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NOTES ON SOME MAMMALS FROM JALISCO, MEXICO

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The varied topography and climate of the Mexican state of Jalisco have resulted in a diverse mammalian fauna, no comprehensive account of which has been published. Significant collections of mammals from Jalisco were obtained for the Museum of Natural History, The University of Kansas, between 1949 and 1969 by field parties and individual field representatives, most notably J. R. Alcorn, R. W. Dickerman, and especially P. L. Clifton. Some of the specimens thus obtained have been recorded in systematic accounts of individual taxa or in reports on selected taxonomic groups (see for example, Choate, 1970; Genoways, 1972; Genoways and Jones, 1969, 1971*a*, 1971*b*; Hall and Genoways, 1970; Jones *et al.*, 1971; Russell, 1968; Smith, 1972; Watkins *et al.*, 1972).

We have recorded herein information that adds substantially to knowledge of distributional patterns in western México of 18 taxa not reported in earlier papers. Nine species or subspecies are recorded from Jalisco for the first time. Comments on systematics and natural history are included in accounts where appropriate.

All specimens are housed in the collections of the Museum of Natural History, The University of Kansas. Recorded measurements are in millimeters and weights are given in grams. Localities in Jalisco from which specimens are reported are plotted on Fig. 1.

Marmosa canescens sinaloae J. A. Allen, 1898

Insofar as we are able to ascertain, the grayish mouse-opossum has not been reported previously from Jalisco. We have specimens from five localities in the northwestern, central, and southeastern parts of the state as follows: 4 mi. SW Puerto Vallarta, 20 ft., 1 (adult male);

2.6 mi. E Etzatlán, 4300 ft., 1 (young male); 27 mi. S and 12 mi. W Guadalajara, 1 (subadult male); 8 mi. E Jilotlán de los Dolores, 2000 ft., 2 (adult males); 14½ mi. S Pihuamo, 1100 ft., 1 (adult male). All these are identifiable as *M. c. sinaloae* according to Tate's (1933:137-138) key and they agree in coloration with comparative material of that subspecies from Sinaloa and Nayarit. Our specimens are somewhat smaller (see below) than those reported from Sinaloa by Armstrong and Jones (1971:750), but this may be related to age in these continuously growing mammals.

The specimen from 2.6 mi. E Etzatlán was caught on the night of 12 September 1963 among dense brush and vines along a stone fence that separated a pasture from a cornfield. P. L. Clifton obtained the individual from 14½ mi. S Pihuamo on the evening of 4 January 1967 from a dense growth of brush along a river. The areas 8 mi. E Jilotlán and 4 mi. SW Puerto Vallarta are described, respectively, in the accounts of *Spermophilus adocetus* and *Neotoma mexicana*. Nothing was recorded concerning the conditions under which the specimen from 27 mi. S and 12 mi. W Guadalajara was taken, but J. R. Alcorn obtained specimens of *Liomys irroratus*, *Reithrodontomys megalotis*, *Baiomys taylori*, and *Mephitis macroura* there in addition to the one mouse-opossum.

Measurements of the adult males, in the same order as listed above, are: total length, 239, 235, 221, 240; length of tail, 133, 133, 122, 134; length of hind foot, 18.5, 19, 19, 19.5; length of ear, 22, 24, 25.5, 23.5; condylobasal length, 28.6, 29.9, 28.8, 32.0; zygomatic breadth, 16.5, 17.3, 15.7, 17.1; interorbital constriction, 4.6, 4.5, 4.2, 4.5; postorbital constriction, 6.5, 6.6, 6.7, 6.0; length of nasals, 13.5, 13.8, 13.2, 15.1; length of maxillary toothrow, 11.7, 12.5, 11.8, 12.8; length of M1-M3, 5.1, 5.5, 5.3, 5.4.

***Sylvilagus audubonii parvulus* (J. A. Allen, 1904)**

The desert cottontail has been reported previously from Jalisco by Nelson (1909:237) on the basis of a single specimen from Lagos. In our collections are seven additional individuals from five different localities in the northern and northeastern parts of the state as follows: 3 mi. S Huejúcar, 5900 ft., 3; 3 mi. S Yahualica, 5900 ft., 1; 5 mi. S, 1 mi. E Yahualica, 1; 8 mi. W Encarnación de Díaz, 1; 3 mi. SW Tepatitlán, 1. These localities form the known western edge of the geographic range of the species in this region of western México.

The locality designated as 3 mi. S Huejúcar is situated in a small valley through which flows a narrow stream. Many small (15-20 feet tall) deciduous trees grew along the stream, whereas rock outcroppings

