MAMMALS FROM THE STATE OF OAXACA, MEXICO, IN THE AMERICAN MUSEUM OF NATURAL HISTORY

GEORGE G. GOODWIN

BULLETIN
OF THE
AMERICAN MUSEUM OF NATURAL HISTORY
VOLUME 141 : ARTICLE 1 NEW YORK : 1969

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BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY
Volume 141, article 1, pages 1–270, figures
1–97, plates 1–40, tables 1–43

Issued April 30, 1969

Price: $15.00 a copy

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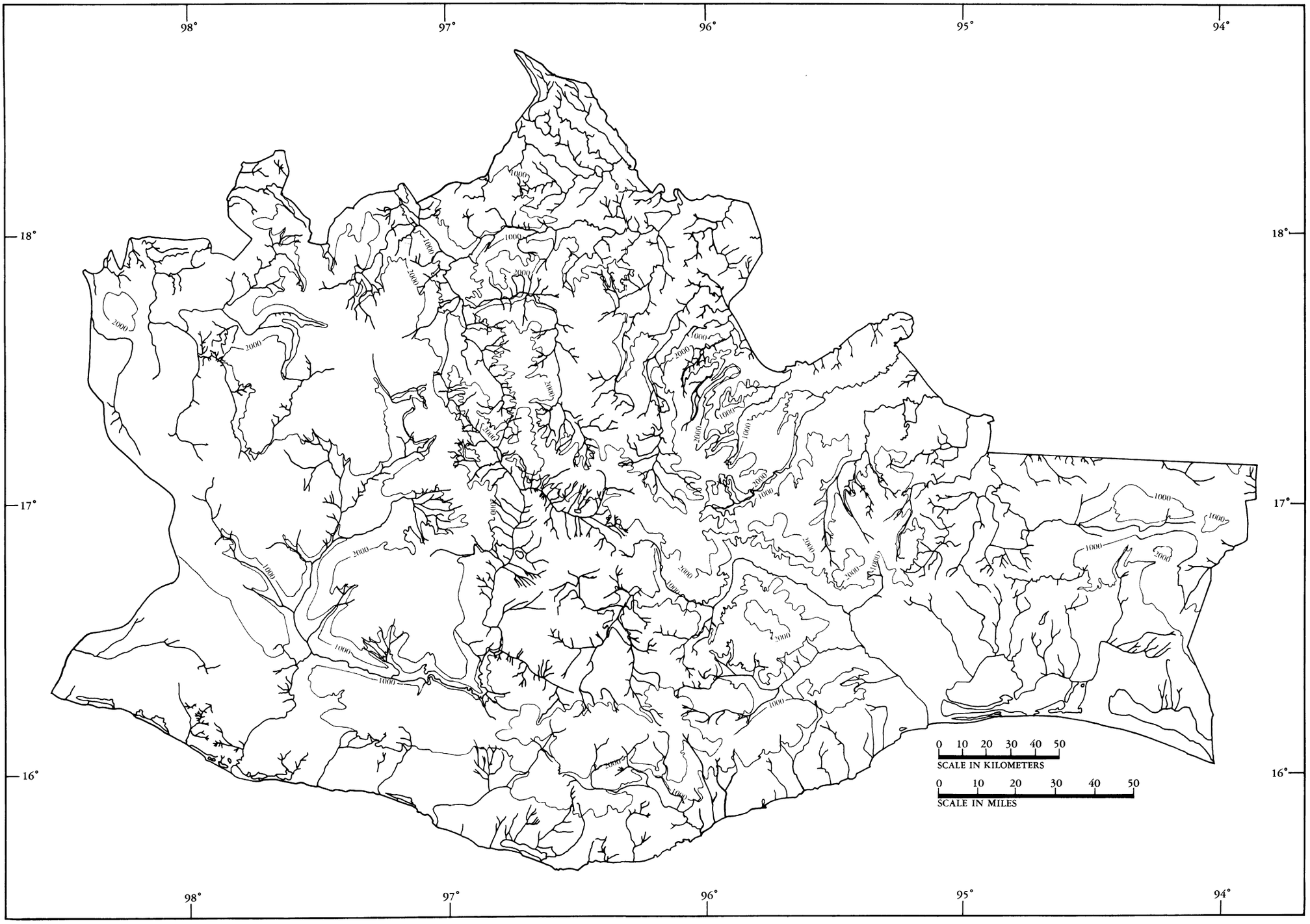


FIG. 1. Map of Oaxaca, showing topographic features, taken from 1:1,000,000 maps of the American Geographical Society.

INTRODUCTION

OWING TO THE geographically intermediate position of the State of Oaxaca, Mexico, wide-ranging species of both the Mexican and the Central American faunas broadly overlap. The sharpest differentiation in the mammalian fauna of Oaxaca occurs at the Isthmus of Tehuantepec. This marks the northwestern limit of the range of some Central American forms and the southeastern limit of the range of some Mexican forms. For example, the ranges of the bobcat and of the cacomistle (*Bassariscus astutus*) extend to, but not eastward beyond, the Isthmus, whereas the ranges of the white-lipped peccary and of the brown mouse (*Scotinomys*) extend to, but not west of, the Isthmus of Tehuantepec.

The taxonomy, geographic distribution, and, to a lesser extent, the ecological distribution of native Recent mammals in the Mexican state of Oaxaca are the subjects of the present report. Information has been derived principally from the study of about 5600 specimens in the American Museum of Natural History. Selected specimens in other collections have been studied if the taxon represented was not present in our collection or to document occurrence in certain parts of Oaxaca, if those parts were unrepresented in our collections. Only those reports in the literature that are needed to document occurrence or ranges as noted above are cited. Actually, most publications since Hall and Kelson (1959) that pertain to the distribution or taxonomy of mammals from Oaxaca are cited.

The nomenclature used here is basically that of Hall and Kelson (1959), and that work may be consulted for synonymies, type localities, and references. All usage that differs from theirs is herein documented. The ranges of each taxon beyond Oaxaca were likewise summarized by Hall and Kelson. Comments on ranges beyond Oaxaca are included here only when they are relevant to the ranges within Oaxaca and in cases in which the ranges are different from those given by Hall and Kelson. Ranges within Oaxaca are summarized on the maps, and comment is included in the text where appropriate.

This report is based principally on collections made by Thomas MacDougall in the years from 1943 to 1967. MacDougall, field botanist and collector of zoological specimens, was born in Scotland, December 9, 1896, and served with the British Armed Forces in World War I. He completed a course in landscape engineering at Syracuse University in 1924 and for the past 20 years has specialized in the flora and fauna of southern Mexico. Other collections of Oaxacan mammals in the American Museum of Natural History included in this report were made by Audry Buller in 1890, by graduate and undergraduate students from Walla Walla College under the direction of Ernest S. Booth from 1951 to 1956, by William J. Schaldach, Jr., in 1961, and by M. D. Tuttle and A. L. Tuttle in 1962.

GEOGRAPHY, TOPOGRAPHY, AND CLIMATE OF OAXACA

Oaxaca is one of the two southernmost Mexican states and is bounded to the west by the State of Guerrero, to the northwest by the State of Puebla, to the north by the State of Veracruz, to the east by the State of Chiapas, and to the south by the Pacific Ocean.

Approximately half of the waters of Oaxaca drain northward into the Gulf of Mexico, and the other half drain southward into the Pacific Ocean.

The bulk of Oaxaca is a high and mountainous region with a temperate climate, partly dry and partly humid. The mountains are bordered on the north and south by areas that are low and hot. There are large areas within the state with a humid climate, and, therefore, the impression of dryness that a traveler receives along the Pan-American Highway which traverses the state from northwest to southeast is exaggerated. Even in the generally drier regions there are many heights that intercept moisture-laden winds, and these support cloud forests with interesting flora and fauna. The city of Oaxaca (Oaxaca de Juárez), is at about 5000 feet in elevation, which is approximately the average altitude of the state. There are many scattered

mountains of 10,000 feet or more in altitude. Climatic conditions in Oaxaca vary greatly, owing to highly diversified local conditions of elevation, slope exposure, and the direction of prevailing winds.

Thomas MacDougall has grouped the extremely varied conditions in the climate and topography of Oaxaca into three major zones.

ZONE A: This zone is based on high humidity. It is an area exposed to moisture-laden winds from the Gulf of Mexico. Because these are prevailingly north winds, the southern slopes of the mountains here are less humid than the northern slopes and support a somewhat different flora, usually with a higher percentage of pines and oaks. Altitudes in zone A vary from near sea level to 10,000 feet and more. The higher elevations are usually pine covered. The natural cover of most of the remainder would be chiefly tropical rain and cloud forest, but large areas have been cleared for crops. Much coffee is grown in zone A, which results in partial protection of the forest; shade required by the coffee trees is usually provided by native trees, left standing when the land is cleared for planting. "Nomadic" farming continues to destroy the rain forest; the forest is cut down and burned, and corn is planted with a "pointed stick," directly onto this burned-over land. After a period of from one to several years the land is abandoned for planting. Few areas are too steep or too rocky for this practice of "nomadic" farming.

Some high altitudes are too cold and wet for native corn production, and here the cloud forest may remain nearly primeval. A good example of the latter may be seen along the Oaxaca-Tuxtepec Highway, north of the Sierra de Juárez, between 7000 and 9000 feet in altitude. The portion of zone A east of the Isthmus of Tehuantepec is of special interest for its flora and fauna. Since the arrival of the Spaniards in Mexico, the larger part of this area has remained uninhabited and unexplored. It is probably the largest single unit of virgin rain forest in Mexico today. Here large nomadic herds of white-lipped peccary find freedom to roam, and the tapir is common. In the cloud forests, the black chachalaca (*pajuil*) abounds, and the quetzal is not uncommon. An occasional view of the magnificent harpy eagle is another attraction. This eastern sub-zone would be nearly ideal as a unit of tropical rain forest to conserve for posterity.

ZONE B: This zone has, in general, a moderately dry and temperate climate. The average altitude is approximately 5000 feet, varying from less than 1000 feet to more than 10,000 feet. Parts of the Pacific slopes of the Sierra Madre del Sur, west of the Isthmus of Tehuantepec, have a moist climate, and this area may be considered a distinct sub-zone. Other variations include the Canyon of Tomellin, a hot, dry valley and gorge, traversed by the Oaxaca to Puebla railroad. Many high peaks exposed to moist winds from the Gulf of Mexico or the Pacific Ocean support cloud forest. Much of the land in zone B has been cleared for farming. Many highland slopes are denuded and often much eroded. The forests are principally of pine and oak of many species. Many of the drier areas at lower altitudes have xerophytic forest cover, in many places with a predominance of large cacti. The moist parts of the Sierra Madre del Sur, referred to above, include a coffee-growing area, some 50 kilometers from north to south and extending east and west across the districts of Pochutla and Juquila. The natural forest cover in this coffee-growing area consists largely of evergreen, broad-leaved trees of many species.

ZONE C: As delineated here (see fig. 2) zone C has an inland boundary of approximately 500 feet in altitude. In some areas, zone C grades gradually into zone B, but usually there is a more abrupt transition to the foothills or steep slopes of the Sierra Madre. In parts of zone C, especially toward the eastern end, there are hills and ridges more than 500 feet in altitude. West of Salina Cruz a large ridge crosses the plains to the coast where it forms a high, rocky headland known as El Morro.

As might be expected from its latitude and altitude, zone C is generally hot. In the area of the Isthmus of Tehuantepec, the heat is tempered from October to March by the prevailing, often strong, north winds. This area is also the driest part of the Pacific plains, and the woods there consist mainly of low-growing xerophytic trees. West of the

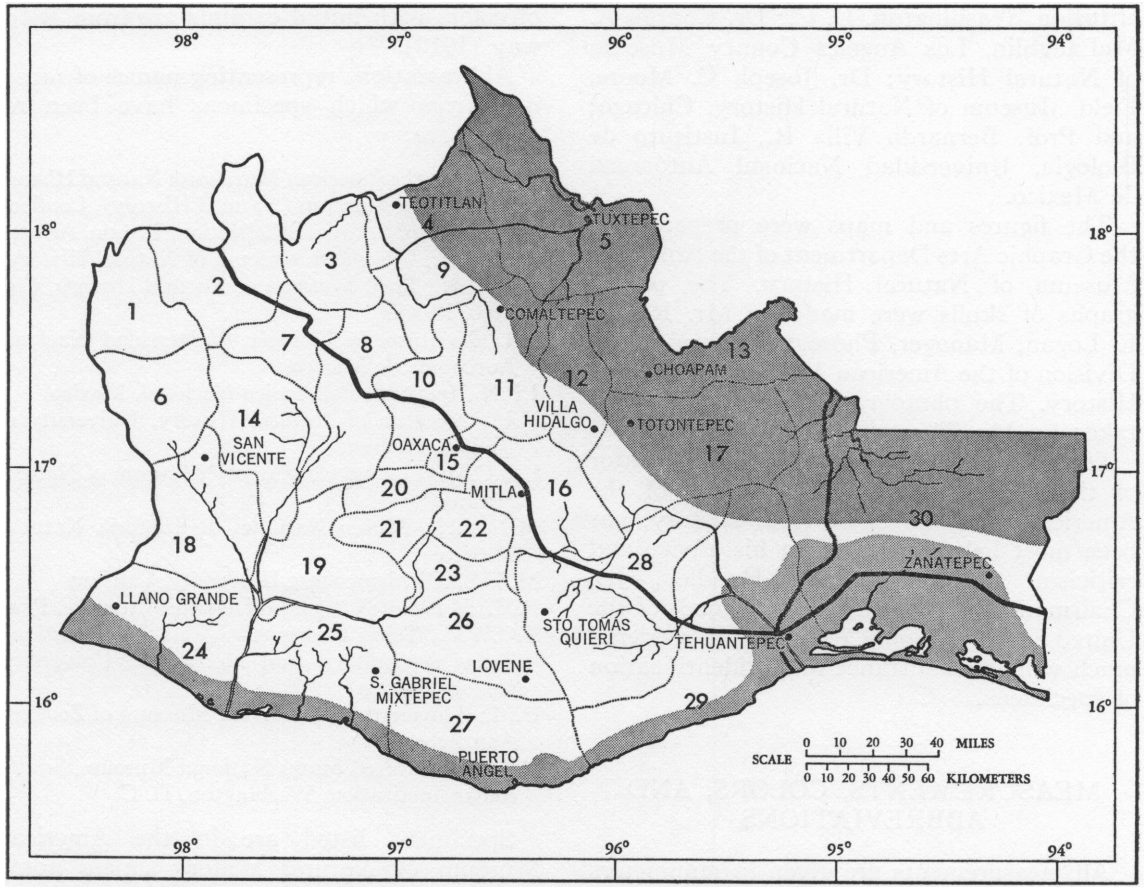


FIG. 2. Political districts and major life zones of Oaxaca. 1, Silacayoapam; 2, Huajuápam; 3, Coixtlahuaca; 4, Teotitlán; 5, Tuxtepec; 6, Juxtlahuaca; 7, Teposcolula; 8, Nochixtlán; 9, Cuicatlán; 10, Etla; 11, Ixtlán; 12, Villa Alta; 13, Choápam; 14, Tlaxiaco; 15, Oaxaca; 16, Tlacolula; 17, Mixes; 18, Putla; 19, Sola de Vega; 20, Zaachila; 21, Zimatlán; 22, Ocotlán; 23, Ejutla; 24, Jamiltepec; 25, Juquila; 26, Miahuatlán; 27, Pochutla; 28, Yautepec; 29, Tehuantepec; 30, Juchitán. *Heavy shading:* Northern humid zone. *Light shading:* Southern hot, arid zone. *No shading:* Central highland zone.

Isthmus, tree associations become taller and more luxuriant, although still mainly deciduous in habit. In addition to man-made savannas, there are natural open grassy areas. Stands of palms, *Attalea cohune*, *Inodes mexicana*, and *Acrocomia mexicana* form other habitat groups. Particularly noteworthy are the extensive and dense stands of corozo palms, *Attalea cohune*, in the area of the Río Grande, District of Juquila. The many coastal lagoons have extensive margins of mangrove swamps. The long Pacific coastal area is still another habitat in zone C. In the western half of the Pacific plains area there are ample rains during the wet season, followed by a definite dry season.

ACKNOWLEDGMENTS

For the loan of material or for information on specimens in other museums, or for both, my thanks are due to Dr. F. Bonet, Escuela de Ciencias Biologicas of the Instituto Politecnico Nacional, Mexico; Dr. William H. Burt, Museum of Zoology, University of Michigan; Dr. William B. Davis, Texas Cooperative Wildlife Collections, Texas Agricultural and Mechanical University; Dr. Jean Dorst, Museum National d'Histoire Naturelle, Paris; Dr. E. Raymond Hall, Museum of Natural History, the University of Kansas; Dr. Charles O. Handley, Jr., United States National Museum of the Smithsonian In-

stitution, Washington, D. C.; Dr. Charles A. McLaughlin, Los Angeles County Museum of Natural History; Dr. Joseph C. Moore, Field Museum of Natural History, Chicago; and Prof. Bernardo Villa R., Instituto de Biologia, Universidad Nacional Autónoma de Mexico.

The figures and maps were prepared by the Graphic Arts Department of the American Museum of Natural History. The photographs of skulls were made by Mr. Robert E. Logan, Manager, Photography and Slides Division of the American Museum of Natural History. The photographs of habitats were taken by Mr. Thomas MacDougall.

Dr. Sydney Anderson, Associate Curator of the Department of Mammalogy of the American Museum of Natural History, has been most helpful in offering his advice and criticism. Dr. Charles O. Handley, Jr., Chairman of the Division of Mammals of the United States National Museum, has rendered much valuable assistance in the identification of specimens.

MEASUREMENTS, COLORS, AND ABBREVIATIONS

All measurements are given in millimeters and are standard in mammalogy. The names of colors with initial capitals are from Ridgway (1912).

Abbreviations representing names of museums from which specimens have been recorded are:

A.M.N.H., the American Museum of Natural History
B.M., British Museum (Natural History), London
C.C., Richard S. Crossin Collection, Tucson, Arizona
C.M.N.H., Cleveland Museum of Natural History
F.M.N.H., Field Museum of Natural History, Chicago, Illinois
I.B., Instituto de Biologia, Universidad Nacional Autónoma de Mexico
I.P.N., Instituto Politecnico Nacional, Mexico
K.U., Museum of Natural History, University of Kansas, Lawrence
L.A.C.M., Los Angeles County Museum of Natural History
M.N.H.N., Museo Nacional de Historia Natural, Mexico
M.S.U., Michigan State University, Lansing
P.M., Museum National d'Histoire Naturelle, Paris
T.C.W.C., Texas Cooperative Wildlife Collections, Texas Agricultural and Mechanical University, College Station
U.M., University of Michigan, Museum of Zoology, Ann Arbor
U.S.N.M., United States National Museum, Smithsonian Institution, Washington, D. C.

Specimens listed are in the American Museum of Natural History unless noted otherwise.

KEY TO THE NATIVE MAMMALS OF OAXACA[1]

1. Marsupium usually present; five pairs of upper incisor teeth . . . . . Marsupialia, 11
   Marsupium never present; fewer than five pairs of upper incisor teeth 2
2(1). Mammals capable of flight; bones of fingers greatly lengthened to support wing membranes . . . . . Chiroptera, 30
   Mammals not capable of flight; bones of fingers not greatly lengthened 3
3(2). Eyes minute; muzzle long and mobile; first upper incisor procumbent, tip curved . Insectivora, 17
   Eyes not minute; muzzle not long and mobile; first upper incisor not procumbent, tip not curved 4
4(3). Limbs greatly lengthened; tail prehensile; muzzle very short and broad; nostrils opening laterally . . . . . Primates, 114
   Limbs not greatly lengthened; tail not prehensile except in the anteaters; muzzle not short and broad; nostrils not opening laterally. 5
5(4). All teeth single-rooted and lacking enamel, or absent . . . . . Edentata, 115
   Some teeth not single-rooted, no teeth lacking enamel, and teeth never entirely absent 6
6(5). Canine teeth not present. 7
   Canine teeth present 9
7(5). Incisors present in upper jaw. 8
   Incisors not present in upper jaw 10
8(7). Only one pair of incisor teeth present in upper jaw . . . . . Rodentia, 123
   Two pairs of incisor teeth present in upper jaw . . . . . Lagomorpha, 117
9(6). Fourth upper premolar and first lower molar teeth strongly developed as carnassial or shearing teeth (not so well developed in the procyonids) . . . . . .Carnivora, 234
   Fourth upper premolar and first lower molar not developed as carnassial or shearing teeth . . . 10
10(9). Third digit on forefoot and hind foot enlarged, and serving as the main axis of the foot . . . . . Perissodactyla, *Tapirus* (p. 249)
   Third and fourth digits on forefoot and hind foot enlarged, paired, and serving as the main axis of the foot . . . . . Artiodactyla, 267
11(1). Hind feet webbed for swimming . . . . . *Chironectes* (p. 30)
   Hind feet not webbed for swimming 12
12(11). More than proximal third of tail haired . . . . . *Caluromys* (p. 33)
   Less than proximal third of tail haired 13
13(12). Pelage with coarse guard hairs overlying under fur . . . . . *Didelphis* (p. 27)
   Pelage without coarse guard hairs overlying under fur. 14
14(13). Total length more than 400 . . . . . *Philander* (p. 31)
   Total length less than 400 . . . . . *Marmosa*, 15
15(14). Tail considerably more than half of total length, color red. . *Marmosa mexicana mexicana* (p. 31)
   Tail not more than half of total length, color gray 16
16(15). Pattern of dorsal pelage strongly marked . . . . . *Marmosa canescens oaxacae* (p. 32)
   Pattern of dorsal pelage obscure . . . . . *Marmosa canescens canescens* (p. 31)
17(3). No more than three unicuspid teeth in each side of upper jaw 18
   More than three unicuspid teeth in each side of upper jaw. 19
18. Total length more than 125 . . . . . *Notiosorex gigas* (p. 42)
   Total length less than 125 . . . . . *Notiosorex phillipsii* (p. 43)
19(17). Length of tail more than 75 per cent of length of head and body . . . . . *Sorex*, 20
   Length of tail less than 45 per cent of length of head and body . . . . . .*Cryptotis*, 24
20(19). Third unicuspid tooth smaller than fourth 21
   Third unicuspid tooth about equal to fourth . . . . . *Sorex saussurei*, 22
21(20). Total length more than 120 . . . . . .*Sorex veraepacis mutabilis* (p. 34)
   Total length less than 115 . . . . . *Sorex oreopolus ventralis* (p. 39)
22(20). Cranial breadth, 9.0. . . . . .*Sorex saussurei oaxacae* (p. 38)
   Cranial breadth, 8.7. 23
23(22). Length of tail, 47–48 . . . . . *Sorex saussurei saussurei* (p. 34)
   Length of tail, 52–57 . . . . . *Sorex saussurei veraecrucis* (p. 38)

[1] In order that persons using this key may have additional characters as an aid in verifying their tentative entifications, selected diagnostic characters or other especially evident characters are noted in each account.

24(19). Total length more than 130 . . . . . *Cryptotis magna* (p. 41)
Total length less than 130 25
25(24). Claws on forefeet enlarged, length more than 3.0 . . . . . *Cryptotis fossor* (p. 41)
Claws on forefeet not enlarged, length less than 3.0 26
26(25). Color of under parts contrasting with color of back . . . . . *Cryptotis celatus* (p. 41)
Color of under parts not contrasting with color of back 27
27(26). Unicuspid teeth with inner tubercles strongly developed . . *Cryptotis mexicana mexicana* (p. 39)
Unicuspid teeth with inner tubercles not strongly developed 28
28(27). Total length less than 100 . . . . . *Cryptotis frontalis* (p. 40)
Total length more than 100 29
29(28). Length of hind foot not more than 14 . . . . . *Cryptotis mexicana peregrina* (p. 39)
Length of hind foot more than 14. . . . . .*Cryptotis mexicana machetes* (p. 40)
30(2). Nose leaf and prominent dermal outgrowths on chin not present 31
Nose leaf and prominent dermal outgrowths on chin present 35
31(30). Tail shorter than interfemoral membrane 32
Tail as long as interfemoral membrane and exceeding length of head and body . Natalidae (p. 93)
32(31). Proximal phalanx of third finger reflexed . . . . . .Emballonuridae, 36
Proximal phalanx of third finger flexed 33
33(32). Tail shorter than interfemoral membrane, feet and claws greatly enlarged . . Noctilionidae (p. 50)
Tail as long as or longer than interfemoral membrane, feet and claws normal 34
34(33). Tail as long as interfemoral membrane, muzzle well haired, wings broad . . Vespertilionidae, 86
Tail longer than interfemoral membrane, muzzle naked, wings narrow. . . . . Molossidae, 103
35(30). Nose leaf and dermal outgrowth on chin prominent, calcar well developed, upper incisors smaller than canines . . . . . Phyllostomidae, 43
Nose leaf rudimentary, calcar rudimentary, upper incisors larger than canines . Desmodontidae, 85
36(32). Forearm dotted with tufts of fur . . . . . *Rhynchonycteris naso* (p. 43)
Forearm not dotted with tufts of fur 37
37(36). Color white . . . . . *Diclidurus albus virgo* (p. 48)
Color not white. 38
38(37). Longitudinal whitish dorsal lines present. . . . . *Saccopteryx bilineata* (p. 44)
Longitudinal whitish dorsal lines not present 39
39(38). Glandular sac in antebrachial membrane present 40
Glandular sac in antebrachial membrane not present . *Centronycteris maximiliani centralis* (p. 48)
49(39). Dorsal surface of rostrum inflated anteriorly 41
Dorsal surface of rostrum not inflated anteriorly 42
41(40). Color gray, length of forearm more than 41 . . . . . *Balantiopteryx plicata plicata* (p. 48)
Color brown, length of forearm less than 41 . . . . . *Balantiopteryx io* (p. 48)
42(40). Length of forearm more than 48 . . . . . *Peropteryx kappleri kappleri* (p. 45)
Length of forearm less than 48 . . . . . *Peropteryx macrotis macrotis* (p. 45)
43(35). Nose leaf usually well developed, platelike outgrowths on lower lip absent 44
Nose leaf absent, platelike outgrowths on lower lip present. . . . . Mormoopinae, 48
44(43). Muzzle short and broad, tail always absent 45
Muzzle long and narrow, tail not always absent 46
45(44). White facial stripes or median dorsal line usually present (*Centurio* excepted), feet not hairy, crowns of molars with cusps rising from a broad flattened surface, interfemoral membrane well developed . . . . . Stenoderminae, 74
White facial stripes and median dorsal line absent, feet hairy, crowns of molars with a longitudina groove on broad flattened surface, interfemoral membrane virtually absent . . .Sturnirinae, 73
46(44). Ears small, tongue extremely long, with bristle-like papillae toward tip . . . Glossophaginae, 61
Ears large, tongue normal, without bristle-like papillae toward tip 47
47(46). Naked pad on lip V- or Y-shaped, and with or without border of small papillae. . . . . Phyllostomatinae, 52
Naked pad on lip with large O-shaped central wart bordered by small, rounded papillae . . . . . Carollinae, 71
48(43). Wings attached along middle of back, presenting a naked-backed appearance. . . . . *Pteronotus davyi fulvus* (p. 54)
Wings attached along sides of body, a tract of haired skin extending to base of tail 49

49(48). Ears connected by a low band across forehead . . . . . *Mormoops m. megalophylla* (p. 55)
Ears separate, not connected by a band across forehead 50
50(49). Length of forearm less than 50 . . . . . *Pteronotus personata psilotis* (p. 51)
Length of forearm more than 50 . . . . . *Pteronotus rubiginosa*, 51
51(50). Length of forearm less than 60 . . . . . *Pteronotus rubiginosa mexicana* (p. 51)
Length of forearm 60 or more . . . . . *Pteronotus rubiginosa fusca* (p. 51)
52(47). One pair of lower incisors present 53
Two pairs of lower incisors present 54
53(52). Length of forearm more than 60 . . . . . *Chrotopterus auritus auritus* (p. 64)
Length of forearm less than 60 . . . . . *Mimon bennettii cozumelae* (p. 62)
54(52). Ears connected by a band across forehead 55
Ears not connected by a band across forehead 56
55(54). Length of forearm more than 50 . . . . . *Macrotus waterhousii mexicanus* (p. 62)
Length of forearm less than 50 . . . . . *Micronycteris megalotis mexicana* (p. 56)
56(54). Length of forearm less than 42 57
Length of forearm more than 45 58
57(56). Fifth metacarpal shortest, third metacarpal longest . . . . . *Micronycteris brachyotis* (p. 57)
Fourth metacarpal shortest, fifth metacarpal longest . . . . . *Micronycteris sylvestris* (p. 61)
58(56). Length of noseleaf more than three times width at base . . . *Lonchorhina aurita aurita* (p. 62)
Length of noseleaf less than three times width at base 59
59(58). Two pairs of lower premolars present . . . . . *Phyllostomus discolor verrucosus* (p. 62)
Three pairs of lower premolars present 60
60(59). Length of forearm less than 65 . . . . . *Trachops cirrhosus coffini* (p. 63)
Length of forearm more than 100 . . . . . *Vampyrum spectrum nelsoni* (p. 65)
61(46). Incisors present in lower jaw 62
Incisors not present in lower jaw 64
62(61). Upper incisors projecting strongly forward . . . . . *Glossophaga soricina leachii* (p. 65)
Upper incisors not projecting strongly forward 63
63(62). Elevation of braincase above bullae, 8.5 . . . . . *Glossophaga commissarisi* (p. 65)
Elevation of braincase above bullae, 8.7 . . . . . *Glossophaga alticola* (p. 69)
64(61). External tail absent . . . . . *Anoura geoffroyi lasiopyga* (p. 70)
External tail present 65
65(64). Length of forearm more than 50 . . . . . *Leptonycteris*, 66
Length of forearm less than 50 67
66(64). Posterior border of interfemoral membrane hairy . . . . . *Leptonycteris nivalis* (p. 72)
Posterior border of interfemoral membrane not hairy . . . . . *Leptonycteris yerbabuenae* (p. 72)
67(65). Length of rostrum less than length of braincase 68
Length of rostrum greater than length of braincase 69
68(67). Pterygoids inflated and in contact with bullae . . . . . *Choeroniscus godmani* (p. 70)
69(67). Pterygoids not inflated and not in contact with bullae 70
70(69). Greatest length of skull more than 32 . . . . . *Musonycteris harrisoni* (p. 70)
Greatest length of skull less than 32 71
71(70). Greatest length of skull more than 25 . . . . . *Choeronycteris mexicana* (p. 70)
Greatest length of skull less than 25 . . . . . *Hylonycteris underwoodi* (p. 71)
72(47). Length of forearm more than 42 . . . . . *Carollia perspicillata azteca* (p. 74)
Length of forearm less than 42 . . . . . *Carollia subrufa* (p. 75)
73(45). Length of forearm, 37–42.5 . . . . . *Sturnira lilium parvidens* (p. 77)
Length of forearm, 43.5–48.5 . . . . . *Sturnira ludovici hondurensis* (p. 79)
74(45). Face naked and covered with dermal outgrowths, nose leaf rudimentary . . . *Centurio senex* (p. 90)
Face not naked and not covered with dermal outgrowths, nose leaf well developed 75
75(74). Nasal bones absent . . . . . *Chiroderma villosum jesupi* (p. 85)
Nasal bones present 76
76(75). Inner upper incisors with cutting edges notched 77
Inner upper incisors with cutting edges entire 78
77(76). Length of forearm more than 52 . . . . . *Vampyrodes caraccioloi major* (p. 85)
Length of forearm less than 40 . . . . . *Artibeus hartii* (p. 90)
78(76). Upper incisors crowded between canines . . . . . *Uroderma bilobatum bilobatum* (p. 79)
Upper incisors not crowded between canines 79

79(78). White dorsal line present . . . . . *Vampyrops helleri* (p. 79)
White dorsal line not present 80
80(79). Length of forearm more than 63 . . . . . *Artibeus lituratus intermedius* (p. 87)
Length of forearm less than 63 81
81(80). Length of forearm more than 53 82
Length of forearm less than 50 83
82(81). Interfemoral membrane hairy . . . . . *Artibeus hirsutus* (p. 85)
Interfemoral membrane not hairy . . . . . .*Artibeus jamaicensis yucatanicus* (p. 85) or *A. j. triomylus* (p. 86)
83(81). Length of forearm more than 42 . . . . . *Artibeus aztecus* (p. 90)
Length of forearm less than 40 84
84(83). Facial stripes indistinct or absent . . . . . *Artibeus toltecus* (p. 88)
Facial stripes sharply defined . . . . . *Artibeus phaeotis phaeotis* (p. 89)
85(35). Thumb more than 14.0 in length, interfemoral membrane and feet not hairy . . . . . *Desmodus rotundus murinus* (p. 92)
Thumb less than 13.0 in length, interfemoral membrane and feet hairy. *Diphylla ecaudata* (p. 93)
86(34). Two pairs of upper incisors present 87
One pair of upper incisors present 96
87(86). Length of ear more than 30 . . . . . *Plecotus townsendii australis* (p. 107)
Length of ear less than 30 88
88(87). More than one pair of upper premolars present 89
One pair of upper premolars present 95
89(85). Two pairs of upper premolars present . . . . . .*Pipistrellus subflavus veraecrucis* (p. 102)
Three pairs of upper premolars present 90
90(89). Length of forearm more than 40 91
Length of forearm less than 40 92
91(90). Posterior border of uropatagium lightly haired . . . . . *Myotis velifer velifer* (p. 95)
Posterior border of uropatagium strongly haired . . . . . *Myotis thysanodes aztecus* (p. 96)
92(90). Length of forearm more than 35 93
Length of forearm less than 35 94
93(92). Basic color of fur cinnamon brown . . . . . *Myotis fortidens* (p. 96)
Basic color of fur blackish brown . . . . . *Myotis argentatus* (p. 101)
94(92). Length of ears exceeding length of muzzle . . . . . *Myotis californicus mexicanus* (p. 96)
Length of ears not exceeding length of muzzle . . . . . *Myotis nigricans dalquesti* (p. 96)
95(88). Length of forearm more than 45 . . . . . .*Eptesicus fuscus miradorensis* (p. 102)
Length of forearm less than 45 . . . . . *Eptesicus gaumeri gaumeri* (p. 103)
96(86). Two pairs of upper premolars present 97
One pair of upper premolars present 98
97(96). Color red, length of forearm less than 50. . . . . *Lasiurus borealis teliotis* (p. 104)
Color silver gray, length of forearm more than 50 . . . . . *Lasiurus cinereus cinereus* (p. 104)
98(96). Length of forearm more than 49 . . . . . *Lasiurus intermedius intermedius* (p. 105)
Length of forearm less than 49 99
99(98). Length of forearm more than 40 100
Length of forearm less than 36 101
100(99). Hair on face black . . . . . .*Lasiurus ega panamensis* (p. 105)
Hair on face clay color . . . . . *Lasiurus ega xanthinus* (p. 105)
101(99). Length of forearm more than 33.5 . . . . . *Baeodon alleni* (p. 107)
Length of forearm less than 33.5 102
102(101). Ears when laid forward extending beyond tip of nostrils . . . . . *Rhogeessa gracilis* (p. 106)
Ears when laid forward not extending beyond tip of nostrils . . . . . *Rhogeessa tumida* (p. 105) or *R. parvula* (p. 106)
103(34). Two or more pairs of incisors in lower jaw 104
One pair of incisors in lower jaw 110
104(103). Three pairs of incisors in lower jaw . . . . . .*Tadarida brasiliensis mexicanus* (p. 112)
Two pairs of incisors in lower jaw. 105
105(104). Ears separate, inner margins not rising from same point on forehead . *Molossops greenhalli* (p. 108)
Ears not separate, inner margins rising from same point on forehead 106

106(105). Vertical grooves on upper lip 107
No vertical grooves on upper lip 108
107(106). Length of forearm more than 55 . . . . . *Tadarida macrotis* (p. 112)
Length of forearm less than 50 . . . . . *Tadarida femorosacca* (p. 112)
108(106). Palate dome-shaped . . . . . *Promops centralis* (p. 114)
Palate not dome-shaped 109
109(108). Length of forearm more than 60 . . . . . *Eumops underwoodi underwoodi* (p. 113)
Length of forearm less than 60 110
110(109). Tragus very small and pointed . . . . . *Eumops auripendulus oaxacensis* (p. 112)
Tragus large and broad . . . . . *Eumops glaucinus* (p. 113)
111(33). Length of forearm more than 50 . . . . . *Molossus ater nigricans* (p. 114)
Length of forearm less than 50 112
112(111). Pelage unicolored, blackish to roots . . . . . *Molossus macdougalli* (p. 114)
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[1] No Oaxacan specimens.

SYSTEMATIC ACCOUNTS

ORDER **MARSUPIALIA** ILLIGER

POUCHED MAMMALS

FAMILY **DIDELPHIDAE** GRAY

OPOSSUMS

GENUS **DIDELPHIS** LINNAEUS

COMMON OPOSSUMS

Didelphis marsupialis californica Bennett

Plate 1, figures 1, 2; text figure 3

TYPE LOCALITY: "That part of California which adjoins to Mexico" (Bennett, 1833, p. 40); restricted to Sonora, Mexico, by Hershkovitz (1951, p. 550).

RANGE IN OAXACA: Widely distributed at low and moderate elvations in eastern and northern Oaxaca, and probably into the southwestern part of the state where specimens have not yet been recorded.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 725–947; tail naked; thumbs on hind feet, opposable to toes; pelage gray, long and lax. Skull long and relatively narrow; rostrum heavy; nasals long; braincase small; occipital and sagittal crests strongly developed with age; canine teeth large, larger in males than in females; five pairs of upper incisors (this number in all species of Oaxacan marsupials).

MEASUREMENTS: In table 1.

SPECIMENS EXAMINED: Juchitán: Buena Vista, one; La Gloria, one; Santa María del Mar, four; Tapanatepec, one. Tehuantepec: Boca del Río, 12; Cerro de Tigre, one; Cerro

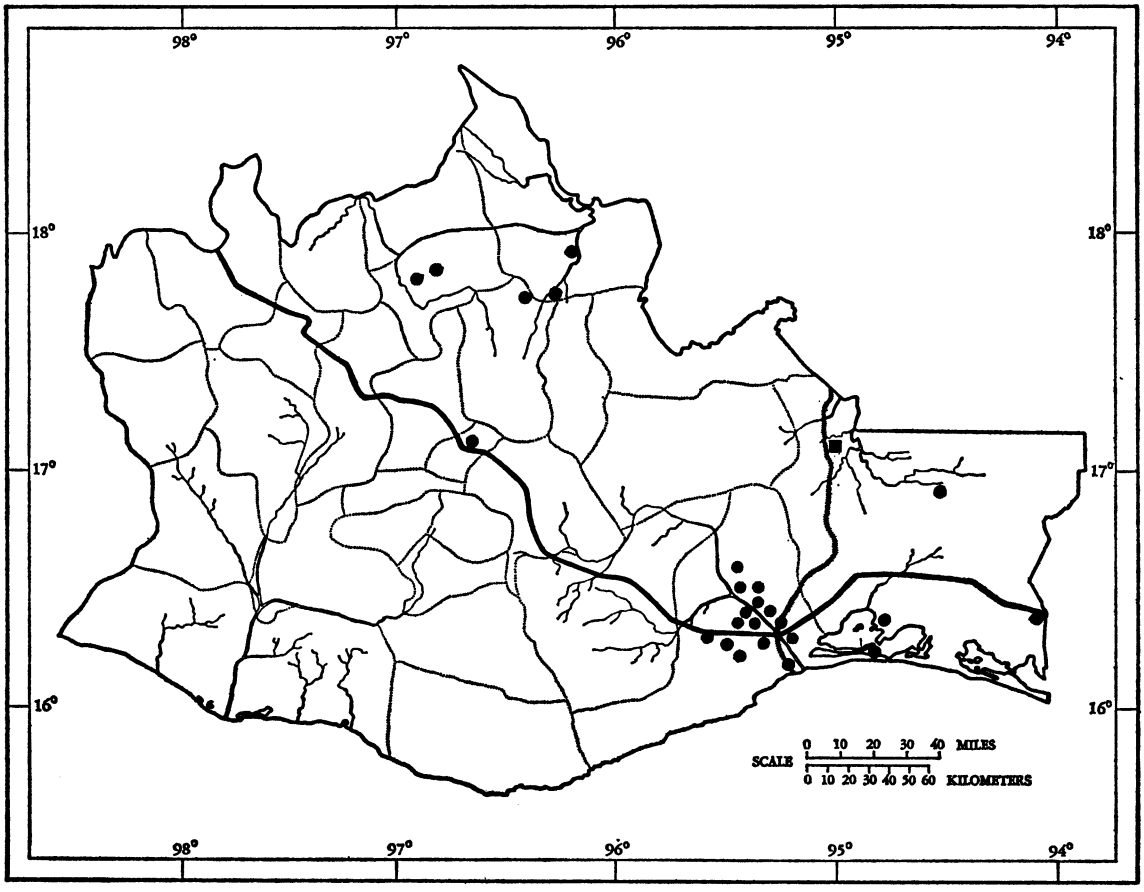


FIG. 3. Records of *Didelphis marsupialis* and *Chironectes minimus* in Oaxaca.
● *D. m. californica.* ■ *C. minimus.*

TABLE 1

MEASUREMENTS (IN MILLIMETERS) OF Didelphids FROM OAXACA AND OF SOME SPECIMENS FROM OTHER AREAS

Species, Museum and Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Postorbital Breadth	Maxillary Tooth Row
Didelphis marsupialis californica											
OAXACA											
A.M.N.H. No. 145175, Cerro Mixtequilla	♀ ad	730	350	65	97.2	94.9	43.4	49.5	19.3	11.7	41.0
A.M.N.H. No. 145630, Guiengola	♂ ad	793	306	62	106.4	103.5	50.3	50.2	19.2	11.0	42.5
A.M.N.H. No. 145639, La Gloria	♂ old	895	386	70	121.1	—	51.5	64.4	21.5	12.0	48.3
A.M.N.H. No. 145636, La Presa	♀ ad	725	295	56	97.8	96.0	43.2	49.1	18.6	11.8	40.5
A.M.N.H. No. 143470, Las Cuevas	♂ old	887	405	68	128.0	123.2	57.3	66.5	26.5	11.0	47.0
A.M.N.H. No. 145182, Salazar	♂ ad	885	435	65	120.0	—	56.0	58.0	23.5	12.0	46.6
A.M.N.H. No. 145631, Salazar	♀ ad	780	376	64	101.4	—	47.3	48.7	19.2	11.0	42.3
A.M.N.H. No. 145633, Salazar	♂ old	890	406	70	134.5	—	56.8	65.6	25.0	11.0	47.7
A.M.N.H. No. 145941, San Antonio	♀ old	820	400	70	111.0	106.0	48.7	56.3	21.0	10.5	45.6
A.M.N.H. No. 145959, San Antonio	♂ old	765	315	57	113.8	—	52.2	57.4	22.2	11.2	47.4
A.M.N.H. No. 145179, Sta. María del Mar	♂ old	885	340	72	139.3	121.5	57.3	63.3	25.4	11.2	47.2
A.M.N.H. No. 145181, Sta. María del Mar	♀ old	859	400	67	110.0	—	50.5	55.9	22.0	12.0	45.0
A.M.N.H. No. 145629, Sta. María del Mar	♂ ad	947	437	70	130.0	—	60.0	64.0	25.0	10.8	49.0
Chironectes minimus											
HONDURAS											
A.M.N.H. No. 123288, Minas de Oro	♂ ad	690	370	60	75.7	74.0	34.0	43.7	16.3	8.4	32.4
A.M.N.H. No. 129703, Las Flores Gracias	♂ ad	744	430	72	80.7	77.0	37.7	42.8	17.0	9.0	34.0
Philander opossum pallidus											
OAXACA											
A.M.N.H. No. 185754, Río Sarabia	♂ ad	565	290	44	72.6	71.3	34.8	36.9	12.3	8.5	30.5
A.M.N.H. No. 185755, Río Sarabia	♀ subad	500	260	40	64.2	62.7	30.5	30.8	10.4	8.3	28.4
A.M.N.H. No. 189480, 5 mi. W. Chiltepec	♂ ad	610	295	43	74.6	73.5	36.5	37.0	11.8	8.5	30.8
A.M.N.H. No. 189481, 5 mi. W. Chiltepec	♀ ad	570	300	42	71.7	71.0	34.4	34.1	11.3	—	30.0
Marmosa mexicana mexicana											
OAXACA											
A.M.N.H. No. 189209, Río Negro	♂ ad	285	175	20	33.9	32.9	15	16.7	5.5	5.7	13.0

TABLE 1—(*Continued*)

Species, Museum and Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Postorbital Breadth	Maxillary Tooth Row
A.M.N.H. No. 189483, San Gabriel Mixtepec	♂ juv	222	132	17	27.5	25.9	11.6	14.7	5.3	6.5	11.0
A.M.N.H. No. 189484, San Gabriel Mixtepec	♀ ad	290	170	20	33.2	31.3	14.6	18.3	6.0	6.6	12.7
A.M.N.H. No. 189485, San Gabriel Mixtepec	♂ juv	228	134	16	28.3	27.0	12.3	15.2	5.3	6.5	11.5
U.S.N.M. No. 71526,[a] Juquila	♂ subad	274	162	20	32.4	—	14.6	16.8	—	6.4	—
Marmosa canescens canescens											
OAXACA											
A.M.N.H. No. 3111/2433,[a] Sto. Domingo de Guzmán	♂ ad	275	140	21	35.1	33.3	16.1	20.2	5.5	6.5	13.5
A.M.N.H. No. 3111/2434, Sto. Domingo de Guzmán	♂ ad	285	145	20	34.1	—	15.2	—	5.5	6.1	13.2
A.M.N.H. No. 3114/2437, Sto. Domingo de Guzmán	♂ ad	285	145	21	—	—	14.3	19.3	5.5	6.8	12.8
A.M.N.H. No. 148969, San Mateo del Mar	♂ ad	257	131	18	33.7	32.5	15.5	18.7	5.0	5.8	13.2
A.M.N.H. No. 149104, Cerro Ocotepec	♂ ad	281	132	21	34.0	32.6	14.0	18.0	5.0	6.1	13.3
A.M.N.H. No. 165651, Las Tejas	♂ ad	252	124	19	33.9	—	—	18.5	4.8	6.1	13.3
A.M.N.H. No. 165653, Las Tejas	♂ ad	278	139	20	34.7	33.5	15.4	20.2	5.6	6.5	13.6
A.M.N.H. No. 185769, Mazahuita	♂ ad	305	167	22	36.8	35.3	16.0	20.0	5.5	6.1	14.3
Marmosa canescens oaxacae											
OAXACA											
U.S.N.M. No. 68240,[a] Oaxaca de Juárez	♀ ad	263	144	18	32.4	—	13.9	18.4	4.8	—	—
Caluromys derbianus aztecus											
OAXACA											
A.M.N.H. No. 185756, Sarabia	♂ ad	738	444	50	62.5	60.2	26.0	36.4	12.0	8.2	21.2

[a] Type.

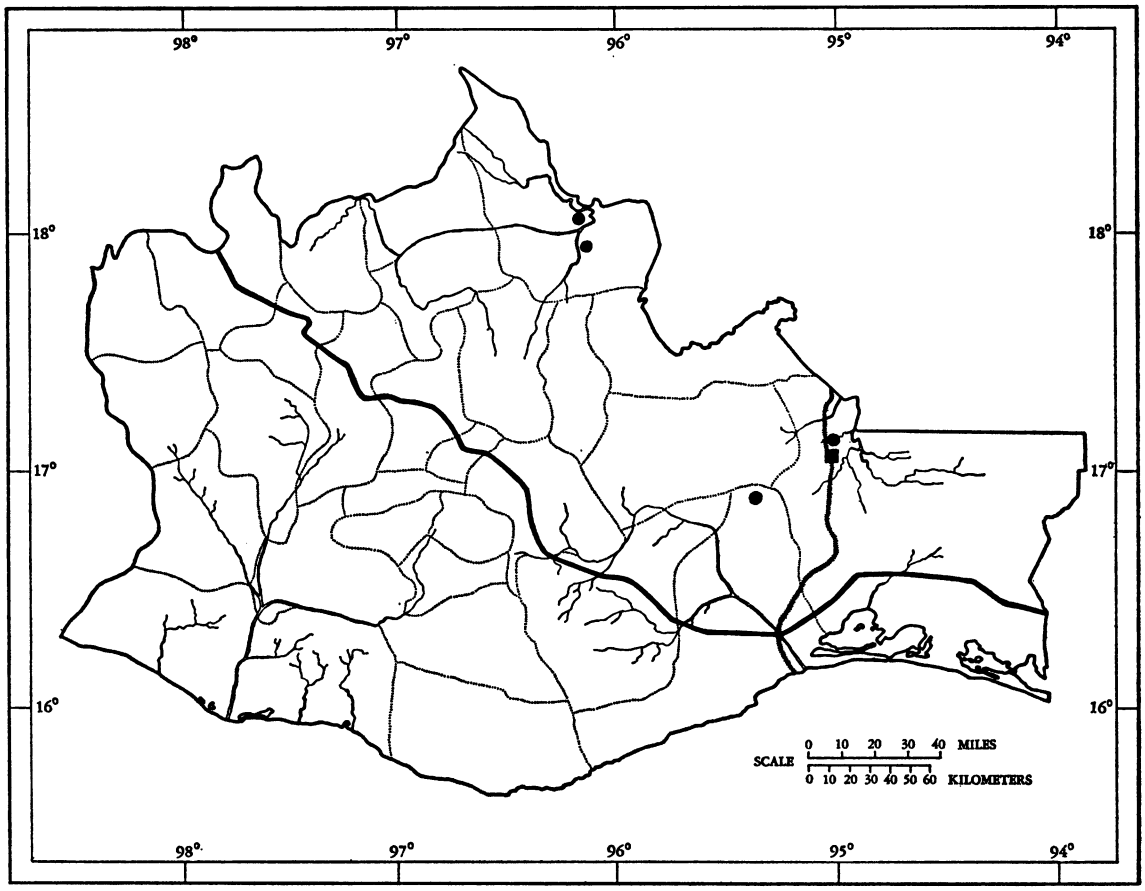


FIG. 4. Records of *Philander opossum* and *Caluromys derbianus* in Oaxaca. ● *P. o. pallidus.* ■ *C. d. aztecus.*

Mixtequilla, two; Gueladú, one; Guiengola, one; La "Presa," two; Las Cuevas, three; Las Pilas, one; Las Tejas, two; Mixtequilla, seven; Potrero Gueladú, one; Salazar, eight; Salina Cruz, two; San Antonio, five; Tehuantepec, two; Tenango, three.

SPECIMENS RECORDED: (Reported by C. O. Handley and J. K. Jones, *in litt.*). Cuicatlán: Cuicatlán, three (U.S.N.M.), one (U.K.); Reyes Papalo, one (U.K.). Oaxaca: Oaxaca de Juárez, one (U.S.N.M.) Teposcolula: Campamento Vista Hermosa, one (U.K.). Tuxtepec: Tuxtepec, six (U.S.N.M.); Yetla, one (U.K.).

REMARKS: According to Hall and Kelson (1959, p. 7), *Didelphis m. tabascensis* Allen may occur in extreme eastern Oaxaca. Cranial characters of a subadult male from Tapanatepec near the Oaxaca-Chiapas border are the same as for Oaxacan specimens from farther west, considered by me as *D. m. californica.* Hershkovitz (1951, p. 548) listed *D. m. tabascensis* and some other subspecies of *D. marsupialis* in the synonomy of *D. m. californica.* Hall and Kelson used *tabascensis* on the grounds that Hershkovitz did not base his classification on examination of specimens but simply guessed at a reasonable arrangement. Shorter nasals relative to the postnasal length of the skull seems to be the only character that distinguishes *D. m. tabascensis* from *D. m. californica.*

GENUS CHIRONECTES ILLIGER
WATER OPOSSUMS
Chironectes minimus (Zimmermann)

Text figure 3

TYPE LOCALITY: Cayenne, French Guiana.

RANGE IN OAXACA: Known only from the Isthmus of Tehuantepec in northern Juchitán District.

GENERAL CHARACTERS: (Based on Hon-

duran specimens). Total length, 650–745; tail, 370–430; hind foot webbed; pelage dense and soft; color marbled black and gray; tail naked except at base. Skull short and broad; posterior palatine vacuities large; sagittal and occipital crests moderately well developed.

MEASUREMENTS: In table 1.

SPECIMENS RECORDED: (Schaldach, 1964, p. 130). Juchitán: Río Sarabia, 30.4 kilometers north of Matías Romero, one (C.C.).

GENUS PHILANDER TIEDEMANN
FOUR-EYED OPOSSUMS

Philander opossum pallidus (J. A. Allen)

Plate 1, figures 3, 4; text figure 4

TYPE LOCALITY: Orizaba, Veracruz, Mexico.

RANGE IN OAXACA: Low and moderate elevations in the northern part of the state, and south on the Isthmus of Tehuantepec to Coatlán.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 565–610; tail about equal to length of head and body; body hair extending on base of tail for from 5 to 8 cm., rest of tail naked; pelage Fuscous-Black, short and close; a large spot above each eye Light Buff. Skull narrow and slender, bony palate with two pairs of fenestrae, sagittal and occipital crests well developed in the adult, audital bullae small.

MEASUREMENTS: In table 1.

SPECIMENS EXAMINED: Juchitán: Río Sarabia, two. Tuxtepec: Five miles west of Chiltepec, two. Tehuantepec: Coatlán, one.

SPECIMENS RECORDED: (J. A. Allen, 1901, p. 216). Tuxtepec: Tuxtepec, one (U.S.N.M.).

GENUS MARMOSA GRAY
MURINE OPOSSUMS

Marmosa mexicana mexicana Merriam

Plate 1, figures 7, 8; text figure 5

TYPE LOCALITY: Juquila, Oaxaca, Mexico.

RANGE IN OAXACA: Known from southern and eastern Oaxaca but probably occurring at moderate elevations throughout the state, as it is not uncommon in Veracruz.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 220–290; tail naked, longer than head and body; pelage reddish, dense and soft; orbital areas black; no pouch in female; mammae varying from 5-1-5 to 7-1-7. Skull without noticeable postorbital constriction, both supraorbital ridges and postorbital processes slightly developed in some old individuals; palate usually fenestrated; maxillary tooth rows straight; third upper premolar larger than first and about equal to second upper premolar.

MEASUREMENTS: In table 1.

SPECIMENS EXAMINED: Juchitán: Río "Negro," one. Juquila: San Gabriel Mixtepec, four. Tehuantepec: Agua Zarca, one. Ixtlán: Campamento Vista Hermosa, one.

REMARKS: *Marmosa mexicana savannarum* Goldman, of which the type was from Boqueron, Chiriqui, Panama, was regarded by Tate (1933, p. 133) as a synonym of, and indistinguishable from, *M. m. mexicana*. *Marmosa mexicana savannarum* was listed by Hall and Kelson (1959, p. 15) as a valid subspecific form. Although there appears to be no external or cranial character that would justify the recognition of *savannarum*, it should be recognized on geographical grounds. *Marmosa mexicana savannarum* is separated from *M. m. mexicana* by the consistently larger form *M. m. zeldoni* which occupies Costa Rica and southern Nicaragua, with a total length of up to 350; *mexicana* and *savannarum* have a total length of less than 300.

Marmosa canescens canescens (J. A. Allen)

Plate 1, figures 5, 6; text figure 5

TYPE LOCALITY: Santo Domingo de Guzmán, Isthmus of Tehuantepec, Oaxaca.

RANGE IN OAXACA: From low to moderate elevations in the southern and western parts of the state, but not recorded from northern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 260–305; tail naked, about equal to length of head and body; color grayish. Larger size, shorter tail, and grayish instead of reddish pelage distinguish specimens of *Marmosa canescens* from those of *Marmosa mexicanus*. Skull short and broad, with widely spreading zygomatic arches; postorbital processes strongly developed and extending backward in raised temporal ridges across parietals; palate broad; third upper premolar larger than first but smaller than second upper premolar.

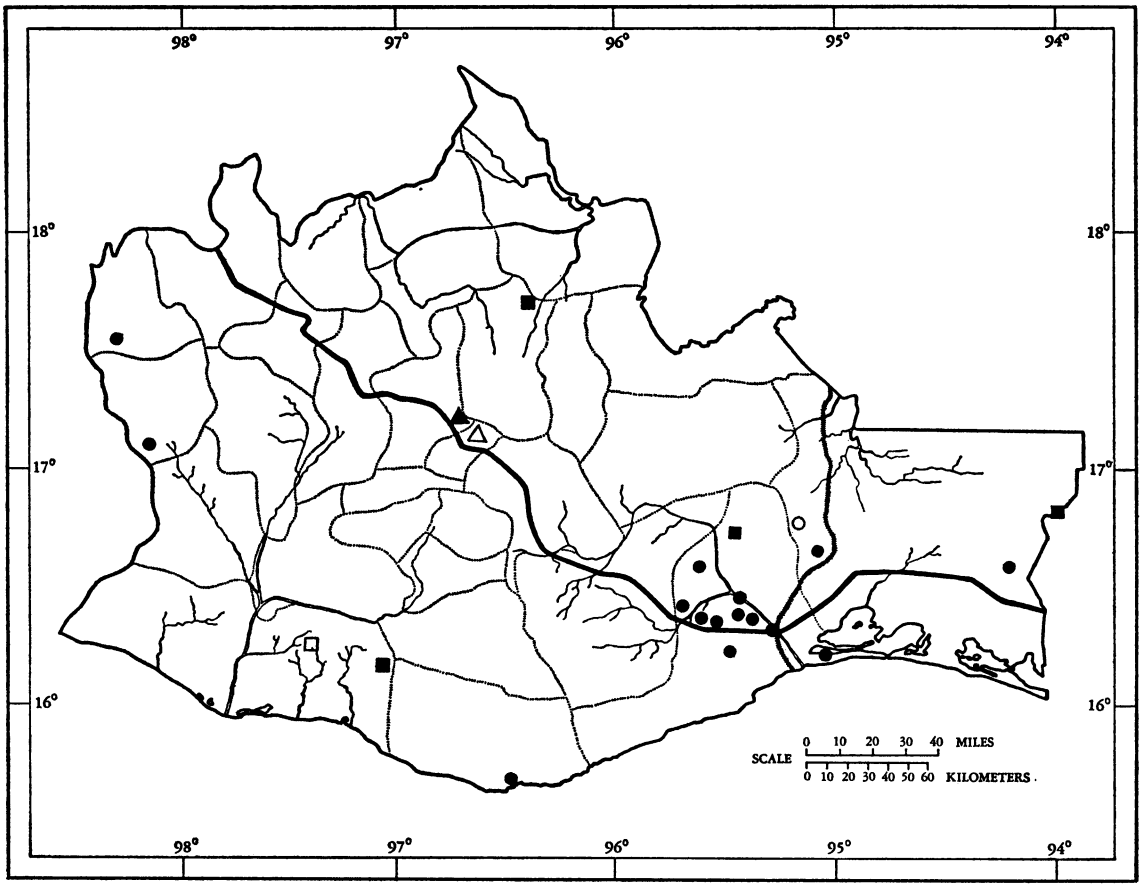


FIG. 5. Records of *Marmosa mexicana* and *Marmosa canescens* in Oaxaca. ■ *M. m. mexicana.* □ Type locality of *M. m. mexicana.* ● *M. c. canescens.* ○ Type locality of *M. c. canescens.* ▲ *M. c. oaxacae.* △ Type locality of *M. c. oaxacae.*

MEASUREMENTS: In table 1.

SPECIMENS EXAMINED: Juchitán: Mazahuito, two; Santo Domingo de Guzmán, six; Zanatepec, one. Tehuantepec: Bisilana, six; Cerro Arenal, one; Cerro Ocotepec, one; Las Tejas, two; Salazar, one; San Matéo del Mar, one; San Pablo, one; Limón, two. Yautepec: San Pedro Jilotepec, one.

SPECIMENS RECORDED: (Tate, 1933, p. 141). Pochutla: Puerto Angel, one (U.S.N.M.). Juxtlahuaca: Tilapa, one (U.S.N.M.). Silacayoapan: Tlapacingo, one (U.S.N.M.).

Marmosa canescens oaxacae Merriam

Text figure 5

TYPE LOCALITY: Vicinity of Oaxaca de Juárez, probably the neighboring slopes of the Cerro San Felipe, Oaxaca, Mexico; altitude possibly about 7000 feet.

RANGE IN OAXACA: Known only from the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Similar in size and general characters to *Marmosa c. canescens*, but pelage markedly darker in color and dorsal color pattern more sharply defined on shoulders and sides of body. Skull about as in *M. c. canescens.*

MEASUREMENTS: In table 1.

SPECIMENS EXAMINED: Cerro San Felipe, one.

SPECIMENS RECORDED: (Tate, 1933, p. 143). Oaxaca: Oaxaca de Juárez, two (U.S.N.M.).

SUMMARY OF *Marmosa* OF OAXACA

The small, dark red, murine opossum *Marmosa mexicana* is restricted to the more

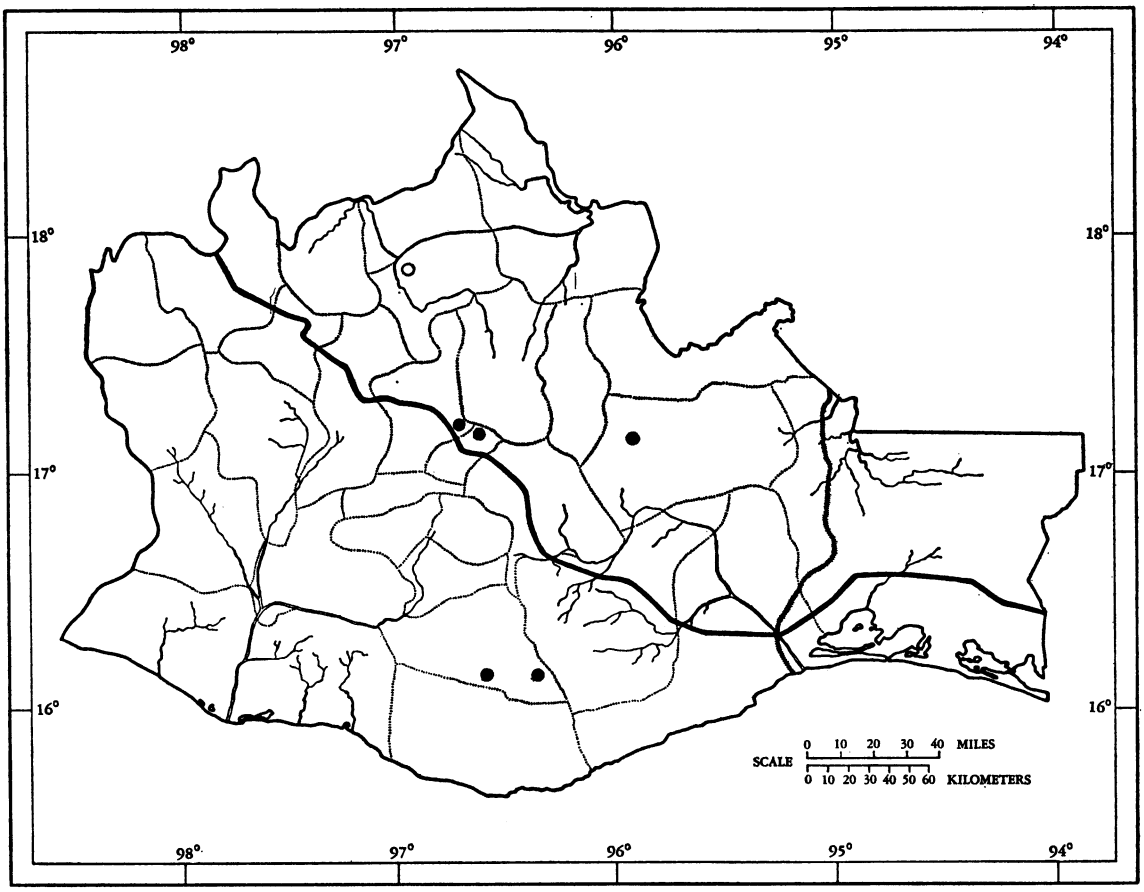


FIG. 6. Records of *Sorex veraepacis* in Oaxaca. ● *S. v. mutabilis.* ○ Type of *S. v. mutabilis.*

or less humid and forested regions of the southern part of the state and of the Isthmus of Tehuantepec. The gray color of *Marmosa canescens* indicates that this species is adapted to arid country. Records of *M. canescens* are from scattered localities in the drier regions of the state. *Marmosa canescens oaxacae* is known only from the type series, an adult female and a young male, taken near the crest of the Continental Divide, a comparatively dry area. It appears to be a recognizable form.

GENUS **CALUROMYS** J. A. ALLEN
WOOLLY OPOSSUMS

Caluromys derbianus aztecus (Thomas)
Plate 1, figures 9, 10; text figure 4

TYPE LOCALITY: San Juan de la Punta, Veracruz, Mexico.

RANGE IN OAXACA: Moderate elevation in the northeastern part of the state and probably all of extreme northern Oaxaca, as *C. d. aztecus* is not uncommon across the border in Veracruz.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 738; tail considerably longer than head and body; body fur extending on tail for about one-third of its length, rest of tail naked; pelage rich Cinnamon in color, withers-mark grayish white; fur long, thick, and woolly; ears large; color pattern ornate. Skull short and broad, with well-developed postorbital processes; maxillary tooth rows arcuate and converging anteriorly.

MEASUREMENTS: In table 1.

SPECIMENS EXAMINED: Juchitán: Sarabia, one.

ORDER **INSECTIVORA** ILLIGER
SHREWS AND MOLES

FAMILY **SORICIDAE** GRAY
SHREWS

GENUS **SOREX** LINNAEUS
LONG-TAILED SHREWS

Sorex veraepacis mutabilis Merriam

Plate 2, figures 1–3; text figure 6

TYPE LOCALITY: Reyes (near Cuicatlán), Oaxaca, Mexico; altitude 10,200 feet.

RANGE IN OAXACA: Central highlands from Cerro San Felipe to Totontepec south to Ozolotepec, and probably west to the state line, as a specimen has been recorded from Omilteme, Guerrero (Jackson, 1928, p. 152).

GENERAL CHARACTERS: (Based on Oaxacan specimens): Total length, 121–128; length of tail more than three-fourths of length of head and body; upper unicuspidate teeth in pairs, first and second subequal and larger than third and fourth, third smaller than fourth; color grayish brown, under parts paler than back; compared with Oaxacan specimens of *S. saussurei*, under parts darker, skull larger (18.0–19.9) and broader (9.1–9.4), and braincase higher (5–5.1); (*S. saussurei*, 18.2–18.5, 8.3–9, 4.4–4.5).

MEASUREMENTS: In table 2.

SPECIMENS EXAMINED: Etla: Cerro San Felipe, one. Mixes: Mt. Zempoaltepec, two (U.S.N.M.). Oaxaca: San Felipe del Agua, two.

SPECIMENS RECORDED: (Jackson, 1928, p. 152): Miahuatlán: Ozolotepec, three (U.S.N.M.); (Schaldach, 1966, p. 288): Río Molino, two (I.B.).

Sorex saussurei saussurei Merriam

Plate 2, figures 4–6; text figure 7

TYPE LOCALITY: North slope of El Nevado de Colima, Jalisco, Mexico; altitude 8000 feet.

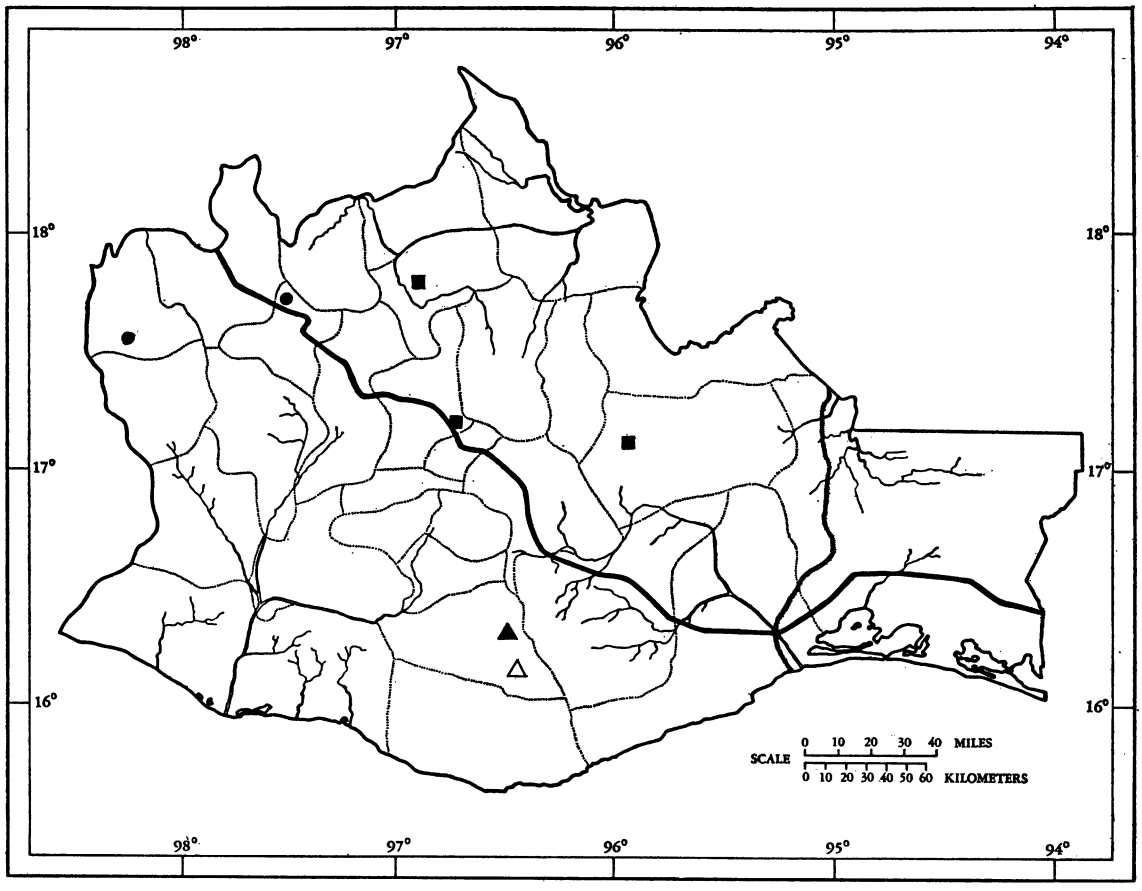


FIG. 7. Records of *Sorex saussurei* in Oaxaca. ● *S. s. saussurei.* ■ *S. s. veraecrucis.* ▲ *S. s. oaxacae.* △ Type locality of *S. s. oaxacae.*

TABLE 2

MEASUREMENTS (IN MILLIMETERS) OF SORICIDS FROM OAXACA

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Palatal Length	Braincase Breadth	Interorbital Breadth	Palate Breadth Across Molars	Upper Tooth Row, I^2–M^3	Upper Tooth Row Entire
Sorex veraepacis mutabilis												
U.S.N.M. No. 69600,[a] Reyes	♀ ad	126	57	14.5	—	18.7	7.3	9.4	4.3	5.3	6.9	—
U.S.N.M. No. 69598, Reyes	♀ ad	—	—	—	—	18.0	7.2	9.1	4.2	5.2	6.9	—
U.S.N.M. No. 68339, Mt. Zempoaltepec	♂ ad	135	58	16	19.9	18.8	7.5	9.2	4.2	5.3	6.9	8.4
U.S.N.M. No. 68567, Mt. Zempoaltepec	♂ ad	130	51	16	19.3	18.7	7.4	9.2	4.0	5.2	6.9	8.4
A.M.N.H. No. 185620, San Felipe del Agua	♂ sub	100	45	13.5	18.0	17.0	7.0	8.6	4.2	5.0	6.6	8.2
Sorex saussurei saussurei												
U.S.N.M. No. 70249, Tamazulápam	♀ ad	110	43	13	18.5	18.2	7.5	8.7	4.0	5.4	6.8	8.0
U.S.N.M. No. 70299, Tamazulápam	—	—	—	—	18.7	—	7.4	—	3.9	5.1	6.7	7.9
Sorex saussurei veraecrucis												
U.S.N.M. No. 68566, Mt. Zempoaltepec	♀ ad	126	57	15	18.5	18.2	7.5	8.7	4.0	5.3	6.9	8.2
U.S.N.M. No. 69599, Reyes	♀ ad	120	54	14.5	18.5	17.8	7.5	8.5	4.0	5.3	6.7	8.0
A.M.N.H. No. 207424, Cerro San Felipe	♀ ad	100	45	13.5	18.2	18.1	7.7	8.3	3.8	5.2	6.6	7.9
Sorex saussurei oaxacae												
U.S.N.M. No. 71467,[a] Sta. María Ozolotepec	♀ ad	114	48	15	—	18.2	7.3	9.0	4.2	5.6	6.7	—
A.M.N.H. No. 148811, San Lorenzo Mixtepec	sub	108	46	13.5	—	—	7.3	—	4.1	5.2	6.7	8.2
Sorex oreopolus ventralis												
U.S.N.M. No. 68342,[a] Cerro San Felipe	♂ ad	104	37	13	—	16.7	6.9	8.6	4.0	5.2	6.0	—
U.S.N.M. No. 68343, Cerro												

TABLE 2—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Palatal Length	Braincase Breadth	Interorbital Breadth	Palate Breadth Across Molars	Upper Tooth Row, I^2–M^2	Upper Tooth Row Entire
San Felipe	♂ ad	112	43	13	17.1	16.6	6.7	8.5	3.7	4.9	5.9	7.1
U.S.N.M. No. 68341, Cerro San Felipe	♂ ad	97	36	13	—	16.2	—	8.0	3.6	4.8	—	—
Cryptotis mexicana mexicana												
U.S.N.M. No. 69604, Reyes	♀ ad	94	27	13	18.6	17.7	7.8	9.4	4.5	5.5	6.5	7.8
U.S.N.M. No. 69606, Reyes	♀ ad	95	26	13	18.5	17.7	7.5	9.4	4.5	5.5	6.6	8.2
A.M.N.H. No. 186899, Huautla	♀ ad	—	—	—	—	18.0	7.8	—	4.6	5.9	6.7	8.3
Cryptotis mexicana peregrina												
U.S.N.M. No. 68317,[a] 15 mi. W. Oaxaca de Juárez	♂ old	106	31	15	20.3	—	—	10.2	—	—	—	—
U.S.N.M. No. 68328, 15 mi. W. Oaxaca de Juárez	♀ ad	104	32	14	20.0	19.2	8.4	9.6	4.6	5.8	7.0	8.8
U.S.N.M. No. 68329, 15 mi. W. Oaxaca de Juárez	—	100	30	13	19.3	18.5	8.2	9.6	4.7	6.0	7.1	8.7
Cryptotis mexicana machetes												
U.S.N.M. No. 71456,[a] Sta. María Ozolotepec	♀ ad	104	31	15	20.0	—	—	9.5	—	—	—	—
U.S.N.M. No. 71457, Sta. María Ozolotepec	♀ ad	—	—	—	19.7	19.5	8.1	9.9	5.2	6.1	7.1	8.3
U.S.N.M. No. 71458, Sta. María Ozolotepec	♀ ad	108	31	15	20.0	19.0	8.3	10.1	4.9	6.3	7.5	8.9
A.M.N.H. No. 178725, San Juan Ozolotepec	sub	—	—	—	19.8	19.0	8.0	9.5	4.7	5.8	7.4	8.9
A.M.N.H. No. 178739, Lovene	♂ sub	—	—	—	20.1	19.4	8.2	9.0	4.8	5.5	7.4	8.8
Cryptotis frontalis												
U.S.N.M. No. 123429,[a] Cerro Guiengola	♀ ad	93	27	12.2	—	19.0	—	10.2	—	6.2	—	8.6
A.M.N.H. No. 185021, Mixtequilla	ad	80	25	11.5	18.6	18.4	7.8	8.9	4.6	5.6	7.0	8.5
A.M.N.H. No. 185022, Mixtequilla	♂ old	111	23	12.0	19.0	18.6	8.0	9.6	4.8	5.9	6.5	7.8

TABLE 2—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Palatal Length	Braincase Breadth	Interorbital Breadth	Palate Breadth Across Molars	Upper Tooth Row, I^2–M^3	Upper Tooth Row Entire
Cryptotis magna												
U.S.N.M. No. 68575,[a] Totontepec	♂ ad	134	42	17	24.5	—	—	11.5	—	—	—	—
U.S.N.M. No. 68565, Mt. Zempoaltepec	♂ ad	135	41	16	23.7	22.7	10.2	12.0	5.4	7.5	8.9	10.9
A.M.N.H. No. 182091, Comaltepec	♀ ad	135	48	17	24.0	22.6	9.9	11.5	5.7	7.5	8.9	11.0
Cryptotis fossor												
U.S.N.M. No. 68546,[a] Mt. Zempoaltepec	♀ ad	108	29	14.6	21.2	—	—	10.7	—	—	—	—
U.S.N.M. No. 68547, Mt. Zempoaltepec	♀ ad	108	28	14.5	21.0	20.4	9.0	10.0	4.7	5.9	7.5	9.0
U.S.N.M. No. 68531, Mt. Zempoaltepec	♂ ad	106	30	14	20.4	19.3	8.5	10.2	4.6	5.9	7.4	9.0
Cryptotis celatus												
A.M.N.H. No. 145838,[a] Las Cuevas	♂ ad	67	14	11	17.5	16.0	6.6	7.4	4.0	5.2	6.3	7.8
A.M.N.H. No. 189486, San Gabriel Mixtepec	♂ ad	99	27	13	18.5	17.3	7.3	8.5	4.4	5.9	6.5	8.0
A.M.N.H. No. 213757, San Agustin Loxicha	♂ ad	85	25	11	17.3	16.8	6.7	8.1	4.1	5.1	6.1	7.3
Notiosorex gigas												
A.M.N.H. No. 212190, San Vicente	♀ ad	130	48	17	23.8	23.7	11.6	10.3	5.7	6.9	9.2	10.9
Notiosorex phillipsii												
I.B. No. 8445,[a] Río Molino	♀ ad	103	34	14	20.8	19.6	9.3	10.4	4.7	—	—	9.1
I.B. No. 8446, Río Guajolote	♀ ad	102	34	14	20.0	19.5	9.4	10.3	4.7	6.0	7.5	9.0

[a] Type.

