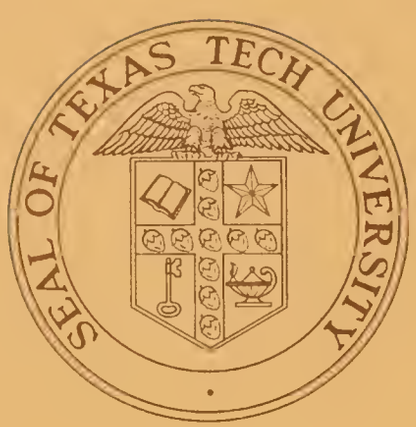
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Mammals of Zacatecas

John O. Matson and Rollin H. Baker

No. 24

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Mammals of Zacatecas

John O. Matson and Rollin H. Baker

In this day of rapid depletion of the earth's resources, once again much attention is being given to surveys of the flora and fauna of various parts of the world. Usually, these are concerned with environmental impact statements relating to local areas that are about to be exploited. In the United States, fairly good base-line data exist for such surveys. However, our knowledge of much of the biota of Latin America is meager.

México currently is faced with one of the greatest rates of population growth in the world (Corzo, 1970; Wellhausen, 1976). Much of México's land is rapidly being exploited for its vast mineral reserves or is being turned to cultivation to meet the economic and nutritional demands made by a growing population (Wellhausen, 1976). While this is a necessary consequence of population growth, the environmental changes can have a drastic effect on the native plants and animals. With adequate base-line data on the biota, the impact of these environmental perturbations can be assessed.

Zacatecas, with its highly dissected topography and diverse but poorly known mammalian fauna, first attracted the second author's attention in the summer of 1952, when his field party from the Museum of Natural History at the University of Kansas made a highly productive collection stop on 12-13 July at a place 13 km. SE Zacatecas. In the later 1950s and the 1960s, he obtained additional collections, this time under the sponsorship of The Museum at Michigan State University. It was in 1970, however, that Zacatecan mammals became the major objective for summer field work. Collecting sites in all parts of the state were visited in subsequent years according to an organized plan, culminating in 1979. Major work was concentrated in the summers of 1976, 1977, and 1978, when the first author was in the field with student assistants.

The aims of this study were (1) to inventory the mammalian life of Zacatecas and (2) to appraise various environmental influences on its distribution and geographic variation. Detailed analysis of rodent distributional patterns was a major concern of the first author (Matson, 1982), who used his findings as partial fulfillment of the requirements for the doctoral degree at Michigan State University.

The first preserved collections of Zacatecan mammals were made by Audley Buller. He obtained specimens in July and August of 1889 for the American Museum of Natural History from along his route to the city of Zacatecas from Tepic, Nayarit, from the mountainous region in the vicinity of Valparaíso, and from grasslands near Zacatecas. Using the Buller specimens, Allen (1889) described as new to science *Eutamias bulleri* and

Sigmodon fulviventer. E. W. Nelson and E. A. Goldman, under the auspices of the U. S. Bureau of Biological Survey, collected mammals in Zacatecas on several occasions between 1893 and 1902 (Goldman, 1951). Most were obtained from September to December 1897. A small collection was acquired by Leon Diguet in 1900 near Pinos (Anderson and Hadary, 1965). A field party from the Museum of Vertebrate Zoology at the University of California collected from the border between San Luis Potosí and Zacatecas at Lulú in May 1940. Later, in the 1950s and 1970s, personnel from Berkeley again visited the state, chiefly to obtain pocket gophers and kangaroo rats. In the 1950s and 1960s, workers from the Museum of Natural History at the University of Kansas made general collections. Also in the 1950s, parties led by J. Dan Webster and sponsored by the California Academy of Sciences visited selected localities (Jones and Webster, 1976). Under the direction of J. Keever Greer, collectors from the Stovall Museum of Science and History at the University of Oklahoma preserved significant specimens of mammals in the late 1960s and early 1970s. Percy L. Clifton, under sponsorship of the Natural History Museum of Los Angeles County, obtained a large collection of mammals in Zacatecas in 1970. Following his important contributions were those of John O. Matson and R. G. Hannum in 1973. Other collections are deposited at the University of Illinois, University of Michigan, Texas A&M University, and Texas Tech University.

Most specimens examined for this report were acquired during summer field seasons by the authors, their students, and colleagues. In 1952, field operations were under the auspices of the Museum of Natural History at the University of Kansas. In the summers of 1957, 1965, 1966, 1968-1971, and 1975-1979, trips were made under the sponsorship of The Museum at Michigan State University. During these years, 40 persons were members of our field parties visiting Zacatecas in the interests of one or both of these institutions:

J. Paul Abravaya
Albert A. Alcorn
J. Raymond Alcorn
Julia N. Allen
Sydney Anderson
James W. Archie
Bruce R. Baker
Byron L. Baker
Mary W. Baker
Rollin H. Baker
Dan Bennack
Karen Bennack
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Jerry W. Shave
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Edward Stern
Charles L. Warner, Jr.
Olin L. Webb
Robert G. Webb
W. David Webster
Francis E. Welling

We thank the following curators and institutions for allowing us to examine specimens in their care (abbreviations used in species accounts are given): Sydney Anderson, American Museum of Natural History (AMNH); Robert T. Orr, California Academy of Sciences (CAS); Robert S. Hoffmann,

Museum of Natural History, University of Kansas (KU); Donald R. Patten, Natural History Museum of Los Angeles County (LACM); George H. Lowery, Jr., Louisiana State University (LSU); William Z. Lidicker and James L. Patton, Museum of Vertebrate Zoology, University of California (MVZ); Philip Myers, Museum of Zoology, University of Michigan (UMMZ); Robert G. Hannum, private collection (RGH); David J. Schmidly, Texas Cooperative Wildlife Collections, Texas A&M University (TCWC); Robert J. Baker, The Museum, Texas Tech University (TTU); Donald F. Hoffmeister, Museum of Natural History, University of Illinois (UI); J. Keever Greer, Stovall Museum of Science and History, University of Oklahoma (OU); Don E. Wilson, National Museum of Natural History (USNM). We also thank Dr. Cornelio Sanchez-H. and Dr. Bernardo Villa-R. for providing us with information on specimens housed in the Instituto de Biología, Universidad Nacional Autónoma de México. We are especially indebted to Donald R. Patten and Loni A. Lester of the Natural History Museum of Los Angeles County for allowing us to borrow more than 800 specimens from that collection.

Collecting permits were provided by the Dirección General de La Fauna Silvestre, México, D. F. Field work was financed by grants from the Kansas University Endowment Association, the Jens Touborg Fund of The Museum at Michigan State University, and the generosity of Russell Jameson and other donors. Some support (for Matson) was by means of Museum and Zoology Research Assistantships at Michigan State. The hospitality of many friends in Zacatecas helped to make our visits to remote areas possible. Special thanks go to Alejandro Delgadillo for allowing field parties to use the facilities of Rancho San Marcos in 1977 and 1978. Officials at the state and regional offices of the Union Ganadera Regional de Zacatecas were most cooperative in arranging visits to excellent collecting localities.

Environment of Zacatecas

Physiography and Topography

Zacatecas covers an area of approximately 72,800 square kilometers in the southern portions of the Central Mexican Plateau and Sierra Madre Occidental. The Tropic of Cancer essentially bisects the state. The varied topography and climate allows for a complex of environmental situations throughout Zacatecas.

Physiographic provinces of México were described and mapped by Raisz (1964). These provinces more or less correspond to the major areas of topographic relief (Fig. 1). Most of the eastern half of Zacatecas is in the Central Mesa Province, with elevations usually below 2000 meters. It is an area of relatively flat to low hilly terrain that serves as a drainage basin for runoff from the higher lands to the east and west. In fact, the Central Mesa Province corresponds to two of the major internal drainage basins of the Chihuahuan Desert described by Henrickson (1978). These two major basins

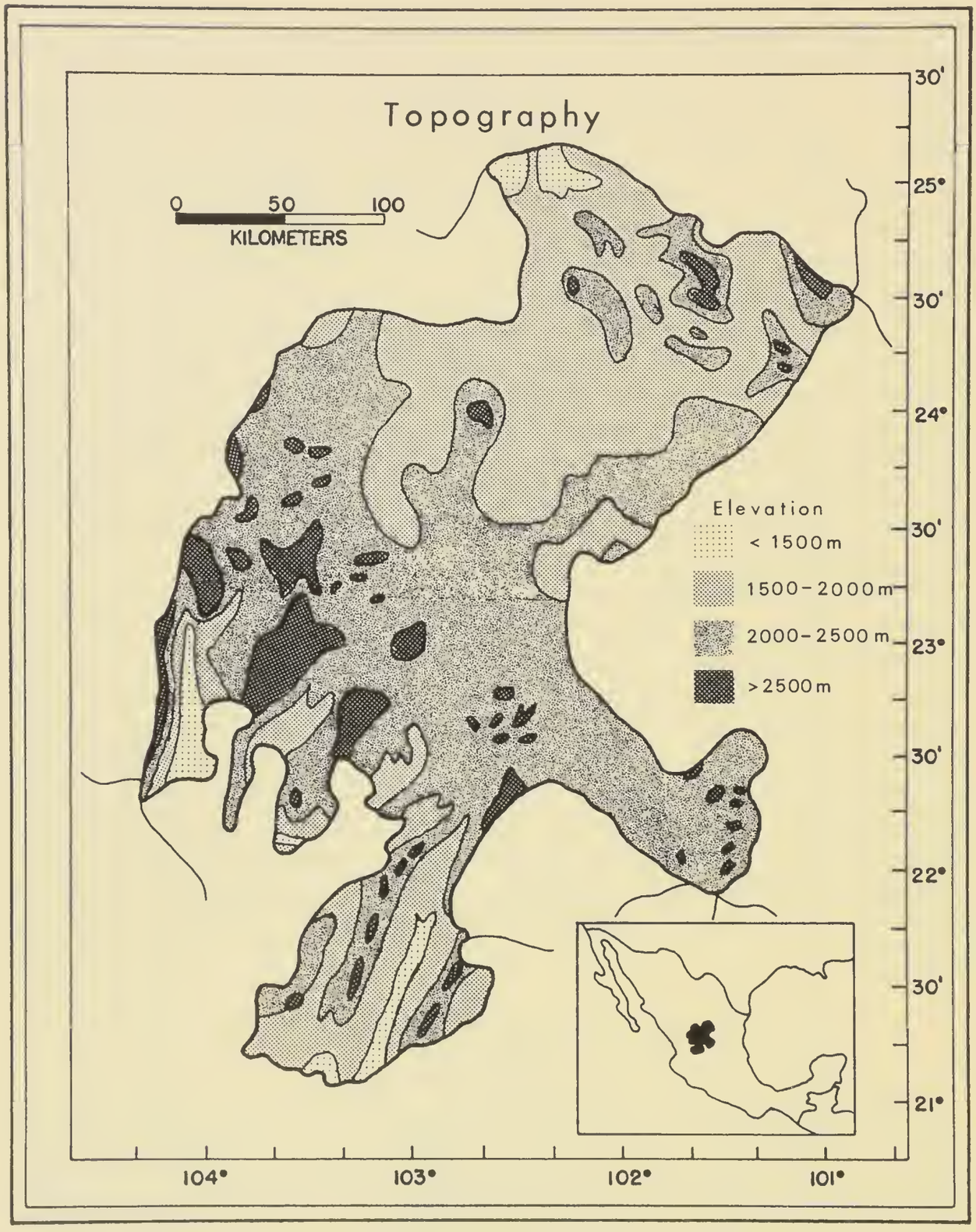

Fig. 1.—Topographic relief in Zacatecas (contour interval, 500 m.).

are the Río Aguanaval (the major river of which originates in west-central Zacatecas) and El Salado (the largest of the Chihuahuan drainage basins).

The extreme northeastern portion of Zacatecas is dominated by numerous isolated mountain ranges (areas above 2500 meters in Fig. 1). These mountains represent the southern part of the Cross Ranges Subprovince of the Sierra Madre Oriental Province described by Raisz (1964). They are a

western extension of the Sierra Madre Oriental, and form a connection between the Sierra Madre Oriental Province and the Sierra Madre Occidental Province in the area of Nasas, Durango. The highest peak (more than 3000 meters) in the Zacatecan portion of the Cross Ranges occurs at the border with Coahuila in the Sierra Antillero (referred to as the Sierra Encarnación by Goldman, 1951, and others).

The western half of Zacatecas lies at elevations mostly above 2000 meters and corresponds to the southern part of the Sierra Madre Occidental Province. Raisz (1964) recognized two subprovinces of this area. The Eastern Uplands are to the east of the main mountain mass of the Sierra Madre Occidental and represent an elevated plateau above the Central Mesa. The other subprovince is the Lava (Rhyolite) Plateau, which represents the main backbone of the Sierra Madre Occidental. In Zacatecas, the Lava Plateau is represented only by fingerlike extensions or isolated mountains of the Sierra. In the extreme south and southwest, these mountainous areas are deeply cut by river canyons that drain the western and southern slopes of the Sierra, forming the major western drainage system in Zacatecas. All tributaries of the Río Grande de Santiago, the rivers include, from west to east, the Río Atengo, the Río Bolaños (including the Río Jérez), and the Río Juchipila. The area of deep canyons was considered by Rzedowski and McVaugh (1966) to represent a distinct physiographic region, which they termed the Canyon Region.

Climate

Climatic data were summarized from climatological maps (Secretaría de la Presidencía, Comisión de Estudios del Territorio Nacional, 1975), and from the published data in Wernstedt (1972) and Soto and Jauregui (1965). These sources also provided part of the raw data for the analyses of rodent species distributions (Matson, 1982). Only the major climatological patterns are summarized here.

Most moisture in Zacatecas is precipitated as rain. Some snow falls during winter months and may occur almost anywhere within the state (except in the extreme southwest). Rainfall occurs mainly between June and September with little or no precipitation from November through April or May. Average annual precipitation (Fig. 2) ranges from less than 250 millimeters in some areas of the northeast to more than 800 millimeters in the extreme southwest (the Canyon Region). The mountains of the northeast receive considerably more rainfall than do surrounding areas. This is reflected in the different vegetation (see section on Vegetation).

Temperatures are moderate over most of the state (Fig. 3). The coldest areas are found in the mountain regions, the warmest in the Canyon Region of the southwest. All areas in Zacatecas are probably subject to winter frost.

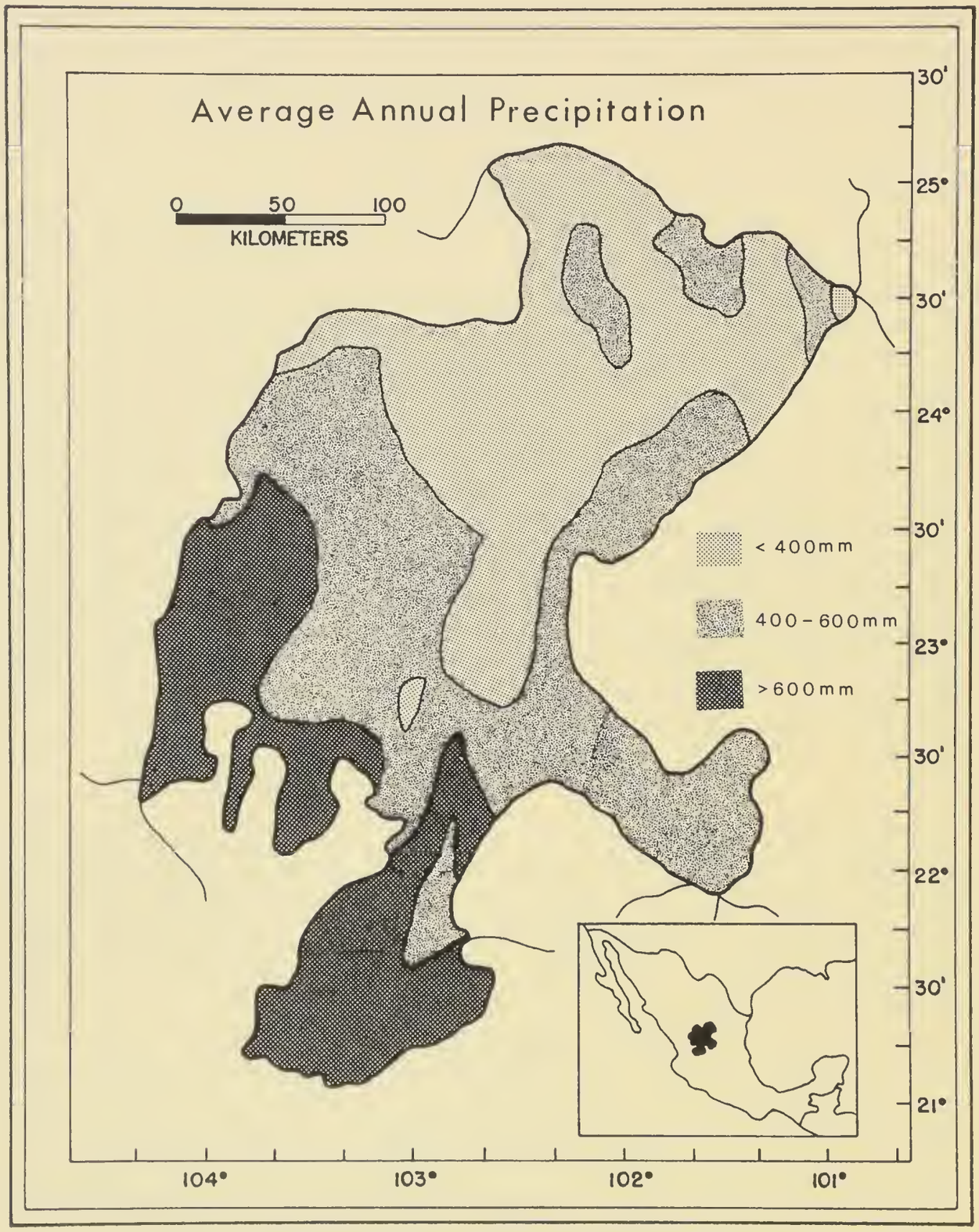

FIG. 2.—Distribution of average annual precipitation in Zacatecas.

Vegetation

The vegetation of Zacatecas is complex, but a comprehensive survey of the flora has not been made. However, Mata *et al.* (1971) considered the major vegetation types throughout México. Rzedowski and McVaugh (1966) studied a region defined as "Nueva Galacia," which contained a large portion of southwestern Zacatecas. These two sources provided the primary

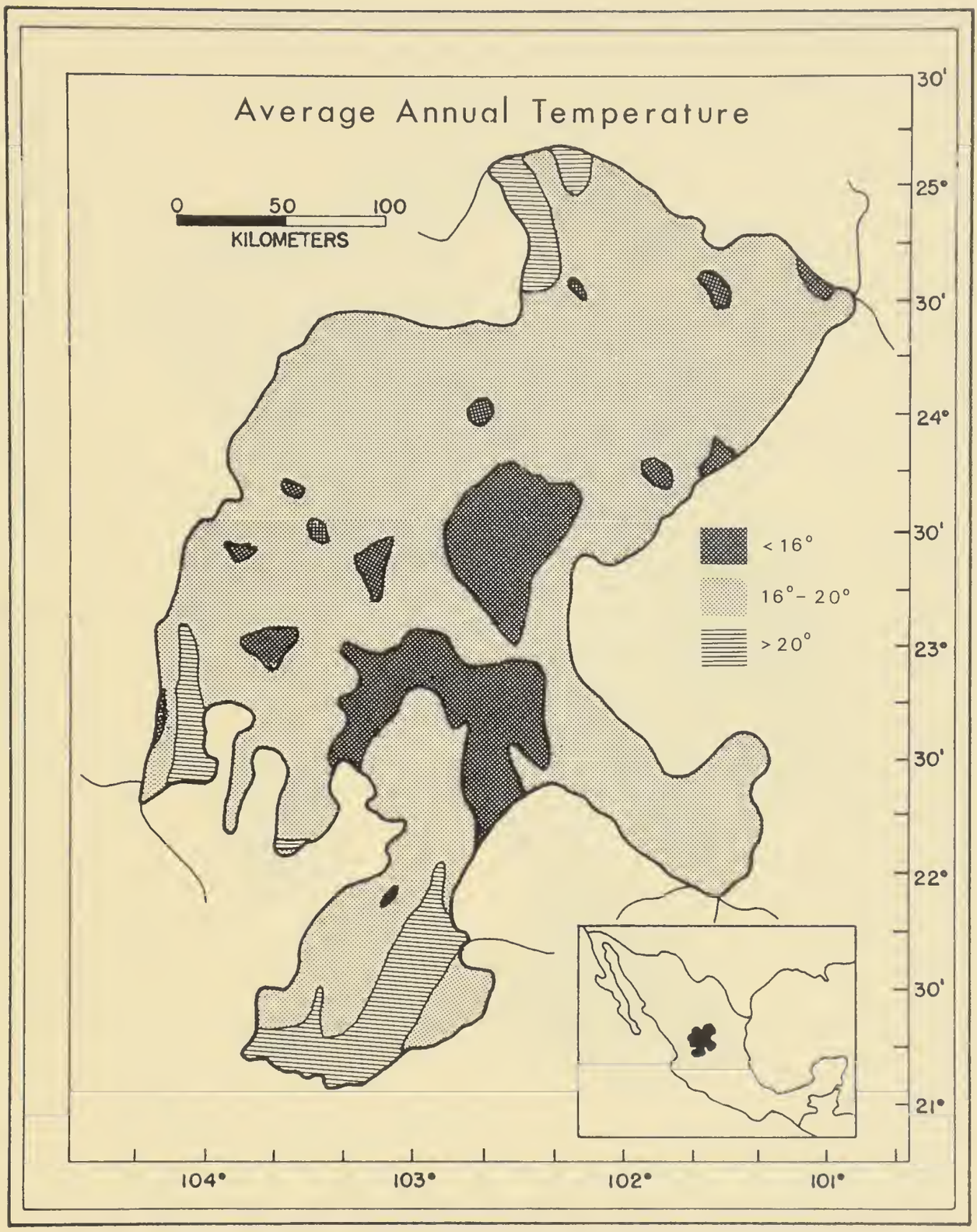

FIG. 3.—Distribution of average annual temperature in Zacatecas.

database and maps for our description of the vegetation in Zacatecas. Personal observation and reference to Leopold (1950), Gentry (1957), Rzedowski (1957), and Johnston (1978) augmented the primary data. In the following descriptions, we recognize six major vegetation types in Zacatecas (Fig. 4). In essence, our classification most closely corresponds to that of Rzedowski and McVaugh (1966) with the exception of the Desert Scrub

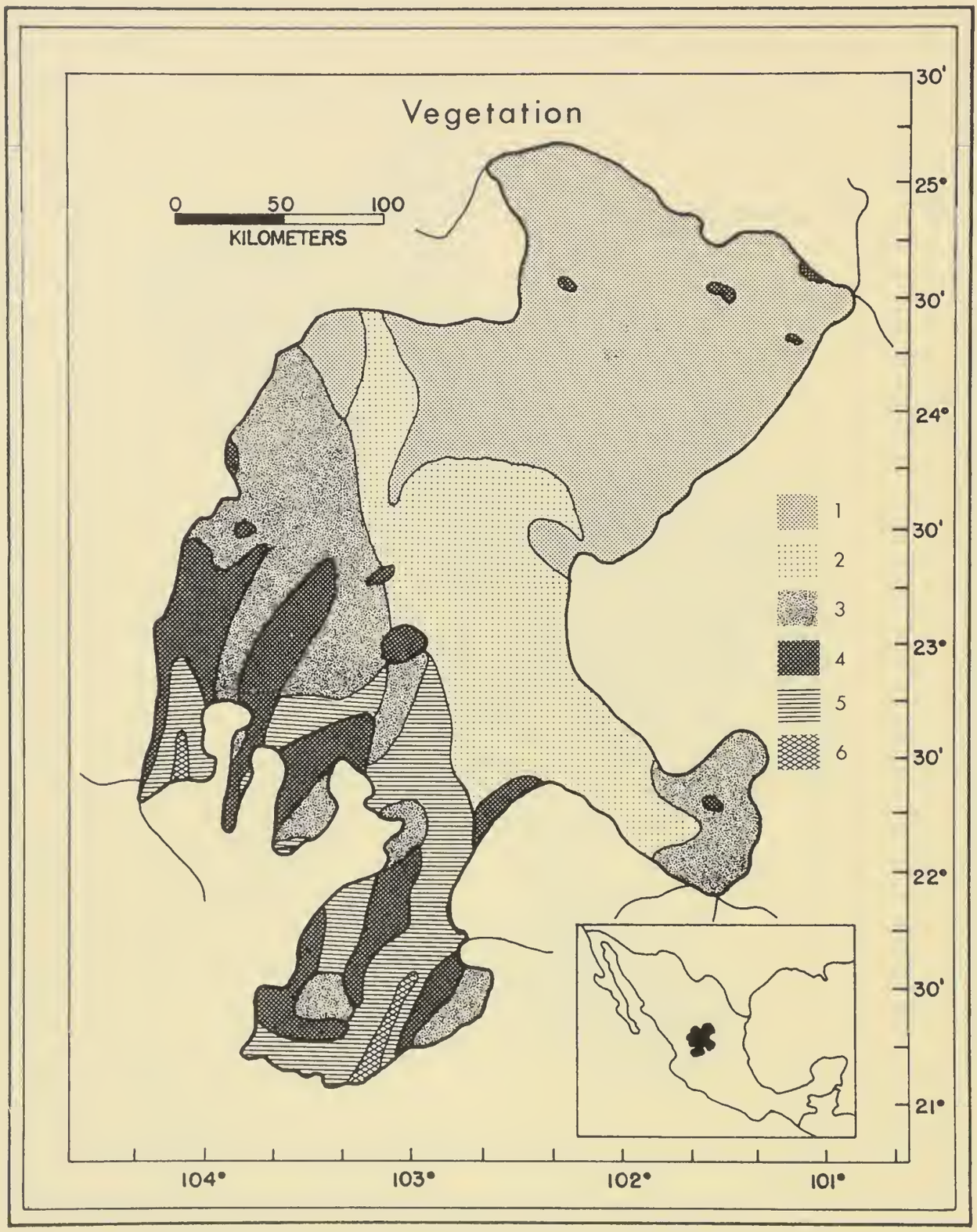

Fig. 4.—Distribution of major vegetation types in Zacatecas; (1) Desert Scrub; (2) Crassicaulescent Scrub; (3) Grassland; (4) Montane Forest; (5) Subtropical Scrub; (6) Tropical Deciduous Forest.

vegetation, which they did not include. The map of major vegetation types in Zacatecas should be considered only as a general guide to their limits.

Desert Scrub.—Desert scrub covers almost the entire northeastern half of Zacatecas, more-or-less corresponding to those areas that receive less than 400 millimeters of precipitation per year. Mata *et al.* (1971) recognized two

distinct types of "desert" vegetation: a microphyll desert scrub, dominated by creosote bush (*Larrea tridentata*) and tarbush (*Flourensia cernua*); and rosetophyll desert scrub, dominated by agave (*Agave lecheguilla*), tree yuccas (*Yucca filifera* and *Y. carnerosana*), and sotol (*Dasylirion* sp.). We combined the two for simplicity. Johnston (1978) showed that these two, along with other community types, represent a rather more complex mosaic than that mapped by Mata *et al.* (1971).

Crassicaulescent Scrub.—Crassicaulescent scrub lies, for the most part, between the desert scrub and grasslands. It could be considered an ecotone between the two, but has sufficiently different plant associates to be assigned a distinct name (Rzedowski and McVaugh, 1966; Mata *et al.*, 1971). Some of its most characteristic plants are cacti (*Opuntia* sp.), catclaw (*Acacia* sp.), and an understory of short grasses (for example, *Bouteloua* sp.). Leopold (1950) recognized essentially the same vegetation as a subgroup of his mesquite-grassland.

Grassland.—Grasslands mostly occupy the western and southern parts of the state. However, in the extreme north and northeast there are isolated areas of grasses (Mata *et al.*, 1971). These are better considered as special situations of the desert scrub because they occur in the poorly drained interior basins (Johnston, 1978). The grasses that occur in these isolated areas include tobosa (*Hilaria* sp.), and dropseed (*Sporobolus* sp.). They are not differentiated from Desert Scrub vegetation in Fig. 4. The more mesic grasslands of the west and south coincide with isohyets of more than 400 millimeters (usually of more than 500 millimeters) of average annual precipitation. Dominant grasses include grama (*Bouteloua gracilis*), bluestem (*Andropogon* sp.), muhly (*Muhlenbergia* sp.), and dropseed (*Sporobolus* sp.). In some areas, the grassland takes on the appearance of a savannah or open woodland with tree acacias (*Acacia tortuosa*). This was observed in the broad, open region above the Río Bolaños south of Monte Escobedo.

Montane Forest.—Montane Forest occurs mostly in the western cordillera with a few isolated stands on the mountains in the northeast. For the most part, montane forest thrives at elevations above 2300 meters. In the northeast (Cerro de Teyra, 24°32′N, 102°10′W, and the mountains surrounding Concepción del Oro, 24°30′N, 101°25′W), the forests are composed of piñon (*Pinus cembroides*), scrub oak (*Quercus* sp.) and juniper (*Juniperus* sp.). In the Sierra Astillero (24°32′N, 101°00′W), Johnston (1978) recorded Douglas fir (*Pseudotsuga* sp.) and fir (*Abies* sp.). Matson did not observe these in his one visit into that mountain range. He saw piñon (*Pinus cembroides*), oaks (*Quercus* sp.), and madrone (*Arbutus* sp.) at elevations up to about 2500 meters. Montane forest in the west and southwest can be pure stands of yellow pine (*Pinus* sp.) or various oaks (*Quercus* sp.), or a mixture of the two (pine-oak forests). We are not aware of any references to fir forests in that part of the state.

Below the montane forest there is usually transitional vegetation from lower altitudes to the forests. This is the "chaparral," which contains scrub oaks (*Quercus* sp.), manzanita (*Arctostaphylos* sp.), and chamise (*Adenostoma fasiculatum*). Mata *et al.* (1971) considered this to be a major vegetation type in México, but its extent is so limited in Zacatecas that we have not included it as a major type.

Subtropical Scrub.—Subtropical scrub, sometimes termed dry or arid tropical scrub, is found in the southwestern part of the state, usually between elevations of 1500 and 2000 meters. It is dominated by scrubby or thorny plants less than five meters high. Common plants include the tree morning glory (*Ipomoea* sp.), catclaw (*Mimosa* sp.), columnar cacti (*Pachycereus* sp.), and an understory of various grasses (Rzedowski and McVaugh, 1966; Mata *et al.*, 1971).

Tropical Deciduous Forest.—The tropical deciduous forest is limited in Zacatecas to the deepest river valleys of the southwest, below 1500 meters, climatically characterized as the warmest, wettest areas. Tree species are usually from eight to 15 meters in height. During the driest months of the year, most or all trees lose their leaves. The common plants occurring in this forest are the same as in the subtropical scrub with the addition of figs (*Ficus* sp.) and bald cypress (*Taxodium* sp.).

The Mammalian Fauna

There are 114 species (not including four tropical felids for which records were not obtained) of native mammals currently known from Zacatecas including muledeer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), black bear (*Ursus americanus*), and gray wolf (*Canis lupus*), which are either extirpated or nearly so. Zacatecan mammals are classified into 63 genera of 21 families of eight orders. Of the species, 17 are monotypic. Of the 97 polytypic species of mammals in Zacatecas, 65 are represented by one subspecies, whereas 27 (25 percent) show sufficient geographic variation to be represented by two or more subspecies within the state. Seven recognized subspecies of the southern pocket gopher (*Thomomys umbrinus*) are present. Mammalian distributional patterns in Zacatecas are much like those analyzed in the Mexican states of Chihuahua (Anderson, 1972), Coahuila (Baker, 1956), Durango (Baker and Greer, 1962), and San Luis Potosí (Dalquest, 1953).

Zoogeographic and Ecogeographic Distribution of Zacatecan Mammals

The 114 species of native mammals known to occur within the political confines of the state of Zacatecas show a variety of distributional patterns. In recent analyses of the rodents from the state, Matson (1979, 1982) was able to reduce the complexity of these to four major ecogeographic divisions (tropical, montane, grassland, and desert, with a fifth ecotonal area between the latter two). The four ecogeographic regions used herein indicate the general mammalian distributional patterns in the state (Tables 1 and 2).