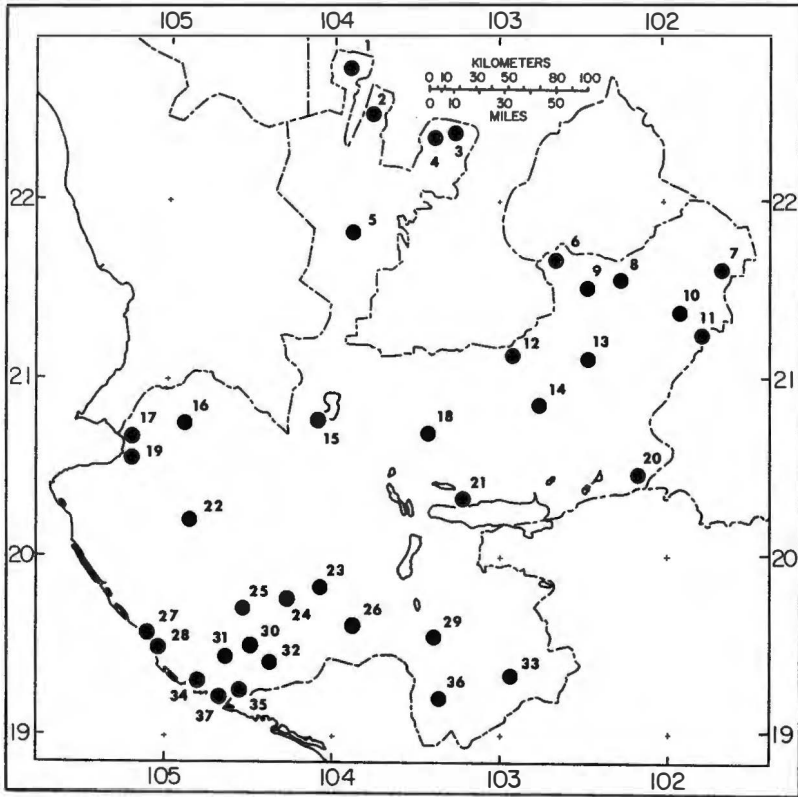


FIG. 1.—Map of Jalisco showing location of place-names used in this report. From north to south these are: 1, Huejuquilla; 2, Mezquitic; 3, Huejúcar; 4, La Mesa María de León; 5, Bolaños; 6, Villa Hidalgo; 7, Matanzas; 8, Encarnación de Díaz; 9, Belén de Refugio; 10, Lagos de Moreno; 11, Comanja de Corona; 12, Yahualica; 13, Jalostotitlán; 14, Tepatitlán; 15, Etzatlán; 16, Milpillas; 17, Ixtapa; 18, Guadalajara; 19, Puerto Vallarta; 20, Degollado; 21, Ajijic; 22, La Cuesta; 23, Limón; 24, Autlán; 25, Purificación; 26, Tolimán; 27, Chamela Bay; 28, Chamela; 29, Tuxpan; 30, Tecomate; 31, La Resolana; 32, Durazno; 33, Jilotlán de los Dolores; 34, Bahía Tenacatita; 35, Cihuatlán; 36, Pihuamo; 37, Barro de Navidad.

along the rim of the valley supported low deciduous shrubs. The remainder of the vegetation in the area was typical of the arid regions of the Mexican Plateau, with a treelike nopal cactus being the conspicuous plant. All three specimens of *S. audubonii* obtained at this place were taken in the valley near the streamside deciduous vegetation. In addition to the desert cottontails, other mammals collected were *Spermophilus variegatus*, *Perognathus nelsoni*, *Liomys irroratus*, *Reithrodontomys fulvescens*, *Peromyscus difficilis*, *Neotoma albigula*,

and *Procyon lotor*. The specimen from 8 mi. W Encarnación de Díaz was obtained in an area where the primary vegetation was grassland, with scattered mesquite and other thorny bushes. Some cultivation (mainly corn) also prevailed in the area. Mammals collected there in the period 6 to 10 October 1965 by P. L. Clifton included *Sylvilagus audubonii*, *Spermophilus mexicanus*, *S. pilosoma*, *Perognathus flavus*, *P. hispidus*, *Dipodomys ordii*, *D. phillipsii*, *Reithrodontomys fulvescens*, and *Mus musculus*.

An adult female from 5 mi. S and 1 mi. E Yahualica, taken on 31 May 1950, contained a single embryo that measured 13 in crown-rump length and one from 3 mi. S Yahualica, taken on 14 June 1950, carried four embryos that measured 21. A lactating female, molting over much of the dorsum, was shot on 14 July 1966 at a place 3 mi. S Huejúcar; a juvenile female was taken on the same date. A fourth adult female, obtained 3 mi. SW Tepatitlán on 31 May 1950, evinced no reproductive activity. An adult male from west of Encarnación weighed 760 grams on 7 October 1965.

Specimens of *Sylvilagus floridanus* also have been taken in the areas of Jalisco where *S. audubonii* occurs. These two species are not easily distinguished, but study of specimens from areas of sympatry in Jalisco revealed the following differences: *audubonii* smaller both externally and cranially (Table 1); auditory bullae and auditory meatuses of *audubonii* larger; ears proportionally longer in *audubonii*; interpterygoid fossa sharply constricted posterior to palate in *audubonii*, but not in *floridanus*.

***Sylvilagus cunicularis insolitus* (J. A. Allen, 1890)**

Specimens of the Mexican cottontail are available to us from the following three localities: 2 mi. N Chamela, 50 ft., 1; Jilotlán de los Dolores, 2400 ft., 1; and 8 mi. E Jilotlán de los Dolores, 2000 ft., 4. The only other localities of record for the species in Jalisco are Ixtapa, in the extreme northwestern part of the state (Nelson, 1909:244), and near Ajijic (Ingles, 1959:387). Specimens from the vicinity of Jilotlán de los Dolores are from near the recorded geographic range of *S. cunicularis* in adjacent Michoacán (Hall and Villa-R., 1949:469). Examination of limited comparative material has led us to assign these specimens to *insolitus*, the lowland subspecies of coastal western México, rather than the highland race from the mountainous areas to the east. We regard this assignment as tentative because geographic variation is poorly documented for the species and the existing sub-specific alignment is in need of review.

TABLE 1.—External and cranial measurements of three species of *Sylvilagus* from Jalisco.

Number of specimens averaged and sex	Total length	Length of tail	Length of hind foot	Length of ear	Greatest length of skull	Zygomatic breadth	Interorbital constriction	Length of nasals	Length of auditory bullae	Breadth across mesopterygoid fossa	Length of maxillary toothrow
<i>Sylvilagus audubonii parvulus</i>											
Mean (2 ♂, 4 ♀)	367.0	25.3 ⁴	78.7	70.5	66.0	32.6 ⁵	17.3	29.2	12.2	7.2 ⁵	11.7
Minimum	346.0	25.0	70.0	63.0	64.5	31.7	16.2	27.4	11.3	6.7	11.1
Maximum	389.0	42.0	81.0	85.0	67.9	33.3	18.2	31.0	13.2	7.6	12.1
1 SE	5.75	4.15	1.74	3.14	0.47	0.28	0.30	0.62	0.32	0.17	0.16
<i>Sylvilagus floridanus subcinctus</i>											
Mean (4 ♀)	410.5	43.8	87.8	69.5	72.8	35.1	18.5	31.1	10.8	8.9	13.6
Minimum	382.0	35.0	77.0	66.0	72.3	33.5	17.9	30.1	10.2	8.5	13.3
Maximum	435.0	53.0	93.0	73.0	73.9	36.9	19.3	31.9	11.2	9.2	14.0
1 SE	10.93	3.68	3.64	1.55	0.19	0.73	0.37	0.38	0.25	0.15	0.15
<i>Sylvilagus cunicularis insolitus</i>											
Mean (1 ♂, 3 ♀)	503.7 ³	52.3 ³	106.0 ³	82.0 ³	87.1	39.9	21.3	38.5	11.2 ³	10.2 ³	16.1
Minimum	491.0	44.0	102.0	81.0	86.7	39.2	19.4	38.2	10.5	9.9	15.9
Maximum	525.0	58.0	110.0	83.0	87.3	40.2	22.9	38.8	11.8	10.4	16.4
1 SE	10.73	4.26	2.31	0.58	0.15	0.23	0.72	0.12	0.39	0.15	0.11

Superscript numbers indicate fewer specimens averaged than indicated in left-hand column.