RANGE IN OAXACA: Highlands in the northwestern part of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 109–115; length of tail less than three-fourths of length of head and body; similar to *S. v. mutabilis* but tail shorter (48–53) (*S. v. mutabilis*, 56–58); color, especially ventrally, paler, skull smaller, and unicuspidate tooth row shorter (1.9) (*S. v. mutabilis*, 2.1).

MEASUREMENTS: In table 2.

SPECIMENS EXAMINED: Teposcolula: Tamazulápam, two (U.S.N.M.).

SPECIMENS RECORDED: (Jackson, 1928, p. 156). Silacayoapam: Tlapacingo, two (U.S.N.M.).

Sorex saussurei veraecrucis Jackson

Plate 2, figures 7–9; text figure 7

TYPE LOCALITY: Xico, Veracruz, Mexico; altitude 6000 feet.

RANGE IN OAXACA: Central highlands from Zempoaltepec west to Cerro San Felipe and north to the Veracruz border.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 118–128; length of tail more than three-fourths of length of head and body; in comparison with *S. s. saussurei*, tail averaging longer, skull more elongate, interorbital region narrower, dentition somewhat heavier, but color essentially the same.

MEASUREMENTS: In table 2.

SPECIMENS EXAMINED: Mixes: Mt. Zempoaltepec, two (U.S.N.M.). Etla: Cerro San Felipe, four.

SPECIMENS RECORDED: (Jackson, 1928, p. 157). Cuicatlán: Reyes, three (U.S.N.M.).

Sorex saussurei oaxacae Jackson

Text figure 7

TYPE LOCALITY: Mountains near Santa

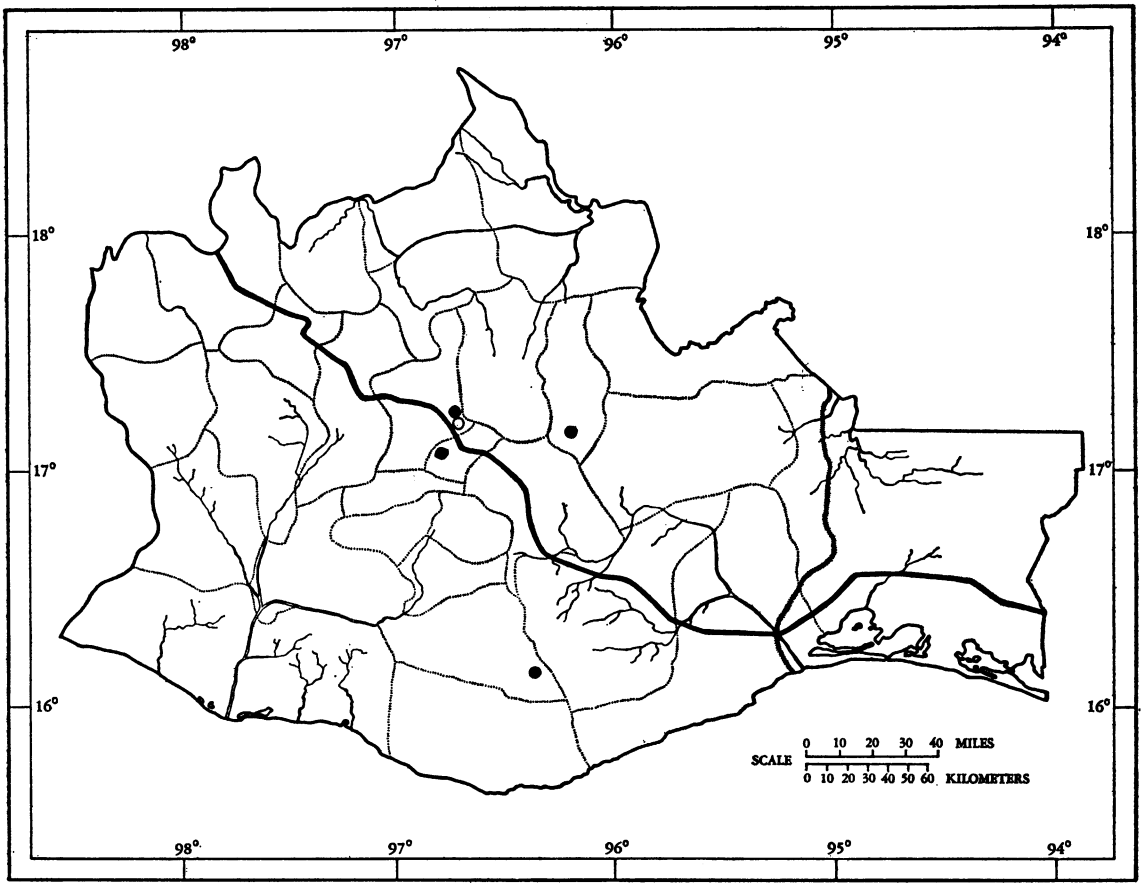


FIG. 8. Records of *Sorex oreopolus* in Oxaca. ● *S. o. ventralis.* ○ Type locality of *S. o. ventralis.*

María Ozolotepec, Oaxaca, Mexico; altitude 10,000 feet.

RANGE IN OAXACA: Known only from the mountains in the district of Miahuatlán.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 114; tail three-fourths of length of head and body. Color decidedly darker than in *S. s. saussurei* or *S. s. veraecrucis* and skull relatively broader than in either, noticeably through cranium and interorbital region (4.2) (*S. s. veraecrucis*, 3.8).

SPECIMENS EXAMINED: Miahuatlán: San Lorenzo Mixtepec, one.

Sorex oreopolus ventralis Merriam

Plate 2, figures 10–12; text figure 8

TYPE LOCALITY: Cerro San Felipe, Etla, Oaxaca, Mexico; altitude 10,000 feet.

RANGE IN OAXACA: Central highlands from Santa María Ozolotepec north to Cajonos and west to Oaxaca de Juárez.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 103–112; tail less than three-fourths of length of head and body; color ranging from Clove Brown to Sepia; size smaller and tail shorter (36–43) than in *S. saussurei* (43–57) or *S. veraepacis* (45–58) and skull higher and less flattened than in either; third upper unicuspid smaller than fourth.

MEASUREMENTS: In table 2.

SPECIMENS EXAMINED: Etla: Cerro San Felipe, one; two (U.S.N.M.). Miahuatlán: Arroyo Agua Fría, one.

SPECIMENS RECORDED: (Jackson, 1928, p. 162). Oaxaca: Fifteen miles west of Oaxaca de Juárez, nine (U.S.N.M.). Villa Alta: Cajonos, two (U.S.N.M.).

SUMMARY OF THE LONG-TAILED SHREWS (*Sorex*) OF OAXACA

In Oaxaca the long-tailed shrews occur at elevations higher than 6000 feet. Three species are represented: one relatively large species, *S. veraepacis;* one medium-sized species, *S. saussurei;* and one small species, *S. oreopolus*. The ranges of these three species overlap. One species, *S. saussurei*, is represented by three subspecies: *S. saussurei saussurei* in extreme northwestern Oaxaca, *S. s. veraecrucis* on the Gulf drainage in central Oaxaca, and *S. s. oaxacae* in the mountains of south central Oaxaca. Specimens of *S. saussurei* can be distinguished from those of *veraepacis* and *oreopolus* by the differences in the unicuspidate teeth, and specimens of *oreopolus* can be distinguished from those of *veraepacis* and *saussurei* by smaller size, especially noticeable in the smaller skull.

GENUS **CRYPTOTIS** POMEL

SHORT-TAILED SHREWS

Cryptotis mexicana mexicana (Coues)

Plate 2, figures 13–15; text figure 9

TYPE LOCALITY: Jalapa, Veracruz, Mexico; altitude 5000 feet.

RANGE IN OAXACA: North central highlands from Mt. Zempoaltepec in the district of Mixes west to La Muralla in Tlaxiaco and north to Reyes Papalo in Cuicatlán.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 97–102; length of tail about one-third of length of head and body; color blackish brown. Upper unicuspidate teeth not in pairs, and with strongly pigmented subsidiary postero-internal cusps; fourth upper unicuspidate tooth very small.

MEASUREMENTS: In table 2.

SPECIMENS EXAMINED: Teotitlán: Huautla, one. Cuicatlán: Reyes Papalo, two (U.S.N.M.). Tlaxiaco: La Muralla, one.

SPECIMENS RECORDED: (Merriam, 1895, p. 24). Etla: Cerro San Felipe, 22 (U.S.N.M.). Mixes: Totontepec, nine (U.S.N.M.). Zempoaltepec, 24 (U.S.N.M.).

Cryptotis mexicana peregrina (Merriam)

Plate 2, figures 16–18; text figure 9

TYPE LOCALITY: Mountains 15 miles west of Oaxaca de Juárez, Oaxaca, Mexico; altitude 9500 feet.

RANGE IN OAXACA: Known only from the districts of Oaxaca and Etla.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Similar in external characters to *C. m. mexicana* but differing in some cranial details; upper unicuspidate teeth with inner subsidiary cusps nearly obsolete and without chestnut tips; molariform teeth more deeply concave posteriorly than in *mexicana* and M^2 with postero-internal lobe larger than antero-internal lobe (the reverse of *mexicana*).

MEASUREMENTS: In table 2.

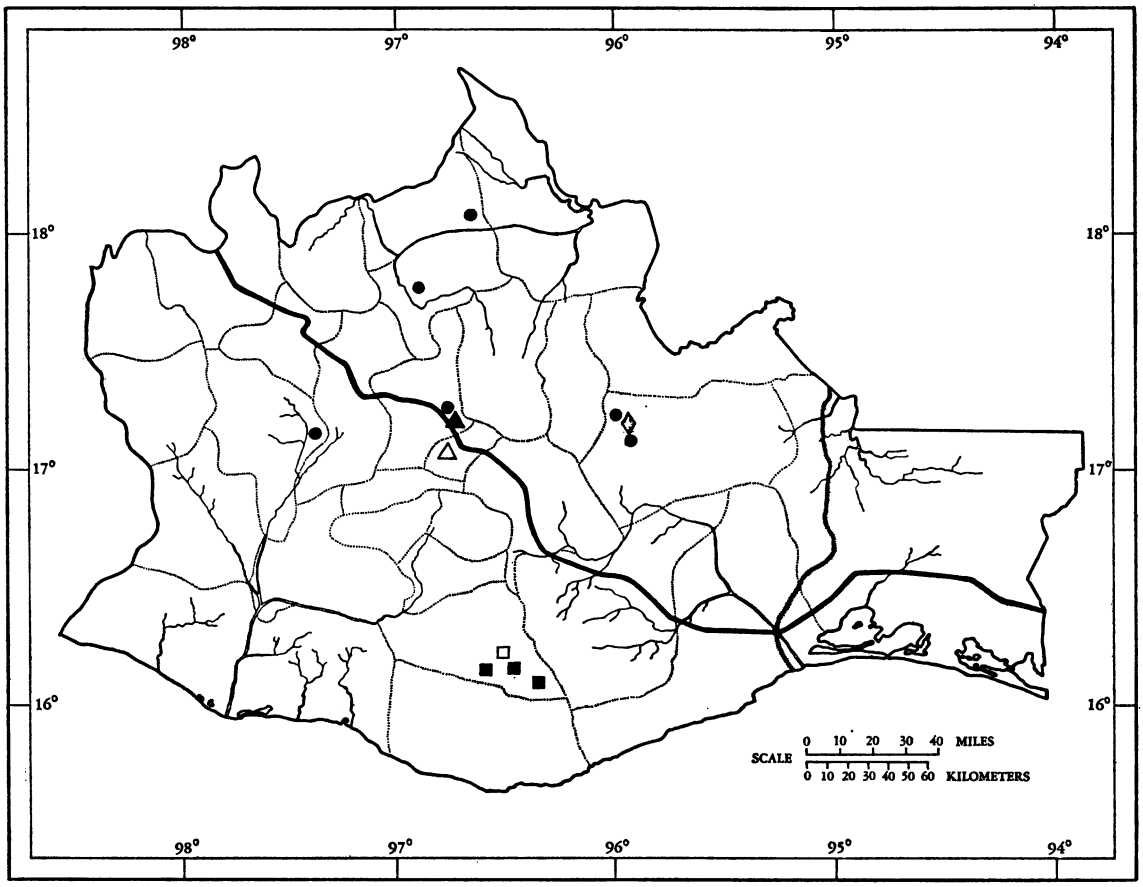


FIG. 9. Records of *Cryptotis mexicana* and *Cryptotis fossor* in Oaxaca. ● *C. m. mexicana.* ▲ *C. m. peregrina.* △ Type locality of *C. m. peregrina.* ■ *C. m. machetes.* □ Type locality of *C. m. machetes.* ◇ Type locality of *C. fossor.*

SPECIMENS EXAMINED: Etla: Cerro San Felipe, two. Oaxaca: Fifteen miles west of Oaxaca de Juárez, two (U.S.N.M.).

Cryptotis mexicana machetes (Merriam)

Plate 3, figures 1–3; text figure 9

TYPE LOCALITY: Mountains near Santa María Ozolotepec, Oaxaca, Mexico; altitude 10,000 feet.

RANGE IN OAXACA: Known only from the vicinity of the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Similar to *C. m. mexicana*, but larger, feet decidedly larger, and differing in some cranial details; upper unicuspidate teeth with inner cuspid smaller and not chestnut-tipped; large upper premolar longer, broader, and more excavated posteriorly, and upper molars larger and more concave posteriorly, than in *C. m. mexicana.*

MEASUREMENTS: In table 2.

SPECIMENS EXAMINED: Miahuatlán: Santa María Ozolotepec, two (U.S.N.M.); San Juan Ozolotepec, one; Lovene, one; Río Molino, four.

Cryptotis frontalis Miller

Plate 3, figures 4–6; text figure 10

TYPE LOCALITY: Cerro Guiengola, near Tehuantepec, Oaxaca, Mexico; altitude 1400 feet.

RANGE IN OAXACA: Comparatively low arid regions in the district of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Similar in size and color to *C. mexicana* but differing in cranial details

and occurring at lower elevations. Skull similar to that of *mexicana* but rostrum more robust; braincase deepened posteriorly and rising anteriorly at a more conspicuous angle than in *mexicana;* teeth larger than in *mexicana* but inner tubercles of upper unicuspidate teeth less developed, though usually retaining pigmented tips.

MEASUREMENTS: In table 2.

SPECIMENS EXAMINED: Tehuantepec: Mixtequilla, two.

Cryptotis magna (Merriam)

Plate 3, figures 7–9; text figure 10

TYPE LOCALITY: Totontepec, Oaxaca, Mexico; altitude 6800 feet.

RANGE IN OAXACA: Mountains about Totontepec, Mt. Zempoaltepec, and Comaltepec, from 6800 to 8000 feet in altitude.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, over 130; length of tail 50 per cent of length of head and body; one of largest of Oaxacan shrews and nearly uniform in coloration. Upper unicuspidate teeth with inner tubercles very small; large upper premolar short and broad, with antero-internal angle broadly rounded.

MEASUREMENTS: In table 2.

SPECIMENS EXAMINED: Ixtlán: Comaltepec, one. Mixes: Mt. Zempoaltepec, one (U.S.N.M.).

Cryptotis fossor (Merriam)

Plate 3, figures 10–12; text figure 9

TYPE LOCALITY: Mt. Zempoaltepec, Oaxaca, Mexico; altitude 10,500 feet.

RANGE IN OAXACA: Higher slopes of Mt. Zempoaltepec, from 8200 to 10,500 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 108–111; length of tail more than one-third of length of head and body; feet large and claws on forefeet especially large, length 3.3 from dorsal cuticle to tip in holotype. Skull somewhat similar to that of *C. mexicana* but slightly larger, braincase narrower, molariform teeth larger, and large upper premolar lacking antero-internal angle.

MEASUREMENTS: In table 2.

SPECIMENS EXAMINED: Mixes: Mt. Zempoaltepec, two (U.S.N.M.).

Cryptotis celatus Goodwin

Plate 3, figures 13–15; text figure 10

TYPE LOCALITY: Las Cuevas, Santiago Lachiguirí, District of Tehuantepec, Oaxaca, Mexico; altitude about 500 feet.

RANGE IN OAXACA: Arid and tropical regions from Tehuantepec west to Juquila.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 67–99; tail about one-third of length of head and body; smallest species of *Cryptotis* in Oaxaca; pelage short, color of under parts paler than that of back. First upper unicuspidate tooth less than half of size of first.

MEASUREMENTS: In table 2.

SPECIMENS EXAMINED: Juquila: Juquila, two (U.S.N.M.); San Gabriel Mixtepec, one. Tehuantepec: Las Cuevas, one. Pochutla: Pluma Hidalgo, two (U.S.N.M.); San Agustin Loxicha, one.

REMARKS: The relatively small size of the type skin can probably be attributed in part to immaturity and possibly to some shrinkage of the skin during the time it was preserved in formaldehyde and alcohol before being made into a study skin.

When *Sorex micrurus* Tomes, 1862 (type from Coban, Guatemala), was transferred to the genus *Blarina*, it became preoccupied by *Galemys micrurus* Pomel, 1848 (a synonym of *Blarina brevicauda*). As no other name was available at the time, Merriam proposed to replace the name *micrurus* of Tomes with the name *tropicalis*. This name had been used earlier as a *nomen nudem* in the combination *Corsira tropicalis* (Gray, 1843, p. 79). The name *B. tropicalis* therefore is attributable to Merriam, 1895. Merriam had not seen the type of Tomes' *micrurus*, but assumed that specimens from Pluma and Juquila, Oaxaca, were the same.

Miller in 1924, unlike Merriam in 1895, recognized the genus *Cryptotis* Pomel, 1848, for the small short-tailed shrews, including *micrurus* of Tomes and its replacement name *tropicalis* of Merriam, as separate from the genus *Blarina*, including *micrurus* of Pomel. This generic separation eliminated the homonymy that led Merriam to replace *micrurus* Tomes with *tropicalis* Merriam, and therefore Miller reinstated the use of *micrurus* Tomes in the combination *Cryptotis micrura* (Tomes).

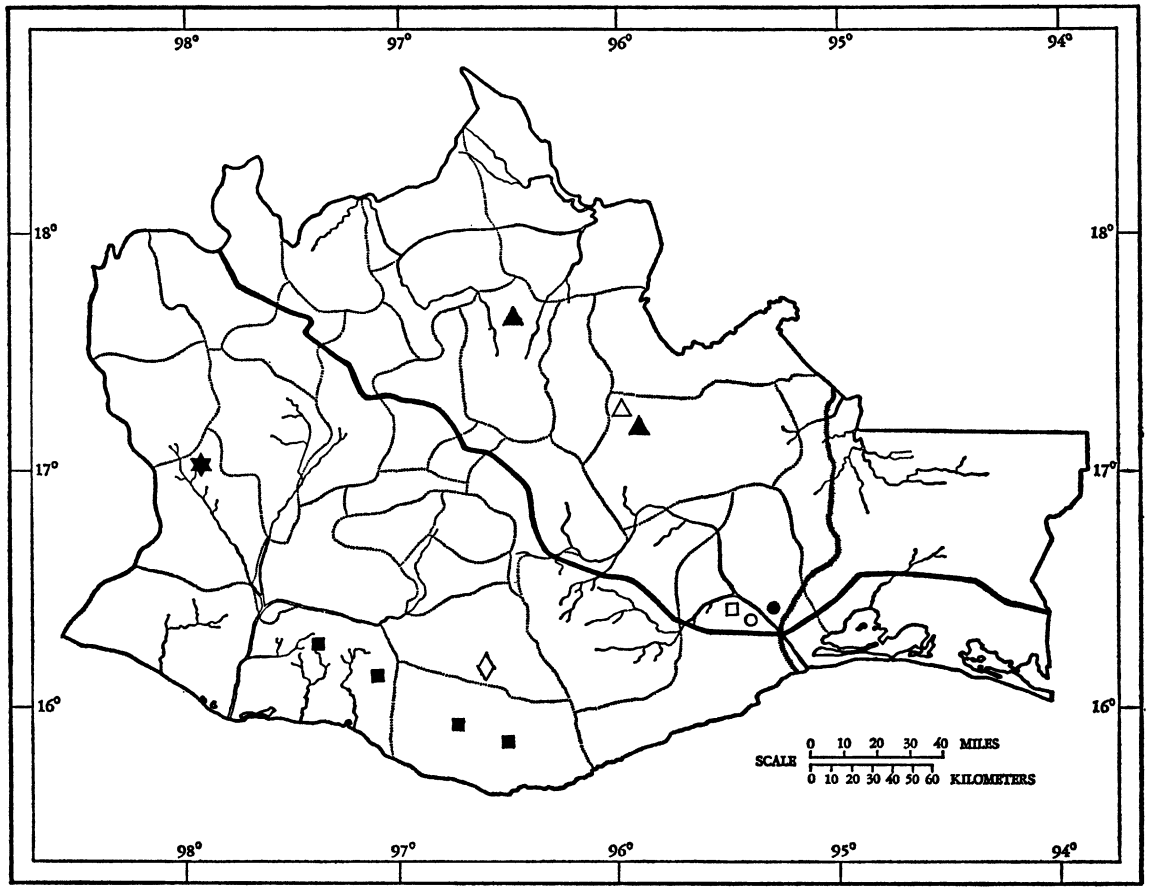


FIG. 10. Records of *Cryptotis frontalis*, *Cryptotis magna*, *Cryptotis celatus*, *Notiosorex gigas*, and *Notiosorex phillipsii* in Oaxaca. ● *C. frontalis*. ○ Type locality of *C. frontalis*. ▲ *C. magna*. △ Type locality of *C. magna*. ■ *C. celatus*. □ Type locality of *C. celatus*. ★ *N. gigas*. ◇ Type locality of *N. phillipsii*.

The specimens from Oaxaca referred by Merriam to *Blarina tropicalis* Merriam have been compared with the type of *Cryptotis celatus* Goodwin, 1956, and with specimens of *Cryptotis micrura* from Guatemala in the American Museum of Natural History. These two taxa are distinct, and the Oaxacan specimens are of the taxon *C. celatus*.

SUMMARY OF THE SHORT-TAILED SHREWS (*Cryptotis*) OF OAXACA

In Oaxaca the short-tailed shrews are not uncommon at elevations higher than 6000 feet but are less plentiful at lower elevations. *Cryptotis mexicana* is the most widely distributed of the montane species and is represented by three subspecies: *C. m. mexicana*, *C. m. peregrina*, and *C. m. machetes*. Other highland species include a very large form, *C. magna*, and a large-clawed form, *C. fossor*. *Cryptotis frontalis* occurs at elevations of from 1000 to 3000 feet and resembles *mexicana* in size and color. *Cryptotis celatus* is a small, widely distributed species frequenting comparatively low, arid regions in southern Oaxaca.

GENUS NOTIOSOREX COUES
DESERT SHREWS

Notiosorex[1] gigas Merriam

Plate 2, figures 19–21; text figure 10

TYPE LOCALITY: Mountains at Milpillas, near San Sebastian, Jalisco, Mexico.

[1] Jones (1966b, p. 249) recognized *Megasorex* Hibbard as distinct from *Notiosorex*, although some recent authors have treated the two as congeneric.

RANGE IN OAXACA: Moderate elevations in the district of Putla.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 130; length of tail, 48; pelage nearly uniform blackish brown, scarcely paler on under parts than on back. Skull large and massive; braincase arched; interorbital constriction swollen; only three unicuspidate teeth in each side of upper jaw; teeth white throughout, without trace of reddish pigmentation on tips.

MEASUREMENTS: In table 2.

SPECIMENS EXAMINED: Putla: San Vicente, one.

Notiosorex (Xenosorex) phillipsii Schaldach

Plate 2, figures 22–24; text figure 10

Notiosorex (Xenosorex) phillipsii SCHALDACH, 1966, p. 289.

TYPE LOCALITY: Río Molino, 3 kilometers southwest of San Miguel Suchixtepec, Miahuatlán District, Oaxaca, Mexico; altitude 2250 meters.

RANGE: Known only from the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 102–103; length of tail, 34; pelage Sooty Black, external appearance somewhat similar to that of *Cryptotis mexicana*. Cranial characters about as in *Notiosorex gigas*, but smaller in all dimensions and differing in detail; braincase more angular, rostrum relatively broader; dental formula the same as in *N. gigas*, but tips of teeth pigmented with reddish brown, and an undeveloped minute PM^4 is present in the subadult specimen in the American Museum of Natural History.

MEASUREMENTS: In table 2.

SPECIMENS EXAMINED: Miahuatlán: Río Guajolote, one (I.B.); San Miguel Suchixtepec, one.

SPECIMENS RECORDED: (Schaldach, 1966, p. 289). Miahuatlán: Río Molino, three (I.B.).

ORDER CHIROPTERA BLUMENBACH
BATS

FAMILY EMBALLONURIDAE DOBSON
SAC-WINGED BATS

SUBFAMILY EMBALLONURINAE FLOWER AND LYDEKKER

GENUS RHYNCHONYCTERIS PETERS
PROBOSCIS BATS

Rhynchonycteris naso (Wied-Neuwied)

Plate 4, figures 1, 2; text figure 11

TYPE LOCALITY: Vicinity of Morro d'Arara, Rio Mucuri, State of Bahia, Brazil.

RANGE IN OAXACA: Low to moderate elevations in northern Juchitan district.

GENERAL CHARACTERS: (Based on Veracruz specimens). Length of forearm, 35–40.5; muzzle elongated, tail projecting from upper side of interfemoral membrane; forearm dotted with tufts of fur; glandular sac not present in antebrachial membrane; two buffy white lines in form of hourglass on lower back. Skull small, with rounded braincase; postorbital processes long and slender; no angle between rostrum and forehead; upper incisors minute; lower incisors small, trifid.

DENTAL FORMULA: Incisors, $\frac{1-1}{3-3}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3} = 32$.

MEASUREMENTS: In table 3.

SPECIMENS EXAMINED: Veracruz: Twenty-two kilometers south-southeast of Jesús Carranza, at the Veracruz-Oaxaca border in Juchitán, one (K.U.); Río Blanco, 20 kilometers west of Piedras Negras, two (K.U.).

SPECIMENS RECORDED: (Schaldach, 1965, p. 131). Juchitán: Río Chichihui, 25 kilometers northeast of Matías Romero, three (I.B.).

REMARKS: Miller in 1907 regarded the names *Rhynchonycteris* Peters, 1867, and *Rhinchonycteris* Tschudi, 1844, as equivalent, and therefore homonyms, in conformity with the prevailing view and the International Code of Zoological Nomenclature in effect at that time. Miller therefore proposed the name *Rhynchiscus* Miller, 1907, to replace Peters' junior homonym. *Rhinchonycteris* Tschudi is, incidentally, a synonym of *Anoura* Gray, 1838. Miller's usage prevailed for many years. In 1945, Simpson (1945, p. 55) returned to the use of *Rhynchonycteris*, because a difference of one letter makes two names different, and therefore not homonymous, even though their pronunciation may be the same. This view, requiring identical spelling for homonymy, has been adopted officially (Hemming, 1953, p. 78) and appears in the latest International Code of Zoological Nomenclature (Article 56a). In view of these facts and the use of the name *Rhynchonycteris* in the general works

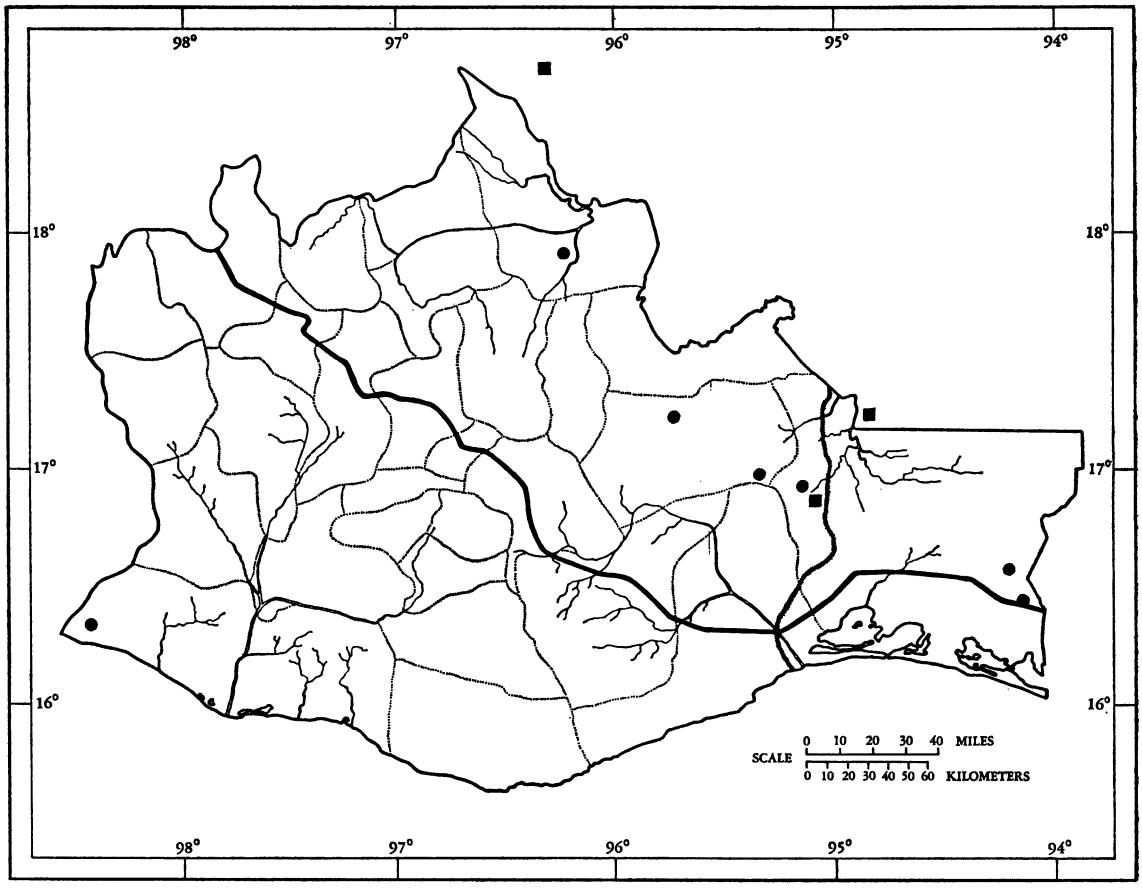


FIG. 11. Records of *Rhynchonycteris naso* and *Saccopteryx bilineata* in Oaxaca and of some specimens from other areas. ■ *R. naso.* ● *S. bilineata.*

most often consulted by persons not already familiar with the above history (Hall and Kelson, 1959, for North America; Cabrera, 1958, for South America; and Walker *et al.*, 1964), this name is used here.

GENUS SACCOPTERYX ILLIGER
WHITE-LINED BATS

Saccopteryx bilineata (Temminck)

Plate 4, figures 3, 4; text figure 11

TYPE LOCALITY: Surinam.

RANGE IN OAXACA: Low to moderate elevations in the northern and southern regions.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 44–51; large glandular sac situated close to forearm near elbow and opening on upper surface of antebrachial membrane. Tail short and projecting from upper side of interfemoral membrane. Color black, with two longitudinal wavy lines of white or buffy white extending from upper back to rump. Skull with moderately developed sagittal crest; postorbital processes long and broad; angle between rostrum and forehead slight; basisphenoid pit large and divided by a plate.

DENTAL FORMULA: Like that in *Rhynchonycteris naso.*

MEASUREMENTS: In table 3.

SPECIMENS EXAMINED: Juchitán: El Jícaro, two; Río Sarabia, five; Tapanatepec, 20. Mixes: Cotzocon, one; Mazatlán, three. Tuxtepec: Five miles west of Chiltepec, nine.

SPECIMENS RECORDED: (Sanborn, 1937, p. 331). Jamiltepec: Llano Grande, six (U.S.-N.M.).

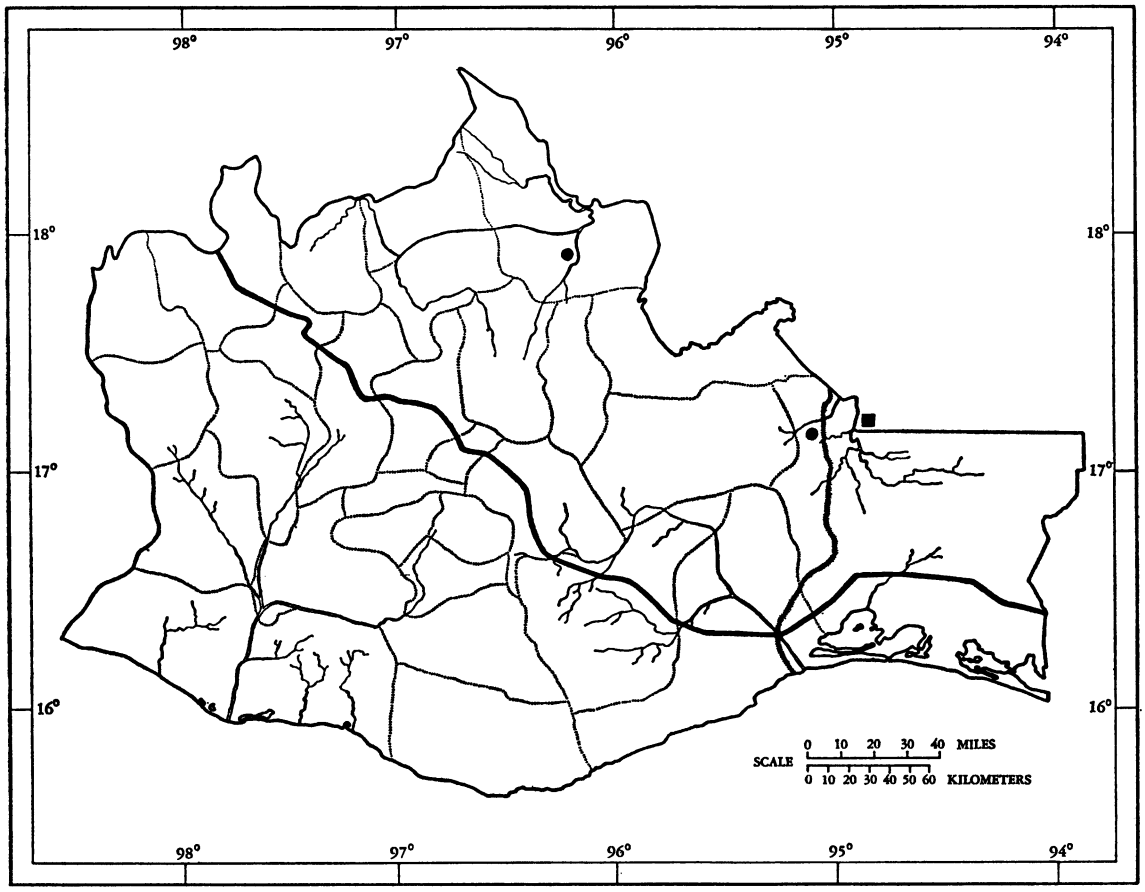


FIG. 12. Records of *Peropteryx macrotis* and *Peropteryx kappleri* in Oaxaca.
● *P. m. macrotis.* ■ *P. k. kappleri.*

GENUS **PEROPTERYX** PETERS
PETERS' SAC-WINGED BATS

Peropteryx macrotis macrotis (Wagner)
Plate 4, figures 5, 6; text figure 12

TYPE LOCALITY: Restricted by Avila-Pires (1965, p. 8) to São Joao da Barra, Río de Janeiro, Brazil.

RANGE IN OAXACA: Low to moderate elevations in northern Juchitán District west to the Chiltepec District.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 38–47; glandular sac situated near upper edge of antebrachial membrane and opening laterally. Similar in dental and general external characters to *Saccopteryx bilineata*, but color brownish instead of black and without whitish dorsal lines. Skull with a sharp angle between rostrum and braincase; basisphenoid pit deep and not divided by a plate; postorbital processes long and slender.

DENTAL FORMULA: Like that in *Rhynchonycteris naso.*

MEASUREMENTS: In table 3.

SPECIMENS EXAMINED: Juchitán: Tolosita, six. Tuxtepec: Five miles west of Chiltepec, eight.

Peropteryx kappleri kappleri Peters
Plate 4, figures 7, 8; text figure 12

TYPE LOCALITY: Surinam.

RANGE IN OAXACA: No specimens are known from the state, but specimens from a locality in Veracruz are so close to the state line that the presence of this species in northern Juchitán District is a foregone conclusion.

GENERAL CHARACTERS: (Based on Veracruz

TABLE 3

MEASUREMENTS (IN MILLIMETERS) OF EMBALLONURIDS FROM OAXACA AND OF SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Interorbital Breadth	Postorbital Constriction	Braincase Breadth	Maxillary Tooth Row
Rhynchonycteris naso									
VERACRUZ									
K.U. No. 19106, Río Blanco	♂ ad	38.5	12.1	11.0	7.3	3.5	2.6	6.2	5.0
K.U. No. 19107, Río Blanco	♂ ad	38.0	12.3	11.2	7.4	3.7	2.6	6.2	4.5
Saccopteryx bilineata									
OAXACA									
A.M.N.H. No. 177465, Tapanatepec	♂ ad	42.5	15.8	14.3	9.9	4.2	2.5	7.5	6.4
A.M.N.H. No. 177466, Tapanatepec	♀ ad	45.6	15.8	14.0	10.1	4.5	2.7	7.5	6.4
A.M.N.H. No. 185757, El Jícaro	♀ ad	47.0	15.5	14.2	9.3	4.3	2.7	7.5	6.4
A.M.N.H. No. 185759, Río Sarabia	♀ ad	46.2	15.9	14.1	9.8	4.2	2.7	7.7	6.3
A.M.N.H. No. 185760, Río Sarabia	♀ ad	46.2	15.6	14.0	10.0	4.2	2.7	7.7	6.5
A.M.N.H. No. 185762, Río Sarabia	♀ ad	43.5	15.7	13.9	9.5	4.0	2.3	7.4	6.1
A.M.N.H. No. 175272, Mazatlán	♀ ad	45.1	—	—	9.8	4.2	2.5	7.4	6.5
Peropteryx macrotis macrotis									
OAXACA									
A.M.N.H. No. 172727, Tolosita	♀ ad	46.4	15.2	14.1	8.5	5.3	3.0	6.7	6.2
A.M.N.H. No. 172745, Tolosita	♀ ad	43.0	14.5	13.0	8.0	5.3	3.0	6.7	6.0
A.M.N.H. No. 172748, Tolosita	♂ ad	43.3	14.4	12.7	7.5	5.4	2.8	6.4	5.6
A.M.N.H. No. 172749, Tolosita	♂ ad	45.5	14.5	13.3	8.2	5.0	3.1	6.5	5.9
A.M.N.H. No. 172751, Tolosita	♀ ad	44.5	14.5	14.0	8.2	5.4	3.2	6.6	6.2
A.M.N.H. No. 172752, Tolosita	♀ ad	45.5	14.5	13.0	8.1	5.2	2.7	6.3	5.7
Peropteryx kappleri kappleri									
VERACRUZ									
K.U. No. 23437, Río Chalchijapa	♂ ad	48.5	16.4	15.3	10.0	6.3	3.1	7.6	6.9
K.U. No. 23438, Río Chalchijapa	♂ ad	48.3	17.0	15.7	10.0	6.2	3.1	7.4	6.9
Centronycteris maximiliani centralis									
VERACRUZ									
K.U. No. 32088, Río Chalchijapa	ad	48.0	15.5	14.5	9.5	5.5	3.3	7.3	6.3

TABLE 3—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Interorbital Breadth	Postorbital Constriction	Braincase Breadth	Maxillary Tooth Row
Balantiopteryx plicata plicata									
OAXACA									
A.M.N.H. No. 147731, Cerro San Pedro	♂ ad	41.7	14.1	13.2	8.5	5.2	3.7	6.8	5.8
A.M.N.H. No. 175273, San Bartolo Yautepec	♂ ad	41.0	14.0	12.9	8.7	5.2	3.3	6.6	5.3
A.M.N.H. No. 178756, San Bartolo Yautepec	♂ ad	41.0	14.5	12.7	9.0	5.3	3.7	7.1	5.5
A.M.N.H. No. 185051, Guichina	♂ ad	38.6	14.0	12.6	8.5	5.2	3.3	6.5	5.3
A.M.N.H. No. 185028, Unión Hidalgo	♀ ad	42.8	13.7	12.5	8.6	5.1	3.0	6.7	5.3
A.M.N.H. No. 144596, Salazar	♀ ad	44.8	14.2	13.2	9.0	5.4	3.1	6.5	5.3
A.M.N.H. No. 171738, Tehuantepec	♀ ad	46.0	14.2	13.0	8.7	5.3	3.4	6.8	5.3
A.M.N.H. No. 189516, Chiltepec	♂ ad	44.0	14.1	13.1	8.8	5.4	3.5	6.8	5.4
A.M.N.H. No. 189529, Chiltepec	♀ ad	45.0	14.3	13.4	9.3	5.4	3.3	6.8	5.5
Balantiopteryx io									
OAXACA									
A.M.N.H. No. 172735, 8 mi. S. Veracruz border	♀	39.5	12.9	11.2	8.3	4.2	3.5	6.5	5.0
A.M.N.H. No. 172743, 8 mi. S. Veracruz border	♂	37.2	12.7	11.0	8.2	5.1	3.6	6.7	4.9
A.M.N.H. No. 172744, 8 mi. S. Veracruz border	♀	39.5	13.0	11.5	8.0	5.0	3.6	6.4	4.8
A.M.N.H. No. 185764, Montebello	♂	37.8	13.3	12.0	8.7	5.2	3.7	6.7	5.0
A.M.N.H. No. 185765, Montebello	♂	37.7	13.2	12.0	8.3	5.0	3.5	6.5	4.8
A.M.N.H. No. 189504, Chiltepec	♀ ad	40.3	13.3	11.5	8.5	5.3	3.3	6.6	5.0
A.M.N.H. No. 189505, Chiltepec	♀ ad	40.0	13.1	11.5	8.4	5.2	3.4	6.5	4.8
A.M.N.H. No. 189509, Chiltepec	♀ ad	39.0	13.3	12.2	8.6	5.2	3.5	6.5	4.8
A.M.N.H. No. 189510, Chiltepec	♀ ad	40.5	13.3	12.2	8.7	5.0	3.3	6.5	4.9
A.M.N.H. No. 189511, Chiltepec	♀ ad	39.7	13.4	11.6	8.5	5.3	3.5	6.7	5.0
Diclidurus albus virgo									
OAXACA									
I.P.N. No. 1881, Río Tonto	♀ ad	70.7	19.0	18.5	12.4	7.1	5.9	9.4	8.4

specimens). Length of forearm, 48.3–48.5; color, external and cranial details similar to those of *Peropteryx m. macrotis* but size larger throughout.

MEASUREMENTS: In table 3.

SPECIMENS EXAMINED: Veracruz: Río Chalchijapa, 38 kilometers southeast of Jesús Carranza, two (K.U.).

GENUS **CENTRONYCTERIS** GRAY

MAXIMILIAN BATS

Centronycteris maximiliani centralis Thomas

Plate 4, figures 9, 10; text figure 13

TYPE LOCALITY: Bogava [Bugaba], foothills of Volcan de Chiriquí, Chiriquí, Panama.

RANGE IN OAXACA: No specimens are known from Oaxaca, but a specimen from a locality in Veracruz is so close to the state line that the presence of this species in northern Juchitán District is probable.

GENERAL CHARACTERS: (Based on Veracruz specimen). Length of forearm, 48.0; wing sac in antebrachial membrane not present; braincase not sharply elevated above rostrum. Skull similar to that of *Peropteryx* but angle between rostrum and braincase wide; basisphenoid pit divided by a plate.

DENTAL FORMULA: Like that in *Rhynchonycteris naso.*

MEASUREMENTS: In table 3.

SPECIMENS EXAMINED: Veracruz: Thirty-five kilometers southeast of Jesús Carranza, one (K.U.).

GENUS **BALANTIOPTERYX** PETERS

PETERS' SAC-WINGED BATS

Balantiopteryx plicata plicata Peters

Plate 4, figures 11, 12; text figure 13

TYPE LOCALITY: Puntarenas, Costa Rica.

RANGE IN OAXACA: Low to moderate elevations throughout the state but not recorded from the southwest.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 39–46; large glandular wing sac situated near center of antebrachial membrane, opening medially; tail short and projecting from upper side of interfemoral membrane. Pelage Hair Brown. Braincase elevated above rostrum; rostrum greatly inflated; basisphenoid pit deep and not divided by a plate; interpterygoid fossa narrow.

DENTAL FORMULA: Like that in *Rhynchonycteris naso.*

MEASUREMENTS: In table 3.

SPECIMENS EXAMINED: Juchitán: Nizanda, 14; 20 miles northeast of La Ventosa, 43; Unión Hidalgo, one. Tehuantepec: Cerro San Pedro, one; Jalapa, one; Las Cuevas, eight; La Ventosa, two; Limón, five; Salazar, 19; Salina Cruz, 18; Tehuantepec, 12; Tequisistlán, six. Tuxtepec: Five miles west of Chiltepec, 38. Yautepec: Guichina, one; San Bartolo Yautepec, eight.

SPECIMENS RECORDED: (Sanborn, 1937, p. 352). Cuicatlán: Cuicatlán, one (U.S.N.M.). Juchitán: Tapanatepec, two (M.C.Z.).

Balantiopteryx io Thomas

Plate 4, figures 13, 14; text figure 14

TYPE LOCALITY: Río Dolores, near Cobán, Alta Verapaz, Guatemala.

RANGE IN OAXACA: Moderate elevations in northern Juchitán District and west to Tuxtepec District.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 35–40.5; similar to *B. plicata* but smaller throughout and of a different color, varying from Prout's Brown to Mummy Brown. Skull similar to that of *B. plicata* but smaller and interpterygoid fossa broadly U-shaped.

MEASUREMENTS: In table 3.

SPECIMENS EXAMINED: Juchitán: Montebello, five; 8 miles south of the Veracruz-Oaxaca border, 12. Tuxtepec: Five miles west of Chiltepec, 14.

SUBFAMILY **DICLIDURINAE** MILLER

GENUS **DICLIDURUS** WIED-NEUWIED

WHITE BATS

Diclidurus albus virgo Thomas

Plate 4, figures 15, 16; text figure 14

TYPE LOCALITY: Escazú, San José, Costa Rica.

RANGE IN OAXACA: Known only from the Río Tonto, Tuxtepec District.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Length of forearm, 70.7; color white; glandular sac in middle of interfemoral membrane; tail projecting from upper side of interfemoral membrane. Skull with large braincase; rostrum broad and depressed,

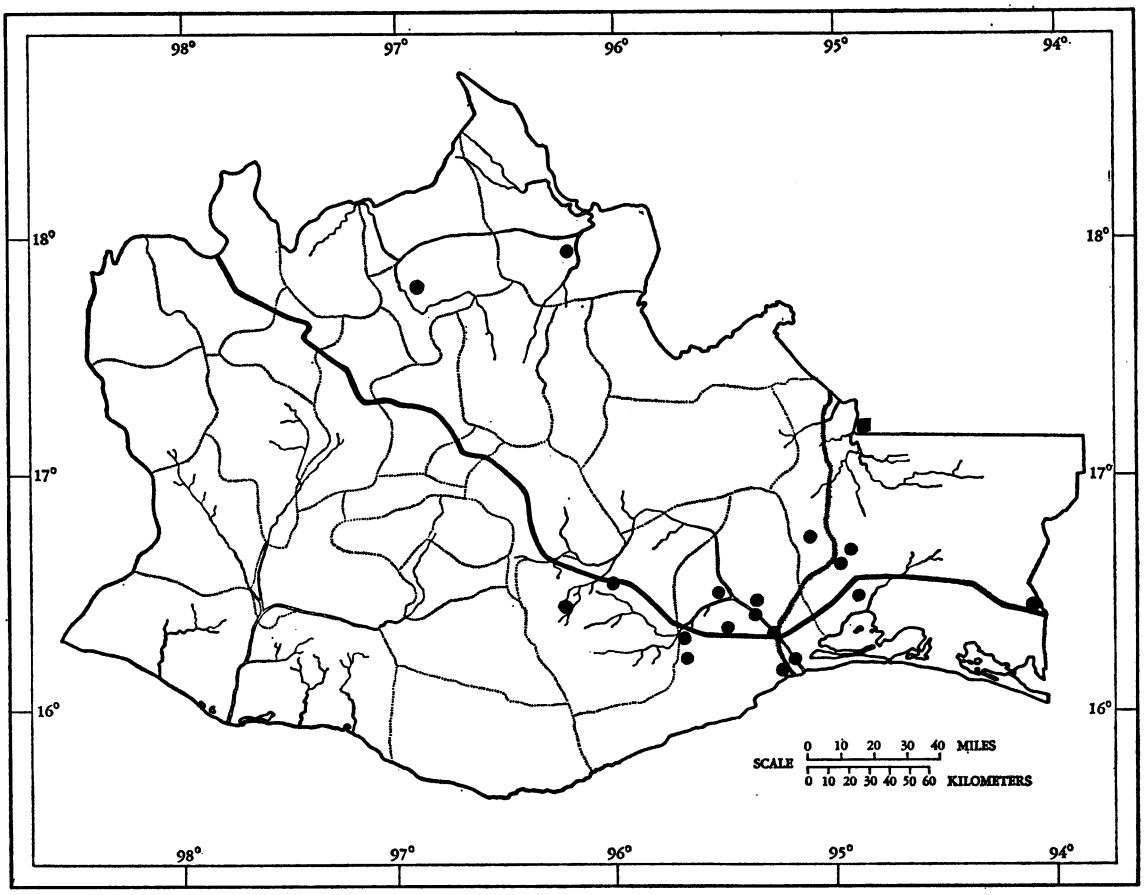


FIG. 13. Records of *Centronycteris maximiliani* and *Balantiopteryx plicata* in Oaxaca and of some specimens from other areas. ■ *C. m. centralis.* ● *B. p. plicata.*

with elevated lateral ridges, postorbital processes underdeveloped.

DENTAL FORMULA: Like that in *Rhynchonycteris naso.*

MEASUREMENTS: In table 3.

SPECIMENS EXAMINED: Tuxtepec: Río Tonto, 14 kilometers north-northeast of Tuxtepec, one (I.P.N.).

REMARKS: North American specimens of *Diclidurus* do not differ appreciably from South American specimens, and *D. virgo* Thomas is at best not more than subspecifically different from Trinidad and Colombia specimens of *D. albus*, and it is doubtful if *virgo* is recognizable even as a subspecies. Unfortunately, the type skull of the nominate form cannot be found and has apparently been destroyed; until typical specimens of *D. albus* from Bahia, Brazil, can be compared with Middle American specimens, Thomas' name *virgo* is here retained for the Oaxacan specimens.

SUMMARY OF THE EMBALLONURIDAE FROM OAXACA

Eight named forms of sac-winged bats can now be included in the fauna of Oaxaca. *Balantiopteryx plicata* is the best known and is common from low to moderate elevations throughout the state. A smaller species, *io*, occurs in the tropical and subtropical regions of northeastern Oaxaca; at some places, these two species of *Balantiopteryx* occur together. *Saccopteryx bilineata*, the white-lined sac-winged bat, has a wide range over the tropical regions of southern Oaxaca. *Peropteryx macrotis* occurs in Oaxaca over much the same area as *B. io*, but is a somewhat larger bat. The

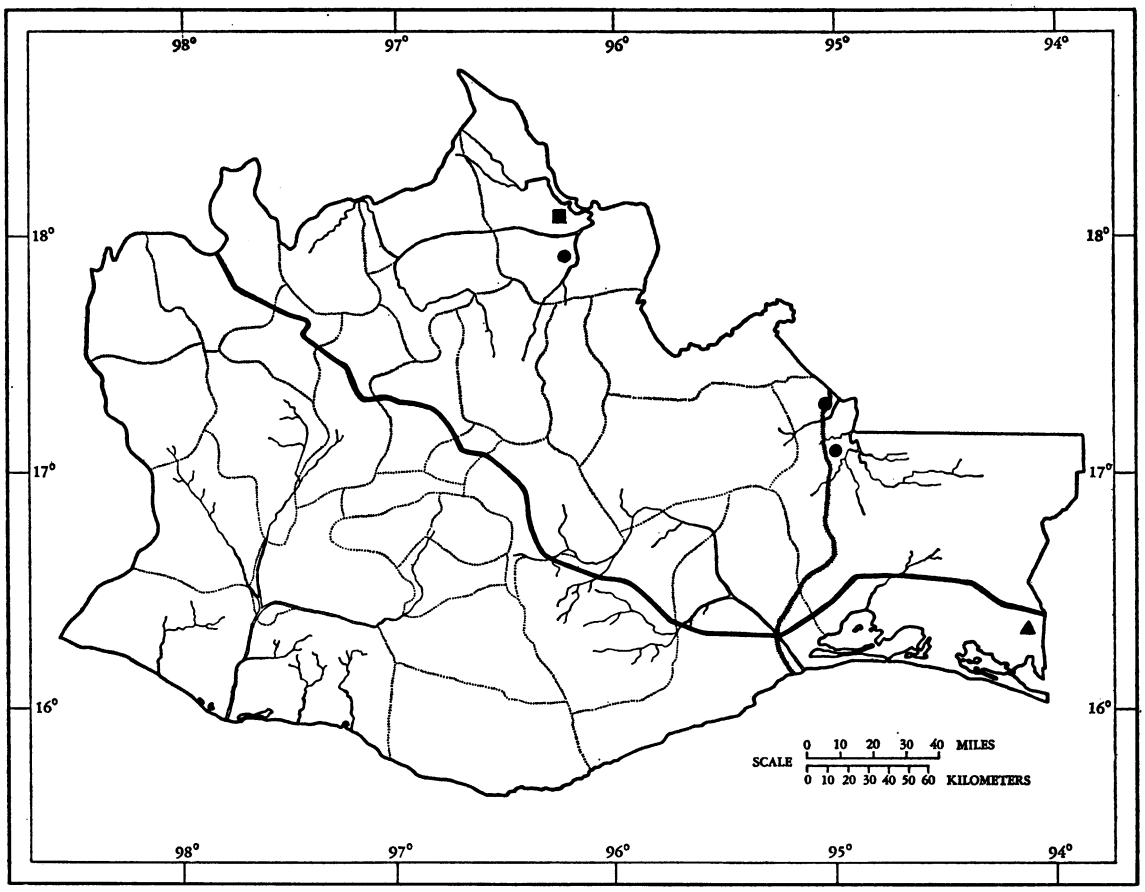


FIG. 14. Records of *Balantiopteryx io*, *Diclidurus albus*, and *Noctilio leporinus* in Oaxaca. ● *B. io.* ■ *D. a. virgo.* ▲ *N. l. mexicanus.*

most northwestern record for the larger species, *Peropteryx kappleri*, is in Veracruz near the border of extreme northeastern Oaxaca. *Rhynchonycteris naso* occurs in northeastern Oaxaca. The inclusion of *Centronycteris maximiliani* in the Oaxacan fauna is based on a specimen from nearby Veracruz. The only known Oaxacan specimen of *Diclidurus albus* came from the district of Tuxtepec and is the most northwestern record for this genus.

FAMILY **NOCTILIONIDAE** GRAY

GENUS **NOCTILIO** LINNAEUS

BULLDOG BATS

Noctilio leporinus mexicanus Goldman

Plate 5, figures 1, 2; text figure 14

TYPE LOCALITY: Papayo, Guerrero, Mexico.

RANGE IN OAXACA: Low to moderate elevations in southern Juchitán District and probably west along the Pacific coast region to Guerrero.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 81.5–86.5; pelage short and close, middorsal line on lower back; hind feet and limbs long, claws large; tail projecting from upper side of interfemoral membrane. Skull large, sagittal crest well developed; canine teeth large, inner upper incisors much larger than outer.

DENTAL FORMULA: Incisors, $\frac{2-2}{1-1}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{1-1}{2-2}$; molars, $\frac{3-3}{3-3}$ = 28.

MEASUREMENTS: In table 4.

SPECIMENS EXAMINED: Juchitán: Tapanatepec, six.

FAMILY **PHYLLOSTOMATIDAE** COUES AND YARROW

LEAF-NOSED BATS

TABLE 4

MEASUREMENTS (IN MILLIMETERS) OF *Noctilio leporinus mexicanus* FROM TAPANATEPEC, OAXACA

Species and Museum Number	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across M^2–M^2	Maxillary Tooth Row
A.M.N.H. No. 177876	♀ ad	84.1	25.2	24.0	17.8	7.0	13.4	12.0	10.0
A.M.N.H. No. 177877	♀ ad	84.0	—	—	—	7.0	13.3	12.5	10.2
A.M.N.H. No. 177878	♂ ad	86.5	29.6	26.2	20.4	7.6	15.0	13.2	10.9
A.M.N.H. No. 177879	♀ sub	81.0	25.6	24.5	18.9	7.3	13.8	12.7	10.2
A.M.N.H. No. 177880	♀ ad	83.0	25.3	24.2	18.7	7.3	13.7	12.6	10.1
A.M.N.H. No. 177881	♀ ad	84.3	24.6	23.8	18.3	7.0	13.7	12.5	10.0

SUBFAMILY **MORMOOPINAE** KOCH

GENUS **PTERONOTUS** GRAY

MUSTACHED BATS

Pteronotus personata psilotis (Dobson)

Plate 5, figures 3, 4; text figure 17

TYPE LOCALITY: Tehuantepec, Oaxaca, Mexico.

RANGE IN OAXACA: Tropical regions in southern Juchitán District and probably occurring at low and moderate elevations throughout the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 42–44.5; ears long and narrow, tip pointed; face well haired, elongated tufts of hair projecting from sides of muzzle; lower lip with platelike dermal outgrowths and numerous small, rounded papillae; tail appearing on upper side of interfemoral membrane. Skull narrowly constricted in interorbital region; braincase subglobose, rostrum depressed near base; nasal opening circular; inner upper incisor twice as large as outer, its cutting edge with a distinct median notch; lower incisors trifid.

DENTAL FORMULA: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{3-3}$; molars, $\frac{3-3}{3-3}$ = 34.

MEASUREMENTS: In table 5.

SPECIMENS EXAMINED: Juchitán: Tapanatepec, 71.

REMARKS: Burt and Stirton (1961, p. 24) have showed that there are no structural differences other than specific between *Chilonycteris* and *Pteronotus* and relegated *Chilonycteris* to synonymy under *Pteronotus*.

Pteronotus rubiginosa mexicana (Miller)

Plate 5, figures 5, 6; text figure 15

Chilonycteris rubiginosa: GOODWIN AND GREENHALL, 1961, p. 223 (*rubiginosa* retained in place of *parnellii* as the specific status for the large mainland individuals of *Chilonycteris*).

Pteronotus rubiginosa [*mexicana*]: BURT AND STIRTON, 1961, p. 25 (regarded *P. rubiginosa* and *P. parnellii* as separate species.)

TYPE LOCALITY: San Blas, Nayarit, Mexico.

RANGE IN OAXACA: Low to moderate elevations on the Pacific watershed from Tapanatepec to Pochutla.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 55–59; similar in most general characters to *P. personata psilotis* but conspicuously larger, and occurring in two color phases, Ochraceous-Tawny or Cinnamon-Brown. Skull similar to that of *P. p. psilotis* but much larger and braincase less elevated above rostrum.

MEASUREMENTS: In table 5.

SPECIMENS EXAMINED: Juchitán: El Jícaro, one; Tapanatepec, two; Unión Hidalgo, two; Zanatepec, one. Tehuantepec: Arroyo Ocotita, 11; Bisilana, one; Carrizal, five; Guiengola, six; Morro Mazatlán, two. Yautepec: Santo Domingo Chontecomatlán, three; Santa María Ecatepec, three.

SPECIMENS RECORDED: (Schaldach, 1966, p. 290). Pochutla: Kilometer 183 (above Pochutla), one (I.B.).

Pteronotus rubiginosa fusca (J. A. Allen)

Text figure 15

Pteronotus rubiginosa [*fusca*]: BURT AND STIRTON, 1961, p. 25.

TABLE 5

MEASUREMENTS (IN MILLIMETERS) OF PHYLLOSTOMIDS IN THE SUBFAMILY CHILONYCTERINAE FROM OAXACA

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across M^3–M^3	Maxillary Tooth Row
Pteronotus personata psilotis									
A.M.N.H. No. 175018, Tapanatepec	♂ ad	42.0	14.5	13.4	7.2	3.4	7.1	5.2	5.6
A.M.N.H. No. 177718, Tapanatepec	♂ ad	42.5	14.9	13.3	8.2	3.7	7.5	5.5	5.8
A.M.N.H. No. 177719, Tapanatepec	♀ ad	44.5	15.2	13.9	8.0	3.4	7.3	5.4	6.0
A.M.N.H. No. 177720, Tapanatepec	♂ ad	44.0	15.0	14.2	8.3	3.6	7.4	5.7	6.3
A.M.N.H. No. 177721, Tapanatepec	♀ ad	44.5	15.0	14.0	8.3	3.7	7.5	5.5	6.0
A.M.N.H. No. 177722, Tapanatepec	♂ ad	42.5	14.9	13.5	8.3	3.1	7.2	5.5	5.9
A.M.N.H. No. 177723, Tapanatepec	♂ ad	43.5	15.0	14.0	8.1	3.4	7.5	5.5	5.9
A.M.N.H. No. 177724, Tapanatepec	♂ ad	44.0	15.2	14.2	8.3	3.4	7.5	5.6	6.0
Pteronotus rubiginosa mexicana									
A.M.N.H. No. 182163, Arroyo Ocotita	♂ ad	58	21.0	20.0	11.6	4.1	10.0	7.5	8.5
A.M.N.H. No. 175267, Arroyo Ocotita	♀ ad	56	20.7	19.4	11.6	4.1	10.0	7.5	8.5
A.M.N.H. No. 145149, Bisilana	♂ ad	58	20.5	19.4	11.5	4.2	10.2	7.5	8.7
A.M.N.H. No. 185024, Chontecomatlán	♀ ad	56	20.5	19.4	11.3	4.2	10.5	7.2	8.5
A.M.N.H. No. 185771, El Jícaro	♀ ad	58	20.8	19.8	11.7	4.2	10.0	7.3	8.5
A.M.N.H. No. 177738, Tapanatepec	♂ ad	56	20.9	19.8	11.5	4.2	10.0	7.4	8.6

TABLE 5—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across M^3–M^3	Maxillary Tooth Row
A.M.N.H. No. 177739, Tapanatepec	♀ ad	58	21.3	20.2	12.0	4.3	10.1	7.6	8.8
A.M.N.H. No. 185772, Zanatepec	♀ ad	59	21.5	20.4	11.5	4.2	9.4	7.5	8.9
Pteronotus rubiginosa fusca									
A.M.N.H. No. 189595, Chiltepec	♂ ad	60	21.8	20.9	12.4	4.5	10.6	7.7	9.2
Pteronotus davyi fulvus									
A.M.N.H. No. 175100, Tehuantepec	♂ ad	46.5	16.4	15.3	8.6	3.9	8.1	6.0	6.7
A.M.N.H. No. 178778, Tehuantepec	♂ ad	45.6	14.5	14.0	8.1	3.5	7.3	5.4	6.0
A.M.N.H. No. 177577, Tapanatepec	♂ ad	43.0	15.2	14.2	8.3	3.5	7.5	5.6	6.0
A.M.N.H. No. 177580, Tapanatepec	♀ ad	44.0	15.1	14.3	8.2	3.3	7.3	5.5	6.0
A.M.N.H. No. 177583, Tapanatepec	♀ ad	44.5	15.4	14.0	8.4	3.5	7.4	5.5	6.2
A.M.N.H. No. 185774, El Jícaro	♂ ad	44.5	15.3	13.8	8.3	3.6	7.5	5.5	5.9
A.M.N.H. No. 185780, El Jícaro	♂ ad	44.8	15.2	14.6	8.6	3.7	7.7	5.7	6.4
A.M.N.H. No. 185795, El Jícaro	♀ ad	51.0	15.1	14.3	8.4	3.5	7.3	5.6	6.1
A.M.N.H. No. 189596, Sola de Vega	♂ ad	45.5	15.3	14.5	8.5	3.6	7.5	5.7	6.3
Mormoops megalophylla megalophylla									
A.M.N.H. No. 177423, Tapanatepec	♂ ad	56.0	14.8	14.7	9.1	5.3	8.6	6.5	8.0
A.M.N.H. No. 177424, Tapanatepec	♂ ad	55.5	15.0	14.9	9.4	5.2	8.9	6.6	7.9
A.M.N.H. No. 190138, Chiltepec	♂ ad	54.0	15.1	15.1	9.4	5.3	8.9	6.7	8.0
A.M.N.H. No. 190139, Chiltepec	♂ ad	54.5	14.9	14.8	9.3	5.2	8.7	6.6	8.1

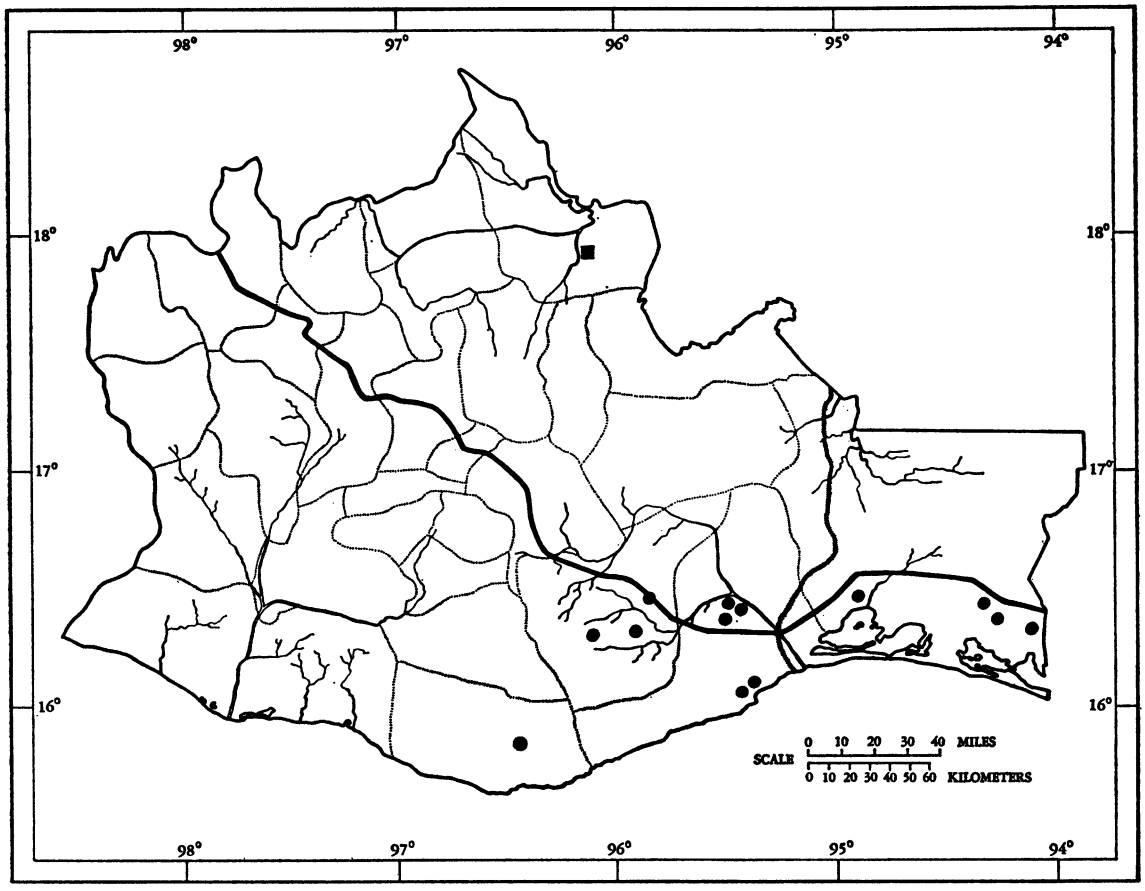


FIG. 15. Records of *Pteronotus rubiginosa* in Oaxaca. ● *P. r. mexicana.* ■ *P. r. fusca.*

TYPE LOCALITY: Las Quiguas, 5 miles south of Puerto Cabello, northern Venezuela; altitude 650 feet.

RANGE IN OAXACA: Moderate elevations in Tuxtepec District but probably occurring elsewhere in the northern part of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Length of forearm, 60; similar in general external characters to *P. rubiginosa mexicana* but size larger and color darker. Skull similar in construction to that of *P. r. mexicana*, but rostrum relatively longer and size larger in all dimensions.

MEASUREMENTS: In table 5.

SPECIMENS EXAMINED: Tuxtepec: Chiltepec, one.

REMARKS: Although the specimen of *P. r. fusca* from Chiltepec, Oaxaca, is slightly smaller than the average for specimens of *P. r. fusca* from Guatemala and Nicaragua, the skull of the Chiltepec specimen is much larger and readily separated by its size from a series of eight skulls of *P. r. mexicanus* from southern Oaxaca and an even larger series of *P. r. mexicanus* from Sonora.

Pteronotus davyi fulvus (Thomas)

Plate 5, figures 7, 8; text figure 16

Pteronotus suapurensis calvus GOODWIN, 1958, p. 1.

TYPE LOCALITY: Las Peñas, Jalisco, Mexico.

RANGE IN OAXACA: Tropical regions in the Pacific coast regions of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 43–46; similar in size and coloration to *P. personata psilotis*, but volar membranes attached to the mid-dorsal line, producing a bare-backed appearance. Skull essentially the same as that in *P. p. psilotis* but larger, rostrum broader and

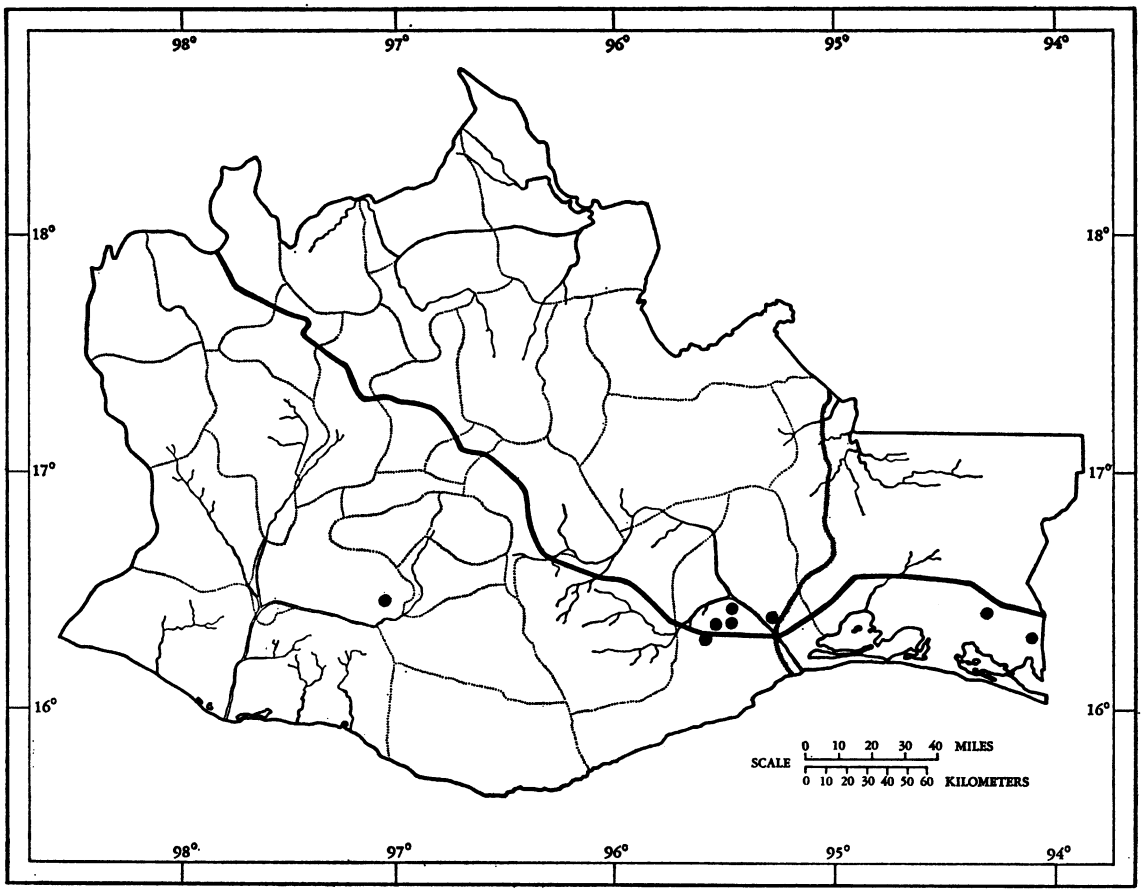


FIG. 16. Records of *Pteronotus davyi* in Oaxaca. ● *P. d. fulvus.*

heavier, braincase larger and more sharply elevated above rostrum, and teeth larger and broader.

