown-rump length). Of the two taken in early July, one from Armstrong County had three fetuses (3 in crown-rump length), whereas another from Terry County carried one that measured 17.

Spilogale gracilis leucoparia Merriam, 1890.—The posterior part of the cranium (58045) of a spotted skunk referable to this species was found at the base of a rocky slope near the bed of the Double Mountain Fork of the Brazos River, 5.5 mi. E Justiceburg, Garza Co., Texas, in April 1989. This record reduces the known hiatus to but a few miles between the range of *S. gracilis* and that of the eastern spotted skunk, *S. putorius*, just to the east of the Llano escarpment (the latter was reported from 1 mi. S Post, Garza County, by Jones *et al.*, 1985). Our specimen clearly is assignable to *gracilis* on the basis of its inflated mastoid region and enlarged auditory bullae. It is the northernmost record of the species in Texas (see Hollander *et al.*, 1987).

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