The specimen from Jilotlán de los Dolores was shot as it crossed a road just west of town; vegetation there consisted of tropical deciduous forest, which had been replaced in many places by cultivated corn. Groves of bananas and mango orchards were located along the nearby Río Apaste. Other small mammals obtained in addition to *S. cunicularis* were *Liomys pictus*, *Pappogeomys tylorhinus*, *Oryzomys palustris*, and *Peromyscus perfulvus*. Conditions under which specimens from 8 mi. E Jilotlán de los Dolores were obtained are discussed in the account of *Spermophilus adocetus*. The specimen from north of Chamela was found dead along a road in an area that was being cleared of tropical deciduous forest.

S. cunicularis is much larger than the other two species of the genus occurring in Jalisco and can be distinguished from either on that basis (see Table 1).

***Eutamias bulleri bulleri* (J. A. Allen, 1889)**

The 20 specimens of this chipmunk collected by P. L. Clifton at a place 10 mi. NE Huejuquilla, 6800 ft., between 9 and 13 November 1966 are the first representatives of the species to be taken in Jalisco, even though they were taken only about 15 kilometers south of the type locality of *E. b. bulleri* at Sierra de Valparaíso, Zacatecas (Howell, 1929:103). The collecting site was located along a large stream, the valley of which received numerous rocky arroyos. Rocky cliffs along the valley and adjacent arroyos were covered with oak. Areas beyond the valley were forested by oak, along with a few small pines and manzanita. Clifton found chipmunks abundant in this area; specimens were taken in rock fences near houses, along the arroyos, and in oak forest near water. Clifton estimated that in this part of Jalisco (probably the only place in the entire state where the species occurs), *E. bulleri* occupied an area of approximately one and a half square miles. Other species of mammals taken there included *Spermophilus variegatus*, *Sciurus nayaritensis*, *Peromyscus boylii*, *Neotoma mexicana*, *Urocyon cinereoargenteus*, *Bassariscus astutus*, *Nasua nasua*, and *Conepatus mesoleucus*.

Of the eight available museum skins, four evinced molt from one adult pelage to another, two specimens were molting from subadult pelage to an adult pelage, and two were in new pelage. No reproductive information was recorded for these specimens.

Because of the large sample at hand, the opportunity was taken to test for the presence of secondary sexual dimorphism in this species. Means for each sex were calculated (Table 2) and these were tested for significant differences using Student's *t*-test (.05 level). The only

measurement in which the sexes proved to be significantly different was total length, suggesting that it would be permissible to combine values for the sexes in any study of geographic variation.

***Spermophilus adocetus adocetus* (Merriam, 1903)**

On 22 January 1967, P. L. Clifton collected six *Spermophilus adocetus* at a place 8 mi. E Jilotlán de los Dolores, 2000 ft., the first locality of record in Jalisco. The area from which these ground squirrels were taken lies in the valley of the Río A paste. Mangos, bananas, and corn were cultivated in the valley; the adjacent hill-sides supported low tropical deciduous forest. Clifton reported that *S. adocetus* was abundant in this area, the six specimens here reported having been obtained in one afternoon of hunting. He also reported sighting individuals near the eastern edge of Jilotlán de los Dolores at 2400 feet, but observed none above that altitude. Other small mammals obtained 8 mi. E Jilotlán de los Dolores in addition to *S. adocetus* were *Marmosa canescens*, *Sylvilagus cunicularis*, *Sciurus aureogaster*, *Liomys pictus*, *Pappogeomys tylorhinus*, *Orthogeomys grandis*, *Peromyscus banderanus*, and *Neotoma alleni*. We follow Alvarez and Ramírez-Pulido (1970) in use of the subspecific name *adocetus* for specimens from this region of western México (see Table 2 for measurements).

***Spermophilus annulatus annulatus* Audubon and Bachman, 1842**

This species has been recorded previously from Jalisco (Hall and Kelson, 1959:356) only from 5 mi. S Purificación. We have specimens from eight additional localities in the state as follows: La Cuesta, 1900 ft., 1; 2 mi. S La Cuesta, 1500 ft., 1; 6 mi. E Limón, 2700 ft., 4; 11 mi. SW Autlán, 2000 ft., 1; Tolimán, 2200 ft., 8; 7½ mi. SE Tecomate, 1500 ft., 1; 25 mi. SW La Resolana, 1; 14 km. S Durazno, 1. Our material is assignable to a single taxon, which, on geographic grounds, should be *S. a. annulatus*. Even though our specimens have, on the average, the long hind feet (Table 2) alleged to be characteristic of the subspecies *annulatus* (Howell, 1938:162-165), we seriously question the utility of recognizing two subspecies within this species because characters used by Howell (1938:162-165) to separate them are relatively minor in nature and not consistent in our material.

Most of our specimens of the ring-tailed ground squirrel were obtained in rocky situations such as rock fences and rock outcroppings along arroyos. In the vicinity of La Cuesta, vegetation consisted of tropical deciduous trees including wild figs; brush had been cleared away under the tall trees for coffee and rubber plantings. In addition

TABLE 2.—External and cranial measurements of five species of Scuriidae from Jalisco.