TABLE 1. *Zoogeographic and ecogeographic distributions of Zacatecan mammals.*

Orders (Number of species per order)	Zoogeographic Distributions			Ecogeographic Distributions			
	Tropical	Temperate	Widespread	Tropical	Montane	Grassland	Desert
Marsupialia (2)	2	0	0	2	2	1	1
Insectivora (2)	0	2	0	0	1	1	1
Chiroptera (39)	22	14	3	33	18	11	5
Edentata (1)	1	0	0	1	0	0	0
Lagomorpha (4)	0	4	0	1	1	4	2
Rodentia (46)	4	40	2	19	16	24	22
Carnivora (16)	5	8	3	11	10	12	10
Artiodactyla (4)	1	2	1	2	1	4	3
Totals	35	70	9	69	49	57	44

Species were assigned to one of the four areas on the basis of known specimens from the area or from sight records (by the authors, field associates, or reliable local observers).

Only five percent of the mammalian fauna of Zacatecas have what can be termed widespread affinities. Five of these six species also occur in three or more of the ecogeographic divisions.

The ecogeographic distributions of nonrodent species recorded here are less reliable than are those for rodents (see Matson, 1979, 1982). This is because less effort has been expended in collecting other mammalian orders from throughout the state. However, certain generalizations can be made. If the number of ecogeographic areas in which a species occurs is considered to be indicative of the ecologic valency of that species (*sensu* Udvardy, 1969), then species occurring in three or four of the areas might be considered as ecologic generalists, whereas those occurring in only one or two areas would be specialists.

The mammalian fauna of Zacatecas also is assigned to "major" zoogeographic regions on the basis of the purported evolutionary history of the elements. While such a classification is necessarily more subjective than is the ecologic assignment, it does permit a theoretical grouping of species allowing for a tentative historical explanation. We have been conservative in selecting "major" zoogeographic affinities for the species: (1) tropical, species with their origin in or descendant from tropical ancestors; (2) temperate, species with their origin in or descendant from temperate species; (3) widespread, species with unresolved affinities.

In general, the majority (61 percent) of Zacatecan mammals has temperate affinities (Tables 1 and 2). Only 31 percent are associated with tropical faunas. This is easily explainable on the basis of the geographic location of Zacatecas. Approximately 75 percent of the state lies on the Central Mexican Plateau, a southern extension of the North American Plains.

If the same data are further analyzed on the basis of species per mammalian order, the results are even more informative. Rodents comprise the majority (57 percent) of mammals having temperate affinities (87 percent of the rodents fall in this category). The Central Plateau may be a

TABLE 2. *Summary of distribution of mammal species: zoogeographic and ecogeographic affinities in Zacatecas.*

	Zoogeographic Distributions			Ecogeographic Distributions			
Species	Tropical	Temperate	Widespread	Tropical	Montane	Grassland	Desert
Didelphis virginiana	X			X	X	X	X
Marmosa canescens	X			X	X		
Sorex emarginatus		X			X		
Notiosorex crawfordi		X				X	X
Pteronotus davyi	X			X			
Pteronotus parnellii	X			X	X		
Mormoops megalophylla	X			X			
Micronycteris megalotis	X				X		
Anoura geoffroyi	X			X	X		
Macrotus waterhousii	X			X			
Glossophaga soricina	X			X			
Choeronycteris mexicana	X			X	X	X	X
Leptonycteris nivalis	X			X			
Leptonycteris sanborni	X			X			X
Sturnira lilium	X			X			
Chiroderma salvini	X			X			
Artibeus hirsutus	X			X	X		
Artibeus jamaicensis	X			X			
Artibeus lituratus	X			X			
Artibeus toltecus	X			X			
Desmodus rotundus	X			X	X	X	
Natalus stramineus	X			X			
Myotis auriculus		X			X		
Myotis californicus		X		X	X	X	X
Myotis leibii		X			X	X	
Myotis planiceps		X			X		
Myotis thysanodes		X		X			
Myotis velifer		X		X	X	X	
Myotis yumanensis		X		X	X		
Pipistrellus hesperus		X		X	X		
Eptesicus fuscus			X	X	X	X	
Lasiurus ega	X				X		
Lasiurus borealis			X	X		X	
Rhogeessa alleni	X			X			
Rhogeessa parvula	X			X			
Plecotus mexicanus		X		X	X	X	
Plecotus townsendii		X			X	X	X
Antrozous pallidus		X		X			
Tadarida aurispinosa	X			X			
Tadarida brasiliensis			X	X	X	X	X
Tadarida femorosacca		X		X		X	
Tadarida macrotis		X		X			
Eumops perotis		X		X			
Dasypus novemcinctus	X			X			
Sylvilagus audubonii		X				X	X
Sylvilagus floridanus		X		X	X	X	
Lepus californicus		X				X	X
Lepus callotis		X				X	
Tamias bulleri		X			X		

TABLE 2.—*Continued.*

Ammospermophilus interpres		X					X
Spermophilus mexicanus		X				X	X
Spermophilus spilosoma		X				X	X
Spermophilus variegatus		X		X	X	X	X
Cyonomys mexicanus		X					X
Sciurus aureogaster	X			X			
Sciurus nayaritensis		X			X		
Pappogeomys castanops		X					X
Thomomys bottae		X					X
Thomomys umbrinus		X		X	X	X	X
Perognathus flavus		X		X		X	X
Perognathus hispidus		X		X		X	
Perognathus lineatus		X				X	
Perognathus nelsoni		X		X		X	X
Perognathus penicillatus		X					X
Dipodomys merriami		X					X
Dipodomys nelsoni		X					X
Dipodomys ordii		X				X	X
Dipodomys phillipsii		X		X		X	
Dipodomys spectabilis		X				X	
Liomys irroratus		X		X		X	
Liomys pictus	X			X			
Reithrodontomys fulvescens			X	X	X	X	
Reithrodontomys megalotis		X		X	X	X	
Peromyscus boylii		X			X		
Peromyscus difficilis		X			X		
Peromyscus eremicus		X					X
Peromyscus hooperi		X					X
Peromyscus maniculatus		X		X	X	X	X
Peromyscus melanophrys		X		X		X	X
Peromyscus melanotis		X			X		
Peromyscus pectoralis		X		X	X	X	
Peromyscus spicilegus	X			X			
Peromyscus truei		X			X	X	
Baiomys taylori		X				X	
Onychomys torridus		X		X		X	X
Sigmodon fulviventer		X				X	
Sigmodon hispidus			X	X		X	X
Sigmodon leucotis		X			X		
Sigmodon mascotensis	X			X		X	
Neotoma albigula		X				X	X
Neotoma goldmani		X					X
Neotoma mexicana		X		X	X		
Neotoma palatina		X		X			
Nelsonia neotomodon		X			X		
Canis latrans		X		X	X	X	X
Canis lupus		X			X		
Vulpes macrotis		X				X	X
Urocyon cinereoargenteus	X			X	X	X	X
Ursus americanus		X			X		
Bassariscus astutus	X			X	X	X	X
Procyon lotor			X	X	X	X	

TABLE 2.—*Continued.*

Nasua narica	X			X	X		
Mustela frenata			X	X		X	X
Taxidea taxus		X				X	X
Spilogale gracilis		X		X		X	X
Mephitis macroura		X		X	X	X	X
Conepatus mesoleucus	X			X	X	X	
Lutra longicaudis	X			X			
Felis concolor			X	X	X	X	X
Felis rufus		X				X	X
Tayassu tajacu	X			X		X	X
Odocoileus hemionus		X				X	X
Odocoileus virginianus			X	X	X	X	X
Antilocapra americana		X				X	
Totals	35	70	9	69	49	57	44

dispersal route for temperate zone mammals (see Baker, 1956; Baker and Greer, 1962; and Schmidly, 1978, for more discussion on the zoogeographic affinities of the plateau mammals).

Tropical species tend to be restricted to the narrow fingers of tropical vegetation that follow the tributaries of the Río Grande de Santiago (Río Atengo, Río Bolaños, and Río Juchipila). These species, in general, have the greater portion of their geographic ranges to the west and south along the Pacific Coastal Lowlands of the Neotropical Region as defined by Baker (1967). The majority of tropical species is bats (order Chiroptera). Fully 56 percent of the bats have their origins in the Neotropics. Of the 35 species of tropical mammals, only four (11 percent) are rodents.

Some 46 percent of the mammalian species in Zacatecas are restricted to one ecogeographic area, and another 24 percent occur in only two areas. Thus, it would appear that approximately 70 percent of the fauna are ecological specialists (see section on Plant-Mammal Relationships for a listing of some of these species). Ecologic generalists are fewer in number; only 20 species (about 18 percent) occur in three ecogeographic areas, whereas 14 (about 12 percent) are known to inhabit all areas.

Plant-Mammal Relationships

Plant-mammal relationship patterns in Zacatecas are much like those analyzed in such bordering states as Coahuila (Baker, 1956) and Durango (Baker and Greer, 1962). In the following plant-mammal discussions, we recognize four major faunal areas. Their limits are not so clear-cut as the map indicates (Fig. 4).

Desert Scrub Faunal Area.—Desert scrub covers most of northeastern Zacatecas, where the amount of precipitation received is less than 400 millimeters per year and elevations are generally below 2000 meters. To the westward and southward, there is a broad ecotone at the junction with the

Grassland Faunal Area. A part of this is certainly a natural interdigitation with increasing rainfall encouraging grasses over scrubs. However, overgrazing in many areas and cessation of periodic fires have allowed for the entry of desert vegetation in the place of grasses, further confusing the plant diversity and related mammalian distributions. Some of the mammals representative of the Desert Scrub Faunal Area are: yellow-faced pocket gopher (*Pappogeomys castanops*), desert pocket mouse (*Perognathus penicillatus*), Nelson's kangaroo rat (*Dipodomys nelsoni*), cactus mouse (*Peromyscus eremicus*), and pygmy woodrat (*Neotoma goldmani*).

Grassland Faunal Area.—The Grassland Faunal Area occurs, for the most part, in western and southern parts of the state, extending into the foothills in the highlands of western and southern Zacatecas. There also are isolated areas of grasslands, mostly in broad valleys, in the extreme northern and northeastern parts of the state. In the central and southern areas, there is also broad overlap with desert scrub in the crassicaulescent scrub type (see Fig. 4). Many of these grassland areas also support mesquite (*Prosopis* sp.), which is usually restricted to riparian areas in the Desert Scrub Faunal Area. Grasses flourish where the annual rainfall is more than 400-500 millimeters.

Some mammals representative of the Grassland Faunal Area are: white-sided jackrabbit (*Lepus callotis*), hispid pocket mouse (*Perognathus hispidus*), Phillips' kangaroo rat (*Dipodomys phillipsii*), Mexican spiny pocket mouse (*Liomys irroratus*), northern pygmy mouse (*Baiomys taylori*), and tawny-bellied cotton rat (*Sigmodon fulviventer*).

Montane Faunal Area.—The Montane Faunal Area has a disjunct distribution in the highlands of the Sierra Madre Occidental and related ranges in western and southern parts of Zacatecas. As shown in Fig. 4, this mammalian environment occurs on Cerra de Teyra (24°32′N, 102°10′W) in the northeastern part of the state, and in the high country in the vicinity of Concepción del Oro, mostly at elevations above 2300 meters.

Although we made a concerted effort, we were not able to find evidence in the Montane Faunal Area of the presence of the boreal Mexican meadow vole (*Microtus mexicanus*), which is known to occur in the Sierra Madre Occidental in adjacent parts of Durango (Baker and Greer, 1962). Mammals characteristic of the Montane Faunal Area in Zacatecas include: Zacatecas shrew (*Sorex emarginatus*), Buller's chipmunk (*Tamias bulleri*), Nayarit squirrel (*Sciurus nayaritensis*), rock mouse (*Peromyscus difficilis*), black-eared mouse (*Peromyscus melanotis*), white-eared cotton rat (*Sigmodon leucotis*), Mexican woodrat (*Neotoma mexicana*), and diminutive woodrat (*Nelsonia neotomodon*).

Tropical Faunal Area.—The Tropical Faunal Area is restricted to the canyon bottoms and adjacent slopes, mostly below 1500 meters elevation, of the river valleys in southern and southwestern Zacatecas. In the deepest river cuts, larger tropical trees, including figs (*Fiscus* sp.), are conspicuous. Bald cypress (*Taxodium* sp.) often lines waterways in the valleys of the Río Atengo, Río Bolaños, and the Río Juchipila, all major tributaries of the

Río Grande de Santiago, which empties into the Pacific Ocean south of Tuxpan in Nayarit. Aside from the numerous tropical bats that reach Zacatecas along these water courses, characteristic terrestrial mammals of the Tropical Faunal Area include: gray mouse-opossum (*Marmosa canescens*), nine-banded armadillo (*Dasypus novemcinctus*), Mexican gray squirrel (*Sciurus aureogaster*), painted spiny pocket mouse (*Liomys pictus*), gleaning mouse (*Peromyscus spicilegus*), Mascota cotton rat (*Sigmodon mascotensis*), Bolaños woodrat (*Neotoma palatina*), and coati (*Nasua narica*).

Human Impact on Zacatecan Mammals

The broad grassy plains of central and western Zacatecas must have been impressive in presettlement times. The Nahuatlacan people brought advanced cultural change to this area late in the twelfth century, as manifested by such evidence as the Chicomoztoc (Quemada) Ruins just south (near Mexican highway 54) of the city of Zacatecas. However, it was not until the entry of the Spanish in the mid-sixteenth century that major human environmental interactions began to accelerate. By 1588, the Spanish were diligently extracting the high-grade silver from the array of productive mines in the vicinity of such settlements as Zacatecas and Fresnillo. At the same time the ranching element of Spanish colonial life spread, as the Indian menace subsided, with the vast grasslands divided into sizable haciendas and stocked with domestic livestock. Through time, the results of excessive grazing, especially by cattle and goats, have had a major influence on the landscape (Johnston, 1978). In the past 30 years, this rate of change has been accelerated markedly—much of these grasslands has been converted to plowed fields for crop production.

In the early 1950s, for example, the second author visited the Sombrerete-Fresnillo-Zacatecas area where grasslands extended outward from the highway without interruption to the distant mountain slopes westward and southward. By 1977, however, much of this area had been plowed and was planted to corn and other field crops. A collecting site 3 km. E Bañon was visted by the first author in 1973 and again in 1976. At the time of the first visit, the area was in the desert-grassland ecotone dominated by nopal cactus (*Opuntia* sp.), creosote bush (*Larrea* sp.), tree yuccas (*Agave* sp.), catclaw (*Acacia* sp.), and a lush undergrowth of grasses. Mounds of banner-tailed kangaroo rats (*Dipodomys spectabilis*) and evidence of other grassland mammals were conspicuous. Three years later, the entire area had been placed in corn cultivation and the mammalian habitat was obliterated. Both instances illustrate the rapidly changing landscape in many parts of the country (Wellhausen, 1976). Not only have current land management practices allowed for the conversion of much arable grassland into cropland, but stream valley soils along such rivers as the Río Juchipila have been cleared of tropical vegetation and planted with sugar cane and other cultivated crops. Certainly the production of food per hectare in Zacatecas

is being drastically increased to meet a growing demand, but at the same time habitat for the native biota is being lost.

The construction of all-weather roads to many formerly isolated areas has accelerated settlement and agricultural production. Most of these new roads are built high above the surrounding terrain with a depression or gulley below the shoulders on each side. These elongated road-ditches frequently collect and hold water for longer periods than does the surrounding land. The result is often a change in vegetation with grasses and herbaceous plants (often exotics) more lush in the ditches than in the adjacent, more xeric areas. These habitats have not been systematically studied, but such species as tawny-bellied cotton rats (*Sigmodon fulviventer*), hispid cotton rats (*S. hispidus*), Mexican spiny pocket mice (*Liomys irroratus*), northern pygmy mice (*Baiomys taylori*), fulvous harvest mice (*Reithrodontomys fulvescens*), western harvest mice (*R. megalotis*), and even yellow-faced pocket gophers (*Pappogeomys castanops*) and southern pocket gophers (*Thomomys umbrinus*) often congregate in these restricted roadside environments. It is suspected that these habitats provide refuges for some species and avenues of dispersal for others.

Although some desert scrub has been irrigated, much of this vast habitat in northeastern Zacatecas has been little altered, except for modest grazing by livestock close to human habitation. Forested uplands are often remote from human dwellings and retain many species of small mammals. Carefully regulated harvest of hardwoods and conifers has allowed much of the montane forest to remain intact.

Threatened Large Mammals

The mammals most obviously affected by human influences have been the larger species (Leopold, 1959; Tinker, 1978). Predators such as the mountain lion (*Felis concolor*), black bear (*Ursus americanus*), and gray wolf (*Canis lupus*) are either extirpated or nearly so. The edible hoofed mammals also have been severely depleted. This is especially true of the mule deer (*Odocoileus hemionus*) and pronghorn (*Antilocapra americana*), which may now be entirely excluded from the state. Because both were adapted for life in desert and grassland areas, they were readily accessible to human populations anxious to supplement their diets with wild game. Conversely, white-tailed deer (*Odocoileus virginianus*) and collared peccary (*Tayassu tajacu*), despite their attractiveness to hunters for both meat and sport, have survived in most parts of Zacatecas. This is because both species, unlike the mule deer and pronghorn, thrive in remote highlands or deep arroyos where human settlements are few and hunting pressure is reduced.

The practice of the rural population, which has a low family earning power, has been to utilize the edible plant and animal resources living in their immediate vicinity. These people are not likely to change their outlook about natural resources. The establishment of national parks in strategic areas is intended to preserve both biotic and scenic attributes. Too

often, however, these preserves are difficult to patrol. Accordingly, even the basic breeding stock of game animals may not be maintained. Instead, the need now and in the next few decades is for conservation-minded public officials to persuade operators of large landholdings to restrict hunting of game mammals on their ranges (Baker, 1978). The cooperative landowners might conceivably receive some tax advantage or other official recognition for the protection they would give to these animals. This type of restoration program is not new to México, because there are ranches in such states as Nuevo León, Coahuila, Chihuahua, and Durango where local ranchers have protected their wildlife from excessive hunting (Baker, 1956; Baker and Greer, 1962).

Threatened Small Mammals

Some small mammals have apparently prospered by human intrusion and the resulting major modifications made to Zacatecan environments—others have not. Certainly the black-tailed jackrabbit (*Lepus californicus*) has been fortunate. However, some have not done well, being much less compatible with environmental changes, including such examples as the above leporid's close relative, the white-sided jackrabbit (*Lepus callotis*). The latter species is merely one of several having had difficulties surviving the much-altered and heavily grazed grasslands. Widespread small-mammal populations that seem to have been depressed, or even locally depleted, by human influences are: desert shrew (*Notiosorex crawfordi*), white-sided jackrabbit (*Lepus callotis*), hispid pocket mouse (*Perognathus hispidus*), banner-tailed kangaroo rat (*Dipodomys spectabilis*), northern pygmy mouse (*Baiomys taylori*), tawny-bellied cotton rat (*Sigmodon fulviventer*), pygmy woodrat (*Neotoma goldmani*), and kit fox (*Vulpes macrotis*).

Small mammals that appear rarely in Zacatecas or are found in highly restricted habitats also are categorized as threatened, partly because their status in the state is so poorly known. Excluding bats, they are: Zacatecas shrew (*Sorex emarginatus*), Mexican ground squirrel (*Spermophilus mexicanus*), Mexican prairie dog (*Cynomys mexicanus*), Mexican gray squirrel (*Sciurus aureogaster*), black-eared mouse (*Peromyscus melanotis*), Mascota cotton rat (*Sigmodon mascotensis*), Bolaños woodrat (*Neotoma palatina*), and diminutive woodrat (*Nelsonia neotomodon*).

Gazetteer

The following is an alphabetical list of places used as points of reference for collecting localities in Zacatecas, including latitudes and longitudes and followed by parenthetical numbers identifying each on the accompanying map (Fig. 5).

Apizolaya — 24°49′N, 102°10′W (4)
Apozol — 21°27′N, 103°05′W (79)
Atolinga — 21°47′N, 103°28′W (73)
Bañon — 23°13′N, 102°27′W (42)
Berriozábal (Estación Berriozábal) — 22°33′N, 102°19′W (61)

Calera — 23°02′N, 102°42′W (48)
Camacho (Estación Camacho) — 24°26′N, 102°22′W (13)
Cañitas de Felipe Pescador (Cañitas) — 23°36′N, 102°43′W (34)
Caopas — 24°47′N, 102°10′W (5)
Capriote — 23°39′N, 102°09′W (32)
Cedros — 24°41′N, 101°46′W (6)
Chalchihuites — 23°29′N, 103°53′W (36)
Chichimequillas — 23°15′N, 102°15′W (45)
Cinco de Mayo — 25°03′N, 102°32′W (2)
Concepción del Oro — 24°37′N, 101°25′W (9)
Cuauhtémoc (Cuidad Cuauhtémoc) — 22°27′N, 102°21′W (63)
El Arenal (Felipe Carrillo Fuerto) — 23°39′N, 103°27′W (29)
El Calabazal (La Farada) — 23°46′N, 103°52′W (25)
El Rosario (Fuerto del Rosario) — 24°23′N, 101°40′W (14)
Felipe Angeles — 22°33′N, 102°48′W (59)
Fresnillo — 23°11′N, 102°52′W (44)
Gonzáles Ortega — 23°57′N, 103°27′W (20)
Gral. Enrique Estrada (Enrique Estrada) — 23°00′N, 102°44′W (47)
Guadalupe — 22°45′N, 102°31′W (53)
Huanasco — 21°50′N, 102°55′W (72)
Jalpa — 21°38′N, 102°31′W (77)
Jérez — 22°39′N, 102°58′W (56)
Jiménez de Téul — 23°15′N, 103°48′W (41)
Juan Aldama — 24°17′N, 103°23′W (16)
Juchipila — 21°24′N, 103°07′W (80)
La Blanca — 22°43′N, 102°31′W (55)
La Colorado (Estacíon La Colorada) — 23°48′N, 102°28′W (23)
La Laja — 24°34′N, 101°26′W (11)
La Pendencia — 24°55′N, 102°29′W (3)
Laguna Valderrama — 23°10′N, 103°29′W (43)
Loreto — 22°16′N, 101°58′W (69)
Luis Moya — 22°26′N, 102°15′W (51)
Lulú (Estación Lulú in San Luis Potosí) — 24°27′N, 100°52′W (15)
Majoma — 23°48′N, 101°41′W (21)
Mazapil — 24°38′N, 101°33′W (7)
Mesillas — 23°28′N, 103°35′W (38)
Mesquituta — 21°14′N, 103°10′W (83)
Milpillas de la Sierra — 23°05′N, 103°41′W (46)
Momax — 21°55′N, 103°19′W (71)
Monte Escobedo — 22°18′N, 103°34′W (68)
Monte Mariana — 23°20′N, 103°07′W (39)
Morelos — 22°52′N, 102°38′W (49)
Moyahua (Moyahua de Estrada) — 21°16′N, 103°10′W (82)
Nieves (General Francisco Murguia) — 24°01′N, 103°01′W (19)
Nochistlán de Mejia — 21°22′N, 102°51′W (81)
Noria de Angeles — 22°22′N, 101°46′W (65)
Ojo Caliente — 22°34′N, 102°16′W (60)
Pinos (Real de Pinos) — 22°18′N, 101°34′W (67)
Plateado (Joaquin Amaro) — 21°56′N, 103°05′W (70)
Rancho Grande — 23°27′N, 102°58′W (37)
Río Grande — 23°50′N, 103°02′W (22)
Sabana Grande — 24°29′N, 101°43′W (12)
Sain Alto — 23°34′N, 103°18′W (33)
Saldaña — 22°24′N, 101°24′W (64)
San Andrés — 23°42′N, 101°55′W (28)
San Felipe Neuvo Mercurio — 24°14′N, 102°09′W (17)
San Juan Capistrano — 22°39′N, 104°06′W (58)
San Juan de los Charcos — 25°02′N, 102°36′W (1)
San Rafael — 24°35′N, 102°07′W (10)
San Tiburcio — 24°09′N, 101°29′W (18)
Santa Efigenia — 23°43′N, 101°52′W (27)
Santa Rosa — 21°11′N, 103°10′W (85)
Sarteneja — 23°41′N, 101°43′W (31)
Sierra Madre — 22°37′N, 104°18′W (57)
Sierra Vieja — 23°29′N, 102°04′W (35)
Sombrerete — 23°38′N, 103°39′W (30)
Tabasco — 21°52′N, 102°55′W (75)
Tecolotes — 23°37′N, 101°59′W (8)
Tepechitlán — 21°40′N, 103°20′N (76)
Tepetongo — 22°27′N, 103°09′N (62)
Tetillas — 23°43′N, 102°54′W (26)
Téul de Gonzáles Ortega — 21°28′N, 103°27′W (78)
Tlaltenango de Sánchez Roman — 21°47′N, 103°18′W (74)
Trancoso — 22°44′N, 102°22′W (54)
Valparaíso — 22°46′N, 103°34′W (50)
Victor Rosales — 22°57′N, 102°42′W (47a)
Villa Insurgentes — 23°45′N, 103°50′W (24)
Villanueva — 22°21′N, 102°53′W (66)
Ville de Cos — 23°18′N, 102°21′W (40)
Yahualica (in Jalisco) — 21°12′N, 102°56′W (84)
Zacatecas — 22°45′N, 102°35′W (52)

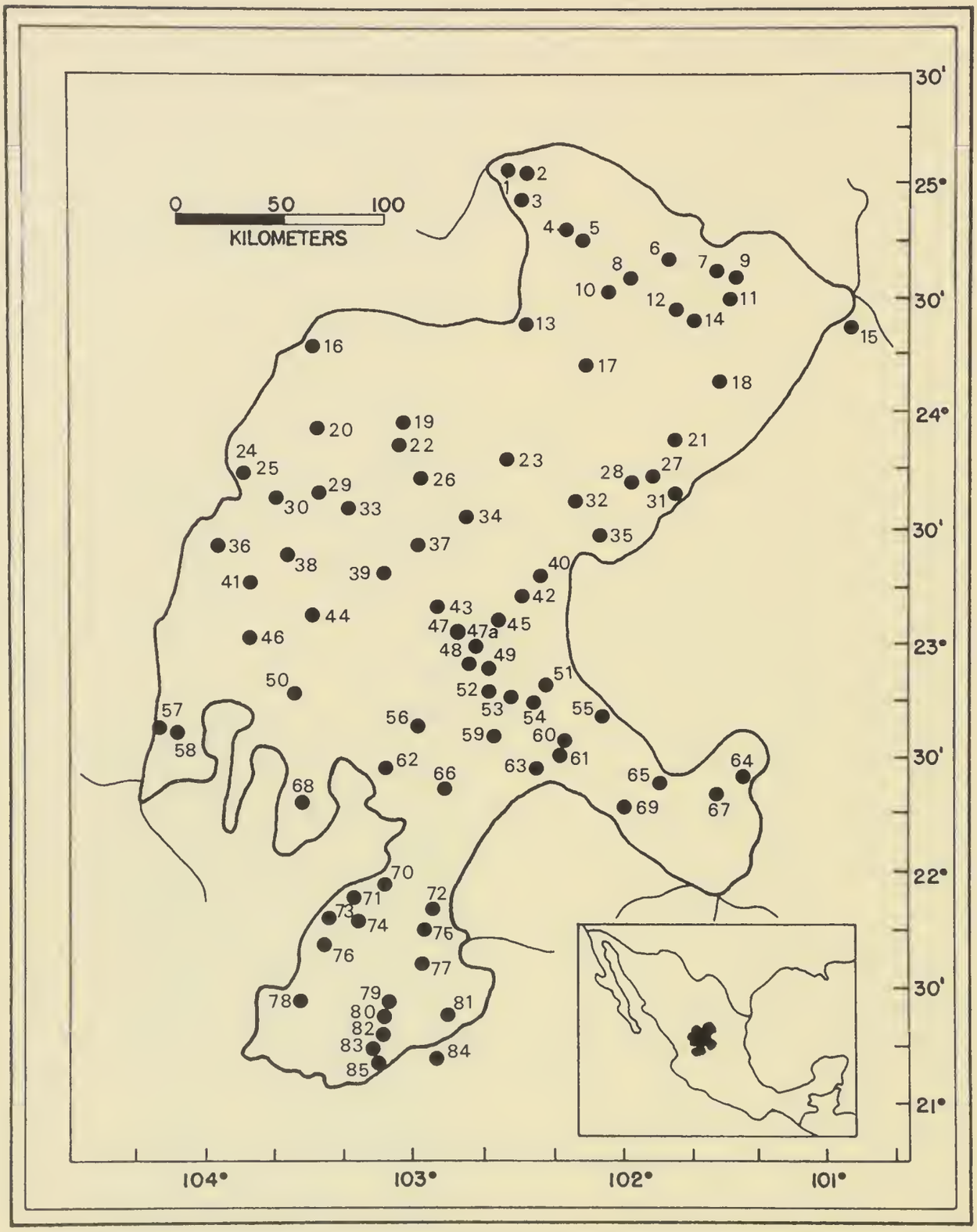

FIG. 5.—Collecting localities in Zacatecas (see list of place names in Gazetteer associated with numbers and solid circles).

ACCOUNTS OF SPECIES

The arrangement of genera in this report follows that of Hall (1981). Species are treated alphabetically within genera. When more than one subspecies are present, these are listed alphabetically under the species heading. Specimens examined are listed from north to south (from east to

west at the same latitude). Localities are given as reported on specimen labels. Other records of occurrence are noted.

Collections from which specimens have been examined, other than The Museum, Michigan State University, are given with abbreviations used in the acknowledgments section at the end of the introductory comments. All measurements of body parts and skulls are in millimeters.

Marsupialia—Marsupials

Didelphidae—New World Opossums

Didelphis virginianus californica Bennett, 1833

Virginia Opossum

The Virginia opossum is closely associated with major waterways and irrigated areas, especially at lower elevations in eastern and southern Zacatecas. It probably is found throughout the state except for the higher mountains. Specimen records are based both on salvaged parts from animals killed on roadways and a series of skins and skulls obtained along or near streams that flow from the southern part of the state westward to the Pacific Ocean by way of the Río Grande de Santiago (Baker, 1968). In addition to specimens preserved from this drainage, road-kills were observed at: 6 km. SE Fresnillo; 15 km. N Zacatecas; Guadalupe; 32 km. S Villanueva; 5 km. N Juchipila; and 6 km. S Juchipila. Two road-kills observed at Río Grande on 31 July 1965 were adjacent to riparian growth along the Río Aquanaval. These animals presumably represented a population with closest affinities with Virginia opossums inhabiting the Laguna District of Coahuila and Durango (Baker, 1956). The specimen recorded from southwest of San Tiburcio is from a desert area remote from watered streamways in eastern Zacatecas—the only permanent water is held in scattered ranch tanks and near human habitations.

Two adult males (LACM 33945, 33946), respectively, measure: total length, 842, 716; length of tail vertebrae, 373, 326; length of hind foot, 67, 59; height of ear from notch, 55, 46; greatest length of skull, 115.9, 95.9; zygomatic breadth, 60.8, 48.7; postorbital breadth, 11.5, 10.2; length of nasals, 50.3, 43.2; breadth of braincase, 28.5, 26.0; length of maxillary toothrow, 42.9, 39.6.

Specimens examined (18).—50 km. SE San Tiburcio, 2125 m., 1; Fresnillo, 2310 m., 1; 5 mi. SE Fresnillo, 7600 ft., 1; Gral. Enrique Estrada, 7200 ft., 1; 8 mi. S Victor Rosales, 7700 ft., 1; 9 km. ESE Trancoso, 2340 m., 1; 12 mi. E Jérez, 7500 ft., 1; 4 km. N Villanueva, 2125 m., 1; 30 km. NE Jalpa (La Palma), 1740 m., 1; 8 mi. NW Nochistlan, 6600 ft., 1 (LACM); 4 mi. S Jalpa, 4300 ft., 4 (LACM); 6 mi. SE Jalpa (near Corral de Piedra), 4900 ft., 1 (LACM), Moyahua, 1100 m., 1; Santa Rosa, 4000 ft., 2 (LACM). *Additional records*: San Juan Capistrano; 8 mi. S Moyahua (Gardner, 1973:72).

Marmosa canescens sinaloae Allen, 1898

Gray Mouse-opossum

The gray mouse-opossum is found only in extreme southern Zacatecas, having arrived there presumably from the tropical Pacific coastal plain by way of suitable habitat along the Río Juchipila. In addition to the two preserved specimens (first reported by Matson, 1977), tracks thought to have been made by this diminutive opossum were observed by David Webster on 24 July 1977 on a muddy flat in the valley of the Río Juchipila, 30 km. NE Jalpa, 1740 m. The specimen from Santa Rosa was taken in tropical deciduous riparian growth. An immature male (LACM 34942) from 10 mi. W Jalpa came from the lower part of the oak-woodland just above the tropical growth characteristic of the Río Juchipila valley. Previously, this subspecies had been recorded only in deciduous tropical vegetation (Armstrong and Jones, 1971; Genoways and Jones, 1973; Tate, 1933). The Jalpa locality is also the highest elevation from which this species has been recorded. The adult male (LACM 33947) from Santa Rosa measures: total length, 296; length of tail vertebrae, 151; length of hind foot, 20.5; height of ear from notch, 24; condylobasal length, 33.2; zygomatic breadth, 19.3, least interorbital constriction, 5.9; postorbital constriction, 6.6; length of nasals, 14.6; length of maxillary toothrow, 13.4; length of M1-M3, 4.6.