MEASUREMENTS: In table 5.

SPECIMENS EXAMINED: Juchitán: El Jícaro, 71; Tapanatepec, 32. Sola de Vega: Sola de Vega, one. Tehuantepec: Arroyo Ocotita, eight; Hierba Santa, three; San Antonio, two; Santa Lucía, one; Tehuantepec, five.

REMARKS: *Pteronotus s. calvus* is here listed in synonymy under *P. d. fulvus.* Although the type of *calvus* shows some characteristics separating it from *suapurensis* and from *fulvus*, these differences can perhaps be best attributed to individual variations of *P. d. fulvus* rather than of *suapurensis.*

GENUS **MORMOOPS** LEACH

Mormoops megalophylla megalophylla Peters

Plate 5, figures 9, 10; text figure 17

TYPE LOCALITY: Southern Mexico; the locality can be fixed here as Parras, Tehuantepec, Oaxaca. Alston (1879–1882, p. 37) listed *M. megalophylla* from Parras, Tehuantepec, in the Berlin Museum, probably the only specimen of *megalophylla* from southern Mexico in European museums at the time and the material apparently used by Peters when he named *M. megalophylla.* Parras may refer to a settlement on the Río Perros east of the city of Tehuantepec.

RANGE IN OAXACA: Tropical regions in the northern and southern parts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 54–56; superficially similar in some general external characters to *Pteronotus rubiginosa*; ears large, broadly rounded, and joined across forehead at extreme base; dermal outgrowths on chin very highly developed; a small area on crown of head devoid of hair; tail encased in interfemoral membrane except for tip.

Skull foreshortened, braincase so elevated above rostrum that foramen magnum is above level of rostrum; dentition essentially the same as that in *Pteronotus*.

MEASUREMENTS: In table 5.

SPECIMENS EXAMINED: Juchitán: Tapanatepec, two. Tuxtepec: Chiltepec, two.

SPECIMENS RECORDED: (Schaldach, 1966, p. 290). Miahuatlán: Río Molino, one (I.B.).

SUMMARY OF THE MORMOOPINAE OF OAXACA

The Mormoopinae in Oaxaca are restricted largely to the low, tropical areas of the state. *Pteronotis personata psilotis*, *P. rubiginosa mexicana*, and *P. davyi fulvus* are common in southeastern Oaxaca, but *Pteronotis rubiginosa fusca* occurs only in the northern parts of the state. *Mormoops m. megalophylla* is represented by specimens from the Gulf drainage as well as the Pacific coast region.

SUBFAMILY **PHYLLOSTOMATINAE** FLOWER AND LYDEKKER

GENUS **MICRONYCTERIS** GRAY

SHORT-TAILED FOREST BATS

SUBGENUS **MICRONYCTERIS** GRAY

Micronycteris megalotis mexicana Miller

Plate 6, figures 1, 2; text figure 18

TYPE LOCALITY: Platanar, Jalisco, Mexico.

RANGE IN OAXACA: Moderate elevations in the southern and eastern districts.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 34–36.5; ears large, rounded in outline, and connected by a high notched band across forehead, noseleaf prominent; tail short, encased in interfemoral membrane except for tip. Skull slender; braincase high; saggital crest low but distinct;

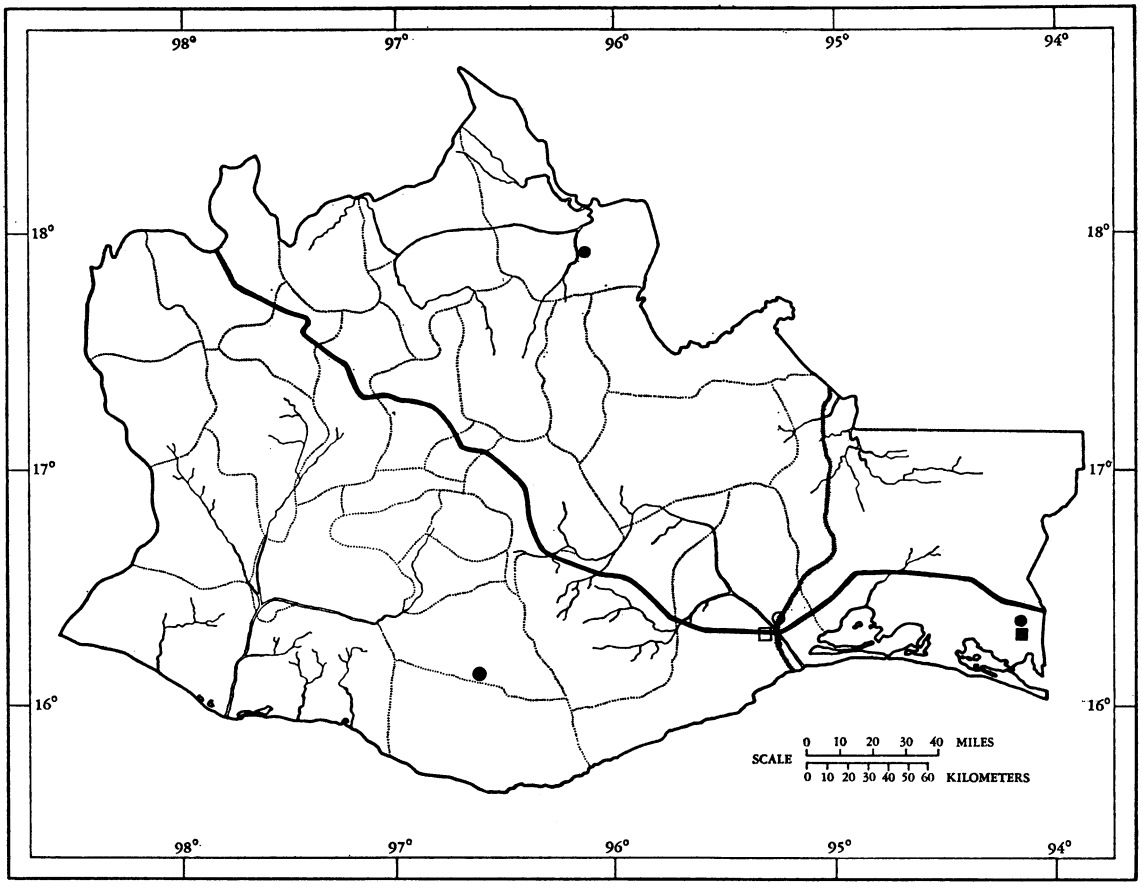


FIG. 17. Records of *Pteronotus personata* and *Mormoops megalophylla* in Oaxaca. ■ *P. p. psilotis*. □ Type locality of *P. p. psilotis*. ● *M. m. megalophylla*. ○ Type locality of *M. m. megalophylla*.

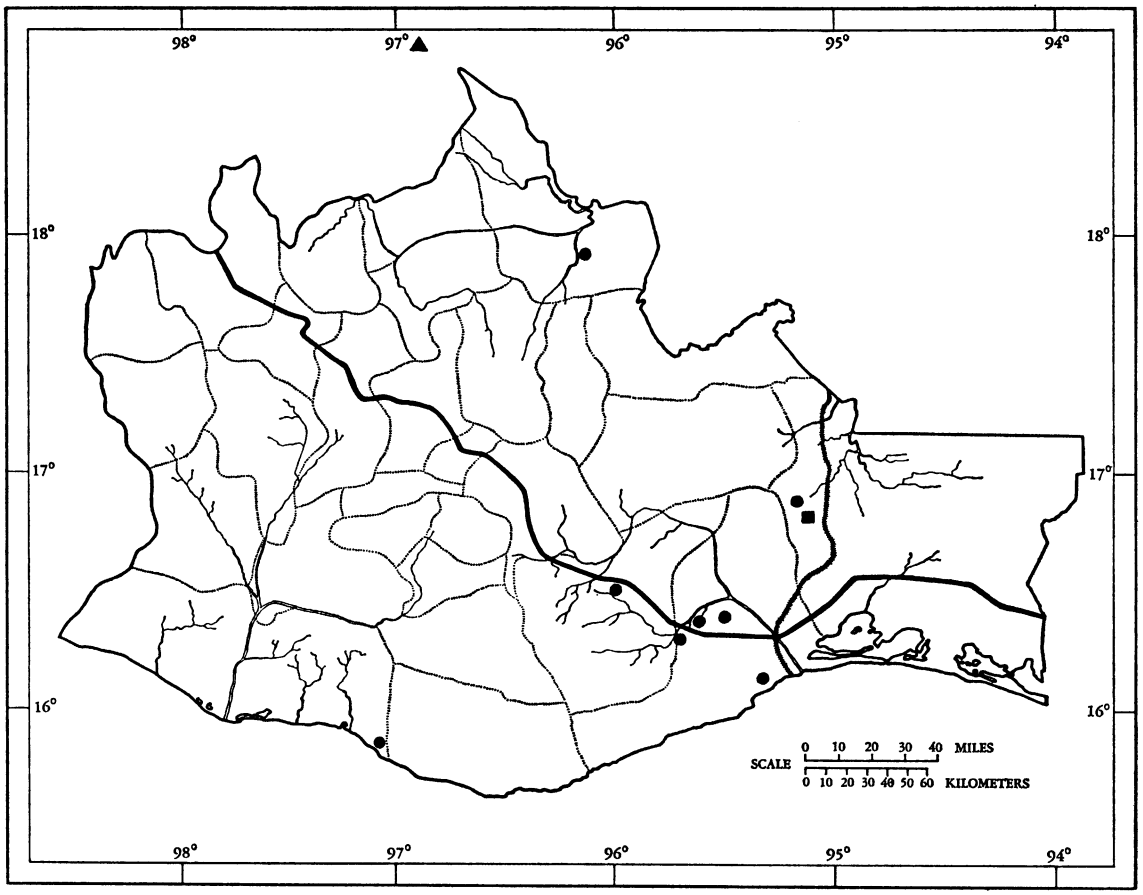


FIG. 18. Records of *Micronycteris megalotis*, *Micronycteris brachyotis*, and *Micronycteris sylvestris* in Oaxaca and of some specimens from other areas. ● *M. m. mexicanus*. ■ *M. brachyotis*. ▲ *M. sylvestris*.

inner upper incisors large, cutting edge faintly divided by a notch near outer side; outer upper incisors very small.

DENTAL FORMULA: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{3-3}$; molars, $\frac{3-3}{3-3}$ = 34.

MEASUREMENTS: In table 6.

SPECIMENS EXAMINED: Juchitán: Seventeen miles north of Matías Romero, five. Mixes: Ixcuintepec, six. Tehuantepec: Escurano, three; San Antonio, three; Cerro San Pedro, eight; Tequisistlán, five. Tuxtepec: Chiltepec, three. Yautepec: San Bartolo Yautepec, seven. Juquila: Puerto Escondido, one.

SUBGENUS **LAMPRONYCTERIS** SANBORN

Micronycteris brachyotis (Dobson)

Plate 6, figures 3, 4; text figure 18

TYPE LOCALITY: Cayenne, French Guiana, South America.

RANGE IN OAXACA: Known only from the Gulf slope of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Length of forearm, 40.4; similar in general characters to *Micronycteris megalotis* but larger, ears smaller than in *M. megalotis* and not joined by a band across forehead; tail short, encased in interfemoral membrane except for extreme tip; naked pad on lower lip with Y-shaped groove; calcar shorter than hind foot with claws; fifth metacarpal shortest, third longest. Color Olive-Brown, entire under parts Mars Yellow to roots of hairs. Skull similar in general to that of *M. megalotis* but braincase lower, rostrum and interorbital region more swollen, rostrum flattened; outer upper incisors bifid, with elongated point in contact with inner teeth; first lower premolar larger than second; third lower premolar equal in size to first lower molar.

TABLE 6

MEASUREMENTS (IN MILLIMETERS) OF PHYLLOSTOMIDS IN THE SUBFAMILY PHYLLOSTOMINAE FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Post-orbital Constriction	Brain-case Breadth	Palate Breadth Across M^1–M^3	Maxillary Tooth Row
Micronycteris megalotis mexicana									
OAXACA									
A.M.N.H. No. 167464, Ixcuintepec	♀ ad	36.5	18.5	17.2	9.0	4.1	7.5	6.2	7.5
A.M.N.H. No. 171595, San Antonio	♂ ad	35.0	19.0	17.3	9.0	4.2	7.5	6.3	7.5
A.M.N.H. No. 185859, 17 mi. N. Matías Romero	♀ ad	34.0	18.5	16.5	8.8	4.0	7.2	6.2	7.3
A.M.N.H. No. 185860, 17 mi. N. Matías Romero	♀ ad	35.0	18.5	16.7	9.0	4.0	7.4	6.1	7.2
A.M.N.H. No. 185861, 17 mi. N. Matías Romero	♀ ad	36.5	18.8	16.5	8.5	4.0	7.5	6.1	7.3
A.M.N.H. No. 189597, Chiltepec	♂ ad	35.0	18.3	16.5	9.0	4.0	7.4	5.9	7.2
A.M.N.H. No. 189598, Chiltepec	♂ ad	34.0	18.5	16.6	9.0	4.0	7.3	6.1	7.3
A.M.N.H. No. 189599, Chiltepec	♂ ad	35.0	18.1	16.0	8.6	4.1	7.3	5.9	6.9
A.M.N.H. No. 205268, Puerto Escondido	♀ ad	35.7	19.4	17.2	9.4	4.3	7.5	6.4	7.5
Micronycteris brachyotis									
OAXACA									
A.M.N.H. No. 185856, Mazahuito	♂ ad	41.0	21.6	19.8	11.0	5.0	8.6	7.0	8.5
Micronycteris sylvestris									
VERACRUZ									
K.U. No. 23645, Tlacotepec	♀ ad	42.5	20.5	18.9	9.9	4.7	8.2	6.8	8.4
K.U. No. 23647, Tlacotepec	♀ ad	42.2	21.0	19.0	10.4	5.0	8.7	7.0	8.4
Macrotus waterhousii mexicanus									
OAXACA									
A.M.N.H. No. 143478, San Antonio	♂ ad	52.3	24.2	21.0	—	4.3	9.2	8.0	9.8
A.M.N.H. No. 149959, Arroyo Ocotita	♀ ad	53.0	23.3	—	—	4.0	8.5	7.8	9.5
A.M.N.H. No. 171591, Tehuantepec	♂ ad	52.0	24.0	21.5	11.8	4.2	9.0	7.9	9.5

TABLE 6—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Post-orbital Constriction	Brain-case Breadth	Palate Breadth Across M^2–M^2	Maxillary Tooth Row
A.M.N.H. No. 178755, Tequisistlán	♀ ad	52.0	23.8	21.5	12.0	4.2	9.2	7.9	9.4
A.M.N.H. No. 182158, Arroyo Ocotita	♂ ad	54.2	24.0	21.9	11.8	4.0	8.7	7.7	9.7
Lonchorhina aurita aurita									
OAXACA									
L.A.C.M. No. 12980, 19 mi. N. Matías Romero	♀ ad	51.0	20.2	18.6	10.3	5.0	8.5	6.5	6.6
L.A.C.M. No. 12981, 19 mi. N. Matías Romero	♀ ad	51.3	20.4	19.2	10.7	4.9	8.9	7.3	6.8
L.A.C.M. No. 12995, 19 mi. N. Matías Romero	♀ ad	50.5	20.5	19.0	10.5	5.0	8.5	6.9	6.7
L.A.C.M. No. 12998, 19 mi. N. Matías Romero	♀ ad	50.8	20.1	19.2	11.1	5.0	8.7	6.9	6.5
Mimon bennettii cozumelae									
OAXACA									
A.M.N.H. No. 185862, Matías Romero	♂	56.9	25.9	23.6	14.4	5.0	10.6	9.6	9.6
A.M.N.H. No. 185863, Matías Romero	♂	53.0	25.9	23.5	13.7	4.6	9.7	9.5	9.5
A.M.N.H. No. 185864, Matías Romero	♂	56.0	26.2	23.4	13.8	4.8	9.9	9.6	9.6
A.M.N.H. No. 185865, Matías Romero	♂	58.0	26.3	23.5	13.7	4.6	10.0	9.6	9.8
A.M.N.H. No. 185866, Matías Romero	♂	56.5	26.4	23.5	13.5	4.6	9.9	9.1	9.5
A.M.N.H. No. 185868, Matías Romero	♀	55.0	26.0	23.1	13.7	4.6	10.0	9.6	9.7
A.M.N.H. No. 185869, Matías Romero	♀	55.5	26.3	23.4	13.7	4.8	9.7	9.5	9.6
A.M.N.H. No. 185870, Matías Romero	♀	55.6	26.0	23.4	13.7	4.5	9.8	9.4	9.5
A.M.N.H. No. 185871, Matías Romero	♀	57.3	26.0	22.9	14.0	4.6	10.2	9.3	9.3
A.M.N.H. No. 185872, Matías Romero	♀	57.0	26.4	23.5	14.3	4.7	9.8	9.7	9.5
Phyllostomus discolor verrucosus									
OAXACA									
A.M.N.H. No. 185873, Río Sarabia	♂ ad	61.5	30.3	27.5	15.5	6.2	11.5	9.8	10.1
A.M.N.H. No. 185874, Río Sarabia	♀ ad	62.0	31.2	28.2	15.9	6.3	12.2	10.7	10.3
A.M.N.H. No. 185875, Río Sarabia	♂ ad	62.0	29.9	27.5	15.6	6.4	12.2	10.5	9.9

TABLE 6—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Post-orbital Constriction	Brain-case Breadth	Palate Breadth Across M^3–M^3	Maxillary Tooth Row
A.M.N.H. No. 185876, Río Sarabia	♂ ad	65.0	31.5	28.3	16.0	6.4	11.6	10.0	10.0
A.M.N.H. No. 185877, Río Sarabia	♂ ad	61.5	29.8	26.5	15.8	6.2	11.9	9.8	9.5
A.M.N.H. No. 185878, Río Sarabia	♂ ad	61.0	30.5	27.7	15.3	6.3	12.2	10.0	9.8
A.M.N.H. No. 185879, Río Sarabia	♂ ad	60.7	30.3	27.4	16.0	6.6	12.2	10.0	10.1
A.M.N.H. No. 185881, Río Sarabia	♀ ad	63.5	30.1	27.3	14.9	6.5	11.5	10.0	9.7
A.M.N.H. No. 185882, Río Sarabia	♀ ad	59.0	29.5	27.0	15.0	7.0	—	10.5	10.0
Trachops cirrhosus coffini									
OAXACA									
A.M.N.H. No. 185886, Matías Romero	♂ ad	57.8	28.5	25.4	14.0	5.2	11.8	9.9	10.6
A.M.N.H. No. 185887, Matías Romero	♂ ad	58.4	28.5	25.3	13.6	4.9	11.3	9.5	10.4
A.M.N.H. No. 185888, Matías Romero	♂ ad	58.0	28.8	26.0	13.2	5.0	11.4	9.8	10.2
A.M.N.H. No. 185889, Matías Romero	♀ ad	56.4	27.7	25.0	13.6	5.1	11.6	10.0	10.2
A.M.N.H. No. 185890, Matías Romero	♀ ad	60.0	28.7	25.5	13.8	5.0	11.5	9.9	10.5
A.M.N.H. No. 185891, Río Ostuta	♂ ad	59.0	27.5	25.0	13.7	5.0	11.5	9.7	10.2
Chrotopterus auritus auritus									
CHIAPAS									
A.M.N.H. No. 175021, 5 mi. SW. Teapa	♂ ad	84.5	36.5	31.7	19.2	6.6	14.3	11.8	13.3
A.M.N.H. No. 175022, 5 mi. SW. Teapa	♂ sub	75.6	—	—	18.8	6.2	13.0	11.6	—
Vampyrum spectrum nelsoni									
VERACRUZ									
U.S.N.M. No. 78127, Coatzacoalcos	♂ ad	106.9	51.0	42.3	23.6	—	—	—	20.2
NICARAGUA									
A.M.N.H. No. 28993, Chinandega	♂ ad	107.0	50.0	42.6	24.3	8.0	15.5	14.3	20.3

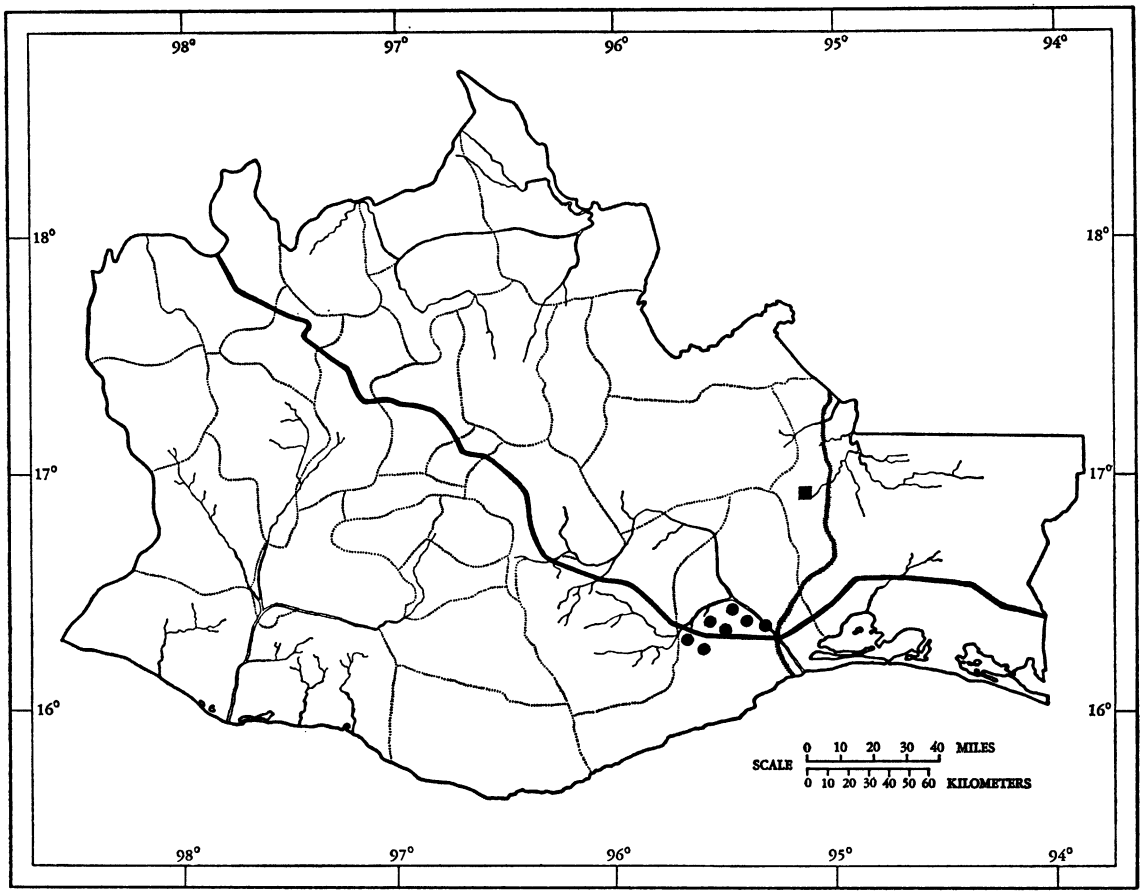


FIG. 19. Records of *Macrotus waterhousii* and *Lonchorhina aurita* in Oaxaca.
● *M. w. mexicanus.* ■ *L. a. aurita.*

MEASUREMENTS: In table 6.

SPECIMENS EXAMINED: Juchitán: Mazahuito, one.

REMARKS: *Micronycteris platyceps* Sanborn, 1949, was recorded in Central America as far north as Nicaragua by Hall and Kelson (1949, p. 100). Goodwin and Greenhall (1961, p. 330) placed this name in synonymy with *Micronycteris brachyotis* (Dobson, 1878).

SUBGENUS **GLYPHONYCTERIS** THOMAS

Micronycteris sylvestris (Thomas)

Plate 6, figures 5, 6; text figure 18

TYPE LOCALITY: Between 1400 and 2000 feet in altitude near Hacienda Miravalles, Volcán de Miravalles, Guanacaste, Costa Rica.

RANGE IN OAXACA: No specimen is known from the state, but Hall and Kelson (1959, p. 100) have shown the range of this species as covering most of Oaxaca.

GENERAL CHARACTERS: (Based on Veracruz specimens). Length of forearm, 40–42; similar in general characters to *M. brachyotis*, but of a different color and skull smaller, rostrum shorter, sagittal crest undeveloped, upper premolars slightly recurved (straight in *M. brachyotis*). Color Clove Brown. Braincase domed but not sharply elevated above rostrum; maxillary bones swollen posteriorly; inner upper incisors large, outer incisors very small; PM^3 slightly larger than PM^4.

MEASUREMENTS: In table 6.

SPECIMENS EXAMINED: Veracruz: Fifteen kilometers east-northeast of Tlacotepec, two (K.U.).

GENUS **MACROTUS** GRAY

BIG-EARED FOREST BATS

Macrotus waterhousii mexicanus Saussure

Plate 6, figures 7, 8; text figure 19

Macrotus waterhousii mexicanus: ANDERSON AND NELSON, 1965, p. 25.

TYPE LOCALITY: Yautepec, near Cuautla, Morelos, Mexico.

RANGE IN OAXACA: Arid tropical regions on the Pacific watershed, but probably occurring elsewhere in the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 51–54; ears very large, rounded in outline and connected across forehead by a low, notched band; noseleaf prominent; tail long; lower lip with triangular naked pad bearing longitudinal groove as in *Micronycteris*. Similar in general characters to species of *Micronycteris* but ears much larger and tail longer. Color Sepia. Skull long and narrow, braincase not sharply elevated above rostrum, rostrum flattened and inflated posteriorly; inner upper incisors large, outer upper incisors very small, structure of teeth essentially as in *Micronycteris*.

DENTAL FORMULA: Like that in *Micronycteris*.

MEASUREMENTS: In table 6.

SPECIMENS EXAMINED: Tehuantepec: Arroyo Ocotita, five; Cerro San Pedro, five; Guiengola, four; San Antonio, seven; Santa Lucía, seven; Tehuantepec, two; Tequisistlán, three.

GENUS **LONCHORHINA** TOMES

LANCE-NOSED BATS

Lonchorhina aurita aurita Tomes

Plate 6, figures 9, 10; text figure 19

TYPE LOCALITY: West Indies; island of Trinidad, according to Cabrera (1958, p. 63).

RANGE IN OAXACA: Moderate elevations in northern Juchitán District.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 47–51; ears very large and pointed at tip; noseleaf exceptionally long and slender; tragus long and slender; tail long and reaching posterior border of wide interfemoral membrane. Color Mummy Brown. Skull relatively narrow, braincase sharply elevated above rostrum; interorbital region depressed, with a concavity at base of rostrum; teeth essentially like those in *Micronycteris*.

DENTAL FORMULA: Like that in *Micronycteris*.

MEASUREMENTS: In table 6.

SPECIMENS EXAMINED: Juchitán: Nineteen miles north of Matías Romero, four (L.A.C.M.).

GENUS **MIMON** GRAY

MIMON BATS

Mimon bennettii cozumelae Goldman

Plate 6, figures 11, 12; text figure 20

Mimon bennettii cozumelae: SCHALDACH, 1964, p. 132.

TYPE LOCALITY: Cozumel Island, Quintana Roo, Mexico.

RANGE IN OAXACA: Moderate elevations in northern Juchitán District.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 53–58; ears large, separate, and hairy at base on inner side; noseleaf simple, broad at base and tapered to a pointed tip; tail short, about as long as femur, and terminating near base of interfemoral membrane; pelage relatively long and woolly; forearm hairy. Color Snuff Brown. Skull superficially resembling that of *Macrotus waterhousii mexicanus* but larger and heavier; braincase elevated above rostrum; inner upper incisors long, outer upper incisors small; first upper premolar larger than outer incisors.

DENTAL FORMULA: Incisors, $\frac{2-2}{1-1}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3}$ = 30.

MEASUREMENTS: In table 6.

SPECIMENS EXAMINED: Juchitán: Twenty miles north of Matías Romero, 11.

GENUS **PHYLLOSTOMUS** LACÉPÈDE

SPEAR-NOSED BATS

Phyllostomus discolor verrucosus Elliot

Plate 6, figures 13, 14; text figure 20

TYPE LOCALITY: Niltepec, Oaxaca, Mexico.

RANGE IN OAXACA: Tropical regions in Juchitán District and probably west in northern Oaxaca to Huajuápam District.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 59–65; form robust; pelage short and close; ears large and widely separated, tips pointed; noseleaf simple; tail short, projecting from base of inter-

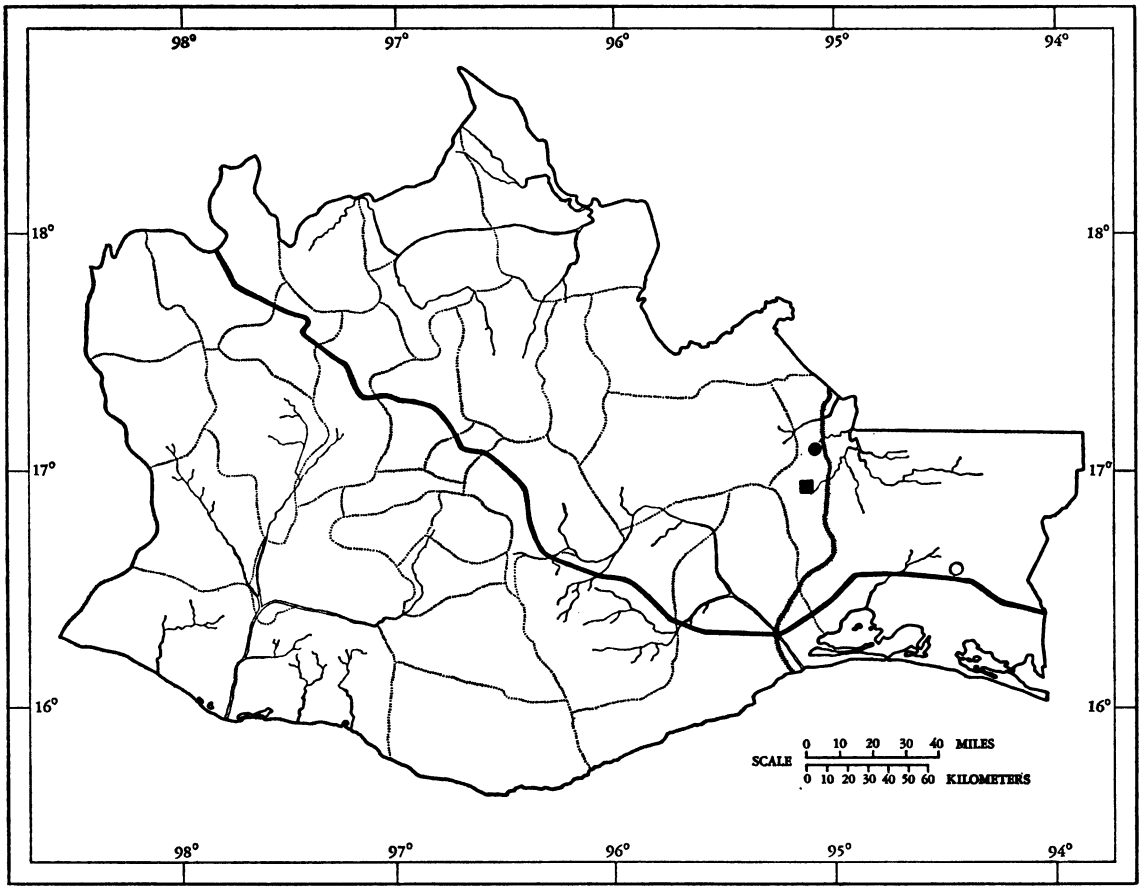


FIG. 20. Records of *Mimon bennettii* and *Phyllostomus discolor* in Oaxaca. ■ *M. b. cozumelae.* ● *P. d. verrucosus.* ○ Type locality of *P. d. verrucosus.*

femoral membrane; naked pad on lower lip V-shaped, margined by rounded papillae. Occurring in two color phases, Ochraceous-Tawny and Mummy Brown. Skull relatively long; inner upper incisors large and directed forward; outer upper incisors low and broad.

DENTAL FORMULA: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3}$ = 32.

MEASUREMENTS: In table 6.

SPECIMENS EXAMINED: Juchitán: Río Sarabia, 13.

GENUS TRACHOPS GRAY

FRINGE-LIPPED BATS

Trachops cirrhosus coffini Goldman

Plate 6, figures 15, 16; text figure 21

TYPE LOCALITY: El Gallo, Petén, Guatemala.

RANGE IN OAXACA: Tropical regions in Juchitán District.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 56.5–60.5; fur long and woolly; ears large, widely separated, tips rounded; noseleaf well developed; lips and chin studded with numerous conical, warty excrescences; tail short, tip projecting from upper surface of interfemoral membrane; forearm hairy. Color varying from Mummy Brown to Dresden Brown. Skull relatively narrow; braincase elevated above rostrum; inner upper incisors large, cutting edges with a distinct notch; outer upper incisors minute.

DENTAL FORMULA: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{3-3}$; molars, $\frac{3-3}{3-3}$ = 34.

MEASUREMENTS: In table 6.

SPECIMENS EXAMINED: Juchitán: Six miles north of Matías Romero, five; Río Ostuta, one.

GENUS **CHROTOPTERUS** PETERS

FALSE VAMPIRE BATS

Chrotopterus auritus auritus (Peters)

Text figure 21

TYPE LOCALITY: Mexico.

RANGE IN OAXACA: Northern districts from Ixtlan to Juchitán.

GENERAL CHARACTERS: (Based on Tabasco specimens). Length of forearm, 76.5–84.5; pelage long and woolly; ears large and widely separated; noseleaf simple; tail very short and scarcely perceptible in base of wide interfemoral membrane; forearm hairy. Color Snuff Brown. Skull large, somewhat hourglass shaped with well-developed sagittal crest; dentition essentially like that of *Phyllostomus* except upper incisors less protruding and anterior upper premolar small and crowded outward from tooth row; middle lower premolar minute and crowded from tooth row on inner side as in *Trachops*.

DENTAL FORMULA: Incisors, $\frac{2-2}{1-1}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{3-3}$; molars, $\frac{3-3}{3-3}$ = 32.

MEASUREMENTS: In table 6.

SPECIMENS EXAMINED: Chiapas: Five miles southwest of Teapa, Tabasco, two.

SPECIMENS RECORDED: Ixtlán: Campamento Vista Hermosa, one (Villa, 1966, p. 224).

REMARKS: Peters' original description (1856a, p. 305) of *Vampyrus auritus* was published on July 24, 1856. Peters also included *Vampyrus auritus* as a "n. sp." in another publication (1856b) bearing the same date of July 24, 1856. It is not possible now to determine which of the two publications actually has priority. The latter publication (1856b), however, includes little more than a brief listing of *Vampyrus*

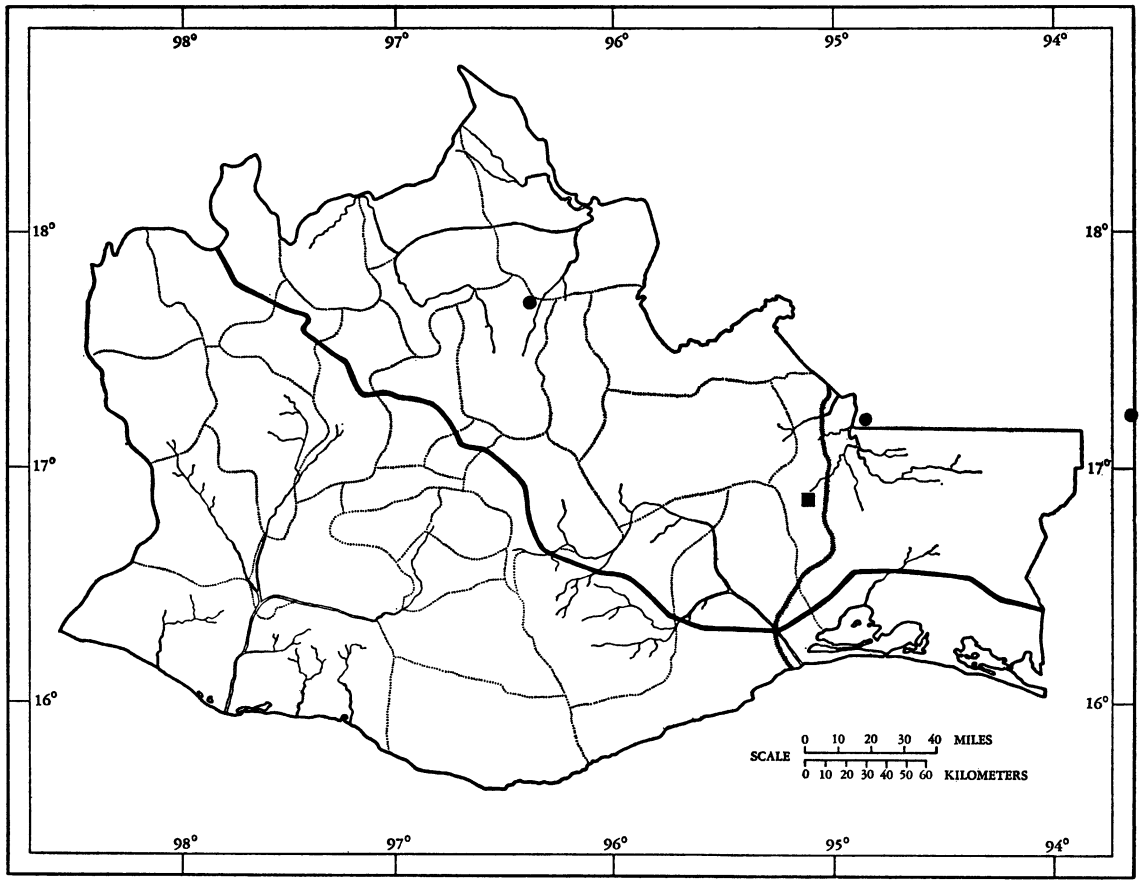


FIG. 21. Records of *Trachops cirrhosus* and *Chrotopterus auritus* in Oaxaca and of some specimens from other areas. ■ *T. c. coffini.* ● *C. a. auritus.*

auritus as a new species. The former publication (1856a) includes six pages of description, one plate with seven figures, and is the reference given by Peters himself (1865, p. 505) for the original naming of *Vampyrus auritus*.

Genus VAMPYRUM Rafinesque
American Giant Bats

Vampyrum spectrum nelsoni (Goldman)

Type Locality: Coatzacoalcos, Veracruz, Mexico.

Range in Oaxaca: No specimens are known from Oaxaca. Hall and Kelson (1959, p. 112) included northeastern Juchitán District as within the range of *V. s. nelsoni*.

General Characters: (Based on Nicaraguan specimen). Length of forearm, 107; largest bat in North America, with a wingspread of 30 inches; ears large, widely separated; muzzle elongate; no external tail; pelage moderately long and soft, woolly on under parts. Color Bister. Skull elongated; sagittal crest well developed; teeth strong and massive; inner upper incisors broader than long; outer upper incisors much smaller than inner; lower incisors very small, subequal, and forming a continuous row between canines.

Dental Formula: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{3-3}$; molars, $\frac{3-3}{3-3} = 34$.

Measurements: In table 6.

Specimens Examined: Nicaragua: Chinandega, one.

Summary of the Phyllostomatinae of Oaxaca

Of the 10 species of phyllostomatine bats that can be expected to range into Oaxaca, seven are known to occur in the state. *Chrotopterus a. auritus*, although not actually recorded from the state, can be expected to occur in the Juchitán District. The Oaxacan record for *Micronycteris brachyotis* is the most northern of the species. *Micronycteris sylvestris* has been recorded from Veracruz and Jalisco. The bats of the subfamily Phyllostomatinae range in the tropical areas of Middle and South America, with the Isthmus of Tehuantepec as about the northwestern limit for most of the species.

Subfamily GLOSSOPHAGINAE Gill

Genus GLOSSOPHAGA E. Geoffroy Saint-Hilaire
Long-tongued Bats

Glossophaga soricina leachii (Gray)

Plate 7, figures 1, 2; text figure 22

Type Locality: Realejo, Chinandego, Nicaragua.

Range in Oaxaca: Tropical regions throughout the state.

General Characters: (Based on Oaxacan specimens). Length of forearm, 35–37; muzzle elongate; ears short and rounded; noseleaf small and triangular; lower lip notched; tail short, tip protruding from upper side of interfemoral membrane. Color varying from Clay Color to Mummy Brown. Skull long and narrow; rostrum long, low, and slightly shorter than length of braincase; braincase not sharply elevated above rostrum; height of braincase above plane of ventral surface of audital bullae, about 8 mm.; upper incisors well developed and projecting strongly forward, outer incisor smaller than inner; lower incisors small and filling space between canines; molariform teeth small and narrow.

Dental Formula: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3} = 34$.

Measurements: In table 7.

Specimens Examined: Juchitán: Diana Liesa, two; 6 miles north of Matías Romero, 26; 4 miles northwest of Tapanatepec, 46; Mogoñé, two; Paso Monte Río, one; Paso Venado, one; Piedra Blanco, 172; Río Sarabia, 13; Santa María Chimalapa, three; Tapanatepec, two; 10 miles south of Tapanatepec, 13; 20 miles northeast of La Ventosa, 24; Unión Hidalgo, three. Jamiltepec: Pinotepa Nacional, seven. Juquila: San Gabriel Mixtepec, five. Sola de Vega: Eighteen miles northwest of the city of Sola de Vega, six; Puerto Escondido, one. Tehuantepec: Portero Villalobos, two; Guiengola, five; Mixtequilla, three; Salina Cruz, 12; Santa María Guiengati, one; 6 miles northwest of Tehuantepec, three; Tehuantepec, 11; 10 miles northwest of Tehuantepec, one; 20 miles northwest of Tehuantepec, one; Tequisistlán, four. Tuxtepec: Five miles west of Chiltepec, nine. Yautepec: Las Vacas, four; San Bartolo Yautepec, three; San Carlos Yautepec, four.

Glossophaga commissarisi Gardner

Plate 7, figures 17, 18; text figure 22

Glossophaga commissarisi Gardner, 1962, p. 1.

Type Locality: Ten kilometers southeast of Tonalá, Chiapas, Mexico.

TABLE 7

MEASUREMENTS (IN MILLIMETERS) OF THE PHYLLOSTOMIDS IN THE SUBFAMILY GLOSSOPHAGINAE FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Glossophaga soricina leachii									
OAXACA									
A.M.N.H. No. 16976, Las Vacas	ad	35.5	21.7	20.5	9.2	4.8	8.4	5.4	7.5
A.M.N.H. No. 171281, Diana Liesa	ad	35.0	22.0	20.5	9.5	4.1	8.6	5.4	7.8
A.M.N.H. No. 189629, 20 mi. NE. La Ventosa	♀ ad	36.0	22.0	20.8	9.3	4.2	8.6	5.5	7.4
A.M.N.H. No. 189673, 60 mi. N. Tehuantepec	♀ ad	35.5	22.1	21.0	9.2	4.2	8.6	6.0	8.0
A.M.N.H. No. 206860, Unión Hidalgo	ad	35.5	22.0	20.6	9.3	4.2	8.5	5.7	8.0
A.M.N.H. No. 212197, Pinotepa Nacional	♂ sub	35.0	20.4	19.0	9.0	4.0	8.5	5.2	7.2
Glossophaga commissarisi									
OAXACA									
A.M.N.H. No. 189636, 20 mi. NE. La Ventosa	♂ ad	35.5	20.0	18.7	9.4	4.5	8.6	5.2	6.7
A.M.N.H. No. 185960, Tapanatepec	♀ ad	35.5	20.0	19.0	9.3	4.0	8.5	5.3	7.0
A.M.N.H. No. 206854, Unión Hidalgo	ad	35.0	20.0	18.8	9.5	4.2	8.5	5.3	6.9
A.M.N.H. No. 206856, Sierra Madre N. Zanatepec	ad	35.5	20.0	18.7	9.1	4.3	8.8	5.3	6.7
A.M.N.H. No. 206858, Unión Hidalgo	ad	35.0	19.8	—	9.0	4.5	8.5	5.2	6.6
Glossophaga alticola									
OAXACA									
A.M.N.H. No. 175747, Santiago Lachiguirí	♀ ad	36.7	20.7	19.1	9.8	4.5	9.0	5.4	6.6
A.M.N.H. No. 178750, Santiago Lachiguirí	♀ ad	35.0	20.3	19.1	9.8	4.5	8.7	5.5	6.9
A.M.N.H. No. 185956, Tapanatepec	♀ ad	36.4	20.9	19.7	9.9	4.2	8.8	6.1	7.3
A.M.N.H. No. 189601, 5 mi. NW. Chiltepec	♀ ad	36.0	21.0	19.8	9.8	4.5	8.6	5.4	7.2
A.M.N.H. No. 189611, 5 mi. NW. Chiltepec	♀ ad	36.5	21.0	19.8	9.9	4.2	9.0	5.4	7.0
A.M.N.H. No. 189616, 5 mi. NW. Chiltepec	♂ sub	35.5	20.8	19.2	9.8	4.6	8.8	5.6	7.2

TABLE 7—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Anoura geoffroyi lasiopyga									
OAXACA									
A.M.N.H. No. 189678, San Gabriel Mixtepec	♂ ad	41.5	25.1	24.2	10.3	4.7	9.6	6.3	10.0
A.M.N.H. No. 189679, San Gabriel Mixtepec	♀ ad	42.0	24.3	23.8	10.0	4.9	9.5	6.0	9.0
A.M.N.H. No. 189680, San Gabriel Mixtepec	♀ ad	42.2	24.9	24.2	9.8	4.9	9.4	6.0	9.5
A.M.N.H. No. 189681, San Gabriel Mixtepec	♀ ad	44.0	24.8	24.5	10.2	5.1	9.5	6.0	9.9
A.M.N.H. No. 189683, San Gabriel Mixtepec	♀ ad	45.0	25.5	25.0	10.4	4.8	9.5	6.0	9.8
A.M.N.H. No. 189684, San Gabriel Mixtepec	♂ ad	44.0	24.5	24.0	10.6	5.0	10.0	6.0	9.2
A.M.N.H. No. 189686, Sola de Vega	♂ ad	42.0	24.5	23.7	10.5	5.0	10.0	6.3	9.8
Choeronycteris mexicana									
OAXACA									
L.A.C.M. No. 9968, Mitla	♂ ad	44.2	29.7	28.7	10.5	3.9	9.5	5.5	11.2
L.A.C.M. No. 9969, Mitla	♂ ad	43.5	29.5	28.5	10.0	3.9	9.5	5.4	11.4
L.A.C.M. No. 9971, Mitla	♂ ad	44.1	30.0	29.3	10.3	4.3	9.3	5.5	11.7
Musonycteris harrisoni									
GUERRERO									
U.M. No. 110524, Zumpango	♂ ad	43.1	34.6	33.8	9.8	4.2	9.2	5.1	13.8
COLIMA									
L.A.C.M. No. 10044, Pueblo Juárez	♂ ad	42.2	33.8	32.8	9.7	3.6	9.2	5.0	13.5
L.A.C.M. No. 11488, Pueblo Juárez	♀ ad	41.6	31.5	30.5	9.3	4.0	9.1	4.6	11.8
Choeroniscus godmani									
OAXACA									
A.M.N.H. No. 186162, Río Sarabia	♀ ad	35.0	20.3	20.0	8.0	3.3	8.3	4.0	7.4
A.M.N.H. No. 172778, Tapanatepec	♂ sub	32.5	19.1	18.5	7.5	3.0	8.2	4.0	7.0
A.M.N.H. No. 172779, Tapanatepec	♂ sub	33.2	18.5	18.0	7.5	3.0	8.0	4.0	6.6

TABLE 7—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygo-matic Breadth	Inter-orbital Breadth	Brain-case Breadth	Palate Breadth Across Molars	Maxil-lary Tooth Row
Hylonicteris underwoodi									
OAXACA									
A.M.N.H. No. 189687, Chiltepec	♂ ad	33.0	21.2	20.3	8.3	4.0	8.3	4.4	7.4
A.M.N.H. No. 189688, Chiltepec	♀ ad	33.5	22.5	21.6	8.7	4.1	8.5	4.9	8.1
T.C.W.C. No. 7303, San José Chacalapa	♂ old	32.2	19.8	19.2	8.2	4.1	7.6	4.1	7.5
T.C.W.C. No. 7304, San José Chacalapa	♀ ad	32.5	20.8	20.1	8.6	4.3	8.0	4.7	7.5
Leptonycteris nivalis									
MORELOS									
A.M.N.H. No. 180341, Tequesqui-Tenango	♂ ad	58.8	27.8	26.9	11.7	5.7	10.9	7.2	9.2
A.M.N.H. No. 180342, Tequesqui-Tenango	♂ ad	59.2	28.2	27.6	11.7	5.6	10.6	7.4	9.4
A.M.N.H. No. 180345, Tequesqui-Tenango	♀ ad	58.2	28.2	27.2	11.1	5.5	11.0	7.4	9.2
A.M.N.H. No. 180346, Tequesqui-Tenango	♀ ad	57.5	27.9	26.9	10.7	5.6	10.5	7.2	9.1
VERACRUZ									
P.M.,[a] Orizaba (timberline)	♀ ad	60.0	28.2	27.5	—	—	10.9	—	9.0
Leptonycteris yerbabuenae									
OAXACA									
A.M.N.H. No. 189689, Chiltepec	♀ ad	53.9	27.2	26.4	—	—	10.0	6.9	8.9
A.M.N.H. No. 186163, El Jícaro	♂ ad	53.0	27.6	26.7	9.4	4.9	9.9	6.9	8.9
A.M.N.H. No. 189693, Sola de Vega	♂ ad	51.1	26.5	25.9	10.5	4.5	9.8	6.4	8.5
A.M.N.H. No. 189694, Sola de Vega	♀ ad	55.2	26.9	26.0	9.8	4.6	9.8	6.5	8.9
A.M.N.H. No. 189695, Sola de Vega	♀ ad	55.0	27.3	26.7	10.7	4.9	10.0	6.9	9.0
A.M.N.H. No. 189716, Sola de Vega	♀ ad	56.0	27.3	26.7	10.5	4.5	9.7	6.4	8.7
A.M.N.H. No. 189719, Sola de Vega	♀ ad	52.7	26.7	26.0	10.5	5.0	10.0	7.0	9.0
A.M.N.H. No. 189722, Sola de Vega	♂ ad	53.4	26.6	26.1	10.7	4.6	9.7	6.6	9.0
GUERRERO									
I.B., No. 402,[a] Yerba Buena	♀ ad	55.7	—	26.8	9.9	4.6	—	—	—
F.M.N.H. No. 73183, Mexcala	♂ ad	53.6	26.2	—	9.5	4.5	10.0	6.6	8.9
VERACRUZ									
F.M.N.H. No. 15703, Orizaba	ad	54.4	—	—	—	4.9	—	6.3	8.5

[a] Type.

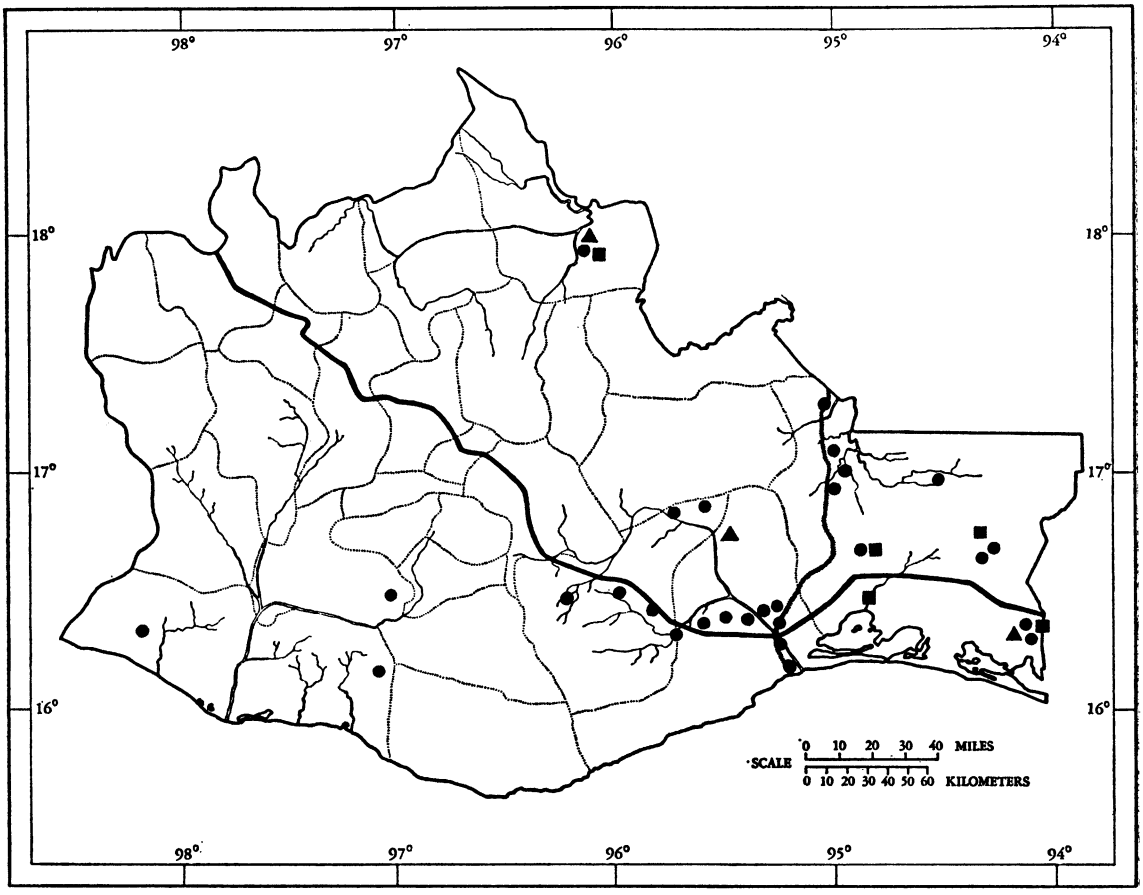


FIG. 22. Records of *Glossophaga soricina*, *Glossophaga commissarisi*, and *Glossophaga alticola* in Oaxaca. ● *G. s. leachii.* ■ *G. commissarisi.* ▲ *G. alticola.*

RANGE IN OAXACA: Tropical regions in the northern and eastern districts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 33–35; except for slightly smaller size and darker color on average, external characters like those in *G. s. leachii.* Skull shortest for genus, owing to shortened rostrum; braincase inflated, height above ventral plane of audital bullae, 8.5; upper incisors nearly perpendicular to postero-anterior plane of skull; outer upper incisors equal in bulk to inner; lower incisors small and separated as two pairs, one on each side of a narrow median space.

MEASUREMENTS: In table 7.

SPECIMENS EXAMINED: Juchitán: Four miles west of Tapanatepec, three; 20 miles northeast of La Ventosa, six; Sierra Madre north of Zanatepec, eight; Unión Hidalgo, six. Tuxtepec: Four miles west of Chiltepec, three.

Glossophaga alticola Davis

Text figure 22

Glossophaga alticola: JONES, 1966a, p. 454.

TYPE LOCALITY: Tlaxcala, Tlaxcala, Mexico; altitude, 4800 feet.

RANGE IN OAXACA: Tropical regions in the northern and eastern districts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 35.5–37.6; similar in external characters to *Glossophaga soricina leachii*, but larger and pelage averaging darker. Skull relatively large and strongly constructed for *Glossophaga;* rostrum short; palate broad; skull similar to that of *G. commissarisi* but larger, braincase more inflated and elevated at a more abrupt angle from rostrum to braincase, height of braincase above plane of ventral surface of audital bullae, 8.7; a distinct ridge on ventral surface

of presphenoid; basisphenoid pits relatively shallow; lower incisors larger, palate broader, and upper incisors less procumbent, than in *commissarisi*.

MEASUREMENTS: In table 7.

SPECIMENS EXAMINED: Juchitán: Tapanatepec, five. Tehuantepec: Santiago Lachiguirí, two. Tuxtepec: Five miles west of Chiltepec, four.

REMARKS: Jones (1966a, p. 454) regarded *G. soricina* and *G. alticola* as separate species.

GENUS **ANOURA** GRAY
TAILLESS BATS

Anoura geoffroyi lasiopyga (Peters)

Plate 7, figures 3, 4; text figure 23

TYPE LOCALITY: Southern Mexico.

RANGE IN OAXACA: Moderate elevations in the districts of Juquila and Sola de Vega, but probably occurring at suitable elevations throughout the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 41.5–45; muzzle elongate; ears and noseleaf small; hind limbs hairy; no external tail; interfemoral membrane very narrow; pelage short and close. Color dark Mummy Brown. Skull elongate; braincase large, low, and smooth; rostrum shorter than braincase; zygomatic arches weak and usually incomplete; inner upper incisors minute, outer upper incisors larger than inner; lower incisors absent.

DENTAL FORMULA: Incisors, $\frac{2-2}{0-0}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{3-3}{3-3}$; molars, $\frac{3-3}{3-3}$ = 32.

MEASUREMENTS: In table 7.

SPECIMENS EXAMINED: Juquila: San Gabriel Mixtepec, seven. Sola de Vega: Sola de Vega, two.

GENUS **CHOERONYCTERIS** TSCHUDI
GREATER SLENDER-NOSED BAT

Choeronycteris mexicana Tschudi

Plate 7, figures 5, 6; text figure 23

TYPE LOCALITY: Mexico.

RANGE IN OAXACA: Central highlands of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 42.0–45.6; muzzle slender, elongate; ears and noseleaf small; tail short, less than half of length of interfemoral membrane. Color uniform Mummy Brown. Skull slender, elongate, and narrow; rostrum more than half of length of skull; zygomatic arches incomplete; teeth small, distinctly separated from one another; upper incisors minute; lower incisors absent.

DENTAL FORMULA: Incisors, $\frac{2-2}{0-0}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{3-3}$; molars, $\frac{3-3}{3-3}$ = 30.

MEASUREMENTS: In table 7.

SPECIMENS EXAMINED: Etla: Cerro San Felipe, 15. Oaxaca: San Felipe del Agua, five. Tlacolula: Six miles west of Mitla, three (L.A.C.M.).

GENUS **MUSONYCTERIS** SCHALDACH AND MCLAUGHLIN
LONG-HEADED BATS

Musonycteris harrisoni Schaldach and McLaughlin

Plate 7, figures 7, 8

Musonycteris harrisoni SCHALDACH AND MCLAUGHLIN, 1960, p. 3.

TYPE LOCALITY: Two kilometers southeast of Pueblo Juárez, Colima, Mexico.

RANGE IN OAXACA: No specimens are known from Oaxaca, but possibly the species occurs in the southwestern part of the state. A specimen from Guerrero came from a locality where climatic conditions are similar to those of southwestern Oaxaca, and not far away.

GENERAL CHARACTERS: (Based on Guerrero specimen). Length of forearm, 43; muzzle excessively long and slender; similar in general characters to *Choeronycteris mexicana* but muzzle more elongate. Color Mummy Brown. Skull excessively long and narrow; rostrum considerably more than half of total length of skull; braincase small and low; teeth widely spaced.

DENTAL FORMULA: Like that of *Choeronycteris*.

MEASUREMENTS: In table 7.

SPECIMENS EXAMINED: Guerrero: Cañon de Zopilote, 14.5 miles north of Zumpango (2000 feet), one (U.M.). Colima: Two kilometers south of Pueblo Juárez, two (L.A.C.M.).

GENUS **CHOERONISCUS** THOMAS
LESSER SLENDER-NOSED BATS

Choeroniscus godmani (Thomas)

Plate 7, figures 9, 10; text figure 23

TYPE LOCALITY: Guatemala.

RANGE IN OAXACA: Low to moderate eleva-

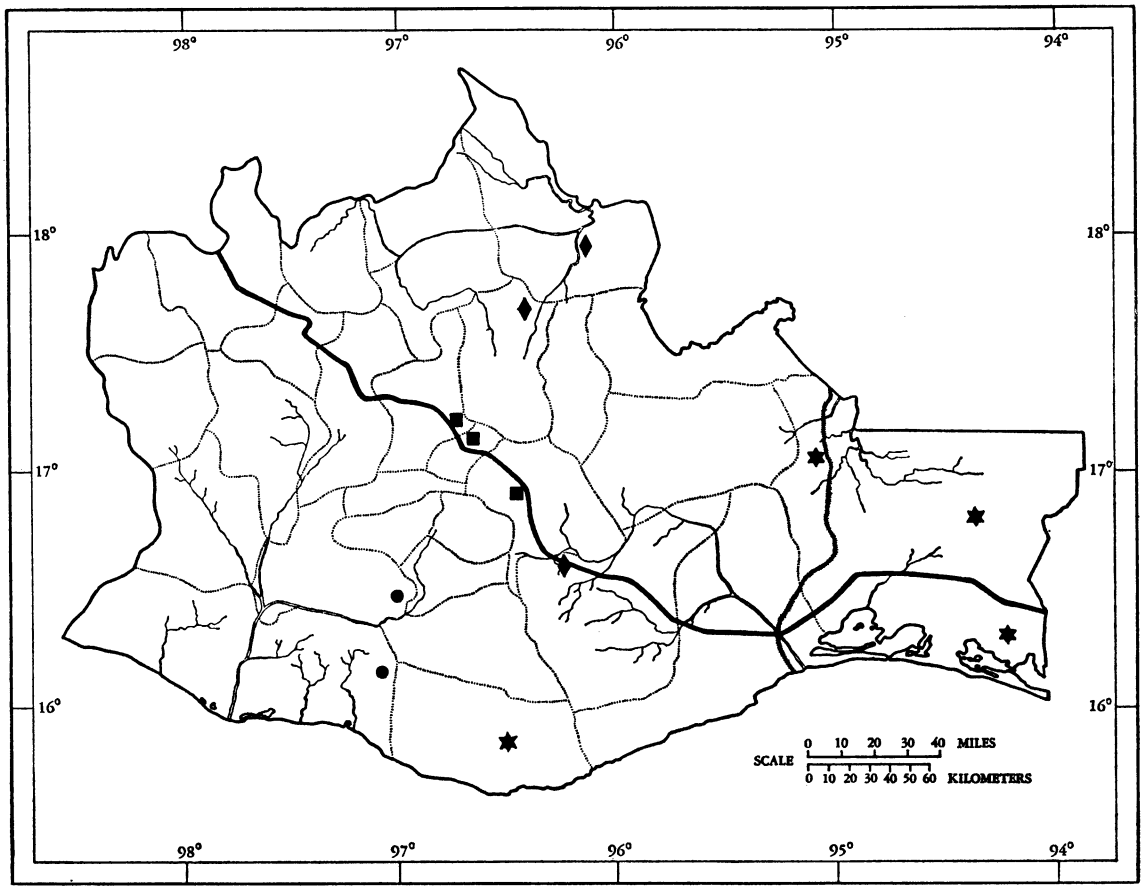


FIG. 23. Records of *Anoura geoffroyi, Choeronycteris mexicana, Choeroniscus godmani,* and *Hylonycteris underwoodi* in Oaxaca. ● *A. g. lasiopyga.* ■ *C. mexicana.* ★ *C. godmani.* ◆ *H. underwoodi.*

tions in southern and eastern parts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 32.5–34.5; noseleaf small and triangular; ears small; muzzle long and slender, tail short; similar in external characters to *Choeronycteris* but smaller. Color varying from Mummy Brown to Blackish Brown (one). Skull slender; braincase smoothly rounded and elevated above rostrum; rostrum long, narrow, and less than half of length of skull; pterygoids inflated and in contact with bullae; maxillary tooth rows parallel sided and space between upper canine and anterior premolar wide; resembling *Choeronycteris* in most cranial details and dental characteristics but size much smaller and rostrum relatively shorter.

DENTAL FORMULA: Like that of *Choeronycteris.*

MEASUREMENTS: In table 7.

SPECIMENS EXAMINED: Juchitán: Río Blanco, one; Río Sarabia, one; Tapanatepec, two.

SPECIMENS RECORDED: (Schaldach, 1966, p. 291). Pochutla: Kilometer 183, one (I.B.).

GENUS **HYLONYCTERIS** THOMAS
LESSER LONG-NOSED BATS
Hylonycteris underwoodi Thomas

Plate 7, figures 11, 12; text figure 23

TYPE LOCALITY: Rancho Redondo, San José, Costa Rica.

RANGE IN OAXACA: Tropical regions and cloud forests at moderate elevations in northern and central districts.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 32.2–33.5; resembling *Choeroniscus godmani* in size, color,

and general external characters. Skull and dentition resembling that of *Choeroniscus godmani* except pterygoids normal, not inflated, and not in contact with bullae, and rostrum longer. Upper tooth rows more convergent anteriorly, space between canine and anterior premolar not wide.

DENTAL FORMULA: Like that of *Choeronycteris*.

MEASUREMENTS: In table 7.

SPECIMENS EXAMINED: Tuxtepec: Chiltepec, two. Yautepec: San José Chacalapa, two (T.C.W.C.).

SPECIMENS RECORDED: (Jones, 1964, p. 511). Ixtlán: Campamento Vista Hermosa, two (K.U.).

GENUS LEPTONYCTERIS LYDEKKER

GREATER LONG-NOSED BATS

Leptonycteris nivalis (Saussure)

Plate 7, figures 13, 14; text figure 24

TYPE LOCALITY: Near snowline on Mt. Orizaba, Veracruz, Mexico.

RANGE IN OAXACA: No specimens are known from the state, but this bat may be expected to occur at high elevations in the northern districts.

GENERAL CHARACTERS: (Based on Morelos specimens). Length of forearm, 55.5–60; muzzle long and slender; noseleaf and ears small; no external tail; fur relatively long and lax; interfemoral membrane narrow, moderately hairy and with a conspicuous fringe of hairs along posterior border. Color Mummy Brown. Skull long and slender, rostrum shorter than braincase; zygomatic arches complete; inner upper incisors broader than long, the cutting edge straight.

DENTAL FORMLUA: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{3-3}$; molars, $\frac{2-2}{2-2} = 30$.

MEASUREMENTS: In table 7.

SPECIMENS EXAMINED: Morelos: Tequequi-Tenango, seven.

Leptonycteris yerbabuenae Martinez and Villa

Plate 7, figures 15, 16; text figure 24

TYPE LOCALITY: Yerba Buena, Guerrero, Mexico; altitude, 617 feet.

RANGE IN OAXACA: Moderate elevations throughout the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 51–56; interfemoral membrane nearly naked. Similar to *Leptonycteris nivalis* but smaller, fur shorter, color paler, and interfemoral membrane without a noticeable fringe of hairs along posterior border. Color Sepia. Cranial characters similar to those of *Leptonycteris nivalis* but skull smaller in all dimensions.

MEASUREMENTS: In table 7.

SPECIMENS EXAMINED: Etla: Cerro San Felipe, one. Juchitán: Three miles north of El Jícaro, one. Oaxaca: San Felipe del Agua, two. Sola de Vega: Eighteen miles northwest of Sola de Vega, 36; San Sebastian, two (T.C.W.C.). Tehuantepec: Six miles northwest of Mixtequilla, four (T.C.W.C.). Tuxtepec, one. Guerrero State: Twelve miles south of Mexcala, one (F.M.N.H.). Veracruz State: Orizaba, one (F.M.N.H.).

REMARKS: *Leptonycteris yerbabuenae* is specifically distinct from *L. nivalis*, which is larger and has a fringe of hairs on the posterior border of the interfemoral membrane not present in *L. yerbabuenae*. *Leptonycteris nivalis* usually occurs at higher elevations than *L. yerbabuenae*, but both species (seven individuals of *L. nivalis* and two of *L. yerbabuenae*) were taken at the same locality at Tequesqui-Tenango, Morelos.

Hoffmeister (1957, p. 458) published a map of the range of *L. nivalis* as extending from southwestern Texas south in eastern Mexico through Veracruz and to Guerrero and Oaxaca, and possibly east to Guatemala. Hoffmeister based his assumption that Guerreran and Oaxacan specimens were *L. nivalis* on the findings of de la Torre (1955, p. 698). He stated that a topotype of *yerbabuenae* was indistinguishable from a topotype of true *nivalis*, and he placed *yerbabuenae* in synonymy. Examination of these two presumed topotypes in the Field Museum of Natural History verifies their taxonomic identity. The presumed individual of *nivalis* from Orizaba, however, is not *nivalis* but is a smaller bat from a much lower elevation than the locality of the type of *nivalis*.

Davis and Carter (1962, p. 196) recognized the species *L. sanborni*, with a range from Texas and Coahuila south to Morelos and Veracruz, and they listed specimens from Oaxaca and Guerrero as *L. sanborni*. They

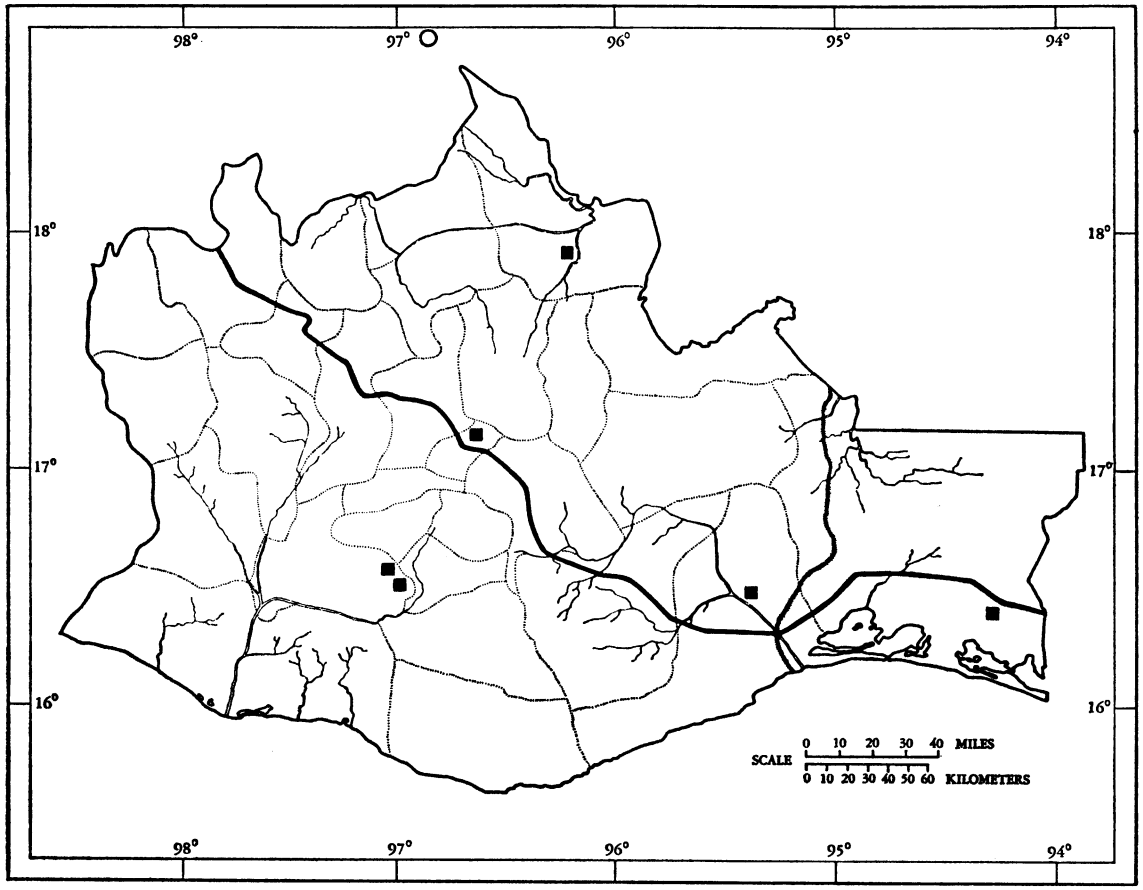


FIG. 24. Records of *Leptonycteris nivalis* and *Leptonycteris yerbabuenae* in Oaxaca and of some specimens from other areas. O Type locality of *L. nivalis*. ■ *L. yerbabuenae*.

placed *L. n. yerbabuenae* in the synonymy of *L. nivalis*. My comparison of the specimens reported by Davis and Carter from Oaxaca (Mixtequilla and San Sebastian) showed them to be indistinguishable from a topotype of *L. yerbabuenae* from Mexcala, Guerrero. I have not formed any conclusion on the status of *Leptonycteris sanborni*, which may prove to be only subspecifically distinct fom *L. yerbabuenae*.

SUMMARY OF THE GLOSSOPHAGINAE OF OAXACA

Three species of *Glossophaga* are now known to occur in the state. *Glossophaga soricina leachii* is the most common and is most abundant in southern Oaxaca and across the Isthmus of Tehuantepec. *Glossophaga commissarisi* is a small, dark-colored species with a short rostrum. *Glossophaga alticola* is a large form with a well-inflated braincase and short rostrum. All three species range over much the same area in Oaxaca.

Anoura geoffroyi lasiopyga occurs at moderate elevations and seems to be local in distribution; it is not uncommon in south-central Oaxaca. *Choeronycteris mexicana* occurs in the same general area as *Anoura* but is less common. The range of the recently discovered *Musonycteris harrisoni* has now been extended to the state of Guerrero and may eventually be found to include southwestern Oaxaca, as climatic conditions are similar. *Choeroniscus godmani* and *Hylonycteris underwoodi* are not common anywhere in Oaxaca and seem to be sparingly distributed in the low, warm areas of the southeastern and northern parts of the state.

I do not agree with Davis and Carter (1962, p. 126) in the assumption that *Leptonycteris*

yerbabuenae is not a valid name. The Oaxacan specimens of *Leptonycteris* were taken from moderate to low elevations and are referable to the species *L. yerbabuenae*. They correspond so closely in external and cranial measurements with a specimen from Mexcala, Guerrero, and in characters given in the description of the type of *yerbabuenae*, that they can be considered typical *yerbabuenae*. *Leptonycteris nivalis* is larger than *L. yerbabuenae;* it occurs at higher elevations and has a distinctly hairy instead of nearly naked interfemoral membrane. The type of *L. nivalis* was taken near snowline on Mt. Orizaba, Veracruz, at an altitude of not less than 10,000 feet, whereas the altitude of the type locality of *L. yerbabuenae* is only 617 feet. The type locality of *Leptonycteris nivalis* is only 23 miles north of the boundary of Oaxaca, and it may be expected to occur at high elevations in the northern part of the state of Oaxaca.

Subfamily **CAROLLIINAE** Miller
Genus **CAROLLIA** Gray
Short-tailed Fruit Bats
Carollia perspicillata azteca Saussure

Plate 35, figures 7, 8; text figure 25

Type Locality: Southern Mexico, restricted to Peréz, Veracruz, by Dalquest (1950, p. 2).

Range in Oaxaca: Hot and humid regions on the Gulf drainage.