Statistics or catalog number and sex	Total length	Length of tail	Length of hind foot	Length of ear	Greatest length of skull	Zygomatic breadth	Interorbital constriction	Breadth of braincase	Length of nasals	Length of maxillary toothrow	Palatal length
<i>Eutamias bulleri bulleri</i>											
Mean (4♂)	231.0 ^a	93.0 ^b	35.8	20.6	38.8	20.9	8.5	17.8	11.8	6.0	18.6
Minimum	231.0	90.0	34.5	20.0	37.9	19.8	8.2	17.6	11.5	5.8	18.2
Maximum	231.0	95.0	37.0	21.0	39.0	21.4	8.8	18.1	12.0	6.3	18.9
1 SE	0	1.53	0.52	0.24	0.27	0.37	0.15	0.10	0.10	0.10	0.15
Mean (7♀)	234.4 ^b	94.4 ^b	35.7	20.9	38.5	20.7	8.7 ^b	18.0 ^b	11.5	6.3	18.5
Minimum	230.0	92.0	34.0	20.0	37.6	19.9	8.3	17.6	11.2	6.0	17.9
Maximum	238.0	97.0	37.0	21.5	39.0	21.7	9.2	18.5	12.0	6.7	19.2
1 SE	1.36	1.03	0.38	0.20	0.30	0.23	0.12	0.12	0.10	0.09	0.17
<i>Spermophilus adocetus adocetus</i>											
Mean (3♂, 3♀)	326.3	142.3	45.5	16.1	45.6	26.0 ^b	12.6 ^b	21.4 ^b	14.1 ^b	9.3	24.5
Minimum	309.0	130.0	44.0	15.5	43.9	24.9	12.2	20.6	13.6	9.2	24.2
Maximum	336.0	151.0	47.0	17.5	47.0	26.9	13.5	22.4	14.7	9.5	25.0
1 SE	10.98	3.24	0.50	0.30	0.44	0.34	0.23	0.33	0.21	0.05	0.13

TABLE 2.—Continued

<i>Spermophilus annulatus annulatus</i>											
Tolimán and Limón											
Mean (4♂, 5♀)	425.7	194.3	55.4	22.9	54.6	31.2 ⁷	14.4	23.0 ⁸	17.6	10.2	29.6
Minimum	405.0	165.0	53.0	20.0	53.5	29.7	12.8	22.6	16.7	9.8	28.6
Maximum	436.0	210.0	58.0	28.0	56.0	32.6	15.5	23.6	18.2	10.7	30.8
1 SE	3.21	4.65	0.51	0.88	0.29	0.41	0.31	0.13	0.16	0.10	0.27
La Cuesta											
KU 111662, ♀	447.0	202.0	54.0	21.0	54.2	30.8	14.8	22.9	15.7	9.4	29.0
KU 111663, ♀	412.0	185.0	54.0	20.5	—	30.6	14.1	22.8	16.0	10.2	28.1
<i>Spermophilus mexicanus mexicanus</i>											
KU 107517, ♂	338.0	128.0	43.0	10.0	48.9	28.8	10.5	21.1	17.5	9.4	18.4
<i>Spermophilus spilosoma spilosoma</i>											
Mean (8♂, 3♀)	236.9 ¹⁰	71.2 ¹⁰	34.9	11.3	40.7 ¹⁰	24.9	8.7	18.9	13.6	7.9	21.7
Minimum	230.0	64.0	33.0	10.5	40.0	23.6	8.0	18.3	12.7	7.5	21.2
Maximum	245.0	76.0	40.0	12.0	41.8	26.0	9.3	19.6	14.5	8.3	23.0
1 SE	1.60	1.14	0.58	0.16	0.21	0.22	0.11	0.12	0.14	0.07	0.18

Superscript numbers indicate fewer specimens averaged than indicated in left-hand column.

to *S. annulatus*, the following mammals were obtained along a large stream, 2 mi. S La Cuesta: *Sciurus colliaei*, *Pappogeomys bulleri*, *Liomys pictus*, *Oryzomys melanotis*, *O. palustris*, and *Peromyscus banderanus*. At a place 6 mi. E Limón, vegetation consisted of fields of corn and melons except for wild fig trees, which lined a stream. Other species obtained there were *Liomys pictus*, *Oryzomys palustris*, and *Neotoma alleni*.

The area southeast of Tecamate was humid; tall tropical deciduous trees lined the streams in the numerous steep-walled valleys that led away from the first range of mountains inland from the coast. Many large boulders, especially along the streams, obtained in the dense tropical forest. Stands of oak grew on the adjacent mountainsides, slightly above the place where collecting was conducted. Other species of small mammals obtained were *Sciurus colliaei*, *Liomys pictus*, *Pappogeomys bulleri*, *Oryzomys melanotis*, and *Peromyscus banderanus*. Similar vegetation and associated species occurred 11 mi. SW Autlán.

Tolimán is situated in a hot valley about one mile north of the Río Armería. Clifton reported that there was little natural vegetation remaining in that area. Most of the fields were planted to agave, but some were in corn. Around the edge of town, orchards of bananas, citrus, mango, chico, and guayavo were noted. In addition to *S. annulatus*, the species *Peromyscus banderanus*, *Spilogale putorius*, and *Conepatus mesoleucus* were taken there. We have no data on conditions under which specimens were obtained at the other three localities. Species taken 14 km. S Durazno along with *S. annulatus* included *Liomys pictus*, *Reithrodontomys fulvescens*, *Baiomys musculus*, and *Peromyscus boylii*; *Reithrodontomys fulvescens* and *Baiomys musculus* were associated with the ring-tailed ground squirrel 5 mi. S Purificación.

***Spermophilus mexicanus mexicanus* (Erxleben, 1777)**

Two specimens of the Mexican ground squirrel from La Mesa María de León extend the geographic range of the species approximately 110 kilometers to the northwest from 1 mi. NE Villa Hidalgo (Hall and Kelson, 1959:348). This record also reduces the gap between the known geographic ranges of *S. m. mexicanus* in central México and *S. m. parvidens* of northeastern México and the adjacent United States.