Specimens examined (2).—10 mi. W Jalpa, 6100 ft., 1 (LACM); Santa Rosa, 4000 ft., 1 (LACM).

INSECTIVORA—Insectivores

SORICIDAE—Shrews

Sorex emarginatus Jackson, 1925

Zacatecas Shrew

The Zacatecas shrew occurs in moist, boreal forests in the highlands of the southwestern part of the state. A lactating female was taken from the mouth of a garter snake (*Thamnophis elegans*) in late afternoon on 4 August 1975. The snake was moving in grassy cover at the edge of a small cornfield, which was surrounded by moist pine-oak forest west of San Juan Capistrano (Baker and Webb, 1976). A male was hand-caught on 4 August 1984 by Robert G. Webb in wet, oak-leaf ground cover piled near the base of a streamside rock wall in open montane oak-manzanita-juniper-madrone forest northwest of Jalpa. We follow Junge and Hoffmann (1981) in the use of this name combination.

Specimens examined (3).—10 km. W San Juan Capistrano, 2900 m., 1; Plateado, 1 (USNM); 26 km. NW Jalpa, 2460 m., 1 (TTU).

Notiosorex crawfordi evotis (Coues, 1877)

Desert Shrew

The only record of the desert shrew in Zacatecas is of a female obtained on 4 September 1897 by E. W. Nelson and E. A. Goldman at Plateado. This

specimen (USNM 90845) is assigned to the western subspecies, *N. c. evotis* (see also Fisher and Bogan, 1977). It is suspected that the northern and eastern subspecies, *N. c. crawfordi* (Coues, 1877), might occur in eastern parts of the state, extending in suitable grassy habitats southward from Coahuila and Durango (Baker, 1956; Petersen, 1979) or perhaps northwestward from Hidalgo (Kaspar and Jones, 1977).

Specimen examined (1).—Plateado (USNM).

Chiroptera—Bats

The following accounts report the occurrence of 39 kinds of bats from Zacatecas. Although there will undoubtedly be additions to the fauna in the future, we were able to summarize the basic zoogeographic affinities of the known species (Table 2). The majority of taxa (56 percent) are representative of tropical faunas. Most reach the political confines of Zacatecas by way of the narrow fingers of tropical growth that follow the tributaries of the Río Grande de Santiago (Río Atengo, Río Bolanos, and Río Juchipila). Generally, these tropical species have the greater portion of their geographic ranges to the west and south, along the Pacific Coastal Lowlands of the Neotropical Region as defined by Baker (1967). In Zacatecas, these species are restricted mostly to the narrow belt of tropical vegetation and adjacent uplands of the deeply entrenched valleys.

About 36 percent of the bat species have their affinity with temperate faunas to the north, especially the temperate highlands of the Central Mexican Plateau (Mesa Central). The remaining eight percent are species of geographically wide distribution.

The amount of data concerning ecogeographic distribution of bats was insufficient to analyze in a manner similar to that carried out for rodents (Matson, 1982). However, using the rodent analyses as a base for general mammalian patterns, we were able to assign the species of bats to ecogeographic units (Table 2).

Mormoopidae—Mustached and Naked-backed Bats

Pteronotus davyi fulvus (Thomas, 1892)

Davy's Naked-backed Bat

Davy's naked-backed bat, distributed along the Pacific Coastal Plain (Hall, 1981), may be expected in any of the tropical valleys of the southern part of the state. It is currently known in Zacatecas from four individuals taken near Jalpa in November 1970. The specimens were captured in mixed cultivated and riparian growth along the Río Juchipila (Matson and Patten, 1975).

Specimens examined (4).—4 mi. S. Jalpa, 4300 ft. (LACM).

Pteronotus parnellii mexicanus (Miller, 1902)

Parnell's Mustached Bat

Parnell's mustached bat was collected along the Río Juchipila near Jalpa in November 1970 and at Monte Escobedo in September 1970 (Matson and Patten, 1975). At the latter locality, 35 individuals were taken in a habitat consisting of mixed agricultural land and pine-oak forest, seemingly an atypical, upland situation for this tropical bat.

Specimens examined (37).—Monte Escobedo, 7300 ft., 35 (LACM); 4 mi. S Jalpa, 4300 ft., 2 (LACM).

Mormoops megalophylla megalophylla Peters, 1864

Peter's Ghost-faced Bat

Peter's ghost-faced bat is acclimated to live in association with progressively narrow tropical and subtropical environments, which follow drainage patterns upstream from the broad Pacific coastal habitats. The male captured near Jalpa was in mixed tropical vegetation bordering the Río Juchipila (Matson and Patten, 1975).

Specimen examined (1).—4 mi. S Jalpa, 4300 ft. (LACM).

Phyllostomatidae—American Leafed-nosed Bats

Micronycteris megalotis mexicana Miller, 1898

Brazilian Large-eared Bat

A mummified bat of the species *Micronycteris megalotis mexicana* was picked up in the parking lot of a motel in the city of Zacatecas (Matson *et al.*, 1978). Whether or not this specimen is of natural occurrence in the state or was transported there cannot be ascertained.

Specimen examined (1).—Zacatecas.

Anoura geoffroyi lasiopyga (Peters, 1868)

Geoffroy's Tail-less Bat

Anoura geoffroyi lasiopyga, a fruit- and nectar-eating bat, may be only a seasonal visitor to the montane forests near Valparaíso. Baker and Greer (1962) also record *A. g. lasiopyga* from montane habitats in Durango. Tamsitt *et al.* (1964) suggested that *A. g. peruana* in Colombia may be a permanent resident of high elevations if appropriate fruit trees and flowers were available. The areas around Valparaíso and Santa Rosa contain many fruit orchards.

Specimens examined (12).—9 mi. NW Valparaíso, 8350 ft., 3; Santa Rosa, 4000 ft., 9 (LACM).

Macrotus waterhousii bulleri H. Allen, 1890

Waterhouse's Leaf-nosed Bat

The species *Macrotus waterhousii bulleri* probably is present in suitable habitats along the tropical portions of the tributaries of the Río Grande de Santiago as evidenced by records in Hall (1981). The two known specimens from Zacatecas were taken along the Río Atengo in arid tropical thorn scrub vegetation (Matson *et al.*, 1978).

Specimens examined (2).—3 km. N San Juan Capistrano, 1 (OU); 6 km. ESE San Juan Capistrano, 1500 m., 1.

Glossophaga soricina handleyi Webster and Jones, 1980

Pallas' Long-tongued Bat

This species seems to be fairly abundant along the lower elevations of the Río Juchipila. It should be expected to occur in any of the tropical canyons of the Río Grande de Santiago watershed, especially in those areas where fruit orchards are prevalent.

Specimens examined (40).—5½ mi. S Moyahua, 4000 ft., 17 (KU); 1.6 km. N Santa Rosa, 3700 ft., 1; Santa Rosa, 4000 ft., 22 (LACM).

Choeronycteris mexicana Tschudi, 1844

Mexican Long-tongued Bat

The Mexican long-tongued bat is apparently widespread in México, from tropical lowlands to montane habitats (Villa-R., 1967). Within Zacatecas, this bat was recorded from a diversity of habitats (Matson and Patten, 1975). Whether or not it is a seasonal inhabitant of these various environments cannot be determined from present data. The species is known to feed on fruits, pollen, nectar, and probably insects (Gardner, 1977).

Specimens examined (50).—10 mi. SW Concepción del Oro, 7600 ft., 3 (LACM); 6 km. W San Rafael, 2170 m., 1; Río Atengo, 6 km. E San Juan Capistrano, 3300 ft., 1 (OU); 6 mi. NNW Pinos, 7900 ft., 10; Hda. El Lobo, 10 km. ENE Loreto, 7350 ft., 3 (OU); Monte Escobedo, 7300 ft., 7 (LACM); 30 km. NE Jalpa (La Palma), 1740 m., 1; 4 mi. S Jalpa, 4300 ft., 5 (LACM); 2.7 mi. N Santa Rosa, 3400 ft., 6 (OU); 10 mi. NW Yahualica, 7100 ft., 3 (LACM). *Additional record*: 8 mi. S Moyahua, 5600 ft. (Jones and Webster, 1976).

Leptonycteris nivalis (Saussure, 1860)

Big Long-nosed Bat

The specimens reported upon by Matson and Patten (1975) remain the only known representatives of the big long-nosed bat in Zacatecas. Their capture in a tropical thorn scrub habitat may represent an atypical occurrence in that Baker and Cockrum (1966) considered this species to be an inhabitant of pine-oak forests.

Specimens examined (11).—4 mi. S Jalpa, 4300 ft. (LACM).

Leptonycteris sanborni Hoffmeister, 1957

Little Long-nosed Bat

Matson and Patten (1975) commented on *Leptonycteris sanborni* as being geographically sympatric with *L. nivalis* near Jalpa. Their specimen of *L. sanborni* was obtained on 24 November 1970; specimens of *L. nivalis* were acquired on 19 November 1970.

Specimens examined (50).—4 km. W San Rafael, 2140 m., 1; 18 km. N San Juan Capistrano, 1100m., 1; Río Atengo, 5 km. E San Juan Capistrano, 3350 ft., 14 (OU); 4 mi. S Jalpa, 4300 ft., 1 (LACM); 5½ mi. S Moyahua, 4000 ft., 28 (KU); Santa Rosa, 4000 ft., 5 (LACM).

Sturnira lilium parvidens Goldman, 1917

Yellow-shouldered Bat

The yellow-shouldered bat seems to be restricted to the tropical habitats within the state. It most likely feeds upon the plentiful fruits in the orchards along the Río Juchipila and Río Atengo. Genoways and Jones (1968) recorded pregnant individuals in June, and Matson and Patten (1975) also found females with enlarged mammary glands in that month.

Specimens examined (35).—3 km. N San Juan Capistrano, 1500 m., 2; 4 mi. S Jalpa, 4300 ft., 2 (LACM); 1.6 km. N Santa Rosa, 1100 m., 1; 5½ mi. S Moyahua, 21 (KU); Santa Rosa, 4000 ft., 9 (LACM).

Chiroderma salvini scopaeum Handley, 1966

Salvin's White-lined Bat

Little is known about the natural history of this bat. Matson and Patten (1975) reported females with enlarged mammae taken in mid-June in a mango orchard near the Río Juchipila.

Specimens examined (26).—1.6 km. N Santa Rosa, 3700 ft., 1; 5½ mi. S Moyahua, 5 (KU); Santa Rosa, 4000 ft., 20 (LACM).

Artibeus hirsutus Andersen, 1906

Hairy Fruit-eating Bat

While most records of *Artibeus hirsutus* indicate a primarily tropical distribution (Hall, 1981), two of four Zacatecan localities are in montane or lower montane habitats. The specimens from west of Jalpa, at the lower edge of the oak forest, were taken in December when nighttime temperatures are relatively cool. The Monte Escobedo locality is in pine-oak forest where temperatures are also cool.

Specimens examined (54).—Monte Escobedo, 7300 ft., 2 (LACM); 10 mi. W Jalpa, 6100 ft., 18 (LACM); 5½ mi. S Moyahua, 4000 ft., 16 (KU); Santa Rosa, 4000 ft., 18 (LACM).

Artibeus jamaicensis triomylus Handley, 1966

Jamaican Fruit-eating Bat

The distribution of the Jamaican fruit-eating bat in the valleys of the Río Juchipila and Río Atengo probably is related to the tropical climate and

availability of various fruits in the numerous orchards near Santa Rosa and San Juan Capistrano. Reproductive activity has been recorded for this species between June and September (Genoways and Jones, 1968; Matson and Patten, 1975).

Specimens examined (63).—5 km. NE San Juan Capistrano, 1330 m., 2; 5½ mi. S Moyahua, 4000 ft., 19 (KU); Santa Rosa, 4000 ft., 42 (LACM).

Artibeus lituratus intermedius J. A. Allen, 1897

Big Fruit-eating Bat

Bats of the species *Artibeus lituratus intermedius*, although apparently less numerous than *A. jamaicensis*, were taken under the same conditions as *A. jamaicensis* near Santa Rosa. Both collecting localities listed are at Santa Rosa (Genoways and Jones, 1968). Several females containing fetuses and one with enlarged mammary glands were taken in June (Genoways and Jones, 1968).

Specimens examined (8).—5½ mi. S Moyahua, 4000 ft., 6 (KU); Santa Rosa, 4000 ft., 2 (LACM).

Artibeus toltecus hesperus Davis, 1969

Lowland Fruit-eating Bat

Little is known concerning the habits of the small, lowland fruit-eating bat. Genoways and Jones (1968) reported a pregnant female and another with enlarged mammae taken in June. Matson and Patten (1975) also recorded June-taken specimens showing reproductive activity. Specimens reported herein were collected in or near mango and banana orchards. The species is known to feed on certain species of figs (Villa-R., 1967), but it probably feeds on other fruits as well.

Specimens examined (30).—5½ mi. S Moyahua, 4000 ft., 6 (KU); Santa Rosa, 4000 ft., 24 (LACM).

Desmodus rotundus murinus Wagner, 1840

Vampire Bat

The vampire bat appears to be locally abundant in a variety of habitats in southwestern Zacatecas. There is little evidence, however, that this bat ranges into desert areas on the Mexican Plateau, although Dalquest (1953) reported it in such habitat in adjacent San Luis Potosí. Interviews with ranchers, mostly on the Plateau, indicated that vampire bats are not major pests to the well-being of domestic stock. Reproductive activity for this bat in Zacatecas has been reported in October (Cockrum, 1956).

Specimens examined (171).—3 km. N San Juan Capistrano, 1500 m., 2; Monte Escobedo, 2225 m., 22 (LACM); 2 mi. NNE Jalpa, 4700 ft., 31 (KU); 10 mi. W Jalpa, 6100 ft., 8 (LACM); 4 mi. S Jalpa, 4300 ft., 55 (LACM); 8 mi. NW Nochistlán, 6600 ft., 1 (LACM); 5½ mi. S Moyahua, 4000 ft., 22 (KU); Santa Rosa, 4000 ft., 30 (LACM).

NATALIDAE—Funnel-eared Bats

Natalus stramineus mexicanus Miller, 1902

Mexican Funnel-eared Bat

The single specimen from Zacatecas was taken in a cave adjacent to the Río Juchipila near Santa Rosa. Justification for the subspecific designation was given in Matson and Patten (1975).

Specimen examined (1).—Santa Rosa, 4000 ft. (LACM).

VESPERTILIONIDAE—Vespertilionid Bats

Myotis auriculus apache Hoffmeister and Krutsch, 1955

Mexican Long-eared Myotis

Specimen examined (1).—10 mi. NW Yahualica, 7100 ft. (LACM).

Myotis californicus

California Myotis

The California myotis can be expected to occur in almost any habitat within the state, including tropical, desert scrub, and montane vegetations. Judging from dates of capture (January, June, August, October), this bat may be active throughout the year, especially in the more tropical areas of the state.

Two subspecies are present in Zacatecas (Bogan, 1975). A pale-colored race, *M. c. californicus*, lives in the northeastern part, whereas the darker-colored *M. c. mexicanus* occurs in the more humid, tropical southwestern sector.

Specimens examined.—***Myotis californicus californicus*** (Audubon and Bachman, 1842) (3): 13 mi. SW Camacho, 5800 ft., 2 (LACM); 8 mi. S Majoma, 7700 ft., 1 (KU). *Additional record*: 20 mi. S Concepción del Oro (Jones and Webster, 1976). ***Myotis californicus mexicanus*** (Saussure, 1860) (7): 8 mi. S Chalchihuites, 8200 ft., 1 (CAS); 5 km. NE San Juan Capistrano, 1330 m., 1; Hda. San Juan Capistrano, 1 (USNM); 6 mi. SW Jalpa, 4900 ft., 1 (LACM); 8 mi. NW Nochistlan, 6600 ft., 1 (LACM); 10 mi. NW Yahualica, 7100 ft., 1 (LACM); Santa Rosa, 4000 ft., 1 (LACM). *Additional record*: 4 mi. SW Tabasco (Bogan, 1978).

Myotis leibii melanorhinus (Merriam, 1890)

Small-footed Myotis

The small-footed myotis was first reported in Zacatecas by Best *et al.* (1972). In assigning our specimens to *M. leibii*, we follow Bogan (1975). This bat is strictly a Plateau species in Zacatecas.

Specimens examined (5).—3 mi. E El Calabazal, 8000 ft., 1; 9 mi. NW Valparaiso, 8350 ft., 1; 9.7 mi. NW Cuauhtémoc, 7100 ft., 1 (OU); 3 mi. N Cuauhtémoc, 6600 ft., 1 (LACM); 10 mi. NW Yahualica, 7100 ft., 1 (LACM).

Myotis planiceps Baker, 1955

Flat-headed Myotis

Only three specimens of this bat are known (Matson, 1975), one each from the states of Coahuila, Nuevo León, and Zacatecas. Like the others, the Zacatecan specimen was taken in mountainous habitat.

Specimen examined (1).—10 mi. SW Concepción del Oro, 7600 ft. (LACM).

Myotis thysanodes thysanodes Miller, 1897

Fringed Myotis

Little is known about the fringed myotis, although it is widespread in western North America (Hall, 1981). Dalquest (1953) considered it to be a typical resident of arid-scrub habitat. The specimens from San Juan Capistrano are also from scrub environment but with a decided subtropical floral component.

Specimens examined (5).—Hda. San Juan Capistrano (USNM).

Myotis velifer velifer (J. A. Allen, 1890)

Cave Myotis

Myotis velifer velifer may be locally abundant because it tends to be a colonial cave dweller. Jones and Webster (1976) estimated that some 200 individuals were roosting together near Laguna Valderrama.

The species appears to be absent from the arid northeastern portion of Zacatecas. However, Baker (1956) recorded it in desert situations in adjacent Coahuila. If populations of *M. velifer* occur in the arid northeast, they would likely belong to the paler-colored subspecies *M. v. incautus*.

Specimens examined (31).—El Vergel, 14.5 mi. WSW Sombrerete, 7100 ft., 7 (OU); Hda. Las Bocas, 16.5 mi. WSW Sombrerete, 6400 ft., 20 (OU); 9 mi. NW Valparaíso, 8350 ft., 1; Hda. San Juan Capistrano, 2 (USNM); 6 mi. E Monte Escobedo, 6500 ft., 1 (KU). *Additional records*: Laguna Valderrama, 40 mi. W Fresnillo, 7800 ft. (Jones and Webster, 1976); Tabasco (Villa-R., 1967).

Myotis yumanensis lutosus Miller and G. M. Allen, 1928

Yuma Myotis

Apparently the Yuma myotis is not abundant in Zacatecas although individuals have been taken from a number of localites. It seems to be absent from the high mountains and the arid regions of the state. Most specimens have been captured in the tropical river valleys. Only one specimen was taken in the high grasslands (east of Monte Escobedo).

Specimens examined (7).—Hda. San Juan Capistrano, 2 (USNM); 6 mi. E. Monte Escobedo, 6500 ft., 1 (KU); 4 mi. S Jalpa, 4300 ft., 1 (LACM); 1 mi. N Santa Rosa, 4000 ft., 1 (LACM); 5½ mi. S Moyahua, 4000 ft., 1 (KU).

Pipistrellus hesperus hesperus (H. Allen, 1864)

Western Pipistrelle

Specimens of *Pipistrellus hesperus* are known only from the western part of Zacatecas. However, it probably occurs statewide (Baker, 1956; Baker and Greer, 1962; Dalquest, 1953).

Specimens examined (27).—18 km. N San Juan Capistrano, 1100 m., 3; Hda. San Juan Capistrano, 9 (USNM); Río Atengo, 5 km. E San Juan Capistrano, 3350 ft., 2 (OU); 4 mi. S Jalpa, 4300 ft., 2 (LACM); 3 mi. N Moyahua, 2 (CAS); 5 mi. WNW Mesquituta, 3450 ft., 1 (OU); 1.6 km. N Santa Rosa, 1100 m., 1; Santa Rosa, 4000 ft., 7 (LACM). *Additional record*: 8 mi. S Chalchihuites (Jones and Webster, 1976).

Eptesicus fuscus miradorensis (H. Allen, 1866)

Big Brown Bat

In Zacatecas, the big brown bat has been taken from montane forests, open grasslands, and tropical scrub habitats in the west. As yet, it has not been found in the arid northeast.

Specimens examined (14).—Sierra del Valparaíso, 2 (USNM); 9 mi. NW Valparaíso, 8350 ft., 1; 7.2 mi. W Valparaíso, 7900 ft., 1 (OU); Hda. San Juan Capistrano, 7 (USNM); 3 mi. NW Monte Escobedo, 8000 ft., 2 (KU); 9 mi. WSW Jalpa, 8250 ft., 1; 10 mi. NW Yahualica, 7100 ft. 1 (LACM). *Additional records*: 3 mi. NW Téul de Ortego (Téul de Gonzáles Ortega); Laguna Valderrama, 40 mi. W Fresnillo (the specimen from this locality was reported as being from 107.2 km. W Fresnillo by Villa-R., 1967) (Jones and Webster, 1976).

Lasiurus ega xanthinus (Thomas, 1897)

Southern Yellow Bat

The four southern yellow bats from Concepción del Oro are the only known representatives of this widespread species from Zacatecas (Baker, 1956).

Specimens examined (4).—Concepción del Oro, 7689 ft. (KU).

Lasiurus borealis teliotis (H. Allen, 1891)

Red Bat

Specimen examined (1).—9.7 mi. NW Cuauhtémoc, 7100 ft. (OU). *Additional record*: 8 mi. S Moyahua, 5900 ft. (Jones and Webster, 1976).

Rhogeessa alleni Thomas, 1892

Allen's Yellow Bat

Tropical valleys in southwestern Zacatecas provide habitat for the diminutive Allen's yellow bat. The locality west of Jalpa, at an elevation of 6100 feet, appears to represent an upper altitudinal record of this tropical species.

Specimens examined (5).—4 mi. S Jalpa, 4300 ft., 4 (LACM); 10 mi. W Jalpa, 6100 ft., 1 (LACM).

Rhogeessa parvula H. Allen, 1866

Little Yellow Bat

Specimens of the little yellow bat were taken in a mango orchard near Santa Rosa (Matson and Patten, 1975). We follow LaVal (1973) in considering this species to be monotypic.

Specimens examined (2).—Santa Rosa, 4000 ft. (LACM).

Plecotus mexicanus (G. M. Allen, 1916)

Mexican Big-eared Bat

According to Handley (1959), the preferred habitat of the Mexican big-eared bat is pine-oak forest. Specimens from Zacatecas have been collected in a variety of montane forest types as well as from grasslands and tropical deciduous forests. Individuals were most often taken from nets set across or near water sources.

Specimens examined (10).—Sierra del Valparaíso (=13 mi. W Valparaíso, 8200 ft., according to Handley, 1959), 1 (USNM); 9.7 mi. NW Cuauhtémoc, 7100 ft., 1 (OU); 3 mi. N Ciudad Cuauhtémoc, 6600 ft., 4 (LACM); Hda. El Lobo, 10 km. ENE Loreto, 7350 ft., 1 (OU); 8 mi. NW Nochistlán, 6600 ft., 1 (LACM); 7 mi. E Moyahua, 5500 ft., 1 (OU); 10 mi. NW Yahualica, 7100 ft., 1 (LACM).

Plecotus townsendii australis (Handley, 1955)

Townsend's Big-eared Bat

Plecotus townsendii commonly occurs in colonies in caves or mines. Specimens from one large colony, presumably a maternity colony, were reported by Matson and Patten (1975). In July 1978, Paul Abravaya and John Matson observed bats, believed to be *P. townsendii* as they emerged from the active mercury mine at San Felipe de Nuevo Mercurio. As they flew out of the mine entrances, barn owls eagerly attacked and devoured many of the bats. This species is absent from only the deepest of the narrow tropical valleys in Zacatecas. Matson and Patten (1975) discussed the subspecific identity of *P. townsendii* in Zacatecas, giving information on geographic variation in color and size.

Specimens examined (126).—10 mi. SW Concepción del Oro, 7600 ft., 94 (LACM); 12 mi. SE Concepción del Oro, 7450 ft., 3; 6 km. W San Rafael, 2170 m., 1; Sierra del Valparaíso (=13 mi. W Valparaíso, 8200 ft.), 1 (USNM); 6 mi. NNW Pinos, 7900 ft., 2; 3 mi. N Cuidad Cuauhtémoc, 6600 ft., 24 (LACM); 8 mi. NW Nochistlán, 6600 ft., 1 (LACM). *Additional record*: Laguna Valderrama, 40 mi. W Fresnillo (Jones and Webster, 1976).

Antrozous pallidus packardi Martin and Schmidly, 1982

Pallid Bat

Although the pallid bat is common in arid parts of Durango and Coahuila (Baker, 1956; Baker and Greer, 1962), it was found only in the extreme southwestern part of Zacatecas in arid subtropical scrub of the Río Atengo valley.

Specimens examined (2).—18 km. N San Juan Capistrano, 1100 m., 1; 5 km. NE San Juan Capistrano, 1330 m., 1.

Molossidae—Free-tailed Bats

Tadarida aurispinosa (Peale, 1848)

Peale's Free-tailed Bat

A lactating female Peale's free-tailed bat reported by Baker *et al.* (1967) is the only Zacatecan specimen of this predominately coastal-plain bat. It was taken in tropical growth along the Río Juchipila in southernmost Zacatecas.

Specimen examined (1).—1.6 km. N Santa Rosa, 1100 m.

Tadarida brasiliensis mexicana (Saussure, 1860)

Brazilian Free-tailed Bat

The widespread Brazilian free-tailed bat seems to be common throughout all but the higher elevations of Zacatecas. A female taken on 16 May 1975 from near Santa Rosa contained a single embryo (11 mm).

Specimens examined (47).—Concepción del Oro, 7680 ft. 11 (KU); 2 mi. WSW Sierra Vieja, 1 (OU); Hda. San Juan Capistrano, 24 (USNM); 5 mi. NE Jalpa, 4 (KU); 8 mi. NW Nochistlán, 6600 ft., 1 (LACM); 1 mi. N Santa Rosa, 4000 ft., 3 (LACM); Santa Rosa, 4000 ft., 3 (LACM). *Additional record*: Tabasco (Villa-R., 1967).

Tadarida femorosacca (Merriam, 1889)

Pocketed Free-tailed Bat

One of the two specimens of the pocketed free-tailed bat was taken in tropical vegetation along the Río Juchipila near Santa Rosa (Matson *et al.*, 1978). The other, a mummified individual, was found hanging from the ceiling of a building near Sombrerete in August 1969.

Specimens examined (2).—El Vergel, 14.5 mi. WSW Sombrerete, 7100 ft., 1 (OU); 1 mi. N Santa Rosa, 3700 ft., 1.

Tadarida macrotis (Gray, 1839)

Big Free-tailed Bat

The one specimen examined, taken in a net set along the Río Juchipila, represents the first record of the big free-tailed bat in Zacatecas. The specimen (LACM 52596) is a male with forearm measuring 59.9; other measurements do not differ greatly from those given for *T. macrotis* from Sinaloa (Jones *et al.*, 1972). Because of its known distribution in México and the United States (Hall, 1981), it seems likely that this species is more widespread than our current data indicate.

Specimen examined (1).—1 mi. N Santa Rosa, 4000 ft. (LACM).

Eumops perotis californicus (Merriam, 1890)

Greater Mastiff Bat

The greater mastiff bat apparently reaches the southernmost limit of its range in continental North America in southern Zacatecas (Eger, 1977; Matson and Patten, 1975).

Specimen examined (1).—Santa Rosa, 4000 ft. (LACM).

EDENTATA—Edentates

DASYPODIDAE—Armadillos

Dasypus novemcinctus mexicanus Peters, 1864

Nine-banded Armadillo

The nine-banded armadillo has presumably extended its range upstream into Zacatecas along the Río Juchipila, a tributary of the Río Grande de Santiago, from coastal Nayarit. This edentate occurs in both tropical growth and adjacent cultivated and fallow areas in alluvial soils deposited in the rather narrow valley of this streamway. Local persons are well aware of the presence of the armadillo and its conspicuous burrows. The only specimen preserved in museum collections from Zacatecas is the skull of a mature male (LACM 35067), which has the following measurements: greatest length, 95.8; zygomatic breadth, 42.2; least interorbital constriction, 22.7; greatest length of nasals, 23.2; breadth of braincase (at junction of sutures between frontal, parietal, and squamosal), 30.4; greatest width of rostrum (at anterior flare), 9.8; mastoidal breadth, 27.2; depth of braincase (at junctions of frontal-parietal and basisphenoid-basioccipital), 22.4; length of maxillary toothrow (left side), 23.5.

Specimen examined (1).—8 mi. NW Nochistlán, 6600 ft. (LACM).

LAGOMORPHA—Lagomorphs

LEPORIDAE—Hares and Rabbits

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

Desert Cottontail

The desert cottontail is characteristic of arid open lands with scattered thorn-scrub cover. Besides the several localities from where specimens were obtained, MSU field parties saw these rabbits along roadways and at desert-scrub camps near San Juan de los Charcos, Cedros, Tecolotes, and Tetillas. Cottontails seen in riparian growth along streams and in grassy foothills in southwestern Zacatecas may have been either this species or *Sylvilagus floridanus*, inasmuch as the two cottontails may use common habitats in such situations. A female obtained on 14 July contained three embryos; others taken on 8 and 9 July were in lactation. Individuals in the process of molting were collected on 3, 8, and 14 July. Although desert cottontails appeared to be common, especially in the vicinity of cultivated lands, there

was little evidence to show that they were either hunted or trapped by local residents.

Zacatecan desert cottontails are assigned to the subspecies *S. a. parvulus* following Diersing and Wilson (1980). This southernmost subspecies is characterized by its small size. This taxonomic arrangement extends the distribution of *S. a. parvulus* on the Mexican Plateau at least as far north as central Durango, with *S. a. minor* occurring northward and eastward along the north side of the Coahuilan-Zacatecan border (Baker, 1956; Baker and Greer, 1962).

Specimens examined (25).—3 km. SE Apizolaya, 1920 m., 1; 6 km. E Mazapil, 2645 m., 1; 10 mi. SW Concepción del Oro, 2 (CAS); 33 mi. SW Concepción del Oro, 2 (CAS); 40 km. ESE Concepción del Oro, 1980 m., 2; 35 km. SSE Concepción del Oro, 1980 m., 1; 7 km. N San Rafael, 1; 14 km. S Camacho, 1730 m., 1; 27 km. S Camacho, 1830 m., 1; 30 km. S Camacho, 1830 m., 1; 3 km. W San Felipe de Nuevo Mercurio, 1700 m., 1; 15 km. NNW Nieves, 1910 m., 1; Berriozábal, 3 (USNM); Cañitas, 2 (USNM); 3 mi. SW Sombrerete, 1 (CAS); 9 km. NW Sarteneja, 2200 m., 1; 13 km. WNW Capriote, 2100 m., 2; 2 km. S Monte Mariana, 2110 m., 1.

Sylvilagus floridanus orizabae (Merriam, 1893)

Eastern Cottontail

Eastern cottontails or signs of their activity were recorded at most MSU field camps in montane pine-oak in the southwestern part of the state. The species also occurred in heavily cultivated sectors along the Río Juchipila in the vicinities of Jalpa, Santa Rosa, and other river-bordering communities. Although none was collected, eastern cottontails are to be expected in northeastern Zacatecas in such isolated forested uplands as those in the vicinity of Concepción del Oro. We follow Diersing and Wilson (1980) in placing all of our Zacatecan specimens in *S. f. orizabae*.

Specimens examined (13).—Valparaíso Mts., 1 (USNM); 9 mi. NW Valparaíso, 8350 ft., 1; Hda. San Juan Capistrano, 3 (USNM); 4 mi. N Villanueva, 1 (CAS); Monte Escobedo, 1 (KU); Plateado, 3 (USNM); 30 km. NE Jalpa, 1740 m., 1; 25 km. ESE Jalpa, 2590 m., 1; 6 km. S Téul de Gonzáles Ortega, 1.

Lepus californicus asellus Miller, 1899

Black-tailed Jackrabbit

Black-tailed jackrabbits are common in all desert-scrub and most grassland habitats of Zacatecas. These hares were observed at field camps near San Juan de los Charcos, Cedros, Tecolotes, Concepción del Oro, Fresnillo, and Pinos; specimens were preserved from 13 other localities. The impression obtained in Durango (Baker and Greer, 1962) that the black-tailed jackrabbit is more successful in occupying over-grazed grasslands than is the strictly grassland species *Lepus callotis* seems also to be the case in western and southern Zacatecas. Three of five female *L. californicus* collected in July were lactating.