General Characters: (Based on Oaxacan specimens). Length of forearm, 42–47; form robust; membranes leathery; ears short and rounded; noseleaf small; chin with wartlike protuberances in center; tail about half of length of interfemoral membrane. Color vary-

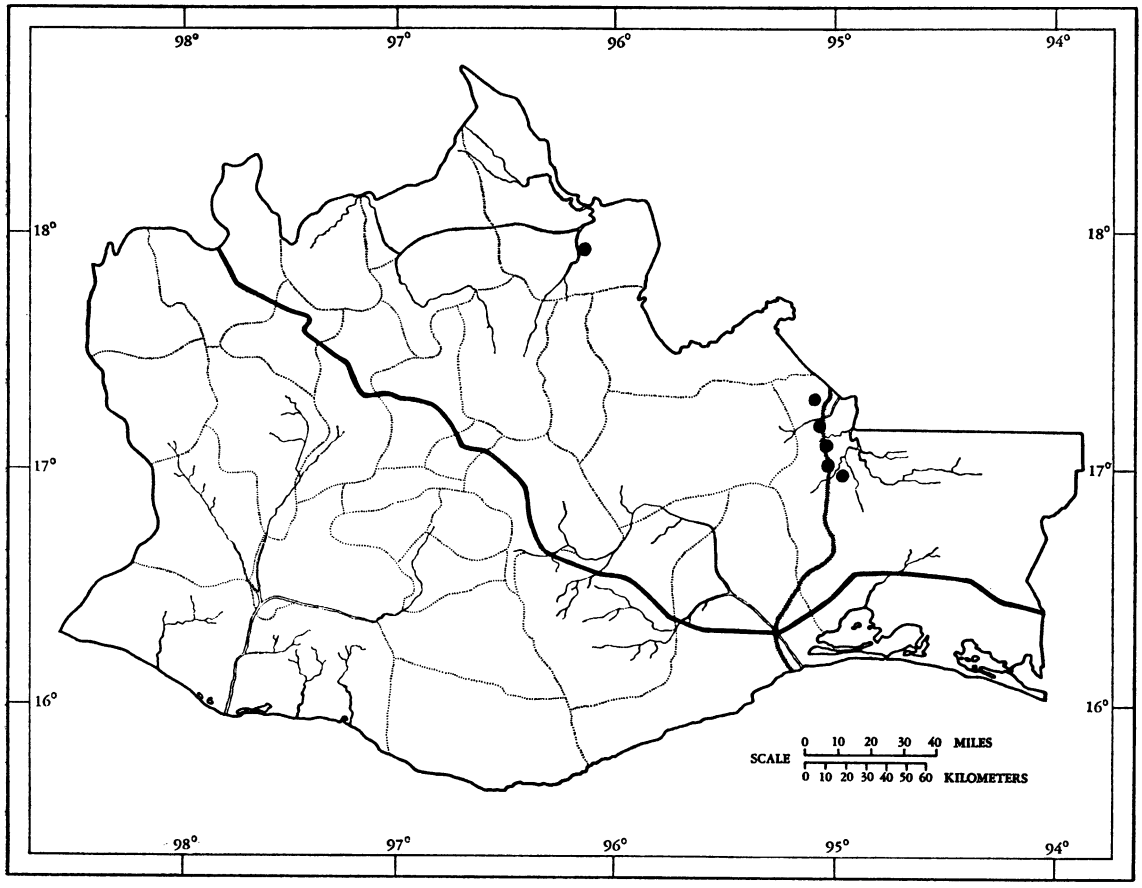


Fig. 25. Records of *Carollia perspicillata* in Oaxaca. ● *C. p. azteca.*

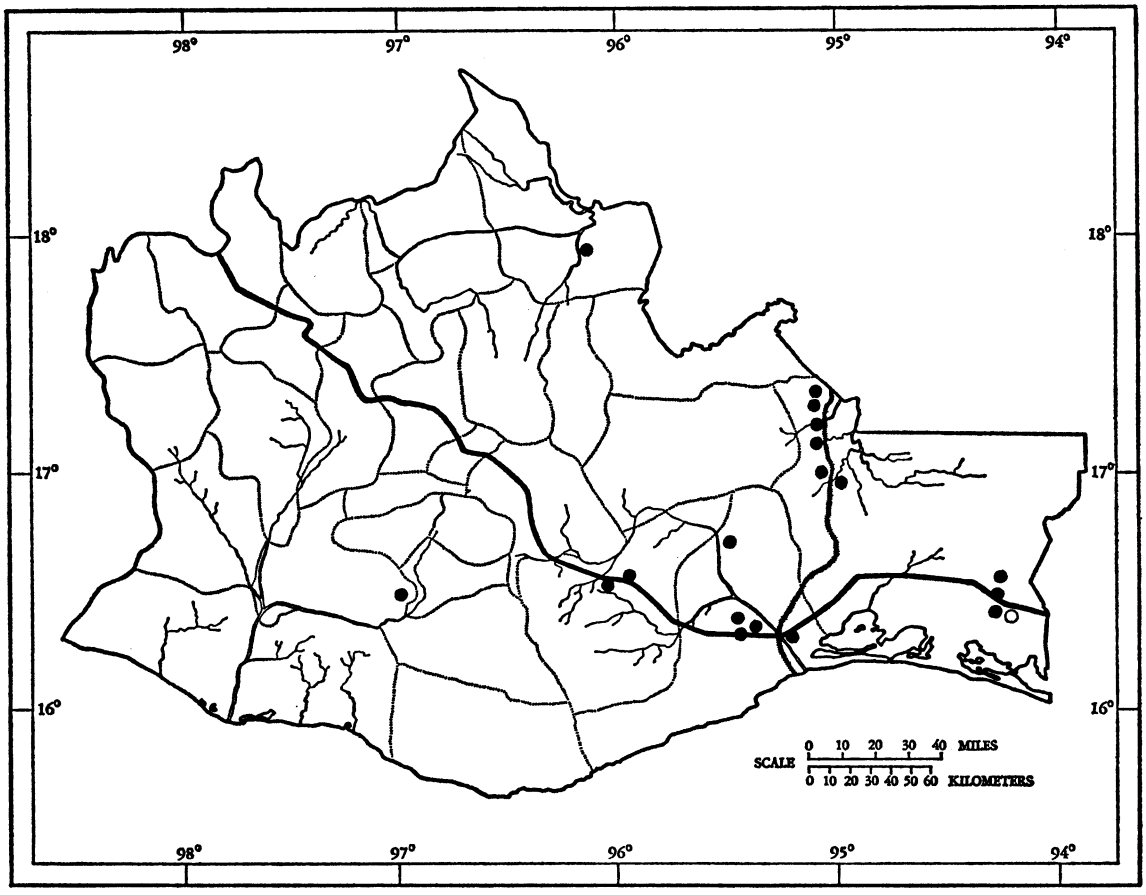


FIG. 26. Records of *Carollia subrufa* in Oaxaca. ● *C. subrufa.* ○ Type locality of *C. subrufa.*

ing from Mummy Brown to Ferruginous, the hairs tricolored. Skull strongly built, zygomatic arches incomplete; braincase well elevated above rostrum; rostrum less than half of length of skull; maxillary tooth rows strongly convergent anteriorly.

DENTAL FORMULA: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3}$ = 32.

MEASUREMENTS: In table 8.

SPECIMENS EXAMINED: Juchitán: Mogoñé, 10; Montebello, one; Piedra Blanca, four; Río Sarabia, one; Sarabia, one. Tuxtepec: Chiltepec, 46.

Carollia subrufa (Hahn)

Plate 35, figures 9, 10; text figure 26

Carollia castanea subrufa: FELTEN, 1956, p. 211.

Carollia subrufa: STARRETT AND DE LA TORRE, 1964, p. 59, regarded *C. subrufa* as specifically distinct from *C. castanea.*

TYPE LOCALITY: Santa Efigenia, a hacienda 8 miles northwest of Tapanatepec, Oaxaca, Mexico.

RANGE IN OAXACA: Humid tropical regions.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 37–41; very similar to *Carollia perspicillata azteca* but smaller. Color varying from Mummy Brown to Ochraceous Tawny. Skull similar to that of *C. p. azteca* but smaller and with a distinct angle between first and second upper premolars.

MEASUREMENTS: In table 8.

SPECIMENS EXAMINED: Juchitán: Eight miles south of Veracruz border, two; Las Vigas, four; Montebello, 26; Piedra Blanca, 100; Río Ostuta, two; Río Sarabia, 35; Sarabia, 32. Sola de Vega: Eighteen miles northwest of Sola de Vega, two. Tehuantepec: Cerro San Pedro, one; Hierba Santa, one;

TABLE 8

MEASUREMENTS (IN MILLIMETERS) OF *Carollia* FROM OAXACA

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Post orbital Constriction	Braincase Breadth	Palate Breadth Across M^2–M^3	Maxillary Tooth Row
Carollia perspicillata azteca									
A.M.N.H. No. 189735, Chiltepec	♀ old	43.2	22.6	21.7	12.0	5.5	9.8	8.2	8.0
A.M.N.H. No. 189738, Chiltepec	♀ ad	47.3	24.3	22.3	12.1	5.7	9.8	8.2	8.3
A.M.N.H. No. 189743, Chiltepec	♂ ad	43.5	24.1	21.8	11.8	5.4	9.7	8.0	8.0
A.M.N.H. No. 189744, Chiltepec	♂ ad	42.1	24.6	22.5	12.0	5.9	9.5	8.4	8.2
A.M.N.H. No. 189747, Chiltepec	♂ ad	43.5	24.2	22.3	12.1	5.8	9.8	8.5	8.1
A.M.N.H. No. 186295, Piedra Blanca	♂ ad	44.8	24.5	22.6	11.7	6.0	10.0	8.4	8.4
A.M.N.H. No. 186296, Piedra Blanca	♂ ad	44.5	24.8	22.8	12.2	5.4	9.8	8.2	8.4
A.M.N.H. No. 186349, Sarabia	♂ ad	45.0	23.7	22.4	12.0	5.5	9.5	8.4	8.4
A.M.N.H. No. 186188, Montebello	♂ ad	43.7	24.5	22.8	11.7	5.7	9.8	8.2	8.3
A.M.N.H. No. 186333, Río Sarabia	♀ ad	44.0	24.1	22.4	11.6	5.3	9.8	7.8	8.2
A.M.N.H. No. 175374, Mogõné	♂ ad	43.0	23.6	21.7	11.5	5.4	9.7	7.8	8.2
A.M.N.H. No. 175376, Mogõné	♂ ad	46.0	24.5	22.2	12.4	5.7	9.9	8.5	8.2
Carollia subrufa									
A.M.N.H. No. 186374, Las Vigas	♂ ad	38.3	21.5	19.6	10.3	5.3	9.3	7.5	7.2
A.M.N.H. No. 186375, Las Vigas	♀ ad	38.8	21.6	19.4	10.7	5.5	9.4	7.4	6.9
A.M.N.H. No. 186376, Las Vigas	♀ ad	38.5	21.2	19.0	10.5	5.2	9.0	7.3	6.8
A.M.N.H. No. 186377, Las Vigas	♀ ad	38.5	21.2	—	—	5.1	8.4	7.3	6.8
A.M.N.H. No. 186378, Río Ostuta	♂ ad	39.8	21.3	19.8	10.5	5.2	8.8	7.6	6.9
A.M.N.H. No. 186379, Río Ostuta	♂ ad	39.0	21.1	19.5	10.7	5.2	9.3	7.9	7.0
A.M.N.H. No. 189727, Sola de Vega	♀ ad	40.5	21.5	20.0	10.5	5.4	9.0	7.6	7.3
A.M.N.H. No. 189728, Sola de Vega	♀ ad	39.0	21.5	19.7	10.2	5.0	8.8	7.6	7.0
A.M.N.H. No. 189729, 60 mi. NW. Tehuantepec	♂ ad	39.0	21.2	19.8	10.5	5.4	9.3	8.0	7.1
A.M.N.H. No. 189730, 60 mi. NW. Tehuantepec	♀ ad	39.6	21.6	19.9	10.9	5.2	9.3	7.7	7.2
A.M.N.H. No. 189752, Santiago Lachiguirí	♀	39.5	21.8	20.4	10.5	5.3	9.2	7.8	7.2
A.M.N.H. No. 189753, Santiago Lachiguirí	♀	41.0	22.2	20.5	16.7	5.2	9.1	7.8	7.5
A.M.N.H. No. 189754, Santiago Lachiguirí	♀	41.0	22.2	20.6	10.2	5.4	9.5	8.3	7.2
A.M.N.H. No. 178751, San Bartolo Yautepec	♀	38.6	21.5	19.7	11.0	5.5	9.2	7.7	7.2
A.M.N.H. No. 167020, Limón	♀	37.8	21.4	19.5	10.0	5.2	9.0	7.6	6.8
A.M.N.H. No. 167026, Limón	♂	39.4	21.7	19.8	11.0	5.2	9.4	7.8	7.2
A.M.N.H. No. 171593, Limón	♂	38.5	21.5	20.0	11.0	5.3	9.2	8.0	7.1
A.M.N.H. No. 189740, Chiltepec	♂	37.0	21.3	19.4	10.8	5.0	9.3	7.6	7.0
A.M.N.H. No. 189750, Chiltepec	♀	39.2	21.1	19.6	10.5	5.2	9.0	7.3	6.9

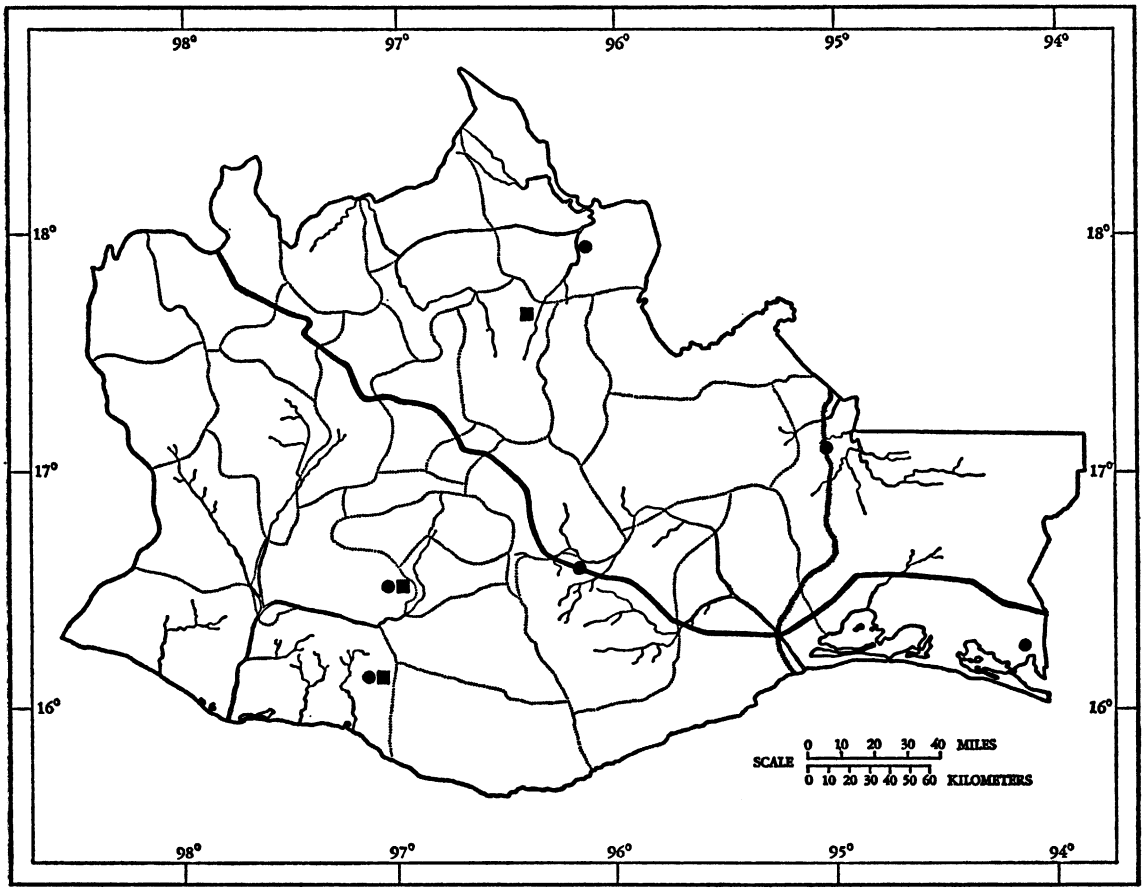


FIG. 27. Records of *Sturnira lilium* and *Sturnira ludovici* in Oaxaca. ● *S. l. parvidens.* ■ *S. l. hondurensis.*

Santiago Lachiguirí, three; Limón, 28; Tehuantepec, one. Tuxtepec: Chiltepec, two. Yautepec: San Bartolo Yautepec, one; 60 miles northwest of Tehuantepec, two.

REMARKS: Felten (1956, p. 211) regarded *Carollia subrufa* as a subspecies of *Carollia castanea* H. Allen, but Starrett and de la Torre (1964, p. 59) stated that these two forms are readily distinguishable on the basis of external, cranial, and dental characters and should be considered as distinct species. Jones (1966a, p. 456) also stated that these two bats, *C. subrufa* and *C. castanea*, are distinct species.

SUMMARY OF THE CAROLLIINAE FROM OAXACA

Bats of the genus *Carollia* are common in the humid tropical regions of Oaxaca. Two species are represented in the state: *C. perspicillata* and *C. subrufa*. There is no indication of intergradation between the two, and the ranges of both overlap in Oaxaca. *Carollia subrufa* is, however, most abundant in southern Oaxaca, whereas *C. perspicillata azteca* is restricted to the northern districts.

GENUS STURNIRA GRAY
EPAULET BATS

Sturnira lilium parvidens Goldman

Plate 8, figures 1, 2; text figure 27

TYPE LOCALITY: Papayo, about 25 miles northwest of Acapulco, Guerrero, Mexico.

RANGE IN OAXACA: Moderate elevations throughout most of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 37–42.5; no external tail; interfemoral membrane narrow and densely furred; hind limbs and feet hairy; noseleaf and ears normal, shoulders with a patch of stiff yellowish or reddish hairs marking a glandular opening. Color Pinkish Buff

TABLE 9

MEASUREMENTS (IN MILLIMETERS) OF *Sturnira* FROM OAXACA

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Post-orbital Constriction	Brain-case Breadth	Palate Breadth Across M^2–M^2	Maxillary Tooth Row
Sturnira lilium parvidens									
A.M.N.H. No. 189835, San Gabriel Mixtepec	♂ ad	41.5	22.5	19.8	13.0	5.7	9.8	8.0	6.8
A.M.N.H. No. 189976, Sola de Vega	♀ ad	42.5	22.2	20.0	13.3	5.6	9.8	8.1	6.7
A.M.N.H. No. 189993, Sola de Vega	♀ ad	41.3	21.5	19.3	13.4	5.8	9.8	7.5	6.0
A.M.N.H. No. 189996, Sola de Vega	♀ ad	41.0	22.0	19.8	13.4	5.7	9.9	7.6	6.3
A.M.N.H. No. 189998, Sola de Vega	♂ ad	41.2	21.9	19.7	13.1	5.7	9.9	8.2	6.9
A.M.N.H. No. 189797, Chiltepec	♀ ad	37.0	20.5	19.0	13.0	5.2	9.8	7.9	6.2
A.M.N.H. No. 189798, Chiltepec	♀ ad	37.0	20.5	18.7	12.5	5.5	9.5	7.8	6.4
A.M.N.H. No. 177428, Tapanatepec	♂ ad	42.2	22.0	19.7	13.5	5.7	10.0	8.1	6.3
A.M.N.H. No. 177433, Tapanatepec	♂ ad	40.5	22.1	19.8	13.2	5.7	9.8	8.0	6.4
Sturnira ludovici hondurensis									
A.M.N.H. No. 189779, San Gabriel Mixtepec	♂ ad	43.5	23.5	21.5	13.3	6.1	10.0	7.8	7.0
A.M.N.H. No. 189780, San Gabriel Mixtepec	♂ ad	44.7	24.0	22.0	14.0	6.2	10.2	8.2	6.6
A.M.N.H. No. 189781, San Gabriel Mixtepec	♂ ad	45.5	24.3	21.7	13.1	6.3	19.0	8.0	7.3
A.M.N.H. No. 189782, San Gabriel Mixtepec	♂ ad	44.2	23.5	21.2	13.5	5.7	10.4	8.0	7.0
A.M.N.H. No. 189783, San Gabriel Mixtepec	♂ ad	44.5	24.2	21.7	13.7	6.1	10.5	8.2	6.8
A.M.N.H. No. 189785, San Gabriel Mixtepec	♂ ad	48.5	23.7	22.2	13.6	6.3	10.2	8.0	6.9
A.M.N.H. No. 189793, San Gabriel Mixtepec	♂ ad	43.5	23.2	21.3	13.4	6.3	10.2	7.7	6.6
A.M.N.H. No. 189794, San Gabriel Mixtepec	♂ ad	44.8	23.9	21.3	13.7	6.5	10.3	8.3	7.0
A.M.N.H. No. 189795, Sola de Vega	♀ ad	44.2	23.2	21.2	13.3	6.1	10.0	8.2	7.0

overlain with Mummy Brown. Skull short and broad; rostrum short; braincase large and rounded; each inner upper incisor moderately large, its cutting edge notched, outer upper incisors small and low; upper tooth rows more or less horseshoe-shaped; cutting edges of lower incisors trilobate.

DENTAL FORMULA: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3} = 32$.

MEASUREMENTS: In table 9.

SPECIMENS EXAMINED: Juchitán: Río Sarabia, one; 10 miles south of Tapanatepec, six. Juquila: San Gabriel Mixtepec, 151. Sola de Vega: Eighteen miles northwest of Sola de Vega, 26. Tuxtepec: Chiltepec, 17. Yautepec: Sixty miles northwest of Tehuantepec, one.

Sturnira ludovici hondurensis Goodwin

Plate 8, figures 3, 4; text figure 27

TYPE LOCALITY: La Cruz Grande, near San José, La Pas, Honduras, altitude 3000 feet.

RANGE IN OAXACA: Tropical regions at moderate elevations in the northern and southern parts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 42–48.5; similar to *S. lilium parvidens* in external characters, but averaging larger and darker in color. Color Mummy Brown. Skull larger, longer, and relatively narrower than that of *S. lilium parvidens;* lower incisors small, cutting edges bilobate.

MEASUREMENTS: In table 9.

SPECIMENS EXAMINED: Juquila: San Gabriel Mixtepec, 15. Sola de Vega: Eighteen miles northwest of Sola de Vega, one.

SPECIMENS RECORDED: (Jones and Dunnigan, 1965, p. 461). Ixtlán: Vista Hermosa, 5 (K.U.).

SUMMARY OF THE STURNIRINAE OF OAXACA

Sturnira lilium parvidens is not uncommon at moderate elevations throughout most of Oaxaca and is plentiful in some areas. *Sturnira ludovici hondurensis* has been collected twice at the same time and place in Oaxaca as the smaller *S. l. parvidens*, but is less plentiful. *Sturnira l. hondurensis* was regarded as a synonym of *Sturnira ludovici* by Herschkovitz (1949, p. 441), but, with the material now available, it seems advisable to recognize *hondurensis* as a subspecies of *ludovici.*

SUBFAMILY **STENODERMINAE** GILL

GENUS **URODERMA** PETERS

TENT BATS

Uroderma bilobatum bilobatum Peters

Plate 8, figures 5, 6; text figure 28

TYPE LOCALITY: São Paulo, Brazil.

RANGE IN OAXACA: Tropical regions at moderate elevations in Juchitán District.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 40–44.5; white facial stripes prominent; white median dorsal line more or less distinct; ears short and rounded; interfemoral membrane narrow; no external tail. Color varying from Dresden Brown to Mummy Brown. Skull relatively long and narrow; rostrum broad, short, and deep; inner upper incisors larger than outer, all four teeth separate and cutting edge bilobed; posterior molars above and below small.

DENTAL FORMULA: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3} = 32$.

MEASUREMENTS: In table 10.

SPECIMENS EXAMINED: Juchitán: Tapanatepec, two; 20 miles northwest of La Ventosa, four.

REMARKS: There are actually two species represented in the Oaxacan specimens of *Uroderma*, both taken at the same localities and both about the same size. Three of the specimens are *Uroderma bilobatum*, having strongly marked facial markings and a depressed rostrum, and three are specimens of an undescribed species with indistinct facial markings and a skull that has a nearly straight dorsal profile. William B. Davis, who is making a study of the genus *Uroderma* and who pointed out these differences to me, will describe the new species in the near future.

GENUS **VAMPYROPS** PETERS

BROAD-NOSED BATS

Vampyrops helleri Peters

Plate 8, figures 7, 8; text figure 28

TYPE LOCALITY: Mexico.

RANGE IN OAXACA: Tropical regions at moderate elevations in the northern part of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens): Length of forearm, 37–39; sharply defined white facial stripes and dorsal line;

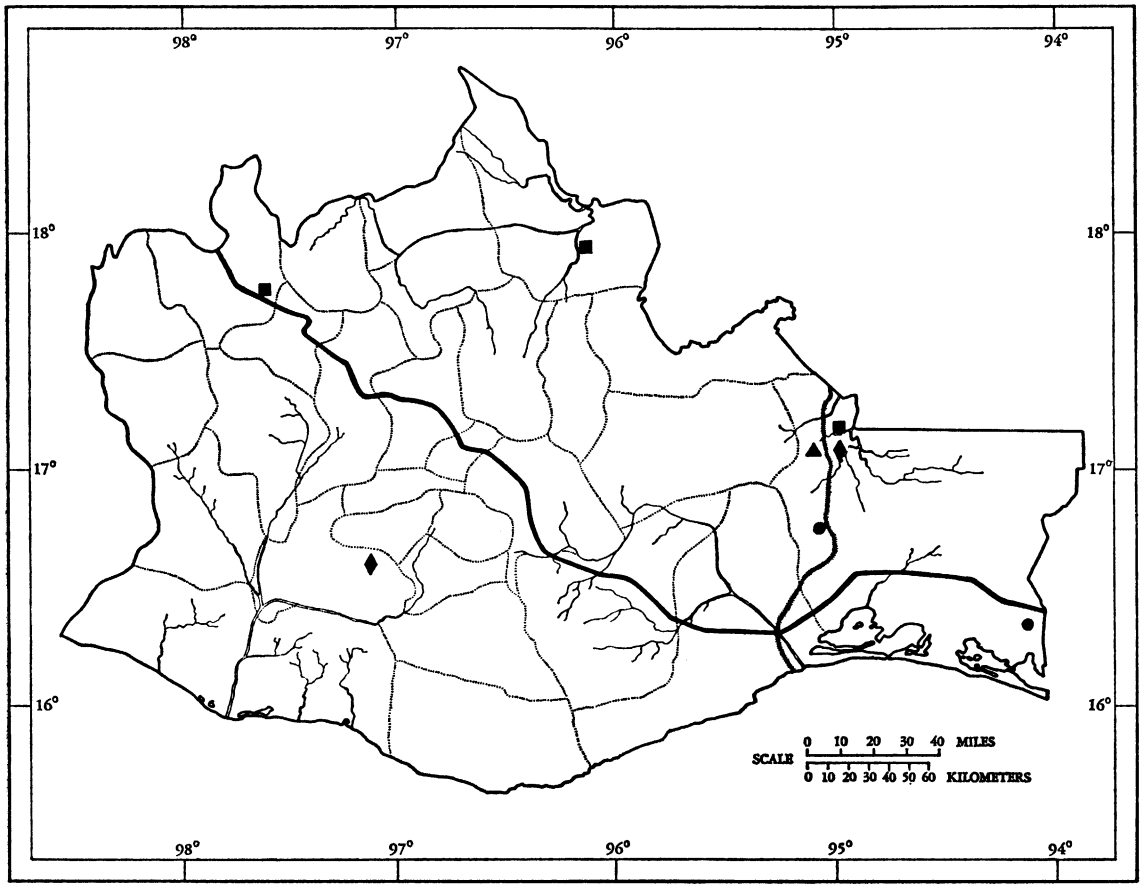


FIG. 28. Records of *Uroderma bilobatum*, *Vampyrops helleri*, *Vampyrodes caraccioloi*, and *Chiroderma villosum* in Oaxaca. ● *U. b. bilobatum.* ■ *Vampyrops helleri.* ▲ *Vampyrodes c. major.* ◆ *Chiroderma v. jesupi.*

interfemoral membrane very narrow, well furred, with a distinct posterior fringe of hairs; forearm well furred for most of its length; no external tail; resembling *Uroderma* in external appearance but size smaller, interfemoral membrane narrower, more hairy, and median dorsal line longer. Color Snuff Brown. Skull resembling that of *Uroderma* but upper incisors more contrasting in size; inner incisor more than twice as high as outer incisor, crowns obliquely set, in contact at cutting edges, simple or faintly trifid in immature specimens.

DENTAL FORMULA: Like that of *Uroderma.*

MEASUREMENTS: In table 10.

SPECIMENS EXAMINED: Tuxtepec: Chiltepec, one.

SPECIMENS RECORDED: (Schaldach, 1964, p. 134). Juchitán: Montebello, two (M.S.U.). (Sanborn, 1955, 9. 412.) Huajuápam: Tutla (Fulta[1]), one (F.M.N.H.).

REMARKS: The generic name *Platyrrhinus* Saussure, 1860, used by some authors for this species of bat is preoccupied by *Platyrrhinus* Fabricius, 1801, a beetle (de la Torre and Starrett, 1959, p. 1).

[1] "Fulta," which is on the original label, has not been found on any map of Oaxaca. On the Field Museum typewritten label, "Tutla" has been firmly marked in pencil over "Fulta." In Oaxaca four small towns bear the name Tutla. Tutla in the district of Huajuápam is probably the locality in question. Of the other three, one Tutla has the prefix San Sebastian and another Tutla has the prefix San Francisco. Both of these localities are about 20 kilometers east of Oaxaca de Juárez. The fourth is Santiago Tutla in the district of Mixes, about 25 kilometers north of Mazatlán.

TABLE 10

MEASUREMENTS (IN MILLIMETERS) OF PHYLLOSTOMIDS IN THE SUBFAMILY STENODERMINAE FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Post-orbital Constriction	Brain-case Breadth	Palate Breadth Across M^2–M^2	Maxillary Tooth Row, C–M^2 or M^3
Uroderma bilobatum bilobatum									
OAXACA									
A.M.N.H. No. 177422, Tapanatepec	♂ ad	43.5	23.1	20.7	12.5	5.6	9.5	8.4	7.8
A.M.N.H. No. 190001, La Ventosa	♀ ad	41.2	22.0	20.0	12.2	5.9	9.4	8.8	7.4
A.M.N.H. No. 190002, La Ventosa	♀ ad	44.5	22.8	21.0	12.9	5.7	9.7	8.4	7.7
Uroderma sp.									
OAXACA									
A.M.N.H. No. 177421, Tapanatepec	♂ sub	38.8	22.5	19.9	12.6	6.5	9.3	9.2	8.0
A.M.N.H. No. 190003, La Ventosa	♀ ad	40.4	22.0	19.6	12.5	5.2	9.5	9.4	7.8
A.M.N.H. No. 190004, La Ventosa	♀ ad	41.5	21.8	19.5	12.5	5.4	9.2	9.0	7.8
Vampyrops helleri									
OAXACA									
A.M.N.H. No. 190005, Chiltepec	♀ ad	37.0	22.5	20.2	12.8	5.5	9.2	8.8	8.3
Vampyrodes caraccioloi major									
OAXACA									
A.M.N.H. No. 186381, Río Sarabia	♂ ad	53.5	28.3	24.9	17.9	6.8	12.1	12.3	10.0
Chiroderma villosum jesupi									
OAXACA									
A.M.N.H. No. 190006, Sola de Vega	♀ ad	46.5	24.7	22.7	15.2	5.7	10.4	10.8	8.8
Artibeus hirsutus									
GUERRERO									
K.U. No. 66440, Teloloapan	♂ ad	56.0	27.3	23.8	16.8	6.7	11.9	11.7	10.0

TABLE 10—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygo-matic Breadth	Post-orbital Con-striction	Brain-case Breadth	Palate Breadth Across M^2–M^2	Maxil-lary Tooth Row, C–M^2 or M^3
K.U. No. 66443, Teloloapan	♂ ad	56.1	26.7	23.7	16.6	6.8	11.8	11.5	9.8
SONORA									
L.A.C.M. No. 13300, Aduana	♂ ad	56.5	26.3	23.5	16.0	6.6	11.8	11.7	9.7
L.A.C.M. No. 13303, Aduana	♂	53.2	25.6	23.0	16.0	6.6	11.7	11.0	9.5
Artibeus jamaicensis yucatanicus									
OAXACA									
A.M.N.H. No. 212377, Cerro San Felipe	♀ ad	66.0	28.8	26.1	18.2	6.8	12.5	12.6	10.3
A.M.N.H. No. 186388, Zanatepec	♀ ad	57.0	27.0	24.3	16.4	7.0	11.2	12.0	9.7
A.M.N.H. No. 186386, Río Sarabia	♂ ad	62.0	28.9	25.7	17.7	7.2	12.6	12.7	10.5
A.M.N.H. No. 177793, Tapanatepec	♀ ad	61.5	29.5	26.0	18.3	7.7	12.8	12.7	10.4
A.M.N.H. No. 190028, La Ventosa	♂ ad	57.4	28.2	25.7	17.3	7.1	11.9	12.5	10.0
A.M.N.H. No. 190053, La Ventosa	♂ ad	62.0	29.2	26.2	18.0	7.3	12.2	12.9	10.5
A.M.N.H. No. 208875, Santa María Chimalapa	♂ ad	61.0	28.5	25.5	17.8	7.2	12.5	12.9	10.5
Artibeus jamaicensis triomylus									
OAXACA									
A.M.N.H. No. 190094, Sola de Vega	♀ ad	61.0	28.0	25.0	17.3	7.0	12.0	12.6	10.2
A.M.N.H. No. 190083, Sola de Vega	♂ ad	61.0	27.7	24.5	17.2	7.0	11.8	12.5	9.8
A.M.N.H. No. 190095, Sola de Vega	♀ ad	62.0	27.8	24.3	17.5	6.7	12.3	13.0	19.0
A.M.N.H. No. 190074, San Gabriel Mixtepec	♂ ad	58.8	27.5	24.4	16.7	7.1	11.8	12.3	10.1
A.M.N.H. No. 190077, San Gabriel Mixtepec	♀ ad	63.0	27.5	24.5	16.7	6.8	11.5	12.0	9.8
A.M.N.H. No. 190073, Salina Cruz	♂ ad	56.8	28.0	24.7	17.5	6.8	12.3	12.6	10.0
Artibeus lituratus intermedius									
OAXACA									
A.M.N.H. No. 186392, Zanatepec	♀ ad	71.5	29.8	27.2	19.0	6.4	13.5	12.6	10.9

TABLE 10—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Post-orbital Constriction	Brain-case Breadth	Palate Breadth Across M^2–M^2	Maxillary Tooth Row, C–M^3 or M^3
A.M.N.H. No. 186391, Zanatepec	♂ ad	68.0	29.0	25.9	17.8	6.5	13.6	13.0	10.6
A.M.N.H. No. 190027, La Ventosa	♀ ad	66.7	29.7	25.9	18.7	6.7	13.2	13.1	10.7
A.M.N.H. No. 177745, Tapanatepec	♀ ad	67.5	29.8	26.5	18.1	6.4	12.7	13.0	11.0
A.M.N.H. No. 186390, Mazahuito	♀ ad	68.6	29.6	26.7	18.7	6.5	12.5	13.1	10.5
A.M.N.H. No. 171598, Tehuantepec	♂ ad	66.4	29.1	26.4	18.5	6.5	12.9	12.6	10.5
A.M.N.H. No. 190109, Sola de Vega	♂ ad	68.2	29.3	26.2	18.3	6.5	12.7	12.9	10.5
A.M.N.H. No. 190079, Sola de Vega	♂ ad	60.5	28.0	24.8	17.7	6.3	12.7	12.7	10.3
Artibeus aztecus									
OAXACA									
A.M.N.H. No. 167469, Sto. Tomás Teipan	♂ ad	45.2	22.4	20.1	12.7	5.7	10.0	9.5	7.5
A.M.N.H. No. 167471, Sto. Tomás Teipan	♂ ad	43.0	20.7	19.3	12.5	5.7	9.9	9.3	7.0
A.M.N.H. No. 167472, Sto. Tomás Teipan	♂ ad	47.5	22.0	20.1	13.3	5.5	10.2	9.6	7.5
A.M.N.H. No. 175282, Sto. Tomás Teipan	♂ ad	45.0	22.0	20.0	12.9	5.7	10.0	9.4	7.4
A.M.N.H. No. 189796, Sola de Vega	♀ ad	45.2	22.4	20.6	12.7	5.6	9.7	9.1	7.5
A.M.N.H. No. 190007, Sola de Vega	♀ ad	45.5	22.0	19.3	13.2	5.7	9.8	9.2	7.5
A.M.N.H. No. 190008, Sola de Vega	♀ ad	47.0	22.0	20.0	13.3	5.8	10.0	9.2	7.4
A.M.N.H. No. 190009, Sola de Vega	♀ ad	44.7	21.5	19.4	12.0	5.7	9.5	9.0	7.2
A.M.N.H. No. 190010, Sola de Vega	♀ ad	45.5	22.2	20.0	12.7	5.5	10.0	9.2	7.5
Artibeus toltecus									
OAXACA									
A.M.N.H. No. 186382, Río Sarabia	♀ ad	38.5	19.7	17.9	11.6	4.9	8.7	7.9	6.4
A.M.N.H. No. 186383, Río Sarabia	♂ ad	39.5	20.0	18.0	11.5	5.0	8.9	8.3	6.5
A.M.N.H. No. 190012, San Gabriel Mixtepec	♀ ad	38.5	19.7	17.6	11.9	5.0	8.6	8.4	6.4
A.M.N.H. No. 190013, San Gabriel Mixtepec	♀ ad	39.0	20.0	17.8	12.3	5.2	9.2	8.9	6.6
A.M.N.H. No. 190014, San Gabriel Mixtepec	♂ ad	38.0	20.1	17.8	11.8	5.0	9.2	8.6	6.6
A.M.N.H. No. 190015, Sola de Vega	♂ ad	38.4	19.2	17.3	11.5	4.8	8.7	8.7	6.4
A.M.N.H. No. 190016, Sola de Vega	♂ ad	37.5	20.3	18.0	11.9	4.9	9.2	8.6	6.6

TABLE 10—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygo-matic Breadth	Post-orbital Con-striction	Brain-case Breadth	Palate Breadth Across M^2–M^2	Maxil-lary Tooth Row, C–M^2 or M^3
A.M.N.H. No. 190017, Sola de Vega	♀ ad	39.5	19.8	17.8	11.5	5.4	9.0	8.3	6.6
Artibeus phaeotis									
OAXACA									
A.M.N.H. No. 186384, Río Sarabia	♀ ad	39.4	19.2	17.0	11.7	4.7	9.3	8.5	5.8
A.M.N.H. No. 186385, Río Sarabia	♀ ad	41.0	19.5	17.2	11.7	5.0	8.8	8.8	6.3
A.M.N.H. No. 186393, Río Sarabia	♀ ad	38.2	19.0	16.9	11.1	5.1	9.0	7.8	6.0
A.M.N.H. No. 186394, Río Sarabia	♂ ad	37.4	18.7	16.6	11.2	4.8	8.8	8.0	6.0
A.M.N.H. No. 190127, Chiltepec	♂ ad	37.1	18.9	17.0	11.3	4.5	8.8	8.5	6.3
A.M.N.H. No. 190128, Chiltepec	♂ ad	38.4	19.0	16.6	11.7	5.0	8.9	8.5	6.2
A.M.N.H. No. 190129, Chiltepec	♀ ad	40.5	19.0	17.2	11.7	4.8	8.5	8.6	6.2
A.M.N.H. No. 190130, Chiltepec	♀ ad	40.2	18.6	16.5	11.3	4.7	8.4	8.2	6.1
A.M.N.H. No. 190131, Chiltepec	♀ ad	39.5	19.4	17.0	11.2	5.0	8.7	8.3	6.3
A.M.N.H. No. 190132, Chiltepec	♀ ad	40.0	19.4	17.0	11.2	4.9	8.7	8.5	6.5
A.M.N.H. No. 190133, Chiltepec	♀ ad	39.2	19.2	16.7	11.5	4.8	8.9	8.2	6.2
A.M.N.H. No. 190134, Chiltepec	♂ ad	39.3	19.6	17.3	11.8	5.0	9.1	8.5	6.2
A.M.N.H. No. 190135, Chiltepec	♀ ad	39.7	19.3	17.1	11.2	4.5	8.6	8.2	6.1
Artibeus hartii									
OAXACA									
A.M.N.H. No. 206872, Zanatepec	♀ ad	39.7	20.8	19.3	12.8	6.1	9.4	8.8	7.2
JALISCO									
F.M.N.H. No. 83309, Ciudad Guzmán	♂ ad	38.3	19.5	18.4	12.0	5.3	9.2	8.4	6.6
F.M.N.H. No. 83328, Ciudad Guzmán	♀ ad	39.1	20.5	19.4	12.6	5.8	9.4	8.5	7.2
Centurio senex									
OAXACA									
A.M.N.H. No. 177419, Tapanatepec	♂ ad	44.0	17.5	14.8	14.9	5.6	10.0	10.7	5.3
L.A.C.M. No. 13755, Tuxtepec	♀ ad	42.0	18.0	15.0	14.4	5.1	10.0	10.2	5.2

GENUS **VAMPYRODES** THOMAS
GREATER BROAD-FACED BATS

Vampyrodes caraccioloi major G. M. Allen

Plate 8, figures 9, 10; text figure 28

Vampyrodes carracioloi [sic] major: SCHALDACH, 1964, p. 135.

TYPE LOCALITY: San Pablo, Panama.

RANGE IN OAXACA: Tropical regions at moderate elevations in Juchitán District.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 52.5–55.5; sharply defined white facial stripes and mid-dorsal line; closely resembling *Vampyrops helleri* in all external characters but size much larger. Skull large and strong; inner upper incisors much larger than outer incisors, all four teeth separated by spaces from one another and from canines, with cutting edges entire; third upper molar absent.

DENTAL FORMULA: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3} = 30$.

MEASUREMENTS: In table 10.

SPECIMENS EXAMINED: Juchitán: Río Sarabia, one.

GENUS **CHIRODERMA** PETERS
BATS WITHOUT NASAL BONES

Chiroderma villosum jesupi J. A. Allen

Plate 8, figures 11, 12; text figure 28

Chiroderma villosum jesupi: HANDLEY, 1960, p. 466.

TYPE LOCALITY: Cacagualito, Santa Marta, Colombia.

RANGE IN OAXACA: Tropical regions at moderate elevations in southern and eastern parts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 45–46.5; white facial stripes and dorsal line indistinct; interfemoral membrane narrow, hairy; no external tail; forearm furry. Color Saccardo's Umber. Skull large and broad, resembling that of *Vampyrodes major* but lacking ossified nasal bones, and third upper and lower molars absent; inner upper incisors slender, tips converging inward, cutting edge entire; outer upper incisors small, barely reaching cingulum of canines.

DENTAL FORMULA: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{2-2}{2-2} = 28$.

MEASUREMENTS: In table 10.

SPECIMENS EXAMINED: Sola de Vega: Eighteen miles northwest of Sola de Vega, one.

SPECIMENS RECORDED: (Schaldach, 1964, p. 134). Juchitán: Selva Alta Siempre Verde, one (M.S.U.).

REMARKS: *Chiroderma isthmicum* Miller is a synonym of *C. villosum* and *C. jesupi* is a subspecies of *C. villosum* (Handley, 1960, p. 466).

GENUS **ARTIBEUS** LEACH
FRUIT-EATING BATS

Artibeus hirsutus Andersen

Plate 9, figures 1, 2

TYPE LOCALITY: La Salada, Michoacán, Mexico.

RANGE IN OAXACA: No specimens known from Oaxaca, but recorded from eastern Guerrero and possibly occurring in western Oaxaca.

GENERAL CHARACTERS: (Based on Guerrero specimens). Length of forearm, 53.5–56.0; form robust; noseleaf and ears normal; interfemoral membrane narrow and well haired; under side of forearm hairy; no external tail; facial stripes indistinct or absent. Color varying from dark Drab to Brownish Drab, tips of hairs silver gray. Skull short, broad, and strongly built, rostrum short and wide; inner upper incisors small, their cutting edges bilobed; outer upper incisors simple, smaller than inner; molar teeth strong, with broad, flattened, crushing surfaces; a small third upper and lower molar usually present.

DENTAL FORMULA: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3} = 32$.

MEASUREMENTS: In table 10.

SPECIMENS EXAMINED: Guerrero: Teloloapan, two (K.U.). Sonora: Aduana, seven (L.A.C.M.).

Artibeus jamaicensis yucatanicus J. A. Allen

Plate 9, figures 3, 4; text figure 29

TYPE LOCALITY: Chichén Itzá, Yucatán.

RANGE IN OAXACA: Tropical regions from low to moderate elevations in the northern and eastern parts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 56–62; ears and noseleaf normal; interfemoral membrane narrow and nearly naked; under parts con-

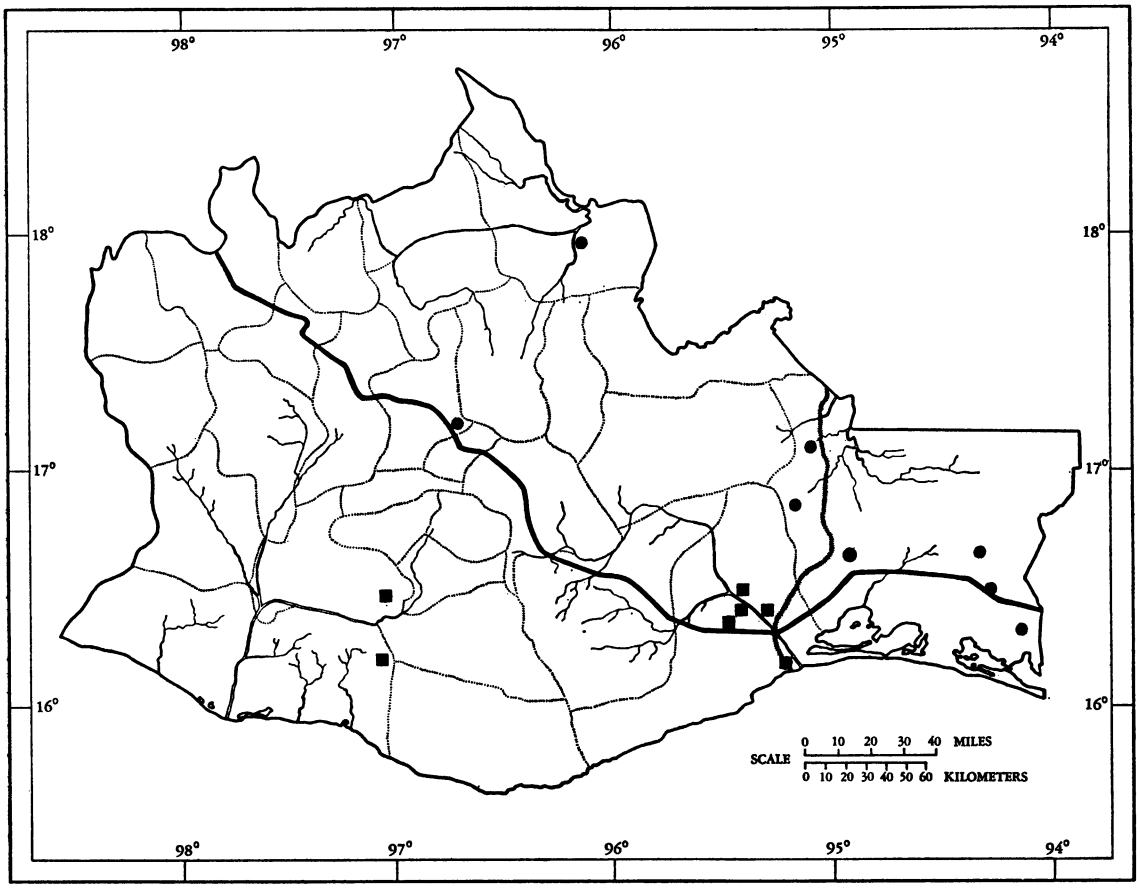


FIG. 29. Records of *Artibeus jamaicensis* in Oaxaca. ● *A. j. yucatanicus.* ■ *A. j. triomylus.*

siderably paler than back; no external tail; facial stripes more or less indistinct; M^3 usually absent. Color varying from Prout's Brown to Mummy Brown; tips of wings yellowish white. Skull strong and massive, similar to that of *hirsutus* but larger; molars $\frac{2-2}{3-3}$ or $\frac{3-3}{3-3}$; small third upper molar usually absent.

MEASUREMENTS: In table 10.

SPECIMENS EXAMINED: Etla: Cerro San Felipe, two. Juchitán: Río Sarabia, two; 20 miles northwest of La Ventosa, 33; Tapanatepec, eight; Paso Venado, two; Zanatepec, one. Tuxtepec: Chiltepec, 8.

REMARKS: M^3 is absent from both maxillae in all Oaxacan specimens examined from the districts of Etla and Tuxtepec, and from localities in the district of Juchitán except Tapanatepec, where one individual in eight specimens has M^3 present in both maxillae.

Most recent authors have followed Andersen (1908b) in listing Middle American specimens of *Artibeus jamaicensis* (except those from the Yucatan Peninsula) as belonging to the nominate subspecies. Oaxacan and other Mexican specimens examined are larger than specimens from Jamaica (the type locality of *A. j. jamaicensis* Leach), and represent a race for which J. A. Allen's name *A. j. yucatanicus* is applicable (Handley, 1965, p. 300).

Artibeus jamaicensis triomylus Handley

Text figure 29

Artibeus jamaicensis triomylus HANDLEY, 1965, p. 299.

TYPE LOCALITY: Papayo, Guerrero, Mexico.

RANGE IN OAXACA: Pacific lowlands and foothills from Salina Cruz to the districts of Juquila and Sola de Vega.

GENERAL CHARACTERS: (Based on Oaxacan

specimens). Length of forearm, 56–64; similar in general external characters to *Artibeus jamaicensis yucatanicus* but differing in some cranial details. M^3 present on both sides of upper jaw, M^3 absent from *A. j. yucatanicus;* rostrum usually flattened, dorsal rostral "shield" usually short and broad, suborbital edges converging sharply posteriorly; in *A. j. yucatanicus* dorsal rostral shield usually long and narrow and supraorbital edges subparallel.

MEASUREMENTS: In table 10.

SPECIMENS EXAMINED: Juquila: San Gabriel Mixtepec, four. Sola de Vega: Eighteen miles northwest of Sola de Vega, 21. Tehuantepec: Limón, three; Las Cuevas, five; Salina Cruz, one; Salazar, 17.

REMARKS: M^3 is present in both maxillae in 25 specimens (100%) from the districts of Sola de Vega and Juquila. M^3 is present in both maxillae in 13 of 19 specimens from the district of Tehuantepec west of the Río Tehuantepec.

Artibeus lituratus intermedius J. A. Allen

Plate 9, figures 5, 6; text figure 30

TYPE LOCALITY: San José, Costa Rica.

RANGE IN OAXACA: Widely distributed in tropical regions at moderate elevations throughout the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 64.0–71.5; resembling *Artibeus jamaicensis* but larger, facial stripes more sharply defined, interfemoral membrane hairier, and under parts not contrasting in color with back; molars $\frac{2-2}{3-3}$. Color varying from Sepia to Mummy Brown. Skull similar to that of *A. jamaicensis* but larger and more massive.

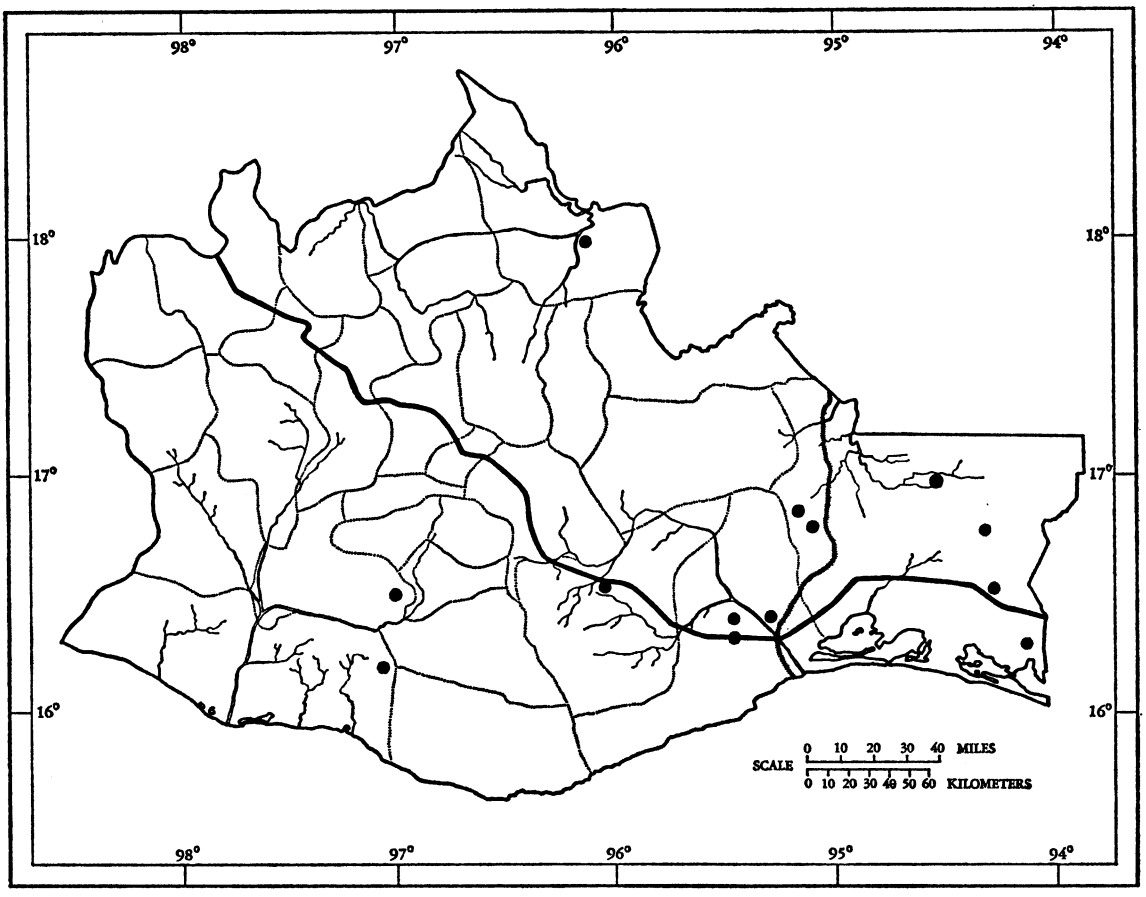


FIG. 30. Records of *Artibeus lituratus* in Oaxaca. ● *A. l. intermedius.*

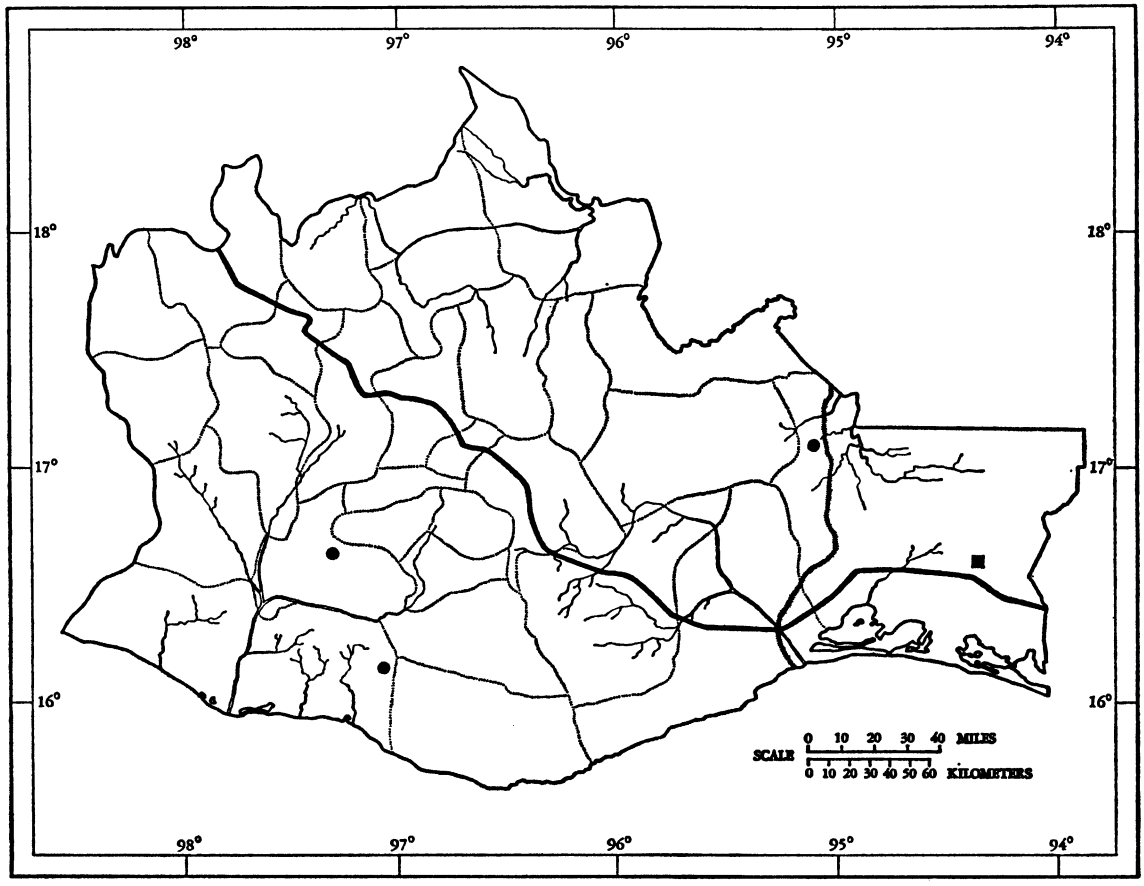


FIG. 31. Records of *Artibeus toltecus* and *Artibeus hartii* in Oaxaca. ● *A. toltecus.* ■ *A. hartii.*

MEASUREMENTS: In table 10.

SPECIMENS EXAMINED: Juchitán: Mazahuita, two; Paso Monte Rico, four; Santa María Chinalapa, one; Tapanatepec, two; 20 miles northwest of La Ventosa, 11; Zanatepec, two. Juquila: San Gabriel Mixtepec, four. Sola de Vega: Eighteen miles northwest of Sola de Vega, six. Tehuantepec: Guiengola, eight; Potrero Villalobos, one; Santa Lucía, three; Tehuantepec, three. Yautepec: San Bartolo Yautepec, two.

REMARKS: Most recent authors have followed Andersen (1908b) in listing *Artibeus intermedius* J. A. Allen in synonomy under *Artibeus l. palmarum* J. A. Allen and Chapman. A comparison of Oaxacan and Trinidadian specimens shows that Oaxacan specimens are larger, darker in color, and different in some cranial details. *Artibeus intermedius* J. A. Allen is reinstated here, as a subspecies of *lituratus*, and is applied to Oaxacan and other Middle American specimens of this species. The name *Artibeus lituratus palmarum* should be used only for specimens from Trinidad (the type locality) and vicinity.

Artibeus toltecus (Saussure)

Plate 9, figures 9, 10; text figure 31

Artibeus toltecus: DAVIS, 1958, p. 165.

TYPE LOCALITY: Mexico, restricted to Mirador, Veracruz, by Hershkovitz (1949, p. 449).

RANGE IN OAXACA: Tropical regions at moderate elevations in southern and eastern parts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 37.5–39.5; facial stripes indistinct or absent; resembling *A. jamaicensis* in cranial and dental characters

but size much smaller; molars $\frac{2-2}{2-2}$. Color varying from Sepia to Mummy Brown. Skull short and broad; rostrum short, depressed in interorbital region; braincase elevated above rostrum; cutting edges of inner upper incisors bilobed.

MEASUREMENTS: In table 10.

SPECIMENS EXAMINED: Juchitán: Río Sarabia, two. Juquila: San Gabriel Mixtepec, three. Sola de Vega: Twelve miles northwest of Sola de Vega, three.

REMARKS: *Artibeus cinereus* and *Artibeus toltecus* are not conspecific (Davis, 1958, p. 165).

Artibeus phaeotis phaeotis (Miller)

Plate 9, figures 11, 12; text figure 32

TYPE LOCALITY: Chichén Itzá, Yucatán.

RANGE IN OAXACA: Tropical regions at moderate elevations in the eastern part of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 37–41; resembling *A. toltecus* in size and color but facial stripes sharply defined and margins of ears and tragus yellowish white; molars $\frac{2-2}{2-2}$. Color Mummy Brown, a pair of sharply defined white facial stripes present. Skull resembling that of *A. toltecus* but rostrum relatively shorter and broader, and depressed in orbital region, nasal bones distinctly bent upward anteriorly and braincase sharply elevated behind rostrum.

MEASUREMENTS: In table 10.

SPECIMENS EXAMINED: Juchitán: Paso Venado, one; Río Sarabia, three; Sierra Madre, north of Zanatepec, one. Mixes: Cotzocon, one. Tuxtepec: Chiltepec, nine. Yautepec: San Bartolo Yautepec, one.

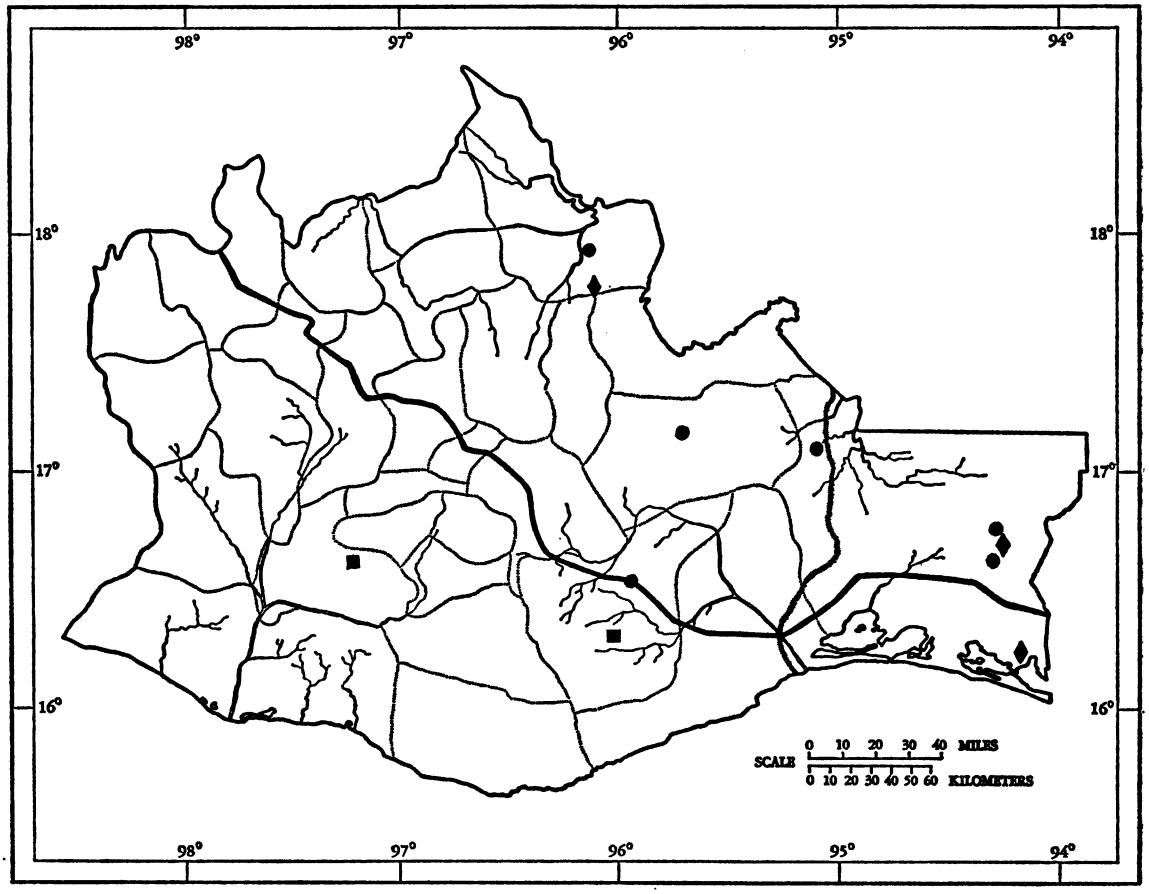


FIG. 32. Records of *Artibeus phaeotis*, *Artibeus aztecus*, and *Centurio senex* in Oaxaca.
● *A. phaeotis.* ■ *A. aztecus.* ◆ *C. senex.*

REMARKS: *Artibeus turpis* Andersen is a synonym of *Artibeus phaeotis* (Miller) (Jones and Lawler, 1965, p. 412).

Artibeus aztecus Andersen

Plate 9, figures 7, 8; text figure 32

TYPE LOCALITY: Tetela del Volcán, Morelos, Mexico.

RANGE IN OAXACA: Moderately high land areas in the southern part of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 43.0–47.5; facial stripes faintly indicated, forearm and feet hairy; interfemoral membrane narrow, hairy, with a distinct fringe of hairs along posterior border; fur comparatively long and lax; molars $\frac{2-2}{2-2}$; *A. aztecus* intermediate in size between *A. jamaicensis* and *A. toltecus*. Color Mummy Brown. Skull similar to that of *A. toltecus* but much larger; molariform tooth rows in a straighter line and not converging strongly posteriorly.

MEASUREMENTS: In table 10.

SPECIMENS EXAMINED: Sola de Vega: Eighteen miles northeast of Sola de Vega, 12. Yautepec: Santo Tomás Teipan (7000 feet), eight.

REMARKS: *Artibeus aztecus* and *Artibeus cinereus* are distinct species (Davis, 1958, p. 165).

Artibeus hartii Thomas

Plate 9, figures 13, 14; text figure 31

TYPE LOCALITY: Royal Botanic Gardens, Port-of-Spain, Trinidad, West Indies.

RANGE IN OAXACA: Known in the state from southern Juchitán District only.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Length of forearm, 39.7; facial stripes indistinct; proximal half of forearm, interfemoral membrane, and feet hairy; molars, $\frac{3-3}{3-3}$. Color Mummy Brown. Skull intermediate between that of *A. toltecus* and that of *A. aztecus* in size; resembling other species of *Artibeus* in general cranial and dental characters, but cutting edges of upper incisors simple, not deeply notched, and small third molar above and below well developed.

MEASUREMENTS: In table 10.

SPECIMENS EXAMINED: Jalisco: Ciudad Guzmán, three (F.M.N.H.). Oaxaca: Juchitán: Sierra Madre, north of Zanatepec, one.

REMARKS: Most previous authors have followed Andersen (1906) in aligning *hartii* with the genus *Enchisthenes* rather than *Artibeus*, because the cutting edge of the inner upper incisors in *hartii* is not notched and the third molar above and below is well developed. In all other characters, *hartii* agrees with the genus *Artibeus*, and it seems advisable to regard *Enchisthenes* and *Artibeus* as congeneric.

GENUS **CENTURIO** GRAY

WRINKLED-FACED BATS

Centurio senex Gray

Plate 10, figures 1, 2; text figure 32

TYPE LOCALITY: Probably Realejo, Nicaragua, according to Goodwin (1946, p. 327).

RANGE IN OAXACA: Tropical regions at low and moderate elevations in the eastern and northern parts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 41–44; noseleaf rudimentary; face naked, foreshortened, and covered with dermal outgrowths; flying membranes between fourth and fifth fingers striated with contrasting light and dark transverse bands; no external tail; interfemoral membrane narrow, hairy. Color between Drab and Saccardo's Brown; white spot on each shoulder. Skull very short and broad, braincase greatly elevated above rostrum, sagittal crest well developed; rostrum rudimentary; palate short and very wide; upper incisors small, inner larger than outer.

DENTAL FORMULA: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{2-2}{2-2} = 28$.

MEASUREMENTS: In table 10.

SPECIMENS EXAMINED: Juchitán: Tapanatepec, one; Río Blanco, one. Tuxtepec: Twenty-five miles south of Tuxtepec, one (L.A.C.M.).

SUMMARY OF THE STENODERMINAE OF OAXACA

The large fruit bats *Artibeus jamaicensis* and *Artibeus lituratus* are widely distributed at low and moderate elevations throughout the state. The subspecific names *jamaicensis* and *palmarum* currently used for these two species from this area are not applicable to the Oaxacan specimens and are replaced here by *yucatanicus* for specimens from eastern

TABLE 11

MEASUREMENTS (IN MILLIMETERS) OF *Desmodus* AND *Diphylla* FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Post-orbital Constriction	Brain-case Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Desmodus rotundus murinus									
OAXACA									
A.M.N.H. No. 167480, Santa Catarina Quioquitani	♀ ad	61.5	24.5	22.5	12.2	5.7	12.0	6.9	3.3
A.M.N.H. No. 177854, Tapanatepec	♂ ad	58.2	24.3	22.2	11.8	5.5	12.0	7.0	3.8
A.M.N.H. No. 177856, Tapanatepec	♀ ad	62.5	24.9	22.4	12.1	5.1	11.6	7.1	3.8
A.M.N.H. No. 177857, Tapanatepec	♂ ad	58.1	25.0	22.2	12.0	5.7	12.0	6.5	3.5
A.M.N.H. No. 177859, Tapanatepec	♂ ad	61.8	24.5	21.8	11.7	5.9	12.5	6.0	3.9
A.M.N.H. No. 190140, Chiltepec	♀ ad	61.5	25.2	22.5	11.9	6.0	12.0	6.6	3.8
A.M.N.H. No. 190144, La Ventosa	♂ ad	59.2	25.5	22.8	12.3	5.7	12.2	6.3	3.6
A.M.N.H. No. 190145, La Ventosa	♀ ad	62.5	24.9	22.4	12.2	6.0	12.5	6.6	4.0
A.M.N.H. No. 190147, Sola de Vega	♂ ad	55.5	24.5	21.7	11.4	5.5	11.7	6.0	4.0
A.M.N.H. No. 190148, Sola de Vega	♂ ad	56.2	23.6	21.2	11.8	5.3	11.3	6.0	3.5
A.M.N.H. No. 190149, San Gabriel Mixtepec	♀ ad	64.8	25.0	22.8	12.2	5.6	12.0	6.6	3.4
A.M.N.H. No. 190150, San Gabriel Mixtepec	♂ ad	56.7	24.5	21.5	11.6	5.5	12.0	6.0	3.6
A.M.N.H. No. 190151, San Gabriel Mixtepec	♀ ad	59.7	24.5	22.0	12.0	5.5	11.8	6.3	3.4
A.M.N.H. No. 190158, San Gabriel Mixtepec	♀ ad	60.5	24.0	21.5	11.8	5.6	11.6	6.3	3.2
Diphylla ecaudata									
YUCATÁN									
A.M.N.H. No. 91283, Yokat	♀ ad	54.0	21.9	20.1	12.7	7.2	11.6	6.0	4.0
SAN LUIS POTOSÍ									
A.M.N.H. No. 16540, Cueva Sabinos	♂ ad	53.5	21.7	20.5	12.7	7.5	11.5	6.5	4.0
HONDURAS									
A.M.N.H. No. 175000, Xilitila	♂ ad	54.0	22.1	20.6	12.5	7.0	11.3	6.4	3.2
A.M.N.H. No. 192041, Las Flores Gracias	♂ ad	53.0	22.3	20.0	12.7	7.3	11.5	6.0	3.3
A.M.N.H. No. 126464, Sabanagrande	♂ ad	55.6	22.5	20.5	12.5	7.5	12.0	6.2	3.4
A.M.N.H. No. 126465, Sabanagrande	♂ ad	—	22.7	20.6	12.5	7.4	10.0	6.4	3.8

and northern Oaxaca, *triomylus* from southwestern Oaxaca, and *intermedius* replaces *palmarum*. *Artibeus hirsutus* has been taken in Guerrero 60 miles west of the Oaxaca state line, and it may be presumed that the range of this species includes southwestern Oaxaca.

The species *Artibeus aztecus* is not rare in southern Oaxaca. It is not a subspecies of *Artibeus cinereus* or of *A. toltecus*. *Artibeus toltecus* and *A. aztecus* have been taken at the same locality in Oaxaca, 12 miles northwest of Sola de Vega. The over-all range of *Artibeus hartii* covers Oaxaca, but only one specimen has been taken in this state. *Artibeus phaeotis* is known to range over the eastern parts of the state. *Artibeus toltecus* occurs in southern Oaxaca, and the ranges of *A. toltecus* and *A. phaeotis* overlap. *Uroderma bilobatum*, *Vampyrops helleri*, *Vampyrodes caraccioloi major*, *Chiroderma v. jesupi*, and *Centurio senex* are known by a few individuals from scattered localities in Oaxaca, chiefly from moderate elevations in tropical areas.

Family DESMODONTIDAE Gill

Genus DESMODUS Wied-Neuwied

Common Vampire Bats

Desmodus rotundus murinus Wagner

Plate 10, figures 3, 4; text figure 33

Type Locality: Mexico.

Range in Oaxaca: Common in tropical regions at low and moderate elevations in the southern part of the state but occurring in central and probably northern Oaxaca.

General Characters: (Based on Oaxacan specimens). Length of forearm, 55–64.8; thumb long, with elongated basal pad; noseleaf rudimentary; no external tail; interfemoral membrane reduced to a narrow fringe; long bones of legs and wings grooved. Color varying from Mummy Brown to bright

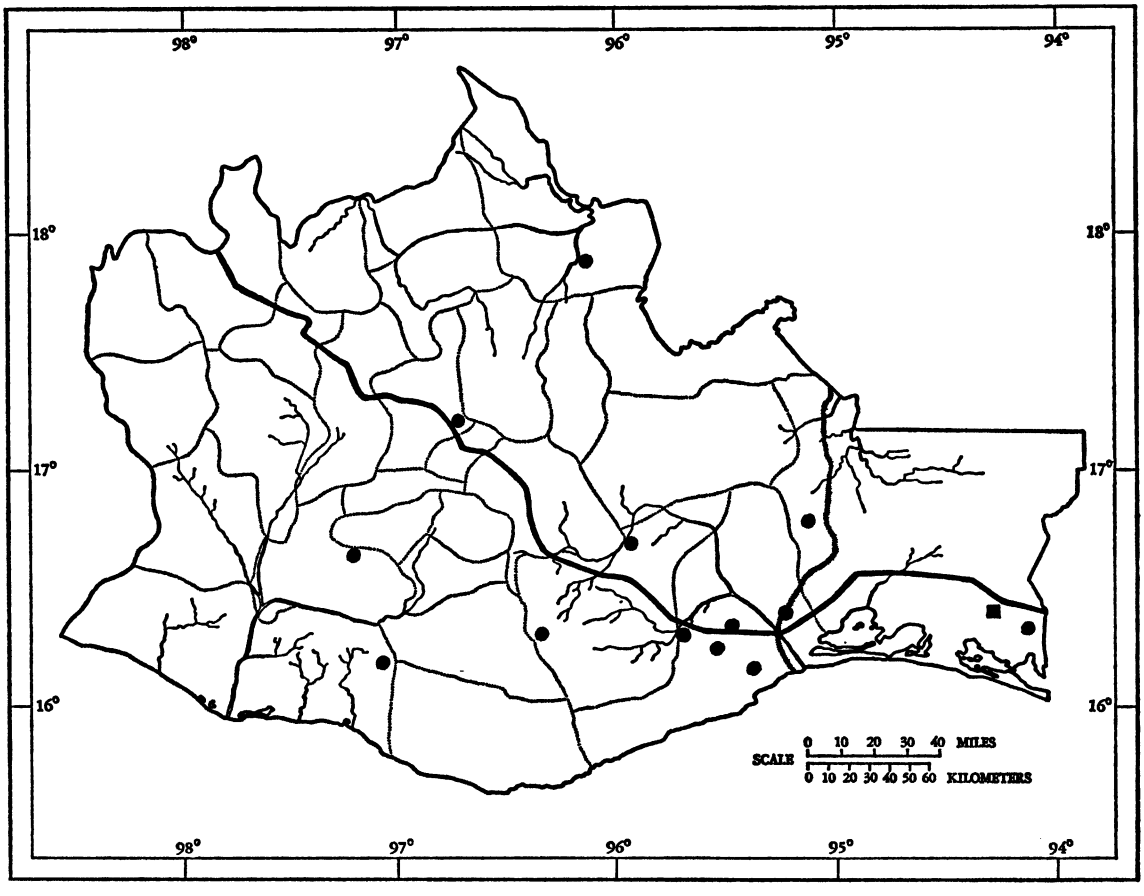


Fig. 33. Records of *Desmodus rotundus* and *Diphylla ecaudata* in Oaxaca. ● *D. r. murinus*. ■ *D. ecaudata*.