The area from which our two specimens were taken was on a mesa approximately 1000 feet above the country immediately to the east. The top of the mesa had a parklike appearance—grassland with scat-

tered oak trees. The escarpment to the east was more heavily vegetated, oak and manzanita being most abundant. The two ground squirrels were captured as they attempted to leave burrows in grassland atop the mesa. Several other individuals of this species were observed in the same area. Other mammals obtained there included *Didelphis virginiana*, *Sylvilagus floridanus*, *Lepus callotis*, *Spermophilus variegatus*, *Perognathus flavus*, *Dipodomys phillipsii*, *Peromyscus boylii*, *P. maniculatus*, *P. melanophrys*, *Sigmodon hispidus*, *Neotoma albigula*, *Urocyon cinereoargenteus*, *Spilogale putorius*, and *Mephitis macroura*.

Both specimens were males, an adult (see Table 2) taken on 23 June 1966 and a juvenile (M3 not above level of alveolus) obtained on 20 July 1966.

***Spermophilus spilosoma spilosoma* Bennett, 1833**

To our knowledge, the spotted ground squirrel has not been reported previously from Jalisco. Specimens from three localities are represented in our collection as follows: 8 mi. W Encarnación de Díaz, 6000 ft., 3; 10 mi. NW Matanzas, 8000 ft., 5; 2 mi. SW Matanzas, 7550 ft., 3. The nearest localities of record are Chicalote, Aguascalientes (Howell, 1938:124), and 2 km. SW Arriaga, San Luis Potosí (Dalquest, 1953:92). The Jaliscan specimens are relatively large; their measurements agree closely with those given by Howell (1938:123) for *S. s. spilosoma*, to which race we have assigned them (Table 2).

The area northwest of Matanzas was described by P. L. Clifton in mid-May as being a large area of relatively unbroken grassland, with scattered patches of nopal cactus, and low stands of oak on the small hills. Clifton noted that *S. spilosoma* was abundant in the area, but that no other ground squirrels were seen. Other mammals collected there included *Sylvilagus floridanus*, *Lepus callotis*, *Thomomys umbrinus*, *Dipodomys phillipsii*, *Peromyscus difficilis*, *P. maniculatus*, *P. melanophrys*, *P. truei*, *Neotoma albigula*, *Canis latrans*, and *Spilogale putorius*. The area southwest of Matanzas, where Clifton obtained spotted ground squirrels by digging them from burrows on 13-14 October 1965, was essentially as described above, grassland with scattered clumps of nopal cactus and thronbush. The following species were taken there: *Thomomys umbrinus*, *Perognathus flavus*, *P. hispidus*, *Dipodomys phillipsii*, *Peromyscus difficilis*, *P. maniculatus*, *Onychomys torridus*, *Sigmodon fulviventer*, and *Mephitis macroura*. The locality west of Encarnación de Díaz is described in the account of *Sylvilagus audubonii parvulus*.

No reproductive data were recorded for our specimens. None of them (taken in mid-May and the first half of October) was molting.

***Perognathus hispidus zacatecae* Osgood, 1900**

We have examined specimens of the hispid pocket mouse from four localities in Jalisco as follows: 2 mi. SW Matanzas, 7550 ft., 1; 8 mi. W Encarnación de Díaz, 6000 ft., 1; 5 mi. E Encarnación de Díaz, 6300 ft., 1; Belén de Refugio, 5700 ft., 3. Although these apparently constitute the first records of this mouse from the state, the species has long been known from Zacatecas to the north and Guanajuato to the south (Osgood, 1900:45). The distinguishing features and relationship of *zacatecae* to other subspecies within the species are not well understood; pending an analysis of geographic variation in the southern portion of the range of *P. hispidus*, we assign our specimens to *zacatecae* on geographic grounds.

The ecological situations at the localities where hispid pocket mice were captured are discussed in other accounts in this paper except for the place 5 mi. E Encarnación de Díaz. There, one specimen was trapped along a ditch adjoining a cultivated field. Only the specimen from 8 mi. W Encarnación de Díaz, taken on 10 October 1965, was an adult (see below for measurements), our remaining five specimens being subadults or young. A hispid pocket mouse taken on 11 October 1965 at Belén de Refugio was molting on the dorsum from juvenile to adult pelage in the manner described by Speth (1969) for *Perognathus parvus*.

Measurements of an adult male are as follows: total length, 220; length of tail, 102; length of hind foot, 26; length of ear, 13; greatest length of skull, 31.4; zygomatic breadth, 16.0; interorbital constriction, 7.7; mastoid breadth, 15.3; length of nasals, 12.0; length of rostrum, 13.0; length of maxillary toothrow, 4.3.

***Perognathus nelsoni nelsoni* Merriam, 1894**

The only previous record of this species from Jalisco of which we are aware is the report by Osgood (1900:53) of specimens from Lagos. Nevertheless, the species evidently is relatively abundant in the extreme northern and northeastern parts of the state. We have examined a total of 32 specimens from the following localities: 1 mi. NW Mezquitic, 5000 ft., 3; 3 mi. S Huejúcar, 5900 ft., 3; 1 mi. NE Villa Hidalgo, 6500 ft., 13; 5 mi. E Encarnación de Díaz, 6300 ft., 1; Belén de Refugio, 5700 ft., 5; 2 mi. WNW Lagos de Moreno, 6300 ft., 7. All our specimens are from relatively near the type locality of *P. n.*

nelsoni at Hacienda La Parada, San Luis Potosí, and their measurements agree closely with those given by Osgood (1900:53, 62) and Dalquest (1953:107) for specimens from that state.