Zacatecan black-tailed jackrabbits seem best allocated to *L. c. asellus*, the population occupying much of the southern part of the Mexican Plateau.

The high degree of variability of the dorsal coloring of specimens from Zacatecas (all July-taken) show no positive differences, except perhaps for darker heads, from Durangan hares assigned to *L. c. texianus*.

Specimens examined (15).—20 km. SW Coapas, 1650 m., 1; 32 km. SW Coapas, 1650 m., 1; 12 km. SE Sabana Grande, 2000 m., 1; 12 km. S Camacho, 1720 m., 1; 3 km. W San Felipe de Nuevo Mercurio, 1700 m., 2; 9 1/2 km. E La Colorada, 1; Cañitas, 1 (USNM); 16 mi. ENE Ville de Cos, 6650 ft., 1; 2 km. S Monte Mariana, 2110 m., 1; Calera, 1 (USNM); Valparaíso, 1 (USNM); 3.5 mi. W La Blanca, 6650 ft., 1 (OU); Berriozábal, 2 (USNM).

Lepus callotis callotis Wagler, 1830

White-sided Jackrabbit

The white-sided jackrabbit formerly lived in open grassland plains habitat in much of Zacatecas but is confined now mostly to lightly and moderately grazed elevated grasslands, foothills, and glades in the forested uplands in the southwestern part of the state. Overgrazing and the encroachment of shrubs on open lands in northern and eastern Zacatecas are thought to have encouraged the expansion of the range of the black-tailed jackrabbit and discouraged *L. callotis*. Our field parties observed white-sided jackrabbits along highway 54 between Fresnillo and Valparaíso, near Noria de Angeles, Pinos, and Monte Escobedo. The hares were usually seen in early morning or at dusk, often at oak woodland edges in the upper foothills; near Monte Escobedo, Matson flushed one from under an oak tree.

In contrast to the usually solitary black-tailed jackrabbit, the white-sided species was observed at least in summer, almost always in pairs (Bogan and Jones, 1975). In late afternoon on 28 July 1970, a white-sided jackrabbit, closely pursued by two trail hounds, raced by our camp in an open grassland, 11 mi. NW Valparaíso. Local residents consider white-sided jackrabbits highly edible. Prospects, in our opinion, for the survival of this striking leporid in many parts of its range are indeed poor.

Specimens examined (3).—Monte Escobedo, 1 (USNM); 20 km. S. Monte Escobedo, 2.

Rodentia—Rodents

Sciuridae—Squirrels

Tamias bulleri J. A. Allen, 1889

Buller's Chipmunk

Buller's chipmunk is a characteristic species in the montane pine-oak forests of the Sierra Madre Occidental of western Zacatecas. This is the only species of chipmunk that has reached as far south in México as southern Zacatecas (southernmost distribution approximately 22°30′N latitude). As is the case for other woodland chipmunks, *T. bulleri* is most common where woodlands have a rocky or log strewn substrate.

Specimens examined (53).—10 mi. SW Chalchihuites, 7200 ft., 5 (LACM); 8 mi. S Chalchihuites, 1 (CAS); 17 mi. W Milpillas, 1 (CAS); 14-16 mi. W Milpillas, 3 (CAS); 8 mi. W Milpillas, 1 (CAS); 25 km. WSW Milpillas de la Sierra, 2580 m., 3; 9 mi. NW Valparaíso,

8350 ft., 7; Valparaíso Mts., 8700 ft., 17 (USNM); 8.7 mi. W Valparaíso, 8400 ft., 2 (OU); 7.2 mi. W Valparaíso, 7900 ft., 2 (OU); Sierra Madre (SW Sombrerete), 9 (USNM); 10 km. W San Juan Capistrano, 2900 m., 2.

Ammospermophilus interpres (Merriam, 1890)

Texas Antelope Ground Squirrel

Baker *et al.* (1980) reported a small population of Texas antelope ground squirrels on arid, brushy arroyo banks and slopes in extreme northern Zacatecas adjacent to the geographic junction of the states of Coahuila, Durango, and Zacatecas. The voucher specimen obtained represents the southernmost locality for the occurrence of this species.

Specimen examined (1).—5 km. NE Cinco de Mayo, 1550 m.

Spermophilus mexicanus

Mexican Ground Squirrel

The few records of Mexican ground squirrels in Zacatecas do not allow for generalizations concerning habitat preferences. Two females taken in desert-scrub in northern Zacatecas were lactating in July. One female taken from southwestern grassland near Monte Escobedo on 3 July contained six embryos.

These records document the occurrence of the northern and southern subspecies of *S. mexicanus* in Zacatecas. The collecting localities narrow the hiatus between the two races to about 200 km. Howell (1938) distinguished the two on the basis of size and color: the northern subspecies, *S. m. parvidens*, is small and pale, whereas the southern subspecies, *S. m. mexicanus*, is large and dark. Two adult females here assigned to *S. m. parvidens* and one adult female assigned to *S. m. mexicanus* have external measurements, respectively, as follows: total length, 302, 293, 330; length of tail vertebrae, 126, 121, 125; length of hind foot, 38, 36, 44; height of ear from notch, 11, 11, 14. Because of the distance separating these two populations and their relatively large size differences, Matson (1982) treated these as separate "species" in his analysis of distributional patterns.

Specimens examined.—***Spermophilus mexicanus mexicanus*** (Erxleben, 1777) (2): 16 km. SSE Monte Escobedo, 2010 m. ***Spermophilus mexicanus parvidens*** Mearns, 1896 (2): 10 km. ESE San Juan de los Charcos, 1500 m., 1; 3 km. SE Apizolaya, 1920 m., 1.

Spermophilus spilosoma

Spotted Ground Squirrel

The spotted ground squirrel is perhaps the mammal most conspicuous to the casual visitor to Zacatecas, because it occurs commonly along highway shoulders in all but the heaviest cover in mountainous and tropical areas in western and southern parts. The species seems equally at home in desert and grassland habitats. A female captured on 8 July carried six fetuses; lactating individuals were obtained in July and August.

Two subspecies of *S. spilosoma* occur in Zacatecas (Howell, 1938). Specimens assigned to *S. s. pallescens* from the arid northeastern part of the state are paler in color than *S. s. spilosoma* from the western and southern area. We found no differences in size although Howell (1938) recorded *S. s. pallescens* as being smaller in size than *S. s. spilosoma.*

Specimens examined.—***Spermophilus spilosoma pallescens*** (A. H. Howell, 1928) (40): 3 km. SE Apizolaya, 1920 m., 3; 7 km. SE Caopas, 1940 m., 1; 11 mi. E Concepción del Oro, 5300 ft., 2 (LACM); 5 km. SW Concepción del Oro, 2400 m. 1; 10 mi. SW Concepción del Oro, 7600 ft., 2 (LACM); 13 km. SE Concepción del Oro, 1; 35 km. SSE Concepción del Oro, 1980 m., 1; 13 mi. SW Camacho, 5900 ft., 2 (LACM); 2 km. W San Felipe de Nuevo Mercurio, 1740 m., 2; 6 km. W San Felipe de Nuevo Mercurio, 1790 m., 1; 20 km. NE Río Grande, 1770 m., 4; 15 mi. NE San Andrés, 6200 ft., 3 (LACM); 6.5 km. S La Colorada, 1970 m., 2; 43 mi. NE Ville de Cos, 7400 ft., 1; 13 km. WNW Capriote, 2100 m., 1; Cañitas, 1 (USNM); 1 mi. W Sierra Vieja, 6100 ft., 2 (OU); 12 km. SW Ville de Cos, 1950 m., 1; 45 km. NE Morelos Jct., 1 (TTU); Bañon, 6400 ft., 6 (LACM); 2 mi. E Bañon, 6400 ft., 1 (LACM), 1 (RGH). ***Spermophilus spilosoma spilosoma*** Bennett, 1833 (60): Chalchihuites, 7500 ft., 1 (LACM); 2 km. S Monte Mariana, 2180 m., 1; 5.6 mi. ESE Sain Alto, 7700 ft., 1 (OU); Sombrerete, 6800 ft., 2 (LACM), 2 (RGH); 10 mi. SW Sombrerete, 2 (CAS); 14 km. N Fresnillo, 1 (CAS); 4.5 mi. E Fresnillo, 8 (MVZ); 17 mi. SW Fresnillo, 1 (CAS); 10 mi. NW Zacatecas, 1 (KU); 5 mi. NW Zacatecas, 7600 ft., 1 (KU); 3 mi. SE Guadalupe, 1 (UI); 2 mi. ESE Trancoso, 7000 ft., 4 (KU); 7 mi. SE Trancoso, 1 (KU); 9 mi. SE Zacatecas, 7900 ft., 1 (KU); Berriozábal, 10 (USNM); 3 mi. N Cuauhtémoc, 6600 ft., 8 (LACM); 2 mi. NNW Cuauhtémoc, 6600 ft., 1 (OU); 5 mi. S Ojo Caliente, 1 (UI); 8 mi. N Villanueva, 6800 ft., 1 (KU); 7 mi. S Pinos, 6800 ft., 10 (LACM); 10 mi. S Pinos, 1 (CAS). *Additional records*: 3 mi. SW Sombrerete; 40-41 mi. W Fresnillo (Jones and Webster, 1976).

Spermophilus variegatus

Rock Squirrel

Rock squirrels abound in mountainous areas of Zacatecas, usually being confined to arroyos or rock cliffs. In grasslands and tropical areas, they occur in association with rock outcroppings and the often-conspicuous, man-made rock fences. One female, taken on 25 July, contained four fetuses; another was lactating on 10 July.

Range maps in Howell (1938) and Hall (1981) indicate the possibility that three subspecies occur in Zacatecas. Specimens assigned to *S. v. couchii* from the northeastern part have a dark brown dorsum with a more distinctly blackened head than that of specimens from more southerly localities assigned to *S. v. variegatus*, and which have a more grayish dorsum. Specimens from northwestern Zacatecas assigned to *S. v. rupestris* differ from *S. v. variegatus* in the same way as does *S. v. couchii.* In comparison with *S. v. couchii, S. v. rupestris* has a paler brown dorsum. We were unable to distinguish differences in size among any of the populations examined.

Specimens examined.—***Spermophilus variegatus couchii*** Baird, 1855 (15): 5 km. NE Cinco de Mayo, 1550 m., 1; 12 km. W San Rafael, 2590 m., 3; 10 mi. SW Concepción de Oro, 7600 ft., 3 (LACM); 5 km. SW Concepción del Oro, 2400 m., 8. *Additional records*: 40 km. ESE Concepción del Oro, 2320 m. (sight). ***Spermophilus variegatus rupestris*** (J. A. Allen, 1903) (7): 15 km. NNW Nieves, 1910 m., 1; 9 mi. N Nieves, 6000 ft., 1 (LACM); 7 mi. SW Sombrerete,

6800 ft., 1 (LACM); 14.5 mi. WSW Sombrerete, 7100 ft., 2 (OU); 14.2 mi. N Jiménez del Téul, 7300 ft., 1 (OU); 32 km. SE Valparaíso, 2040 m., 1. *Additional records*: 3 mi. SW Sombrerete (Jones and Webster, 1976); 2 km. S Monte Mariana, (sight); 53 km. WSW Fresnillo, (sight); 32 km. SW Fresnillo, (sight); Valparaíso, (sight); 13 km. E Jérez, (sight); 8 km. SW Jérez (sight); Zacatecas, (sight). ***Spermophilus variegatus variegatus*** (Erxleben, 1777) (23): Berriozábal, 1 (USNM); Monte Escobedo, 7300 ft., 3 (LACM); 10 km. ENE Loreto, 7350 ft., 1 (OU); 7 mi. S Pinos, 6800 ft., 1 (LACM); 30 km. NE Jalpa, 1740 m., 3; 10 mi. W Jalpa, 6100 ft., 1 (LACM); 24 km. ESE Jalpa, 2590 m., 1; 4 mi. S Jalpa, 4300 ft., 1 (LACM); 8 mi. NW Nochistlán, 6600 ft., 4 (LACM); 6 km. S Téul de Gonzáles Ortega, 2010 m., 1; 16 km. SSW Jalpa, 1; 10 mi. NW Yahualica, 7100 ft., 1 (LACM); 0.5 mi. ENE Mesquituta, 3450 ft., 2 (OU); Santa Rosa, 4000 ft., 2 (LACM). *Additional records*: 18 km. N San Juan Capistrano, 1100 m. (sight); San Juan Capistrano (sight); 3 mi. N Cuauhtémoc (sight); Pinos (sight); 20 km. S Monte Escobedo (sight); 8 mi. S Moyahua (Jones and Webster, 1976).

Cynomys mexicanus Merriam, 1892

Mexican Prairie Dog

Mexican prairie dogs are known from a few rather adjacent localities in Coahuila, Nuevo León, and San Luis Potosí (Dalquest, 1953; Baker, 1956; Pizzimenti, 1975; Hall, 1981). Specimens reported here represent the first records of this species in Zacatecas. All were obtained in an "island" of mesquite grassland in an intermontane basin east of Concepción del Oro by a field party from the Natural History Museum of Los Angeles County. Later, on 25 July 1975, one of us (Baker) observed Mexican prairie dogs approximately 14 km. NE Concepción del Oro, close to the Coahuilan border. This area was reached by means of a ranch road turning southeastward from Mexican highway 54 about 13 km. NNE Concepción del Oro. In the vicinity of the small village of C. de Rocomontes, one colony with about 20 characteristic burrows was observed in a 16-hectare area. Both adults and pups were seen sitting on their mounds; two burrowing owls (*Speotyto cunicularia*) and several spotted ground squirrels (*Spermophilus spilosoma*) also were noted at burrow entrances. Local residents reported that more *perritos* (as the animals were referred to locally) occurred farther beyond in the narrow valley. Grazing by livestock (cattle and goats), cultivation, and the encroachment of woody shrubs from the slopes on either side of the narrow valley illustrate the precarious nature of the preferred habitat of this restricted species, now placed on the endangered list by international conservation agencies.

Specimens examined (6).—11 mi. E Concepción del Oro, 5300 ft. (LACM).

Sciurus aureogaster socialis Wagner, 1837

Mexican Gray Squirrel

Three specimens from two localities in tropical forest environment represent the first records for Zacatecas of the Mexican gray squirrel, which is widespread in tropical and adjacent montane forests (Musser, 1968).

Specimens examined (3).—10 mi. NW Yahualica, 7100 ft., 1 (LACM); Santa Rosa, 4000 ft., 2 (LACM).

Sciurus nayaritensis nayaritensis J. A. Allen, 1890

Nayarit Squirrel

The Nayarit squirrel seems to be most prevalent in montane forests dominated by oaks. The species was taken in association with *Sciurus aureogaster* 10 mi. NW Yahualica; other records of this sympatry are reported by Musser (1968). Females in lactation were taken on 24 and 25 July.

Specimens examined (55).—Laguna Valderrana, 41 mi. W Fresnillo, 1 (CAS); 18 mi. W Milpillas, 2 (CAS); Sierra Valparaíso, 8200 ft., 4 (AMNH); Valparaíso Mountains, 8700 ft., 19 (USNM); 9 mi. NE Valparaíso, 8350 ft., 2; 9.5 mi. WSW Valparaíso, 8650 ft., 2; Sierra Madre, 1 (USNM); 36 km. SSE Valparaíso, 2330 m., 1; Monte Escobedo, 7300 ft., 5 (LACM); 5 mi. W Monte Escobedo, 3 (CAS); Plateado, 12 (USNM); 9 mi. ENE Jalpa, 8250 ft., 2; 10 mi. NW Yahualica, 7100 ft., 1 (LACM). *Additional record*: 8 mi. S Chalchihuites (Jones and Webster, 1976).

Geomyidae—Pocket Gophers

Pappogeomys castanops

Yellow-faced Pocket Gopher

Yellow-faced pocket gophers most often were found in interior desert basins where soils are silty or sandy and deep. Mounds denoting surface deposition from underground burrows were numerous, for example, at Rancho San Marcos, 7 km. W San Felipe de Nuevo Mercurio. Females taken on 5 and 21 August contained one and two fetuses, respectively. Russell (1968) recognized four subspecies in Zacatecas; we follow his arrangement.

Specimens examined.—***Pappogeomys castanops goldmani*** (Merriam, 1895) (15): 4 km. N Nieves, 1980 m., 3; 6 km. SE Tetillas, 2040 m., 1; Cañitas, 5 (USNM); 1 mi. SW Cañitas, 2 (TTU); 11 mi. SW Cañitas, 4 (TTU). ***Pappogeomys castanops rubellus*** (Nelson and Goldman, 1934) (23): Ville de Cos, 6700 ft., 8 (KU); 1 mi. SW Ville de Cos, 4 (TTU); 20 mi. NE Morelos Jct., 3 (TTU); 45 km. NE Morelos Jct., 8 (TTU). ***Pappogeomys castanops subnubilus*** (Nelson and Goldman, 1934) (30): 16.4 mi. ENE Concepción del Oro, 2 (OU); 10 mi. E Concepción del Oro, 5390 ft., 1 (LACM); 11 mi. E Concepción del Oro, 5300 ft., 4 (LACM), 4 (RGH); 15 mi. S Concepción del Oro, 6900 ft., 3 (KU); 35 km. SSE Concepción del Oro, 1980 m., 2; 3 mi. N Lulú, 13 (MVZ); 1 mi. N Lulú, 1830 m., 1. ***Pappogeomys castanops surculus*** Russell, 1968 (39): 10 km. ESE San Juan de los Charcos, 1500 m., 2; 3 km. SE Apizolaya, 1920 m., 1; 7 km. SE Caopas, 1940 m., 1; 1 mi. S Cedros, 6050 ft., 1; 18 mi. NE Concepción del Oro, 1 (CAS); Concepción del Oro, 7680 ft., 8 (KU); 22 mi. SW Concepción del Oro, 4 (CAS); 3.5 mi. E Mazapil, 1 (TTU); 2 km. SE Sabana Grande, 1945 m., 1; 13 mi. SW Camacho, 5800 ft., 8 (LACM), 1 (RGH); 7 km. SE San Felipe de Nuevo Mercurio, 1790 m., 2; 3 km. E San Tiburcio, 1880 m., 1; 25 km. SW San Tiburcio, 2030 m., 2; 5 km. S La Colorada, 1960 m., 1; 8 mi. S Majoma, 7700 ft., 9 (KU).

Thomomys bottae analogus Goldman, 1938

Botta Pocket Gopher

Fresh mounds excavated by Botta pocket gophers were numerous in soils supporting stands of piñon pines in the highlands west of Concepción del Oro in the summer of 1976. The animals seemed equally at home in both

deep alluvial soils and those densely mixed with rocks on slopes. Zacatecan animals are clearly assignable to *T. b. analogus*, based on the characters given by Baker (1953).

Specimens examined (14).—5 km. E Mazapil, 2270 m., 1; 3.5 mi. E Mazapil, 2 (TTU); 10 mi. SW Concepción del Oro, 7600 ft., 4 (LACM); 5 km. SW Concepción del Oro, 2400 m., 5; 40 km. ESE Concepción del Oro, 2320 m., 2.

Thomomys umbrinus

Southern Pocket Gopher

The southern pocket gopher is widely distributed in Zacatecas. However, it is less uniformly found in desert scrub areas of the northeastern parts of the state than it is in mountainous parts of the west and south. In addition, expansion of farming in former grasslands and in irrigated sectors of desert has encouraged the increase of these fossorial rodents, especially in central and northwestern Zacatecas. Two females taken on 27 and 30 July contained five and one fetuses, respectively. Females examined on 1 and 6 August were lactating.

The presence of populations attributable to seven named subspecies reflects the remarkable degree of geographic variation observed in *T. umbrinus* in Zacatecas. Pale color and small size are distinctive features of the xeric-adapted *T. u. goldmani* in northeastern Zacatecas (Merriam, 1901). Basilar lengths (BL) of skulls of adult males average 29.6. In the contiguous grasslands to the westward, *T. u. durangae* is darker but not much larger (BL, 30.6).

Southern pocket gophers from the mountains in west-central Zacatecas are assigned to *T. u. crassidens*, the type locality of which is from the highlands in the vicinity of Valparaíso. This subspecies is only slightly darker than is the grasslands *T. u. durangae* but noticeably larger (BL, 31.5 for specimens from the vicinity of Chalchihuites; 31.2 for those from near Valparaíso). In more southerly mountainous areas along the western Zacatecan border, large and dark southern pocket gophers are assignable to *T. u. sheldoni* (BL, 32.0).

Nelson and Goldman (1934) described *T. u. enixus* based on specimens from near Plateado in the Sierra Moroni of southwestern Zacatecas and northwest of Jalpa. Subsequently, specimens from nearby Aguascalientes and Jalisco were also assigned to *T. u. enixus* by Hall (1981). The type selected in the original description of *T. u. enixus* was a subadult male (USNM 90834). Two topotypes had broken skulls; the fourth specimen in this type series was not seen. Consequently, we based our examinations on near topotypical material also from the Sierra Moroni, six specimens being from 11 mi. NW Jalpa and three from 9 mi. NW Jalpa. In comparing these specimens, representing *T. u. enixus*, with comparable specimens of *T. u. zacatecae* from the type locality (Berriozábal) and from nearby Cuauhtémoc,

there are no obvious size differences and no appreciably distinguishing coloration. In addition, specimens from south of Pinos, north of Ojo Caliente, and northwest of Nochistlán also compare favorably with the Jalpa series and are assigned to *T. u. zacatecae*. Although not seen by us, specimens from 1 mi. NE Villa Hidalgo (in Jalisco) and from 12 mi. N Rincón de Romos (in Aguascalientes), assigned also to *T. u. enixus* by Hall (1981), can be tentatively referred to *T. u. zacatecae*, at least on geographic grounds. In fact, Hall assigned specimens from the Aguascalientes locality to both subspecies (Hall, 1981:482, 496). Further, our series showed no close affinity with topotypes of *T. u. newmani* from near Palma in nearby San Luis Potosí. Accordingly, *T. u. zacatecae* appears to occupy most of southern and southeastern Zacatecas and *T. u. enixus* becomes a synonym of *T. u. zacatecae*.

We assign a single adult male from 25 km. ESE Pinos to *T. u. arriagensis* principally on the basis of color. In our examination of topotypes of *T. u. arriagensis* in comparison with our series of *T. u. zacatecae*, there appeared to be no differences in cranial features and overall size. This action thus extends the known range of *T. u. arriagensis* northward from San Luis Potosí into extreme southeastern Zacatecas.

Southern pocket gophers living in the alluvial soils in the valley of the tropical Río Juchipila are assignable to *T. u. musculus*. Specimens from north of Moyahua possess the drab coloration and coarse pelage that characterize this subspecies.

Specimens examined.—***Thomomys umbrinus arriagensis*** Dalquest, 1951 (1): 25 km. ESE Pinos, 2425 m., 1. ***Thomomys umbrinus crassidens*** Nelson and Goldman, 1934 (50): 10 mi. SW Chalchihuites, 7200 ft., 15 (LACM); 8 mi. S Chalchihuites, 8600 ft., 5 (CAS); 8 mi. W Milpillas (de la Sierra), 8300 ft., 2 (CAS); 25 km. WSW Milpillas de la Sierra, 2580 m., 5; 9 mi. NW Valparaíso, 8350 ft., 13; Valparaíso Mountains (type locality), 10 (USMN). ***Thomomys umbrinus durangae*** Nelson and Goldman, 1934 (50): 5 km. S Gonzáles Ortega, 2450 m., 1; 18 km. S Gonzáles Ortega, 2150 m., 3; 3 mi. SW Sombrerete, 5 (CAS); 5 mi. SW Sombrerete, 6800 ft., 1 (LACM), 2 (RGH); 7 mi. SW Sombrerete, 6900 ft., 2 (LACM), 2 (RGH); 14.5 km. WSW Sombrerete, 7100 ft., 3 (OU); 10 km. S, 2 km. W Sombrerete, 17 (MVZ); 14.2 mi. N Jiménez de Téul, 7300 ft., 2 (OU); 40 mi. W Fresnillo, 7700 ft., 12 (CAS). ***Thomomys umbrinus goldmani*** Merriam, 1901 (29): 5 km. NE Cinco de Mayo, 1550 m., 2; 22 mi. S Concepción del Oro, 1 (CAS); 15 mi. NE San Andres, 6200 ft., 26 (LACM). ***Thomomys umbrinus musculus*** Nelson and Goldman, 1934 (2): 2.5 mi. N Moyahua, 4400 ft., 2 (CAS). ***Thomomys umbrinus sheldoni*** Bailey, 1915 (42): Sierra Madre, 5 (USNM); 36 km. SSE Valparaíso, 2330 m., 3; 3 mi. NW Monte Escobedo, 13 (KU); Monte Escobedo, 7300 ft., 21 (LACM). ***Thomomys umbrinus zacatecae*** Nelson and Goldman, 1934 (145): 10 mi. SE Fresnillo, 1 (TTU); 5 mi. NW Zacatecas, 7600 ft., 1 (KU); 9 mi. W Zacatecas, 1 (CAS); 4 mi. W Trancoso, 2 (TTU); 5 mi. NW Trancoso, 1 (UI); 2 mi. S, 5 mi. E Zacatecas, 7700 ft., 1; 3 km. N Ojo Caliente, 25 (MVZ); Berriozábal (type locality), 10 (USNM); 3 mi. N Cuauhtémoc, 6600 ft., 21 (LACM); 0.5 mi. SE Cuauhtémoc, 6600 ft., 5 (OU); 2 km. N Noria de Angeles, 2200 m., 1; 6 mi. NNW Pinos, 7900 ft., 1; 10 km. ENE Loreto, 7350 ft., 2 (OU); 7 mi. S Pinos, 6800 ft., 9 (LACM); Plateado, 3 (USNM); 11 mi. NW Jalpa, 8000 ft., 15 (KU); 9 mi. WNW Jalpa, 8250 ft., 3; 25 km. ESE Jalpa, 2590 m., 16; 8 km. NW Téul de Gonzáles Ortega, 2200 m., 1; 8 mi. NW Nochistlán, 6600 ft., 26 (LACM).

Heteromyidae—Heteromyids

Perognathus flavus

Silky Pocket Mouse

Silky pocket mice appeared to be most numerous in the grasslands of western Zacatecas. Burrows of these mice, found in summer in a plowed field, were about 5 to 10 centimeters deep with a greatest length of about 100 centimeters. No seed caches were present in any of five burrows excavated. Two females taken on 22 July and 21 August contained three fetuses each.

Baker (1954), in reviewing the subspecies of *Perognathus flavus* in Mexico, reported one subspecies from Zacatecas and indicated that two others might also be present. These three subspecies were separated on the basis of size and color. Specimens from the extreme north are assigned to *P. f. pallescens* based upon their pale color and small size. Specimens assigned to *P. f. medius* occur throughout most of the state. They are darker and larger than are *P. f. pallescens*. In localities east of Concepción del Oro specimens appear to be intermediate between *pallescens* and *medius*. Because the Sierra Astillero and narrow intermontane valleys may act as a partial barrier to interbreeding with populations to the north, these intermediate specimens are assigned to *P. f. medius*. Specimens from the extreme southern part of Zacatecas are assigned to *P. f. parviceps* on the basis of small size and pale color.

Specimens examined.—***Perognathus flavus medius*** Baker, 1954 (101): 6 km. E Mazapil, 2645 m., 1; 12 km. ENE Concepción del Oro, 1850 m., 2; 35 km SSE Concepción del Oro, 1980 m., 6; 3 km. NW San Felipe de Nuevo Mercurio, 1770 m., 4; 2 km. W San Felipe de Nuevo Mercurio, 1740 m., 2; 1 mi. S San Tiburcio, 7000 ft., 2 (KU); 15 km. NNW Nieves, 1910 m., 7; 4 km. N Nieves, 1980 m., 2; 23 km. NE Río Grande, 1800 m., 5; 12 mi. NW Río Grande, 6800 ft., 1; 18 km. S Gonzáles Ortega, 2450 m., 1; 5 km. S La Colorada, 1960 m., 1; 6.5 km. S La Colorada, 1970 m., 1; 13 km. WNW Capriote, 2100 m., 1; 5 mi. SW Sombrerete, 6900 ft., 1 (LACM), 1 (RGH); 5 km. NE Chalchihuites, 2360 m., 1; 3 km. SE Rancho Grande, 2190 m., 1; Bañon, 6400 ft., 2 (LACM); Laguna Valderrama, 5 (CAS); 4.5 mi. E Fresnillo, 5 (MVZ); 10 km. SE Fresnillo, 2250 m., 1; 53 km. SW Fresnillo, 2250 m., 5; Valparaíso, 6200 ft., 1 (USNM); 3 mi. SE Guadalupe, 1 (UI); 2 mi. S, 5 mi. E Zacatecas, 7700 ft., 1; 5 mi. SW Zacatecas, 1 (MVZ); 15 km. SW Valparaíso, 2250 m., 1; 6 mi. W Jérez, 6700 ft., 1; 6 mi. E Jérez, 7000 ft., 2 (KU); 8 km. SW Jérez, 2030 m., 18; Berriozábal, 1 (USNM); 5 mi. S Ojo Caliente, 7 (UI); 2 km. N Noria de Angeles, 2200 m., 5; 10 km. S Tepetongo, 1950 m., 1; 7 mi. S Pinos, 6800 ft., 2 (LACM); 10 mi. S Pinos, 1 (CAS); 25 km. ESE Pinos, 2425 m., 1; 45 km. S Pinos, 2350 m., 1. ***Perognathus flavus pallescens*** Baker, 1954 (4): 10 km. ESE San Juan de los Charcos, 1500 m., 2; 3 km. SE Apizolaya, 1920 m., 1; 7 km. SE Caopas, 1940 m., 1. ***Perognathus flavus parviceps*** Baker, 1954 (5): 16 km. SSE Monte Escobedo, 2010 m., 2; 2.5 mi. S Momax, 5800 ft., 1; 25 km. ESE Jalpa, 2590 m., 1; 8 mi. NW Nochistlán, 6600 ft., 1 (LACM).

Perognathus hispidus zacatecae Osgood, 1900

Hispid Pocket Mouse

Hispid pocket mice seemed nowhere abundant but were most likely to be found in open grassland habitats and riparian growth. An adult female taken on 24 July was lactating.

Specimens examined (37).—5.5 mi. NW Juan Aldama, 6200 ft., 1 (OU); 5 km. S Gonzáles Ortega, 2150 m., 1; 10 mi. NW Sombrerete, 1 (CAS); 23 km. NE Río Grande, 1800 m., 1; 10 km. SE Fresnillo, 2250 m., 1; 11 mi. NE Valparaíso, 7100 ft., 2; Valparaíso, 6200 ft. (type locality), 9 (USNM); 2 mi. S, 5 mi. E Zacatecas, 7700 ft., 1; 3 mi. SE Guadalupe, 1 (UI); 8 mi. SE Zacatecas, 7225 ft., 6 (KU); 13 km. E Jérez, 2200 m., 1; 8 km. SW Jérez, 2030 m., 3; 2 km. N Noria de Angeles, 2200 m., 1; 25 km. ESE Pinos, 2425 m., 1; 45 km. S Pinos, 2350 m., 3; 30 km. NE Jalpa, 1740 m., 3; 6 mi. SW Jalpa, 4900 ft., 1 (LACM).

Perognathus lineatus Dalquest, 1951

Lined Pocket Mouse

In the original description of the lined pocket mouse, Dalquest (1951) commented upon the similarity between *P. lineatus* and *P. nelsoni*. The former lacks the distinct stiff pelage spines present on *P. nelsoni*. Compared to *P. penicillatus*, which also lacks spines, *P. lineatus* has a broader skull. In a numerical taxonomic analysis in which species of the subgenus *Chaetodipus* were considered, *P. lineatus* was found to be distinct from either *P. nelsoni* or *P. penicillatus* (Caire, 1976). We compared our two Zacatecan *P. lineatus* with topotypes and believe they are best referred to this species.

Specimens examined (2).—1 mi. NE Noria de Angeles, (CAS).

Perognathus nelsoni nelsoni Merriam, 1894

Nelson's Pocket Mouse

Nelson's pocket mouse is the most widely distributed and abundant heteromyid in Zacatecas. It is absent only from montane forests in the western part of the state. Ten females taken between 5 July and 8 August contained an average of 2.9 (range one to four) fetuses. Six females captured between 13 July and 18 August were lactating. Of 32 females obtained in June, none showed evidence of breeding activity. The large series of this pocket mouse from Zacatecas, obtained mostly through our efforts, increases greatly our knowledge of the distribution of the species (Osgood, 1900; Jones and Webster, 1976). No appreciable amount of geographic variation was obvious.