Ochraceous-Tawny. Skull wedge-shaped, braincase large and elevated; rostrum reduced to a mere support of large incisors and canines; upper incisors large, almost completely filling space between canines; lower incisors small, deeply bilobed; canines large, long, and acutely pointed.

DENTAL FORMULA: Incisors, $\frac{1-1}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{1-1}{2-2}$; molars, $\frac{1-1}{1-1} = 20$.

MEASUREMENTS: In table 11.

SPECIMENS EXAMINED: Juchitán: Twenty miles northwest of La Ventosa, two; Tapanatepec, 112. Juquila: San Gabriel Mixtepec, 10. Oaxaca: San Felipe del Agua, 25. Sola de Vega: Eighteen miles northwest of Sola de Vega, three. Tehuantepec: Guiengola, 20; Las Cuevas, four; Limón, four; Mazatlán, 14; Salazar, 18; San Antonio, one; Tehuantepec, 27; Tequisistlán, two. Tuxtepec: Chiltepec, five. Yautepec: San Bartolo Yautepec, eight; Santa Catarina Quioquitani, six; 60 miles northwest of Tehuantepec, one.

GENUS **DIPHYLLA** SPIX
HAIRY-LEGGED VAMPIRE BAT
Diphylla ecaudata Spix

Plate 10, figures 5, 6; text figure 33

TYPE LOCALITY: Río San Francisco, Bahia, Brazil.

RANGE IN OAXACA: Known only from Juchitán District, but probably occurring at moderate elevations throughout the state.

GENERAL CHARACTERS: (Based on Honduran specimens). Length of forearm, 53.0–55; similar to *Desmodus* but smaller, ears shorter and more rounded, thumb shorter and lacking basal pad; interfemoral membrane and hind feet hairy. Color Seal Brown. Skull with large braincase and rostrum greatly reduced, differing from that of *Desmodus* in much higher and broader interorbital region; inner upper incisors not so large as in *Desmodus;* outer upper incisors minute; lower incisors highly specialized, inner about as high as wide, cutting edges with four beadlike lobes, outer decidedly wider than high, cutting edges with seven lobes.

DENTAL FORMULA: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{1-1}{2-2}$; molars, $\frac{2-2}{2-2} = 26$.

MEASUREMENTS: In table 11.

SPECIMENS EXAMINED: San Luis Potosí: Cueva Sabinos, one; Xilitla, one. Yucatan: Yokat, one. Honduras: Sabanagrande, two; Las Flores Gracias, one.

SPECIMENS RECORDED: (Harrison Allen, 1895, p. 769). Oaxaca: Juchitán: Santa Efigenia, one (U.S.N.M.).

REMARKS: Burt and Stirton (1961, p. 37) regarded *Diphylla centralis* as indistinguishable from *Diphylla ecaudata* Spix. The primary distinction between *centralis* and *ecaudata* as given in the type description was in the relative sizes of the lower cheek teeth. Donald R. Dickey in 1927 sent Salvadoran specimens of *Diphylla* to Thomas for comparison with the type of *centralis*. Thomas' reply (*in litt.*, May 29, 1927) was as follows: "I am sorry to say that the validity of *Diphilla centralis* has long appeared doubtful to me and I do not think it distinct from *ecaudata*. The sizes of the decadent lower cheek teeth vary a good deal, in the type of *centralis*, their proportions are merely a little out of the common run."

SUMMARY OF THE DESMODONTIDAE OF OAXACA

Desmodus rotundus murinus is not uncommon in the hot coastal region of southern Oaxaca and across the Isthmus of Tehuantepec, but *Diphylla ecaudata* is known in Oaxaca only from the extreme southeastern part of the state. *Diaemus youngi* has been reported from South America, with northern records at 4.4 kilometers southeast of Teapa, Tabasco, and southern Tamaulipas, Mexico (Villa, 1965, p. 127).

FAMILY **NATALIDAE** MILLER

GENUS **NATALUS** GRAY
FUNNEL-EARED BATS
Natalus stramineus saturatus Dalquest and Hall

Plate 10, figures 7, 8; text figure 34

TYPE LOCALITY: Three kilometers east of San Andres Tuxtla, Veracruz, Mexico, altitude, 1000 feet.

RANGE IN OAXACA: Tropical regions at low and moderate elevations in the southern part of the state and across the Isthmus of Tehuantepec.

GENERAL CHARACTERS: Length of forearm, 36.0–40.5; form slender, limbs long; interfemoral membrane wide; tail long, extending to posterior border of interfemoral membrane; ears low, funnel-shaped; fur long and lax;

TABLE 12

MEASUREMENTS (IN MILLIMETERS) OF *Natalus* FROM OAXACA

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Post-orbital Constriction	Brain-case Breadth	Palate Breadth Across M^2–M^2	Maxillary Tooth Row
Natalus mexicanus saturatus									
A.M.N.H. No. 143479, San Antonio	♂ ad	39.0	16.0	14.8	8.1	3.2	7.7	5.4	6.9
A.M.N.H. No. 148386, San Antonio	♀ ad	39.0	15.4	14.8	7.9	3.1	7.2	5.4	6.9
A.M.N.H. No. 165945, San Antonio	♀ ad	38.5	16.0	15.0	7.8	3.0	7.4	5.2	7.0
A.M.N.H. No. 148387, Guiengola	♀ ad	38.7	16.3	14.9	7.8	3.0	7.5	5.4	7.0
A.M.N.H. No. 148388, Guiengola	♂ ad	38.5	16.5	15.4	—	3.1	7.6	5.4	7.1
A.M.N.H. No. 145148, Bisilana	♂ ad	40.5	16.5	15.2	7.8	3.3	7.6	5.5	7.1
A.M.N.H. No. 178758, El Salado	♂ ad	38.2	16.8	15.2	8.4	3.4	7.8	5.5	7.0
A.M.N.H. No. 178759, El Salado	♂ ad	38.2	16.0	15.2	8.0	3.2	7.7	5.5	7.0
A.M.N.H. No. 178760, El Salado	♂ ad	38.5	15.5	15.0	8.1	3.1	7.3	5.4	6.9
A.M.N.H. No. 17742, Tapanatepec	♂ ad	38.2	16.3	15.5	8.3	3.3	7.8	5.7	6.9
A.M.N.H. No. 178746, Tehuantepec	♀ ad	36.0	15.0	14.2	7.7	3.0	7.4	4.8	6.5
A.M.N.H. No. 186395, El Jícaro	♂ ad	39.3	16.0	14.9	7.9	3.0	7.5	5.2	6.6
A.M.N.H. No. 186399, El Jícaro	♂ ad	38.1	15.7	14.8	8.0	3.2	7.7	5.2	7.0
A.M.N.H. No. 186402, El Jícaro	♀ ad	38.1	16.2	14.9	7.9	3.0	7.3	5.3	7.0
A.M.N.H. No. 186403, El Jícaro	♀ ad	37.7	15.7	14.5	7.7	3.1	7.4	5.2	6.6

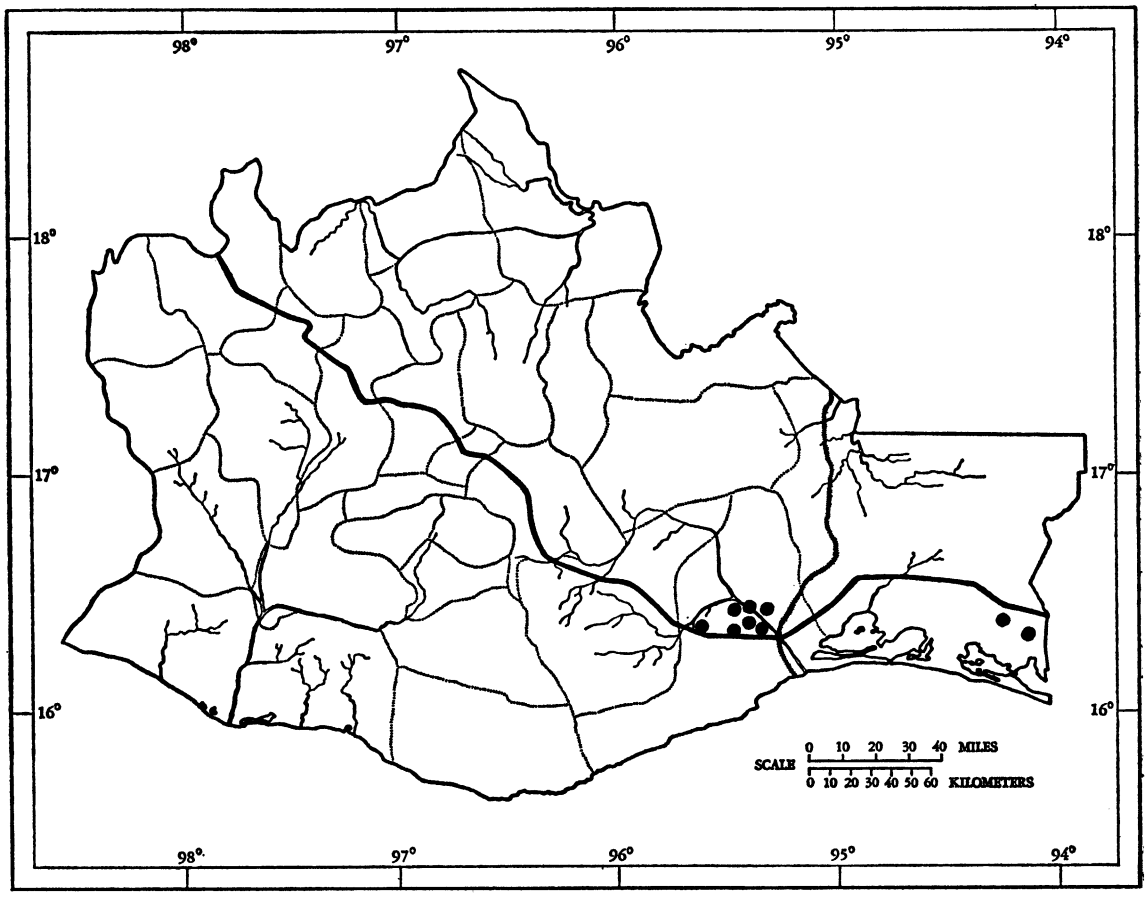


FIG. 34. Records of *Natalus stramineus* in Oaxaca. ● *N. s. saturatus.*

natalid organ present in males, large and bell-shaped, covering front of head. Occurring in red and gray color phases. Skull long and narrow; rostrum elongate; braincase globular, sharply elevated above rostrum; upper incisors low, subequal, in pairs, divided by a wide palatal emargination; lower incisors small, trifid.

DENTAL FORMULA: Incisors, $\frac{2-2}{3-3}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{3-3}{3-3}$; molars, $\frac{3-3}{3-3}$ = 38.

MEASUREMENTS: In table 12.

SPECIMENS EXAMINED: Juchitán: El Jícaro, 11; Tapanatepec, one. Tehuantepec: Bisilana, one; Diana Liesa, 25; Escurano, one; Guiengola, 14; El Salado, four: Mixtequilla, 15; San Antonio, six; Tequisistlán, five; Tehuantepec, one.

REMARKS: Goodwin (1959, p. 7) showed that the specific name *stramineus* is applicable to Oaxacan *Natalus.*

SUMMARY OF THE NATALIDAE OF OAXACA

Only one subspecies, *Natalus stramineus saturatus*, of the family Natalidae occurs in Oaxaca. The present series, all from the southern coastal regions and across the Isthmus of Tehuantepec, shows a marked diversity in color.

FAMILY VESPERTILIONIDAE GRAY

GENUS MYOTIS KAUP

LITTLE BROWN BATS

Myotis velifer velifer (J. A. Allen)

Plate 10, figures 9, 10; text figure 35

TYPE LOCALITY: Santa Cruz del Valle, Guadalajara, Mexico.

RANGE IN OAXACA: Central tableland, but few specimens recorded.

GENERAL CHARACTERS: (Based on Oaxacan

specimens). Length of forearm, 40.0–47.0; size large for genus *Myotis;* pelage long and soft; color dark brown; interfemoral membrane wide, tail long, tragus long and slender; third and fourth metacarpals subequal, fifth much shorter; border of uropatagium with fringes of widely separated fine hairs. Skull large; braincase elevated above rostrum; palate emarginate; sagittal and lambdoid crests well developed; rostrum broad, not noticeably narrower than braincase.

DENTAL FORMULA: Incisors, $\frac{2-2}{3-3}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{3-3}{3-3}$; molars, $\frac{3-3}{3-3}$ = 38 (the small first and second upper premolars are drawn in from tooth row so that the second is partly hidden in exterior view behind the corner of the third premolar).

MEASUREMENTS: In table 13.

SPECIMENS EXAMINED: Yautepec: Santo Tomás Teipan, one.

SPECIMENS RECORDED: (Miller and G. M. Allen, 1928, p. 91). Tehuantepec: Tehuantepec, one (B.M.).

Myotis fortidens Miller and G. M. Allen

Plate 10, figures 11, 12; text figure 35

TYPE LOCALITY: Teapa, Tabasco, Mexico.

RANGE IN OAXACA: Tropical regions at moderate elevations in the southern part of the state and across the Isthmus of Tehuantepec to Tuxtepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 35.6–38.6; size medium for the genus *Myotis;* color light brown; tragus long and slender; tail extending to posterior border of naked interfemoral membrane; premolars usually $\frac{2-2}{2-2}$. Braincase low, sagittal crest well developed; small upper premolar in contact with canine and large premolar.

MEASUREMENTS: In table 13.

SPECIMENS EXAMINED: Tehuantepec: Tequisistlán, four (T.C.W.C.). Tuxtepec: Tuxtepec, one. Yautepec: San Bartolo Yautepec, one.

Myotis thysanodes aztecus Miller and G. M. Allen

Plate 10, figures 13, 14; text figure 35

TYPE LOCALITY: San Antonio, Oaxaca, Mexico.

RANGE IN OAXACA: Known only from the highlands in central part of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 43.0–44.0; ears elongated, reaching beyond tip of nose when laid forward; tragus long and slender; about equaling *M. v. velifer* in size but more slender, with longer and lighter-colored fur; free edge of interfemoral membrane thickly fringed with short, coarse hairs. Color Tawny Olive. Skull about the size of that of *velifer* but more slender; braincase narrower and more oval; occiput inflated posteriorly.

MEASUREMENTS: In table 13.

SPECIMENS RECORDED: (Miller and G. M. Allen, 1928, p. 128). Tehuantepec: Hacienda Cinco Señores, two (B.M.). Oaxaca: San Antonio, one (B.M.). (Schaldach, 1966, p. 291). Miahuatlán: Río Molino, one (I.B.).

Myotis californicus mexicanus (Saussure)

Plate 10, figures 15, 16; text figure 36

TYPE LOCALITY: Exact locality unknown (the desert and warmer parts of the state of Mexico, Mexico, according to Dalquest, 1953, p. 49).

RANGE IN OAXACA: Highlands in the northern and central parts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 32.6–34.5; ear exceeding muzzle when laid forward; tragus long and slender; foot small; pelage long. Color of base of hair contrasting with color of tip, varying from Brussels Brown to Sudan Brown; distal end of third metacarpal reaching elbow. Skull slender; rostrum long and slender; braincase elevated above rostrum and flat-topped; sagittal crest weak or absent.

MEASUREMENTS: In table 13.

SPECIMENS EXAMINED: Etla: Cerro San Felipe, one. Yautepec: Chontecomatlán, one.

SPECIMENS RECORDED: (Miller and G. M. Allen, 1928, p. 160). Cuicatlán: Cuicatlán, one (U.S.N.M.); Reyes, five (U.S.N.M.).

Myotis nigricans dalquesti Hall and Alvarez

Plate 10, figures 17, 18; text figure 36

Myotis nigricans dalquesti HALL AND ALVAREZ, 1961, p. 71.

TYPE LOCALITY: Three kilometers east of San Andres Tuxtla, Veracruz, altitude, 1000 feet.

RANGE IN OAXACA: Tropical regions in the northern and southern parts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 33.1–36.4; size

TABLE 13

MEASUREMENTS (IN MILLIMETERS) OF VESPERTILIONIDS FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Post-orbital Constriction	Brain-case Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Myotis velifer velifer									
OAXACA									
A.M.N.H. No. 175264, Sto. Tómas Teipan	♂ ad	43.3	16.5	16.0	10.4	3.9	7.4	6.5	6.5
JALISCO									
A.M.N.H. No. 2696–2135,[a] Guadalajara	♂ ad	43.3	16.4	15.7	10.1	4.2	7.3	6.5	6.5
Myotis fortidens									
OAXACA									
T.C.W.C. No. 7642, Tequisistlán	♀ ad	37.0	14.9	14.2	9.3	4.0	6.9	6.0	5.5
T.C.W.C. No. 7643, Tequisistlán	♀ ad	37.3	15.0	14.3	9.5	4.1	7.2	6.2	5.7
T.C.W.C. No. 7644, Tequisistlán	♀ ad	36.4	14.8	14.2	9.5	4.0	7.0	6.4	5.7
T.C.W.C. No. 7645, Tequisistlán	♀ ad	35.9	14.7	14.0	9.4	4.1	6.9	5.9	5.5
A.M.N.H. No. 190163, Tuxtepec	♀ ad	37.5	14.8	14.0	9.2	4.2	7.1	5.7	5.5
Myotis thysanodes aztecus									
OAXACA									
B.M. No. 58.6.2.3, San Antonio	—	43.4	—	—	—	4.0	8.0	6.8	6.2
B.M. No. 7.1.1.523, Hac. Cinco Señores	—	45.0	—	—	10.0	4.2	8.0	6.6	6.3
B.M. No. 7.1.1.524, Hac. Cinco Señores	—	43.0	—	—	10.0	4.2	8.1	7.0	6.4
B.M. No. 7.1.1.525, Hac. Cinco Señores	—	43.0	—	—	—	4.0	—	6.5	6.2
B.M. No. 7.1.1.526, Hac. Cinco Señores	—	44.0	—	—	—	4.0	—	6.6	6.5
Myotis californicus mexicanus									
OAXACA									
A.M.N.H. No. 165944, Chontecomatlán	♂ ad	33.0	13.3	12.2	7.5	3.1	6.1	4.8	5.1
A.M.N.H. No. 172129, Cerro San Felipe	♂ ad	34.0	13.8	13.3	8.1	3.5	6.6	5.7	5.5
Myotis nigricens dalquesti									
OAXACA									
A.M.N.H. No. 190161, Chiltepec	♀ ad	34.2	12.7	12.1	7.5	3.2	5.6	5.5	4.7

TABLE 13—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Post-orbital Constriction	Brain-case Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
A.M.N.H. No. 190162, Chiltepec	♂ ad	33.7	12.7	12.0	7.7	3.4	5.9	4.9	4.6
Myotis argentatus									
VERACRUZ									
K.U. No. 19228,[a] Río Coatzocoalcos	♂ ad	35.8	14.8	13.8	9.2	4.3	7.5	5.5	5.3
K.U. No. 19227, Río Coatzocoalcos	♀ sub	34.5	14.0	13.0	9.0	4.0	7.4	5.6	5.0
Pipistrellus subflavus veraecrucis									
VERACRUZ									
K.U. No. 29882, Las Vigas	♂ ad	31.2	12.0	11.3	7.0	3.4	6.1	4.5	4.2
Eptesicus fuscus miradorensis									
OAXACA									
A.M.N.H. No. 185032, Chontecomatlán	♀ ad	52.3	20.4	19.7	14.1	4.1	8.9	8.4	7.5
A.M.N.H. No. 190167, Sola de Vega	♀ ad	50.0	19.5	18.5	12.8	4.2	8.4	7.6	7.0
A.M.N.H. No. 190168, Sola de Vega	♂ ad	50.2	19.6	19.1	12.4	4.2	8.3	7.8	7.3
A.M.N.H. No. 205167, Cerro San Felipe	♂ ad	47.5	19.3	19.0	13.3	4.7	9.1	8.3	7.6
Eptesicus gaumeri gaumeri									
OAXACA									
A.M.N.H. No. 190164, Chiltepec	♀ ad	40.6	15.7	14.9	10.5	4.1	7.2	6.5	5.9
A.M.N.H. No. 190165, Chiltepec	♀ ad	39.0	15.3	14.9	10.5	4.1	7.2	6.3	5.7
A.M.N.H. No. 190166, San Gabriel Mixtepec	♂ ad	43.2	15.5	15.2	10.6	4.0	7.4	6.8	6.0
Lasiurus borealis teliotis									
ARIZONA									
A.M.N.H. No. 4255/3286, Tucson	ad	41.5	12.7	12.7	9.0	4.2	6.9	5.5	4.7
CALIFORNIA									
A.M.N.H. No. 6974/5579, Nicasio	♂ ad	42.7	12.2	12.3	8.8	4.5	7.0	5.6	4.2
Lasiurus borealis frantzii									
GUATEMALA									
A.M.N.H. No. 97501, Barrillos	♂ ad	38.6	11.6	11.4	8.3	4.2	6.9	5.2	3.9

TABLE 13—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Post-orbital Constriction	Brain-case Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Lasiurus cinereus cinereus									
OAXACA									
T.C.W.C. No. 7667, El Fortin	♂ ad	48.7	17.0	17.0	12.2	5.2	—	8.5	5.8
A.M.N.H. No. 205168, Cerro San Felipe	♂ ad	52.0	17.3	17.3	12.5	5.5	10.2	8.0	6.2
A.M.N.H. No. 207428, San Felipe del Agua	♂ ad	52.8	17.3	17.3	11.8	5.1	8.8	7.6	6.0
Lasiurus intermedius									
OAXACA									
A.M.N.H. No. 167045, Tehuantepec	♀ ad	55.0	18.8	18.4	14.1	5.3	9.5	8.9	6.8
A.M.N.H. No. 175390, Tehuantepec	♂ ad	52.0	18.5	18.0	12.8	5.2	9.2	8.4	6.7
A.M.N.H. No. 185033, Chontecomatlán	♂ ad	51.0	18.3	17.7	12.6	5.0	8.8	8.2	6.4
A.M.N.H. No. 190174, Chiltepec	♂ ad	53.0	17.7	17.6	12.6	5.0	8.9	8.4	6.6
A.M.N.H. No. 190175, Chiltepec	♂ ad	52.8	17.9	17.8	13.1	5.2	9.4	8.3	6.4
A.M.N.H. No. 190176, Chiltepec	♂ ad	49.0	17.8	17.6	12.6	5.0	8.8	8.3	6.5
A.M.N.H. No. 190178, Chiltepec	♂ ad	51	18.3	17.7	12.8	5.2	8.8	8.5	6.4
Lasiurus ega panamensis									
OAXACA									
A.M.N.H. No. 190170, Chiltepec	♂ ad	42.8	15.0	14.5	10.3	4.5	8.0	6.7	5.2
A.M.N.H. No. 190171, Chiltepec	♀ ad	45.8	—	15.0	10.8	4.3	—	6.9	5.3
A.M.N.H. No. 190172, Chiltepec	♀ ad	45.5	15.4	15.1	10.3	4.5	8.2	7.2	5.4
Lasiurus ega xanthinus									
SINALOA									
A.M.N.H. No. 24922, Escuinapa	♀ ad	47.2	16.3	16.2	11.7	4.5	8.4	7.6	5.8
BAJA CALIFORNIA									
A.M.N.H. No. 32312, Miraflores	♂ ad	44.5	15.3	15.1	10.6	4.8	8.5	7.3	5.4
A.M.N.H. No. 32316, Miraflores		47.0	16.3	16.2	11.2	4.5	8.3	7.7	5.7

TABLE 13—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Post-orbital Constriction	Brain-case Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Rhogeessa tumida major									
OAXACA									
A.M.N.H. No. 167467, San Carlos Yautepec	♀ ad	32.7	13.0	—	8.3	3.2	5.8	5.3	5.0
A.M.N.H. No. 175263,[a] San Bartolo Yautepec	♂ ad	32.0	13.1	12.5	8.5	3.2	5.8	5.4	5.0
A.M.N.H. No. 178744, Tehuantepec	♂ ad	30.5	13.0	12.4	8.2	3.3	5.7	5.3	4.7
A.M.N.H. No. 178745, Tehuantepec	♀ ad	31.0	12.7	12.3	8.3	3.3	5.7	5.5	4.8
A.M.N.H. No. 185023, Yautepec	ad	31.0	12.6	12.2	8.4	3.5	5.9	5.5	5.0
Rhogeessa parvula parvula									
OAXACA									
A.M.N.H. No. 213764, Cerro San Pedro	♂ ad	28.5	11.5	11.0	7.9	3.1	5.5	5.0	4.5
A.M.N.H. No. 186406, Zanatepec	♂ ad	30.5	12.9	12.4	8.4	3.4	5.9	5.3	4.8
Rhogeessa gracilis									
OAXACA									
A.M.N.H. No. 186901, Cerro San Felipe	♂ ad	32.8	13.2	12.3	8.1	3.3	6.0	5.1	4.7
Baeodon alleni									
OAXACA									
K.U. No. 61170, Tamazulápam	♂ ad	33.5	14.4	13.8	9.0	3.4	6.4	6.2	5.4
K.U. No. 61171, Tamazulápam	♂ ad	34.1	14.4	14.0	9.2	3.4	6.5	6.2	5.5
Plecotus townsendii australis									
OAXACA									
A.M.N.H. No. 166984, Mitla	♀ ad	43.6	16.0	15.2	9.3	3.8	7.7	5.6	5.1
A.M.N.H. No. 169961, Tehuantepec	♀ ad	43.6	16.0	15.2	9.2	3.7	7.8	5.7	5.1

[a] Type.

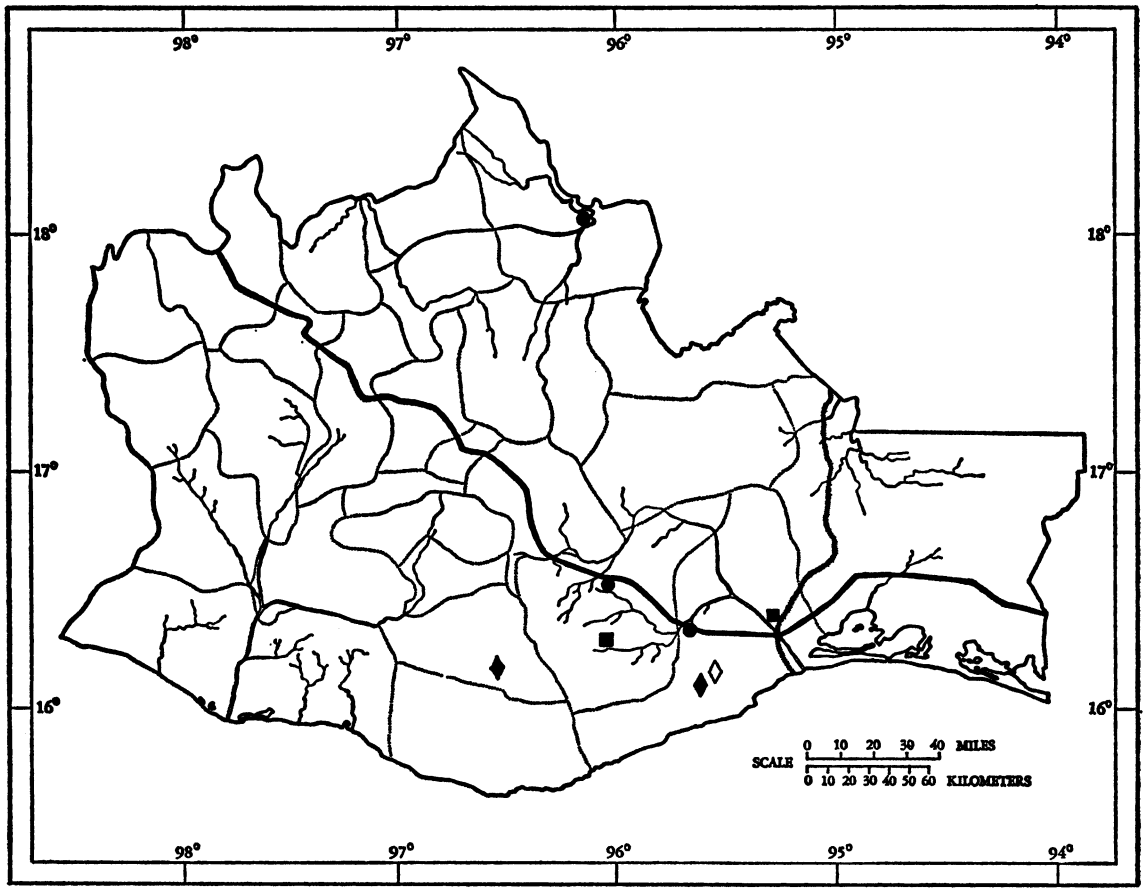


FIG. 35. Records of *Myotis velifer*, *Myotis fortidens*, and *Myotis thysanodes* in Oaxaca.
■ *M. v. velifer*. ● *M. fortidens*. ◆ *M. t. aztecus*. ◇ Type locality of *M. t. aztecus*.

small; ears small, rarely extending beyond nostrils when laid forward; tragus about half of height of ear; pelage varying from short and woolly to silky; color blackish brown; distal end of third metacarpal not reaching elbow. Skull small and delicately formed; braincase globular and sharply elevated above rostrum; rostrum relatively broad in proportion to length; dentition normal for genus; sagittal crest absent.

MEASUREMENTS: In table 13.

SPECIMENS EXAMINED: Tuxtepec: Chiltepec, two.

SPECIMENS RECORDED: (Schaldach, 1966, p. 292). Pochutla: Kilometer 183, one (I.B.).

Myotis argentatus Dalquest and Hall

Plate 10, figures 19, 20; text figure 36

TYPE LOCALITY: Fourteen kilometers southwest of Coatzocoalcos, Veracruz, Mexico, on a tributary of the Río Coatzocoalcos, altitude 100 feet.

RANGE IN OAXACA: No specimens known from the state, but the range may extend south in the valley of the Río Coatzocoalcos to Oaxaca.

GENERAL CHARACTERS: (Based on Veracruz specimens). Length of forearm, 34.5–35.8; size medium for genus *Myotis;* tail short, foot long; pelage long and dark brown, heavily frosted on back and rump with silvery white. Skull relatively short and broad; braincase large and rounded; rostrum short and weak; sagittal crest low; molariform teeth small.

MEASUREMENTS: In table 13.

SPECIMENS EXAMINED: Veracruz: Tributary of Río Coatzacoalcos, two (K.U.).

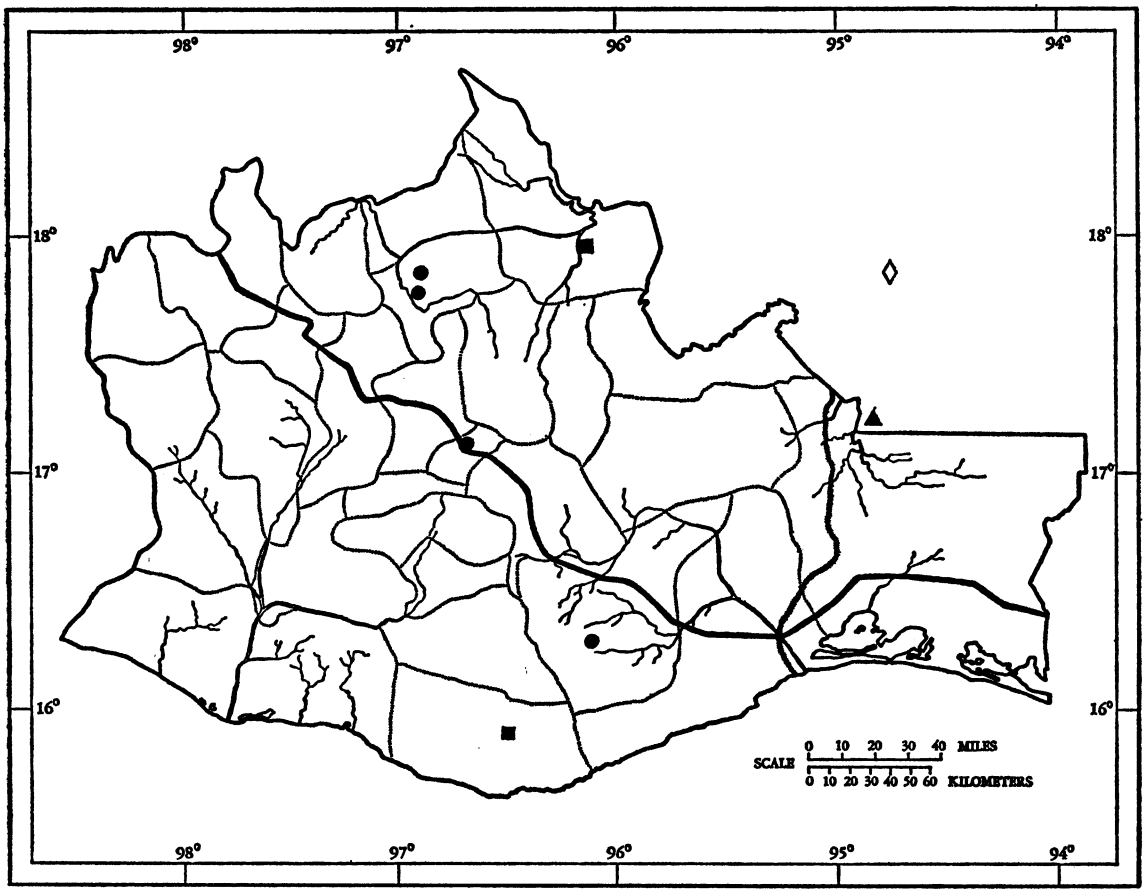


FIG. 36. Records of *Myotis californicus*, *Myotis nigricans*, *Myotis argentatus*, and *Pipistrellus subflavus* in Oaxaca and of some specimens from other areas. ● *M. c. mexicanus.* ■ *M. n. dalquesti.* ◇ Type locality of *M. argentatus.* ▲ *P. s. veraecrucis.*

GENUS **PIPISTRELLUS** KAUP

PIPISTRELLES

Pipistrellus subflavus veraecrucis (Ward)

Plate 10, figures 21, 22; text figure 36

TYPE LOCALITY: Las Vigas, Canton of Japapa, Veracruz, Mexico.

RANGE IN OAXACA: No specimens known from the state, but the range possibly includes extreme northeastern Oaxaca.

GENERAL CHARACTERS: (Based on Veracruz specimens). Length of forearm, 29.5–33.1; form slender; color dark brown; fur tricolored; tail as long as outstretched leg and enclosed in interfemoral membrane. Dorsal profile of skull convex in interorbital region; inner upper incisors bicuspidate; outer upper incisors unicuspidate, dentition essentially like that of *Myotis* except third upper and third lower premolars invariably absent.

DENTAL FORMULA: Incisors, $\frac{2-2}{3-3}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3} = 34$.

MEASUREMENTS: In table 13.

SPECIMENS EXAMINED: Veracruz: Four kilometers east of Las Vigas, one (K.U.); 30 kilometers southeast of Jesús Carranza, one (K.U.).

GENUS **EPTESICUS** RAFINESQUE

BIG BROWN BATS

Eptesicus fuscus miradorensis (H. Allen)

Plate 11, figures 1, 2; text figure 37

TYPE LOCALITY: Mirador, Veracruz, Mexico.

RANGE IN OAXACA: Central highlands and

probably most of the plateau region in the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 47.5–52.0; form robust; ears narrower than long; tragus long and tapered to a rounded point; flying membranes leathery; tail long and enclosed in interfemoral membrane. Color Sayal Brown. Skull broad, rostrum flattened; sagittal crest well developed; nares and palatal emargination not especially enlarged; upper incisors well developed, inner ones larger than outer, outer separated from canines by a space.

DENTAL FORMULA: Incisors, $\frac{2-2}{3-3}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{1-1}{2-2}$; molars, $\frac{3-3}{3-3} = 32$.

MEASUREMENTS: In table 13.

SPECIMENS EXAMINED: Etla: Cerro San Felipe, four. Sola de Vega: Eighteen miles northwest of Sola de Vega, two. Oaxaca: San Felipe del Agua, one. Yautepec: Chontecomatlán, one.

Eptesicus gaumeri gaumeri (J. A. Allen)

Plate 11, figures 3, 4; text figure 37

TYPE LOCALITY: Izamal, Yucatán, Mexico.

RANGE IN OAXACA: Moderate elevations in the northern and southern districts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 39.0–43.2; resembling *Eptesicus fuscus miradorensis* in external characters, but smaller. Color varying from Prout's Brown to Mummy Brown. Skull and dentition about like those of *E. fuscus miradorensis* but smaller.

MEASUREMENTS: In table 13.

SPECIMENS EXAMINED: Juquila: Fifteen miles southeast of San Gabriel Mixtepec, one. Tuxtepec: Five miles west of Chiltepec, two.

REMARKS: Davis (1965, p. 233) showed that the name *gaumeri* is applicable to the small Oaxacan *Eptesicus*.

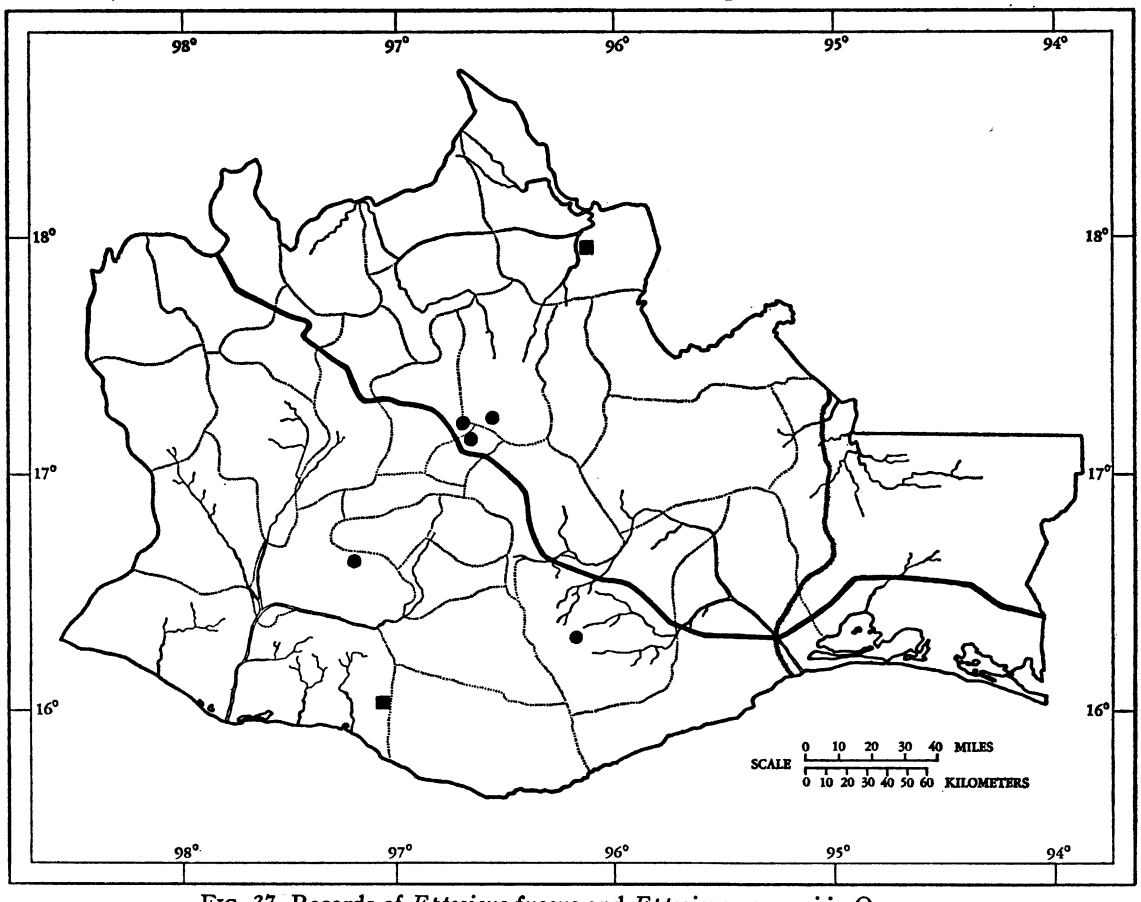


FIG. 37. Records of *Eptesicus fuscus* and *Eptesicus gaumeri* in Oaxaca.
● *E. f. miradorensis.* ■ *E. g. gaumeri.*

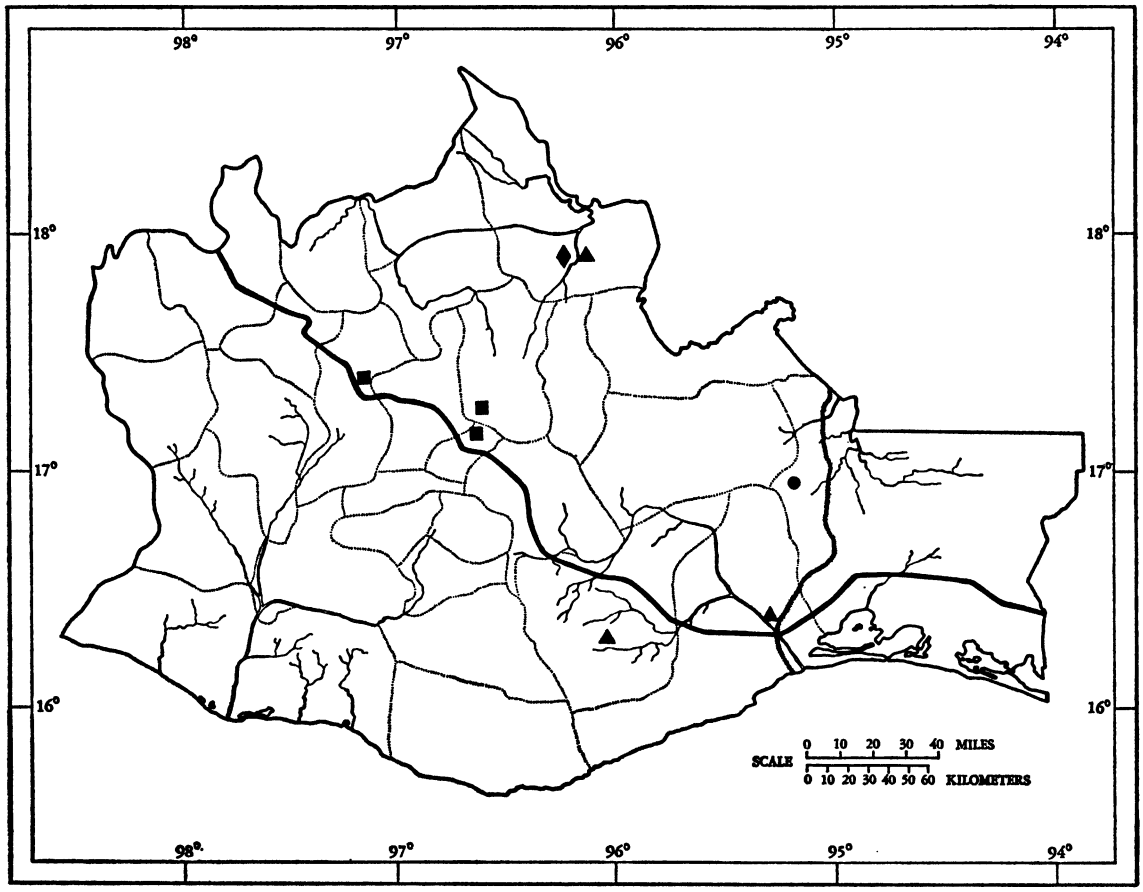


FIG. 38. Records of *Lasiurus borealis*, *Lasiurus cinereus*, *Lasiurus intermedius*, and *Lasiurus ega* in Oaxaca. ● *L. b. teliotis.* ■ *L. c. cinereus.* ▲ *L. intermedius.* ◆ *L. e. panamensis.*

GENUS **LASIURUS** GRAY

HAIRY-TAILED BATS

Lasiurus borealis teliotis (H. Allen)

Plate 11, figures 5, 6; text figure 38

TYPE LOCALITY: Unknown, probably California.

RANGE IN OAXACA: Isthmus of Tehuantepec, and probably occurring in other areas of the state during the migration season.

GENERAL CHARACTERS: (Based on specimens from Arizona and California): Length of forearm, 41.5–42.7; proximal half of upper side of interfemoral membrane and hind limbs well furred; ears short and rounded; tail long, extending full length of broad interfemoral membrane. Color bright Chestnut. Skull short and broad; braincase high and rounded; nares and palatal emargination wide; upper incisors short, in contact with canines; lower incisors small, trifid; first upper premolar minute, placed on inner side of tooth row at base of canine.

DENTAL FORMULA: Incisors, $\frac{1-1}{3-3}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3}$ = 32.

MEASUREMENTS: In table 13.

SPECIMENS RECORDED: (Miller, 1897, p. 112). Juchitán: Guichicovi, one (U.S.N.M.).

REMARKS: *Lasiurus borealis ornatus* Hall was regarded by Handley (1960, p. 472) as a synonym of *L. b. teliotis.*

Lasiurus cinereus cinereus Palisot de Beauvois

Plate 11, figures 7, 8; text figure 38

TYPE LOCALITY: Philadelphia, Pennsylvania.

RANGE IN OAXACA: Boreal regions in the central and northern districts.

GENERAL CHARACTERS: (Based on Oaxacan

specimens). Length of forearm, 52–54; interfemoral membrane on upper side and under side of forearm and ears hairy; resembling *Lasiurus borealis* in external and cranial characters but larger and color whitish.

MEASUREMENTS: In table 13.

SPECIMENS EXAMINED: Etla: Ten miles northeast of Cerro San Felipe, two. Nochixtlán: El Fortin, one (T.C.W.C.). Oaxaca: San Felipe del Agua, two.

SUBGENUS **DASYPTERUS** PETERS

Lasiurus intermedius intermedius H. Allen

Plate 11, figures 9, 10; text figure 38

TYPE LOCALITY: Matamoros, Tamaulipas, Mexico.

RANGE IN OAXACA: Low to moderate elevations in northern and southern districts.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 49.0–55.0; interfemoral membrane furred on basal half; ear low; tragus triangular; tail long, supporting interfemoral membrane to a point well beyond outstretched feet. Color Antique Brown. Skull similar to that of *L. cinereus* but more robust and without small anterior upper premolar.

DENTAL FORMULA: Incisors, $\frac{1-1}{3-3}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{1-1}{2-2}$; molars, $\frac{3-3}{3-3} = 30$.

MEASUREMENTS: In table 13.

SPECIMENS EXAMINED: Tehuantepec: Tehuantepec, two. Tuxtepec: Chiltepec, five. Yautepec: Chontecomatlán, one.

REMARKS: Handley (1960, p. 4) regarded the genera *Lasiurus* and *Dasypterus* as congeneric.

Lasiurus ega panamensis Thomas

Plate 11, figures 11, 12; text figure 38

TYPE LOCALITY: Bugaba, Chiriqui, Panama.

RANGE IN OAXACA: Moderate elevations in northern districts.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 42.7–45.8; differing from *L. intermedius* mainly in being smaller in size and from *L. ega xanthinus* in color. Color about Clay Color, hair of interfemoral membrane not strongly contrasting with color of back; face in front of eyes and including nose and lips black. Skull resembling that of *L. intermedius* but smaller, greatest length 42–46, that of *L. intermedius* 49–55.

MEASUREMENTS: In table 13.

SPECIMENS EXAMINED: Tuxtepec: Chiltepec, five.

Lasiurus ega xanthinus (Thomas)

TYPE LOCALITY: Sierra Laguna, Baja California, Mexico.

RANGE IN OAXACA: No specimens are known from Oaxaca, but some may occur in southwestern districts.

GENERAL CHARACTERS: (Based on specimens from Sinaloa and Baja California). Length of forearm, 44.5–47.2; closely resembling *L. e. panamensis* but differing mainly in color pattern. Clay Color; hair of interfemoral membrane with a reddish tinge, face colored like back and not blackened as is that in *L. e. panamensis*.

MEASUREMENTS: In table 13.

SPECIMENS EXAMINED: Sinaloa: Escuinapa, one. Baja California: Miraflores, two.

GENUS **RHOGEESSA**[1] H. ALLEN

LITTLE YELLOW BATS

Rhogeessa tumida major Goodwin

Plate 11, figures 13, 14; text figure 39

Rhogeessa tumida major GOODWIN, 1958, p. 4.

TYPE LOCALITY: San Bartolo Yautepec, Oaxaca, Mexico, altitude 800 meters.

RANGE IN OAXACA: Moderate elevations on the Pacific watershed.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 31–32.7; resembling *Myotis* in general external characters, but flying membranes thick and leathery; interfemoral membrane hairy on basal third. Color varying from Snuff Brown to Sayal Brown. Skull relatively large; zygomatic arches widely spread; rostrum broad and low; interorbital region flattened; braincase elevated above rostrum, high and long and drawn out to elevated peak posteriorly.

DENTAL FORMULA: Incisors, $\frac{1-1}{3-3}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{1-1}{2-2}$; molars, $\frac{3-3}{3-3} = 30$.

[1] The International Code of Zoological Nomenclature (Article 27) has ruled that diacritical marks are not to be used, or, if published (Article 32, c. i), are to be corrected by the deletion of the mark. The etymology of *Rhogĕessa* is unknown. In any event, the umlaut should be deleted.

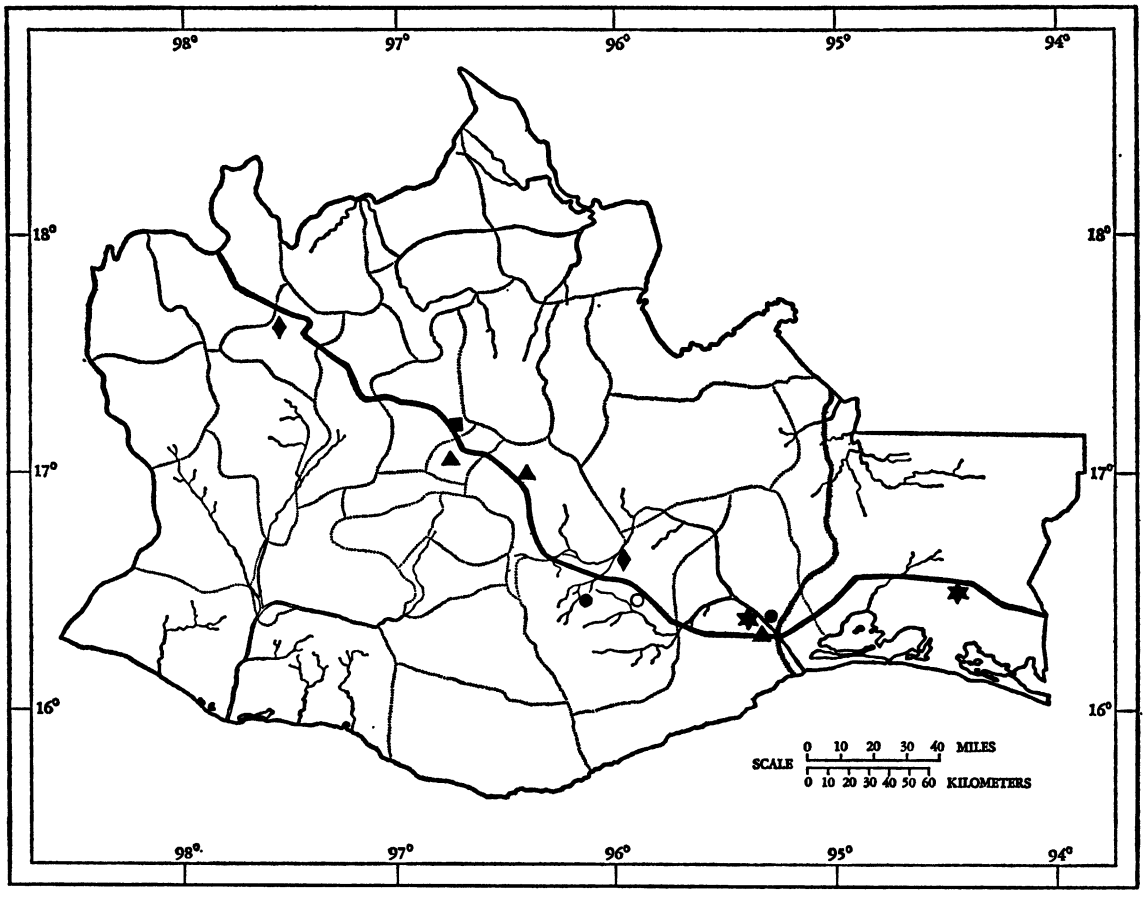


FIG. 39. Records of *Rhogeessa tumida*, *Rhogeessa parvula*, *Rhogeessa gracilis*, *Baeodon alleni*, and *Plecotus townsendii* in Oaxaca. ● *R. t. major*. ○ Type locality of *R. t. major*. ★ *R. p. parvula*. ■ *R. gracilis*. ◆ *B. alleni*. ▲ *P. t. australis*.

MEASUREMENTS: In table 13.

SPECIMENS EXAMINED: Tehuantepec: Tehuantepec, two. Yautepec: San Bartolo Yautepec, one; San Carlos Yautepec, one; Yautepec (no exact locality), one.

Rhogeessa parvula parvula H. Allen

Text figure 39

TYPE LOCALITY: Tres Marias Islands, Nayarit, Mexico.

RANGE IN OAXACA: Pacific coast regions in southeastern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 28.5–30.5; similar in external and cranial characters to *Rhogeessa tumida major* but smaller.

SPECIMENS EXAMINED: Juchitán: Zanatepec, one. Tehuantepec: Cerro San Pedro, one.

Rhogeessa gracilis Miller

Plate 11, figures 15, 16; text figure 39

TYPE LOCALITY: Piaxtla, Puebla, Mexico.

RANGE IN OAXACA: High elevations in the central part of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 30.3–33.3; ears large, length from meatus, about 14 mm., pelage long and lax. Color Raw Umber; ears blackish; tragus long and slender. Skull resembling that of *R. tumida* but narrower and with a more globular braincase and more slender rostrum.

MEASUREMENTS: In table 13.

SPECIMENS EXAMINED: Juchitán: Isthmus

of Tehuantepec (no exact locality), one (U.S.N.M.). Etla: Cerro San Felipe, one.

Genus **BAEODON** Miller

Baeodon alleni (Thomas)

Plate 11, figures 17, 18; text figure 39

Type Locality: Santa Rosalía, near Autlán, Jalisco, Mexico.

Range in Oaxaca: Highlands of the central districts of the state.

General Characters: (Based on Oaxacan specimens). Length of forearm, 33.5–35; ears large, when laid forward extending about 2 mm. beyond tip of nose; thumb short and thick, resembling *Rhogeessa* in general external characters, but larger. Color about Snuff Brown; posterior border of wing membranes whitish. Skull similar to that of *Rhogeessa* but outer lower incisor reduced to functionless spicule.

Dental Formula: Incisors, $\frac{1-1}{3-3}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{1-1}{2-2}$; molars, $\frac{3-3}{3-3} = 30$.

Measurements: In table 13.

Specimens Examined: Teposcolula: Tamazulápam, two (K.U.).

Specimens Recorded: (Hall and Kelson, 1959, p. 197). Yautepec: Nejapa, one (K.U.).

Remarks: Pine (1966, p. 308) named *Baeodon meyeri* from the Río Quezalopan, Veracruz. On the separate received, Pine has added the following remark in ink, "Congeneric with and perhaps a junior synonym of *Antrozous dubiaquercus* Van Gelder." The extension of the known range of this species of bat from the Pacific to the Gulf coast implies that it may eventually be recorded from Oaxaca.

Genus **PLECOTUS** E. Geoffroy Saint-Hilaire

Subgenus **CHORYNORHINUS** H. Allen

Big-eared Bats

Plecotus townsendii australis (Handley)

Plate 11, figures 19, 20; text figure 39

Type Locality: Two miles west of Jacala, Hidalgo, Mexico, altitude 5500 feet.

Range in Oaxaca: Arid mountain ranges at moderate elevations in the central and southern districts.

General Characters: (Based on Oaxacan specimens). Length of forearm, 39–45; ears very large, joined at base across forehead; tragus long and slender; pelage long and lax; cross ribs on interfemoral membrane numerous (usually eight or nine); a conspicuous muzzle gland present between eye and nostrils. Color between Russet and Cinnamon Brown. Skull small and slender; rostrum short and depressed in interorbital region; braincase elevated and smoothly rounded; bullae large.

Dental Formula: Incisors, $\frac{2-2}{3-3}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{3-3}$; molars, $\frac{3-3}{3-3} = 30$.

Measurements: In table 13.

Specimens Examined: Tlacolula: Mitla, one. Tehuantepec: Tehuantepec, one.

Specimens Recorded: (Hall and Villa, 1949, p. 445). Oaxaca: Three miles southwest of Oaxaca de Juárez, one (U.S.N.M.).

Remarks: Handley (1959, p. 185) regarded *Corynorhinus* as a subgenus of *Plecotus*.

Summary of the Vespertilionidae of Oaxaca

Five species of *Myotis* are now represented in Oaxaca and probably a sixth, *Myotis argentatus*, will eventually be added to the list. The genus *Pipistrellus* has not been actually recorded from the state, but *Pipistrellus subflavus veraecrucis* is known to occur on the Isthmus of Tehuantepec, just across the border in Veracruz. *Plecotus townsendii australis*, generally assumed to be a highland form in Oaxaca, is also represented from within the city limits of Tehuantepec. Both the large *Eptesicus fuscus miradorensis* and the small *Eptesicus g. gaumeri* are common species in Oaxaca. Only one specimen of the red bat, *Lasiurus borealis*, is known from Oaxaca, but the hoary bat, *Lasiurus c. cinereus*, is not uncommon at high elevations during the winter season. *Dasypterus* is congeneric with *Lasiurus;* two species of the yellow bat are found in the state: the large species, *L. intermedius*, and the smaller species, *L. ega*, represented by two subspecies, *panamensis* and *xanthinus*, the latter not as yet recorded from Oaxaca. *Rhogeessa* is represented by three species in Oaxaca, a big-eared form, *R. gracilis*, restricted to the highlands, a lowland form with relatively small ears, *R. tumida major*, and a small lowland form, *R. parvula parvula*, from eastern Oaxaca. *Baeodon alleni* apparently belongs with *Rhogeessa* and is represented by specimens from northwestern and southern Oaxaca.

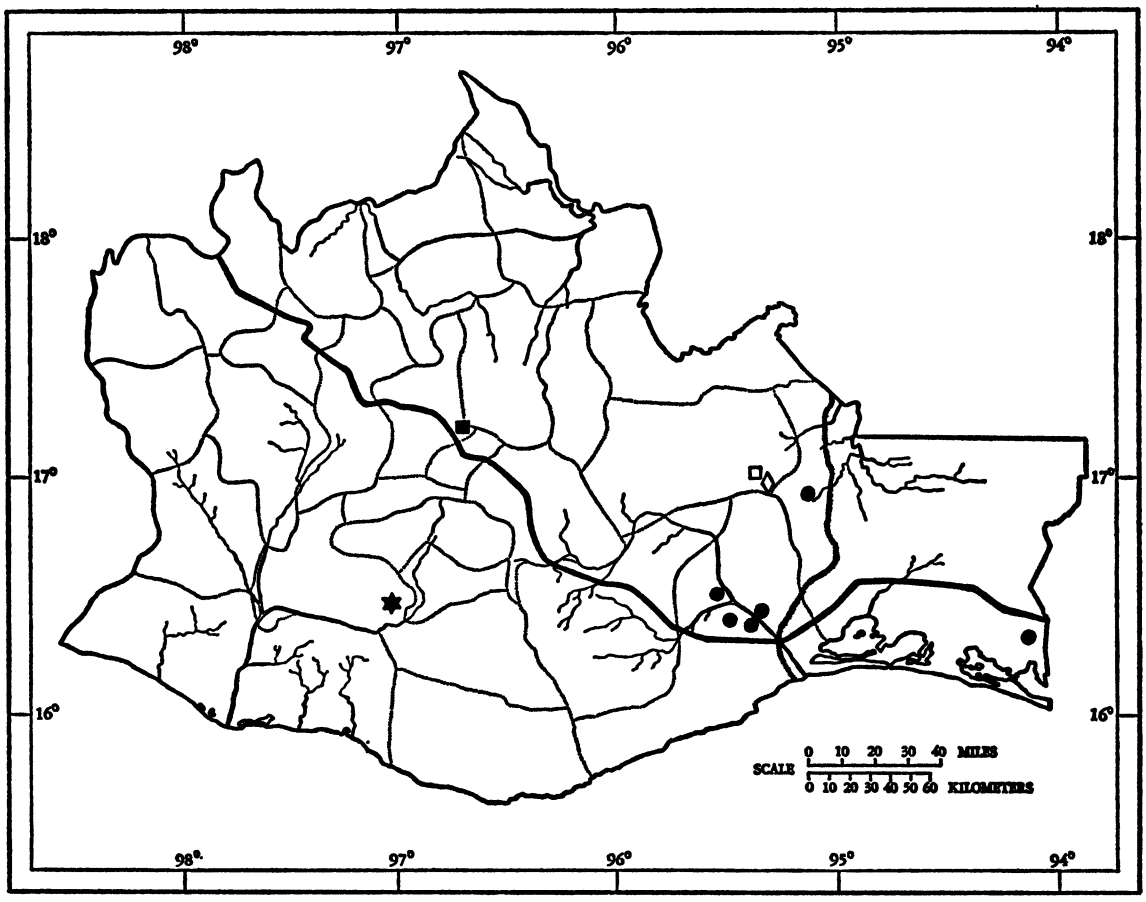


FIG. 40. Records of *Tadarida brasiliensis*, *Tadarida femorosacca*, *Eumops auripendulus*, and *Molossops greenhalli* in Oaxaca. ■ *T. b. mexicana*. ● *T. femorosacca*. ◇ Type locality of *E. a. oaxacensis*. ★*M. greenhalli*.

FAMILY **MOLOSSIDAE** GILL

GENUS **MOLOSSOPS** PETERS

DOG-FACED BATS

SUBGENUS **CYNOMOPS** THOMAS

Molossops greenhalli (Goodwin)

Plate 4, figures 17, 18; text figure 40

Cynomops greenhalli GOODWIN, 1958, p. 3.

Molossops greenhalli: GOODWIN AND GREENHALL, 1961, p. 282.

TYPE LOCALITY: Royal Botanic Gardens, Port-of-Spain, Trinidad, West Indies.

RANGE IN OAXACA: Known in the state only from Sola de Vega.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Length of forearm, 36.3; ears short, thick, and leathery, not rising from same point on forehead; muzzle short and thick; tail long and projecting beyond posterior border of interfemoral membrane; pelage short and thick. Color Russet, with base of hairs whitish. Skull short, broad, and low; rostrum relatively high; lacrimal ridges projecting laterally; braincase smooth and flattened on top; upper incisors simple and projecting forward; lower incisors crowded forward, cutting edges bifid.

DENTAL FORMULA: Incisors, $\frac{1-1}{1-1}$; or $\frac{1-1}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{1-1}{2-2}$; molars, $\frac{3-3}{3-3}$ = 26 or 28.

MEASUREMENTS: In table 14.

SPECIMENS EXAMINED: Sola de Vega: Five miles east of Sola de Vega, one (K.U.).

TABLE 14

MEASUREMENTS (IN MILLIMETERS) OF MOLOSSIDS FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Molossops greenhalli									
OAXACA									
K.U. No. 99747, Sola de Vega	♀ ad	36.3	18.2	16.5	12.0	4.4	9.2	8.0	6.8
Tadarida brasiliensis mexicanus									
OAXACA									
A.M.N.H. No. 212379, Cerro San Felipe	♀ ad	43.4	16.2	15.1	9.8	5.0	7.5	6.5	6.0
A.M.N.H. No. 165961, Mazatlán	ad	43.7	16.9	16.3	9.6	4.1	8.0	6.7	6.15
Tadarida femorosaca									
OAXACA									
A.M.N.H. No. 165962, Río de Iguana	♀ ad	43.0	18.5	17.0	10.1	3.8	8.5	7.2	7.0
A.M.N.H. No. 165963, Río de Iguana	♀ ad	42.5	18.3	16.8	10.2	3.7	8.8	7.2	7.0
A.M.N.H. No. 165964, Río de Iguana	♂ ad	42.5	17.8	16.5	9.8	3.7	8.5	7.1	6.9
A.M.N.H. No. 171606, Limón	♀ ad	43.5	18.0	16.5	10.0	3.7	8.4	7.2	6.5
A.M.N.H. No. 171596, Limón	♂ ad	43.8	18.4	—	10.2	3.9	8.8	7.1	6.6
A.M.N.H. No. 171725, Limón	♀ ad	45.5	17.7	16.6	10.3	3.8	8.8	7.3	6.6
A.M.N.H. No. 171733, Limón	♀ ad	42.5	17.9	16.7	10.1	3.6	8.4	7.3	6.6
A.M.N.H. No. 175355, Mogoñé	♀ ad	43.0	18.0	16.5	10.0	3.6	8.5	7.0	6.6
A.M.N.H. No. 175266, Jalapa	♀ ad	43.3	17.8	16.5	10.1	3.6	8.6	7.2	6.8
Tadarida macrotis									
ARIZONA									
A.M.N.H. No. 8414/6740, Chiricahua Mts.	♀ ad	59.7	23.5	22.1	12.6	4.2	10.2	8.9	8.8
A.M.N.H. No. 169546, Cochise County	♀ ad	59.7	23.0	21.8	12.4	4.1	10.0	8.9	9.0
A.M.N.H. No. 169547, Cochise County	♂ ad	59.5	23.3	21.9	12.2	4.0	10.3	8.5	8.9

TABLE 14—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Eumops auripendulus oaxacensis									
OAXACA									
A.M.N.H. No. 165943,[a] Mazatlán	♂ ad	58.3	24.2	22.9	14.8	4.5	11.0	9.9	9.1
Eumops underwoodi underwoodi									
HONDURAS									
A.M.N.H. No. 126862,[a] El Pedrero	♂ ad	71.5	31.8	29.5	18.7	6.2	13.5	12.6	12.1
A.M.N.H. No. 126866, El Pedrero	♀ ad	73.5	30.3	29.0	18.7	5.8	14.2	12.0	11.6
Eumops glaucinus									
HONDURAS									
A.M.N.H. No. 126829, La Cruz Grande	♂ ad	61.0	24.1	23.0	14.3	5.1	11.4	9.5	9.4
A.M.N.H. No. 126830, La Cruz Grande	♂ ad	61.5	24.7	23.4	14.0	5.0	11.5	9.7	9.3
Promops centralis									
OAXACA									
A.M.N.H. No. 178741, Tehuantepec	♂ ad	55.0	21.8	20.6	13.0	4.3	10.5	9.7	8.1
A.M.N.H. No. 178742, Tehuantepec	♀ ad	54.3	21.6	20.5	12.5	4.1	10.3	9.4	8.0
Molossus ater nigricans									
OAXACA									
A.M.N.H. No. 178743, Tehuantepec	♂ ad	51.5	23.5	21.2	14.4	5.0	11.2	9.7	8.1
A.M.N.H. No. 189216, Sta. María Guienagati	♂ ad	51.5	22.5	20.3	14.5	4.6	11.0	10.1	8.2
A.M.N.H. No. 190181, Chiltepec	♂ ad	54.5	23.5	21.3	14.8	4.8	11.2	11.4	8.5
A.M.N.H. No. 190182, Chiltepec	♂ ad	53.0	23.0	21.3	14.5	4.8	11.2	10.1	8.5
A.M.N.H. No. 190183, Chiltepec	♀ ad	50.0	22.2	20.1	13.7	4.5	10.7	9.8	8.1
A.M.N.H. No. 190184, La Ventosa	♀ ad	52.0	21.5	20.5	13.0	4.7	10.5	9.4	8.0
Molossus macdougalli									
OAXACA									
A.M.N.H. No. 145150,[a] San Blas	♀ ad	48.7	20.4	18.9	12.7	4.3	10.3	9.5	7.7

TABLE 14—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Forearm Length	Skull, Greatest Length	Condylo-incisive Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
GUERRERO									
F.M.N.H. No. 73111, Acapulco	♀ ad	49.0	21.0	19.5	13.1	4.3	10.2	9.6	7.9
F.M.N.H. No. 73113, Acapulco	♀ ad	48.5	21.0	19.4	13.0	4.3	10.0	9.3	7.9
Molossus sinaloae									
SINALOA									
A.M.N.H. No. 24524,[a] Escuinapa	♀ ad	46.5	19.5	18.0	12.0	4.0	9.7	8.8	7.2
NICARAGUA									
A.M.N.H. No. 41190, Río Grande	♀	47.2	19.1	17.5	11.0	3.7	9.0	8.1	7.0
A.M.N.H. No. 41191, Río Grande	♀	47.0	18.8	17.7	10.8	4.0	9.2	8.3	7.2
A.M.N.H. Mo. 41193, Río Grande	♀	47.9	19.6	18.0	11.3	3.8	9.0	8.1	7.4
A.M.N.H. No. 41194, Río Grande	♀	47.8	19.5	18.0	11.5	4.0	9.6	8.3	7.4
Molossus aztecus									
OAXACA									
A.M.N.H. No. 171597, Limón	♀ ad	38.5	16.5	15.3	10.5	3.5	8.7	7.5	6.0
A.M.N.H. No. 171605, Limón	♂ ad	39.0	17.2	16.0	11.0	3.6	9.0	7.7	6.2
A.M.N.H. No. 171636, Limón	♀ old	39.2	16.0	15.4	10.5	3.5	8.9	7.5	6.2
A.M.N.H. No. 171637, Limón	♀ ad	38.0	16.0	15.1	10.5	3.5	8.7	7.4	6.0
A.M.N.H. No. 171638, Limón	♀ ad	38.1	16.5	15.2	10.4	3.5	8.5	7.3	6.0
A.M.N.H. No. 171639, Limón	♂ ad	38.4	17.5	16.2	10.7	4.0	8.8	7.5	6.2
A.M.N.H. No. 171640, Limón	♀ ad	38.2	16.6	15.6	10.7	3.5	8.8	7.5	6.1
A.M.N.H. No. 171641, Limón	♀ ad	36.5	16.3	15.3	10.3	3.5	8.5	7.4	6.0
A.M.N.H. No. 175274, Tehuantepec	♂ ad	38.0	17.1	15.7	11.0	3.7	9.1	7.7	6.2
A.M.N.H. No. 190179, Chiltepec	♂ ad	37.0	—	—	—	—	—	8.1	6.2
A.M.N.H. No. 190188, Salina Cruz	♀ ad	37.2	16.4	15.2	10.4	3.5	9.0	7.5	6.0

[a] Type.

GENUS **TADARIDA** RAFINESQUE

FREE-TAILED BATS

Tadarida brasiliensis mexicana (Saussure)

Plate 11, figures 21, 22; text figure 40

TYPE LOCALITY: Cofre de Perote, Veracruz, Mexico, altitude 13,000 feet.

RANGE IN OAXACA: Highlands in Etla and Mixes districts but probably occurring in other mountains of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 43.4–43.7; ears relatively large, arising from near same point on forehead, when laid forward reaching to end of muzzle; upper lip with deep vertical grooves; tail long and projecting beyond posterior border of interfemoral membrane. Color varying from Mummy Brown to Sayal Brown. Skull broad, rostrum flat and low and wider than interorbital constriction; upper incisors widely separated by a palatal emargination, outer lower incisors small and crowded against canines.

MEASUREMENTS: In table 14.

DENTAL FORMULA: Incisors, $\frac{1-1}{3-3}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3} = 32$.

SPECIMENS EXAMINED: Mixes: Mazatlán, one. Etla: Cerro San Felipe, one.

Tadarida femorosacca (Merriam)

Plate 11, figures 23, 24; text figure 40

TYPE LOCALITY: Agua Caliente (Palm Springs), Riverside County, California.

RANGE IN OAXACA: Arid tropical regions in the southern part of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 41.5–45.5; resembling *T. brasiliensis mexicana* in general external characters but averaging larger; ears when laid forward reaching beyond end of muzzle and inner margin united at base. Color Mummy Brown. Skull long and narrow, rostrum high and narrow, about as wide as interorbital constriction; palate with anterior emargination, very narrow; upper incisors set close together at their bases.

MEASUREMENTS: In table 14.

SPECIMENS EXAMINED: Juchitán: Mogoñé, one; Tapanatepec, one. Tehuantepec: Jalapa, 15; Limón, 13; Río de Iguana, three; Tehuantepec, one.

Tadarida macrotis (Gray)

Plate 11, figures 25, 26

TYPE LOCALITY: Cuba, West Indies.

RANGE IN OAXACA: No specimens known from the state at the present time.

GENERAL CHARACTERS: (Based on specimens from Arizona). Length of forearm, 58–64; largest species in the genus *Tadarida;* resembling *T. femorosacca* but larger. Color varying from Argus Brown to Mummy Brown. Skull long and narrow and without anterior palatal emargination; rostrum long, narrow, and high; upper incisors widely separated at base and converging strongly toward tips.

MEASUREMENTS: In table 14.

SPECIMENS EXAMINED: Arizona: Chiricahua Mountains, one; Cochise County, two.

REMARKS: According to Husson (1962, p. 236), *Vespertilio molossus* Pallas, 1766, and *Vespertilio molossus* Pallas, 1767, belong to the genus *Molossus* and are not the equivalent of *Tadarida molossa* of some recent authors. The latter is now *Tadarida macrotis.*

GENUS **EUMOPS** MILLER

MASTIFF BATS

Eumops auripendulus oaxacensis Goodwin

Plate 12, figures 1, 2; text figure 40

TYPE LOCALITY: Mazatlán, District of Mixes, Oaxaca, Mexico, altitude 3000 feet.

RANGE IN OAXACA: Known only from the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Length of forearm, 59.5; pelage moderately long and soft; membranes leathery; ears short and rounded, rising from same point on forehead; forearm naked; tragus very small and pointed; antitragus large and broad. Color dark Seal Brown, almost black. Skull hourglass-shaped; braincase tapered posteriorly; sagittal crest low; lambdoidal crest well developed, squared across posteriorly and extending slightly beyond supraoccipital, but not approaching extreme extent seen in *E. a. milleri.* Small anterior upper premolar present in *E. a. milleri* absent from both sides.

DENTAL FORMULA: Incisors, $\frac{1-1}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{1-1}{2-2}$; molars, $\frac{3-3}{3-3} = 28$.