The locality 1 mi. NW Mezquitic lies in the valley of the Río Mezquitic, which is in heavy agricultural use. Specimens of Nelson's pocket mouse were taken there in traps set under a dense growth of deciduous bushes and cacti bordering a dry stream bed along with *Liomys irroratus*, *Peromyscus boylii*, and *Neotoma palatina*. At Belén de Refugio, traps were set above the valley of the Río Aguascalientes (where more weeds and brush and fewer cornfields were found than in the valley), and in the valley itself, which was dotted with cornfields, many separated by stone fences; mesquite grew along the riverbank. On the night of 10 October 1965, P. L. Clifton set 100 snap traps baited with rolled oats in this area. These yielded two *Perognathus nelsoni*, two *Perognathus hispidus*, two *Dipodomys ordii*, and five *Liomys irroratus*. On the following night, Clifton set 77 rat traps and 75 museum specials along a weed-covered, dirt bank at the edge of a cornfield. From these he removed five *Perognathus nelsoni*, one *P. hispidus*, and four *Liomys irroratus*. Specimens of *Spermophilus variegatus* and *Perognathus flavus* also were obtained in this area by means other than trapping. Species taken along with *P. nelsoni* at 2 mi. WNW Lagos de Moreno included *Liomys irroratus*, *Reithrodontomys fulvescens*, *Peromyscus maniculatus*, *P. truei*, and *Baiomys taylori*, whereas those taken 1 mi. NE Villa Hidalgo were *Spermophilus mexicanus*, *Thomomys umbrinus*, *Perognathus flavus*, *Dipodomys phillipsii*, *Reithrodontomys fulvescens*, *Peromyscus maniculatus*, and *Baiomys taylori*. Several other localities of capture are discussed elsewhere in this paper.

A specimen taken on 18 July 1966 at a place 1 mi. NW Mezquitic was molting from one adult pelage to another on the posterior part of the back and on the flanks. External and cranial measurements of seven adults (four for total length and length of tail and six for zygomatic breadth) from 2 mi. WNW Lagos de Moreno are as follows (mean, range in parentheses, and one standard error of the mean): total length, 175.8 (165.0-188.0) \pm 4.87; length of tail, 100.0 (87.0-109.0) \pm 4.92; length of hind foot, 22.7 (22.0-23.0) \pm 0.18; length of ear, 8.4 (8.0-9.0) \pm 0.20; greatest length of skull, 25.4 (23.9-26.8) \pm 0.33; zygomatic breadth, 13.1 (12.8-13.4) \pm 0.09; interorbital constriction, 6.4 (6.2-6.7) \pm 0.08; mastoid breadth, 13.0 (12.8-13.2) \pm 0.05; length of nasals, 9.4 (8.2-10.1) \pm 0.26; length of rostrum, 11.2 (9.8-11.8) \pm 0.25; length of maxillary toothrow, 3.5 (3.4-3.7) \pm 0.04.

***Oryzomys fulvescens lenis* Goldman, 1915**

The only previous record of this rice rat from Jalisco is the mention of a series from an unspecified locality in the state by Hooper (1952). We have examined a nonpregnant, adult female from 2 mi. SW La Resolana, 1100 ft., which was obtained on 20 November 1950 by J. R. Alcorn, and a subadult male obtained on 1 December 1966 by P. L. Clifton at Cihuatlán.

The specimen from Cihuatlán was taken in a trap set among brush and vines along the bank of the Río Cihuatlán. Other species obtained in the situation included *Liomys pictus*, *Oryzomys palustris*, and *Baiomys taylori*. This individual was molting from subadult to adult pelage. The conditions under which the adult female from near La Resolana was taken are unknown but *Liomys pictus*, *Oryzomys palustris*, and *Reithrodontomys fulvescens* were taken in the same area.

Measurements of the adult female from 2 mi. SW La Resolana are: length of hind foot, 21.0; length of ear, 13.0; greatest length of skull, 21.5; zygomatic breadth, 11.4; interorbital constriction, 3.3; breadth of braincase, 9.8; length of nasals, 8.1; length of rostrum, 7.8; length of maxillary toothrow, 2.8.

***Peromyscus perfulvus chrysopus* Hooper, 1955**

The marsh mouse is presently known in Jalisco only from the vicinity of Barro de Navidad and Bahía Tenacatita (Hooper, 1955:19) along the Pacific coast in the extreme southwestern part of the state. We have 14 specimens from 4 mi. NNE Puerto Vallarta, 50 ft., along the Pacific coast in extreme northwestern Jalisco and approximately 165 kilometers to the north of the previous records. Within the species *Peromyscus perfulvus*, two subspecies currently are recognized — *P. p. perfulvus* (Osgood, 1945) from Michoacán and Guerrero and *P. p. chrysopus* (Hooper, 1955) from southwestern Jalisco. Our specimens approach the smaller *chrysopus* in size (measurements given below). However, the ectostylids and mesolophs on the first two molars are evidently not so well developed in the specimens from Puerto Vallarta as in typical *chrysopus* as described by Hooper (1955). Otherwise, these specimens appear to represent that subspecies, to which we have assigned them.

The conditions under which J. R. Alcorn collected specimens near Puerto Vallarta, between 28 and 31 January 1955, are unknown. Other species of mammals obtained there included *Didelphis virginiana*, *Dasyopus novemcinctus*, *Sciurus colliaei*, *Liomys pictus*, *Oryzomys palustris*, and *O. melanotis*. None of our four adult females evidenced gross reproductive activity and none was molting.

External and cranial measurements of five adults, two males and three females, are as follows (statistics in same order as in account of *Perognathus nelsoni*): total length, 230.2 (220-245) \pm 4.27; length of tail, 122.2 (115-127) \pm 2.03; length of hind foot, 24.0 (24-24) \pm 0.00; length of ear, 18.8 (18-20) \pm 0.37; greatest length of skull, 29.0 (28.4-30.3) \pm 0.35; zygomatic breadth, 14.9 (14.4-15.5) \pm 0.17; interorbital constriction, 4.6 (4.6-4.8) \pm 0.03; breadth of braincase, 13.3 (13.0-13.4) \pm 0.07; length of nasals, 11.1 (10.6-11.7) \pm 0.21; length of rostrum, 10.8 (10.5-11.4) \pm 0.17; length of maxillary tooth-row, 4.0 (3.8-4.1) \pm 0.04.

***Onychomys torridus canus* Merriam, 1904**

The southern grasshopper mouse, which heretofore has not been reported from Jalisco, is represented in our material by two individuals from a place 2 mi. SW Matanzas, 7550 ft. These two specimens, a young adult male and an adult female, were obtained on 13 October 1965 by P. L. Clifton. We have assigned our specimens to the subspecies *canus* mainly on geographic grounds, awaiting more material from this area for a complete analysis of the relationships of these animals.