Specimens examined (522).—5 km. NE Cinco de Mayo, 1550 m., 1; 10 km. ESE San Juan de los Charcos, 1500 m., 5; 6 km. W Apizolaya, 1800 m., 39; 3 km. SE Apizolaya, 1920 m., 11; 7 km. SE Caopas, 1940 m., 3; 8 mi. W Cedros, 5650 ft., 1 (LACM), 2 (RGH); 18.6 mi. ENE Concepción del Oro, 1 (OU); 12 km. ENE Concepción del Oro, 1850 m., 57; 4 km. W San Rafael, 2140 m., 3; 13 km. NE Concepción del Oro, 1700 m., 1; 40 km. ESE Concepción del Oro, 2320 m., 11; 13 km. SW Concepción del Oro, 1900 m., 1; 5 km. SW Concepción del Oro, 2400 m., 2; 5 km. SE Concepción del Oro, 1935 m., 4; 18 km. SSW Concepción del Oro, 2130 m., 5; 22 mi. SW Concepción del Oro, 3 (CAS); 22 mi. S Concepción del Oro, 1 (CAS); 2 km. SE Sabana Grande, 1945 m., 13; 7 km. SE El Rosario, 2100 m., 1; 35 km. SSE Concepción del Oro, 1980 m., 10; 13 km. SW Camacho, 5800 ft., 2 (LACM); 3 km. NW San Felipe de Nuevo Mercurio, 1770 m., 21; 2 km. W San Felipe de Nuevo Mercurio, 1740 m., 2; 10 mi. SE Juan Aladama, 2210 m., 4; 15 km. WSW San Tiburcio, 1980 m., 1; 15 km. NNW Nieves, 1910 m., 8; 9 mi. NE Nieves, 2010 m., 2; 23 km. NE Río Grande, 1800 m., 2; 25 km. SW San Tiburcio, 2030 m., 2; 15 mi. NE San Andrés, 6200 ft., 2 (LACM); 5 mi. SE Río Grande, 1940 m., 14; 5 km. S La Colorada, 1960 m., 3; 6.5 km. S La Colorada, 1970 m., 14;

6 km. SE Tetillas, 2040 m., 4; 2 mi. S Santa Efigenia, 7400 ft., 2 (KU); 9.5 mi. W Sombrerete, 1 (OU); 13 km. WNW Capriote, 2100 m., 20; 3 km. E El Arenal, 2450 m., 2; 9 km. NW Sarteneja, 2200 m., 2; 10 mi. N Rancho Grande, 6700 ft., 1; 15.5 mi. WSW Sombrerete, 6400 ft., 1 (OU); Cañitas, 1 (USNM); 5 km. NE Chalchihuites, 2360 m., 1; 1 mi. W Sierra Vieja, 6100 ft., 1 (OU); 40 km. NE Ville de Cos, 2000 m., 1 (OU); 3 km. SE Rancho Grande, 2190 m., 2; 18 km. NE Ville de Cos, 2040 m., 8; 3 mi. E, 4.6 mi. N Ville de Cos, 2 (OU); 2 km. S Monte Mariana, 2180 m., 3; 2 mi. SE Ville de Cos, 6200 ft., 2; 3 mi. NW Fresnillo, 7760 ft., 2; Bañon, 6400 ft., 12 (LACM); 2 mi. E Bañon, 6400 ft., 1 (LACM), 2 (RGH); 6 km. N Fresnillo, 2250 m., 2; 1.8 mi. N Fresnillo, 1 (MVZ); 2.5 km. WNW Fresnillo, 7400 ft., 2 (OU); 18 km. N San Juan Capistrano, 1100 m., 9; Valparaíso, 6200 ft., 1 (USNM); 5 mi. SW Zacatecas, 4 (MVZ); 2 mi. S, 5 mi. E Zacatecas, 7700 ft., 1; 8 mi. SE Zacatecas, 7225 ft., 14 (KU); San Juan Capistrano, 1 (USNM); 5 km. NE San Juan Capistrano, 1330 m., 4; 3 km. N San Juan Capistrano, 1500 m., 7; 5 km. E San Juan Capistrano, 1 (OU); 13 km. E Jérez, 2200 m., 5; 8 km. SW Jérez, 2030 m., 6; Berriozábal, 11 (USNM); 3 mi. N Cuauhtémoc, 6600 ft., 5 (LACM); 3 mi. WNW Saldaña, 6850 ft., 1; 5 mi. S Ojo Caliente, 13 (UI); 2 km. N Noria de Angeles, 2200 m., 2; 10 km. ENE Loreto, 7350 ft., 7 (OU); 6 km. ENE Loreto, 6850 ft., 1 (OU); 7 mi. S Pinos, 6800 ft., 17 (LACM); 20 km. S Villanueva, 1810 m., 2 (CAS); 25 km. ESE Pinos, 2425 m., 26; 30 km. ENE Jalpa, 1740 m., 10; 2 mi. S Tabasco, 2 (UI); between Tabasco and Huanasco, 1 (CAS); 7 mi. N Jalpa, 1 (CAS); 10 mi. W Jalpa, 6100 ft., 7 (LACM); 4 mi. S Jalpa, 4300 ft., 5 (LACM); 13 mi. WSW Jalpa, 1 (OU).

Perognathus penicillatus eremicus Mearns, 1898

Desert Pocket Mouse

Desert pocket mice appear most abundantly where desert soils are sandy and deep. The western limit of this species' range coincides with the beginning of grassland vegetation, while its often close associates, *P. flavus* and *P. nelsoni*, seem to thrive equally well in both major open-land habitats. A female taken on 10 July and another captured on 5 August contained four and five fetuses, respectively. Two females examined on 7 and 9 July were lactating.

Baker *et al.* (1980) first reported the desert pocket mouse from Zacatecas; previously the species was known from both north and south of Zacatecas (Hoffmeister and Lee, 1967). Our specimens are assigned to the subspecies *P. p. eremicus* based on characters given in Hoffmeister and Lee (1967).

Specimens examined (140).—10 km. ESE San Juan de los Charcos, 1500 m., 3; 6 km. W Apizolaya, 1800 m., 1; 3 km. SE Apizolaya, 1920 m., 23; 8 mi. W Cedros, 5650 ft., 1 (LACM); 1 mi. S Cedros, 6500 ft., 3; 15 mi. NE Concepción del Oro, 8 (OU); 14.5 mi. NE Concepción del Oro, 3 (OU); 12 km. ENE Concepción del Oro, 1850 m., 9; 13 km. NE Concepción del Oro, 1700 m., 2; 11 mi. E Concepción del Oro, 5300 ft., 3 (LACM); 2 km. SE Sabana Grande, 1940 m., 6; 3 mi. N Lulú, 7 (MVZ); 35 km. SSE Concepción del Oro, 1980 m., 1; 13 mi. SW Camacho, 5800 ft., 8 (LACM), 1 (RGH); 3 km. NW San Felipe de Nuevo Mercurio, 1770 m., 37; 2 km. W San Felipe de Nuevo Mercurio, 1740 m., 9; 3 km. E San Tiburcio, 1880 m., 3; 15 km. WSW San Tiburcio, 1980 m., 4; 6.5 km. S La Colorada, 1970 m., 7; 3 mi. E, 4.6 mi. N Ville de Cos, 1 (OU).

Dipodomys merriami atronasus Merriam, 1894

Merriam's Kangaroo Rat

Merriam's kangaroo rat appears most abundant in desert flats sparsely covered with shrubs in northeastern Zacatecas. Its range extends only

marginally into grassland habitats and it can be expected mostly where xeric shrubs are interdigitated with grassy areas. Eighteen females obtained on 6 July 1978 in arid desert (with vegetation mostly dormant and showing little new growth) near San Tiburcio showed no signs of reproductive activity. In an area containing more luxuriant vegetation, near Capriote, of 20 females examined on 8 July 1978, seven contained an average of three (range two to four) fetuses. Of 12 females taken on 14 July 1978 near Monte Mariana, also having green, luxuriant desert plant cover, four contained an average of 2.8 (range two to three) fetuses.

Lidicker (1960) recognized in Zacatecas only one subspecies of this kangaroo rat, *D. m. atronasus*. However, he indicated that another, *D. m. ambiguus*, might occur in the extreme northern part of the state. Our specimens from this northern area show some characteristics of the latter subspecies (mostly in pale coloring), but in size all are referable to *D. m. atronasus*.

Specimens examined (576).—10 km. ESE San Juan de los Charcos, 1500 m., 1; 2.5 mi. N La Pendencia, 5400 ft., 3 (OU); 6 km. W Apizolaya, 1800 m., 51; 3 km. SE Apizolaya, 1920 m., 26; 7 km. SE Caopas, 1940 m., 5; 8 mi. W Cedros, 5650 ft., 2 (LACM), 1 (RGH); 1 mi. S Cedros, 5600 ft., 1; 4 km. W San Rafael, 2140 m., 1; 15 mi. NE Concepción del Oro, 3 (OU); 14.5 mi. ENE Concepción del Oro, 6 (OU); 16.4 mi. ENE Concepción del Oro, 5 (OU); 12 km. ENE Concepción del Oro, 1850 m., 22; 13 km. NE Concepción del Oro, 1700 m., 2; 11 mi. E Concepción del Oro, 5300 ft., 3 (LACM); 5 km. SE Concepción del Oro, 1940 m., 4; 18 km. SSW Concepción del Oro, 2130 m., 3; 22 mi. SSW Concepción del Oro, 3 (CAS); 22 mi. SW Concepción del Oro, 3 (CAS); 2 km. SE Sabana Grande, 1945 m., 9; 3 mi. N Lulú, 4 (MVZ); 14 mi. S Concepción del Oro, 1 (CAS); 15 mi. S Concepción del Oro, 6900 ft., 8 (KU); 20 mi. S Concepción del Oro, 3 (CAS); 7 km. SE El Rosario, 2100 m., 8; 35 km. SSE Concepción del Oro, 1980 m., 8; 5.5 mi. NW Juan Aldama, 6200 ft., 3 (OU); 13 mi. SW Camacho, 5800 ft., 1 (LACM), 2 (RGH); 3 km. NW San Felipe de Nuevo Mercurio, 1770 m., 14; 10 mi. SE Juan Aldama, 2210 m., 2; 1 mi. SW San Tiburcio, 9 (KU); 3 km. E San Tiburcio, 1880 m.,,6; 15 km. WSW San Tiburcio, 1980 m., 33; 15 km. NNW Nieves, 1910 m., 1; 9 mi. NE Nieves, 6050 ft., 1; 4 km. N Nieves, 1980 m., 5; 23 km. NE Río Grande, 1800 m., 9; 25 km. WSW San Tiburcio, 2030 m., 4; 12 mi. NW Río Grande, 6900 ft., 2; 15 mi. NE San Andrés, 1 (LACM); 5 mi. SE Río Grande, 6350 ft., 5; 5 km. S La Colorada, 1960 m., 3; 6.5 km. S La Colorada, 1970 m., 15; 8 mi. S Majoma, 7700 ft., 17 (KU); 6 km. SE Tetillas, 2040 m., 4; 13 km. WNW Capriote, 2100 m., 39; 9 km. NW Sarteneja, 2200 m., 2; 10 mi. N Rancho Grande, 6700 ft., 6; Cañitas, 6; 1 mi. N Rancho Grande, 1 (KU); 1 mi. W Sierra Vieja, 6100 ft., 14 (OU); 18 km. NE Ville de Cos, 4; 23 km. N Fresnillo, 2140 m., 2; 3 mi. E, 4.6 mi. N Ville de Cos, 3 (OU); 17 mi. NW Fresnillo, 1 (CAS); 16 mi. NNW Fresnillo, 2 (CAS); 13 mi. NNW Fresnillo, 2 (LACM); 8 mi. N Fresnillo, 6 (CAS); Ville de Cos, 6700 ft., 9 (KU); 2 km. S Monte Mariana, 2180 m., 34; 2 mi. SE Ville de Cos, 6200 ft., 1; 45 km. NE Morelos Jct., 3 (TTU); Bañon, 6400 ft., 33 (LACM); 2 mi. E Bañon, 6400 ft., 2 (LACM), 4 (RGH); 4 km. ESE Bañon, 6200 ft., 6 (OU); 4.5 mi. E Fresnillo, 12 (MVZ); 10 km. SE Fresnillo, 2250 m., 4; 24 mi. NE Zacatecas, 6700 ft., 2 (LACM), 2 (RGH); 8 mi. SE Zacatecas, 7225 ft., 16 (KU); 2 mi. ESE Trancoso, 7000 ft., 6 (KU); 3 mi. N Cuauhtémoc, 6600 ft., 13 (LACM); 5 mi. S Ojo Caliente, 5 (UI); 3 mi. WNW Saldaña, 6850 ft., 2; 2 km. N Noria de Angeles, 2200 m., 2; 7 mi. S Pinos, 6800 ft., 1 (LACM); 10 mi. S Pinos, 7100 ft., 1 (LACM); 25 km. ESE Pinos, 2425 m., 1.

Dipodomys nelsoni Merriam, 1907

Nelson's Kangaroo Rat

Scattered dome-shaped burrows with peripheral entrances typical of Nelson's kangaroo rat are conspicuous on desert flats. The northeastern distribution of this xeric-adapted rodent seems limited to the south and west primarily by the desert-grassland ecotone. A female taken on 22 July contained two fetuses.

A specimen from 3 mi. N Lulú identified as *D. spectabilis cratodon* by Alvarez (1960) is instead, according to Cornelio Sanchez-H. (personal communication), *D. nelsoni*. Other specimens from that locality, examined by us, all are referable to *D. nelsoni*. Although Nader (1978) arranged *D. nelsoni* as a subspecies of *D. spectabilis*, Matson (1980) has demonstrated that they are indeed two distinct species.

Specimens examined (77).—10 km. ESE San Juan de los Charcos, 1500 m., 2; 6 km. W Apizolaya, 1800 m., 2; 3 km. SE Apizolaya, 1920 m., 4; 7 km. SE Caopas, 1940 m., 6; 8 mi. W Cedros, 5650 ft., 1 (RGH); 15 mi. NE Concepción del Oro, 12 (OU); 14.5 mi. ENE Concepción del Oro, 1 (OU); 16.4 mi. ENE Concepción del Oro, 1 (OU); 10 mi. E Concepción del Oro, 5300 ft., 1 (LACM); 11 mi. E Concepción del Oro, 5300 ft., 1 (LACM); 16 km. SW Concepción del Oro, 1900 m., 1; 14 mi. S Concepción del Oro, 1 (CAS); 3 mi. N Lulú, 4 (MVZ); 7 km. SE El Rosario, 2100 m., 1; 35 km. SSE Concepción del Oro, 1980 m., 2; 20 mi. SSW Concepción del Oro, 5 (KU); 22 mi. SSW Concepción del Oro, 6000 ft., 3 (KU); 13 mi. SW Camacho, 5800 ft., 5 (LACM); 3 km. NW San Felipe de Nuevo Mercurio, 1770 m., 1; 2 km. W San Felipe de Nuevo Mercurio, 1740 m., 2; 6 mi. NE San Tiburcio, 6100 ft., 1 (KU); 3 km. E San Tiburcio, 1880 m., 1; 1.5 mi. SW San Tiburcio, 6100 ft., 2 (KU); 3.5 mi. SW San Tiburcio, 6100 ft., 3 (KU); 4 mi. SW San Tiburcio, 6100 ft., 3 (KU); 7 mi. SW San Tiburcio, 6100 ft., 1 (KU); 7.5 mi. SW San Tiburcio, 6000 ft., 3 (KU); 8 mi. SW San Tiburcio, 1 (KU); 9 mi. NE Nieves, 6050 ft., 1; 4 km. N Nieves, 1980 m., 3; 23 km. NE Río Grande, 1880 m., 1.

Dipodomys ordii

Ord's Kangaroo Rat

Ord's kangaroo rat is widespread in most open lands of Zacatecas. In the northeast desert habitat, it appears to be a close associate of similar-sized *D. merriami*, although *D. ordii* seems more spotted in distribution, preferring sandy areas to desert flats covered with hard pan. Ord's kangaroo rat appears equally at home in grassland environments in southern and western Zacatecas where it occasionally associates with another similar-sized species, *D. phillipsii*. Of interest would be a study of how these closely-related species interact and share food resources in their common habitats. Of 40 females examined in June, July, and August, none showed evidence of reproductive activity.

Based on characters given by Setzer (1949), we recognize three subspecies in Zacatecas. In the extreme north, specimens are assigned to *D. o. idoneus* based on their small size and pale color. In northeastern Zacatecas, specimens referred to *D. o. fuscus* are large and pale in color. In central and

southeastern Zacatecas, specimens consigned to the subspecies *D. o. palmeri* are medium-sized and dark-colored.

Specimens examined.—***Dipodomys ordii fuscus*** Setzer, 1949 (43): 14.5 mi. ENE Concepción del Oro, 1 (OU); 12 km. ENE Concepción del Oro, 1850 m., 17; Concepción del Oro, 7600 ft., 1 (KU); 10 mi. E Concepción del Oro, 5300 ft., 1 (LACM); 11 mi. E Concepción del Oro, 5300 ft., 2 (LACM), 1 (RGH); 16 km. SW Concepción del Oro, 1900 m., 2; 3 mi. N Lulú, 5 (MVZ); 35 km. SSE Concepción del Oro, 1980 m., 11; 3 mi. E San Tiburcio, 1880 m., 2. ***Dipodomys ordii idoneus*** Setzer, 1949 (17): 3 km. SE Apizolaya, 1920 m., 5; 7 km. SE Caopas, 1940 m., 10; 13 mi. SW Camacho, 5800 ft., 1 (LACM); 3 km. NW San Felipe de Nuevo Mercurio, 1770 m., 1. ***Dipodomys ordii palmeri*** (J. A. Allen, 1881) (223): 15 km. NNW Nieves, 1910 m., 3; 23 km. NE Río Grande, 1800 m., 4; 15 mi. NE San Andres, 6200 ft., 2 (LACM); 13 km. WNW Río Grande, 2050 m., 1; 6.5 km. S La Colorada, 1970 m., 9; Santa Efigenia, 7400 ft., 1 (KU); 5.5 mi. SW Sombrerete, 6850 ft., 2 (LACM); 15.5 mi. WSW Sombrerete, 6400 ft., 1 (OU); 10 mi. N Rancho Grande, 6700 ft., 1; Cañitas, 5 (USNM); 1 mi. S Cañitas, 2 (TTU); 3 km. SE Rancho Grande, 2190 m., 1; Ville de Cos, 6700 ft., 3 (KU); 13 mi. NNW Fresnillo, 3 (LACM); 2 km. S Monte Mariana, 2180 m., 2; Bañon, 6400 ft., 22 (LACM); 2 mi. E Bañon, 6400 ft., 1 (RGH); 4 km. ESE Bañon, 6200 ft., 5 (OU); 4.5 mi. E Fresnillo, 1 (MVZ); 10 mi. N Zacatecas, 6200 ft., 1 (KU); 2 mi. SE Calera, 7300 ft., 3 (KU); 2 mi. S, 5 mi. E Zacatecas, 7700 ft., 27; 9 mi. SE Zacatecas, 7900 ft., 1 (KU); 8 mi. SE Zacatecas, 7225 ft., 65 (KU); 3 mi. SE Guadalupe, 7 (UI); 7 mi. SE Trancoso, 1 (KU); 13 km. E Jérez, 2200 m., 1; 8 mi. N Villanueva, 6800 ft., 1 (KU); 5 mi. S Ojo Caliente, 2 (UI); 6 mi. NNW Pinos, 7900 ft., 2; 7 mi. S Pinos, 6800 ft., 12 (LACM); 10 mi. S Pinos, 7100 ft., 1 (RGH); 25 km. ESE Pinos, 2425 m., 1.

Dipodomys phillipsii ornatus Merriam, 1894

Phillips' Kangaroo Rat

Phillips' kangaroo rat seems to prefer open lands with short-grass cover, although in Zacatecas specimens were captured in dense grassy situations at elevations as high as 2400 meters and in open areas surrounded by tropical scrub vegetation in deep canyons at elevations as low as 1100 meters. Three females taken on 19-20 July and on 3 August each contained three fetuses.

All specimens from Zacatecas are assigned to the subspecies *D. p. ornatus* following the review by Genoways and Jones (1971*a*). As did these authors, we noted that specimens from lower elevations are paler in color than are those from higher elevations. In our series the palest individuals are from near San Juan Capistrano at 1100 meters.

Specimens examined (101).—5 km. S Gonzáles Ortega, 2150 m. and 2320 m., 7; 3 km. E El Arenal, 1; 5.5 mi. SW Sombrerete, 6850 ft., 1 (LACM); 5 km. NE Chalchihuites, 2360 m., 2; 2 km. S Monte Mariana, 2180 m., 2; Laguna Valderrama, 7800 ft., 4 (CAS); 40 mi. W Fresnillo, 7700 ft., 2 (CAS); 45 km. SW Fresnillo, 2165 m., 1; 53 km. SW Fresnillo, 2250 m., 2; 11 mi. NE Valparaíso, 7100 ft., 1; Valparaíso, 6200 ft., 11 (USNM); 18 km. N San Juan Capistrano, 1100 m., 7; Zacatecas, 4 (USNM); 5 mi. SW Zacatecas, 4 (MVZ); 2 mi. S, 5 mi. E Zacatecas, 1; 8 mi. SE Zacatecas, 7225 ft., 4 (KU); 5 km. NE San Juan Capistrano, 1330 m., 2; San Juan Capistrano, 3 (USNM); 6 mi. W Jérez, 6700 ft., 1; 13 km. E Jérez, 2200 m., 2; 8 km. SW Jérez, 2030 m., 4; Berriozábal, 2 (USNM); 3 mi. N Cuauhtémoc, 6600 ft., 15 (LACM); 5 mi. S Ojo Caliente, 2 (UI); 2 mi. N Villanueva, 1 (KU); 1 mi. S Momax, 1 (CAS); 6 mi. NNW Pinos, 7900 ft., 1; 7 mi. S Pinos, 6800 ft., 1 (LACM); 25 km. ESE Pinos, 2425 m., 2; 45 km. S Pinos, 2350 m., 1; Plateado, 5 (USNM); 30 km. NE Jalpa, 1740 m., 1; 5.5 mi. SW Jalpa, 4400 ft., 3 (OU). *Additional record*: 12 mi. N, 7 mi. E Fresnillo (Genoways and Jones, 1971*a*).

Dipodomys spectabilis cratodon Merriam, 1907

Banner-tailed Kangaroo Rat

The banner-tailed kangaroo rat and Nelson's kangaroo rat are the two large species of kangaroo rats inhabiting the Mexican Plateau. Both construct burrow systems consisting of conspicuous earthen mounds with side entrances. *D. spectabilis* thrives in grassland habitat characteristic of the western side of the Plateau and well into the eastern foothills of the Sierra Madre Occidental. An unexplained hiatus separates the southernmost subspecies, *D. s. cratodon*, which occurs no farther northward than central Zacatecas, and its next northern relative, *D. s. zygomaticus*, which ranges no farther southward than the Chihuahua-Durango border. Somewhat in between, but avoiding grassy areas in northwestern Zacatecas and western Durango (occupied only by the smaller *D. ordii* and *D. phillipsii*), is the more xeric-adapted *D. nelsoni*. As was an objective in Durango (Baker and Greer, 1962), field work in Zacatecas was designed to attempt to find overlap in these two species, perhaps in the interdigitating desert-grassland ecotone. Mexican highway 54 between Concepción del Oro, in the vicinity of which *D. nelsoni* was numerous, and Ville de Cos, where *D. spectabilis* was a well-established inhabitant, proved to be an excellent transect. However, travelling southwestward on this highway, there were no more mounds of, or opportunities to catch, *D. nelsoni* after some 15 km. SW San Tiburcio, whereas the first evidence of *D. spectabilis* was not found until about 40 km. NW San Andrés, leaving a hiatus of mostly desert environment of perhaps 20 km. Finding these two large kangaroo rats in close association is yet to be accomplished.

Specimens examined (113).—28 mi. NE San Andrés, 6700 ft., 5 (KU); 6.5 km. S La Colorada, 1970 m., 1; 13 km. WNW Capriote, 2100 m., 2; 12 mi. SW San Andrés, 6000 ft., 3 (KU); Cañitas, 3 (USNM); 40 km. NE Ville de Cos, 2000 m., 1; 3 mi. E, 4.6 mi. W Ville de Cos, 38 (OU); Ville de Cos, 6700 ft., 3 (KU); 13 mi. NNW Fresnillo, 1 (LACM); Bañon, 6400 ft., 17 (LACM); 4.5 mi. E Fresnillo, 1 (MVZ); 5 mi. SW Bañon, 3 (KU); 10 mi. N Zacatecas, 6200 ft., 3 (KU); 8 mi. W Zacatecas, 1 (KU); 8 mi. SE Zacatecas, 7225 ft., 3 (KU); 1.5 mi. E Jérez, 7000 ft., 2 (KU); Berriozábal, 4 (USNM); 3 mi. N Cuauhtémoc, 6600 ft., 4 (LACM); 8 mi. N Villanueva, 6800 ft., 2 (KU); 6 mi. N Villanueva, 6500 ft., 3 (KU); 4 mi. N Villanueva, 6400 ft., 4 (KU); 2 mi. N Villanueva, 6500 ft., 4 (KU); 5 mi. S Ojo Caliente, 2 (UI), 2; Pinos, 4 (AMNH).

Liomys irroratus

Mexican Spiny Pocket Mouse

On the Mexican Plateau, the Mexican spiny pocket mouse seems most abundant in brushy areas where nopal cactus (*Opuntia* sp.) is a dominant plant. In lower and more tropical areas, it thrives in grassy and scrub growth, often common in fallow fields and along ungrazed fencerows. In the desert regions of northeastern Zacatecas, this mouse had a spotty distribution, being restricted mostly to often isolated clumps of mesquite and grasses. Five females taken between 27 July and 18 August contained

an average of 4.2 (range three to five) fetuses. A female examined on 5 July contained five fetuses and was lactating.

Two subspecies were recognized in Zacatecas by Genoways (1973). The large-sized *L. i. alleni* occurs on the Plateau and western slopes of the tropical canyons. The smaller *L. i. jaliscensis* lives in the southernmost tropical canyon near Santa Rosa. Genoways (1973) noted that specimens from Zacatecas he assigned to *jaliscensis* showed evidence of intergradation between *jaliscensis* and *alleni*. We have followed Genoways (1973) in the assignment of subspecies; specimens from near Santa Rosa in the valley of the Río Juchipila are difficult to identify to subspecies. Specimens here assigned to *L. i. alleni* from near La Colorada, San Felipe de Nuevo Mercurio, and Apizolaya, all from locally isolated mesquite-grassland habitat, extend the known range of this subspecies some 100 kilometers east of that given by Genoways (1973).

Specimens examined.—***Liomys irroratus alleni*** (Coues, 1881) (249): 3 km. SE Apizolaya, 1920 m., 1; 2 km. W San Felipe de Nuevo Mercurio, 1740 m., 5; 9 mi. NE Nieves, 6050 ft., 1; 23 km. NE Río Grande, 1800 m., 1; 5 km. S Gonzáles Ortega, 2320 m., 2; 13 km. WNW Río Grande, 2050 m., 1; 5 mi. SE Río Grande, 1940 m., 2; 5 km. S La Colorada, 1960 m., 2; 6.5 km. S La Colorada, 1970 m., 1; 6 km. SE Tetillas, 2040 m., 2; 15.8 mi. W Sombrerete, 7050 ft., 2 (OU); 10.4 mi. WSW Sombrerete, 7250 ft., 2 (OU); 14.5 mi. WSW Sombrerete, 7100 ft., 7 (OU); 15.5 mi. WSW Sombrerete, 6400 ft., 1 (OU); 10 mi. N Rancho Grande, 6700 ft., 11; 14.2 mi. N Jiménez del Teul, 7300 ft., 1 (OU); 13 mi. NNW Fresnillo, 1 (LACM); 6 km. N Fresnillo, 2250 m., 5; 2.5 km. WNW Fresnillo, 7400 ft., 1 (OU); Bañon, 6400 ft., 15 (LACM); 2 mi. E Bañon, 6400 ft., 1 (LACM); 4 km. ESE Bañon, 6200 ft., 2 (OU); 11 mi. NE Valparaíso, 7100 ft., 5; San Juan Capistrano, 2 (USNM); 6 mi. W Jérez, 6700 ft., 3; 13 km. E Jérez, 2200 m., 13; 3.5 km. W La Blanca, 6650 ft., 13 (OU); 11.7 mi. NW Cuauhtémoc, 7100 ft., 2 (OU); 9.7 mi. NW Cuauhtémoc, 7100 ft., 5 (OU); 3 mi. N Cuauhtémoc, 6600 ft., 27 (LACM); 3 mi. WNW Saldaña, 6850 ft., 11; 13 km. N Villanueva (Ruinas Chicomoztoc), 1 (LACM); 10 km. ENE Loreto, 7350 ft., 4 (OU); 7 mi. S Pinos, 6800 ft., 2 (LACM); 10 mi. S Pinos, 7100 ft., 4 (LACM), 1 (RGH); 25 km. ESE Pinos, 2425 m., 1; 16 km. SSE Monte Escobedo, 2010 m., 2; 20 km. S Villanueva, 1810 m., 2; 45 km. S Pinos, 2350 m., 1; 2.5 mi. S Momax, 5; 30 km. NE Jalpa, 1740 m., 18; 3 mi. NE Jalpa, 5400 ft., 2; 10 mi. W Jalpa, 6100 ft., 7 (LACM); 5.5 mi. SW Jalpa, 4400 ft., 22 (OU); 25 km. ESE Jalpa, 2590 m., 1; 13 mi. WSW Jalpa, 6000 ft., 3 (OU); 4 mi. S Jalpa, 4300 ft., 6 (LACM); 8 mi. NW Nochistlán, 6600 ft., 15 (LACM); 6 km. S Apozol, 1170 m., 14. *Additional records*: 2 mi. W Sain Alto, 4 mi. NNW Chalchihuites, 1 mi. N Rancho Grande, 5 mi. NW Zacatecas, 9 mi. W Zacatecas, 2 mi. ESE Trancoso, 7 mi. SE Trancoso, 8 mi. SE Zacatecas, Berriozábal, 1 mi. NE Noria de Angeles, 13 mi. N Jalpa, 3 mi. SW Jalpa (Genoways, 1973). ***Liomys irroratus jaliscensis*** (J. A. Allen, 1906) (60): 0.5 mi. ENE Mesquituta, 3450 ft., 11 (OU); 2.5 mi. N Santa Rosa, 3700 ft., 8 (OU); 2 mi. N Santa Rosa, 3850 ft., 11; 1.5 mi. N Santa Rosa, 3900 ft., 3 (OU); 1.1 mi. N Santa Rosa, 3500 ft., 1 (OU); 1 mi. N Santa Rosa, 3600 ft., 11; Santa Rosa, 4000 ft., 14 (LACM); 7 km. SE Santa Rosa, 1500 m., 1.

Liomys pictus hispidus (J. A. Allen, 1897)

Painted Spiny Pocket Mouse

A specimen of *Liomys pictus* from near San Juan Capistrano was reported by Matson *et al.* (1978); *L. irroratus*, incidentally, also has been taken at San Juan Capistrano. Genoways (1973) suggested that in the few areas where the two species, *L. irroratus* and *L. pictus*, have been reported

in sympatry, *L. pictus* seemed to be associated more with mesic lowland situations than did *L. irroratus*. The single *L. pictus*, obtained from a sugar cane field adjacent to the Río Atengo, is assigned to the subspecies *L. p. hispidus* on geographic grounds.

Specimens examined (1).—5 km. NE San Juan Capistrano, 1330 m.

Cricetidae—Cricetids

Reithrodontomys fulvescens

Fulvous Harvest Mouse

In desert areas in northeastern Zacatecas, the fulvous harvest mouse seems most abundant in grassy flats and in sparse grass protected from grazing by clumps of cactus or thorny brush. In western and southern parts of the state, fulvous harvest mice are to be expected wherever grass cover is luxuriant. Six females taken between 15 July and 2 August contained an average of 4.5 fetuses (range four to six). Two females examined on 22 July and 6 August, respectively, were lactating.

Hooper (1952) recorded one subspecies in Zacatecas with the indication that a second might also occur there. Following the characters given by Hooper (1952), which differentiate the two, we recognize *R. f. canus* in northern Zacatecas based upon its pale color, small auditory bullae, and narrow frontal region of the skull. Specimens assigned to *R. f. griseoflavus* are darker (redder), and have a more-or-less distinct dorsal stripe, larger bullae, and broader frontal region.