MEASUREMENTS: In table 14.

SPECIMENS EXAMINED: Mixes: Mazatlán, one.

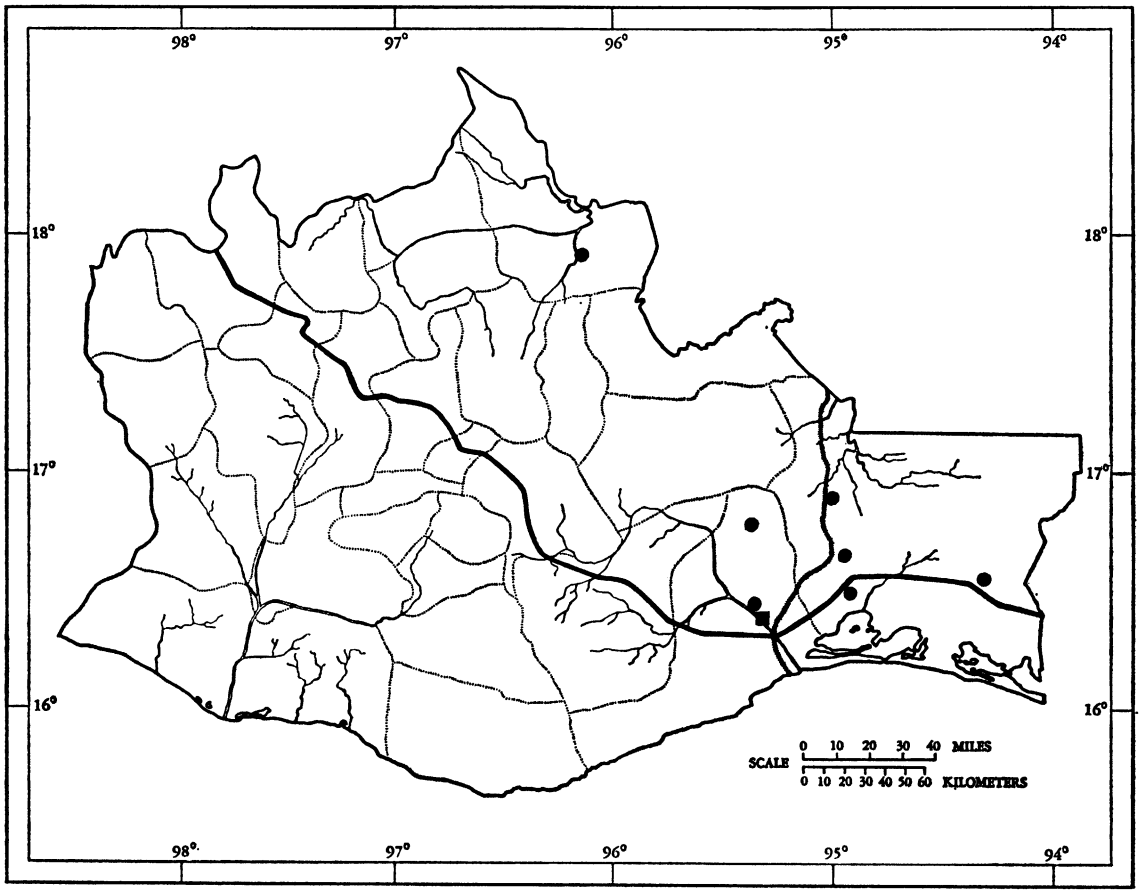


FIG. 41. Records of *Promops centralis* and *Molossus ater* in Oaxaca. ■ *P. centralis.* ● *M. a. nigricans.*

REMARKS: Goodwin (1960, p. 5) showed that the name *auripendulus* is applicable to this species of Oaxacan *Eumops.*

Eumops underwoodi underwoodi Goodwin

Plate 12, figures 3, 4

TYPE LOCALITY: El Pedrero, 6 kilometers north of Chinacla, Honduras.

RANGE IN OAXACA: No specimens are known from the state, but the species has been recorded from northwest and southeast of Oaxaca.

GENERAL CHARACTERS: (Based on specimens from Honduras). Length of forearm, 65.3–73.5; resembling *E. auripendulus oaxacensis* in external form but larger. Color between Cinnamon Brown and Mummy Brown. Upper incisors long and slender; lower incisors subequal, bifid; interorbital region hourglass-shaped; rostrum broad.

DENTAL FORMULA: Incisors, $\frac{1-1}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3}$ = 30.

MEASUREMENTS: In table 14.

SPECIMENS EXAMINED: Honduras: El Pedrero, five.

Eumops glaucinus (Wagner)

Plate 12, figures 5, 6

TYPE LOCALITY: Cuyaba, Mato Grosso, Brazil.

RANGE IN OAXACA: No specimens are known from the state, but the species has been recorded as far north as Morelos, Mexico.

GENERAL CHARACTERS: (Based on specimens from Honduras). Length of forearm, 58–61; about size of and resembling *E. auripendulus* externally, but tragus relatively large, broad, and squared across top. Color Cinnamon Brown. Skull similar to that of *E. auripendulus*, but braincase not tapered pos-

teriorly; lambdoidal crest broad and squared across transversely and not overhanging supraoccipital; lacrimal ridges lacking; first upper premolar small and crowded out of tooth row.

MEASUREMENTS: In table 14.

SPECIMENS EXAMINED: Honduras: La Cruz Grande, two.

GENUS **PROMOPS** GERVAIS

DOMED-PALATE BATS

Promops centralis Thomas

Plate 12, figures 7, 8; text figure 41

TYPE LOCALITY: Northern Yucatán, Mexico.

RANGE IN OAXACA: Arid regions in southern Oaxaca and probably occurring in other areas of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 52.8–55.0; ears rounded, rising from same point on forehead; tragus minute; antitragus broad and flattened; pelage moderately long and soft. Color varying from Prout's Brown to glossy black. Skull short and broad; palate highly domed; sagittal crest well developed; upper incisors large, their shafts slender and projecting forward; lower incisors small, bifid, and crowded forward; anterior upper premolar when present reduced to a small spicule.

DENTAL FORMULA: Incisors, $\frac{1-1}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3} = 30$.

MEASUREMENTS: In table 14.

SPECIMENS EXAMINED: Tehuantepec: Tehuantepec, two.

GENUS **MOLOSSUS** E. GEOFFROY SAINT-HILAIRE

MASTIFF BATS

Molossus ater nigricans Miller

Plate 12, figures 9, 10; text figure 41

TYPE LOCALITY: Acaponeta, Nayarit, Mexico.

RANGE IN OAXACA: Tropical regions from low to moderate elevations in southern Oaxaca and across the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 50.5–54.5; pelage short and close; ears short and rounded, anterior borders arising from a point on forehead; tragus very small and subterete; antitragus large, broad, constricted at base. Color glossy Blackish Brown or Russet. Skull high and angular; sagittal and lambdoidal crests strongly developed; palate arched.

DENTAL FORMULA: Incisors, $\frac{1-1}{1-1}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{1-1}{2-2}$; molars, $\frac{3-3}{3-3} = 26$.

MEASUREMENTS: In table 14.

SPECIMENS EXAMINED: Juchitán: La Ventosa, four; 24 miles north of Matías Romero, one; Unión Hidalgo, one; Zanatepec, one. Tehuantepec: Santa María Guienagati, one; Tehuantepec, one. Tuxtepec: Chiltepec, four.

REMARKS: Goodwin (1960, p. 6) showed that the name *ater* is applicable to this species of *Molossus*.

Molossus macdougalli Goodwin

Plate 12, figures 11, 12; text figure 42

TYPE LOCALITY: San Blas, 3 kilometers southeast of Tehuantepec, Oaxaca, Mexico, altitude 100 feet.

RANGE IN Oaxaca: Known only from the vicinity of the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 48.0–49.8; pelage short and close, nearly unicolored; resembling *Molossus ater nigricans* in general characters but smaller. Color uniform dark Seal Brown, almost black, hairs indistinctly grayish at base. Skull short and broad, with relatively low sagittal crest and lambdoidal crest, similar to that of *M. a. nigricans* but smaller, palate flatter, and teeth noticeably smaller.

MEASUREMENTS: In table 14.

SPECIMENS EXAMINED: Oaxaca: Tehuantepec: San Blas, one; Tehuantepec, five. Guerrero: Acapulco, four (F.M.N.H.).

REMARKS: Four of the nine specimens recorded as *Molossus sinaloae* by de la Torre (1955, p. 701) from Acapulco, Guerrero, have been examined by me. These specimens are essentially the same in all external and cranial characters as *M. macdougalli*. Compared with the type of *M. sinaloae*, the specimens from Acapulco are larger in external and cranial measurements, have shorter and closer pelage, and the hairs on the back are nearly unicolored rather than broadly whitish at the base as in *M. sinaloae*.

Molossus sinaloae J. A. Allen

Plate 12, figures 13, 14

Molossus sinaloae J. A. ALLEN, 1906, p. 236.

TYPE LOCALITY: Escuinapa, Sinaloa, Mexico.

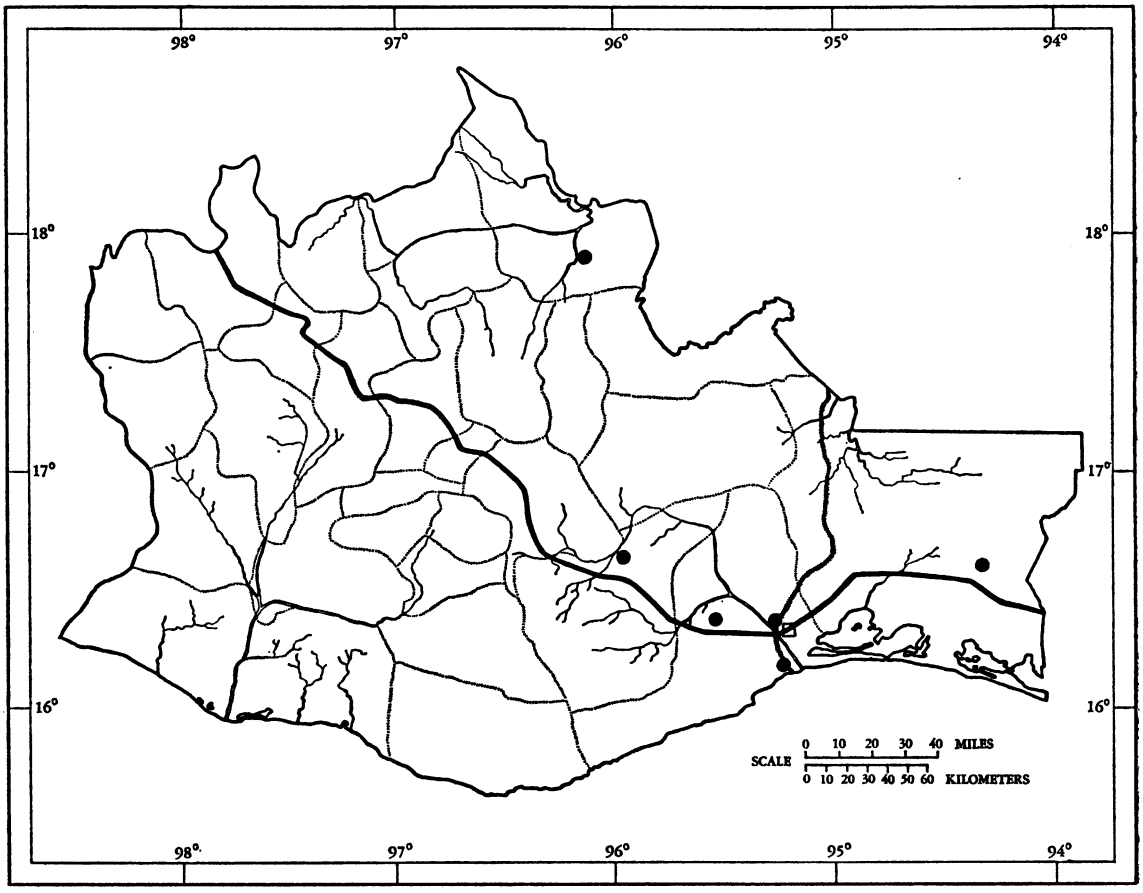


FIG. 42. Records of *Molossus macdougalli* and *Molossus aztecus* in Oaxaca.
□ Type of locality of *M. macdougalli*. ● *M. aztecus*.

RANGE IN OAXACA: No specimens are known from the state, but the species is recorded from east and west of Oaxaca.

GENERAL CHARACTERS: (Based on specimens from Sinaloa and Nicaragua). Length of forearm, 45–47; pelage comparatively long, lax, and strongly bicolored. Color Brownish Drab, base of hairs broadly whitish. Skull resembling that of *M. macdougalli* but smaller.

MEASUREMENTS: In table 14.

SPECIMENS EXAMINED: Sinaloa: Escuinapa, one (type). Nicaragua: Río Grande, four.

Molossus aztecus aztecus Saussure

Plate 12, figures 15, 16; text figure 42

TYPE LOCALITY: Amecameca, Mexico, Mexico.

RANGE IN OAXACA: Tropical regions from low to moderate elevations in southeastern Oaxaca and across the Isthmus of Tehuantepec to Chiltepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Length of forearm, 36.5–29.2; pelage moderately long, hair bicolored; resembling *Molossus sinaloae* in external and cranial details but smaller. Color varying from Snuff Brown to Mummy Brown. Skull similar to that of *M. sinaloae* but much smaller.

MEASUREMENTS: In table 14.

SPECIMENS EXAMINED: Juchitán: Sierra Madre, 5 miles north of Zanatepec, four. Tehuantepec: Limón, eight; Salina Cruz, one; Tehuantepec, one. Tuxtepec: Chiltepec, one.

SPECIMENS RECORDED: (Gardner, 1966, p. 5). Yautepec: Santo Domingo Nejapa, one (K.U.).

REMARKS: Gardner (1966, p. 1) named *Molossus aztecus lambi* as a small subspecies

(forearm, 34.1–37.1) from the Pacific slope of the Sierra Madre del Sur in southwestern Chiapas, Mexico. Specimens of *aztecus* in the American Museum of Natural History from the Sierra Madre north of Zanatepec in the Juchitán District average smaller than specimens from the Tehuantepec District, but are closer to typical *aztecus* than to the subspecies *lambi*.

Summary of the Molossidae of Oaxaca

The species *Tadarida macrotis*, *Eumops u. underwoodi*, *Eumops glaucinus*, and *Molossus sinaloae* have not been recognized from the state of Oaxaca. Each has, however a recognized range that more or less encompasses some part of the state, and all four probably occur in Oaxaca. All Oaxacan specimens of the Molossidae, except *Tadarida b. mexicana* reported here, were taken at low or moderate elevations. *Molossus aztecus* is treated here as a full species rather than as a subspecies of *Molossus major*. Oaxacan specimens of *Tadarida femorosacca* are from low or moderate elevations, whereas *Tadarida b. mexicana* was taken only in the mountains. A specimen of *Molossops greenhalli* from Sola de Vega appears to be identical with the type from Trinidad. *Eumops a. oaxacensis* as a valid subspecies is open to question, because it is based mainly on the absence of the small anterior upper premolar present in *E. a. milleri*. Oaxacan specimens of *Promops centralis* are from arid tropical regions on the Pacific drainage. *Molossus macdougalli* is here regarded as a full species rather than a subspecies of *pretiosus* and is more closely allied to *Molossus trinitatus* than any other known species of the genus.

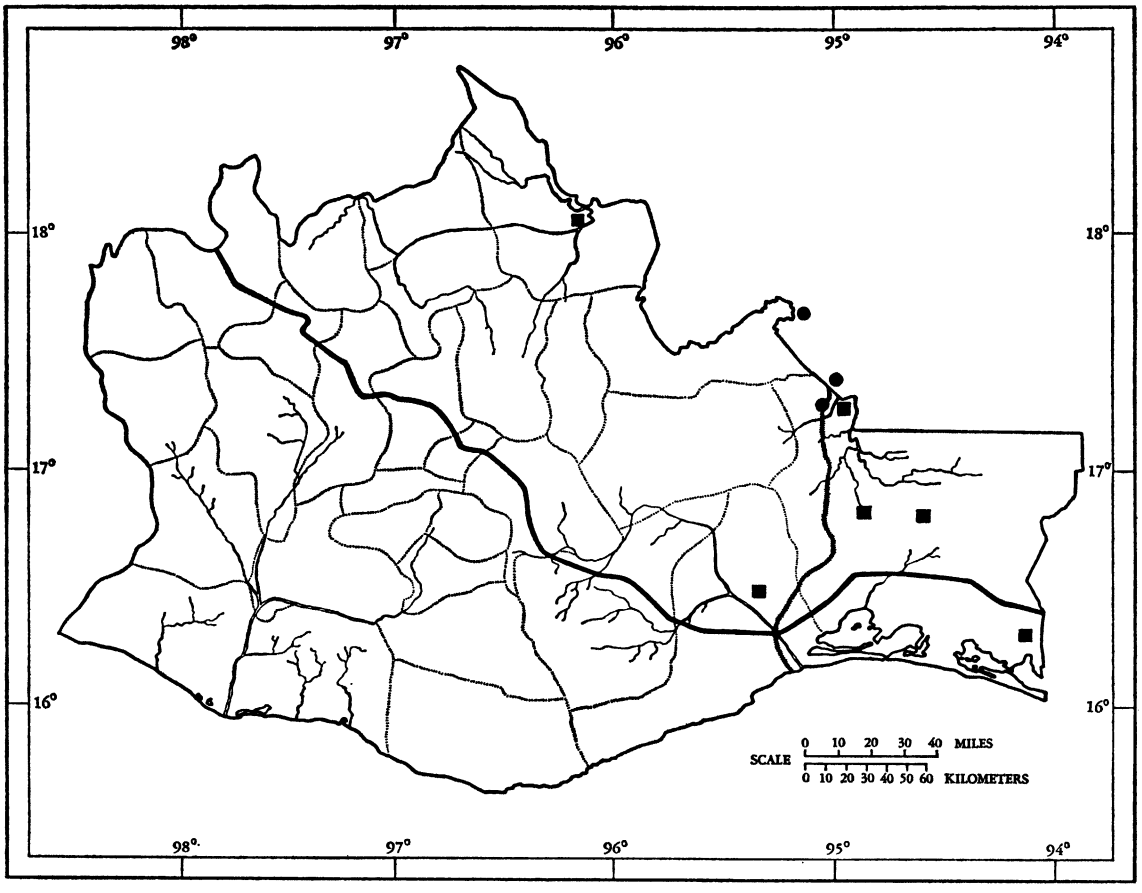


FIG. 43. Records of *Alouatta villosa* and *Ateles geoffroyi* in Oaxaca and of some specimens from other areas. ● *A. v. mexicanus*. ■ *A. g. vellerosus*.

ORDER **PRIMATES** LINNAEUS

FAMILY **CEBIDAE** SWAINSON

GENUS **ALOUATTA** LACÉPÈDE

HOWLER MONKEYS

Alouatta villosa mexicana Merriam

Plate 13, figures 1, 2; text figure 43

TYPE LOCALITY: Minatitlán, Veracruz, Mexico.

RANGE IN OAXACA: Isthmus of Tehuantepec near the Veracruz state line in the Juchitán District.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 1120; tail, 600, prehensile; face naked, a beard well developed in males; thumbs on forefeet present; basic color blackish, with a mantle of light-colored hairs along sides of body from armpits to groin. Skull short and broad; braincase flattened; hyoid bone enlarged (especially in males) to form a bony sound box; mandible greatly deepened posteriorly to accommodate large hyoid bones; brow and temporal ridges strongly developed.

MEASUREMENTS: In table 15.

SPECIMENS EXAMINED: Oaxaca: Juchitán: Ubero, one. Veracruz: Pasa Nueva, six.

SPECIMENS RECORDED: (Hall and Kelson, 1959, p. 223). Veracruz: Thirty-five kilometers southeast of Jesús Carranza, one (K.U.); Achotal, four (F.M.N.H.).

GENUS **ATELES** E. GEOFFROY SAINT-HILAIRE

SPIDER MONKEYS

Ateles geoffroyi vellerosus Gray

Plate 13, figures 3, 4; text figure 43

TYPE LOCALITY: "Brazil," fixed as Mirador, Veracruz, Mexico, altitude 2000 feet, by Kellogg and Goldman (1944, p. 33).

RANGE IN OAXACA: Forested regions at low and moderate elevations from the Isthmus of Tehuantepec east to the Chiapas state line and west to Tuxtepec in northern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 1050–1310; tail, 670–820, prehensile; limbs and feet long and slender; thumbs on forefeet absent; head small; hair of head directed forward and upward and terminating in a crest; body hair long, silky, and yellowish brown on lower back. Skull relatively long and narrow, braincase elongate and elevated above rostrum; molar and canine teeth small.

MEASUREMENTS: In table 15.

SPECIMENS EXAMINED: Juchitán: Cerro Atravesado, nine; Río Grande, three; Río Jaltepec, three; Tapanatepec, two. Tehuantepec: Cerro Mixtequilla, two; Oaxaca, no exact locality, four.

SPECIMENS RECORDED: (Hall and Kelson, 1959, p. 230). Tuxtepec: Tuxtepec, two (U.S.N.M.).

SUMMARY OF THE PRIMATES OF OAXACA

Eastern Oaxaca and eastern Veracruz now represent the northern limit of the range of the primates other than man in Mexico. The range of *Ateles*, the spider monkey, formerly extended northward to eastern San Luis Potosí. The howler monkey was heard by Ernest S. Booth of Walla Walla College in 1956 in the forests along the Río Jaltepec south of the Veracruz border, and MacDougall collected an actual specimen from this region in 1965.

ORDER **EDENTATA** CUVIER

FAMILY **MYRMECOPHAGIDAE** BONAPARTE

GENUS **TAMANDUA** GRAY

THREE-TOED ANTEATERS

Tamandua tetradactyla mexicana (Saussure)

Plate 13, figures 5, 6; text figure 44

TYPE LOCALITY: Tabasco, Mexico.

RANGE IN OAXACA: Arid tropical regions on the Pacific drainage.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 1050–1200; head long and conical; ears small, 30–35; mouth, 20, buccal cavity tubular, tongue long and slender; tail, 515–675, prehensile; claw on third digit of forefoot strongly developed; pelage coarse, black and white markings sharply defined. Skull long and cylindrical, zygomatic arches incomplete.

MEASUREMENTS: In table 16.

SPECIMENS EXAMINED: Juchitán: Río Sarabia, one; Tapanatepec, two; 20 miles northeast of La Ventosa, four; Zanatepec, one. Tehuantepec: Cerro San Pedro, one; Las Cuevas, one; Las Tejas, one. Yautepec: Zapotitlán, one.

TABLE 15

MEASUREMENTS (IN MILLIMETERS) OF PRIMATES FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot, Length	Skull, Greatest Length Exclusive of Incisors	Zygomatic Breadth	Interorbital Breadth	Postorbital Constriction	Braincase Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Alouatta villosa mexicana											
VERACRUZ											
A.M.N.H. No. 17229, Pasa Nueva	♂ old	1140	620	153	118.0	83.1	13.2	39.8	49.0	38.3	40.7
A.M.N.H. No. 17230, Pasa Nueva	♀ ad	1123	630	148	103.8	72.4	9.8	40.0	47.3	35.2	39.4
A.M.N.H. No. 17231, Pasa Nueva	♀ old	1100	625	148	104.0	68.2	9.5	39.7	47.3	34.0	38.0
A.M.N.H. No. 17232, Pasa Nueva	♂ ad	1115	604	153	110.0	78.5	10.8	40.5	47.8	37.5	41.5
A.M.N.H. No. 17235, Pasa Nueva	♀ ad	1049	572	140	100.0	68.4	9.9	39.5	46.1	33.3	37.0
A.M.N.H. No. 17239, Pasa Nueva	♂ ad	1212	635	152	113.0	83.3	12.0	39.6	47.9	36.5	42.2
OAXACA											
A.M.N.H. No. 212193, Ubero	♀ ad	1120	600	170	118.3	83.4	12.4	40.0	47.0	38.5	42.8
Ateles geoffroyi vellerosus											
OAXACA											
A.M.N.H. No. 143461, Río Grande	♂ ad	1225	820	180	108.5	63.0	8.0	46.5	55.2	31.2	29.0
A.M.N.H. No. 143463, Río Grande	♀ ad	1243	778	178	113.5	65.8	9.3	46.2	57.0	34.5	31.0
A.M.N.H. No. 145159, Cerro Mixtequilla	♀ ad	1220	760	184	105.5	64.5	9.1	47.4	59.5	32.0	29.5
A.M.N.H. No. 145203, Cerro Atravesado	♂ ad	1140	705	160	104.8	65.2	8.0	47.2	58.0	31.0	30.5
A.M.N.H. No. 145205, Cerro Atravesado	♀ ad	1058	670	170	111.0	71.8	9.4	49.6	61.6	32.1	30.5
A.M.N.H. No. 176648, Río Jaltepec	♂ ad	1310	805	150	113.0	69.2	10.4	46.8	58.6	32.7	29.0
A.M.N.H. No. 176650, Río Jaltepec	♂ ad	1210	750	180	110.5	67.5	9.5	46.9	57.0	34.6	30.8

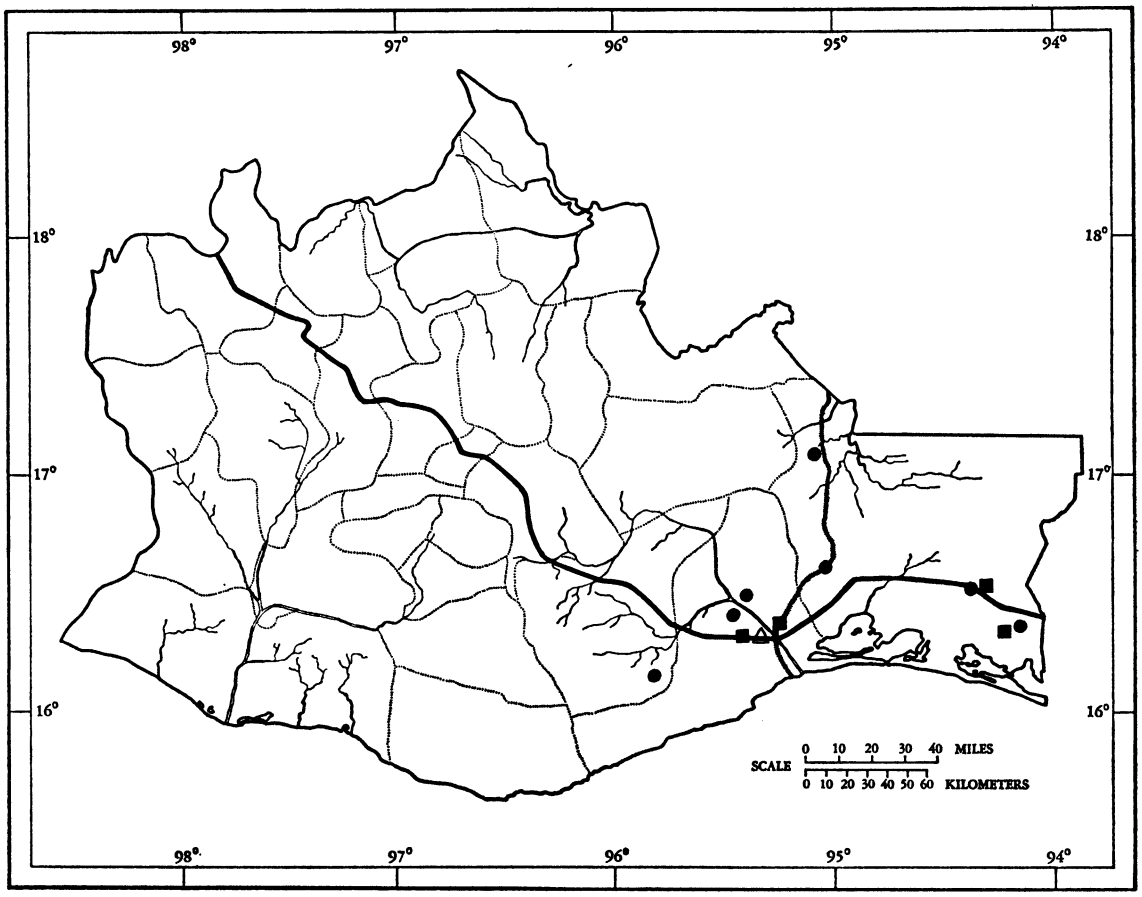


FIG. 44. Records of *Tamandua tetradactyla*, *Cyclopes didactylus*, and *Dasypus novemcinctus* in Oaxaca. ● *T. t. mexicanus*. △ Type locality of *C. d. mexicanus*. ■ *D. n. mexicanus*.

GENUS **CYCLOPES** GRAY

TWO-TOED ANTEATERS

Cyclopes didactylus mexicanus Hollister

Plate 13, figures 9, 10; text figure 44

TYPE LOCALITY: Tehuantepec, Oaxaca, Mexico.

RANGE IN OAXACA: Known only from the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 443; forefeet with second and third digits present, third armed with a stout claw; pelage soft, thick, and woolly; tail prehensile, about equal in length to length of head and body; head long and cylindrical, mouth tiny, tongue long and slender; ears small; jaws toothless. Color about Pale Orange-Yellow, dorsal line dark brown and narrow. Skull small and slender and more or less arched in profile; zygomatic arches absent.

MEASUREMENTS: In table 16.

SPECIMENS RECORDED: (Hollister, 1914, p. 210). Tehuantepec: Tehuantepec, one (U.S.-N.M.).

SPECIMENS EXAMINED: Tabasco: Cardenas, one.

FAMILY **DASYPODIDAE** BONAPARTE

SUBFAMILY **DASYPODINAE** GILL

GENUS **DASYPUS** LINNAEUS

NINE-BANDED ARMADILLOS

Dasypus novemcinctus mexicanus Peters

Plate 13, figures 7, 8; text figure 44

TYPE LOCALITY: Matamoros, Tamaulipas, Mexico.

RANGE IN OAXACA: Arid tropical regions on

TABLE 16

MEASUREMENTS (IN MILLIMETERS) OF EDENTATES FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Condylo-basal Length	Condylo-nasal Length	Nasal Length	Brain-case Breadth	Inter-orbital Con-striction	Rostrum Width at Posterior Con-striction
Tamandua tetradactyla mexicana										
OAXACA										
A.M.N.H. No. 143970, Las Cuevas	♀ ad	1200	601	100	—	130.5	48.5	42.3	24.5	20.0
A.M.N.H. No. 147579, Zanatepec	♀ ad	1130	586	97	129.6	129.3	48.5	40.7	25.0	20.5
A.M.N.H. No. 148801, Cerro San Pedro	♀ ad	1055	515	106	127.9	126.7	44.9	40.5	22.0	20.0
A.M.N.H. No. 176663, Tapanatepec	♂ ad	1106	555	96	—	128.8	48.5	42.2	24.5	19.0
A.M.N.H. No. 176664, Tapanatepec	♂ ad	1145	675	95	129.4	126.0	46.0	42.4	24.6	21.5
A.M.N.H. No. 186407, Río Sarabia	—	—	—	—	129.2	128.3	50.0	39.0	23.0	17.5
A.M.N.H. No. 190190, La Ventosa	♀ ad	1130	574	96	131.1	126.0	47.0	40.2	23.2	20.3
A.M.N.H. No. 190192, La Ventosa	♀ ad	1122	570	95	137.0	135.7	48.0	42.5	24.2	20.5
Cyclopes didactylus mexicanus										
OAXACA										
U.S.N.M. No. 11137/38534,[a] Tehuantepec		443	242	—	45.7	—	—	23.6	9.6	—
Cyclopes didactylus dorsalis										
COSTA RICA										
A.M.N.H. No. 139460, Palmar	♀ ad	398	200	36	—	50.2	14.0	21.8	9.0	—
Dasypus novemcinctus mexicanus										
OAXACA										
A.M.N.H. No. 172715, Tapanatepec	♂ ad	849	435	96	85.3	90.5	29.1	29.5	22.3	13.3
A.M.N.H. No. 207420, Las Tejas	♂ ad	870	440	85	—	94.0	32.6	—	—	14.0

[a] Type.

the Pacific drainage from the Isthmus of Tehuantepec east to the state border, but probably common at low and moderate elevations in other areas.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 600–850; a bony carapace or protective shell over exposed parts of body and head; head elongate; snout long and narrow; ears close together on top of head; tail long, evenly tapered to tip, ringed basally and armored throughout its length; nine movable transverse bands across middle of shell on back; four toes on forefeet; five toes on hind feet; under parts nearly naked of hair and free of armor. Skull narrow; rostrum long and slender; zygomatic arch strongly developed; teeth small, simple; upper tooth row implanted in front of root of zygoma.

MEASUREMENTS: In table 16.

SPECIMENS EXAMINED: Juchitán: Tapanatepec, one; Zanatepec, one (skull). Tehuantepec: Las Tejas, one; Tehuantepec, four (skulls).

SUMMARY OF THE EDENTATA OF OAXACA

Tamandua is common in low, arid, tropical regions. *Cyclopes* reaches the northwestern limit of its known range in the Isthmus of Tehuantepec. *Dasypus* is widely distributed throughout the state from low to moderate elevations, but specimens are few.

ORDER LAGOMORPHA BRANDT

FAMILY LEPORIDAE GRAY

GENUS SYLVILAGUS GRAY

COTTONTAIL RABBITS

Sylvilagus brasiliensis truei (J. A. Allen)

Plate 14, figures 1, 2; text figure 45

TYPE LOCALITY: Mirador, Veracruz, Mexico.

RANGE IN OAXACA: Known in this state only from the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Nicaraguan specimens). Total length, 380–400; ears short and rounded, averaging 45.5, from notch in dry skin; tail very small (20–21); pelage relatively coarse; color dark brown. Skull relatively narrow; rostrum heavy, broader at base than interorbital width, supraorbital process broadly joined to frontals; antorbital notch very small or lacking; postorbital process small and short; bullae small.

MEASUREMENTS: In table 17.

SPECIMENS EXAMINED: Juchitán: Santo Domingo, two juveniles (U.S.N.M.).

Sylvilagus floridanus aztecus (J. A. Allen)

Plate 14, figures 3, 4; text figure 45

TYPE LOCALITY: Tehuantepec City, Oaxaca, Mexico.

RANGE IN OAXACA: From the Isthmus of Tehuantepec in southern Oaxaca east along the Pacific coast region to the Chiapas state line, and north to Santa María Patapa.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 400–450; ears 54–58, from notch in dry skins; tail long, 45–57; pelage soft; color light buff. Skull large; rostrum long and broad, about as broad at base as interorbital width; nasals inflated and decurved near tip; braincase narrow; interorbital region broad; bullae small; jugal heavy and usually with a distinct groove on outer side.

MEASUREMENTS: In table 17.

SPECIMENS EXAMINED: Juchitán: Ixhuatán, one; La Ventosa, one; Santa María Petapa, one. Tehuantepec: Las Cuevas, two; Las Tejas, four; Salina Cruz, one; San Antonio, one; Tehuantepec, two; Tequisistlán, one.

SPECIMENS RECORDED: (Merriam, 1909, p. 188). Juchitán: Santa Efigenia, three (U.S.N.M.).

Sylvilagus floridanus connectens (Nelson)

Text figure 45

TYPE LOCALITY: Chichicaxtle, central Veracruz, Mexico.

RANGE IN OAXACA: Highlands in the central districts of Mixes and Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 375–435, resembling *S. f. aztecus* in reddish color and nearly equaling its size but ears larger, averaging 60 from notch in dry skins.

MEASUREMENTS: In table 17.

SPECIMENS EXAMINED: Mixes: Zempoaltepec, two (U.S.N.M.). Oaxaca: Five miles southeast of Oaxaca de Juárez, one (T.C.-W.C.); San Felipe del Agua, one.

REMARKS: Schaldach (1966, p. 292) recorded two specimens of *Sylvilagus floridanus* from San Miguel Suchixtepec. Both are too young for subspecific identification.

TABLE 17

MEASUREMENTS (IN MILLIMETERS) OF *Sylvilagus* AND *Lepus* FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Ear from Notch in Dry Skin	Skull, Greatest Length	Condylobasal Length	Nasal Length Along Median Line	Greatest Length of Nasals	Zygomatic Width	Interorbital Width	Postorbital Constriction	Breadth of Rostrum Above Premolars	Maxillary Tooth Row
Sylvilagus brasiliensis truei														
VERACRUZ														
U.S.N.M. No. 6357-34878, Mirador	ad	—	—	75.0	46.0	—	—	—	27.0	35.0	—	—	—	14.0
Sylvilagus brasiliensis gabbi														
NICARAGUA														
A.M.N.H. No. 29820, Pena Blanca	♀ ad	350	20	76.0	40.0	71.6	63.3	23.5	28.5	33.0	13.6	13.1	18.2	13.4
Sylvilagus floridanus aztecus														
OAXACA														
A.M.N.H. No. 2438-3116,[a] Tehuantepec	♂ ad	—	—	—	58.5	72.8	62.8	25.4	33.1	35.0	20.0	11.3	18.7	13.4
A.M.N.H. No. 2439-3117, Tehuantepec	♂ ad	—	—	—	54.2	76.9	67.2	22.3	32.2	36.0	21.0	12.1	19.2	13.8
A.M.N.H. No. 142550, Santa María Petapa	♂ ad	430	50	90.0	58.5	75.2	63.7	22.5	31.0	34.7	17.5	11.5	20.0	13.0
A.M.N.H. No. 143455, San Antonio	♀ ad	420	57	88.0	58.0	68.8	—	22.5	29.5	33.6	18.3	12.5	19.0	12.5
A.M.N.H. No. 143456, Las Cuevas	♂ ad	436	55	100.0	57.5	67.5	59.2	21.0	28.8	31.8	17.2	12.8	18.5	12.5
A.M.N.H. No. 143457, Las Cuevas	♀ ad	367	44	89.0	54.5	76.7	67.8	23.5	34.1	36.3	19.5	13.6	18.6	13.2
A.M.N.H. No. 143458, Las Tejas	♀ ad	410	57	91.0	57.0	71.0	61.0	21.2	30.5	33.6	16.8	10.2	17.8	12.5

TABLE 17—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Ear from Notch in Dry Skin	Skull, Greatest Length	Condylobasal Length	Nasal Length Along Median Line	Greatest Length of Nasals	Zygomatic Width	Interorbital Width	Postorbital Constriction	Breadth of Rostrum Above Premolars	Maxillary Tooth Row
A.M.N.H. No. 143460, Las Tejas	♂ ad	433	56	93.0	57.5	73.7	64.9	25.0	32.3	34.1	19.0	12.5	19.0	13.4
A.M.N.H. No. 145166, Tequisistlán	♂ ad	375	45	95.0	—	67.7	59.2	21.5	30.7	33.3	17.5	12.2	16.5	12.9
A.M.N.H. No. 186409, Ixhuatán	♀ ad	440	48	92.0	55.0	76.8	66.6	24.5	33.3	35.0	20.4	12.3	18.5	13.6
Sylvilagus floridanus connectens														
VERACRUZ														
U.S.N.M. No. 63660,[a] Chichicaxtla	♂ ad	442	63	97.0	63.0	76.0	—	—	—	35.0	18	—	—	—
OAXACA														
U.S.N.M. No. 68189, Zempoaltepec	♂ sub	382	38	83.0	54.0	71.0	62.5	22.0	30.4	33.4	14.5	12.9	17.0	12.9
U.S.N.M. No. 68190, Zempoaltepec	♀ sub	428	53	95.0	52.0	72.2	65.0	24.7	29.8	35.5	14.5	13.3	20.2	12.5
T.C.W.C. No. 4947, Oaxaca de Juárez	♂ juv	305	25	70.0	—	27.5	—	24.5	—	30.6	13.0	—	—	10.6
Sylvilagus cunicularius cunicularius														
OAXACA														
U.S.N.M. No. 68192, Zempoaltepec	♂ ad	512	67	100.0	76.0	86.0	76.8	28.5	36.5	40.5	18.1	15.7	22.5	16.0
A.M.N.H. No. 208914, San Felipe del Agua	ad	485	50	91.8	80.0	80.0	70.0	28.5	35.5	38.5	15.5	14.8	20.0	14.7
Sylvilagus cunicularius pacificus														
OAXACA														
U.S.N.M. No. 71262, Llano Grande	♀ ad	525	66	107.0	74.0	83.3	73.8	27.8	36.2	37.5	15.4	13.1	20.5	16.0

TABLE 17—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Ear from Notch in Dry Skin	Skull, Greatest Length	Condylobasal Length	Nasal Length Along Median Line	Greatest Length of Nasals	Zygomatic Width	Interorbital Width	Postorbital Constriction	Breadth of Rostrum Above Premolars	Maxillary Tooth Row
Lepus callotis callotis														
OAXACA														
U.S.N.M. No. 68216, Oaxaca de Juárez	♂ ad	578	80	131.0	118.0	98.0	85.0	30.3	41.0	45.9	21.0	13.2	26.5	17.8
U.S.N.M. No. 70295, Tlapacingo	♀ ad	570	70	139.0	117.0	97.1	85.4	30.5	41.0	45.0	18.4	11.3	25.3	17.5
Lepus flavigularis														
OAXACA														
A.M.N.H. No. 145170, Sta. María del Mar	♀ ad	610	68	125.0	112.0	99.3	85.8	34.5	42.0	43	26.8	12.0	25.5	16.5
A.M.N.H. No. 145171, Sta. María del Mar	♀ ad	685	85	130.0	112.0	—	87.7	36.5	44.5	43	26.1	12.0	27.0	16.2
A.M.N.H. No. 145172, Sta. María del Mar	♀ ad	600	95	134.0	110.0	—	89.0	34.7	44.7	44.5	26.7	12.5	27.0	16.5
A.M.N.H. No. 145603, Sta. María del Mar	♂ ad	565	75	115.0	114.0	99.5	87.8	35.9	43.0	45.0	26.5	12.2	26.7	17.0
A.M.N.H. No. 145605, Sta. María del Mar	♀ ad	587	68	120.0	119.0	98.6	87.3	34.7	43.4	43.5	25.2	12.7	26.1	17.0
A.M.N.H. No. 145607, Sta. María del Mar	♂ ad	565	65	128.0	113.0	—	86.5	36.0	43.8	46.3	26.0	11.5	27.0	17.8
A.M.N.H. No. 145608, Sta. María del Mar	♂ ad	565	75	128.0	107.0	93.0	81.5	31.5	40.0	42.0	—	14.5	26.0	16.1

[a] Type.

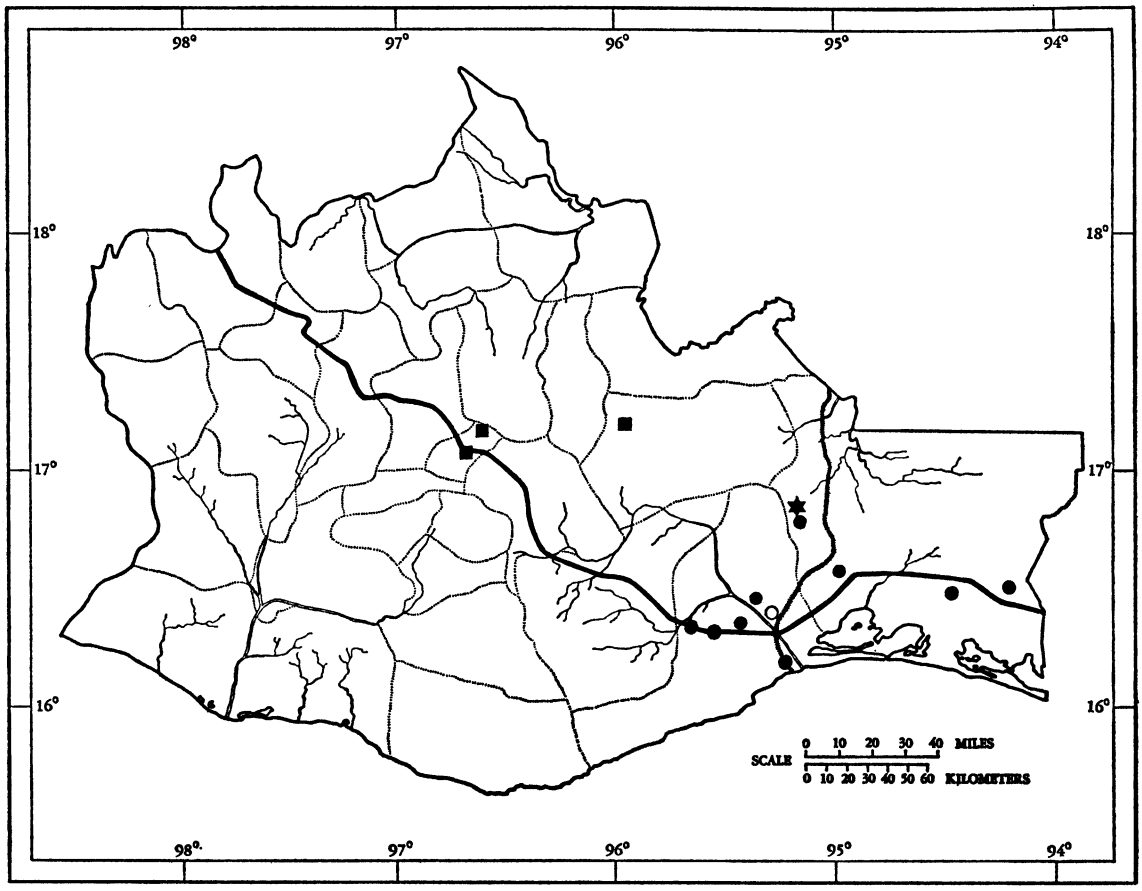


FIG. 45. Records of *Sylvilagus floridanus* and *Sylvilagus brasiliensis* in Oaxaca. ● *S. f. aztecus.* ○ Type locality of *S. f. aztecus.* ■ *S. f. connectens.* ★ *S. b. truei.*

Sylvilagus cunicularius cunicularius (Waterhouse)
Plate 14, figures 5, 6; text figure 46

TYPE LOCALITY: "Sacualpan" (= Zacualpan), Mexico.

RANGE IN OAXACA: Mountains about the southern end of the Mexican tableland from the highlands west of the Isthmus of Tehuantepec, west to the Oaxaca state line; altitudinal range from 2000 to 11,000 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 500–515; pelage coarse; ears 76–80 in dry skins, color brownish gray. Skull large and massive; braincase broad; rostrum broad; zygomatic arches heavy, jugal deeply grooved; supraorbital process slight; postorbital process joined to frontal posteriorly, enclosing an oval aperture.

MEASUREMENTS: In table 17.

SPECIMENS EXAMINED: Mixes: Mt. Zempoaltepec, two (U.S.N.M.). Oaxaca: San Felipe del Agua, one.

SPECIMENS RECORDED: (Nelson, 1909, p. 241). Huajuápam: Huajuápam, one (U.S.N.M.). Oaxaca: Oaxaca de Juárez, two (U.S.N.M.). Miahuatlán: Suchixtepec, one (U.S.N.M.).

Sylvilagus cunicularius pacificus (Nelson)
Text figure 46

TYPE LOCALITY: Acapulco, Guerrero, Mexico.

RANGE IN OAXACA: Coastal plain and adjacent foothills from Jamiltepec in Oaxaca west to the state of Guerrero; altitudinal range from sea level to 2500 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 485–505; similar to *S. c. cunicularius* but smaller, ears shorter,

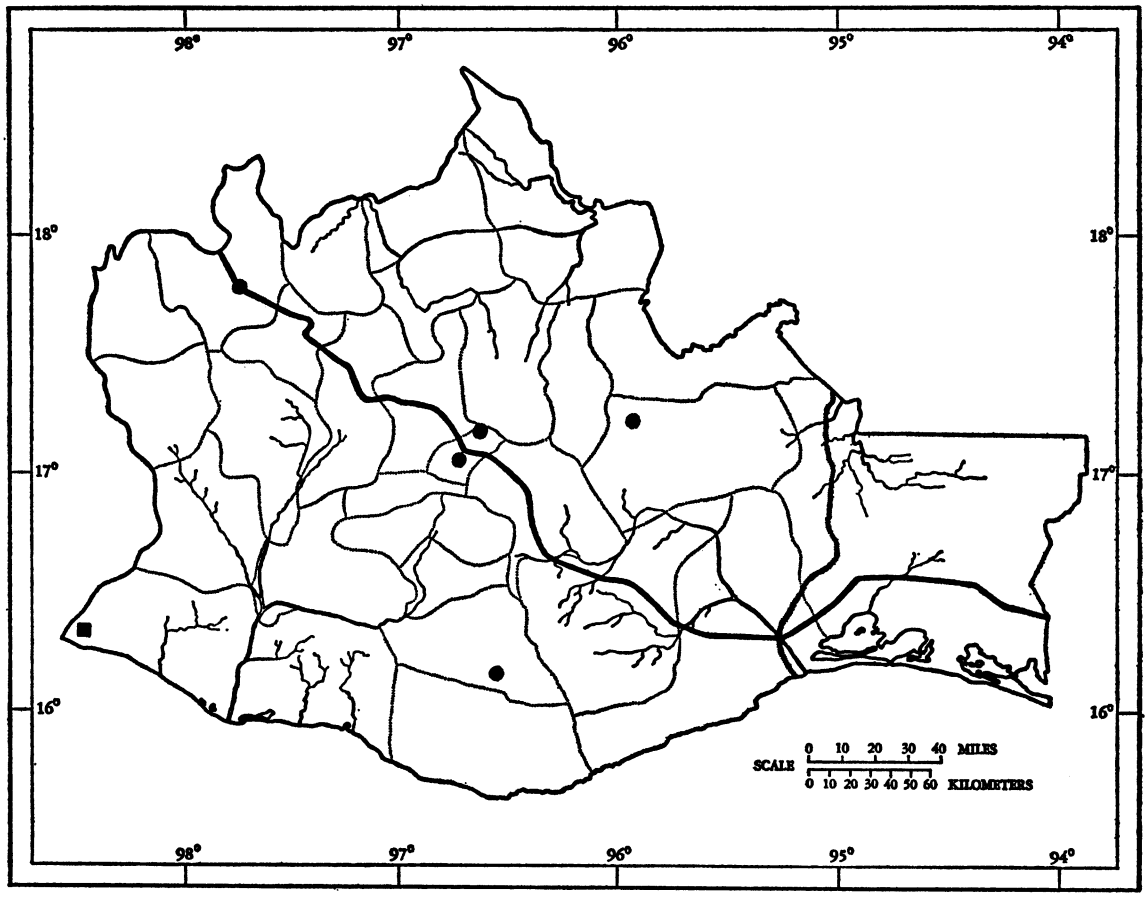


FIG. 46. Records of *Sylvilagus cunicularius* in Oaxaca. ● *S. c. cunicularius.* ■ *S. c. pacificus.*

averaging 74 from notch in dry skins, hind feet relatively longer. Skull much like that of typical *cunicularius* but rostrum narrower and deeper, nasals broader and more inflated at tip, postorbital processes larger, braincase narrower.

MEASUREMENTS: In table 17.

SPECIMENS EXAMINED: Jamiltepec: Llano Grande, one (U.S.N.M.).

GENUS **LEPUS** LINNAEUS

HARES

Lepus callotis callotis Wagler

Plate 14, figures 7, 8; text figure 47

Lepus callotis callotis: GOLDMAN, 1951, p. 375.

TYPE LOCALITY: Southern end of Mexican tableland.

RANGE IN OAXACA: Open plains of the Mexican tableland, from Oaxaca de Juárez northwest to the state line; altitudinal range 2500 to 8500 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 480–565; ears large, length averaging 117 from notch in dry skin and without trace of black tip; pelage coarse. Color Pinkish Buff. Skull short and broad; nasals short, broad, and not strongly tapered anteriorly; supraorbital and postorbital processes short, broad, and raised above plane of frontals; jugal broad and flat.

MEASUREMENTS: In table 17.

SPECIMENS EXAMINED: Oaxaca: Oaxaca de Juárez, one (U.S.N.M.). Silacayoapam: Tlapacingo, one (U.S.N.M.).

REMARKS: *Lepus callotis* Wagler and *Lepus mexicanus* Lichtenstein are conspecific; both were named in 1830 but the exact date of publication of either has not been established.

Lepus flavigularis Wagner

Plate 14, figures 9, 10; text figure 47

TYPE LOCALITY: Near Tehuantepec City, Oaxaca, Mexico.

RANGE IN OAXACA: Coastal plains and bordering foothills on the southern side of the Isthmus of Tehuantepec, in southern Oaxaca and east to the western border of southern Chiapas, Mexico; altitudinal range sea level to 2000 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 545–685; pelage coarse; ears large, length averaging 112 from notch in dry skin; similar to *Lepus callotis* but color richer, ears smaller, black on nape of neck divided by a buffy area. Skull relatively long; rostrum compressed laterally and tapering more rapidly toward tip than in *callotis;* bullae very small; supraorbital process joined closely to skull; postorbital process broad and attached to skull posteriorly; nasals long and tapered strongly forward.

MEASUREMENTS: In table 17.

SPECIMENS EXAMINED: Juchitán: Santa María del Mar, 24; Santa Efigenia, one (U.S.N.M.). Tehuantepec: Huilotepec, one (U.S.N.M.).

SUMMARY OF THE LEPORIDAE OF OAXACA

Two genera, five species, and seven subspecies of leporids have been recorded from Oaxaca. The forest rabbit, *Sylvilagus brasiliensis truei*, is the smallest and most widely distributed form in Oaxaca, but is not common anywhere. The eastern cottontail, *Sylvilagus floridanus*, is represented by two subspecies. *Sylvilagus f. connectens* is known to occur in Oaxaca only in the northwestern part

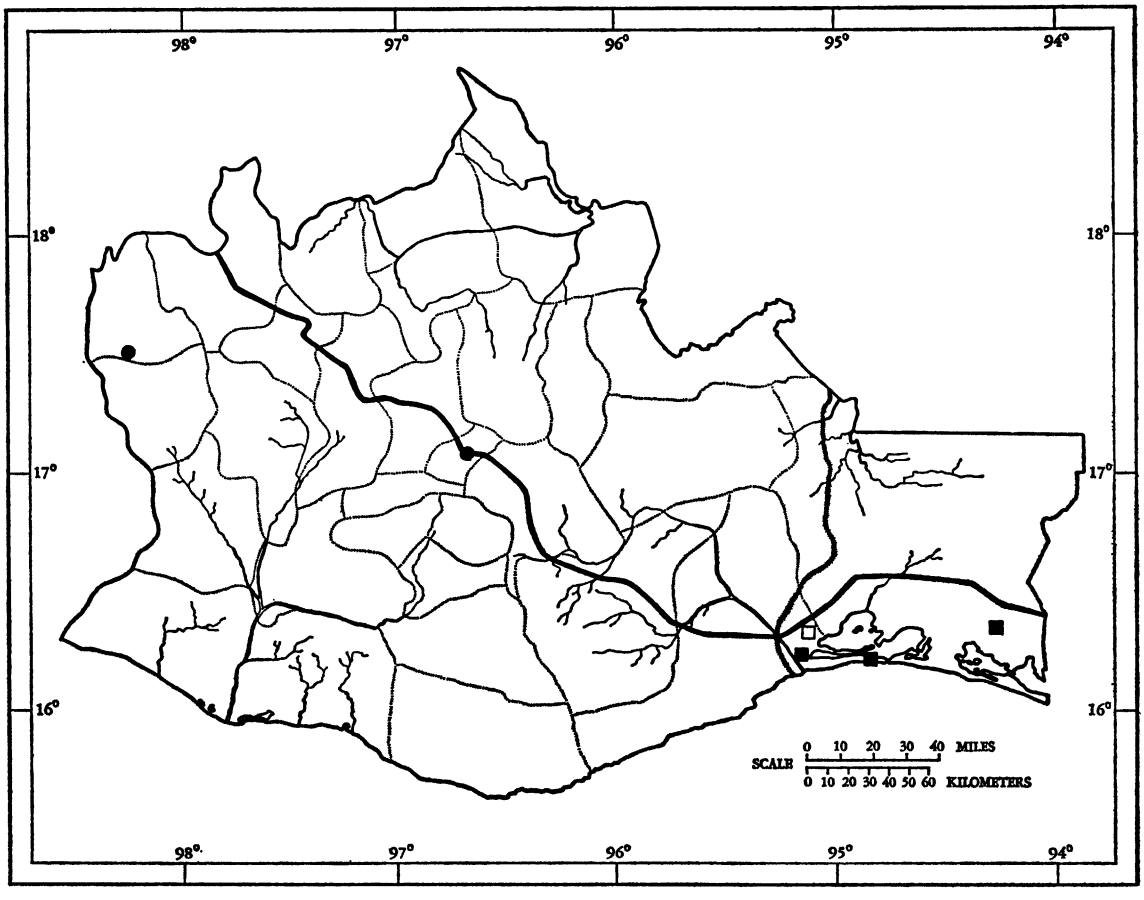


FIG. 47. Records of *Lepus callotis* and *Lepus flavigularis* in Oaxaca. ● *L. c. callotis.* ■ *L. flavigularis.* □ Type locality of *L. flavigularis.*

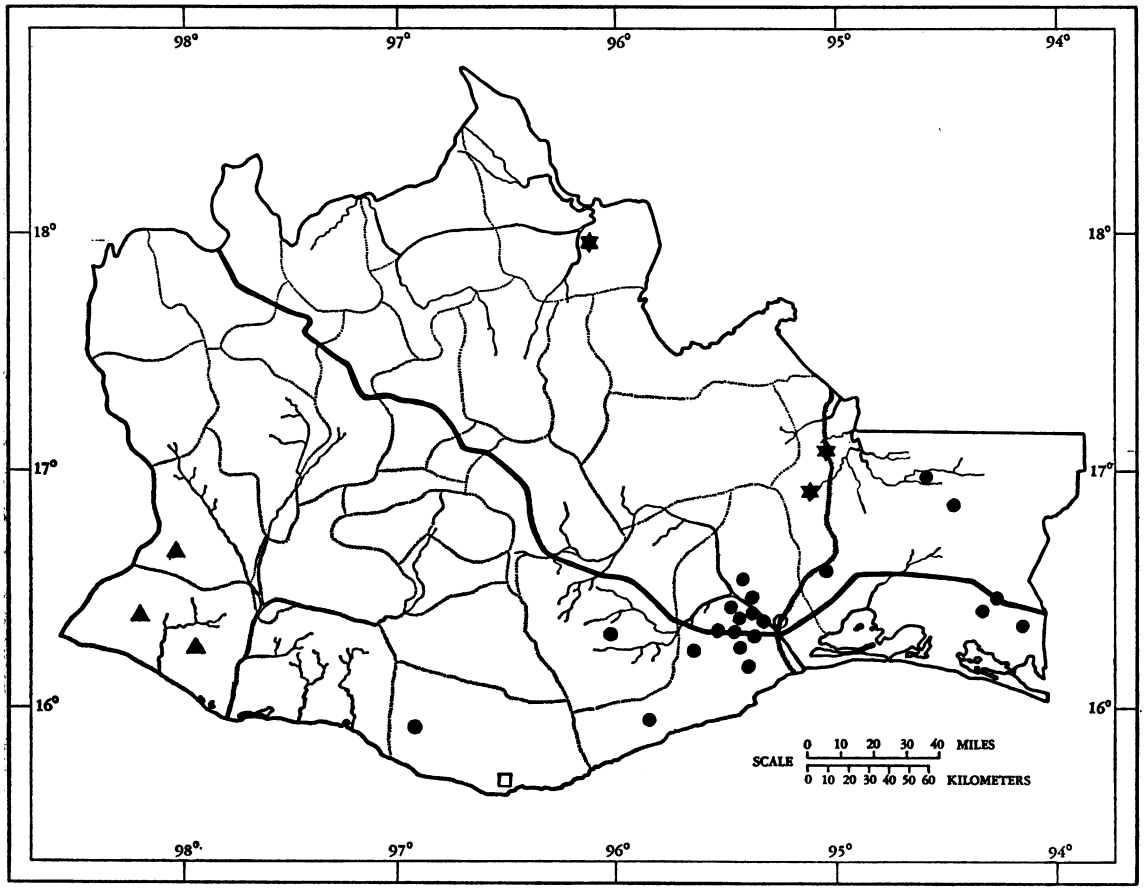


FIG. 48. Records of *Sciurus aureogaster* and *Sciurus socialis* in Oaxaca. ★ *S. a. aureogaster.* ● *S. s. socialis.* ○ Type locality of *S. s. socialis.* ▲ *S. s. cocos.* □ Type locality of *S. s. littoralis.*

of the state, and *S. f. aztecus* is restricted to the foothills and coastal plains of southeastern Oaxaca. The Mexican cottontail, *Sylvilagus cunicularius*, is large for a cottontail and is represented in Oaxaca by two subspecies. The typical form, *S. c. cunicularius*, has a range that probably covers most of the highlands west of the Isthmus of Tehuantepec but is replaced by a somewhat smaller form, *S. c. pacificus*, on the plains and foothills in southwestern Oaxaca.

Two species of whitesided jackrabbits occur in Oaxaca. *Lepus flavigularis* is restricted to the coastal plains in extreme southeastern Oaxaca and adjacent parts of Chiapas, the most southeasterly record for the genus *Lepus* in North America. *Lepus callotis callotis* occurs only west of the Isthmus of Tehuantepec and at higher elevations than *flavigularis*. For the use of the name *L. c. callotis* Wagler in preference to the name *L. mexicanus* Lichtenstein for the white-sided jackrabbit in Oaxaca, see Anderson and Gaunt (1962, p. 9).

ORDER **RODENTIA** BOWDICH

FAMILY **SCIURIDAE** GRAY

GENUS **SCIURUS** LINNAEUS

TREE SQUIRRELS

Sciurus aureogaster aureogaster F. Cuvier

Plate 15, figures 1, 2; text figure 48

TYPE LOCALITY: Altamira, Tamaulipas, Mexico.

RANGE IN OAXACA: Arid tropical lowlands and adjacent mountains from the Isthmus of Tehuantepec on the Gulf drainage west to Chiltepec; altitudinal range usually below 4000 feet but sporadically up to over 8000 feet.

GENERAL CHARACTERS: (Based on Oaxacan

specimens). Total length, 470–550; pelage short and coarse, tail long and slender, occurring in red and black color phases. In normal phase bright reddish of under parts and shoulders contrasting sharply with white or whitish on head, back, and tail. In dark phase entire animal jet-black.

MEASUREMENTS: In table 18.

SPECIMENS EXAMINED: Juchitán: Matías Romero, five; Sarabia, two. Tuxtepec: Chiltepec, 45.

Sciurus poliopus poliopus Fitzinger

Plate 15, figures 7, 8; text figure 49

TYPE LOCALITY: Cerro San Felipe, Oaxaca, Mexico.

RANGE IN OAXACA: Highlands of central Oaxaca in pine and oak forests of Transition and Boreal zones on mountains, east and south of Valley of Oaxaca de Juárez; altitudinal range, 7500 to 11,000 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 520; pelage thick and soft, back grizzled; under parts Ochraceous-Tawny; feet white; tail large and bushy.

MEASUREMENTS: In table 18.

SPECIMENS EXAMINED: Sola de Vega: Sola de Vega, one.

SPECIMENS RECORDED: (Nelson, 1899, p. 48). Etla: Cerro San Felipe, one (U.S.N.M.). Cuicatlán: Reyes, one (U.S.N.M.). Mixes: Mt. Zempoaltepec, one (U.S.N.M.). Miahuatlán: Mountains near Santa María Ozolotepec, one (U.S.N.M.). Pochutla: Pluma Hidalgo, one (U.S.N.M.).

Sciurus poliopus hernandezi Nelson

Text figure 49

TYPE LOCALITY: Mountains 15 miles west of Oaxaca de Juárez, Oaxaca, Mexico.

RANGE IN OAXACA: Pine and oak forest of

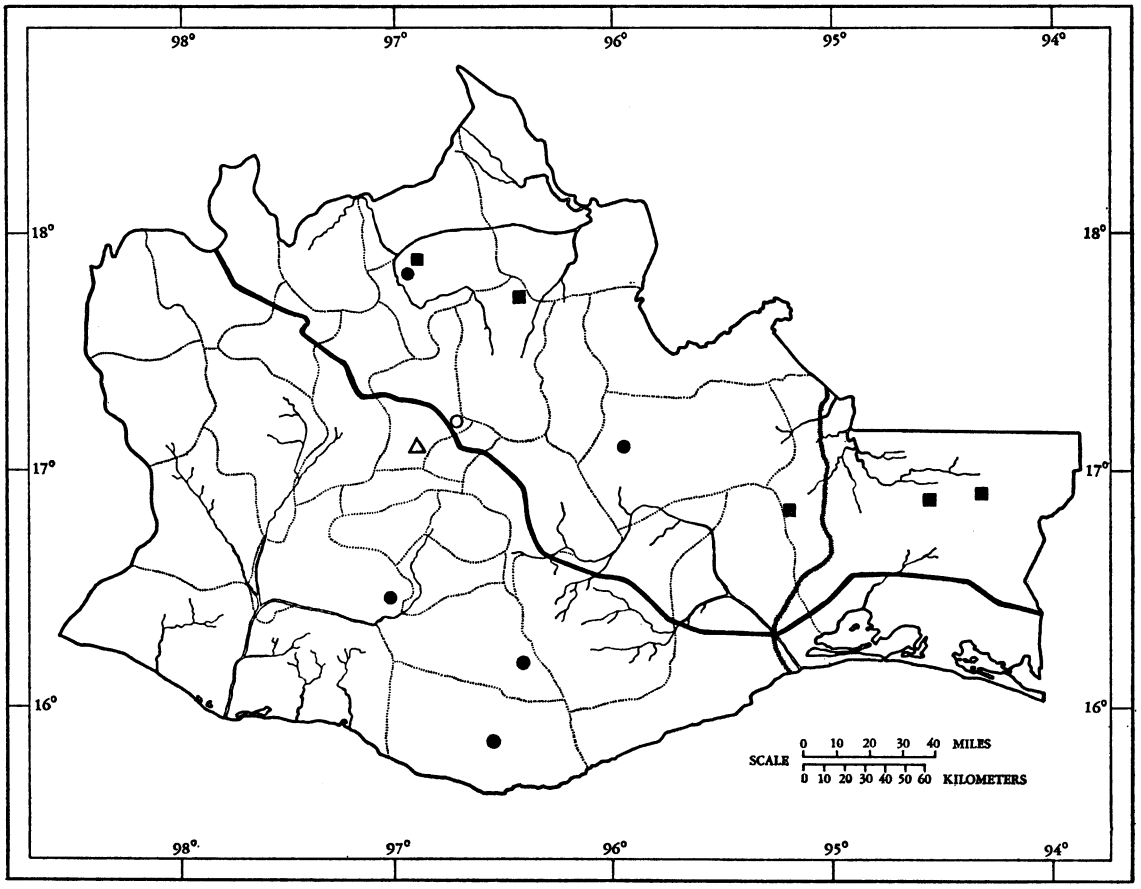


FIG. 49. Records of *Sciurus deppei* and *Sciurus poliopus* in Oaxaca. ■ *S. d. deppei.* ● *S. p. poliopus.* ○ Type locality of *S. p. poliopus.* △ Type locality of *S. p. hernandesi.*

TABLE 18

MEASUREMENTS (IN MILLIMETERS) OF *Sciurus* AND *Glaucomys* FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Postorbital Constriction	Palate Breadth Across Molars	Maxillary Tooth Row
Sciurus aureogaster aureogaster												
OAXACA												
A.M.N.H. No. 3088/2406, Sarabia	♂ ad	—	—	—	61.9	56.0	17.8	35.7	19.8	20.8	15.6	11.5
A.M.N.H. No. 3089/2407, Sarabia	♂ ad	—	—	—	61.3	56.7	16.6	34.5	18.7	19.1	14.8	11.6
A.M.N.H. No. 186418, Matías Romero	♂ ad	500	251	65	61.9	55.8	19.2	35.0	18.7	20.1	14.5	11.9
A.M.N.H. No. 186419, Matías Romero	♂ ad	510	265	67	59.4	53.2	17.0	34.3	19.2	19.2	14.3	10.9
A.M.N.H. No. 186420, Matías Romero	♀ ad	—	—	67	61.9	54.9	18.0	34.7	19.6	19.8	14.6	11.5
A.M.N.H. No. 186421, Matías Romero	♀ ad	—	—	65	59.6	55.8	16.7	35.4	19.7	19.4	14.7	11.5
A.M.N.H. No. 190197, Chiltepec	♀ ad	485	235	62	57.9	52.1	17.4	34.0	18.4	20.0	13.6	11.5
A.M.N.H. No. 190198, Chiltepec	♀ ad	510	255	67	57.9	52.7	17.0	33.3	18.9	19.2	14.2	11.9
A.M.N.H. No. 190199, Chiltepec	♀ ad	550	270	70	61.0	55.6	17.9	34.8	18.9	19.6	14.7	12.1
A.M.N.H. No. 190220, Chiltepec	♂ ad	495	260	63	59.0	53.7	18.8	32.4	19.0	19.0	14.3	11.3
A.M.N.H. No. 190234, Chiltepec	♀ ad	515	270	65	57.5	53.3	17.3	33.7	18.9	19.2	15.0	11.6
Sciurus poliopus poliopus												
OAXACA												
A.M.N.H. No. 190244, Sola de Vega	♂ ad	520	260	70	59.7	54.8	18.8	34.1	19.5	18.3	13.4	11.1
Sciurus poliopus hernandezi												
OAXACA												
A.M.N.H. No. 13746, 15 mi. W. Oaxaca de Juárez	♂ ad	530	280	65	62.0	56.0	19.0	34.3	18.4	17.7	14.2	11.5

TABLE 18—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Postorbital Constriction	Palate Breadth Across Molars	Maxillary Tooth Row
Sciurus socialis socialis												
OAXACA												
A.M.N.H. No. 3090/2412, Tehuantepec	♂ ad	510	240	65	60.6	54.3	18.6	34.7	19.0	20.4	14.5	11.0
A.M.N.H. No. 143358, Las Cuevas	♂ ad	505	257	65	58.7	54.2	17.2	35.2	19.0	21.0	14.1	10.4
A.M.N.H. No. 143369, Las Cuevas	♂ ad	509	272	69	60.0	54.7	20.0	33.4	19.5	19.0	13.8	10.9
A.M.N.H. No. 144584, Chontecomatlán	♂ ad	570	278	67	63.2	58.0	20.6	34.3	19.7	19.5	14.8	11.5
A.M.N.H. No. 145196, Potrero Gueladú	♀ ad	513	266	65	60.0	54.9	17.0	35.4	18.9	20.0	15.2	11.6
A.M.N.H. No. 145197, Cerro Atravesado	♂ ad	510	260	64	60.5	56.7	17.7	—	20.0	19.4	15.0	11.4
A.M.N.H. No. 172250, Tapanatepec	♀ ad	561	290	68	62.0	57.5	19.0	35.6	20.5	18.2	15.0	11.0
A.M.N.H. No. 172255, Tapanatepec	♂ ad	558	282	70	62.5	56.7	17.3	36.5	20.2	20.0	15.0	11.4
A.M.N.H. No. 176684, Tapanatepec	♂ ad	613	334	65	63.3	—	18.2	35.1	20.2	20.3	15.0	—
A.M.N.H. No. 186412, El Jícaro	♂ ad	565	291	70	61.1	56.0	19.4	33.2	19.7	19.4	14.3	11.6
A.M.N.H. No. 190245, La Ventosa	♂ ad	540	270	65	61.5	56.5	18.6	34.2	19.9	18.9	14.8	11.7
Sciurus socialis cocos												
GUERRERO												
A.M.N.H. No. 13748, Acapulco	♀ ad	520	270	63	59.3	54.2	17.0	33.9	18.5	19.0	13.8	11.2

TABLE 18—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Postorbital Constriction	Palate Breadth Across Molars	Maxillary Tooth Row
Sciurus socialis littoralis												
OAXACA												
U.S.N.M. No. 71322,[a] Puerto Angel	♀ ad	526	273	69	—	—	—	—	—	—	—	—
Sciurus deppei deppei												
OAXACA												
A.M.N.H. No. 145976, La Gloria	♀ ad	370	175	54	52.2	46.3	15.0	31.0	15.6	18.8	12.2	9.3
A.M.N.H. No. 145977, La Gloria	♀ ad	401	189	55	51.6	47.2	14.9	30.6	16.5	18.0	11.5	9.5
A.M.N.H. No. 145979, La Gloria	♂ ad	365	180	54	53.0	46.6	14.9	30.0	17.0	18.8	11.9	9.7
A.M.N.H. No. 148995, La Gloria	♀ ad	338	118	52	50.6	46.0	15.0	29.7	16.5	17.2	11.8	9.1
A.M.N.H. No. 149000, La Gloria	♂ ad	338	166	55	52.4	46.3	14.5	30.2	16.5	18.7	12.4	9.2
A.M.N.H. No. 149002, La Gloria	♂ ad	370	154	54	50.5	45.5	15.3	29.5	15.3	17.3	11.3	8.9
A.M.N.H. No. 175180, La Esperanza	♂ ad	423	167	49	49.5	44.7	14.5	29.7	16.2	17.8	11.8	8.1
A.M.N.H. No. 186902, Cerro Pelon	♂ ad	340	160	50	50.1	44.5	14.7	29.0	14.5	18.0	11.0	8.5
Glaucomys volans chontali												
OAXACA												
A.M.N.H. No. 185014,[a] Chontecomatlán	♂ ad	210	94	28.0	33.4	30.4	8.0	20.2	6.3	8.3	7.9	6.1
Glaucomys volans oaxacensis												
OAXACA												
A.M.N.H. No. 17833,[a] Jilotepec	♂ ad	230	104	30.0	35.3	32.3	9.5	21.0	6.9	9.5	8.4	6.6
U.M. No. 94482, Cerro San Felipe	♀ ad	251	109	31.0	34.7	31.8	9.7	21.0	7.0	9.0	8.4	6.3
K.U. No. 68833, Nejapa	♂ juv	211	93	29.0	33.7	30.7	9.6	20.0	6.7	8.5	7.8	6.4
K.U. No. 68834, Nejapa	♀ juv	228	102	29.0	33.6	—	9.7	21.0	6.5	8.4	8.2	6.2

[a] Type.

the Transition and Boreal zones in the mountains west of the Valley of Oaxaca de Juárez.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 530; pelage thick and soft; tail large and bushy; similar to *S. p. poliopus* but back grayer and under parts white or buffy.

MEASUREMENTS: In table 18.

SPECIMENS EXAMINED: Etla: Fifteen miles west of Oaxaca de Juárez, one.

Sciurus socialis socialis Wagner

Plate 15, figures 3, 4; text figure 48

TYPE LOCALITY: Vicinity of Tehuantepec City, Oaxaca, Mexico.

RANGE IN OAXACA: Lowland forests in the Arid Tropical Zone along the Pacific coast from Colotepec east to the Chiapas state line.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 490–613; pelage coarse and thin; tail long and slender; back grizzled; nape and top of head reddish, color of under parts variable.

MEASUREMENTS: In table 18.

SPECIMENS EXAMINED: Juchitán: Cerro Atravesado, two; Chimalapa, one; El Jícaro, two; La Ventosa, three; Río Ostuta, three; Tapanatepec, eight; Zanatepec, one. Tehuantepec: Astata, one; Cerro San Pedro, one; El Limón, two; Escurano, one; Guiengola, one; La Concepción, one; La Presa, one; Las Cuevas, two; Las Tejas, five; Potrero Gueladu, one; Salazar, four; San Miguel Tenango, one; San Pablo, five; Tehuantepec, five. Yautepec: Contecomatlán, one.