The area 2 mi. SW Matanzas is described in the account of *Spermophilus pilosoma*. The adult female revealed no gross evidence of recent reproductive activity and neither specimen was molting.

External and cranial measurements of the male, followed by those of the female, are: total length, 141.0, 141.0; length of tail, 43.0, 49.0; length of hind foot, 20.5, 20.5; length of ear, 16.5, 17.5; greatest length of skull, 25.7, 25.8; zygomatic breadth, —, 12.9; interorbital constriction, 4.7, 4.5; breadth of braincase, 12.1, 11.5; length of nasals, 9.5, 10.0; length of rostrum, 9.4, 9.5; length of maxillary toothrow, 3.7, 3.8.

***Neotoma alleni alleni* Merriam, 1892**

Although this woodrat is known from north of Jalisco in Sinaloa and Nayarit and to the south in Colima, the only previous records from the state are a skull figured in Hall and Kelson (1959:705) from Chamela Bay and the bacula of two specimens that were discussed and illustrated by Burt (1960) from an unspecified locality. We have specimens from the following localities: 7 mi. N Guadalajara, 4100 ft., 1; 6 mi. E Limón, 2700 ft., 3; 10 mi. SE Tuxpan, 4200 ft., 1; 5 km. NNW Barro de Navidad, 5. The large size (Table 3), tawny-red upper parts, blackish and sparsely haired tail, and dusky feet clearly ally these specimens with the nominate subspecies (Merriam,

1892; Goldman, 1938; Birney and Jones, 1972). The specimen from 10 mi. SE Tuxpan is a juvenile male and, because it originates from near the geographic range of *N. a. elattura* (see below), subspecific allocation is questionable. However, because this rat has dusky hind feet and a unicolored black tail, we have assigned it to *N. a. alleni*.

Evidently this woodrat has followed tropical vegetation in the barranca of the Río Grande de Santiago eastward from coastal areas, because an adult female from 7 mi. N Guadalajara is from much farther inland than other specimens known from the central part of the geographic range of the species. This animal was taken by P. L. Clifton on 31 August 1965 at her nest in a small cave, where she recently had nursed young. The cave was located in one of the steep walls of the barranca; tropical vegetation and mango orchards grew below, interspersed with many large boulders. Other rodents taken at this place were *Liomys pictus*, *Peromyscus boylii*, *P. maniculatus*, and *Neotoma mexicana*.

Our three specimens from 6 mi. E Limón were taken on 28 and 29 September along a rock fence in the area described in the account of *Spermophilus annulatus*. At the place 5 km. NNW Barro de Navidad, M. R. Lee collected mammals from 24 March to 2 April 1961. Lee made his camp at the base of a cliff that extended for nearly a third of a mile. A grove of coco-oil palms was situated near the base of the cliff, with low thorn forest above. Traps were set among boulders near the base of the cliff where little or no vegetation prevailed among the rocks. These traps yielded *Liomys pictus*, *Peromyscus banderanus*, and *Neotoma alleni*. Lee noted that *alleni* did not construct large nests of sticks and debris characteristic of other woodrats, the only evidence of its presence among the boulders being droppings and caches of coco-oil nuts.

The place 10 mi. SE Tuxpan is at the confluence of two large streams near the highway between Tecatitlán and Pihuamo. The vegetation along the stream consisted of dense tropical deciduous forest, but pine-oak forest prevailed at slightly higher elevations. On the evening of 5 September 1966, P. L. Clifton set traps among the rocks and fallen logs along the banks of the streams. These traps yielded one juvenile *Neotoma alleni*.

Three maturational pelages are evident in our material. Juvenile pelage, represented by the specimen from 10 mi. SE Tuxpan (KU 109418), is dark slate to blackish, with only a few reddish-brown hairs visible dorsally. A specimen from 5 km. NNW Barro de Navidad is in subadult pelage, which is pale grayish in color and contains numerous reddish-brown hairs dorsally, thinning on the sides. Pelage of

TABLE 3.—External and cranial measurements of adults of three taxa of woodrats from Jalisco.

Catalog number and sex	Total length	Length of tail	Length of hind foot	Length of ear	Greatest length of skull	Zygomatic breadth	Interorbital constriction	Mastoid breadth	Length of nasals	Length of incisive foramen	Length of palatal bridge	Length of maxillary toothrow
<i>Neotoma alleni alleni</i>												
7 mi. N Guadaluajara												
KU 103830, ♀	380.0	168.0	41.5	31.0	49.7	25.7	5.7	17.5	18.0	9.2	10.9	10.7
6 mi. E Limón												
KU 103831, ♂	408.0	189.0	40.5	35.0	50.8	25.0	6.0	17.7	18.3	11.7	9.1	10.5
KU 103833, ♀	406.0	182.0	41.0	29.0	—	23.8	5.4	17.3	17.9	9.9	9.1	10.4
5 km. NNW Barro de Navidad												
KU 87657, ♂	454.0	215.0	46.0	33.0	53.2	27.5	5.8	18.0	18.5	10.9	9.0	11.2
KU 87656, ♀	443.0	200.0	42.0	31.0	53.3	26.9	6.1	18.1	19.0	10.0	9.8	11.4
KU 87658, ♀	477.0	243.0	48.0	34.0	—	27.9	5.7	—	19.5	10.6	9.5	11.2
<i>Neotoma alleni elattura</i>												
KU 111952, ♀	368.0	158.0	37.0	32.0	46.3	24.4	5.6	17.2	16.6	10.6	7.7	9.4
<i>Neotoma mexicana eremita</i>												
KU 111944, ♂	305.0	136.0	31.0	24.5	40.5	20.5	5.4	15.4	15.8	8.2	7.6	8.0

adults is characterized by a reddish-brown or tawny-red color both dorsally and laterally. A specimen taken on 28 September near Limón was molting from subadult to adult pelage, whereas an adult taken there on the next day was molting from one pelage to another. None of our adult females evinced gross reproductive activity.