Specimens examined.—***Reithrodontomys fulvescens canus*** Benson, 1939 (26): 6 km. W Apizolaya, 1800 m., 1; 3 km. SE Apizolaya, 1920 m., 2; 12 km. ENE Concepción del Oro, 1850 m., 8; 6 km. E Mazapil, 2645 m., 1; 18 km. SSW Concepción del Oro, 2130 m., 1; 3 km. SW San Felipe de Nuevo Mercurio, 1770 m., 6; 2 km. W San Felipe de Nuevo Mercurio, 1740 m., 7. ***Reithrodontomys fulvescens griseoflavus*** Merriam, 1901 (120): 5 km. S Gonzáles Ortega, 2150 m., 2; 23 km. NE Río Grande, 1800 m., 1; 15 mi. NE San Andrés, 6200 ft., 1 (LACM); 13 km. WNW Río Grande, 2050 m., 1; 5 mi. SE Río Grande, 1940 m., 1; 3 mi. E El Calabazal, 8000 ft., 3; 15.8 mi. W Sombrerete, 7050 ft., 1 (OU); 9 mi. W Sombrerete, 7900 ft., 1 (OU); 3 km. E El Arenal, 2460 m., 2; 13 km. WNW Capriote, 2100 m., 1; 15.5 mi. WSW Sombrerete, 6400 ft., 1 (OU); 1 mi. W Sierra Vieja, 6100 ft., 1 (OU); 2 km. S Monte Mariana, 2180 m., 1; 6 km. N Fresnillo, 2250 m., 5; 3 mi. NW Fresnillo, 7760 ft., 1; 4 km. ESE Bañon, 6200 ft., 2 (OU); 10 km. SE Fresnillo, 2250 m., 2; 53 km. SW Fresnillo, 2250 m., 1; 9 mi. W Zacatecas, 1 (CAS); Valparaíso, 6200 ft., 6 (USNM); 3.5 km. W La Blanca, 6650 ft., 3 (OU); 6 mi. W Jérez, 6700 ft., 1; 13 km. E Jérez, 2200 m., 4; 8 km. SW Jérez, 2030 m., 7; 32 km. SE Valparaíso, 2040 m., 6; 36 km. SSE Valparaíso, 2330 m., 3; Berriozábal, 1 (USNM); 5 mi. S Ojo Caliente, 5 (UI); 3 mi. WNW Saldaña, 6850 ft., 1; 10 km. S Tepetongo, 1950 m., 1; 10 km. ENE Loreto, 7350 ft., 2 (OU); 16 km. SSE Monte Escobedo, 2010 m., 4; 20 km. S Villanueva, 1810 m., 4; 25 km. ESE Pinos, 2425 m., 10; 45 km. S Pinos, 2350 m., 8; 30 km. NE Jalpa, 1740 m., 5; 10 mi. W Jalpa, 6100 ft., 5 (LACM); 4 mi. S Jalpa, 4300 ft., 3 (LACM); 8 mi. NW Nochistlán, 6600 ft., 3 (LACM); 8 mi. S Moyahua, 3 (CAS); 0.5 mi. ENE Mesquituta, 3450 ft., 1 (OU); Santa Rosa, 4000 ft., 2 (LACM); 7 km. SE Santa Rosa, 1500 m., 3.

Reithrodontomys megalotis

Western Harvest Mouse

The western harvest mouse was taken regularly at collecting localities in grasslands and in the desert-grassland ecotone. Not only was it found in association with *R. fulvescens*, but *R. megalotis* also seemed to occur in more open and less grassy areas than did the fulvous harvest mouse, and it appeared to be more tolerant of sparsely vegetated situations. In the western highlands, *R. megalotis* was widely distributed in woodland habitats. Five females taken from 16 to 24 July contained an average of 3.8 embryos (range two to five). A female examined on 18 July was lactating.

Hooper (1952) recorded two subspecies in Zacatecas—*R. m. megalotis*, a pale-colored subspecies of the Mexican Plateau, and *R. m. zacatecae*, a dark-colored race in the Sierra Madre Occidental. We agree with Hood *et al.* (1984) that *R. m. zacatecae* is a distinctive montane taxon and may well deserve specific status.

Specimens examined.—***Reithrodontomys megalotis megalotis*** (Baird, 1858) (89): 7 km. SE Caopas, 1940 m., 4; 6 km. E Mazapil, 2645 m., 3; 2 km. SE Sabana Grande, 1945 m., 2; 3 mi. N Lulú, 1 (MVZ); 5.5 mi. NW Juan Aldama, 1890 m., 1 (OU); 5 km. NW Juan Aldama, 1980 m., 1; 3 km. NW San Felipe de Nuevo Mercurio, 1770 m., 3; 2 km. W San Felipe de Nuevo Mercurio, 1740 m., 13; 5 km. S Gonzáles Ortega, 2150 m., 1; 23 km. NE Río Grande, 1800 m., 1; 13 km. WNW Río Grande, 2050 m., 1; 5 km. S La Colorada, 1960 m., 1; 2 mi. S Santa Efigenia, 7400 ft., 2 (KU); 13 km. WNW Capriote, 2100 m., 3; 8 mi. W, 1 mi. N Sombrerete, 7800 ft., 1; 9 mi. W Sombrerete, 7900 ft., 7 (OU); 3 km. E El Arenal, 2460 m., 1; 5 km. NE Chalchihuites, 2360 m., 2; 1 mi. N Rancho Grande, 4 (KU); 3 km. SE Rancho Grande, 2190 m., 1; 5 mi. WSW Sierra Vieja, 6200 ft., 1 (OU); 2 km. S Monte Mariana, 2180 m., 4; 6 km. N Fresnillo, 2250 m., 3; 3 mi. NW Fresnillo, 7760 ft., 2; 2.5 km. WNW Fresnillo, 7400 ft., 1 (OU); Bañon, 6400 ft., 2 (LACM); 4 km. ESE Bañon, 6200 ft., 1 (OU); 10 km. SE Fresnillo, 2250 m., 2; Zacatecas, 2 (USNM); 2 mi. S, 5 mi. E Zacatecas, 7700 ft., 1; 9 mi. SE Zacatecas, 7900 ft., 3 (KU); 13 km. E Jérez, 2200 m., 3; 5 mi. S Ojo Caliente, 1 (UI); 2 km. N Noria de Angeles, 2200 m., 1; 6 mi. NNW Pinos, 7900 ft., 1; 25 km. ESE Pinos, 2425 m., 5; 45 km. S Pinos, 2350 m., 3. *Additional records*: 22 mi. SW Concepción del Oro, 40 mi. W Fresnillo (Jones and Webster, 1976). ***Reithrodontomys megalotis zacatecae*** Merriam, 1901 (24): 25 km. WSW Milpillas de la Sierra, 2580 m., 2; 9 mi. NW Valparaíso, 8350 ft., 1; Valparaíso Mountains, 8700 ft., 14 (USNM); 36 km. SSE Valparaíso, 2330 m., 1; 25 km. SSE Jalpa, 2590 m., 6. *Additional record*: 8 mi. S Chalchihuites (Jones and Webster, 1976).

Peromyscus boylii rowleyi (J. A. Allen, 1893)

Brush Mouse

The brush mouse seems most common in the pine-oak forests of the Sierra Madre Occidental; however, it also occurs in rocky and brushy places in the foothills. Nine females obtained between 23 July and 7 August contained an average of 2.7 fetuses (range one to four). Six females examined between 23 July and 7 August were lactating.

The status of brush mice in western México has been under study, with populations on the Pacific side of the western mountains formerly considered as *P. b. specilegus* and *P. b. simulus* by Osgood (1909) now regarded as full species (Carleton, 1977; Carleton *et al.*, 1982). However,

brush mice from the highlands and the eastern slopes of the Sierra Madre Occidental are still arranged as *P. b. rowleyi*, even though the assemblage of animals assigned to this subspecies (Hall, 1981), the type locality of which is in Utah, show considerable variation. In fact, our Zacatecan specimens from localities in the extreme west and south appear larger than those from localities farther east and north.

Specimens examined (305).—2 mi. E Villa Insurgentes, 8050 ft., 4; 3 mi. E El Calabazal, 8000 ft., 1; 14.8 mi. W Sombrerete, 7250 ft., 3 (OU); 13.6 mi. W Sombrerete, 7450 ft., 1 (OU); 9.5 mi. W Sombrerete, 7900 ft., 11 (OU); 9 mi. W Sombrerete, 7900 ft., 5 (OU); 3 mi. SW Sombrerete, 1 (CAS); 10.4 mi. WSW Sombrerete, 7250 ft., 12 (OU); 10.7 mi. WSW Sombrerete, 7250 ft., 2 (OU); 15.5 mi. WSW Sombrerete, 6400 ft., 1 (OU); 3 km. E El Arenal, 2460 m., 2; 21 mi. SW Sombrerete, 7800 ft., 2 (LACM), 2 (RGH); 10 mi. SW Chalchihuites, 7200 ft., 12 (LACM); 14.2 mi. N Jiménez del Téul, 7300 ft., 18 (OU); 4 km. E Jiménez del Téul, 2375 m., 1; 64 mi. W Fresnillo, 2 (CAS); 40 mi. W Fresnillo, 1 (CAS); Laguna Valderrama, 2 (CAS); 16 mi. W Fresnillo, 1 (CAS); 25 km. WSW Milpillas de la Sierra, 2580 m., 7; 9 mi. NW Valparaíso, 8350 ft., 11; Valparaíso Mountains, 8700 ft., 1 (USNM); 8.2 mi. W Valparaíso, 7900 ft., 14 (OU); 6.2 mi. W Valparaíso, 7500 ft., 4 (OU); 6 mi. W Valparaíso, 7400 ft., 1 (OU); Valparaíso, 13 (USNM); 15 km. SW Valparaíso, 2250 m., 18; Sierra Madre, 10 (USNM); 10 km. W San Juan Capistrano, 2900 m., 7; 8 km. W San Juan Capistrano, 2110 m., 6; 32 km. SE Valparaíso, 2040 m., 13; 36 km. SSE Valparaíso, 2330 m., 4; 11.7 mi. NW Cuauhtémoc, 7100 ft., 7 (OU); 20 mi. S Villanueva, 2 (CAS); Monte Escobedo, 1 (USNM); 7300 ft., 13 (LACM); 16 km. SSE Monte Escobedo, 2010 m., 1; 20 km. S Monte Escobedo, 1920 m., 6; Plateado, 4 (USNM); 3.5 mi. W Tlatenango, 6500 ft., 3; 11 mi. NW Jalpa, 8000 ft., 7 (KU); 9 mi. WNW Jalpa, 8250 ft., 13; 25 km. ESE Jalpa, 2590 m., 2; 8 mi. NW Nochistlán, 6600 ft., 16 (LACM); 3 mi. NW Téul de Gonzáles Ortega, 4 (CAS); 6 km. SW Téul de Gonzáles Ortega, 1; 6 km. S Téul de Gonzáles Ortega, 2010 m., 30; 10 mi. NW Yahualica, 7100 ft., 1 (LACM). *Additional records*: 4 mi. NW Chalchihuites, 8 mi. S Chalchichuites (Jones and Webster, 1976).

Peromyscus difficilis

Rock Mouse

The rock mouse is characteristic of the montane forests of Zacatecas but has a definite affinity for rock outcrops and other protective ground cover. Five females taken between 29 and 31 July 1970 from northwest of Valparaíso contained an average of three fetuses (range two to four); two others were lactating. Six females examined on 27 and 28 July 1977 from southeast of Jalpa had an average of 3.2 fetuses (range two to four). Of 31 females taken in June from the Sierra Madre Occidental, none showed signs of reproductive activity. Four females trapped on 30 June and 1 July 1978 in the Sierra Astillero contained three embryos each.

Of the two subspecies known from Zacatecas, *P. d. difficilis* is widespread in the western and southern highlands, whereas *P. d. petricola* occurs only in the mountainous terrain near Concepción del Oro in the extreme northeastern part of the state (Hoffmeister and de la Torre, 1961; Diersing, 1976).

Specimens examined.—***Peromyscus difficilis difficilis*** (J. A. Allen, 1891) (212): 2 mi. E Villa Insurgentes, 8050 ft., 2; 3 mi. E El Calabazal, 8000 ft., 1; 9.5 mi. W Sombrerete, 6 (OU); 10 mi. SW Chalchihuites, 7200 ft., 16 (LACM); 8 mi. S Chalchihuites, 8600 ft., 4 (CAS); 4 km. E Jiménez del Téul, 2375 m., 2; 25 km. WSW Milpillas de la Sierra, 2580 m., 4; 45 km. SW

Fresnillo, 2165 m., 2; 9 mi. NW Valparaíso, 8350 ft., 28; Valparaíso Mountains, 8700 ft., 24 (USNM); Zacatecas, 14 (USNM); Sierra Madre, 1 (USNM); 10 km. W San Juan Capistrano, 2900 m., 2; 36 km. SSE Valparaíso, 2330 m., 1; 11.7 mi. NW Cuauhtémoc, 7100 ft., 4 (OU); Monte Escobedo, 7300 ft., 5 (LACM); 1 mi. NE Noria de Angeles, 1 (CAS); 10 km. ENE Loreto, 7350 ft., 12 (OU); 25 km. ESE Pinos, 2425 m., 6; Plateado, 19 (USNM); 11 mi. NW Jalpa, 8000 ft., 8 (KU); 9 mi. WNW Jalpa, 8250 ft., 12; 25 km. ESE Jalpa, 2590 m., 37; 8 mi. NW Nochistlán, 6600 ft., 1 (LACM). ***Peromyscus difficilis petricola*** Hoffmeister and de la Torre, 1959 (76): 5 km. E Mazapil, 2770 m., 2; 6 km. E Mazapil, 2645 m., 8; 7 mi. E Mazapil, 1 (UI), 1 (TTU); 4 mi. SE Mazapil, 8425 ft., 21 (OU); 6 mi. W Concepción del Oro, 8 (UI); 4 mi. W Concepción del Oro, 10 (UI); 3 mi. W Concepción del Oro, 1 (UI); 10 mi. SW Concepción del Oro, 7600 ft., 5 (LACM); 40 km. ESE Concepción del Oro, 2320 m., 19.

Peromyscus eremicus phaeurus Osgood, 1904

Cactus Mouse

Arid open country supporting scattered shrubs and little grass seems preferred by the cactus mouse. Its western limits of distribution in Zacatecas coincide with the eastern edge of the desert-grassland ecotone. Ten females obtained between 9 July and 17 August contained an average of 3.1 fetuses (range two to four). Six females examined between 4 July and 17 August were lactating. The subspecies *P. e. phaeurus* abounds in most parts of northeastern and east-central Zacatecas as well as throughout the so-called Mesa Central sector of the Mexican Plateau.

Specimens examined (248).—5 mi. NE Cinco de Mayo, 1550 m., 1; 10 km. ESE San Juan de los Charcos, 1500 m., 1; 6 km. W Apizolaya, 1800 m., 2; 3 km. SE Apizolaya, 1920 m., 13; 8 mi. W Cedros, 5650 ft., 1 (LACM); 20 km. NE Concepción del Oro, 1910 m., 1; 15 mi. NE Concepción del Oro, 1 (OU); 18.6 mi. ENE Concepción del Oro, 2 (OU); 12 km. ENE Concepción del Oro, 1850 m., 11; 13 km. NE Concepción del Oro, 1700 m., 1; Concepción del Oro, 7600 ft., 1 (KU); 10 mi. E Concepción del Oro, 5300 ft., 1 (LACM); 11 mi. E Concepción del Oro, 5300 ft., 8 (LACM), 2 (RGH); 1 mi. W Tecolotes, 6150 ft., 1; 5 km. SE Concepción del Oro, 1935 m., 1; 12 mi. SE Concepción del Oro, 7450 ft., 1; 22 mi. SW Concepción del Oro, 11 (CAS); 20 mi. S Concepción del Oro, 4 (CAS); 25 km. NE Camacho, 1975 m., 3; 2 km. SE Sabana Grande, 1945 m., 6; 3 mi. N Lulú, 2 (MVZ); 1 mi. N Lulú, 1; 5 km. NW Juan Aldama, 1980 m., 1; 13 mi. SW Camacho, 5900 ft., 1 (LACM); 3 km. NW San Felipe de Nuevo Mercurio, 1770 m., 3; 2 km. W San Felipe de Nuevo Mercurio, 1740 m., 6; 10 mi. SE Juan Aldama, 2210 m., 2; 3 km. E San Tiburcio, 1880 m., 2; 1 mi. SW San Tiburcio, 7000 ft., 13 (KU); 15 km. WSW San Tiburcio, 1980 m., 2; 15 km. NNW Nieves, 1910 m., 3; 23 km. NE Río Grande, 1800 m., 6; 15 mi. NE San Andrés, 6200 ft., 1 (LACM); 25 km. SW San Tiburcio, 2030 m., 16; 13 km. WNW Río Grande, 2050 m., 2; 5 mi. SE Río Grande, 1940 m., 2; 50 km. SW San Tiburcio, 2125 m., 1; 8 mi. S Majoma, 7700 ft., 10 (KU); 6 km. SE Tetillas, 2040 m., 2; 2 mi. S Santa Efigenia, 7400 ft., 1 (KU); 13 km. WNW Capriote, 2100 m., 7; 9 km. NW Sarteneja, 2200 m., 3; Cañitas, 7 (USNM); 1 mi. S Cañitas, 2 (TTU); 1 mi. W Sierra Vieja, 6100 ft., 1 (OU); 3 km. SE Rancho Grande, 2190 m., 2; 18 km. NE Ville de Cos, 2040 m., 4; Ville de Cos, 6700 ft., 18 (KU); 13 mi. NNW Fresnillo, 1 (LACM); 8 mi. W Fresnillo, 3 (CAS); 2 km. S Monte Mariana, 2180 m., 14; 6 km. N Fresnillo, 2250 m., 2; 3 mi. NW Fresnillo, 7760 ft., 1; Bañon, 6400 ft., 11 (LACM); 2 mi. E Bañon, 6400 ft., 1 (LACM), 1 (RGH); 4 km. ESE Bañon, 6200 ft., 20 (OU).

Peromyscus hooperi Lee and Schmidly, 1977

Hooper's Mouse

Hooper's mouse is included as a member of the Zacatecan mammalian fauna on the basis of collections deposited at Texas A&M University. Although our field parties visited the area in extreme northeastern Zacatecas from where the above specimens were taken, we failed to augment this representation. The mouse, according to Lee and Schmidly (1977), appears restricted to tree yucca and sotol habitats, which are conspicuous parts of the environment at the Zacatecan-Coahuilan border (see also Schmidly *et al.*, 1985).

Specimens examined (7).—0.5 mi. S Coahuila-Zacatecas border (Mexican Highway 54) (TCWC).

Peromyscus maniculatus

Deer Mouse

Deer mice occur throughout Zacatecas, seemingly equally at home in desert scrub, on luxuriant grassland plains, and in pine-oak woodlands in mountainous areas. However, in most instances they are trapped in fewer numbers at any given locality than are other species of *Peromyscus*. Eight females taken between 3 and 30 July contained an average of three fetuses (range two to four). Three females examined on 18 July and 3 and 5 August, respectively, were lactating.

The two Zacatecan subspecies *P. m. blandus* and *P. m. labecula* are most easily distinguished by coat color, the former being paler brown than the latter. Specimens intermediate in color but otherwise assignable to *P. m. blandus* according to Osgood (1909) were obtained from near Chalchihuites and east of Jalpa, whereas those referred to *P. m. labecula* were taken on the mesa country above the Río Bolaños and south of Monte Escobedo.

Specimens examined.—***Peromyscus maniculatus blandus*** Osgood, 1904 (404): 2.5 mi. N La Pendencia, 5400 ft., 1 (OU); 3 km. SE Apizolaya, 1920 m., 2; 7 km. SE Caopas, 1940 m., 9; 12 km. ENE Concepción del Oro, 1850 m., 8; 4 mi. SE Mazapil, 8425 ft., 5; Concepción del Oro, 7600 ft., 1 (KU); 11 mi. E Concepción del Oro, 5300 ft., 5 (LACM); 2 km. SE Sabana Grande, 1945 m., 2; 3 mi. N Lulú, 2 (MVZ); 1 mi. N Lulú, 1830 m., 1; 35 km. SSE Concepción del Oro, 1980 m., 2; 5.5 mi. NW Juan Aldama, 6200 ft., 4 (OU); 3 km. NW San Felipe de Nuevo Mercurio, 1770 m., 7; 2 km. W San Felipe de Nuevo Mercurio, 1740 m., 4; 3 km. E San Tiburcio, 1880 m., 1; 1 mi. SW San Tiburcio, 7000 ft., 18; 15 km. WSW San Tiburcio, 1980 m., 4; 15 km. NNW Nieves, 3; 5 km. S Gonzáles Ortega, 2150 m., 1; 23 km. NE Río Grande, 1800 m., 3; 15 mi. NE San Andrés, 6200 ft., 1 (LACM); 13 km. WNW Río Grande, 2050 m., 1; 45 km. SW San Tiburcio, 1940 m., 1; 5 mi. SE Río Grande, 1940 m., 4; 5 km. S La Colorada, 1960 m., 3; 6.5 km. S La Colorada, 1970 m., 2; 8 mi. S Majoma, 7700 ft., 38; 2 mi. E Villa Insurgentes, 8050 ft., 1; 6 km. SE Tetillas, 2040 m., 2; 2 mi. S Santa Efigenia, 7400 ft., 9 (KU); 13 km. WNW Capriote, 2100 m., 15; 13.6 mi. W Sombrerete, 7450 ft., 2 (OU); 5 mi. SW Sombrerete, 6900 ft., 3 (LACM), 2 (RGH); 7 mi. SW Sombrerete, 6800 ft., 4 (LACM), 1 (RGH); Cañitas, 3 (US); 5 km. NE Chalchihuites, 2360 m., 2; 6 mi. WSW Sierra Vieja, 6200 ft., 1 (OU); 23 km. N Fresnillo, 2140 m., 2; Ville de Cos, 6700 ft., 6 (KU); 4 km. E Jiménez del Téul, 2375 m., 1; 2 km. S Monte Mariana, 2180 m., 14; Bañon, 6400 ft., 21 (LACM); 2 mi. E Bañon, 6400 ft., 1 (RGH); 4 km. ESE Bañon, 6200 ft., 10 (OU); 4.5 mi. E Fresnillo,

3 (MVZ); 24 mi. NE Zacatecas, 6700 ft., 1 (LACM), 1 (RGH); Zacatecas, 4 (USNM); 2 mi. S, 5 mi. E Zacatecas, 7700 ft., 9; 8 mi. SE Zacatecas, 7225 ft., 45 (KU); 9 mi. SE Zacatecas, 7900 ft., 1 (KU); 3 mi. SE Guadalupe, 10 (UI); 7 mi. SE Trancoso, 2 (KU); 13 km. E Jérez, 2200 m., 8; Berriozábal, 6 (USNM); 6 mi. NNW Pinos, 7900 ft., 2; 24 km. ESE Pinos, 2425 m., 11; 10 mi. S Pinos, 7100 ft., 2 (RGH); 45 km. S Pinos, 2350 m., 3; 30 km. NE Jalpa, 1740 m., 21; 25 km. ESE Jalpa, 2590 m., 20; 4 mi. S Jalpa, 4300 ft., 2 (LACM); 6 km. S Apizolaya, 1170 m., 19. ***Peromyscus maniculatus labecula*** Elliot, 1903 (63): 11 mi. NE Valparaíso, 7100 ft., 1; Valparaíso Mountains, 8700 ft., 1 (USNM); Valparaíso, 17 (USNM); 32 km. SE Valparaíso, 2040 m., 9; 8 km. SE Jérez, 2030 m., 19; 16 km. SSE Monte Escobedo, 2010 m., 6; 20 km. S Monte Escobedo, 1920 m., 8; Plateado, 1 (USNM); 1 mi. S Atolinga, 7300 ft., 1.

Peromyscus melanophrys

Plateau Mouse

Plateau mice are widely distributed in central and eastern Zacatecas. This species avoids forested highlands but ranges into the subtropical valleys of the southwestern part of the state. In open lands, this mouse is chiefly associated with tree yuccas and prickly pear cactus. It is more apt to be captured in a trap placed on a branch of a tree yucca than on the desert floor at its base. In subtropical canyons, it prefers rock ledges to open scrub situations. Fourteen females taken between 10 July and 8 August contained an average of 3.1 fetuses (range two to five). Four females examined in October (6-19) carried an average of 3.75 fetuses (range three to four). Lactating individuals were noted from 10 July to 10 October. A number of plateau mice were captured in Sherman live traps and transported alive back to the MSU Museum Live Animal Colony where they thrived, reproduced, and were easily handled.

Four subspecies of *P. melanophrys* are recognized in Zacatecas following the descriptions given by Baker (1952). In the northern desert areas near the border with Durango and Coahuila, the pale-colored *P. m. xenurus* is distinctive and differs chiefly from the equally pale *P. m. coahuilensis* (found near the Zacatecan border with Coahuila and San Luis Potosí) by having smaller auditory bullae. The darker and larger *P. m. consobrinus* resides in central and southeastern Zacatecas. The smaller *P. m. micropus* apparently occurs in Zacatecas only in the vicinity of San Juan Capistrano, along the Río Atengo. Specimens from the drainage of the Río Juchipila in the vicinity of Santa Rosa are assigned to *P. m. consorbrinus* but in size and dark reddish dorsum they approach *P. m. micropus*.

Specimens examined.—***Peromyscus melanophrys coahuilensis*** Baker, 1952 (42): 18.6 mi. ENE Concepción del Oro, 1 (OU); 16.4 mi. ENE Concepción del Oro, 1 (OU); 12 km. ENE Concepción del Oro, 1850 m., 7; 7 mi. E Mazapil, 1 (UI); 6 km. E Mazapil, 2645 m., 6; Concepción del Oro, 7 (KU); 2 mi. SE Concepción del Oro, 1860 m., 1; 5 km. SW Concepción del Oro, 2400 m., 1; 10 mi. SW Concepción del Oro, 7600 ft., 3 (LACM); 18 km. SSW Concepción del Oro, 2130 m., 4; 40 km. ESE Concepción del Oro, 2320 m., 3; 12 mi. SE Concepción del Oro, 2270 m., 1; 2 km. SE Sabana Grande, 1945 m., 3; 7 km. SE El Rosario, 2100 m., 4; 35 km. SSE Concepción del Oro, 1980 m., 1; 3 mi. N Lulú, 5 (MVZ). *Additional record*: 22 mi. SW Concepción del Oro (Jones and Webster, 1976). ***Peromyscus melanophrys consobrinus*** Osgood, 1904 (290): 15 km. SW San Tiburcio, 1980 m., 2; 15 mi. NE San Andrés, 6200 ft., 3 (LACM); 25 km. SW San Tiburcio, 2030 m., 3; 45 km. SW San Tiburcio, 1940 m.,

1; 8 mi. S Majoma, 7700 ft., 19 (KU); 5 mi. SE Río Grande, 1940 m., 8; 5 mi. S La Colorada, 1970 m., 1; 6 km. SE Tetillas, 2040 m., 2; 2 mi. S Santa Efigenia, 7400 ft., 3 (KU); 13 km. WNW Capriote, 2100 m., 7; 12 mi. W Sombrerete, 2 (KU); 4 mi. SW Sombrerete, 7000 ft., 1 (RGH); 10 mi. N Rancho Grande, 6700 ft., 4; 15.5 mi. WSW Sombrerete, 6400 ft., 2 (OU); 14.2 mi. N Jiménez del Téul, 7300 ft., 6 (OU); 1 mi. N Rancho Grande, 8 (KU); 6 mi. WSW Sierra Vieja, 4 (OU); 23 km. N Fresnillo, 2140 m., 2; 13 mi. NNW Fresnillo, 3 (LACM); Ville de Cos, 6700 ft., 1 (KU); 2 km. S Monte Mariana, 2180 m., 1; 3 mi. NW Fresnillo, 7760 ft., 1; 6 km. N Fresnillo, 2250 m., 28; 5 km. N Fresnillo, 2250 m., 16; Bañon, 6400 ft., 1 (LACM); 2 mi. E Bañon, 6400 ft., 19 (LACM), 2 (RGH); 4 km. ESE Bañon, 6200 ft., 12 (OU); 2.5 km. WNW Fresnillo, 7400 ft., 9 (OU); 10 km. SE Fresnillo, 2250 m., 1; 24 mi. NE Zacatecas, 6700 ft., 1 (LACM); 45 km. SW Fresnillo, 2200 m., 1; 46 km. SW Fresnillo, 2150 m., 1; 2 mi. SE Calera, 7300 ft., 1 (KU); 2 mi. S, 5 mi. E Zacatecas, 7700 ft., 2; 8 mi. SE Zacatecas, 7225 ft., 8 (KU); 9 mi. SE Zacatecas, 7900 ft., 1 (KU); 2 mi. ESE Trancoso, 7000 ft., 1 (KU); 3.5 km. W La Blanca, 6650 ft., 4 (OU); 13 km. E Jérez, 2200 m., 2; 8 km. SW Jérez, 2030 m., 1; 11.7 mi. NW Cuauhtémoc, 7100 ft., 2 (OU); Berriozábal, 12 (USNM); 3 mi. N Cuauhtémoc, 6600 ft., 7 (LACM); 5 mi. S Ojo Caliente, 4 (UI); 3 mi. WNW Saldaña, 6850 ft., 2; 13 mi. NE Villanueva (Ruinas Chicomoztoc), 2040 m., 2 (LACM), 1 (RGH); 10 km. S Tepetongo, 1950 m., 1; 6 mi. NNW Pinos, 7900 ft., 5; 10 km. ENE Loreto, 7350 ft., 14 (OU); 6 km. ENE Loreto, 6850 ft., 2 (OU); Monte Escobedo, 1 (USNM); 10 mi. S Pinos, 7100 ft., 2 (LACM); 25 km. ESE Pinos, 2425 m., 9; 20 km. S Villanueva, 1810 m., 1; 3.5 mi. W Tlatenango, 6500 ft., 2; 13 mi. N Jalpa, 5000 ft., 1 (KU); 10 mi. W Jalpa, 6100 ft., 5 (LACM); 3 mi. SW Jalpa, 4600 ft., 1 (KU); 6 mi. SW Jalpa, 4900 ft., 4 (LACM); 4 mi. S Jalpa, 4300 ft., 5 (LACM); 13 mi. WSW Jalpa, 6000 ft., 4 (OU); 0.5 mi. ENE Mesquituta, 3450 ft., 1 (OU); 1 mi. N Santa Rosa, 3600 ft., 4; Santa Rosa, 4000 ft., 3 (LACM). *Additional records*: 8 mi. W Fresnillo, 8 mi. S Moyahua (Jones and Webster, 1976). ***Peromyscus melanophrys micropus*** Baker, 1952 (16): 18 km. N San Juan Capistrano, 1100 m., 6; 3 km. N San Juan Capistrano, 1500 m., 1; 5 km. NE San Juan Capistrano, 1330 m., 4; 5 km. E San Juan Capistrano, 3350 ft., 3; 6 km. E San Juan Capistrano, 3300 ft., 1 (OU); San Juan Capistrano, 1 (USNM). ***Peromyscus melanophrys xenerus*** Osgood, 1904 (29): 10 km. ESE San Juan de los Charcos, 1500 m., 5; 3 km. SE Apizolaya, 1920 m., 1; 6 km. W Apizolaya, 1800 m., 5; 7 km. SE Caopas, 1940 m., 1; 8 mi. W Cedros, 5650 ft., 1 (LACM); 4 km. W San Rafael, 2140 m., 3; 25 km. NE Camacho, 1975 m., 9; 10 km. NW Juan Aldama, 1860 m., 1; 3 km. NW San Felipe de Nuevo Mercurio, 1770 m., 1; 10 mi. SE Juan Aldama, 7250 ft., 1; 9 mi. NE Nieves, 6600 ft., 1.

Peromyscus melanotis J. A. Allen and Chapman, 1897

Black-eared Mouse

The black-eared mouse is the common small mammal of the moist pine-oak woodlands of the mountains of western Chihuahua and Durango (Baker and Greer, 1962; Anderson, 1972) and southward in Jalisco and Michoacán (Hall, 1981). In Zacatecas, however, we found *P. melanotis* in highland environments only in west-central areas, near Milpillas de la Sierra and in the Valparaíso Mountains. In similar areas to the southward (for example, mountains northwest of Jalpa), collections included only *Peromyscus boylii rowleyi* and *P. maniculatus labecula.*

Specimens examined (7).—25 km. WSW Milpillas de la Sierra, 2580 m., 1; Valparaíso Mountains, 8700 ft., 6 (USNM).

Peromyscus pectoralis

White-ankled Mouse

The white-ankled mouse is characteristic of the desert mountains of the Mexican Plateau, as may be expected, and usually the most common small mammal in situations where rimrock and other eroded arroyo walls have extensive rocky exposures. Populations of this rodent often are separated widely by open desert scrub, as, for example, around the scrub-covered base of an igneous intrusive that rises perhaps 100 meters above the desert floor near Tetillas. Twelve females obtained from 1 July to 7 August contained an average of 3.5 fetuses (range two to four). Three females taken on 29 and 30 July were lactating.