SPECIMENS RECORDED: (Nelson, 1899, p. 65). Pochutla: Colotepec, one (U.S.N.M.).

Sciurus socialis cocos Nelson

Text figure 48

TYPE LOCALITY: Acapulco, Guerrero, Mexico, altitude, 1000 feet.

RANGE IN OAXACA: Arid tropical lowlands of the Pacific coast region in southwestern Oaxaca below 1500 feet.

GENERAL CHARACTERS: (Based on Guerrero specimen). Total length, 520; pelage thin and coarse, tail long and narrow; nape and rump patches deep reddish brown, sharply defined and in sharp contrast with whitish color on rest of upper parts.

MEASUREMENTS: In table 18.

SPECIMENS EXAMINED: Guerrero: Acapulco, one.

SPECIMENS RECORDED: (Nelson, 1899, p. 67). Jamiltepec: Jamiltepec, one (U.S.N.M.); Pinotepa, one (U.S.N.M.). Putla: Llano Grande, one (U.S.N.M.).

Sciurus socialis littoralis Nelson

Text figure 48

TYPE LOCALITY: Puerto Angel, Oaxaca, Mexico.

RANGE IN OAXACA: Known only from coastal hills of southern Oaxaca near Puerto Angel.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 526; pelage short and close, tail long and relatively bushy for *socialis* group; similar to typical *S. socialis* but colors much paler and differing from S. *socialis cocos*, in absence of reddish rump patch.

MEASUREMENTS: In table 18.

SPECIMENS RECORDED: (Nelson, 1907, p. 87). Pochutla: Puerto Angel, seven (U.S.N.M.).

Sciurus deppei deppei Peters

Plate 15, figures 5, 6; text figure 49

TYPE LOCALITY: Papantla, Veracruz, Mexico.

RANGE IN OAXACA: Humid tropical and austral zones, on Gulf drainage; altitudinal range below 6000 feet, sporadically up to 9500 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 335–400; pelage short, coarse, and blackish brown; tail narrow, tail hairs finely tipped with white.

MEASUREMENTS: In table 18.

SPECIMENS EXAMINED: Juchitán: Cerro Atravesado, one; La Esperanza, one; La Gloria, 19. Ixtlán: Cerro Pelon, one.

SPECIMENS RECORDED: (Nelson, 1899, p. 104). Cuicatlán: Reyes Papalo, one (U.S.N.M.).

GENUS **GLAUCOMYS** THOMAS

FLYING SQUIRRELS

Glaucomys volans chontali Goodwin

Plate 15, figures 9, 10; text figure 50

Glaucomys volans chontali GOODWIN, 1961, p. 3.

TYPE LOCALITY: Santo Domingo Chontecomatlán, District of Yautepec, Oaxaca, Mexico, altitude 7000 feet.

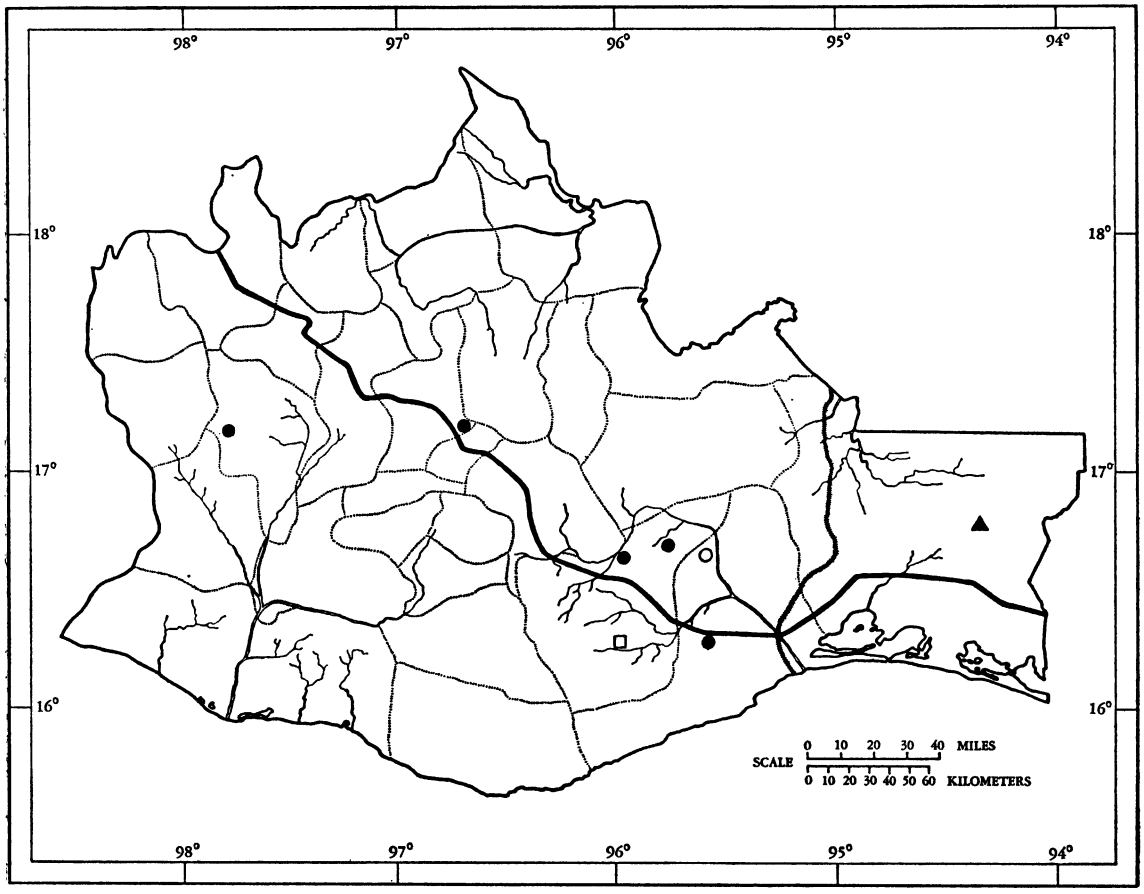


FIG. 50. Records of *Glaucomys volans* in Oaxaca. □ Type locality of *G. v. chontali.* ● *G. v. oaxacensis.* ○ Type locality of *G. v. oaxacensis.* ▲ *G. v. herreranus.*

RANGE IN OAXACA: Known only from the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length about 210; fur exceedingly soft and Ochraceous-Tawny; tail flattened. Skull small, short, and broad; braincase small and steeply domed; rostrum short and slender; molariform teeth small.

MEASUREMENTS: In table 18.

SPECIMENS EXAMINED: Yautepec: Santo Domingo Chontecomatlán, one.

Glaucomys volans oaxacensis Goodwin

Plate 15, figures 11, 12; text figure 50

Glaucomys volans oaxacensis GOODWIN, 1961, p. 11.

TYPE LOCALITY: San Pedro Jilotepec, District of Yautepec, Oaxaca, Mexico, altitude 5000 feet.

RANGE IN OAXACA: Highlands of central Oaxaca west of the Isthmus of Tehuantepec and west to Acahuizotla, Guerrero.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 230–250; color pale buffy; differing from *G. v. chontali* in larger size and paler color. Skull short and broad; rostrum short; palate broad; molariform teeth large.

MEASUREMENTS: In table 18.

SPECIMENS EXAMINED: Etla: Cerro San Felipe, one (U.M.). Tehuantepec: Tenango, one. Tlaxiaco: Cerro Yucuyacua, one. Yautepec: San Pedro Jilotepec, five; San Sebastian Jilotepec, one; Santo Domingo Nejapa, two (K.U.).

Glaucomys volans herreranus Goldman

Text figure 50

TYPE LOCALITY: Said to be the mountains of Veracruz. Exact locality unknown, but believed by Goldman to be a region where cloud-forest conditions prevail.

RANGE IN OAXACA: Humid forested mountain slopes east of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 224–230. Color dark, upper surface of patagium glossy black; darkest of the Middle American flying squirrels.

SPECIMENS EXAMINED: Juchitán: Sierra Madre north of Zanatepec, four.

SUMMARY OF THE SCIURIDAE OF OAXACA

The squirrels of Oaxaca can be separated into three major groups: the big gray squirrels, the small red squirrels, and the flying squirrels. The gray squirrels are represented by three species that are separated geographically. *Sciurus aureogaster* occupies northern Oaxaca at low and moderate elevations. *Sciurus socialis* is represented by three subspecies that range over the arid tropical forests along the full length of the Oaxaca Pacific coast region. *Sciurus poliopus*, represented by two subspecies, is the largest squirrel in Oaxaca and frequents the highland forests in the central part of the state west of the Isthmus of Tehuantepec. The small red squirrel, *Sciurus deppei*, occupies humid tropical forests of northern Oaxaca below 6000 feet, but also occurs up to an elevation of 9500 feet. The flying squirrel, *Glaucomys volans*, represented by three subspecies, is widely distributed in highland forests of pine and oak, but is not common anywhere in the state.

FAMILY **GEOMYIDAE** GILL

GENUS **ORTHOGEOMYS** MERRIAM

GIANT POCKET GOPHERS

Orthogeomys grandis scalops (Thomas)

Text figure 51

TYPE LOCALITY: Tehuantepec, east of the Río Tehuantepec, Oaxaca, Mexico.

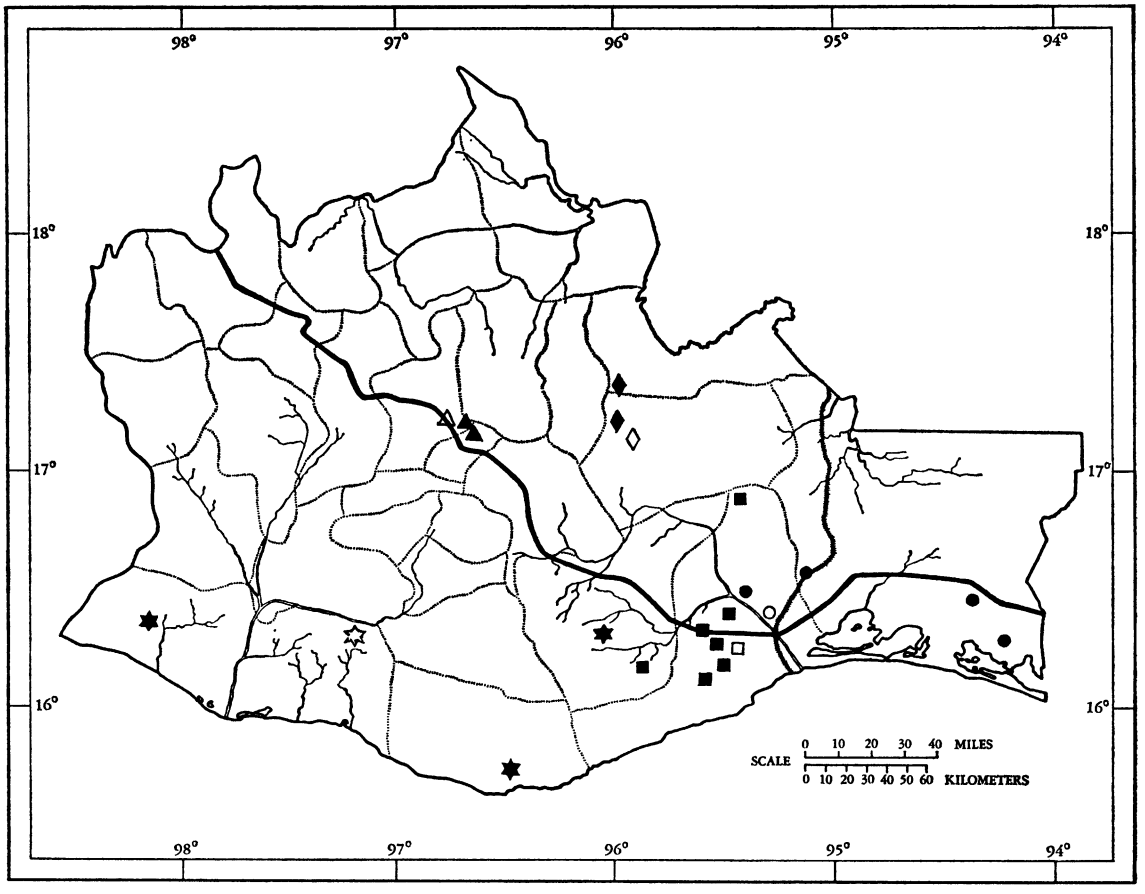


FIG. 51. Records of *Orthogeomys grandis* in Oaxaca. ● *O. g. scalops.* ○ Type locality of *O. g. scalops.* ■ *O. g. carbo.* □ Type locality of *O. g. carbo.* ★ *O. g. alleni.* ▲ *O. g. felipensis.* △ Type locality of *O. g. felipensis.* ◆ *O. g. nelsoni.* ◇ Type locality of *O. g. nelsoni.* ☆ Type locality of *O. g. alvarezi.*

TABLE 19

MEASUREMENTS (IN MILLIMETERS) OF *Orthogeomys* AND *Heterogeomys* FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Rostrum Breadth at Root of Zygoma	Interorbital Width	Diastema	Palate Width Across Molars	Maxillary Tooth Row
Orthogeomys grandis scalops													
OAXACA													
A.M.N.H. No. 167849, Zanatepec	♀ ad	380	120	46.0	69.7	68.7	23.6	42.5	15.3	14.4	25.5	12.0	15.2
B.M. No. 79.1.6.7,[a] Tehuantepec	ad	360	95	45.2	—	—	26.0	40.8	15.0	14.2	24.5	—	—
U.S.N.M. No. 74613, Ixtepec	♂ ad	395	124	51.0	69.0	67.5	25.7	41.3	15.8	14.5	26.4	12.6	14.5
U.S.N.M. No. 74614, Ixtepec	♂ ad	400	123	50.0	70.0	68.9	26.0	43.1	15.5	15.1	26.5	12.4	14.8
U.S.N.M. No. 74624, Ixtepec	♀ ad	360	124	48.0	64.7	63.0	23.3	40.2	14.3	14.2	23.3	12.8	14.2
Orthogeomys grandis carbo													
OAXACA													
A.M.N.H. No. 165988,[a] Escurano	♂ sub	375	138	44.0	63.1	60.5	21.5	36.9	16.5	14.0	22.5	12.0	14.5
A.M.N.H. No. 167389, Sta. Lucía	♂ ad	366	130	51.0	72.0	66.5	24.6	41.5	17.5	—	24.4	14.0	15.2
A.M.N.H. No. 171622, San Antonio	♂ ad	395	127	55.0	70.1	69.5	26.0	47.0	17.5	15.6	27.4	12.9	15.4
A.M.N.H. No. 171625, Morro Mazatlán	♀ ad	385	124	48.0	70.8	70.0	26.2	42.3	15.2	12.7	27.3	12.8	14.6
A.M.N.H. No. 167393, Morro Mazatlán	♂ ad	—	—	—	69.1	67.0	22.5	40.5	15.5	14.1	25.0	13.5	15.0
A.M.N.H. No. 171633, Limón	♂ sub	342	116	46.0	63.5	62.0	24.7	38.7	15.5	15.3	23.4	12.5	14.5
A.M.N.H. No. 171635, Limón	♂ ad	400	151	50.0	67.0	—	21.8	—	14.6	13.0	23.7	13.0	14.1
Orthogeomys grandis alleni													
GUERRERO													
U.S.N.M. No. 70586,[a] Acapulco	♂ ad	382	115	53.0	—	71.5	28.9	44.3	—	10.3	—	—	15.4
OAXACA													
U.S.N.M. No. 71316, Puerto Angel	♀ sub	355	124	52.0	69.0	66.4	24.6	38.9	14.6	12.4	25.6	13.0	14.0

TABLE 19—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Rostrum Breadth at Root of Zygoma	Interorbital Width	Diastema	Palate Width Across Molars	Maxillary Tooth Row
U.S.N.M. No. 71317, Puerto Angel	♂ ad	400	133	54.0	78.3	75.9	31.8	44.7	16.8	12.1	28.6	13.5	15.8
A.M.N.H. No. 175179, Zapotitlán	♂ ad	—	—	45.0	72.5	69.7	27.2	41.3	15.5	13.0	27.0	13.5	14.5
Orthogeomys grandis felipensis													
OAXACA													
U.S.N.M. No. 67030,[a] Cerro San Felipe	♂ ad	372	110	51.0	—	66.5	25.8	42.7	—	14.8	—	—	13.1
A.M.N.H. No. 185055, San Felipe del Agua	♂ ad	—	—	51.5	73.0	69.3	28.3	42.5	15.5	14.8	28.0	13.5	13.5
Orthogeomys grandis alvarezi													
I.B. No. 8496,[a] Lachão pass	♀ ad	375	125	53.0	68.8	67.4	25.1	43.1	—	15.0	—	—	15.4
Orthogeomys grandis nelsoni													
OAXACA													
U.S.N.M. No. 66751,[a] Mt. Zempoaltepec	♂ ad	397	123	53.0	77.0	73.0	28.0	44.0	16.0	16.0	28.5	—	15.0
U.S.N.M. No. 66753, Mt. Zempoaltepec	♂ old	435	140	55.0	75.8	73.5	28.0	45.0	17.5	17.0	28.0	13.6	15.0
U.S.N.M. No. 66754, Totontepec	♂ sub	385	119	53.0	62.5	61.8	23.6	39.6	15.0	18.0	22.2	13.4	14.3
U.S.N.M. No. 66755, Comaltepec	♂ juv	338	102	52.0	58.2	58.5	20.8	36.2	14.6	14.2	20.8	12.5	14.3
Orthogeomys cuniculus													
OAXACA													
F.M.N.H. No. 14052,[a] Zanatepec	♂ ad	330	95	44.0	60.5	57.9	25.7	35.5	13.0	11.7	21.3	12.3	13.2
A.M.N.H. No. 143382, Ingenio Sto. Domingo	♀ ad	320	95	45.0	59.3	—	22.2	36.5	14.2	14.0	22.2	14.0	13.3
A.M.N.H. No. 206830, Unión Hidalgo	♂ sub	320	100	48.0	58.7	57.8	20.0	33.3	13.5	13.1	20.7	11.8	13.5

TABLE 19—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Rostrum Breadth at Root of Zygoma	Interorbital Width	Diastema	Palate Width Across Molars	Maxillary Tooth Row
Heterogeomys hispidus hispidus													
VERACRUZ													
A.M.N.H. No. 12761-11055, Jalapa	♂ old	345	70	45.0	63.6	63.2	25.6	45.2	14.8	11.7	24.5	13.2	13.3
A.M.N.H. No. 12760-11054, Jalapa	♀ old	323	70	45.0	59.3	57.2	23.2	37.7	13.0	11.0	21.2	12.2	13.1
A.M.N.H. No. 12759-11053, Jalapa	♂ ad	343	75	47.0	59.5	57.7	23.0	37.5	13.5	10.2	21.4	12.0	13.2
OAXACA													
U.S.N.M. No. 235481, Reyes	♀ ad	332	98	49.5	—	—	—	—	—	—	—	—	—
Heterogeomys hispidus torridus													
VERACRUZ													
U.S.N.M. No. 63629,[a] Chichicaxtlan	♀ ad	323	88	52.0	—	60.5	—	41.0	15.0	11.0	21.0	—	13.5
U.S.N.M. No. 63632, Motzorongo	♂ ad	348	97	49.5	66.5	63.5	22.5	43.5	15.0	10.5	23.0	—	14.5
Heterogeomys hispidus isthmicus													
VERACRUZ													
U.S.N.M. No. 78062,[a] Jaltipan	♂ ad	325	86	46.0	—	59.0	24.4	41.5	—	11.0	—	—	13.5
A.M.N.H. No. 178698, Zuchil	♂ ad	—	—	—	58.5	—	—	37.7	13.5	—	21.0	—	13.8
Heterogeomys hispidus tehuantepecus													
OAXACA													
U.S.N.M. No. 73434,[a] Santo Domingo Petapa	♂ ad	332	102	48.0	—	61.7	23.9	39.2	—	10.7	—	—	13.0
A.M.N.H. No. 165989, La Gloria	♀ ad	307	82	43.0	59.5	56.5	22.5	35.8	12.7	10.3	20.5	11.7	13.4

[a] Type.

RANGE IN OAXACA: Arid tropical regions of southeastern Oaxaca east of the Río Tehuantepec and east at least to Zanatepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 365–400; nasal pad naked and well developed; pelage coarse and without woolly under fur, moderately sparse and dark brown; tail naked, black or blotched with white below. Skull elongated, frontal region broad and flat, as broad as or broader than muzzle; upper incisors large, each with a wide groove down anterior surface, slightly on inner side of midline of each tooth, as in other members of genus; rostrum relatively narrow; nasals long and slender; ascending branches of premaxilla narrow.

MEASUREMENTS: In table 19.

SPECIMENS EXAMINED: Juchitán: Chahuites, one; Ixtepec, three (U.S.N.M.); Zanatepec, one. Tehuantepec: Guigovéo, one.

Orthogeomys grandis carbo Goodwin

Plate 16, figures 1, 2; text figure 51

TYPE LOCALITY: Escurano, Cerro San Pedro, District of Tehuantepec, Oaxaca, Mexico, altitude 2500 feet.

RANGE IN OAXACA: Arid tropical lowlands and foothills of southern Oaxaca west of the Río Tehuantepec; western limits undetermined.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 334–440; pelage coarse, scanty, and blackish; naked nasal pad small. Color Fuscous-Black grading to Mummy Brown in worn faded pelage, under parts more sparsely haired than back. Skull short and broad; zygomata heavy and widely expanded; nasals short and broad.

MEASUREMENTS: In table 19.

SPECIMENS EXAMINED: Tehuantepec: Caja de Agua, three; Coatlán, one; Escurano, one; Limón, seven; Morro Mazatlán, nine; San Antonio, one; Santa Lucía, one. Yautepec: Chontecomatlán, one.

Orthogeomys grandis alleni Nelson and Goldman

Plate 16, figures 3, 4; text figure 51

TYPE LOCALITY: Acapulco, Guerrero, Mexico, altitude 2000 feet.

RANGE IN OAXACA: Arid tropical lowlands and adjacent mountain slopes along the Pacific coast in the southwestern districts.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 340–382; pelage coarse, scanty, and blackish brown; resembling *O. g. carbo* in external characters, but skull of *alleni* larger and wider than that of *carbo*, superior outline more concave, frontal region narrower, rostrum longer and narrower, nasals longer and narrower.

MEASUREMENTS: In table 19.

SPECIMENS EXAMINED: Pochutla: Puerto Angel, two (U.S.N.M.). Yautepec: Zapotitlán, one.

SPECIMENS RECORDED: (Nelson and Goldman, 1930, p. 157). Jamiltepec: Pinotepa, two (U.S.N.M.).

Orthogeomys grandis felipensis
Nelson and Goldman

Text figure 51

TYPE LOCALITY: Cerro San Felipe, 10 miles north of Oaxaca de Juárez, Mexico, altitude 10,000 feet.

RANGE IN OAXACA: Oak- and pine-forested slopes of mountains of the central districts, altitudinal range 7000 to 10,000 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 366–372; pelage relatively soft, dense, long, and blackish; tail naked; feet scantily haired. Skull relatively long and slender; rostrum long and narrow; nasals long and slender, ascending branches of premaxillae narrow; zygomatic arches relatively weak and sides nearly parallel.

MEASUREMENTS: In table 19.

SPECIMENS EXAMINED: Etla: Cerro San Felipe, one. Oaxaca: San Felipe del Agua, two.

Orthogeomys grandis alvarezi Schaldach

Text figure 51

Orthogeomys grandis alvarezi SCHALDACH, 1966, p. 292.

TYPE LOCALITY: Ridge above Lachao Pass, above Kilometer 183 on road from Oaxaca de Juárez to Puerto Escondido, District of Juquila, Oaxaca, Mexico, altitude approximately 1700 m.

RANGE IN OAXACA: Known only from the vicinity of the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length of adult female, 375; external characters similar to those of *Ortho-*

geomys g. alleni, but larger and darker in color, about the size of *O. g. nelsoni*. Skull of *O. g. alvarezi* similar to that of *O. g. alleni* but dorsal line flatter and frontals broader. Compared with *O. g. nelsoni* the skull of *O. g. alvarezi* is lighter in construction, the zygomatic arches are more slender, and the nasals are wider posteriorly (triangular or cuneate in *nelsoni*).

MEASUREMENTS: In table 19.

SPECIMENS RECORDED: (Schaldach, 1966, p. 292). Juquila: Lachao Pass, two (I.B.).

Orthogeomys grandis nelsoni Merriam

Text figure 51

TYPE LOCALITY: Mt. Zempoaltepec, Oaxaca, Mexico, altitude 8000 feet.

RANGE IN OAXACA: Humid Gulf slopes of the mountains of east-central Oaxaca in the vicinity of Mt. Zempoaltepec and adjacent region, including Comaltepec and Totontepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 380–435; pelage sparse, coarse, and dark brown; naked nasal pad present. Skull large, long, and massive; rostrum long and broad; nasal bones long and very narrow posteriorly; ascending branches of premaxilla extending back to plane of orbit.

MEASUREMENTS: In table 19.

SPECIMENS EXAMINED: Choapam: Comaltepec, one (U.S.N.M.). Mixes: Totontepec, one (U.S.N.M.); Zempoaltepec, one (U.S.N.M.).

Orthogeomys cuniculus Elliot

Plate 16, figures 5, 6; text figure 52

TYPE LOCALITY: Zanatepec, Oaxaca, Mexico.

RANGE IN OAXACA: Arid tropical regions in the foothills of southeastern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 320–330; naked nasal pad small or absent; pelage coarse, moderately long, Vandyke Brown, and sparsely distributed over under parts, forelimbs and hind limbs, and feet; ears small; tail naked. Skull small for genus; nasals long and narrow; rostrum slender; zygomatic arches relatively slender and narrow.

MEASUREMENTS: In table 19.

SPECIMENS EXAMINED: Juchitán: Ingenio Santo Domingo, one; Unión Hidalgo, one.

SPECIMENS RECORDED: (Elliot, 1905, p. 234). Juchitán: Zanatepec, one (F.M.N.H.).

SUMMARY OF *Orthogeomys* OF OAXACA

Two species of *Orthogeomys* are known to occur in Oaxaca. A comparatively small species, *O. cuniculus*, is found in the tropical lowlands of the southeastern part of the state, and a large species, *O. grandis*, represented by six geographical forms, is widely distributed over the tropical lowlands and central highlands of Oaxaca. *Orthogeomys g. scalops* is a medium-sized, well-haired, brownish form occurring in southern Oaxaca east of the Río Tehuantepec. *Orthogeomys g. carbo* is a scantily haired, blackish brown form about the size of *O. g. scalops* which ranges in the tropical lowlands and adjacent foothills west of the Rio Tehuantepec. *Orthogeomys g. carbo* probably intergrades with *O. g. alleni*, a larger, scantily haired lowland form occurring in southwestern Oaxaca. *Orthogeomys g. nelsoni* is a very large, well-haired, brownish form occurring in the northeastern highlands west of the Isthmus of Tehuantepec. *Orthogeomys g. felipensis*, a comparatively long-haired, blackish form, has a distribution on the high mountain slopes of central Oaxaca. *Orthogeomys g. alvarezi* is a recently described form of which no specimens have been seen by this author.

GENUS **HETEROGEOMYS** MERRIAM

HISPID POCKET GOPHERS

Heterogeomys hispidus hispidus (LeConte)

Text figure 52

TYPE LOCALITY: Near Jalapa, Veracruz, Mexico.

RANGE IN OAXACA: Mountain slopes in the northwestern part of the state.

GENERAL CHARACTERS: (Based on Veracruz specimens). Total length, 323–345, size large; color dark brown, with or without a narrow white stripe across lower back that may or may not encircle body; pelage dense and coarse; claws on forefeet enlarged; upper incisors deeply unisulcate, sulcus wholly on inner side; tail naked; a large naked pad at end of nose above nostrils. Skull large, angular, and broad; frontals broad and flat;

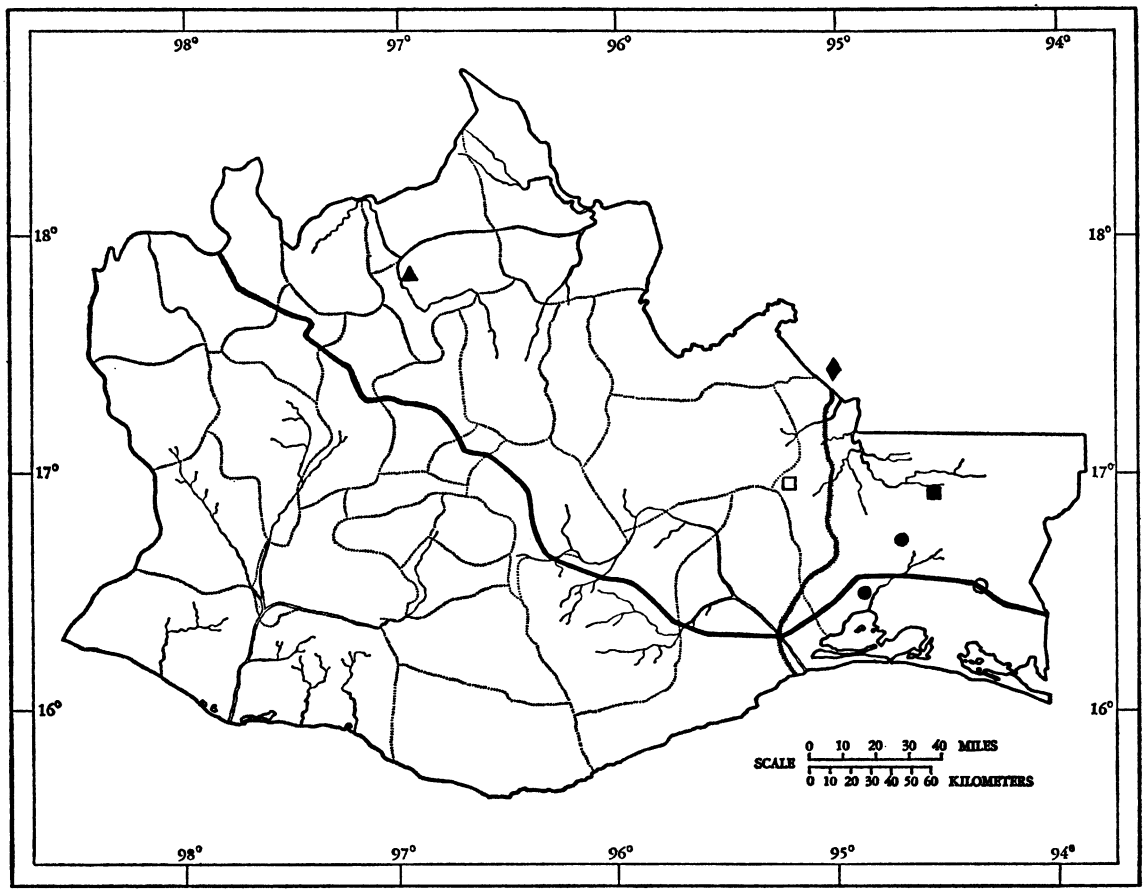


FIG. 52. Records of *Orthogeomys cuniculus* and *Heterogeomys hispidus* in Oaxaca. ● *O. cuniculus.* ○ Type locality of *O. cuniculus.* ▲ *H. h. hispidus.* ■ *H. h. tehuantepecus.* □ Type locality of *H. h. tehuantepecus.* ◆ *H. h. isthmicus.*

zygomatic arches widely spread; nasals long and inflated anteriorly.

MEASUREMENTS: In table 19.

SPECIMENS EXAMINED: Oaxaca: Cuicatlán: Reyes, one skin (U.S.N.M.). Veracruz: Jalapa, six.

Heterogeomys hispidus torridus Merriam

TYPE LOCALITY: Chichicaxtla, Veracruz, Mexico, altitude 500 feet.

RANGE IN OAXACA: No specimens are known from this state, but the species may eventually be recorded from north-central Oaxaca.

GENERAL CHARACTERS: (Based on Veracruz specimens). Total length, 313–348; very similar in basic color to *H. h. hispidus*, but skull broader, with more widely spreading zygomatic arches and shorter nasal bones.

MEASUREMENTS: In table 19.

SPECIMENS EXAMINED: Veracruz: Motzorongo, one (U.S.N.M.).

Heterogeomys hispidus tehuantepecus Goldman

Plate 16, figures 7, 8; text figure 52

TYPE LOCALITY: Mountains 12 miles northwest of Santo Domingo and 60 miles north of the city of Tehuantepec, Oaxaca, Mexico, altitude 1600 feet.

RANGE IN OAXACA: Mountain slopes in the region near the top of the Continental Divide on the Isthmus of Tehuantepec and in northeastern Oaxaca.

GENERAL CHARACTERS: Based on Oaxacan specimens). Total length, adult male 332, adult females 306–348; pelage short, woolly, and dark brown; resembling *H. h. hispidus* from Jalapa, Veracruz, in general characters

but averaging smaller and paler. Skull angular, short, and broad, and strongly compressed in interorbital region; similar to that of *H. h. hispidus* but nasals more highly arched, less inflated posteriorly, frontal region less depressed anteriorly, jugal narrower; auditory bullae less inflated, not projecting below plane of surface of basioccipital; molariform tooth rows shorter.

MEASUREMENTS: In table 19.

SPECIMENS EXAMINED: Juchitán: La Gloria, one; Santo Domingo, five (U.S.N.M.).

Heterogeomys hispidus isthmicus
Nelson and Goldman
Text figure 52

TYPE LOCALITY: Jaltipan, Veracruz, Mexico, altitude 100 feet.

RANGE IN OAXACA: No specimens are known from Oaxaca, but the species may be eventually recorded from this state.

GENERAL CHARACTERS: (Based on Veracruz specimens). Total length, adult males 309–334, females 292–317; resembling *H. h. torridus* in size and color, but pelage a lighter shade of brown. Skull similar to that of *H. h. torridus*, but nasals longer, maxillary arm of zygoma heavier, and median part of lambdoid crest with a marked crescent-shaped anterior deflection.

MEASUREMENTS: In table 19.

SPECIMENS EXAMINED: Veracruz: Zuchil, two.

SUMMARY OF *Heterogeomys* OF OAXACA

The range of the genus *Heterogeomys* is restricted in Oaxaca to the Gulf drainage. Only one species, represented by a single form, *H. h. tehuantepecus*, has definitely been recorded from within the boundaries of the state. *Heterogeomys h. isthmicus* is a lowland form from the Isthmus of Tehuantepec in Veracruz, and its range can be expected to extend south into northern Oaxaca. A skin without skull in the United States National Museum from Reyes Papalo, Oaxaca, seems to be intermediate between *H. h. tehuantepecus* and typical *H. hispidus* from Jalapa, Veracruz; it appears to be closer to *H. h. tehuantepecus* but is listed here under *H. h. hispidus* because of the proximity and elevation of Reyes Papalo to the type locality of the nominate race.

TABLE 20
MEASUREMENTS (IN MILLIMETERS) OF TWO MALE ADULTS OF *Dipodomys phillipsii oaxacae* FROM TEOTITLÁN, OAXACA

	U.M. No. 88652[a]	U.M. No. 88653
Total length	255.0	248.0
Tail length	160.0	150.0
Hind foot	37.0	36.0
Skull, greatest length	34.5	34.0
Condylobasal length	28.0	26.6
Nasal length	12.9	12.7
Zygomatic breadth	19.6	18.3
Greatest breadth across bullae	22.0	21.7
Interorbital breadth	12.5	12.5
Rostrum breadth at root of zygoma	6.5	5.2
Palate breadth across molars	6.6	6.4
Maxillary tooth row	4.1	4.2

[a] Type.

FAMILY **HETEROMYIDAE** J. A. ALLEN AND CHAPMAN

SUBFAMILY **DIPODOMYINAE** COUES

GENUS **DIPODOMYS** GRAY

KANGAROO RATS

Dipodomys phillipsii oaxacae Hooper
Plate 17, figures 1, 2; text figure 53

TYPE LOCALITY: Teotitlán, Oaxaca, Mexico, altitude 950 meters.

RANGE IN OAXACA: Semi-arid uplands of northwestern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 248–255; tail longer than combined length of head and body, with crest of long hairs on terminal portion; hind limbs and feet greatly elongated; forefeet small; head and eyes large; ears small. Color Light Pinkish Cinnamon. Skull very broad posteriorly and flat; bullae large, rostrum narrow, slender, and extending anteriorly beyond incisors; upper incisors sulcate; molars rootless.

MEASUREMENTS: In table 20.

SPECIMENS EXAMINED: Teotitlán: Teotitlán, one (U.M.).

SUMMARY OF *Dipodomys* OF OAXACA

Dipodomys p. oaxacae is a small, pale-colored subspecies of *D. phillipsii*. It has a smaller and narrower skull than either

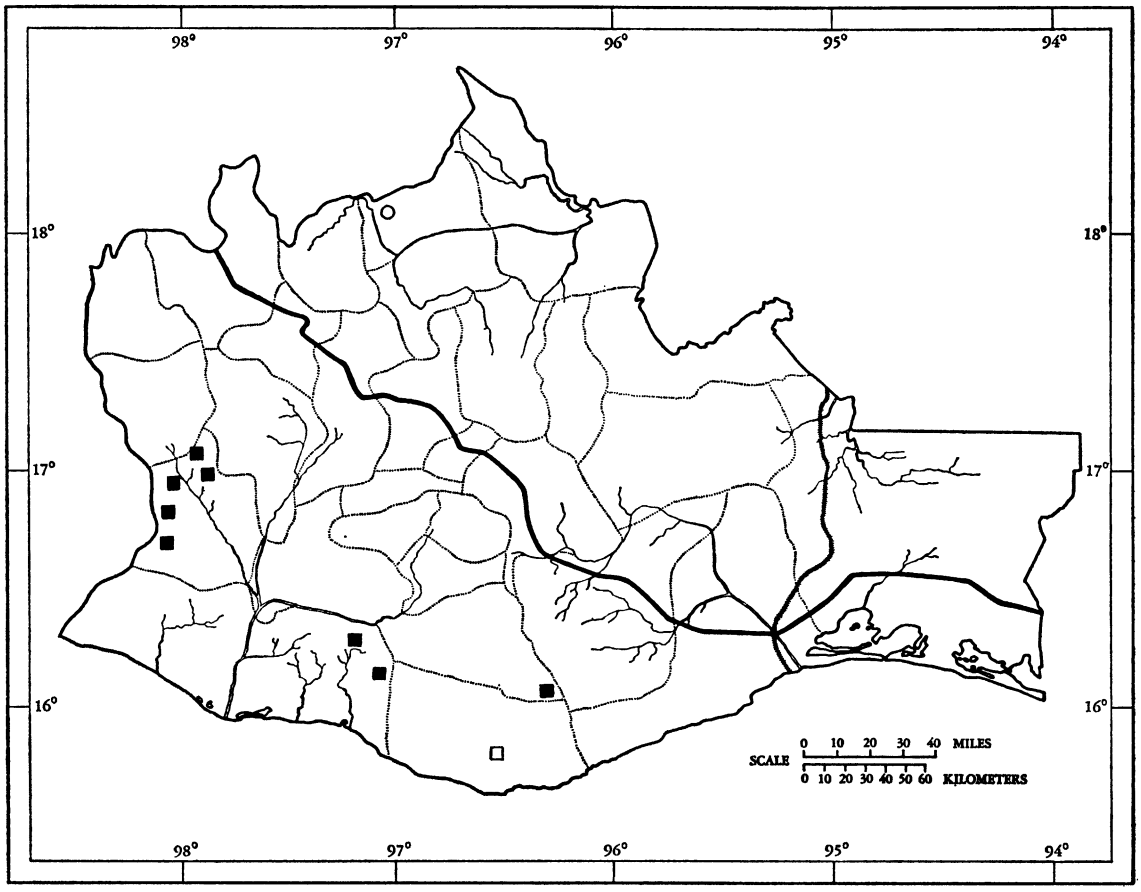


FIG. 53. Records of *Dipodomys phillipsii* and *Liomys annectens* in Oaxaca. ○ Type locality of *D. p. oaxacae.* ■ *L. annectens.* □ Type locality of *L. annectens.*

D. p. perotensis from Perote, Veracruz, or *D. p. phillipsii* from Hildalgo, Mexico. Teotitlán is the most southern known locality in the range of the genus *Dipodomys.*

SUBFAMILY **HETEROMYINAE** ALSTON

GENUS **LIOMYS** MERRIAM

SPINY POCKET MICE

Liomys pictus isthmius Merriam

Plate 17, figures 3, 4; text figure 54

TYPE LOCALITY: Tehuantepec, Oaxaca, Mexico.

RANGE IN OAXACA: Arid coastal plains and interior valleys on the southern side of the Isthmus of Tehuantepec in southern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 226–257; tail hairy, longer than head and body; sharply bicolored; color Mouse Gray, orange buffy lateral line narrow and indistinct; ears narrowly edged with whitish; outer sides of forelimbs white. Skull long and narrow; supraorbital ridges weakly developed; interparietal large and subtriangular; rostrum long and narrow; nasals long and slender; interpterygoid space U-shaped.

MEASUREMENTS: In table 21.

SPECIMENS EXAMINED: Juchitán: Buena Vista, three; La Mata, one; Nizanda, two; Tapanatepec, 28; 20 miles northwest of La Ventosa, three. Miahuatlán: San José Lachiguirí, one. Tehuantepec: Aguaje Guayaba, two; Aguaje Tres Cabezas, three; Cerro de Tigre, five; Cerro Palma de Oro, two; Cerro San Pedro, seven; Cerro Sombrerito, one; El Bambita, one; El Campanario, two; Escurano, 19; Gueladú, three; Guiengola, five; Jalapa,

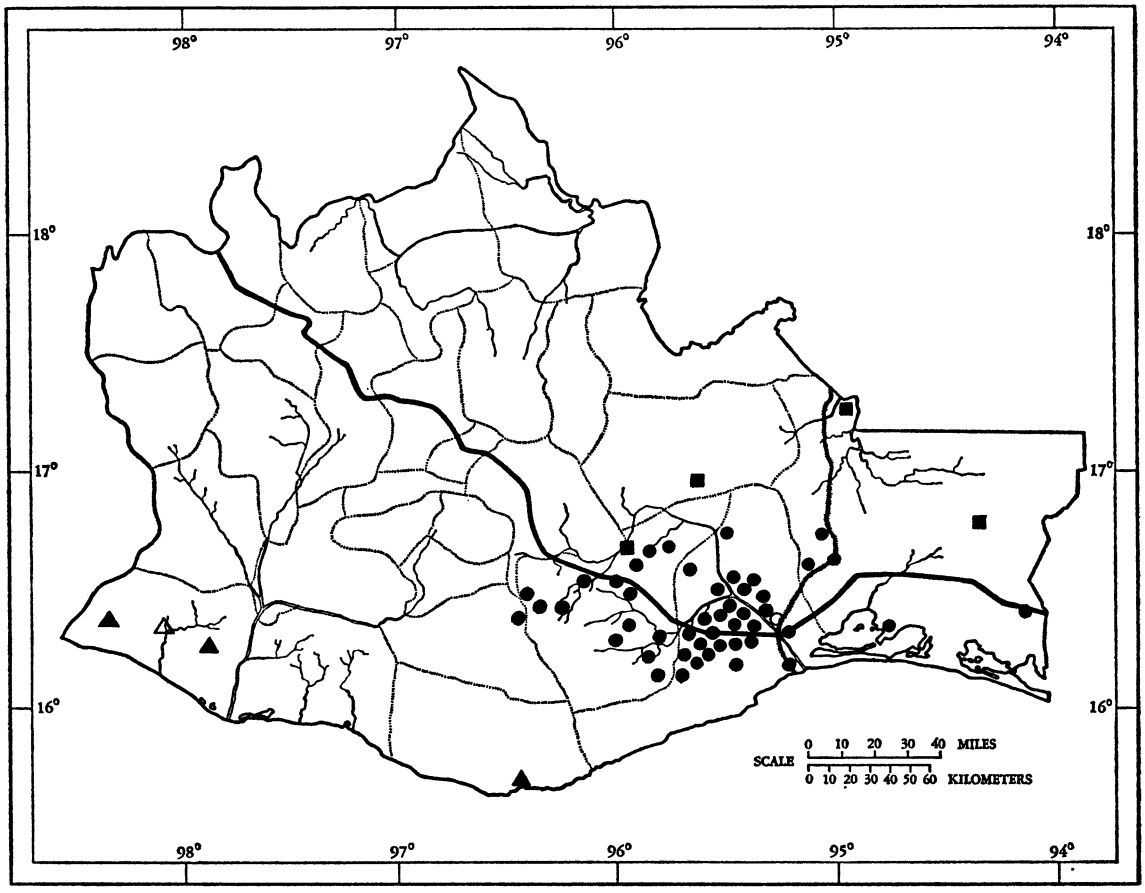


FIG. 54. Records of *Liomys pictus* in Oaxaca. ● *L. p. isthmius.* ○ Type locality of *L. p. isthmius.* ■ *L. p. veraecrucis.* ▲ *L. p. phaeurus.* △ Type locality of *L. p. phaeurus.*

two; Las Cuevas, two; Las Tejas, one; Mixtequilla, two; Ocotita, two; Portillo Guayaba, four; Portillo Zapote, one; Poza Río, three; Río Chile, one; Salazar, nine; Salina Cruz, one; San Antonio, two; Santa Lucía, 16; Santiago Lachiguirí, three; Tenango, two. Yautepec: Agua Blanca, six; Cerro Ocotepec, one; Cerro Verde, one; Chivaguela, one; Chontecomatlán, one; Guichina, five; La Chacahua, one; Río Grande, one; San Bartolo Yautepec, three; San Juan la Jarica, two; San Pedro Jilotepec, seven; Santa Catalina Quierí, one; Santa María Ecatepec, eight; Zarzamora, eight.

Liomys pictus veraecrucis Merriam

Text figure 54

TYPE LOCALITY: San Andres Tuxtla, Veracruz, Mexico.

RANGE IN OAXACA: Humid northern mountain slopes of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 220–234; similar in size to *L. p. isthmius* but color darker and less tawny; buffy lateral line narrow and indistinct in some specimens. Skull short and broad, rostrum heavy; zygomatic arches widely spread; nasals short and broad.

MEASUREMENTS: In table 21.

SPECIMENS EXAMINED: Juchitán: Isthmus of Tehuantepec, 8 miles south of the Veracruz-Oaxaca state line, one; Sierra Madre, 15 miles north of Zanatepec, four. Mixes: Ixcuintepec, two. Yautepec: Sixty miles northwest of Tehuantepec, three.

Liomys pictus phaeurus Merriam

Text figure 54

TYPE LOCALITY: Pinotepa, Oaxaca, Mexico.

RANGE IN OAXACA: Arid coastal region of southwestern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 215–239; similar to *L. p. isthmius* but averaging smaller, buffy lateral line more conspicuous and under side of tail dusky instead of white. Skull relatively shorter and broader than that of *isthmius*, with frontals broader and interparietal smaller.

MEASUREMENTS: In table 21.

SPECIMENS EXAMINED: Jamiltepec: Jamiltepec, three; Llano Grande, two (U.S.N.M.); Pinotepa Nacional, five. Pochutla: Puerto Angel, two (U.S.N.M.).

Liomys annectens (Merriam)

Plate 17, figures 5, 6; text figure 53

TYPE LOCALITY: Pluma, Oaxaca, Mexico, altitude 3000 feet.

RANGE IN OAXACA: Pacific slopes of the Sierra Madre in southwestern Oaxaca and west of the Guerrero state line.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Greatest length, 240–33, largest of *pictus* group; buffy lateral line conspicuous; similar in external characters to *phaeurus* and *rostratus* but decidedly larger than either. Skull most like that of *phaeurus*, but decidedly larger and rostrum relatively longer and narrower; interpterygoid space broadly V-shaped.

MEASUREMENTS: In table 21.

SPECIMENS EXAMINED: Miahuatlán: Sierra de San Felipe Lachilló, one. Juquila: Lachao, one; San Gabriel Mixtepec, 25. Putla: La Concepción, one; Mesones, one; Putla, one; San Vicente, five; Zacatepec, one.

SUMMARY OF THE *Liomys pictus* GROUP IN OAXACA

The *Liomys pictus* group in Oaxaca occurs

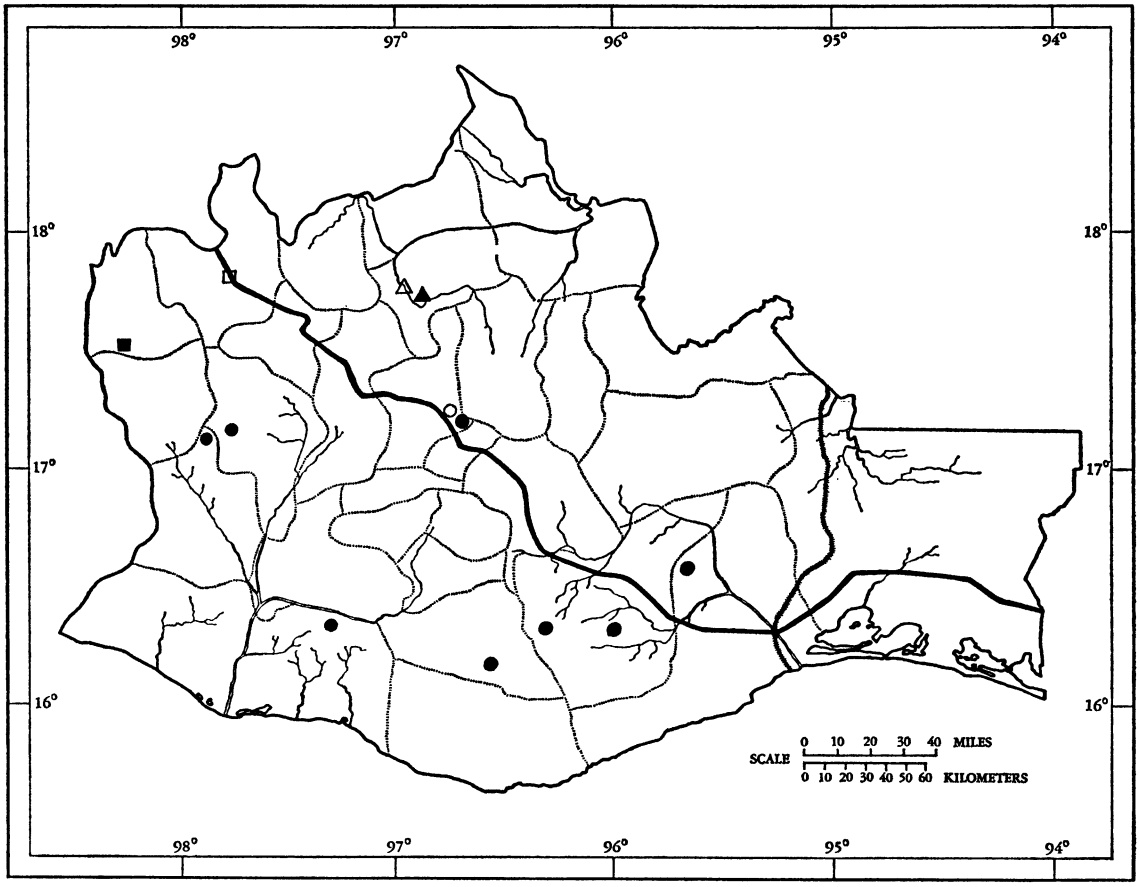


FIG. 55. Records of *Liomys irroratus* in Oaxaca. ● *L. i. irroratus*. ○ Type locality of *L. i. irroratus*. ■ *L. i. minor*. □ Type locality of *L. i. minor*. ▲ *L. i. torridus*. △ Type locality of *L. i. torridus*.

TABLE 21

MEASUREMENTS (IN MILLIMETERS) OF *Liomys* FROM OAXACA

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Breadth of Braincase	Palate Breadth Across Molars	Maxillary Tooth Row
Liomys pictus isthmius												
A.M.N.H. No. 145984, Buena Vista	♂ ad	245	112	28.0	34.1	29.1	14.4	15.6	8.0	12.5	6.1	4.5
A.M.N.H. No. 167450, Santiago Lachiguirí	♂ ad	242	131	27.0	33.7	28.6	13.6	15.6	8.4	13.5	6.6	4.8
A.M.N.H. No. 182092, San Bartolo Yautepec	♂ ad	256	123	25.0	—	28.3	—	15.5	8.5	13.2	5.9	4.7
A.M.N.H. No. 143435, Salazar	♂ ad	289	129	30.0	33.1	27.5	13.5	15.0	8.5	12.6	5.6	4.5
A.M.N.H. No. 143439, Salazar	♂ ad	244	131	28.0	31.5	26.2	13.0	14.5	7.9	12.8	5.5	4.2
A.M.N.H. No. 142561, Guiengola	♂ ad	246	132	30.0	32.7	26.8	13.4	15.3	8.0	13.2	6.0	4.5
A.M.N.H. No. 174653, Tapanatepec	♀ ad	244	136	27.0	33.5	28.4	13.5	15.4	8.5	12.7	5.8	4.8
A.M.N.H. No. 176974, Tapanatepec	♂ ad	252	125	28.0	33.4	28.0	13.0	15.3	8.1	12.5	5.6	5.0
A.M.N.H. No. 178735, San José Lachiguirí	♀ ad	122	124	30.0	31.3	26.4	12.8	14.8	8.3	12.3	5.9	4.9
A.M.N.H. No. 143937, Escurano	♀ ad	220	112	26.0	31.4	26.9	12.9	14.0	7.6	11.9	5.3	4.6
A.M.N.H. No. 204669, Zanatepec	♀ ad	242	139	29.0	32.0	27.0	13.5	15.5	8.2	12.7	6.0	4.8
A.M.N.H. No. 144570, Escurano	♂ ad	268	151	30.0	34.0	28.0	14.6	15.5	8.5	12.4	5.9	4.5
Liomys pictus phaearus												
U.S.N.M. No. 71495, Llano Grande	♂ ad	235	119	30.0	31.4	27.3	12.0	14.4	7.4	13.0	5.5	4.3
U.S.N.M. No. 71496, Llano Grande	♂ ad	215	100	29.0	32.4	28.2	13.5	14.6	7.7	12.7	5.5	5.1
U.S.N.M. No. 71504, Puerto Angel	♀ ad	228	118	30.0	31.0	25.5	12.3	14.4	8.7	12.5	5.5	4.7
U.S.N.M. No. 71505, Puerto Angel	♀ ad	238	123	30.0	31.0	25.5	12.5	14.5	7.5	12.7	5.5	4.6
Liomys pictus veraecrucis												
A.M.N.H. No. 165993, Ixcuintepec	♀ ad	227	121	27.5	—	—	13.7	15.2	9.8	13.2	5.8	4.7
A.M.N.H. No. 165994, Ixcuintepec	♀ ad	238	130	28.0	—	—	13.2	15.5	7.5	13.3	5.7	4.8
A.M.N.H. No. 190283, 60 mi. NW. Tehuantepec	♀ ad	239	139	28.0	31.9	26.6	13.2	14.0	7.7	12.2	5.7	5.0
A.M.N.H. No. 190284, 60 mi. NW. Tehuantepec	♂ ad	240	135	28.0	—	27.2	—	14.0	7.4	12.3	5.6	4.5

TABLE 21—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Breadth of Braincase	Palate Breadth Across Molars	Maxillary Tooth Row
Liomys annectens												
A.M.N.H. No. 190263, San Gabriel Mixtepec	♀ ad	245	124	30.0	33.5	28.5	14.2	15.2	8.3	13.1	5.8	5.0
A.M.N.H. No. 190271, San Gabriel Mixtepec	♂ ad	253	133	31.0	33.7	28.3	14.2	15.5	7.8	13.0	6.0	5.1
A.M.N.H. No. 190277, San Gabriel Mixtepec	♂ ad	275	149	31.0	34.6	29.2	14.2	15.8	8.3	13.2	6.0	4.9
A.M.N.H. No. 190273, San Gabriel Mixtepec	♀ ad	245	130	30.0	33.3	27.8	14.3	15.0	7.6	12.3	5.8	5.0
A.M.N.H. No. 206879, Sierra San Felipe Lachillo	♂ ad	250	130	30.0	33.7	28.7	13.3	15.9	7.9	13.0	5.9	5.2
Liomys irroratus irroratus												
A.M.N.H. No. 142261, Sto. Tomás Ocotepec	♀ ad	291	163	35.0	34.8	29.9	12.7	16.2	8.5	13.4	6.8	5.4
A.M.N.H. No. 145215, Sto. Tomás Quierí	♀ ad	290	160	34.0	34.9	30.0	14.0	16.0	8.4	13.0	6.8	5.4
A.M.N.H. No. 149921, San Pedro Jiltepec	♀	280	163	32.8	33.8	29.3	14.2	15.2	8.2	13.5	6.3	5.2
A.M.N.H. No. 189223, San Andrés Chicahuaxtla	♀ sub	230	125	32.0	33.6	29.2	12.2	16.0	8.2	13.1	6.3	5.5
A.M.N.H. No. 189228, San Andrés Chicahuaxtla	♀ ad	248	149	32.0	34.3	29.5	13.8	15.7	8.5	13.4	6.6	5.2
A.M.N.H. No. 189229, San Andrés Chicahuaxtla	♂ ad	268	151	32.0	35.5	30.5	13.3	15.5	8.4	13.7	7.4	6.2
Liomys irroratus torridus												
U.S.N.M. No. 69645,[a] Cuicatlán	♂ ad	242	134	28.0	—	—	—	—	—	—	—	—
A.M.N.H. No. 189219, Cuicatlán	♂ sub	232	137	29.0	31.5	26.6	12.3	14.0	7.5	11.9	5.8	4.9
A.M.N.H. No. 206877, Cuicatlán	♂ sub	232	134	28.0	—	—	—	—	—	—	—	—
Liomys irroratus minor												
U.S.N.M. No. 70301,[a] Huajuápam	♀ ad	222	125	27.0	29.0	—	11.7	14.2	7.3	13.9	—	4.6
U.S.N.M. No. 70226, Tlapacingo	♂ ad	257	143	29.0	31.3	27.1	13.3	15.4	7.8	13.3	6.3	4.5

[a] Type.

in the southern part of the state and across the Isthmus of Tehuantepec to Veracruz. Oaxacan specimens are separable into two species and four subspecies. *Liomys p. phaeurus* is applicable to specimens from southwestern Oaxaca, is the smallest form, and has a bright buffy lateral line and a tail that is unicolored distally. *Liomys p. isthmius* is comparatively large, its lateral line is indistinct or absent, its rostrum is long and slender, and it is common in the arid regions of southeastern Oaxaca. *Liomys p. veraecrucis* is about the size of *isthmius*, but is darker and has a lateral line that is brighter and a rostrum that is broader. It occupies Veracruz, and its range extends about halfway across the isthmus in Oaxaca. *Liomys annectens* is a well-marked species distinguishable from all other forms of the *pictus* group in Oaxaca by its large size; it frequents the humid tropical slopes of the Sierra Madre in southern Oaxaca.

Liomys irroratus irroratus (Gray)

Plate 17, figures 7, 8; text figure 55

Liomys irroratusy autepecus GOODWIN, 1956, p. 7; type from Rancho Sauce, Oaxaca.

TYPE LOCALITY: La Parada, 15 miles northeast of Oaxaca de Juárez, Oaxaca, Mexico.

RANGE IN OAXACA: High plains and mountain slopes of central Oaxaca at elevations from 4500 to 8000 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 252–295; size large for genus; tail long and hairy; pelage grizzled, buffy lateral line absent or inconspicuous when present; ears margined with white; upper side of limbs dusky; tail sharply bicolored, tip tufted. Skull large, supraorbital and parietal ridges lyre-shaped; nasals broad and notched posteriorly; premaxillae extending posteriorly, almost to level of orbits; audital and mastoidal bullae small.

MEASUREMENTS: In table 21.

SPECIMENS EXAMINED: Juquila: Yaitepec, one. Miahuatlán: San Miguel Suchitepec, one. Putla: San Andrés Chicahuaxtla, 10. Tlaxiaco: Santo Tomás Ocotepec, one. Yautepec: San Pedro Jilotepec, one; Santo Tomás Quierí, one; Santo Tomás Teipan, one. Etla: Cerro San Felipe, one.

REMARKS: Although the type series of *Liomys irroratus yautepecus* does display some characters divergent from the nominate form, these differences are of a local nature and not of sufficient importance to warrant the recognition of *yautepecus* as a subspecies.

Liomys irroratus minor Merriam

Text figure 55

TYPE LOCALITY: Huajuápam, Oaxaca, Mexico, altitude 5000 feet.

RANGE IN OAXACA: Upper slopes and plains of the Río Balsas drainage basin in northwestern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 215–263; size about like that of *L. i. torridus*, color much like that of *L. i. irroratus*. Skull small; rostrum relatively short and strongly tapered anteriorly; braincase deep; zygomata narrowed posteriorly.

MEASUREMENTS: In table 21.

SPECIMENS EXAMINED: Silacayoapam: Tlapacingo, one (U.S.N.M.).

Liomys irroratus torridus Merriam

Text figure 55

TYPE LOCALITY: Cuicatlán, Oaxaca, Mexico, altitude 2500 feet.

RANGE IN OAXACA: Arid interior slopes and valleys east of the Río Balsas drainages in northern Oaxaca and southeastern Puebla.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 230–275; size small, tail relatively long and color pale; smaller and lighter-colored than typical *irroratus*. Skull closely resembling that of typical *irroratus* but smaller and interparietal relatively broader and nasals less emarginate posteriorly.

MEASUREMENTS: In table 21.

SPECIMENS EXAMINED: Cuicatlán: Cuicatlán, two.

SUMMARY OF THE *Liomys irroratus* GROUP OF OAXACA

The Isthmus of Tehuantepec is the eastern limit of the range of the species *Liomys irroratus*. It occurs on the high plains and mountain slopes in central and northern Oaxaca. Three subspecies are known from the state; the typical form *L. i. irroratus* is widely distributed over central Oaxaca; a

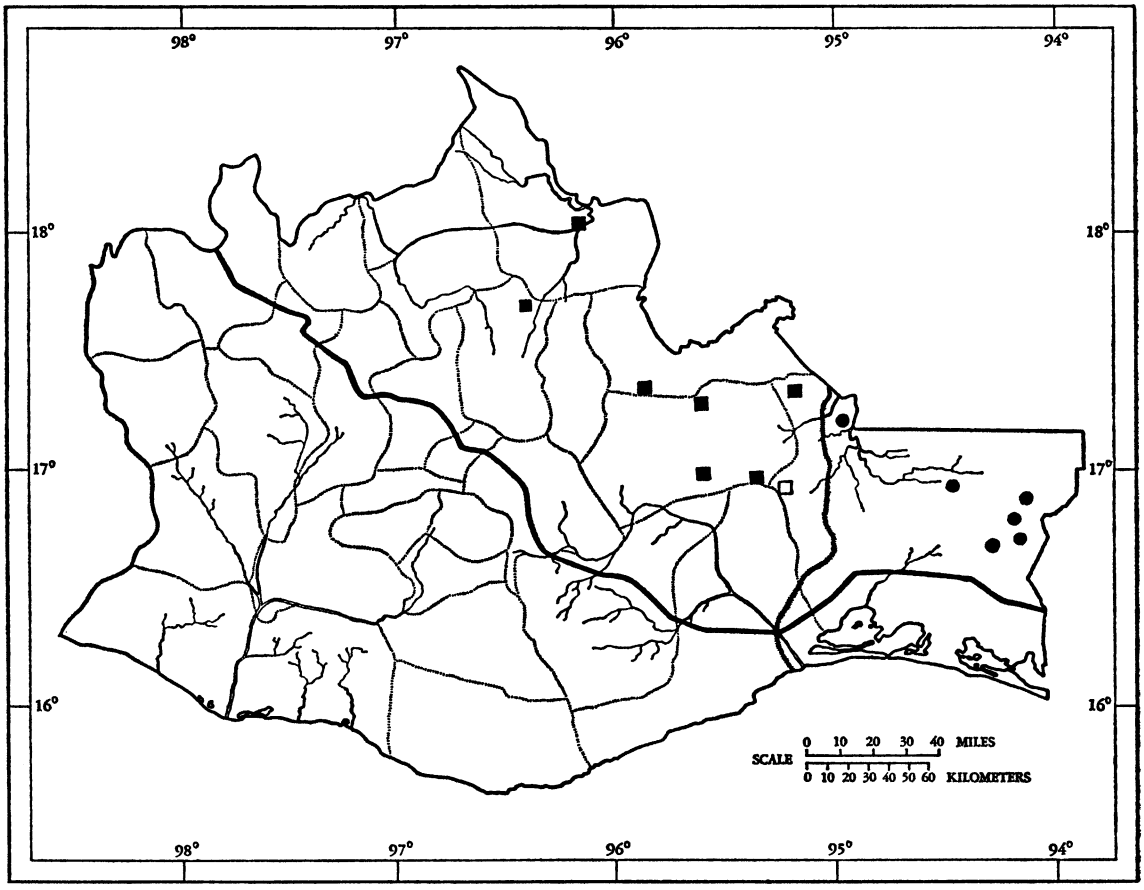


FIG. 56. Records of *Heteromys desmarestianus* and *Heteromys lepturus* in Oaxaca.
● *H. d. griseus.* ■ *H. lepturus.* □ Type locality of *H. lepturus.*

small pale form, *L. i. torridus*, occurs in north central Oaxaca, and a small dark form, *L. i. minor*, in the northwestern part of the state.

GENUS **HETEROMYS** DESMAREST
GREATER SPINY POCKET MICE

Heteromys desmarestianus griseus Merriam

Plate 17, figures 9, 10; text figure 56

TYPE LOCALITY: Mountains near Tonalá, Chiapas, Mexico.

RANGE IN OAXACA: Forested mountain slopes from the Isthmus of Tehuantepec east to the Chiapas state line.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 310–325; pelage spiny; claw on second digit of hind feet enlarged; tail longer than combined length of head and body; Mouse Gray color of upper parts extending down over outside of forearm to wrists; ears without white edging. Skull elongate, relatively small for species; interpterygoid fossa V-shaped and narrowed to a point anteriorly; premaxillae narrow and tapered posteriorly.

MEASUREMENTS: In table 22.

SPECIMENS EXAMINED: Juchitán: Arroyo Encantado, one; 40 miles south of Acayucan, Veracruz, two; La Gloria, one; Río Mono Blanco, six; Río Negro, one; Sierra Madre north of Zanatepec, seven.

Heteromys lepturus Merriam

Plate 17, figures 11, 12; text figure 56

Heteromys nigricaudatus GOODWIN, 1956, p. 4.

TYPE LOCALITY: La Rancheria Mountains near Santo Domingo (a few miles west of Guichicovi), Oaxaca, Mexico.

RANGE IN OAXACA: Humid, heavily forested

TABLE 22

MEASUREMENTS (IN MILLIMETERS) OF *Heteromys* FROM OAXACA

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Brain case Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Heteromys desmarestianus griseus												
A.M.N.H. No. 165999, Río Mono Blanco	♀ ad	307	175	37.0	36.7	—	15.4	17.6	9.5	14.3	6.4	5.0
A.M.N.H. No. 166000, Río Mono Blanco	♀ ad	295	167	37.0	37.6	—	15.6	17.0	9.2	13.9	6.3	5.2
A.M.N.H. No. 172496, 50 mi. S. Acayucan	♀ sub	270	157	32.0	34.2	28.3	14.3	16.3	—	13.4	6.2	5.0
A.M.N.H. No. 174688, 50 mi. S. Acayucan	♀ ad	310	178	37.0	38.0	31.5	16.4	17.5	9.9	14.2	6.4	5.2
A.M.N.H. No. 189234, Río Mono Blanco	♀ ad	300	170	35.0	38.5	31.7	16.7	17.6	10.0	14.9	6.4	5.2
A.M.N.H. No. 189235, Río Mono Blanco	♀ ad	287	176	37.0	37.3	31.2	14.7	17.0	9.3	14.2	6.4	5.5
A.M.N.H. No. 189237, Río Negro	♀ ad	270	157	34.0	35.0	28.9	14.7	15.9	9.0	14.2	6.0	4.8
A.M.N.H. No. 204667, Zanatepec	♀ ad	297	165	37.0	38.0	—	16.0	17.2	9.7	14.6	6.3	5.0
A.M.N.H. No. 205278, Zanatepec	♀ ad	312	181	36.0	37.6	31.2	16.0	17.4	9.0	13.8	6.3	5.1
Heteromys lepturus												
U.S.N.M. No. 73382,[a] Sto. Domingo	♂ ad	340	191	39.0	38.2	—	15.9	—	10.9	15.7	—	5.4
U.S.N.M. No. 73381, Sto. Domingo	♀ ad	311	176	38.0	36.5	30.2	15.0	16.6	10.1	14.1	6.2	5.0
U.S.N.M. No. 15438, Tuxtepec	♀ ad	305	164	35.0	36.2	30.0	15.4	16.8	9.8	13.6	6.1	5.1
U.S.N.M. No. 68591, Choápam	♀ sub	285	152	40.0	35.8	29.3	14.6	16.5	9.3	14.0	6.2	5.6
A.M.N.H. No. 165995, Mazatlán	♀ sub	283	153	36.5	36.0	29.0	14.5	16.9	9.5	13.9	6.5	5.4
A.M.N.H. No. 212386, Tarabundí	♀ ad	285	155	35.5	36.3	30.2	15.8	16.4	9.5	14.0	6.3	5.0
A.M.N.H. No. 212388, Tarabundí	♀ ad	265	140	36.8	36.5	30.5	15.0	16.9	9.2	14.0	6.3	5.5

[a] Type.

mountain slopes and coastal plains on the Gulf drainage west of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 311–340; tail long; color dark; ankles dusky all around, rather than white on upper side as in *desmarestianus;* ears without white edging; buffy lateral line usually present but narrow. Skull large, rostrum heavy and long; frontals broad; braincase high; premaxillary broad and reaching posteriorly beyond posterior border of nasals; zygomatic arches widely spreading anteriorly; frontals broad.

MEASUREMENTS: In table 22.

SPECIMENS EXAMINED: Choapan: Choapan, one (U.S.N.M.). Ixtlán: Tarabundí, three. Juchitán: Río Jaltepec, near Oaxaca-Veracruz border, one; mountains near Santo Domingo, one (U.S.N.M.). Tuxtepec: Tuxtepec, one (U.S.N.M.). Mixes: Ixcuintepec, one; Mazatlán, one; Jaltepec, one.

REMARKS: *Heteromys nigricaudatus* Goodwin is here listed in synonymy under *H. lepturus*. The type specimen of *nigricaudatus* is immature, and the characteristics attributed to this species come within the range of individual variation of the series of *H. lepturus* now available.

SUMMARY OF *Heteromys* OF OAXACA

The genus *Heteromys* is restricted to the eastern and northern areas of the state. Two species are represented; a buffy gray form, *H. desmarestianus griseus*, common east of the Isthmus of Tehuantepec, and a darker form that occurs on the heavily forested mountain slopes west of the Isthmus; both species approach each other, and their ranges probably overlap near the Oaxaca and Veracruz border on the Isthmus.

FAMILY **CRICETIDAE** ROCHEBRUNE

SUBFAMILY **CRICETINAE** MURRAY

GENUS **ORYZOMYS** BAIRD

RICE RATS

SUBGENUS **ORYZOMYS** BAIRD

Oryzomys couesi couesi (Alston)

Plate 18, figures 1, 2; text figure 57

TYPE LOCALITY: Cobán, Guatemala.

RANGE IN OAXACA: Gulf drainage in northern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 242–294; pelage brownish, short and close; ears small and well haired; tail about equal to length of head and body, scaly and sparsely covered with fine short hair; feet white, large and broad; color of under parts normally buffy. Skull short, broad, and smoothly rounded; supraorbital and temporal ridges prominent; zygomata slender, evenly bowed and widest posteriorly; rostrum short; anterior palatine slits short and wide; barely reaching plane of anterior border of first molars; palate reaching posteriorly well beyond plane of last molars.

MEASUREMENTS: In table 23.

SPECIMENS EXAMINED: Ixtlán: Comaltepec, one. Juchitán: Palomares, two; Río Blanco, one; Río Jaltepec, three; La Gloria, six; Río Mono Blanco, one; Río Negro, one; Río Sarabia, one; Ubero, four. Mixes: Ixcuintepec, one, "Nueva Raza," three. Tuxtepec: Chiltepec, four.

Oryzomys couesi mexicanus J. A. Allen

Text figure 57

TYPE LOCALITY: Hacienda San Marcos, Tonila, Jalisco, Mexico, altitude 3500 feet.

RANGE IN OAXACA: Coastal plains and basal mountains slopes on the Pacific drainage.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 230–273; size and general characters about like those of *O. c. couesi*, but color paler and more buffy and under parts normally white (under parts buffy in *couesi*). Skull about like that of *Oryzomys c. couesi.*

MEASUREMENTS: In table 23.

SPECIMENS EXAMINED: Jamiltepec: Pinotepa Nacional, one. Juchitán: Buena Vista, one; Tapanatepec, six; Zanatepec, two. Juquila: Juquila, two; Nopala, one; San Gabriel Mixtepec, 32. Tehuantepec: Huamelula, four; Jalapa, six; Tres Cruces, one.

REMARKS: The specimen from Pinotepa is richer colored than the average for specimens of *Oryzomys c. mexicanus* from southern Oaxaca and has the under parts warm buffy. This specimen, however, is immature and is here provisionally referred to *mexicanus* on geographical grounds.

Oryzomys couesi aztecus Merriam

Text figure 57

TYPE LOCALITY: Yautepec, Morelos, Mexico, altitude 4000 feet.