***Neotoma alleni elattura* (Osgood, 1938)**

A specimen from 8 mi. E Jilotlán de los Dolores, 2000 ft., evidently is assignable to this subspecies rather than to *N. a. alleni* to the west. This rat, an adult female, differs from individuals of *N. a. alleni* in being smaller, both externally and cranially (Table 3), in having white feet (instead of feet black at least to the bases of toes), and in having a somewhat bicolored tail. In all of these characteristics, the specimen from Jilotlán agrees with *N. a. elattura* (Osgood, 1938; Kelson, 1952). The nearest known locality of record for this subspecies is approximately 140 kilometers to the south-southeast at 7 mi. S Tumbiscatio, Michoacán (Kelson, 1952). Our specimen was trapped on 14 March 1967 in weeds growing among large boulders. The area east of Jilotlán was described in the account of *Spermophilus adocetus*.

***Neotoma mexicana eremita* Hall, 1955**

Hall (1955) described *N. m. eremita* on the basis of two specimens from 1 mi. S San Francisco, Nayarit. He distinguished *eremita* from other subspecies of *N. mexicana* on the basis of its small cranial size and dark grayish to dull ochraceous dorsal coloration. Since Hall's original description, no additional specimens of this race have been reported. We have two woodrats from 4 mi. SW Puerto Vallarta, 20 ft., Jalisco, obtained by P. L. Clifton on 24 and 26 March 1967, which clearly are assignable to *eremita*. An adult male (KU 111944) is slightly larger (see Table 3 for measurements) than the adult female holotype of *eremita* but smaller than the female holotypes of *parvidens* and *tenuicauda* with which Hall compared *eremita*. Our second specimen is a subadult female. Both compare favorably with the holotype in dorsal coloration.

The two woodrats were trapped among rocks and brush in an arroyo in an area of tropical deciduous thorn forest. Other small mammals obtained at this place were *Marmosa canescens*, *Megasorex gigas*, *Liomys pictus*, *Oryzomys palustris*, and *Peromyscus banderanus*.

***Mustela frenata leucoparia* (Merriam, 1896)**

Examination of the distribution map published by Hall (1951:221) reveals that three subspecific names — *frenata*, *leucoparia*, and *neomexicana* — could be applicable to long-tailed weasels occurring in Jalisco. Comparison of our material with representatives of these three subspecies in the Museum of Natural History at the University of Kansas, and with Hall's descriptions, reveals that our specimens are best assigned to *leucoparia*. They agree in color with Hall's description and colored plate (Hall, 1951:4) of that race, and their auditory bullae are somewhat smaller than in specimens from central México. The differences in color and size of bullae between *M. f. leucoparia* and *M. f. frenata* are not striking in our limited material and the two races clearly are closely related. We have examined Jaliscan specimens from the following localities: 2 mi. N Milpillas, 3000 ft., 2; 4½ mi. NE Comanja de Corona, 8000 ft., 1; 4 mi. SE Degollado, 5600 ft., 1. Hall (1951:351) recorded the species from three other localities in the state. The nonpregnant, adult female from 4 mi. SE Degollado weighed 169.7 when captured on 21 September 1966.

Two specimens (adult males) from 2 mi. N Milpillas were obtained by P. L. Clifton on 7 and 9 July 1967; both were shot on a rock fence along a densely vegetated stream. At the place 4½ mi. NE Comanja de Corona, Clifton camped on the slopes of a high ridge in oak forest, where an adult male was shot on 31 October 1966 along a rock fence. Other mammals also obtained at this place included *Dasyopus novemcinctus*, *Liomys irroratus*, *Thomomys umbrinus*, *Reithrodontomys megalotis*, *Peromyscus boylii*, *P. difficilis*, *P. melanophrys*, *P. truei*, *Baiomys taylori*, *Sigmodon fulviventer*, *Neotoma mexicana*, *Urocyon cinereoargenteus*, *Spilogale putorius*, *Mephitis macroura*, and *Lynx rufus*. The locality southeast of Degollado was situated in an area of rimrock in tropical deciduous forest. An adult female weasel was shot there on a pile of rocks.

Measurements of our four specimens are in the same order as localities listed above (three males followed by a female): total length, 489, 466, 501, 373; length of tail, 160, 183, 191, 144; length of hind foot, 56, 51, 51, 37; length of ear, 26, 25, 27, 20; greatest length of skull, 58.1, 53.0, 56.6, 46.0; zygomatic breadth, 32.9, 30.1, 32.5, 24.0; interorbital constriction, 12.5, 10.7, 11.2, 9.1; postorbital breadth, 7.8, 9.4, 8.3, 8.3; mastoid breadth, 27.9, 26.0, —, —; palatal length, 24.0, 21.9, 24.2, 18.2; length of maxillary toothrow, 15.3, 14.0, 15.7, 12.3.

***Lynx rufus escuinapae* J. A. Allen, 1903**

Insofar as we have been able to ascertain, this species has not been reported from Jalisco previously, although bobcats are known from western México both to the north and south of the state. Among our Jaliscan collections are three *L. rufus* from 2 mi. E Bolaños, 4½ mi. NE Comanja de Corona, 8000 ft., and 1 mi. S Jalostotitlán. The measurements of these specimens (given below) correspond with those recorded by Allen (1906:222) for *L. r. escuinapae*.

The cat from north of Bolaños was shot along a stone fence in an area of thorn forest. The locality northeast of Comanja de Corona was described in the account of *Mustela frenata* and the specimen from Jalostotitlán was purchased from natives.

External measurements of an adult female from 4½ mi. NE Comanja de Corona are: total length, 780; length of tail, 150; length of hind foot, 160; length of ear, 74. Cranial measurements of the same specimen, followed by those of an adult female from east of Bolaños and the specimen from near Jalostotitlán (unsexed, but probably an adult male) are: greatest length of skull, 109.0, 109.4, 128.1; zygomatic breadth, 79.5, 77.4, 88.2; interorbital constriction, 21.3, 21.9, 25.0; postorbital breadth, 41.1, 39.1, 40.2; mastoid breadth, 49.4, 48.2, 55.8; palatal length, 42.6, 42.9, 47.6; length of maxillary tooth-row, 33.6, 33.4, 36.6.

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