Two subspecies occur in Zacatecas (Schmidly, 1972). Specimens with longer tails, shorter skulls, and smaller auditory bullae from western and southern Zacatecas belong to *P. p. pectoralis*, whereas those with comparatively shorter tails, longer skulls, and larger auditory bullae from northeastern Zacatecas are assigned to *P. p. laceianus*.

Specimens examined.—***Peromyscus pectoralis laceianus*** V. Bailey, 1906 (14): 4 mi. W Concepción del Oro, 14 (UI); 3 mi. W Concepción del Oro, 2 (UI); 1 mi. W Concepción del Oro, 1 (UI); Concepción del Oro, 14 (KU); 5 km. W Concepción del Oro, 2400 m., 5; 10 mi. SW Concepción del Oro, 7600 ft., 21 (LACM); 4 km. W San Rafael, 2140 m., 2; 1 mi. W Tecolotes, 6150 ft., 1; 40 km. ESE Concepción del Oro, 2320 m., 5; 18 km. SW Concepción del Oro, 2130 m., 1. ***Peromyscus pectoralis pectoralis*** Osgood, 1904 (137): 5.5 mi. NW Juan Aldama, 1890 m., 4 (OU); 5 km. NW Juan Aldana, 1890 m., 1; 10 mi. SE Juan Aldama, 7250 ft., 7; 9 mi. NE Nieves, 6600 ft., 1; 13 km. WNW Río Grande, 2050 m., 1; 6 km. SE Tetillas, 2040 m., 3; 12 mi. W Sombrerete, 4 (KU); 10 mi. N Rancho Grande, 6700 ft., 1; 2.5 mi. WNW Fresnillo, 7400 ft., 1 (OU); 18 km. N San Juan Capistrano, 1100 m., 26; 3 km. N San Juan Capistrano, 1500 m., 2; 5 km. NE San Juan Capistrano, 1330 m., 2; San Juan Capistrano, 2 (USNM); 5 km. E San Juan Capistrano, 3350 ft., 4 (OU); 36 km. SSE Valparaíso, 2330 m., 2; 13 km. NE Villanueva, 2040 m., 5; 2 km. N Noria de Angeles, 2200 m., 1; 3 mi. WNW Saldaña, 6850 ft., 1; Monte Escobedo, 7300 ft., 2 (LACM), 1 (USNM); 20 km. S Monte Escobedo, 1920 m., 22; 10 mi. W Jalpa, 6100 ft., 17 (LACM); 6 mi. SW Jalpa, 4900 ft., 2 (LACM); 4 mi. S Jalpa, 4300 ft., 7 (LACM); 13 mi. WSW Jalpa, 6000 ft., 10 (OU); 6 km. S Téul de Gonzáles Ortega, 2010 m., 5; 0.5 km. ENE Mesquituta, 3450 ft., 1 (OU); 1 mi. N Santa Rosa, 3600 ft., 3. *Additional record*: 3 mi. SW Sombrerete (Jones and Webster, 1976).

Peromyscus spicilegus J. A. Allen, 1897

Gleaning Mouse

The gleaning mouse is known only from extreme southwestern and southern Zacatecas, being taken in subtropical river valleys and at the lower edge of the montane pine-oak forests along the watersheds of the Río Bolaños and the Río Juchipila near Monte Escobedo and Moyahua, respectively. At both localities *P. spicilegus* was taken in company with *Peromyscus boylii rowleyi*, although it was not determined if they were taken in the same microhabitats. In Nayarit and Durango, *P. spicilegus* also occurs in the upper reaches of the subtropical vegetation where it interdigitates with pine-oak habitats (Baker and Greer, 1962; Carleton, 1977; Carleton *et al.*, 1982).

Specimens examined (5).—Monte Escobedo, 1 (USNM); 10 mi. NW Yahualica, 7100 ft., 2 (LACM); 8 mi. S Moyahua, 5600 ft., 2 (CAS).

Peromyscus truei gentilis Osgood, 1904

Piñon Mouse

In Zacatecas, the piñon mouse occurs in grassland and brush habitats generally on slopes and rocky foothills supporting oaks, piñon, and junipers, and rarely at higher elevations where mesic pine-oak forests predominate. Seven females examined between 9 July and 5 August contained an average of three fetuses (range two to four). A female taken on -5 August was lactating and carried four embryos. All Zacatecan specimens are referable to *P. t. gentilis,* although some from extreme southern Zacatecas show a tendency toward intergradation with the more southern *P. t. gratus,* according to diagnoses of these two taxa by Hoffmeister (1951).

Specimens examined (177).—40 km. ESE Concepción del Oro, 2320 m., 18; 5 km. S Gonzáles Ortega, 2150 m., 1; 2 mi. E Villa Insurgentes, 8050 ft., 3; 3 mi. E El Calabazal, 8000 ft., 1; 4 mi. E El Calabazal, 1 (MVZ); 8 mi. W, 1 mi. N Sombrerete, 7800 ft., 8 (KU); 12 mi. W Sombrerete, 5 (KU); 10.7 mi. WSW Sombrerete, 7250 ft., 10 (OU); 4 mi. SW Sombrerete, 7000 ft., 1 (LACM); 15.5 mi. WSW Sombrerete, 6400 ft., 2 (OU); 3 km. E El Arenal, 2460 m., 1; 2 mi. W Sain Alto, 6900 ft., 6 (KU); 5 km. NE Chalchihuites, 2360 m., 2; 4 km. E Jiménez del Téul, 2375 m., 2; 25 km. WSW Milpillas de la Sierra, 2580 m., 16; 45 km. SW Fresnillo, 2165 m., 5; 46 km. SW Fresnillo, 2200 m., 1; 53 km. SW Fresnillo, 2250 m., 2; 11 mi. NE Valparaíso, 2250 m., 7; 13 km. E Jérez, 2200 m., 8; 8 km. SW Jérez, 2030 m., 5; 32 km. SE Valparaíso, 2040 m., 11; 35 km. SSE Valparaíso, 2330 m., 1; 3 mi. N Cuauhtémoc, 6600 ft., 4 (LACM), 2 (RGH); 5 mi. S Ojo Caliente, 7 (UI); 13 km. NE Villanueva (Ruinas Chicomoztoc), 2040 m., 10 (LACM); 6 km. ENE Loreto, 6850 ft., 1 (OU); 6 mi. NNW Pinos, 7900 ft., 5; 25 km. ESE Pinos, 2425 m., 12; 45 km. S Pinos, 2350 m., 1; 8 mi. NW Nochistlán, 6600 ft., 18 (LACM). *Additional records*: 3 mi. SW Sombrerete, 8 mi. S Chalchihuites, 40 mi. W Fresnillo (Jones and Webster, 1976).

Baiomys taylori paulus (J. A. Allen, 1903)

Northern Pygmy Mouse

The northern pygmy mouse requires grassland habitats and was rarely found in areas over-grazed by livestock. Accordingly, its abundance was usually only local (Packard, 1960; Petersen, 1978). In Zacatecas, our catches of *B. taylori* were generally small, usually more so than were the associated *Peromyscus maniculatus* and *Reithrodontomys fulvescens.* Four females taken between 12 and 24 July contained an average of 1.5 fetuses (range one to two).

Specimens examined (67).—15 km. NNW Nieves, 1910 m., 1; 5 km. S Gonzáles Ortega, 2150 m., 1; 16 mi. NW Río Grande, 6750 ft., 1; 13 km. WNW Río Grande, 2050 m., 1; 3 mi. E El Calabazal, 8000 ft., 3; Valparaíso, 6200 ft., 10 (USNM); 15 km. SW Valparaíso, 2250 m., 1; 6 mi. W Jérez, 6700 ft., 2; 13 km. E Jérez, 2200 m., 3; 8 km. SW Jérez, 2030 m., 3; 32 km. SE Valparaíso, 2040 m., 9; 36 km. SSE Valparaíso, 2330 m., 3; 16 km. SSE Monte Escobedo, 2010 m., 5; 20 km. S Monte Escobedo, 1920 m., 1; 20 km. S Villanueva, 1810 m., 2; 2.5 mi. S Momax, 5800 ft., 1; 3.5 mi. W Tlatenango, 6500 ft., 1; 30 km. NE Jalpa, 1740 m., 2; 10 mi. W Jalpa, 6100 ft., 8 (LACM); 5.5 mi. SW Jalpa, 4400 ft., 1 (OU); 25 km. ESE Jalpa, 2590

m., 1; 8 mi. NW Nochistlán, 6600 ft., 2 (LACM); 6 mi. S Téul de Gonzáles Ortega, 2010 m., 2; 7 km. SE Santa Rosa, 1500 m., 3. *Additional records*: 4 mi. NW Chalchihuites, 40 mi. W Fresnillo, 8 mi. S Moyahua (Jones and Webster, 1976).

Onychomys torridus canus Merriam, 1904

Southern Grasshopper Mouse

The presence of at least some grassy cover seemed to be a requirement for the presence of the southern grasshopper mouse. Even so, animals were rarely caught in numbers of more than one or two at most collecting localities. A female taken on 31 July contained four fetuses and was lactating. Two females examined on 26 July and 21 August were lactating.

Zacatecan specimens are referable to *O. t. canus*, although some from the extreme northeastern part of the state approach *O. t. surrufus* in having slightly longer anterior palatine foramina but not possessing the spine on the posterior border of the palate (Hollister, 1914). We agree with Van Cura and Hoffmeister (1966) and Matson and Friesen (1979) that color, length of the anterior palatine foramina, and the development of a spine on the palate are of questionable value in separating the more northern subspecies of *O. torridus*.

Specimens examined (83).—15 mi. NE Concepción del Oro, 2 (OU); 12 km. ENE Concepción del Oro, 1850 m., 1; 35 km. SSE Concepción del Oro, 1980 m., 1; 13.5 mi. SW Camacho, 5800 ft., 1 (RGH); 3 km. NW San Felipe de Nuevo Mercurio, 1770 m., 4; 4 km. N Nieves, 1980 m., 1; 15 mi. NE San Andrés, 6200 ft., 3 (LACM); 6.5 km. S La Colorada, 1970 m., 1; 8 mi. S Majoma, 7700 ft., 5 (KU); 10 mi. N Rancho Grande, 6700 ft., 1; 1 mi. S Cañitas, 1 (TTU); 1 mi. W Sierra Vieja, 6100 ft., 10 (OU); 40 km. NE Ville de Cos, 2000 m., 1; 18 km. NE Ville de Cos, 2040 m., 1; 3 mi. E, 4.6 mi. N Ville de Cos, 1 (OU); Ville de Cos, 6700 ft., 2 (KU); 2 km. S Monte Mariana, 2180 m., 3; 45 km. NE Morelos Jct., 1 (TTU); Bañon, 6400 ft., 1 (LACM); 2 mi. E Bañon, 6400 ft., 3 (LACM), 2 (RGH); 4 km. ESE Bañon, 6200 ft., 15 (OU); 10 km. SE Fresnillo, 2250 m., 1; 24 mi. NE Zacatecas, 6700 ft., 1 (LACM), 1 (RGH); Calera, 7300 ft., 3 (KU); 3 mi. SE Guadalupe, 2 (UI); 8 mi. SE Zacatecas, 7225 ft., 1 (KU); 9 mi. SE Zacatecas, 7900 ft., 2 (KU); 2 mi. ESE Trancoso, 7000 ft., 1 (KU); 7 mi. SE Trancoso, 1 (KU); 13 km. E Jérez, 2200 m., 1; San Juan Capistrano, 5 (USNM); 5 mi. S Ojo Caliente, 1 (UI); 3 mi. WNW Saldaña, 6850 ft., 1. *Additional records*: 20 mi. S Concepción del Oro, 40 mi. W Fresnillo, 8 mi. W Fresnillo (Jones and Webster, 1976).

Sigmodon fulviventer fulviventer J. A. Allen, 1889

Tawny-bellied Cotton Rat

The tawny-bellied cotton rat occurs in the grassland areas of southwestern Zacatecas but has a spotty distribution in ranch lands because of its sensitivity to over-grazing (Baker, 1969). Often, it is confined to roadside and fenceline cover and to sparse grasses growing in clumps of acacias or prickly pear cactus.

Specimens examined (22).—5 km. S Gonzáles Ortega, 2150 m., 1; 16 mi. NW Río Grande, 6750 ft, 1; 16 mi. E El Calabazal, 8000 ft., 1; 9 mi. W Sombrerete, 7900 ft., 1 (OU); 5 km. NE Chalchihuites, 2360 m., 1; 12 mi. SE Fresnillo, 7000 ft., 1; 45 km. SW Fresnillo, 2165 m., 2; Zacatecas (type locality), 3 (AMNH); 10.9 mi. NW Cuauhtémoc, 7100 ft., 1 (OU); Monte Escobedo, 7300 ft., 8 (LACM); 25 km. ESE Jalpa, 2590 m., 1; 8 km. NW Téul de Gonzáles

Ortega, 2200 m., 1. *Additional records*: 67 km. W Fresnillo (Baker, 1969); 13 mi. S Villanueva (Dalby and Lillevik, 1969).

Sigmodon hispidus berlandieri Baird, 1855

Hispid Cotton Rat

Hispid cotton rats are apt to be found in any grassy situation in the open lands of northern and central Zacatecas, although the more moist and rank growths in west-central parts of the plains and foothills are generally occupied by *S. f. fulviventer*. Evidence of interdigitation of the ranges of the two species is presumed to be in the vicinities of Fresnillo, Zacatecas, and possibly Villanueva, based on our collecting activities. In the desert, hispid cotton rats thrive in tabosa grass flats and within scant grass cover secluded from foraging livestock by thorn brush and cacti. Three females captured on 10 and 15 July and 3 August, respectively, contained five, six and 11 fetuses. A female examined on 15 July was lactating.

Specimens examined (90).—10 km. ESE San Juan de los Charcos, 1500 m., 1; 3 km. SE Apizolaya, 1920 m., 1; 12 km. ENE Concepción del Oro, 1850 m., 1; 5 km. NW Juan Aldama, 1980 m., 1; 13 mi. SW Camacho, 5900 ft., 1 (LACM); 35 km. SSE Concepción del Oro, 1980 m., 1; 1 mi. N Lulú, 1930 m., 1; 2 km. W San Felipe de Nuevo Mercurio, 1740 m., 14; 5 km. S Gonzáles Ortega, 2320 m., 2; 23 km. NE Río Grande, 1800 m., 1; 13 km. WNW Río Grande, 2050 m., 1; 2 mi. W Sain Alto, 6900 ft., 7 (KU); 6 km. N Fresnillo, 2250 m., 8; 5 km. N Fresnillo, 2250 m., 1; 2.5 km. WNW Fresnillo, 7400 ft., 2 (OU); 2 mi. S Fresnillo, 7420 ft., 1; 5 mi. NW Zacatecas, 7600 ft., 1 (KU); Valparaíso, 6200 ft., 3 (USNM); 8 mi. SE Zacatecas, 7225 ft., 3 (KU); 20 km. S Villanueva, 1810 m., 1; 25 km. ESE Pinos, 2425 m., 1; 2.5 mi. S Momax, 5800 ft., 1; 30 km. NE Jalpa, 1740 m., 1; 10 mi. W Jalpa, 6100 ft., 8 (LACM); 5.5 mi. SW Jalpa, 4400 ft., 6 (OU); 6 mi. SW Jalpa, 5100 ft., 1 (LACM); 4 mi. S Jalpa, 4300 ft., 10 (LACM); 8 mi. NW Nochistlán, 6600 ft., 2 (LACM); Santa Rosa, 4000 ft., 8 (LACM). *Additional record*: 9 mi. W Zacatecas (CAS).

Sigmodon leucotis leucotis V. Bailey, 1902

White-eared Cotton Rat

The white-eared cotton rat is adapted to grassy and scrub-grass meadows and forest edges in the highlands of west-central and southern Zacatecas. It seems to avoid the overhead canopy of the pine-oak forest but will venture to its edge in brushy glades. The surface runway systems of this cotton rat are usually less well-marked than are those of *S. fulviventer*. Our observations indicate that *S. leucotis* will occupy suitable ground cover in both the deep soils of intermontane valleys and the shallow soils on rocky hillsides. Three females taken on 5 and 6 August contained three, four, and six fetuses, respectively. Another female, examined on 5 August, was lactating.

Specimens examined (19).—25 km. WSW Milpillas de la Sierra, 2580 m., 14; 9 mi. NW Valparaíso, 8350 ft., 2; 9 mi. WNW Jalpa, 8250 ft., 3. *Additional records*: 13 km. S Chalchihuites, 13 km. W Milpillas [de la Sierra], 27 km. W Milpillas [de la Sierra], Valparaíso Mountains, 15 km. W Zacatecas, 17 km. S Pinos (Baker, 1969).

Sigmodon mascotensis mascotensis J. A. Allen, 1897

Mascota Cotton Rat

The heavy-bodied Mascota cotton rat is adapted for life in the luxuriant grass-scrub vegetation of the Pacific lowlands of southwestern México. It does, however, follow tropical and subtropical riparian growth upstream, where it reaches Zactecas along the drainages of the Atengo, Bolaños, and Juchipila rivers. Many of our specimens were trapped near streamside agricultural areas. Two females examined on 21 and 30 July carried six and eight fetuses, respectively; two females taken on 21 July were lactating. Even though Zimmerman (1970) demonstrated that *S. mascotensis* is specifically distinctive from *S. hispidus*, the two species closely resemble each other externally, and both construct surface runways and produce other almost identical field signs. A subadult cotton rat from near San Juan Capistrano was incorrectly identified by Matson *et al.* (1978) as *S. arizonae.* It is, instead, an example of *S. mascotensis.*

Specimens examined (18).—18 km. N San Juan Capistrano, 1100 m., 6; 5 km. NE San Juan Capistrano, 1330 m., 1; 16 km. SSE Monte Escobedo, 2010 m., 7; 6 km. S Apozol, 1170 m., 1; 2 mi. N Santa Rosa, 3850 ft., 2; Santa Rosa, 4000 ft., 1 (LACM).

Neotoma albigula leucodon Merriam, 1894

White-throated Woodrat

The white-throated woodrat is equally at home in arid desert surroundings, in mesquite grasslands, and, in Zacatecas, at the edge of the subtropical growth along the Río Juchipila. Along the Zacatecan tributaries of the Río Bolaños, also in the southwestern part of the state, *N. albigula* appears to be absent, apparently being replaced there by *N. palatina.* It has already been suggested by Hall and Genoways (1970) that, where the ranges of these two species approach one another, *N. albigula* occurs in the upland areas while *N. palatina* occupies streamside habitats. Five females examined between 16 and 31 July carried an average of 1.6 fetuses (range one to two). In addition, five other females collected between 6 and 16 July were lactating.

Specimens examined (262).—6 km. W Apizolaya, 1800 m., 3; 3 km. SE Apizolaya, 1920 m., 1; 7 km. SE Caopas, 1940 m., 1; 8 mi. W Cedros, 5650 ft., 1 (LACM); 12 km. W San Rafael, 2590 m., 1; 13 km. NE Concepción del Oro, 1700 m., 2; Concepción del Oro, 7600 ft., 1 (KU); 11 mi. E Concepción del Oro, 5300 ft., 5 (LACM); 40 km. ESE Concepción del Oro, 2320 m., 2; 25 km. NE Camacho, 1975 m., 5; 12 mi. SE Concepción del Oro, 7450 ft., 3; 3 mi. N Lulú, 2 (MVZ); 1 mi. N Lulú, 6000 ft., 1; 7 km. SE El Rosario, 2100 m., 1; 15 mi. S Concepción del Oro, 1 (KU); 13 mi. SW Camacho, 5800 ft., 2 (LACM); 10 mi. SE Juan Aldama, 7250 ft., 3; 2 km. W San Felipe de Nuevo Mercurio, 1740 m., 16; 3 km. E San Tiburcio, 1880 m., 1; 1 mi. SW San Tiburcio, 7000 ft., 6 (KU); 15 km. WSW San Tiburcio, 1980 m., 3; 9 mi. NE Nieves, 6600 ft., 2; 4 km. N Nieves, 1980 m., 3; 5 km. S Gonzáles Ortega, 2320 m., 1; 23 km. NE Río Grande, 1800 m., 1; 25 km. SW San Tiburcio, 2030 m., 1; 15 mi. NE San Andrés, 6200 ft., 1 (LACM); 13 km. WNW Río Grande, 2050 m., 1; 45 km. SW San Tiburcio, 1940 m., 2; 5 mi. SE Río Grande, 1940 m., 11; 50 km. SW San Tiburcio, 2125 m., 1; 6.5 km. S La Colorada, 1970 m., 1; 8 mi. S Majoma, 7700 ft., 6 (KU); 4 mi. E El Calabazal, 1 (UMMZ);

13 km. WNW Capriote, 2100 m., 10; 9 km. NW Sarteneja, 2200 m., 1; 10 mi. N Rancho Grande, 6700 ft., 6; 7 km. N Rancho Grande, 2190 m., 1; 1 mi. W Sierra Vieja, 6100 ft., 13 (OU); 40 km. NE Ville de Cos, 2000 m., 2; 6 mi. WSW Sierra Vieja, 6200 ft., 1 (OU); 10 mi. SW Chalchihuites, 7200 ft., 1 (LACM); 3 mi. E, 4.6 mi. N Ville de Cos, 3 (OU); 23 km. N Fresnillo, 2140 m., 1; Ville de Cos, 6700 ft., 6 (KU); 2 km. S Monte Mariana, 2180 m., 1; 2 mi. SE Ville de Cos, 6200 ft., 1; 6 km. N Fresnillo, 2250 m., 1; 3 mi. NW Fresnillo, 7760 ft., 1; 2.5 km. WNW Fresnillo, 7400 ft., 2 (OU); 20 mi. NE Morelos Jct., 2 (OU); Bañon, 6400 ft., 18 (LACM); 2 mi. E Bañon, 6400 ft., 3 (LACM); 4 km. ESE Bañon, 6200 ft., 19 (OU); 45 km. SW Fresnillo, 2165 m., 1; 7.2 mi. W Valparaíso, 7900 ft., 3 (OU); 6 mi. W Valparaíso, 7400 ft., 1 (OU); Valparaíso, 6200 ft., 5 (USNM); 10 mi. N Valparaíso, 6200 ft., 1 (KU); Zacatecas, 1 (USNM); 8 mi. SE Zacatecas, 7225 ft., 1 (KU); 2 mi. ESE Trancoso, 7000 ft., 7 (KU); 8 mi. SW Jérez, 2030 m., 1; 11.7 mi. NW Cuauhtémoc, 7100 ft., 2 (OU); Berriozábal, 9 (USNM); 3 mi. N Cuauhtémoc, 6600 ft., 13 (LACM), 1 (RGH); 13 km. NE Villanueva, 2040 m., 2; 3 mi. WNW Saldaña, 6850 ft., 1; 6 mi. NNW Pinos, 7900 ft., 1; Pinos, 1 (AMNH); Monte Escobedo, 7300 ft., 4 (LACM); 8 mi. S Villanueva, 6850 ft., 1; 25 km. ESE Pinos, 2425 m., 4; Plateado, 1 (USNM); 13 mi. N Jalpa, 5000 ft., 6 (KU); 10 mi. W Jalpa, 6100 ft., 1 (LACM); 3 mi. SW Jalpa, 4600 ft., 1 (KU); 5.5 mi. SW Jalpa, 4400 ft., 2 (OU); 6 mi. SW Jalpa, 4900 ft., 1 (RGH); 4 mi. S Jalpa, 4300 ft., 3 (LACM). *Additional records*: 22 mi. SE Concepción del Oro, 6 mi. W Fresnillo (Jones and Webster, 1976).

Neotoma goldmani Merriam, 1903

Goldman's Woodrat

Goldman's woodrat occurs in rocky situations in the northern and eastern parts of the Mexican Plateau, with its distribution thought to be centered in the interior basin topography, which includes sectors of Chihuahua, Coahuila, Durango, and northeastern Zacatecas, plus northern San Luis Potosí and extreme southwestern Nuevo León (Rainey and Baker, 1955; Hall, 1981). Collections reported herein represent southwestern marginal records for this diminutive species. In our field work, we found no specific sign to denote the presence of this rodent, the animals merely showing up occasionally in traplines placed in rocky desert habitat, sometimes along with *N. albigula*. Three females examined on 9 and 21 July and 8 August contained one, two, and one fetuses, respectively. A female obtained 29 July was lactating.

Specimens examined (15).—20 km. NE Concepción del Oro, 1910 m., 2; 4 km. W San Rafael, 2140 m., 1; 6 mi. W Concepción del Oro, 1 (UI); Concepción del Oro, 7600 ft., 1 (KU); 25 km. SW San Tiburcio, 2030 m., 2; 50 km. SW San Tiburcio, 2125 m., 3; 5 mi. S Ojo Caliente, 1 (UI); 3 mi. WNW Saldaña, 6850 ft., 2; 6 mi. NNW Pinos, 7900 ft., 1; 25 km. ESE Pinos, 2425 m., 1.

Neotoma mexicana

Mexican Woodrat

Mexican woodrats are associated with rock outcrops and can be expected in such habitat in any of the forested highlands of western and southern Zacatecas. In the extreme southern part of the state, these woodrats also occur in rock ledges well down into the subtropical valley of the Río Juchipila at Santa Rosa. Two females examined on 30 July were lactating.

Two subspecies are known from Zacatecas; specimens assigned to *N. m. mexicana* from west-central areas are larger and have a more reddish-colored dorsum than those from farther south that are referred to *N. m. tenuicauda*. A third subspecies, *N. m. navus*, is to be expected from the montane areas just at the Coahuilan border in extreme northeastern Zacatecas.

Specimens examined.—***Neotoma mexicana mexicana*** Baird, 1855 (15): 4 mi. E El Calabazal, 3 (UMMZ); 12 mi. W Sombrerete, 2 (KU); 14.2 mi. N Jiménez del Téul, 7300 ft., 1 (OU); 25 km. WSW Milpillas de la Sierra, 2580 m., 4; 9 mi. NW Valparaíso, 8350 ft., 5. *Additional record*: Sierra de Valparaíso (Hall, 1955). ***Neotoma mexicana tenuicauda*** Merriam, 1892 (14): Pinos, 3 (AMNH); Plateado, 6 (USNM); 10 mi. W Jalpa, 6100 ft., 1 (LACM); 8 mi. NW Nochistlán, 6600 ft., 1 (LACM); 0.5 mi. ENE Mesquituta, 3450 ft., 1 (OU); Santa Rosa, 4000 ft., 1 (LACM).

Neotoma palatina Goldman, 1905

Bolaños Woodrat

The Bolaños woodrat was collected in rocky habitats, including a rock fence, in the riparian growth associated with the often steep-walled banks of the Río Atengo in the vicinity of San Juan Capistrano. This seemingly localized population appeared to be an upstream extension of the distribution of this species, which had been known previously only from northern Jalisco (Matson *et al.*, 1978). A female examined on 3 August contained one fetus.

Specimens examined (5).—18 km. N San Juan Capistrano, 1100 m., 2; 5 km. NE San Juan Capistrano, 1330 m., 2; 5 km. E San Juan Capistrano, 3350 ft., 1 (OU).

Nelsonia neotomodon neotomodon Merriam, 1897

Diminutive Woodrat

The diminutive woodrat is restricted to pine-oak highlands in western México with an irregular distributional pattern from west-central Durango southward to southern Jalisco and western Michoacán (Hooper, 1954; Hall, 1981). This rodent has been found mostly associated with stream banks, rock ledges, and moss-covered boulders on tree-shaded slopes (Baker and Greer, 1962). Either *Nelsonia* is uncommon or is not attracted to traps, because our field parties visited numerous montane areas but caught only one individual as a result of our efforts. Our specimen, from northwest of Valparaíso, was taken in a Sherman live trap baited with rolled oats on 31 July 1970. The trap had been set for two previous nights at a wide crack in a massive rock wall just below the rimrock on a west-facing canyon. Other small mammals taken at that place were *Tamias bulleri*, *Peromyscus boylii*, *Peromyscus difficilis*, and *Neotoma mexicana*.

Specimens examined (11).—9 mi. NW Valparaíso, 8350 ft., 1; Valparaíso Mountains, 8700 ft., 2 (USNM); Sierra Madre, 4 (USNM); Plateado, 4 (USNM).

Carnivora—Carnivores

Canidae—Canids

Canis latrans

Coyote

The coyote's vocalizations were heard nightly at most field camps; its tracks were frequently noticed in loose soils; and its alleged depredations on livestock were topics of conversation by local informants in every part of the state. Evidence of coyote activity was obtained in a variety of Zacatecan habitats: in desert-scrub near Tecolates on 5 August 1971, in forested highlands near Jiménez de Téul on 17 July 1977, in mesquite-grassland near Saldaña on 8 August 1968 and near Valparaíso on 27 July 1970, and in subtropical grass-scrub country near Jérez on 28 July 1971. Most specimens examined from the state were victims of trapping, poisoning, or shooting by ranchers or of encounters with automobiles on highways.

The coyotes in Zacatecas are divisible, according to Young and Jackson (1951), into *C. l. impavidus*, which occurs in mesquite-grasslands and montane forested areas of western and southern parts of the state, and *C. l. mearnsi*, which occupies desert-scrub in northeastern sectors. The collection of skins, skulls, and skull fragments (from road kills) made verification of these taxonomic conclusions difficult. Consequently, subspecific allocations were made geographically.

Specimens examined.—***Canis latrans impavidus*** J. A. Allen, 1903 (23): 5 mi. NE Nieves, 6800 ft., 1; 23 km. NE Río Grande, 1800 m., 1; 5 km. NW Río Grande, 2190 m., 1; El Vergel, 14.5 mi. WSW Sombrerete, 7100 ft., 1 (OU); 10 mi. SW Chalchihuites, 2 (LACM); 3 km. SE Rancho Grande, 2190 m., 1; 14.2 mi. N Jiménez de Téul, 7300 ft., 1 (OU); Bañon, 6400 ft., 4 (LACM); 8 km. SE Fresnillo, 2300 m., 1; 8 km. N Tepetongo, 1; Cuauhtémoc, 6100 ft., 3 (LACM); 7 mi. S Pinos, 6800 ft., 1 (LACM); 11 mi. NW Jalpa, 8000 ft., 1 (KU); 10 mi. W Jalpa, 6100 ft., 3 (LACM); Mesquituta, 3400 ft., 1 (OU). *Additional records*: near Fresnillo (Jones and Webster, 1976); Laguna Valderrama, 40 mi. W Fresnillo (Young and Jackson, 1951). ***Canis latrans mearnsi*** Merriam, 1897 (3): 13 mi. NE Concepción del Oro, 1700 m., 1; 11 mi. E Concepción del Oro, 5300 ft., 2 (LACM).

Canis lupus baileyi Nelson and Goldman, 1929

Gray Wolf

Residual populations of the gray wolf, once a widespread canid (Baker and Villa-R., 1959; Hall, 1981; Bogan and Mehlhop, 1983), are reported to occur in scattered localities in mountainous districts of western and southern Zacatecas. Although Dalquest (1953) found gray wolves in mixed mountains and plains areas in western San Luis Potosí, we were unable to learn of any recent occurrence of this species near the border of that state in eastern Zacatecas. Likewise, in the 1960s and 1970s we received no evidence of the presence of gray wolves in northern and north-central Zacatecas from resident ranchers and other informants.

In the 1970s, cattlemen assured us of the occurrence of gray wolves at various localities along the western and southern border in the rugged and

often isolated barranca country of the Sierra Madre Occidental and associated highlands. It was the contention of Durango rancher Fidel Gutiérrez that gray wolves trapped on the Rancho Las Margaritas, near the northwestern Zacatecan border (Baker and Greer, 1962), moved into his mountainous holdings from Zacatecas. This rancher, for example, thought that a large male (MSU 23667) taken in March 1974 at his ranch (45 km. S, 28 km. W Vicente Guerrero, 2610 m., Durango) came directly from across the Zacatecan border.

In west-central Zacatecas, residents reported gray wolves in the mountains 25 km. WSW Milpillas de la Sierra in August 1977, and near Jiménez de Téul in July 1977. In July 1970, officials of the Unión Ganadera Regional de Zacatecas in Valparaíso explained to members of the MSU field party that gray wolves had been reduced in numbers or extirpated in many parts of western Zacatecas by predatory control specialists from the United States. These workers were engaged by local ranch operators. Even so, Roy McBride (personal communication) related that there were two reports in October 1974 of cattle kills by gray wolves near the Durangan border, probably west of Valparaíso. Earlier, in July 1954, Jones and Webster (1976) reported a live gray wolf in grassland-juniper ecotone 6 mi. NW Sombrerete.

In extreme southern Zacatecas, a center of gray wolf activity may still persist in mountainous country from immediately north of Villanueva to as far southward as Tabasco and Jalpa, eastward to the border with Aguacalientes, and westward to the border with Jalisco (McBride, 1980). In oak-covered mountains 16 km. WNW Jalpa, ranchers were quick to explain to MSU field parties that gray wolves were persistently destructive to calves and burros. Rancher Jesus Ibarra, whose cattle ranged in this area, told us of seeing a gray wolf there in 1966. Northeast of Jalpa, however, local informants agreed that gray wolves had been eliminated there by 1946. The valley of the Río Juchipila, with its intense agricultural development and high human population, may act to discourage large predators such as the gray wolf from east-west movements. The latest report of gray wolves in southern Zacatecas was obtained in July 1978; local observers told us of seeing two of these wolves in oak-covered uplands 6 km. S Téul de Gonzáles Ortega.

The only specimen of a gray wolf from Zacatecas is an unsexed skull of a young adult (CAS 11022) picked up in oak-savannah about 5 mi. S Laguna Valderrama (perhaps 40 m. W Fresnillo) in July 1954 (Jones and Webster, 1976). Overall cranial measurements in comparison with those of the adult male from Durango (mentioned above), respectively, are: greatest length, 223.5, 246.3; zygomatic breadth, 120.3, 138.9.

Specimen examined (1).—5 mi. S Laguna Valderrama [=40 mi. W, 5 mi. S Fresnillo] (CAS).

Vulpes macrotis zinseri Benson, 1938

Kit Fox

The kit fox is well known to residents of open lands in eastern Zacatecas. Our field parties found its tracks on cattle trails, in sandy arroyos, and along dusty roadways. Burrows thought to have been excavated by this small canid were found in heavy desert soil 7 km. SE Coapas on 21 July 1976. Completely flattened carcasses of individuals were examined on the blacktop of highway 49 at a point 5 mi. SSE Victor Rosales and 20 mi. ESE Guadalupe (Baker, 1968).

Of four kit foxes (three males and one female) from 7 mi. S Pinos (Matson, 1977), two adult males and one adult female (taken on 12 and 13 July) have, respectively, the following measurements: total length, 797, 799, 795; length of tail vertebrae, 295, 303, 292; length of hind foot, 128, 127, 122; height of ear from notch, 83, 85, 83; greatest length of skull, 118.0, 122.0, 110.7; condylobasal length, 115.2, 119.1, 109.2; zygomatic breadth, 65.6, 66.6, 62.3; least interorbital breadth, 23.2, 23.5, 21.5; breadth of braincase, 43.5, 44.8, 42.9; length of maxillary toothrow, 53.0, 55.8, 51.6. These measurements are somewhat larger than those recorded for more northern kit foxes (Benson 1938; Baker, 1956).

Specimens examined (7).—11 mi. SW San Tiburcio, 6200 ft., 1 (KU); 5 mi. SSE Victor Rosales, 7700 ft., 1; 20 mi. ESE Guadalupe, 7100 ft., 1; 7 mi. S Pinos, 6800 ft., 7 (LACM). *Additional record*: Pinos (Anderson and Hadary, 1965).

Urocyon cinereoargenteus

Gray Fox

The gray fox lives in all Zacatecan environments. Tracks and other signs of this adaptable canid were observed at many field camps. Fecal droppings examined in montane forest 9 mi. NW Valparaíso, 8350 ft., in July 1970 contained manzanita berries (*Arctostaphylos*). Three subspecies occur in Zacatecas (Goldman, 1938; Burt and Hooper, 1941; Dalquest, 1953; Baker, 1956; Baker and Greer, 1962; Armstrong *et al.*, 1972). These are *U. c. madrensis* in the west-central mountains close to the border with Durango, *U. c. nigrirostris* in the southern and southwestern highlands and subtropical stream valleys, and *U. c. scottii* in the northeastern and east-central desert-scrub and mesquite-grassland plains. Zacatecan specimens from arid and semiarid open lands have the pale color alluded to in descriptions of *U. c. scottii*, whereas the two subspecies from the western and southern forested highlands and stream valleys have more richly darker pelages.

Specimens examined.—***Urocyon cinereoargenteus madrensis*** Burt and Hooper, 1941 (1): 14.2 mi. N Jiménez de Téul, 7300 ft., (OU). ***Urocyon cinereoargenteus nigrirostris*** (Lichtenstein, 1850) (15): 3 mi. NW Monte Escobedo, 8000 ft., 1 (KU); Monte Escobedo, 7300 ft., 5 (LACM); 10 mi. W Jalpa, 6100 ft., 1 (LACM); 8 mi. NW Nochistlán, 6600 ft., 3 (LACM); 10 mi. NW Yahualica (in Jalisco), 7100 ft., 2 (LACM); Santa Rosa, 4000 ft., 3 (LACM). *Additional records*: San Juan Capistrano (Goldman, 1938, as *U. c. colimensis*); 8 mi. S Moyahua (Jones and

Webster, 1976). ***Urocyon cinereoargenteus scottii*** Mearns, 1891 (11): 10 mi. SW Concepción del Oro, 7600 ft., 4 (LACM); 32 km. SW Concepción del Oro, 1; 9 mi. N Nieves, 6000 ft., 1 (LACM); 12 km. SE Río Grande, 1950 m., 1; 3 mi. N Cuauhtémoc, 4 (LACM).

Ursidae—Bears

Ursus americanus machetes Elliot, 1903

Black Bear

The black bear was formerly a resident in the pine-oak highlands in western Zacatecas. It still may occur in mountainous terrain along the Durangan border in the west-central part of the state. In more than 20 years of field work in Zacatecas, no actual records of black bear were obtained. Nevertheless, this ursid is well known to persons living in the Sierra Madre Occidental. On lands of the Tepehuanan Indians west of San Juan Capistrano, local residents in August 1975 reported that black bears lived there in the recent past. In the forested highlands west of Valparaíso, there were conflicting reports; some ranchers informed us that bear were still present, while others stressed its complete absence. In the vicinities of Milpillas de la Sierra and Jiménez de Téul, however, our field parties learned that black bear still linger in some of the remote and deeply dissected country. If black bears remain in adjacent parts of Durango (Baker and Greer, 1962), it is reasonable to suppose that a vestige of this once widespread ursid is in Zacatecas. The only other black bears in Zacatecas may occur, according to local observers, in the pine-oak highlands of the Sierra El Astillero, a mountainous area of the Zacatecan-Coahuilan border north-northeast of Concepción del Oro. If present in this area, these bears might represent the eastern Mexican subspecies *U. a. eremicus*.

Procyonidae—Procyonids

Bassariscus astutus

Ringtail

The ringtail is well known to local inhabitants in all parts of Zacatecas. Through the efforts of Percy L. Clifton, we have representative collections from most sectors of the state (Matson, 1977). At least two subspecies of ringtails occur in Zacatecas. In plateau habitats of northern and eastern areas, the widely distributed *B. a. flavus* is the resident subspecies. In the pine-oak highlands and subtropical valleys of southwestern Zacatecas, ringtails are assignable to *B. a. consitus*.

Specimens examined.—***Bassariscus astutus consitus*** Nelson and Goldman, 1932 (13): 10 mi. SW Chalchihuites, 7200 ft., 1 (LACM); 3 mi. NW Monte Escobedo, 8000 ft., 2 (KU); Monte Escobedo, 7300 ft., 5 (LACM); 11 mi. NW Jalpa, 8000 ft., 1 (KU); Santa Rosa, 4000 ft., 3 (LACM); 10 mi. NW Yahualica (in Jalisco), 7100 ft., 1 (LACM). ***Bassariscus astutus flavus*** Rhoads, 1894 (11): 10 mi. SE Concepción del Oro, 7600 ft., 5 (LACM); 9 mi. N Nieves, 6000 ft., 2 (LACM); 3 mi. N Cuidad Cuauhtémoc, 6600 ft., 4 (LACM).

Procyon lotor

Raccoon

The raccoon occurs along waterways and in the vicinity of ranch impoundments, irrigated areas, and human habitations in all sectors of Zacatecas. Field parties from MSU noted tracks and other signs of raccoons at such northern and eastern locations as near Río Grande, Tetillas, Victor Rosales, Guadalupe, Trancoso, and Pinos. Signs observed in southern Zacatecas in the vicinity of Tabasco, Jalpa, and Santa Rosa might also have been attributable to the coati. Central Zacatecas appears to be an area of integradation between the darker, southern, and transcontinental subspecies *P. l. hernandezii* and the paler *P. l. mexicanus* of northwestern Mexico (Goldman, 1950). Without specimens from northeastern Zacatecas, we are unable to determine if *P. l. fuscipes* also occurs in the state. Although naturally continuous raccoon populations exist in the well-watered Sierra Madre Occidental in western Zacatecas, there may have been a hiatus earlier caused by the presence of arid and semiarid lands between the watersheds of the north-flowing Río Aguanaval, the south-flowing Río Juchipila and other tributaries of the Río Grande de Santiago, and the east-flowing Río Verde with headwaters in southwestern San Luis Potosí. Today, however, it is possible that raccoon populations of the Mexican Plateau may move between these watersheds by travelling short distances between recently developed ranch impoundments and irrigated lands. We follow Goldman (1950) in assigning subspecies.

Specimens examined.—***Proyon lotor hermandezii*** Wagler, 1831 (5): 20 km. ESE Trancoso, 2140 m., 1; 20 mi. ESE Trancoso, 7000 ft., 1; 1 km. S Tabasco, 1510 m., 1; 8 mi. NW Nochistlán, 1 (LACM); Santa Rosa, 4000 ft., 1 (LACM). ***Procyon lotor mexicanus*** Baird, 1858 (1): 14.2 mi. N Jiménez de Téul, 7300 ft., (OU).

Nasua narica molaris Merriam, 1902

Coati

The coati ranges upstream along the deeply entrenched tributaries of Pacific coastal rivers, but appears equally at home in the montane forests above the canyon floors. Apparently, this procyonid rarely, if at all, extends its range eastward into arid and semiarid parts of northern and eastern Zacatecas. Skulls of an adult male from Monte Escobedo (LACM 36056) and an adult female from Santa Rosa (LACM 33251) have, respectively, the following measurements: condylobasal length, 120.5, 115.6; zygomatic breadth, 70.2, 63.7; least interorbital breadth, 29.1, 29.8; postorbital breadth 28.1 30.8; mastoid breadth, 48.9, 45.2; length of maxillary toothrow, 48.8, 47.9.

Specimens examined (5).—14.2 mi. N Jiménez de Téul, 7300 ft., 1 (OU); Monte Escobedo, 7300 ft., 1 (LACM); Moyahua, 1 (OU); Santa Rosa, 4000 ft., 2 (LACM).

MUSTELIDAE—Mustelids

Mustela frenata

Long-tailed Weasel

It is the impression of the authors that the long-tailed weasel is not only better known to local residents but actually more abundant in the open lands of Zacatecas than it is farther north in Durango (Baker and Greer, 1962) and Coahuila (Baker, 1956). It apparently is most common in grassland habitat and adjoining farming areas in west-central and southern Zacatecas. However, a weasel observed at close range by Paul Abravaya, John Matson, and David Webster 10 km. N San Rafael in arid desert-scrub in the northeastern part of the state illustrates its widespread occurrence. A skin received from officials at the office of the Unión Ganadera Regional de Zacatecas in Valparaíso apparently came from a farming area east of the city. According to Hall (1951, 1981), three subspecies of long-tailed weasels could occur in Zacatecas. However, based on an examination of the four specimens available from the state, it appears that the only two subspecies present are *M. f. neomexicana* in central and northern areas and *M. f. leucoparia* in the subtropical river valleys in the extreme south. A male (MSU 16375) from Valparaíso resembles in coloration of both upper and lower parts and in the extent of the white facial markings a male *M. f. neomexicana* (MSU 4107) from 1.5 mi. W Gregio Garcia, Durango. A female (LACM 35453) from near Ciudad Cuauhtémoc fits Hall's description of this subspecies in external characteristics, but in cranial features it resembles *M. f. frenata*, which occurs eastward in San Luis Potosí (Dalquest, 1953). An adult female from near Cuauhtémoc has the following measurements: total length, 429; length of tail vertebrae, 170; length of hind foot, 48; height of ear from notch, 15; condylobasal length of skull, 48.0; basilar length, 43.6; breadth of rostrum, 12.6; interorbital breadth, 10.8; orbitonasal length, 13.9; zygomatic breadth, 27.3; mastoid breadth, 23.9; length of tympanic bulla, 14.8; breadth of tympanic bulla, 8.1; length of toothrow, 14.8; length of M1, 4.9; width of P4, 4.8. A subadult male (LACM 35454) from near Jalpa has features of both *M. f. frenata* and *M. f. leucoparia* (Hall, 1951), but is referred to the latter on geographic grounds, chiefly because of Jalpa's proximity to northern Jalisco, from where *M. f. leucoparia* has been reported (Genoways and Jones, 1973).

Specimens examined.—***Mustela frenata leucoparia*** (Merriam, 1896) (1): 10 mi. W Jalpa, 6100 ft., (LACM). ***Mustela frenata neomexicana*** (Barber and Cockerell, 1898) (3): Valparaíso, 1; 3 mi. N Ciudad Cuauhtémoc, 6600 ft., 1 (LACM); Hda. El Lobo, 10 km. ENE Loreto, 7350 ft., 1 (OU).

Taxidea taxus berlandieri Baird, 1858

Badger

Badgers occur throughout the desert-scrub and mesquite-grasslands of northern and eastern Zacatecas. Burrows, the most conspicuous

manifestation of the presence of badgers, were noted by our field parties near San Juan de los Charcos, Cedros, Mazapil, Lulú, San Tiburcio, Tetillas, Rancho Grande, Saldaña, Pinos, and Jalpa. In the mountains east of Jalpa, Matson found four trapped pocket gophers (*Thomomys umbrinus*) had been removed from underground and eaten by a badger.

There appears to be little difference between external and cranial measurements of three adult badgers from Zacatecas and published data by Long (1972) on animals from more northern areas in the American Great Plains. Our findings are thus contrary to his division of badgers into what are essentially a larger northern group and a smaller southern group. However, the Zacatecan specimens do possess the long dorsal stripe and the reddish color characteristic of Long's (1972) southern group.

Specimens examined (6).—10 mi. E Concepción del Oro, 5300 ft., 3 (LACM); Bañon, 6400 ft., 2 (LACM); 33 km. ESE Trancoso, 2250 m., 1.

Spilogale gracilis

Spotted Skunk

The spotted skunk is the least conspicuous of the three skunks known to occur in Zacatecas. In the arid and semiarid open lands of northern and eastern Zacatecas, spotted skunks frequent rocky arroyo sides, rock fences, and boulder-strewn hills (Genoways and Jones, 1971*b*). The animal is also equally at home in forested uplands in southwestern parts of the state (Baker and Baker, 1975). Our knowledge of the distribution of spotted skunks in Zacatecas has been acquired largely by the efficient collecting of Percy L. Clifton (Matson, 1977). Of 12 specimens obtained, six showed lesions of the frontal sinuses resulting from infestations by roundworms (*Skrjabingylus* sp.).

Spotted skunks in the open lands of northern and eastern Zacatecas are referable to *S. g. leucoparia*, whereas smaller individuals found in southern and southwestern forested highlands and subtropical valleys belong to *S. p. angustifrons* (Van Gelder, 1959; Genoways and Jones, 1971*b*). The adult male (LACM 35455) from near Ciudad Cuauhtémoc, considered as *S. g. angustifrons*, has external and cranial dimensions somewhat intermediate between the two subspecies.

Specimens examined.—***Spilogale gracilis angustifrons*** A. H. Howell, 1902 (6): 3 mi. N Cuidad Cuauhtémoc, 6600 ft., 1 (LACM); 10 mi. W Jalpa, 5100 ft., 3 (LACM); 8 mi. NW Nochistlán, 6600 ft., 2 (LACM). ***Spilogale gracilis leucoparia*** Merriam, 1890 (6): 10 mi. SW Concepción del Oro, 7600 ft., 4 (LACM); 9 mi. N Nieves, 6000 ft., 2 (LACM).

Mephitis macroura

Hooded Skunk

Hooded skunks are common mustelids in all parts of the state. With the exception of leporids, these are the animals most frequently observed as road-kills on major highways. A female taken on 25 July was lactating. Skulls of individuals from near Pinos, Monte Escobedo, and Jalpa show

swollen postorbital areas indicative of severe infestations of frontal sinuses by roundworms (*Skrjabingylus* sp.).

Hooded skunks tend to be larger in northern México and adjacent parts of the United States (*M. m. milleri*) than in central and southern México (*M. m. macroura*). According to Hall and Dalquest (1950) and Howell (1901), the border between these two subspecies extends through northeastern Zacatecas, chiefly because of a specimen assigned to *M. m. milleri* from La Ventura, Coahuila, near the border of Zacatecas. Although lacking critical material from Zacatecas, it is suspected that this subspecies extends southward in the open lands of eastern Zacatecas, with the more southern subspecies, *M. m. macroura*, occurring in subtropical valleys and adjacent montane forests of western and southern Zacatecas. However, there seems to be no definite break in the gradual north-south trend in size.

Specimens examined.—***Mephitis macroura milleri*** Mearns, 1897 (9): 10 mi. SW Concepción del Oro, 7600 ft., 3 (LACM); 4 mi. NW Juan Aldama, 6200 ft., 1; 2 km. NW Juan Aldama, 1940 m., 1; 10 km. S Juan Aldama, 2220 m., 1; 23 km. NW Río Grande, 2190 m., 1; 1 km. N Rancho Grande, 2190 m., 1; 20 mi. NE Zacatecas, 6760 ft., 1. ***Mephitis macroura macroura*** Lichtenstein, 1832 (10): 12 mi. E Jérez, 6500 ft., 1; 7 mi. S Pinos, 6800 ft., 1 (LACM); Monte Escobedo, 7300 ft., 3 (LACM); 30 km. NE Jalpa, 1740 m., 1; 10 mi. W Jalpa, 6100 ft., 2 (LACM); 4 mi. S Jalpa, 4300 ft., 1 (LACM); 8 mi. NW Nochistlán, 6600 ft., 1 (LACM). *Additional record*: Valparaíso (Hall and Dalquest, 1950).

Conepatus mesoleucus

Hog-nosed Skunk

According to observations by our field parties, the hog-nosed skunk was much less conspicuous than was the hooded skunk in the open lands of northern and eastern Zacatecas. A part of this conclusion results from finding more road kills of the hooded skunk than of *C. mesoleucus*.

Hog-nosed skunks referable to *C. m. mearnsi* occur in the open desert-scrub and mesquite-grasslands of northern and eastern Zacatecas and are widespread in most of the northern and central parts of the Mexican Plateau. On the other hand, *C. m. sonoriensis* occupies only a small sector of subtropical valleys and adjacent forested highlands in southwestern Zacatecas. These latter animals have close resemblance to populations living on the northern and central Mexican Pacific Coastal Plain (Hall, 1981).

Measurements of an adult female *C. m. mearnsi* from near Villa Insurgentes and of two *C. m. sonoriensis*, an adult female from near Jalpa and an adult male from near Nochistlán, are, respectively: total length, ——, 565, 690; length of tail vertebrae, ——, 240, 265; length of hind foot, ——, 65, 80; height of ear from notch, ——, 65, 80; condylo-premaxillary length, 65.2, 67.5, 79.0; zygomatic breadth, 46.1, 44.4, 51.8; least interorbital constriction, 19.2, 20.5, 20.6; mastoid breadth, 38.9, 37.8, 44.1; width across first upper molars, 26.0, 27.1, 29.6; length of maxillary toothrow, 19.9, 21.1, 23.8.

Specimens examined.—***Conepatus mesoleucus mearnsi*** Merriam, 1902 (1): 2 mi. E Villa Insurgentes, 8050 ft. ***Conepatus mesoleucus sonoriensis*** Merriam, 1902 (6): Monte Escobedo,

7300 ft., 1 (LACM); Plateado, 2 (USNM); 10 mi. W Jalpa, 6100 ft., 1 (LACM); 8 mi. NW Nochistlán, 6600 ft., 1 (LACM); 2.7 mi. N Santa Rosa, 3400 ft., 1 (OU). *Additional records*: Laguna Valderrama, 40 mi. W Fresnillo (Jones and Webster, 1976); Valparaíso Mountains (Merriam, 1902).

Lutra longicaudis annectens Major, 1897

Southern River Otter

Local residents living adjacent to major tributaries of the Río Grande de Santiago in the subtropical valleys of southwestern Zacatecas are well acquainted with river otters as occasional inhabitants of such streams as the Río Juchipila and Río Atengo. It is likely that Zacatecan river otters are safe from over-exploitation where stretches of these rivers occur in deeply entrenched barrancas. No specimens were available for study.

Felidae—Cats

Felis concolor azteca Merriam, 1901

Mountain Lion

There are records (Young and Goldman, 1946) of the mountain lion from Chichimequillas [=20 mi. E Fresnillo] and Colorada [=40 mi. N Fresnillo]. Livestock operators wage a constant control program against this species, with cat traps maintained on trails and ranch workers being rewarded when animals are taken. The exact extent of destruction to domestic stock by mountain lions is not quantified; nevertheless, ranchers become concerned about the welfare of their herds when tracks of these large felids are discovered in range lands. Even so, mountain lions still persist in arid mountainous situations in eastern and northern Zacatecas. From this part of the state, one of our field parties received a report that an animal was shot 40 km. ESE of Concepción del Oro in 1977, and its hide sold in Saltillo. The mountainous area in the vicinity of Pico de Teyra northeast of Camacho, according to local residents, harbored mountain lions in 1975. Matson examined a photograph, taken in about 1957, of two mountain lions (Figure 6) on Rancho San Marcos near San Felipe de Nuevo Mercurio. These animals were shot in open desert-shrub by Alejandro Delgadillo. Near Río Grande, a mountain lion was captured a few years prior to 1971.

In southwestern Zacatecas, mountain lions appear to be widespread and not in the spotty numbers reported from other parts of the state. The remote barranca country of the Sierra Madre Occidental and adjacent ranges provide isolation for these cats. Reports of the presence of mountain lions were obtained from residents in the mountains west of Valparaíso, both northeast and northwest of Jalpa, and in the vicinity of Jiménez del Téul.

FIG. 6.—Two mountain lions (*Felis concolor*) taken about 1957 on Rancho San Marcos, west of San Felipe de Nuevo Mercurio. Photograph courtesy of Sn. Alejandro Delgadillo. The name of the man in photograph is unknown.

Felis rufus

Bobcat

The bobcat, although scorned by livestock operators, persists in most parts of Zacatecas. At most camp sites visited by our field parties, local residents reported the presence of these short-tailed felids. Desert ranges and rimrock habitat scattered throughout northern and eastern Zacatecas offer refuge for bobcats. However, the population is undoubtedly largest in the dissected highlands of the southwestern part of the state.

Subspecifically, bobcats are separable into *F. r. texensis*, which occurs in northern Zacatecas, and *F. r. escuinapae*, in the southern part (Matson, 1977). Although there appears to be no clear size difference between felids from northeastern and from southern Zacatecas, skins from the former area (near Concepción del Oro and San Andrés) are paler in color and more

scantily spotted than are those from the latter area (near Cuauhtémoc). Specimens from near Fresnillo and Bañon somewhat intermediate in these characters, are best referable to *F. r escuinapae*, to which Dalquest (1953) also assigned bobcats from western San Luis Potosí.

Specimens examined.—***Felis rufus escuinapae*** (J. A. Allen, 1903) (6): Bañon, 1951 m., 2 (LACM); 13 mi. NNW Fresnillo, 1 (LACM); 3 mi. N Cuauhtémoc, 6600 ft., 3 (LACM). ***Felis rufus texensis*** (J. A. Allen, 1895) (6): 4.5 mi. NE Concepción del Oro, 1 (OU); 11 mi. E Concepción del Oro, 5300 ft., 1 (LACM); 10 mi. SW Concepción del Oro, 7600 ft., 3 (LACM); San Andrés, 1 (LACM).

Tropical Cats

In southwestern Zacatecas, a mixture of subtropical valleys and adjacent highlands of the Sierra Madre Occidental seemingly be would attractive to tropical felids moving upstream along the tributaries of the Río Grande de Santiago from coastal Nayarit. The jaguar, *Felis onca hernandesii* (Gray), is well known to persons in this part of the state. Smaller spotted cats, "tigrillos," were also described by residents as occurring in tropical riparian growth along the streams and on adjacent rocky hillsides. There was no indication whether these reports included both, or only one of, the ocelot, *Felis pardalis*, and the margay, *Felis weidii*, either of which could reach Zacatecas by travelling along streamways from coastal Nayarit. There were no specific reports that the jagouaroundi, *Felis yagouaroundi*, occurred in Zacatecas. To date, however, no specimens of any of these cats are known from Zacatecas.

Artiodactyla—Even-toed Ungulates

Tayassuidae—Peccaries

Tayassu tajacu sororiensis (Mearns, 1897)

Collared Peccary

The collared peccary has a statewide distribution, but in thickly settled districts and the open lands of eastern Zacatecas, populations may be highly vulnerable to hunting and, consequently, are confined to more remote desert ranges where rimrock and dense shrub vegetation provide cover. In southwestern Zacatecas, the animal occurs in both subtropical growth along streams and in adjacent pine-oak highlands. At most camp sites, MSU field parties either noted tracks in the muddy banks of ranch tanks and other watering places or received word about the presence of the animals from local ranch operators. In eastern Zacatecas, records of collared peccaries were obtained in the vicinity of such places as Apizolaya, Coapas, Cedros, Tecolotes, Concepción del Oro, Camacho, Nieves, Río Grande, and Pinos. At the latter place, however, some observers felt that the animals had disappeared because of locally extensive cultivation and dense human population. In southwestern Zacatecas, reports of the collared peccary were obtained from residents of the streamside subtropical growth in canyons and

of the pine-oak highlands. Populations appeared to be holding their own south and west of Valparaíso and in the barranca country in the vicinity of Jalpa.

Although no specimens of collared peccary were secured in northeastern Zacatecas, it is suspected that this desert-shrub area is occupied by *T. t. angulatus*, which is known from Bledos in adjacent San Luis Potosí (Dalquest, 1953). Animals in southwestern Zacatecas are referred, chiefly on geographic grounds (Hall, 1981), to *T. t. sonoriensis*.

Specimens examined (2).—14.2 mi. N Jiménez de Téul, 7300 ft., 2 (OU).

Cervidae—Cervids

Odocoileus hemionus crooki (Mearns, 1897)

Mule Deer

It is supposed that in early times the mule deer occurred in most of northern and northeastern Zacatecas, especially in desert-shrub and arid, rim-rocked highlands, which are scattered through that part of the state. These habitats were occupied by early settlers and did not remain isolated for long from hunters. Constituting both a food supply for meat-hungry residents and a trophy for urban-dwelling sportsmen, this big, desert cervid appears to have followed a pattern of disappearance similar to that suffered by animals in adjacent areas of San Luis Potosí, as described by Dalquest (1953). At such places as Tecolotes, Coapas, and San Juan de los Charcos, local residents interviewed by members of field parties were well acquainted with the mule deer in the 1970s and usually said they had disappeared or lived only in remote badlands. On 7 August 1971, a licensed hunter living in Río Grande told Baker that mule deer still occurred in desert-scrub and rugged mountainous areas 30 kilometers west of the city. He said he shot five male mule deer in that area in 1970. We saw no trophies to substantiate his claim. He did suggest, however, that the establishment of permanent water supplies by building dams and drilling wells was extending livestock ranching to remote and formerly dry areas. The presence of such operations allowed more hunting, resulting in the demise of the animal. No specimens from Zacatecas have been preserved to our knowledge.

Odocoileus virginianus couesi (Coues and Yarrow, 1875)

White-tailed Deer

Unlike the mule deer, which is resident in desert plains and badlands, the white-tailed deer has thrived in areas of dense desert-scrub, along waterways, and especially in higher mountainous sectors of the state. Its major refuges today are pine-oak highlands and deeply entrenched valleys of the Sierra Madre Occidental and related mountain masses in the southwestern and southern parts of the state. In all of our field camps in southwestern mountainous districts, either deer tracks were observed or local persons reported the presence of the animals. Northwest of Valparaíso, Gary

Dawson saw a doe and a spotted fawn on 31 July 1970; near Milpillas de la Sierra, David Webster saw a deer on 7 August 1977; south of Tepetongo, Matson saw two adult females and a fawn in tropical thron scrub on 2 August 1977; southwest of Jérez, Matson saw a deer on 2 August 1977.

Although white-tailed deer are hunted year-around—despite laws to the contrary—the mountainous country is sufficiently rugged and steep-sloped to discourage all but the most persistent hunters. Thus, deer survive in many places, at least in minimum numbers. One of our field parties spent several days in July 1970 collecting in the vicinity of a deer camp in pine-oak habitat about 9 mi. NW Valparaíso, at 8350 feet elevation. We were told that each autumn a group of urban sportsmen hunt deer using this place as a base camp.

In northeastern Zacatecas, white-tailed deer have been thinned out by persistent hunting and other human encroachments in most places except in rugged highlands of desert mountains. Although surface water may be at a premium in these uplands, usually there are sufficient brush-edged rimrocks and stunted clumps of oak and piñon to provide a diversified food supply for this cervid. In the course of our field work in this area, we received positive reports of white-tailed deer occurring in the vicinity of such communities as San Juan de los Charcos, Apizolaya, Coapas, Cedros, Tecolotes, Concepción del Oro, Camacho, Río Grande, Sartaneja, and Ville de Cos. South of Rancho San Marcos near San Felipe de Nuevo Mercurio, Matson, on 7 July 1978, saw a white-tailed deer browsing on the riparian scrub growth in a desert arroyo about 50 kilometers southwest of the nearest montane habitat (Cerro de Teyra). The ranch owner, Alejandro Delgadillo, has a number of trophy antlers from the area.

The white-tailed deer in Zacatecas, as is characteristic of many other mammals in the area, evidently is divisible into two subspecies, *O. v. miquihuananensis* in the northeast and *O. v. couesi* in the southwest. According to Goldman and Kellogg (1940), the former subspecies is distinguished from the latter by having shorter ears, darker mid-dorsal area, upper side of tail noticeably black, but possessing no external or cranial size differences. We had no specimens from the northeastern area with which to make comparisons.

Specimens examined (7).—14.2 mi. N Jiménez de Téul, 7300 ft., 2 (OU); 9 mi. NW Valparaíso, 8350 ft., 1; San Juan Capistrano, 1 (USNM); Plateado, 2 (USNM); 9 mi. WNW Jalpa, 8250 ft., 1. *Additional record*: Laguna Valderrama, 40 mi. W Fresnillo (Jones and Webster, 1976).

Antilocapridae—Pronghorn

Antilocapra americana mexicana Merriam, 1901

Pronghorn

The pronghorn occurred in early historic times in open country of the Mexican Plateau as far south as Hidalgo, Guanajuato, and Jalisco (Hall, 1981; Nelson, 1925; Villa-R., 1951, 1955). With European settlement, the

preferred grassland of this hoofed animal became prime range for the raising of domestic livestock and, in many places, cultivated crops. The pronghorn was not only virtually excluded from its Mexican habitat but was also hunted to extinction in most of the vast area. Thus, by the mid-twentieth century, only token populations remained in scattered areas in Coahuila, Chihuahua, Sonora, Baja California, Durango, and perhaps San Luis Potosí and Zacatecas. The residual populations, in most instances, resulted from a concerted effort by local conservation-minded land operators to protect small herds from over hunting.

The pronghorn is known to many residents of northeastern Zacatecas. However, persons interviewed by members of our field parties considered the animal extirpated in the state. Nevertheless, its former presence is perpetuated in names of local places such as the Cerro Los Berrendos (20°57′N, 102°01′W), and Cerro El Berrendo (24°25′N, 102°01′W). The last record of pronghorn for Zacatecas was reported by Villa-R. (1951), and obtained by Dr. Martinez Cardenas, who observed small groups of these animals at the border of Zacatecas and San Luis Potosí in the Llanos de Palulú (about 23°50′N, 101°26′W). This plains area is approximately 33 km. SSE San Tiburcio. There is no recent evidence that pronghorn are still in the locality. No specimens are known to be preserved from Zacatecas.

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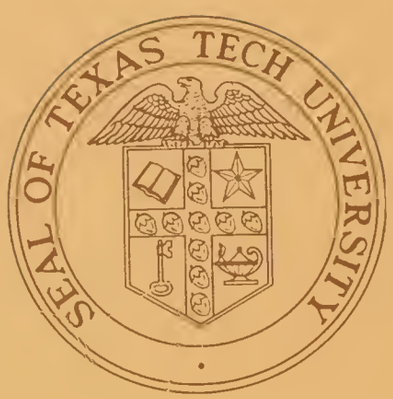
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