TABLE 23

MEASUREMENTS (IN MILLIMETERS) OF *Oryzomys* FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Oryzomys couesi couesi												
OAXACA												
A.M.N.H. No. 177202, Río Jaltepec	♂ ad	282	156	32.0	32.5	29.8	13.5	16.3	5.9	12.8	5.8	4.7
A.M.N.H. No. 177203, Río Jaltepec	♂ ad	251	127	30.0	31.0	28.2	12.3	16.3	5.0	13.1	5.5	4.4
A.M.N.H. No. 186422, Río Sarabia	♂ ad	252	123	32.0	31.0	—	12.5	16.1	4.5	13.0	5.8	4.6
A.M.N.H. No. 189239, Río Mono Blanco	♂ ad	242	135	31.0	31.2	28.6	12.3	15.5	4.5	13.2	5.7	4.9
A.M.N.H. No. 189240, Río Negro	♂ ad	222	130	30.0	29.2	26.0	11.5	14.2	4.7	12.7	5.5	4.6
A.M.N.H. No. 166012, La Gloria	♂ ad	258	135	30.0	30.5	28.5	13.3	14.7	4.7	13.2	5.2	4.7
A.M.N.H. No. 186914, Comaltepec	♂ ad	233	123	30.5	29.7	26.7	12.2	14.5	4.6	12.5	5.6	4.5
A.M.N.H. No. 190287, Chiltepec	♂ ad	272	145	32.0	32.0	29.9	12.6	16.2	4.7	13.2	5.7	4.7
Oryzomys couesi mexicanus												
OAXACA												
A.M.N.H. No. 145255, Huamelula	♀ ad	251	132	28.0	30.4	27.9	11.7	16.3	5.1	12.2	5.4	4.3
A.M.N.H. No. 147721, Zanatepec	♀ ad	243	123	30.0	29.4	—	11.3	15.3	5.0	12.3	5.6	4.8
A.M.N.H. No. 175202, Jalapa	♂ ad	259	138	32.0	—	26.4	—	15.9	4.8	12.1	5.4	4.4
A.M.N.H. No. 174624, Tapanatepec	♀ ad	247	129	28.0	29.2	26.9	11.2	15.2	4.5	12.5	5.6	4.2
A.M.N.H. No. 143291, Tres Cruces	♀ ad	247	139	32.0	28.7	26.5	11.2	15.3	5.0	12.5	5.6	4.5
A.M.N.H. No. 190293, San Gabriel Mixtepec	♀ ad	255	130	28.0	30.4	28.0	12.2	16.7	5.2	12.5	5.6	4.2
A.M.N.H. No. 190306, San Gabriel Mixtepec	♂ ad	230	120	30.0	28.6	26.0	10.5	14.8	4.5	12.5	5.3	4.6
A.M.N.H. No. 190313, San Gabriel Mixtepec	♀ ad	272	142	29.0	31.2	28.4	12.7	16.4	4.7	13.2	5.8	4.5
A.M.N.H. No. 190326, San Gabriel Mixtepec	♂ ad	241	121	28.0	30.2	27.6	12.0	16.0	4.6	12.8	5.5	4.4

TABLE 23—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Oryzomys couesi aztecus												
MORELOS												
U.S.N.M. No. 51173,[a] Yautepec	♂ ad	290	154	35.0	32.4	—	12.9	17.0	5.2	12.2	—	5.0
Oryzomys melanotis rostratus												
OAXACA												
A.M.N.H. No. 175228, Jaltepec	♂ ad	218	123	29.0	28.5	25.2	10.5	14.1	4.5	12.0	5.2	4.4
A.M.N.H. No. 175258, Jaltepec	♀ ad	248	130	30.0	29.5	—	11.3	14.6	4.7	12.0	5.6	4.5
Oryzomys alfaroi chapmani												
OAXACA												
A.M.N.H. No. 182095, Macuiltianguis	♂ ad	216	122	27.0	26.5	23.4	9.3	13.2	5.0	11.8	4.9	3.9
A.M.N.H. No. 182096, Macuiltianguis	♀ ad	220	121	26.0	26.7	23.7	9.4	13.8	4.9	12.0	5.1	3.8
A.M.N.H. No. 178739, Santiago Lachiguirí	♀ ad	223	121	26.0	27.4	24.5	10.6	14.0	4.9	11.3	5.0	3.8
VERACRUZ												
A.M.N.H. No. 12564, Jalapa	♀ ad	210	110	24.0	26.5	23.3	9.5	13.4	4.8	11.8	5.3	3.9
A.M.N.H. No. 12556, Jalapa	♀ ad	219	111	25.0	26.3	23.4	11.0	13.7	4.7	11.5	5.2	3.7
Oryzomys alfaroi guerrensis												
GUERRERO												
U.S.N.M. No. 127517,[a] Omilteme	♂ ad	220	118	27.0	26.3	—	10.1	14.0	4.9	10.6	—	3.8
OAXACA												
A.M.N.H. No. 165024, Río Grande	♂ ad	205	100	24.0	26.3	23.3	11.0	—	5.3	—	4.5	3.5
A.M.N.H. No. 145311, Zapotitlán	♀ juv	174	98	24.0	24.8	22.0	9.0	13.0	4.8	11.0	4.6	3.7
Oryzomys alfaroi gloriaensis												
OAXACA												
A.M.N.H. No. 166013, La Gloria	♀ ad	215	115	25.0	—	—	10.7	14.0	4.8	11.7	5.4	4.0
A.M.N.H. No. 166014,[a] La Gloria	♂ ad	225	127	26.0	26.9	24.9	11.5	14.3	4.9	11.8	5.4	3.9

TABLE 23—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Oryzomys alfaroi palatinus												
TABASCO												
U.S.N.M. No. 99977,[a] Teapa	♀ ad	209	106	25.0	26.7	—	10.2	12.6	4.8	10.2	—	3.8
OAXACA												
A.M.N.H. No. 206909, Sierra Madre, Zanatepec	♂ ad	225	130	25.0	27.6	24.9	9.3	13.3	4.6	11.0	5.2	3.5
A.M.N.H. No. 206911, Sierra Madre, Zanatepec	♀ ad	205	105	25.0	27.2	25.4	10.4	13.5	4.8	11.8	4.8	3.5
Oryzomys caudatus												
OAXACA												
U.S.N.M. No. 68641,[a] Comaltepec	♂ ad	257	141	30.0	29.0	—	11.4	15.0	5.0	11.3	—	3.9
U.M. No. 112896, 4 mi. SW. Llano de las Flores	♂ ad	231	115	25.0	28.3	25.4	11.0	14.0	4.8	11.7	5.0	3.9
U.M. No. 112900, N. Llano de las Flores	♂ ad	235	122	27.0	30.0	27.0	11.8	14.2	5.6	12.2	5.2	4.1
U.M. No. 112910, 13 mi. NE. Llano de las Flores	♀ ad	230	123	26.0	27.7	24.5	10.7	14.3	4.6	11.8	5.0	3.8
A.M.N.H. No. 212214, Tarabundí	♂ ad	223	126	29.0	28.3	25.5	11.0	14.0	4.6	11.8	5.2	4.0
A.M.N.H. No. 212215, Tarabundí	♂ ad	233	127	27.0	28.4	25.5	11.3	14.3	5.1	12.1	5.2	4.0
Oryzomys fulvescens fulvescens												
OAXACA												
A.M.N.H. No. 145716, Santiago Lachiguirí	♀ old	195	115	22.0	22.4	—	8.3	11.0	3.5	10.1	4.1	3.1
A.M.N.H. No. 147602, Matías Romero	♀ ad	182	109	21.0	20.4	18.9	7.8	10.5	3.3	9.5	4.0	2.8
A.M.N.H. No. 175168, Ubero	♂ sub	165	95	23.0	20.3	17.8	7.3	10.5	3.6	10.2	3.9	2.9
A.M.N.H. No. 175169, Ubero	♂ sub	158	93	21.0	20.0	18.3	7.2	10.5	3.6	9.8	3.7	2.9

TABLE 23—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
VERACRUZ												
A.M.N.H. No. 12537–10847, Jalapa	♀ sub	173	100	21.0	21.0	18.5	8.5	10.8	3.4	10.2	4.1	2.8
A.M.N.H. No. 12540–10850, Jalapa	♀ ad	180	100	21.0	21.2	18.5	7.2	10.6	3.3	9.8	3.9	2.9
A.M.N.H. No. 12549–10859, Jalapa	♀ ad	180	115	21.0	21.0	18.9	7.4	10.8	3.1	9.7	3.9	3.0
Oryzomys fulvescens lenis												
OAXACA												
A.M.N.H. No. 190328, San Gabriel Mixtepec	♂ ad	190	110	23.0	22.4	20.0	8.3	11.8	3.9	—	4.0	2.9
A.M.N.H. No. 190329, San Gabriel Mixtepec	♀ sub	125	96	10.0	20.2	17.7	6.5	10.7	3.5	10.2	3.7	3.0
MICHOACÁN												
U.S.N.M. No. 125941,[a] Los Reyes	♂ ad	198	115	23.0	22.6	—	8.6	12.3	3.4	10.0	—	3.0
Oryzomys fulvescens pacificus												
OAXACA												
A.M.N.H. No. 174640, Tapanatepec	♀ ad	175	101	21.0	21.2	19.5	8.3	11.0	3.7	10.0	4.0	3.1

[a] Type.

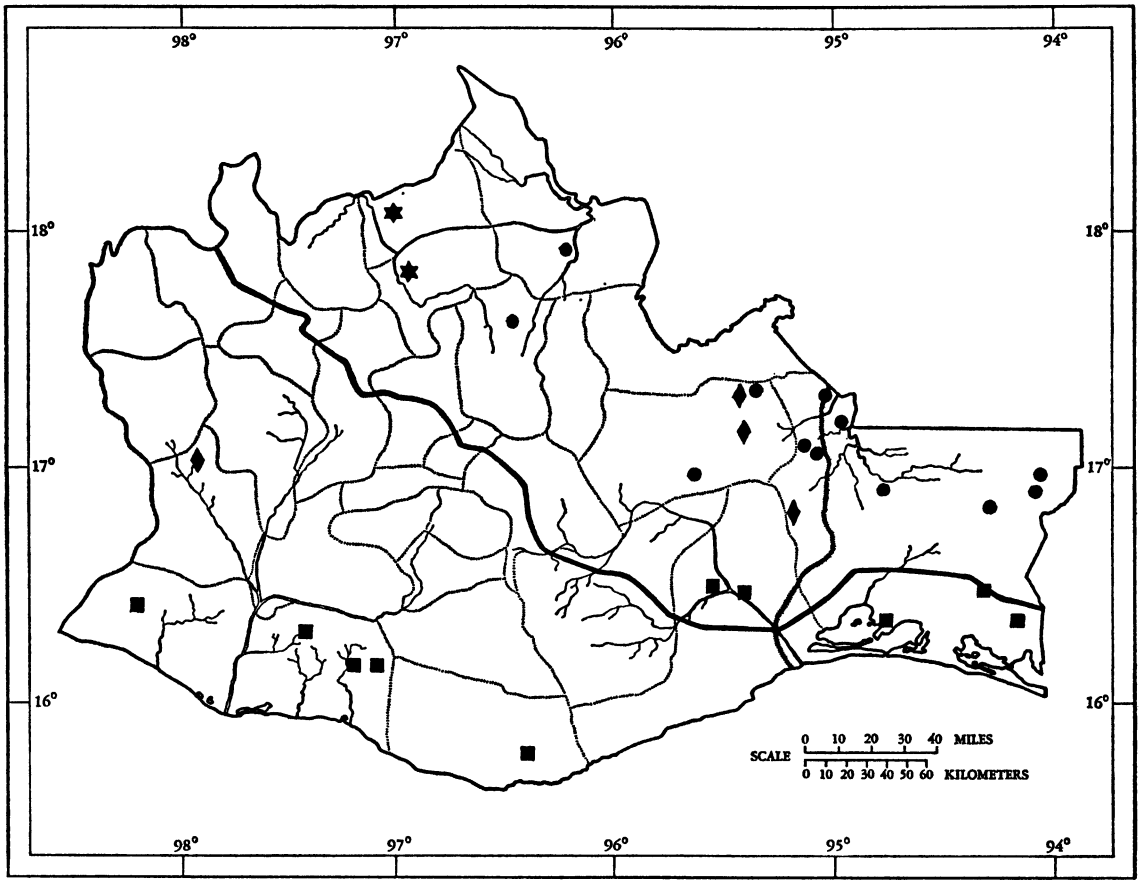


FIG. 57. Records of *Oryzomys couesi* and *Oryzomys melanotis* in Oaxaca. ● *O. c. couesi.* ■ *O. c. mexicanus.* ★ *O. c. aztecus.* ◆ *O. m. rostratus.*

RANGE IN OXACA: Interior valleys in the districts of Teotitlán and Cuicatlan.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 290–318; a pale-colored form closely resembling *O. c. mexicanus* but averaging larger, color paler and dentition heavier. Skull about like that of *O. c. mexicanus*, but molar teeth larger.

MEASUREMENTS: In table 23.

SPECIMENS EXAMINED: Cuicatlán: Cuicatlán, one (U.S.N.M.). Teotitlán: Teotitlán, one (U.M.).

Oryzomys melanotis rostratus Merriam

Plate 18, figures 5, 6; text figure 57

TYPE LOCALITY: Metlatloyuca, Puebla, Mexico, altitude 800 feet.

RANGE IN OAXACA: Forested plains and basal mountain slopes of northern and central Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 240–277; pelage coarse reddish brown; tail scaly, about as long as head and body; ears relatively large; hairs on hind toes projecting beyond tips of claws. Skull narrow, rostrum relatively long and slender; anterior palatine foramina very short and wide, shorter than palatal bridge, and ending posteriorly well in front of anterior plane of first molars.

MEASUREMENTS: In table 23.

SPECIMENS EXAMINED: Mixes: Jaltepec, two; "Nueva Raza," one. Putla: San Vicente, one.

SPECIMENS RECORDED: (Goldman, 1918, p. 54). Juchitán: Mountains near Santo Domingo, five (U.S.N.M.).

SUMMARY OF THE *Oryzomys couesi* GROUP OF OAXACA

Two species occur in Oaxaca. *Oryzomys*

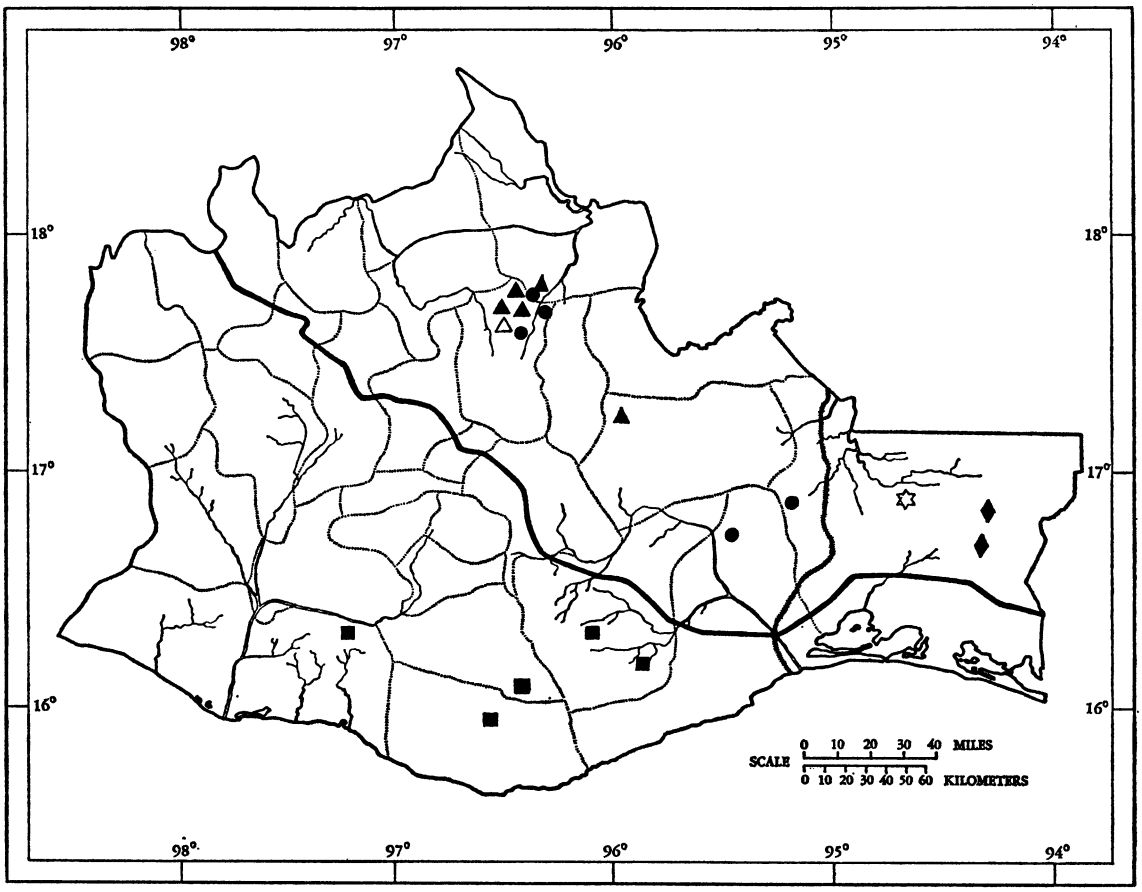


FIG. 58. Records of *Oryzomys alfaroi* and *Oryzomys caudatus* in Oaxaca. ● *O. a. chapmani.* ■ *O. a. guerrerensis.* ◆ *O. a. palatinus.* ☆ Type locality of *O. a. gloriaensis.* ▲ *O. caudatus.* △ Type locality of *O. caudatus.*

melanotis has one subspecies in Oaxaca, *O. m. rostratus.* It has hairs on the hind toes that project beyond the tips of the claws and is known from the Gulf drainage on the Isthmus of Tehuantepec and western Oaxaca. *Oryzomys couesi* is represented by three subspecies in Oaxaca: *Oryzomys c. couesi*, with warm buffy under parts, ranges in the Gulf drainage of northern Oaxaca; *O. c. mexicanus*, with buffy white under parts, frequents the lowlands and foothills of the Pacific drainage; and *O. c. aztecus*, a pale-colored form with whitish under parts, occurs in northwestern Oaxaca.

Oryzomys caudatus Merriam

Plate 18, figures 3, 4; text figure 58

TYPE LOCALITY: Comaltepec, Oaxaca, Mexico, altitude 3500 feet.

RANGE IN OAXACA: Mountains of northeastern Oaxaca west of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 218–257; size large for *alfaroi* group; pelage dense; color buffy brown mixed with black; tail unicolored, longer than length of head and body; elongated silvery tufts of hairs on toes of hind feet projecting beyond tips of longest claws. Skull large and heavy, rostrum broad and short; braincase flattened; anterior palatine foramina short and broad, shorter than palatal bridge and not reaching plane of first molars.

MEASUREMENTS: In table 23.

SPECIMENS EXAMINED: Ixtlán: Four miles southwest of Llano de las Flores, 8200 feet, one (U.M.); north of Llano de las Flores, 9500 feet, one (U.M.); 13 miles northeast of Llano de las Flores, 9200 feet, three (U.M.); Tarabundí, 5000 feet, two.

SPECIMENS RECORDED: (Goldman, 1918, p. 65). Mixes: Totontepec, one (U.S.N.M.).

REMARKS: Recent authors have followed Goldman (1918, p. 64) in placing *Oryzomys caudatus* as a subspecies of *Oryzomys alfaroi* because the greater size of *O. caudatus* has been its chief distinguishing character. Actually, *Oryzomys caudatus* differs from *O. alfaroi* not only externally but in distinctive cranial characters. Furthermore, there are specimens of both *O. caudatus* and *O. alfaroi* in the American Museum of Natural History from the same locality and collected on the same date. They should be regarded as separate species.

Specimens in the University of Michigan from the mountains near Llano de las Flores, 8200–9500 feet, are grayer in color and have skulls that are more slender than specimens from Tarabundí at 5000 feet. These differences, however, are here considered local.

Oryzomys alfaroi chapmani Thomas

Plate 18, figures 7, 8; text figure 58

TYPE LOCALITY: Jalapa, Veracruz, Mexico, altitude 4400 feet.

RANGE IN OAXACA: Forested eastern slopes of the Mexican plateau west of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 202–265; size small; pelage short, color dark tawny buff; tail longer than length of head and body; tufts of hairs on toes of hind feet projecting beyond tip of longest claws. Skull relatively short and broad; rostrum elongate; braincase broad and low; zygomatic arches squarely spreading anteriorly; anterior palatine foramina relatively long, frequently reaching anterior plane of first molars.

MEASUREMENTS: In table 23.

SPECIMENS EXAMINED: Ixtlán: Macuiltianguis, two; Tarabundí, three; Compamento Vista Hermosa, one. Juchitán: Petepa, one. Tehuantepec: Santiago Lachiguirí, one.

Oryzomys alfaroi guerrerensis Goldman

Text figure 58

TYPE LOCALITY: Omilteme, Guerrero, Mexico, altitude 8000 feet.

RANGE IN OAXACA: Forested Pacific slopes of Sierra Madre in southwestern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 174–221; size small; color pale buffy; similar in general to *O. a. chapmani* but smaller, color paler, and skull smaller and flatter. Skull small and short.

MEASUREMENTS: In table 23.

SPECIMENS EXAMINED: Juquila: Lacháo, one. Miahuatlán: Río Molino, two. Yautepec: Río Grande, one; Zapotitlán, one.

SPECIMENS RECORDED: (Goldman, 1918, p. 70). Pochutla: Pluma, two (U.S.N.M.).

Oryzomys alfaroi gloriaensis Goodwin

Text figure 58

TYPE LOCALITY: La Gloria, rain forest, 10 kilometers south of Santa Maria Chimalapa, District of Juchitán, Oaxaca, Mexico, altitude 2500 feet.

RANGE IN OAXACA: Known only from the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 215–225; size small; color dark; tail long and slender; similar in general to *O. a. chapmani* but color darker, tail relatively longer.

MEASUREMENTS: In table 23.

SPECIMENS EXAMINED: Juchitán: La Gloria, four.

Oryzomys alfaroi palatinus Merriam

Text figure 58

TYPE LOCALITY: Teapa, Tabasco, Mexico, altitude 3000 feet.

RANGE IN OAXACA: Forested mountain slopes on the Gulf drainage in eastern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 205–225; size small; color dark; tail long and slender; similar to *O. a. chapmani* but color darker and skull longer and narrower.

MEASUREMENTS: In table 23.

SPECIMENS EXAMINED: Juchitán: Sierra Madre north of Zanatepec, four; Río Blanco, one.

SUMMARY OF THE *Oryzomys alfaroi* GROUP OF OAXACA

Oaxacan specimens of the *alfaroi* group are separable into five forms. Four are geographical races of the species *alfaroi*. *Oryzomys a. chapmani* of Veracruz extends into northern Oaxaca and south on the western side of the Isthmus of Tehuantepec. A specimen from Lachiguirí seems to be intermediate between

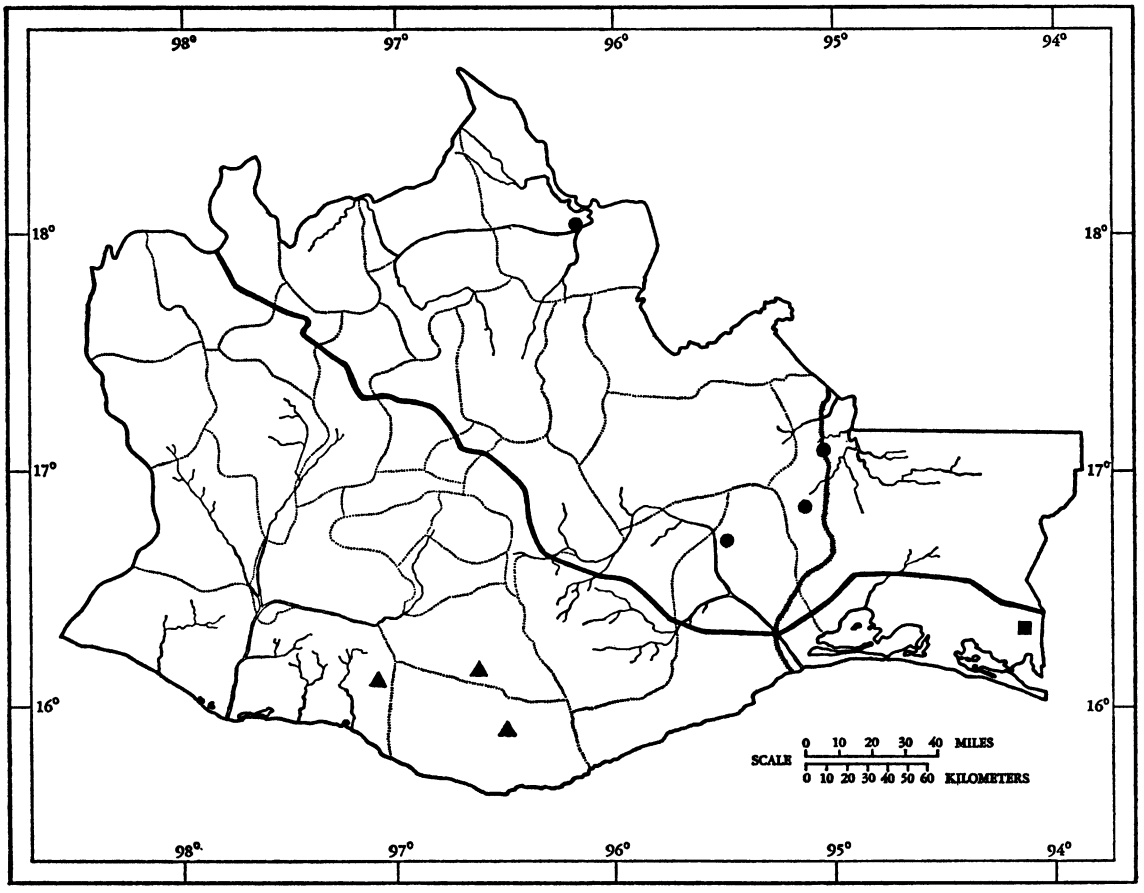


FIG. 59. Records of *Oryzomys fulvescens* in Oaxaca. ● *O. f. fulvescens.* ▲ *O. f. lenis.* ■ *O. f. pacificus.*

O. a. guerrerensis and *O. a. chapmani*, but is closer to the latter. *Oryzomys a. guerrerensis* is the palest form of the *alfaroi* group and is found in the hill country of southwestern Oaxaca. *Oryzomys a. gloriaensis* resembles *O. a. chapmani* in general characters but has a darker pelage, larger molariform teeth and occurs in Oaxaca east of the Isthmus of Tehuantepec. *Oryzomys a. palatinus* is a small form with very dark pelage and a narrow skull, and frequents the rain forests in southeastern Oaxaca. *Oryzomys caudatus* is the largest and most differentiated form of the Oaxaca *alfaroi* group. Its large size alone is sufficient to distinguish it from other forms.

SUBGENUS **OLIGORYZOMYS** BANGS

Oryzomys fulvescens fulvescens (Saussure)

Text figure 59

TYPE LOCALITY: State of Veracruz, Mexico; fixed by Merriam (1901, p. 295) at Orizaba.

RANGE IN OAXACA: Basal mountain slopes of the Isthmus of Tehuantepec, northwestward to Tuxtepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 168–205; tail longer than combined length of head and body; ears relatively large and coarsely haired; fur on toes of hind feet projecting beyond tips of claws; pelage short; color varying from dark Ochraceous-Buff to Ochraceous-Tawny; moderately darkened on back. Skull small and smoothly rounded; supraorbital and temporal ridges absent; interorbital region narrow; anterior palatine foramina moderately long and narrow; molariform teeth small.

MEASUREMENTS: In table 23.

SPECIMENS EXAMINED: Juchitán: Matías Romero, one; Ubero, two. Tehuantepec: Santiago Lachiguirí, one.

SPECIMENS RECORDED: (Goldman, 1918, p. 91). Tuxtepec: Tuxtepec, one (U.S.N.M.).

Oryzomys fulvescens lenis Goldman

Plate 18, figures 9, 10; text figure 59

TYPE LOCALITY: Los Reyes, Michoacán, Mexico.

RANGE IN OAXACA: Coastal plains and basal mountain slopes of southwestern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 188–198; similar to *O. f. fulvescens* but color paler and more yellowish. Skull similar to that of *O. f. fulvescens* but broader; zygomatic arches more widely spreading and dentition averaging larger.

MEASUREMENTS: In table 23.

SPECIMENS EXAMINED: Juquila: San Gabriel Mixtepec, three. Miahuatlán: Río Molino, two.

SPECIMENS RECORDED: Pochutla: Pluma Hidalgo, one (U.S.N.M.).

Oryzomys fulvescens pacificus Hooper

Text figure 59

TYPE LOCALITY: Mapastepec, Chiapas, Mexico, altitude 150 feet.

RANGE IN OAXACA: Pacific coastal plains and basal mountain slopes of southeastern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 155–190; tail relatively short; similar to *O. f. lenis* but tail shorter, color paler, and blackish hairs on dorsum more finely mixed with buffy hairs. Skull similar to that of *O. f. lenis* but smaller, narrower, and slenderer; palatine slits relatively longer.

MEASUREMENTS: In table 23.

SPECIMENS EXAMINED: Juchitán: Tapanatepec, one.

SUMMARY OF THE *Oryzomys fulvescens* GROUP OF OAXACA

Three closely allied subspecies of *Oryzomys fulvescens* occur in the Aird and Humid Lower Tropical zones of Oaxaca. *Oryzomys f. fulvescens* is the brightest colored and the tawniest form; specimens from northern Oaxaca and across the Isthmus of Tehuantepec are referable to this subspecies. *Oryzomys f. lenis*, a comparatively large and pale-colored form, ranges over the coastal lowlands in southwestern Oaxaca. *Oryzomys f. pacificus* is restricted to the coastal lowlands of southeastern Oaxaca and has a tail that is shorter and pelage that is paler than in either *O. f. fulvescens* or *O. f. lenis*.

GENUS **TYLOMYS** PETERS

TREE-CLIMBING RATS

Tylomys nudicaudus gymnurus Villa

Plate 19, figures 1, 2; text figure 60

TYPE LOCALITY: Presidio, Veracruz, Mexico, altitude, 1000 feet.

RANGE IN OAXACA: Forested mountain slopes of nothern Oaxaca west of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 385; tail naked, coarsely annulated, longer than combined length of head and body, distal third white; hind feet broad and short, upper surface dusky; pelage Dusky Drab, soft and woolly; pollex vestigial and bearing short, broad nail. Skull angular, superior outline nearly straight; braincase elongated, low, and flat; frontals broad, extended forward into wide supraorbital shelves and backward to outer corners of interparietal; anterior palatine foramina short and wide; molariform teeth large and heavy, first upper molar with six well-developed tubercles.

MEASUREMENTS: In table 24.

SPECIMENS EXAMINED: Mixes: Ixcuintepec, one. Yautepec: Lachivía, one skull.

REMARKS: Schaldach (1966, p. 295) regarded *Tyomys gymnurus* Villa as a probable subspecies of *T. nudicaudus*.

Tylomys nudicaudus microdon Goodwin

Plate 19, figures 3, 4; text figure 60

TYPE LOCALITY: La Gloria, rain forest, 10 kilometers southeast of Santa Maria Chimalapa, District of Juchitán, Oaxaca, Mexico, altitude 2500 feet.

RANGE IN OAXACA: Humid forested regions in southeastern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, about 422; size small; dorsal surface blackish; molariform teeth very small. Skull broad; supraorbital shelves broad, anterior palatine foramina long and narrow.

MEASUREMENTS: In table 24.

SPECIMENS EXAMINED: Juchitán: La Gloria, one.

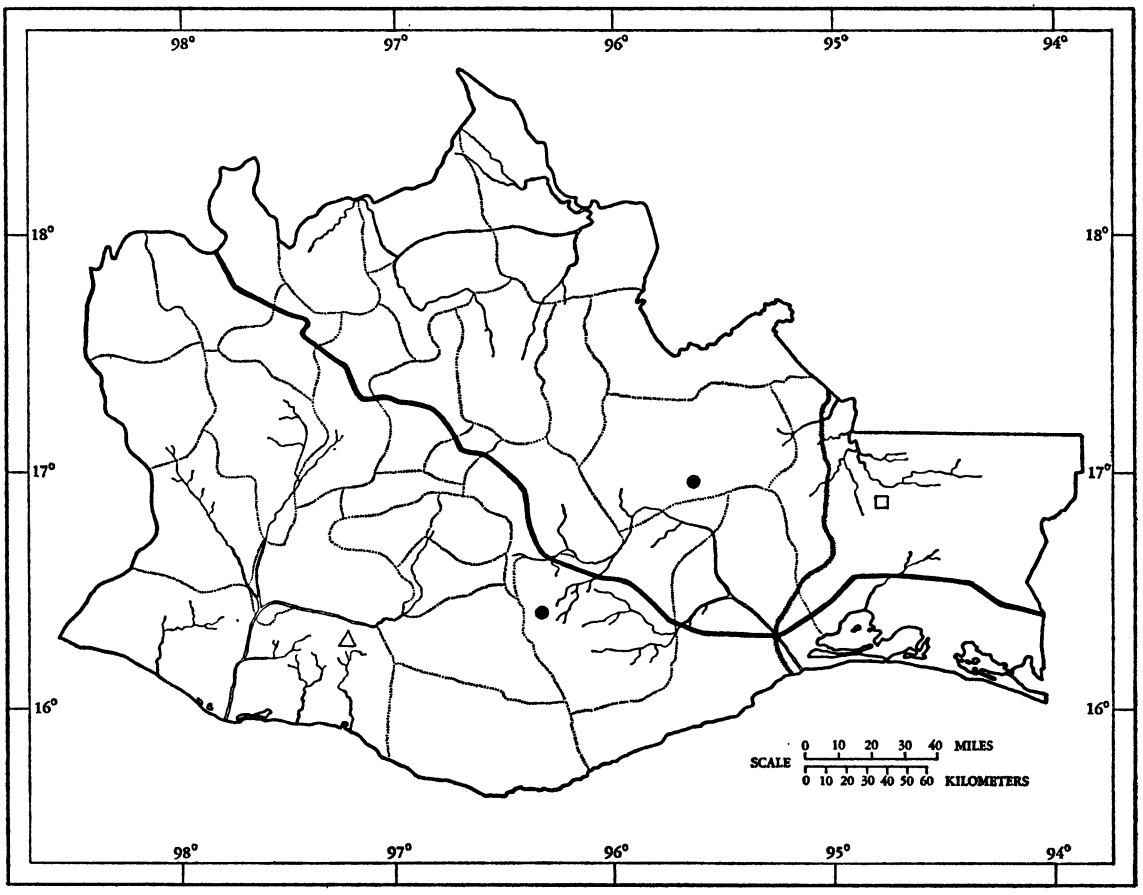


FIG. 60. Records of *Tylomys nudicaudus* in Oaxaca. ● *T. n. gymnurus.* □ Type locality of *T. n. microdon.* △ Type locality of *T. n. villai.*

Tylomys nudicaudus villai Schaldach

Text figure 60

Tylomys nudicaudus villae SCHALDACH, 1966, p. 294.

TYPE LOCALITY: Kilometer 183 on road from Oaxaca de Juárez to Puerto Escondido, 36.5 kilometers by road north of San Gabriel Mixtepec, Juquila District, Oaxaca, Mexico, altitude 1700 meters.

RANGE IN Oaxaca: Known only from the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length of adult female, 437; pelage brightly colored, between Orange Tawny and Sayal Brown. Skull similar to that of *T. n. microdon*, but nasals shorter and rostrum shorter and narrower, maxillary tooth row shorter than in *T. n. gymnurus*.

MEASUREMENTS: In table 24.

SPECIMENS RECORDED: (Schaldach, 1966, p. 294). Juquila: Kilometer 183, two (I.B.).

SUMMARY OF *Tylomys* OF OAXACA

Three forms of the tree-climbing rat *Tylomys nudicaudus* occur in Oaxaca. *Tylomys nudicaudus gymnurus* ranges from Veracruz south into the mountains of Oaxaca west of the Isthmus of Tehuantepec. It is a large rat with large molariform teeth, but the characteristics separating it from other forms of *Tylomys* in the *nudicaudus* group do not rank higher than subspecific differences. *Tylomys n. microdon* is known only from the rain forest east of the Isthmus of Tehuantepec in Oaxaca; its darker color, smaller teeth, and relatively longer palate readily distinguish it from *gymnurus*. In size, *T. n. microdon* suggests relationship with *Tylomys bullaris* Merriam from Tuxtla, Chiapas, Mexico, but the markedly inflated

TABLE 24

MEASUREMENTS (IN MILLIMETERS) OF *Tylomys* FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Tylomys nudicaudus gymnurus												
OAXACA												
A.M.N.H. No. 145347, Lachivía	ad	—	—	—	49.5	45.0	16.7	—	9.6	20.0	9.0	8.7
A.M.N.H. No. 148409, Ixcuintepec	♂ sub	383	204	41.0	46.8	42.1	15.7	22.8	8.4	18.1	8.8	9.0
VERACRUZ												
M.N.H.N.,[a] Presidio	♂ ad	400	200	38.6	47.0	43.8	16.1	25.2	8.5	—	—	9.4
Tylomys nudicaudus microdon												
OAXACA												
A.M.N.H. No. 165991,[a] La Gloria	♂ ad	422	227	39.0	49.5	45.3	18.7	26.0	9.1	9.6	8.5	8.1
Tylomys nudicaudus villai												
OAXACA												
I.B. No. 8516,[a] Kilometer 183	♀	437	237	40.0	49.0	44.8	16.4	25.7	8.4	17.6	8.5	8.0
Tylomys nudicaudus tumbalensis												
CHIAPAS												
U.S.N.M. No. 76059,[a] Tumbala	♂ sub	448	234	46.0	49.1	43.8	16.1	24.3	8.9	—	—	9.3
Tylomys bullaris												
CHIAPAS												
U.S.N.M. No. 76058,[a] Tuxtla	♂ im	324	158	37.5	—	36.2	—	20.8	7.8	—	—	8.2

[a] Type.

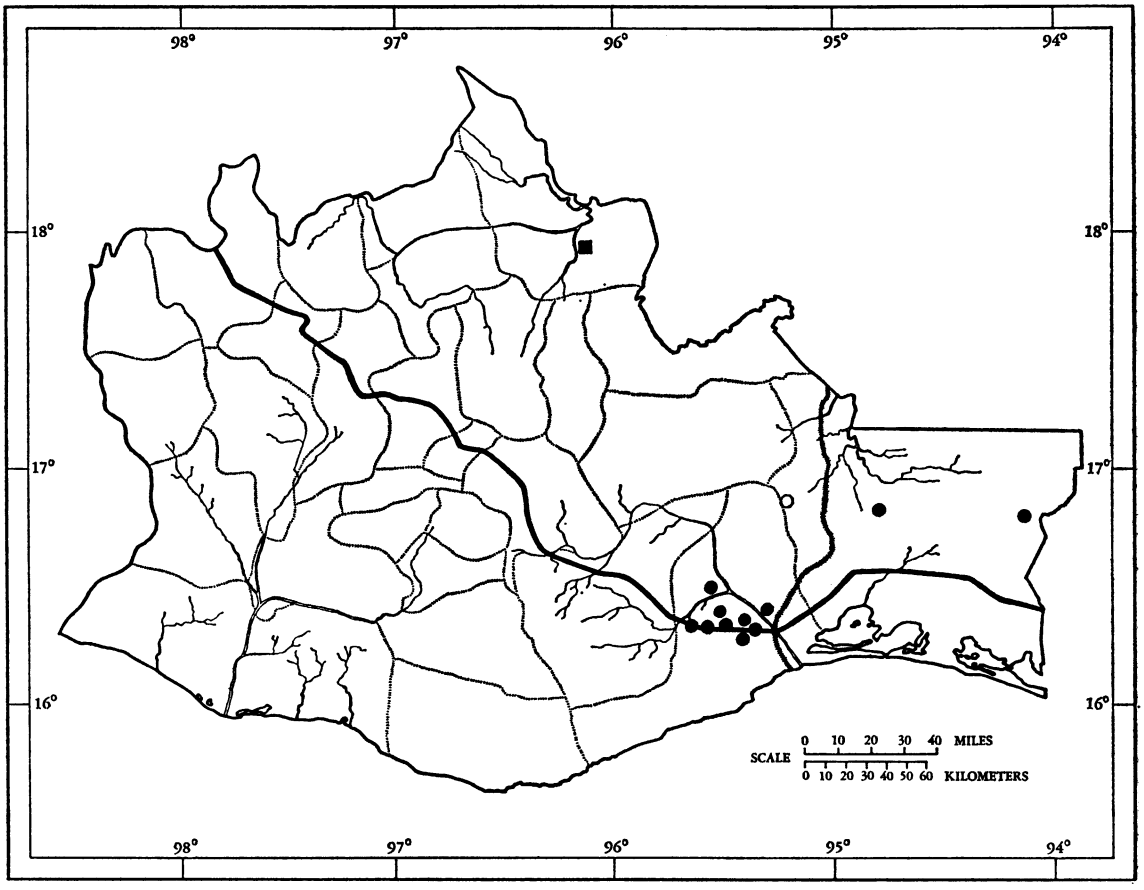


FIG. 61. Records of *Nyctomys sumichrasti* in Oaxaca. ■ *N. s. sumichrasti.* ● *N. s. pallidulus.* ○ Type locality of *N. s. pallidulus.*

audital bullae in *bullaris* are unique. In *microdon* the bullae are small and normal for the genus and have an anterior prolongation drawn out to a point not present in *bullaris*. The third form of Oaxacan climbing rat, *T. n. villai*, is about the same size as *T. n. microdon* and also has small molariform teeth, but the bright color of the pelage in *villai* is characteristic of the subspecies.

GENUS NYCTOMYS SAUSSURE

VESPER RATS

Nyctomys sumichrasti pallidulus Goldman

Plate 18, figures 11, 12; text figure 61

TYPE LOCALITY: Santo Domingo de Guzmán, 8 miles west of Lagunas, District of Juchitán, Oaxaca, Mexico, altitude 900 feet.

RANGE IN OAXACA: Arid tropical belt on the Pacific slopes of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 235–250; pelage short, color Cinnamon-Buff; tail thick, hairy, and slightly longer than length of head and body; hind feet short and broad; pad on forefeet representing pollex prominent and bearing a vestigial claw. Skull short and broad; rostrum short and slender; zygomatic arches squared and broadly spreading; supraorbital ridges strongly developed and extending across parietals to corners of interparietal; audital bullae small.

MEASUREMENTS: In table 25.

SPECIMENS EXAMINED: Juchitán: Las Conchas, one; Santo Domingo de Guzmán, five; Río Negro, one. Tehuantepec: Cerro Palma del Oro, one; Cerro San Pedro, five; Cerro Tigre, one; Escurano, five; Jalapa, two; Limón, one; San Antonio, one; Tehuantepec, one; Tenango, three.

TABLE 25

MEASUREMENTS (IN MILLIMETERS) OF *Nyctomys* FROM OAXACA

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Nyctomys sumichrasti pallidulus												
A.M.N.H. No. 143381, Las Conchas	♂ ad	—	—	23.0	30.9	27.7	10.2	16.9	5.4	13.5	6.0	4.6
A.M.N.H. No. 3101–2429, Santo Domingo	♂ ad	—	—	24.0	31.2	28.7	10.2	17.4	6.0	14.2	5.7	4.7
A.M.N.H. No. 3102–2421, Santo Domingo	♀ ad	228	104	23.0	30.8	28.2	9.8	17.7	5.6	14.3	5.8	4.5
A.M.N.H. No. 3103–2422, Santo Domingo	♀ ad	241	109	23.0	30.4	27.2	9.4	16.8	5.6	14.2	6.0	4.6
A.M.N.H. No. 145212, San Antonio	♂ ad	—	—	23.0	30.6	28.0	9.5	17.3	6.7	14.2	5.9	4.6
A.M.N.H. No. 149019, Escurano	♂ ad	249	132	25.0	31.0	—	11.3	17.0	5.6	13.8	6.3	4.8
A.M.N.H. No. 148836, Escurano	♀ ad	242	132	23.0	31.0	28.7	11.7	17.9	5.5	14.3	5.8	4.6
A.M.N.H. No. 149042, Cerro San Pedro	♂ ad	244	116	25.0	31.4	29.0	10.0	16.8	5.4	13.7	6.0	4.5
A.M.N.H. No. 147690, Tenango	♂ ad	243	132	25.0	30.1	28.0	9.4	16.3	5.5	13.7	5.5	4.7
A.M.N.H. No. 185019, Tehuantepec	♂ sub	—	—	22.0	29.8	26.8	9.3	16.0	5.5	13.7	5.5	4.5
Nyctomys sumichrasti sumichrasti												
A.M.N.H. No. 190330, Chiltepec	♀ im	212	110	23.0	27.5	25.0	8.4	16.0	5.5	13.3	5.6	4.7

Nyctomys sumichrasti sumichrasti (Saussure)

Text figure 61

TYPE LOCALITY: Eastern slope of mountain in southern Veracruz.

RANGE IN OAXACA: Northwestern side of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Size and general characters about as in *N. s. pallidulus* but color darker, richer, and more tawny.

MEASUREMENTS: In table 25.

SPECIMENS EXAMINED: Tuxtepec: Chiltepec, one.

SUMMARY OF *Nyctomys* OF OAXACA

Two subspecies of vesper rats are known to occur in Oaxaca. *Nyctomys s. pallidulus* inhabits the wooded mountain slopes on the southern side of the Isthmus of Tehuantepec. The pale coloration of *pallidulus* is quite distinctive and is probably adaptive in its arid environment. The bright tawny pelage of *Nyctomys s. sumichrasti* contrasts with the paleness of *pallidulus*, and the rich coloration of *sumichrasti* is probably adaptive in the humid environment of northern Oaxaca. Hall and Kelson (1959, p. 578) show the range of *N. s. colimensis* Laurie as extending eastward into southwestern Oaxaca, but specimens of this subspecies have not as yet been recorded from the state.

GENUS **REITHRODONTOMYS** GIGLIOLI

HARVEST MICE

SUBGENUS **REITHRODONTOMYS** GIGLIOLI

Reithrodontomys megalotis alticolus Merriam

Plate 20, figures 1, 2; text figure 62

TYPE LOCALITY: Cerro San Felipe, near Oaxaca de Juárez, Oaxaca, Mexico, altitude 10,000 feet.

RANGE IN OAXACA: Highlands of central and northern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 135–154; pelage Ochraceous-Buff, long and soft; tail bicolored, about as long as head and body, under parts buffy; feet white. Skull angular; upper incisors with longitudinal groove on front surface; braincase smoothly rounded; rostrum narrow; zygomatic notch broad and deep; molar teeth small; bullae moderately large.

MEASUREMENTS: In table 26.

SPECIMENS EXAMINED: Etla: Cerro San Felipe, two. Ixtlán: Llano de las Flores, two. Miahuatlán: Río Molino, five; San Pedro Mixtepec, five; San Juan Mixtepec, one. Putla: San Andrés Chicahuaxtla, one.

Reithrodontomys sumichrasti sumichrasti (Saussure)

Text figure 62

TYPE LOCALITY: Mirador, Veracruz.

RANGE IN OAXACA: Mountains in the northwestern parts of the state; altitudinal range from 4000 to 9500 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 147–190; tail longer than length of head and body, nearly unicolored; under parts buffy; feet in most cases white; total length averaging longer than that of *R. m. alticola*, and tail much longer and pelage shorter. Skull relatively large, braincase about like that of *megalotis;* zygomatic notch broad but shallow; anterior palatine foramina long and narrow; molar teeth relatively large, larger than in *megalotis.*

MEASUREMENTS: In table 26.

SPECIMENS EXAMINED: Etla: Cerro San Felipe, one. Oaxaca: San Felipe del Agua, one. Teotitlán: Huehuetlán, one.

SPECIMENS RECORDED: (Hooper, 1952, p. 73–74). Cuicatlán: Reyes, three (U.S.N.M.). Etla: Cerro San Felipe, three (U.M.); 5 miles northeast of Cerro San Felipe, three (M.V.Z.). Oaxaca: Fifteen miles southwest of Oaxaca de Juárez, one (U.S.N.M.).

Reithrodontomys sumichrasti luteolus
A. H. Howell

Plate 20, figures 3, 4; text figure 62

TYPE LOCALITY: Juquila, Oaxaca, Mexico, altitude 5000 feet.

RANGE IN OAXACA: Mountains in the south-central part of the state west of the Isthmus of Tehuantepec; altitudinal range from 3000 to 10,000 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 158–190; resembling typical *sumichrasti* but color brighter. Skull similar in general to that of typical *sumichrasti*, but braincase flatter, more shallow posteriorly, and dorsal profile less convex.

MEASUREMENTS: In table 26.

SPECIMENS EXAMINED: Jamiltepec: Jamil-

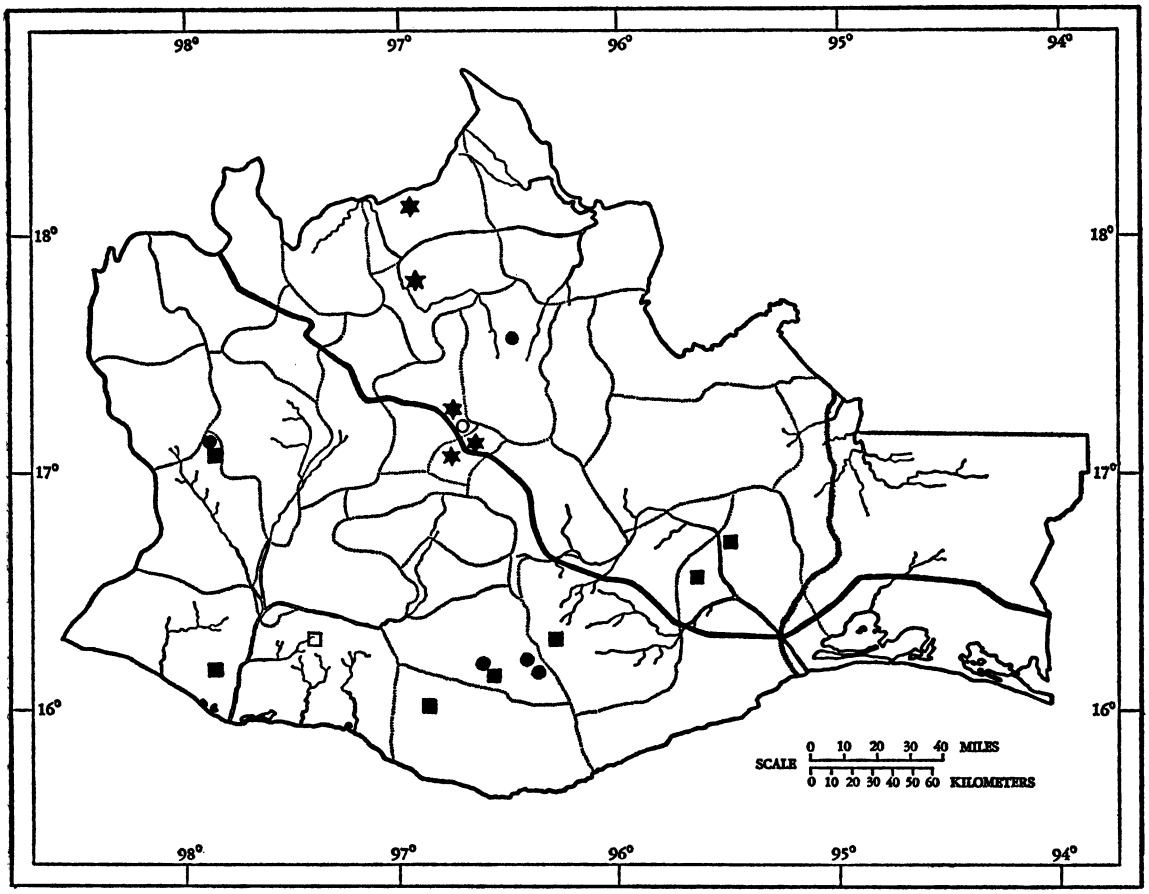


FIG. 62. Records of *Reithrodontomys megalotis* and *Reithrodontomys sumichrasti* in Oaxaca. ● *R. m. alticolus*. ○ Type locality of *R. m. alticolus*. ★ *R. s. sumichrasti*. ■ *R. s. luteolus*. □ Type locality of *R. s. luteolus*.

tepec, one. Miahuatlán: Río Molino, 10. Pochutla: La Soldedad, two. Putla: San Andrés Chicahuaxtla, one; San Vicente, one. Tehuantepec: Agua Zarca, one; Santiago Lachiguirí, one. Yautepec: San Pedro Jilotepec, one; Santo Tomás Quierí, one.

Reithrodontomys fulvescens helvolus Merriam

Plate 20, figures 5, 6; text figure 63

TYPE LOCALITY: Oaxaca de Juárez, Oaxaca, Mexico, altitude 5000 feet.

RANGE IN OAXACA: The Sierra Madre del Sur in Oaxaca, from the vicinity of Oaxaca de Juárez south to Sola de Vega, east to the vicinity of Tehuantepec and west to the Guerrero state line.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 172–200; tail longer than combined length of head and body, bicolored; feet white; pelage short and close, color light buffy. Skull short and broad; braincase comparatively narrow and shallow; superior outline evenly convex; frontals narrow; audital bullae small; interpterygoid foassa broad.

MEASUREMENTS: In table 26.

SPECIMENS EXAMINED: Miahuatlán: San Jose Lachiguirí, three. Tehuantepec: Arroyo Palmar, one; Cerro Arenal, one; La Concepción, one; Santa Lucía, four; Tres Cruces, two. Yautepec: Santa María Ecatepec, three; San Pedro Jilotepec, one.

Reithrodontomys fulvescens mustelinus
A. H. Howell

Text figure 63

TYPE LOCALITY: Llano Grande, Oaxaca, Mexico, altitude, 300 feet.

RANGE IN OAXACA: Pacific coastal slopes of the Sierra Madre del Sur in southwestern Oaxaca; altitudinal range from 300 to 6000 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 165–184; similar in size and general characters to *R. f. helvolus* but colors darker and richer and under parts buffy. Skull like that of *R. f. helvolus*, but braincase relatively larger, frontals narrower, molar teeth smaller.

MEASUREMENTS: In table 26.

SPECIMENS EXAMINED: Juquila: Teotepec, one.

Reithrodontomys fulvescens amoenus Elliot

Text figure 63

TYPE LOCALITY: Reforma, Oaxaca, Mexico, altitude 500 feet.

RANGE IN OAXACA: Pacific coastal slopes of the Sierra Madre del Sur east of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 148; similar in color and general characters to *R. f. helvolus*, but smaller and tail shorter. Skull small for the species, but rostrum moderately broad; incisive foramina relatively long.

MEASUREMENTS: In table 26.

SPECIMENS RECORDED: (Hooper, 1952, p. 121). Juchitán: Reforma, two (F.M.N.H.).

Reithrodontomys fulvescens infernatis Hooper

Text figure 63

TYPE LOCALITY: Teotitlán, Oaxaca, Mexico, altitude 3100 feet.

RANGE IN OAXACA: Northwestern Oaxaca and north to southeastern Puebla.

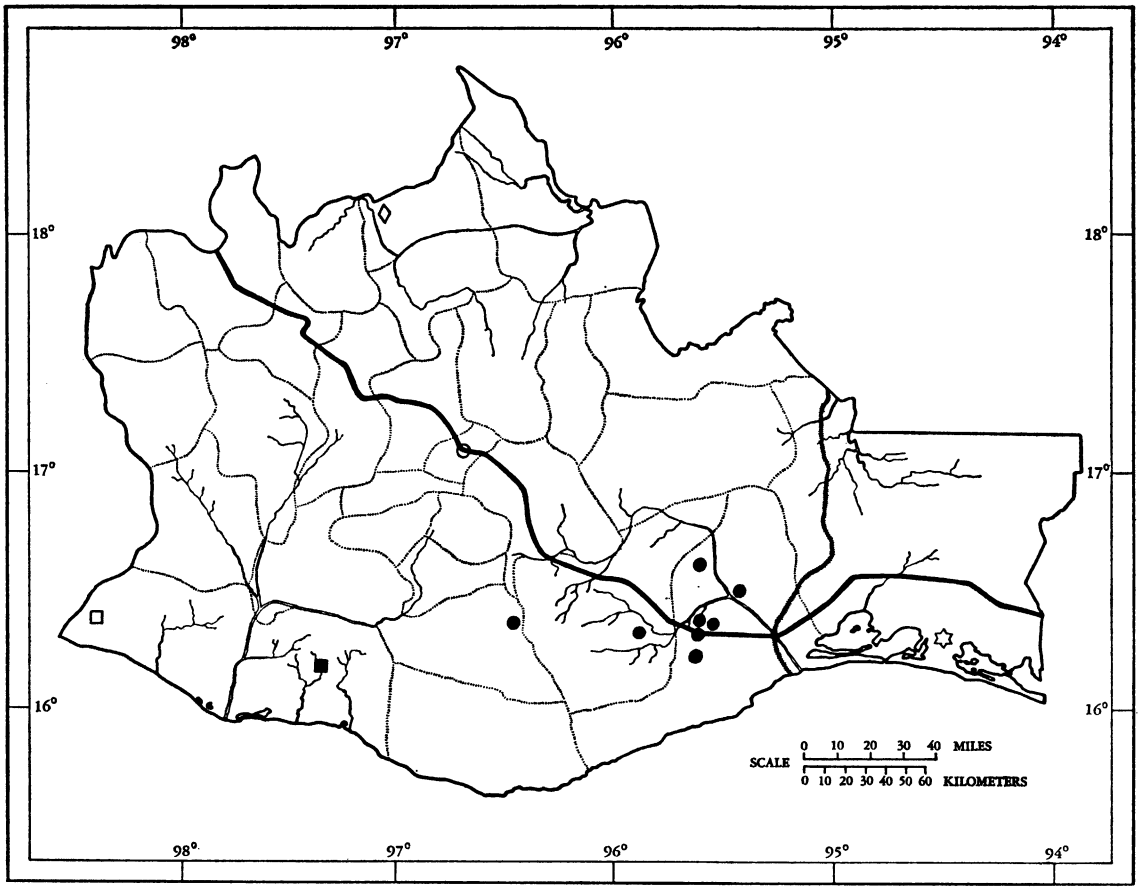


FIG. 63. Records of *Reithrodontomys fulvescens* in Oaxaca. ● *R. f. helvolus*. ○ Type locality of *R. f. helvolus*. ■ *R. f. mustelinus*. □ Type locality of *R. f. mustelinus*. ☆ Type locality of *R. f. amoenus*. ◇ Type locality of *R. f. infernatis*.

TABLE 26

MEASUREMENTS (IN MILLIMETERS) OF *Reithrodontomys* FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Reithrodontomys megalotis alticolus												
OAXACA												
A.M.N.H. No. 148881, San Pedro Mixtepec	♂ ad	159	87	20.0	23.0	—	9.7	11.3	3.1	10.7	4.5	3.3
A.M.N.H. No. 148882, San Pedro Mixtepec	♀ ad	145	79	19.0	22.7	19.5	10.2	10.8	3.5	10.3	4.5	3.2
A.M.N.H. No. 148883, San Pedro Mixtepec	♀ ad	148	77	19.0	23.3	19.6	8.0	11.5	3.2	10.8	4.6	3.2
A.M.N.H. No. 148884, San Pedro Mixtepec	♂ ad	152	80	19.0	22.3	19.8	9.7	11.7	3.3	11.0	4.6	3.5
A.M.N.H. No. 148885, San Pedro Mixtepec	♀ old	158	81	20.0	—	—	9.7	10.5	3.2	—	4.6	3.3
Reithrodontomys sumichrasti sumichrasti												
OAXACA												
A.M.N.H. No. 207435, San Felipe del Agua	♀ ad	180	105	18.0	23.0	20.5	10.0	11.9	3.3	10.5	4.6	3.4
A.M.N.H. No. 207437, Huehuetlán	♂ sub	155	90	19.0	21.4	18.5	8.9	10.7	3.4	10.5	4.4	3.5
VERACRUZ												
A.M.N.H. No. 12483–10802, Jalapa	♂ ad	177	99	20.0	22.8	20.1	8.5	11.2	3.5	10.7	4.6	3.5
A.M.N.H. No. 12487–10806, Jalapa	♂ ad	168	91	19.0	22.3	20.1	8.8	11.2	3.5	10.5	5.0	3.5
A.M.N.H. No. 12489–10808, Jalapa	♀ ad	168	93	19.0	22.9	20.5	8.6	11.7	3.7	11.0	4.7	3.6

TABLE 26—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
Reithrodontomys sumichrasti luteolus												
OAXACA												
A.M.N.H. No. 145247, Sto. Tomás Queirí	♂ old	180	92	19.0	22.8	20.9	—	11.1	3.5	10.7	4.8	3.3
A.M.N.H. No. 171602, La Soledad	♂ old	178	105	21.0	24.0	21.1	8.5	11.3	3.5	11.0	5.0	3.5
A.M.N.H. No. 171720, La Soledad	♀ im	170	90	19.0	21.0	18.0	7.5	10.6	3.3	10.5	5.0	3.7
A.M.N.H. No. 175242, Santiago Lachiguirí	♂ ad	173	100	20.0	21.9	19.5	8.7	11.7	3.3	11.2	4.5	3.4
A.M.N.H. No. 186915, San Andrés Chicahuaxtla	♀ ad	178	97	19.0	23.3	20.6	9.0	11.8	3.3	10.7	4.8	3.4
Reithrodontomys fulvescens helvolus												
OAXACA												
A.M.N.H. No. 143398, Sta. Lucía	♀ ad	159	98	20.0	21.2	18.7	8.5	11.0	3.7	10.4	4.4	3.3
A.M.N.H. No. 144575, Sta. Lucía	♀ ad	166	97	20.0	21.3	18.7	8.5	10.6	3.7	10.5	4.5	3.3
A.M.N.H. No. 145758, Sta. María Ecatepec	♂ ad	166	92	20.0	22.0	19.7	8.5	11.5	3.8	10.6	4.5	3.2
A.M.N.H. No. 145828, Sta. María Ecatepec	♂ ad	161	96	21.0	21.5	18.6	8.0	10.5	3.5	10.5	4.3	3.2
A.M.N.H. No. 146018, San José Lachiguirí	♂ ad	183	100	20.0	21.7	18.5	9.2	11.0	3.5	10.5	4.4	3.4
A.M.N.H. No. 147603, Tres Cruces	♀ ad	160	95	20.0	20.8	18.5	8.4	10.7	3.7	10.2	4.3	3.2
Reithrodontomys fulvescens mustelinus												
OAXACA												
U.S.N.M. No. 71549,[a] Llano Grande	♀ ad	184	105	20.0	22.3	—	9.0	—	—	10.4	—	—

TABLE 26—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Molars	Maxillary Tooth Row
A.M.N.H. No. 204674, Teotepec	♀ ad	165	95	19.0	—	—	8.5	10.5	3.6	10.2	4.2	3.3
Reithrodontomys fulvescens amoenus												
OAXACA												
F.M.N.H. No. 14064,[a] Reforma	♀ ad	148	81	18.5	19.6	—	7.7	10.0	3.0	10.3	—	3.2
Reithrodontomys mexicanus mexicanus												
OAXACA												
A.M.N.H. No. 212232, Tarabundí	♂ ad	182	106	20.0	23.7	21.2	8.3	11.5	3.7	10.8	4.7	3.5
Reithrodontomys mexicanus scansor												
OAXACA												
A.M.N.H. No. 206916, Zanatepec	♀ old	160	90	17.0	21.7	19.7	7.0	11.6	3.5	10.7	4.2	3.3
A.M.N.H. No. 206917, Zanatepec	♂ ad	160	100	18.0	21.3	18.5	7.4	9.9	3.5	10.0	4.0	3.2
A.M.N.H. No. 206918, Zanatepec	♂ ad	175	115	19.0	22.0	18.6	8.0	11.0	3.7	10.5	4.4	3.2
A.M.N.H. No. 206919, Zanatepec	♂ ad	150	90	19.0	21.0	18.0	7.4	10.4	3.5	10.7	4.4	3.4
Reithrodontomys microdon albilabris												
OAXACA												
U.S.N.M. No. 68393,[a] Cerro San Felipe	♀ ad	187	117	20.0	22.4	—	7.8	11.5	3.6	11.4	—	3.2
U.M. No. 112631, Llano de los Flores	♂	204	122	22.0	23.2	20.5	8.0	11.9	3.9	11.7	4.6	3.2

[a] Type.

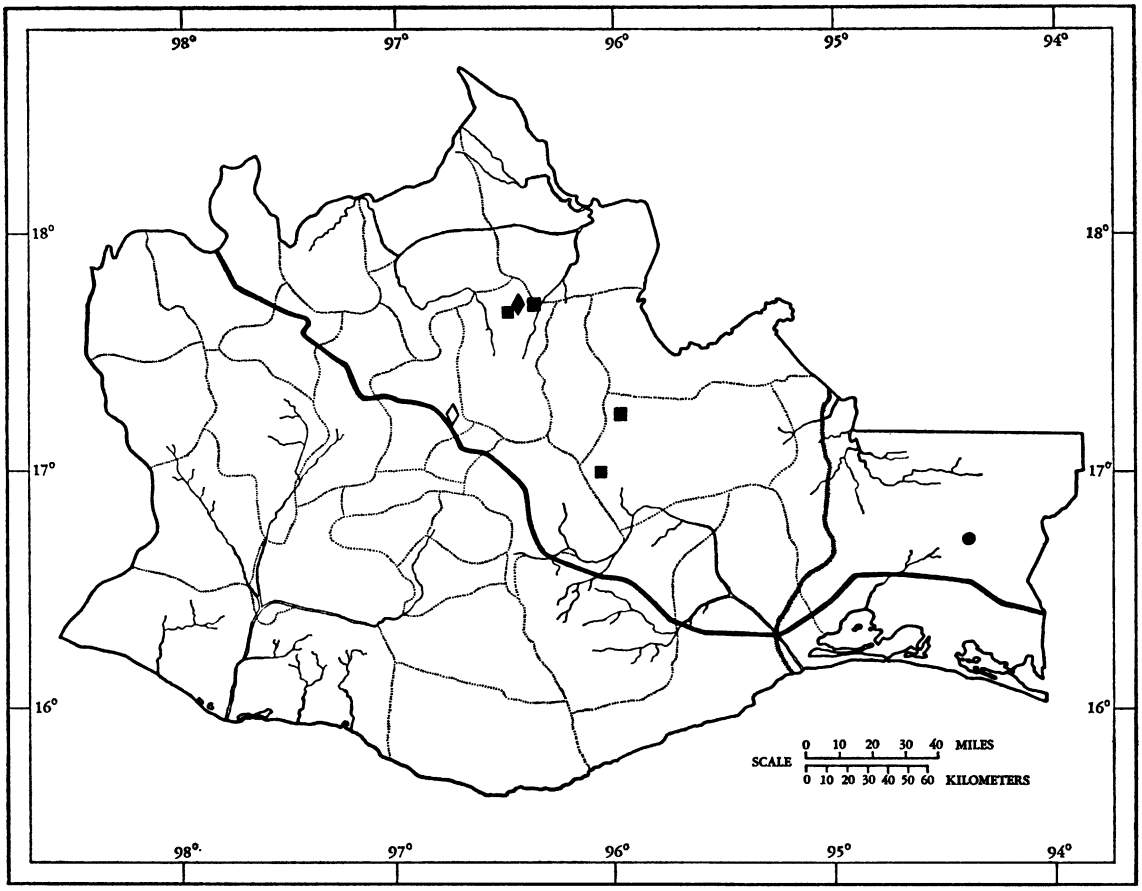


FIG. 64. Records of *Reithrodontomys mexicanus* and *Reithrodontomys microdon* in Oaxaca. ■ *R. m. mexicanus*. ● *R. m. scansor*. ◆ *R. m. albilabris*. ◇ Type locality of *R. m. albilabris*.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 159–165; similar to *R. f. helvolus*, but color paler and warmer, body size smaller, and tail relatively longer. Skull similar to that of *R. f. helvolus*, but interorbital breadth less, rostrum narrower, molar teeth narrower, and tooth row shorter.

MEASUREMENTS: In table 26.

SPECIMENS RECORDED: (Hooper, 1952, p. 119). Teotitlán: Teotitlán, eight (U.M.).

SUBGENUS **APRODON** A. H. HOWELL

Reithrodontomys mexicanus mexicanus
(Saussure)

Plate 20, figures 13, 14; text figure 64

TYPE LOCALITY: Mountains of Veracruz, Mexico; restricted to Mirador, Veracruz (Hooper, 1952, p. 140).

RANGE IN OAXACA: Moderate elevations on mountain slopes within the Gulf drainage west of the Isthmus of Tehuantepec; altitudinal range from 800 to 6000 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 182; tail long, unicolored; pelage short, tawny; dorsal surface of hind feet dark brown; under parts white. Skull short and broad; rostrum broad; rear part of skull behind interorbital constriction longer than forepart; audital bullae small; molar teeth relatively large and strong, mesolophs and mesostyles well developed on molar teeth.

MEASUREMENTS: In table 26.

SPECIMENS EXAMINED: Ixtlán: Tarabundí, one. Tehuantepec: Agua Zarca, one.

SPECIMENS RECORDED: (Hooper, 1952, p. 144). Mixes: Totontepec, two (U.S.N.M.). (Musser, 1964, p. 8). Ixtlán: Cerro Pelon, one (U.M.).

Reithrodontomys mexicanus scansor Hooper

Plate 20, figures 7, 8; text figure 64

TYPE LOCALITY: Villa Flores, Chiapas, Mexico, altitude 2000 feet.

RANGE IN OAXACA: Interior and tropical valleys east of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 160–195; similar to *R. m. mexicanus*, but body smaller and colors paler. Skull similar to that of *R. m. mexicanus* but averaging smaller.

MEASUREMENTS: In table 26.

SPECIMENS EXAMINED: Juchitán: Mountains north of Zanatepec, nine.

Reithrodontomys microdon albilabris Merriam

Plate 20, figures 9, 10; text figure 64

TYPE LOCALITY: Cerro San Felipe, Oaxaca, Mexico, altitude 10,000 feet.

RANGE IN OAXACA: Upper slopes of high mountains in central Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 187; tail very long, slender, and unicolored; hind feet dusky; pelage Pinkish Cinnamon, long and soft. Skull small, braincase broad and flattened; rostrum long and narrow; bullae relatively small and flat.

MEASUREMENTS: In table 26.

SPECIMENS EXAMINED: Ixtlán: Llano de los Flores, one (U.M.).

SUMMARY OF *Reithrodontomys* OF OAXACA

Ten subspecies of five species of *Reithrodontomys* are known to occur in Oaxaca, and the type localities of six of them are in the state.

The long-furred, relatively short-tailed *Reithrodontomys megalotis alticolus* occurs at high elevations in Oaxaca west of the Isthmus of Tehuantepec. *Reithrodontomys microdon albilabris* is another soft-furred form of the high mountains, which also has white under parts and is found in central Oaxaca, but which, unlike *alticolus*, has an exceptionally long tail. *Reithrodontomys sumichrasti* is a long tailed, soft-furred species with white feet, unicolored tail, and buffy under parts, and it is represented by two subspecies: *R. s. sumichrasti* in the mountains on the Gulf drainage west of the Isthmus in Oaxaca, and *R. s. luteolus* in the mountains of the Pacific drainage. *Reithrodontomys fulvescens* is a long-tailed, short-furred, light-colored species represented by four subspecies in Oaxaca: *Reithrodontomys f. helvolus*, the most widely distributed subspecies in the state and distinguishable from *R. f. mustelinus* of southwestern Oaxaca by its much paler color; *R. f. amoenus* of southeastern Oaxaca and *R. f. infernatis* of northwestern Oaxaca, both averaging smaller and paler in color than *R. f. helvolus*. *Reithrodontomys mexicanus*, a robust form with a long, unicolored tail, a wedge of dark color on the hind feet, and white under parts, is represented by two forms: *R. m. mexicanus*, the larger, ranging in northern Oaxaca east of the Isthmus; *R. m. scansor*, a comparatively small form, occurring in the mountains of eastern Oaxaca.

GENUS **PEROMYSCUS** GLOGER

WHITE-FOOTED MICE

SUBGENUS **PEROMYSCUS** GLOGER

Peromyscus maniculatus fulvus Osgood

Plate 21, figure 6; plate 22, figure 6; text figure 65

TYPE LOCALITY: Oaxaca de Juárez, Oaxaca, Mexico, altitude 5000 feet.

RANGE IN OAXACA: Central highlands west of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length 140–183; hind foot, 18–22; tail less than half of total length, hairy and sharply bicolored; resembling *P. l. affinis* in size and in Tawny-Olive color, but pelage longer and softer, tail shorter and more hairy. Skull with smoothly rounded, rather low braincase; supraorbital border rounded; rostrum slender, nasals long and narrow; anterior palatine foramina long and narrow; bullae moderately large; maxillary teeth relatively weak.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Ejutla: Ejutla, one (U.M.). Oaxaca: Oaxaca de Juárez, one (U.M.). Nochixtlán: Nochixtlán, one (U.M.). Tlacolula: One mile east of Tlacolula, two (U.M.).

SPECIMENS RECORDED: (Osgood, 1909, p. 87). Huajuápam: Huajuápam, two (U.S.-N.M.). Oaxaca: Oaxaca de Juárez, three (U.S.N.M.).

Peromyscus leucopus affinis (J. A. Allen)

Plate 21, figure 1; plate 22, figure 1; text figure 65

TYPE LOCALITY: El Barrio, Oaxaca, Mexico.

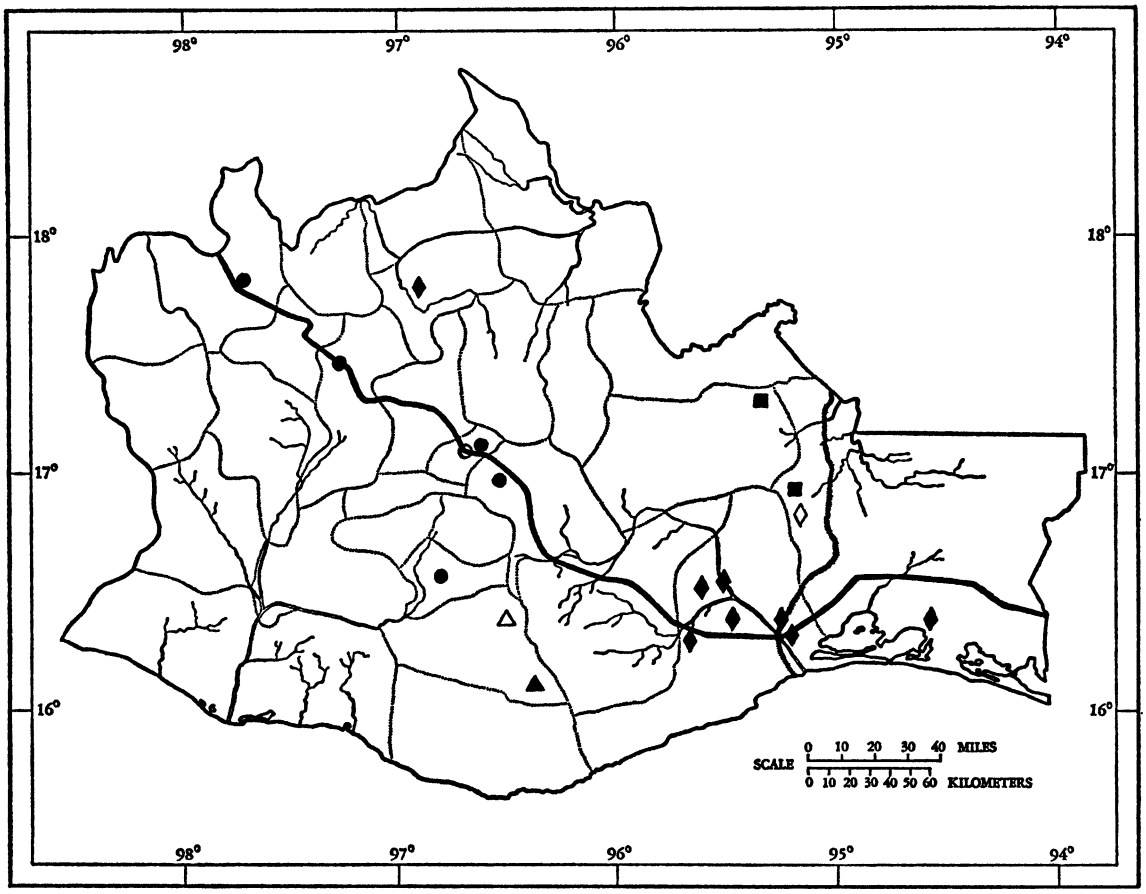


FIG. 65. Records of *Peromyscus maniculatus* and *Peromyscus leucopus* in Oaxaca. ● *P. m. fulvus.* ○ Type locality of *P. m. fulvus.* ◆ *P. l. affinis.* ◇ Type locality of *P. l. affinis.* ■ *P. l. incensus.* ▲ *P. l. lachiguiriensis.* △ Type locality of *P. l. lachiguiriensis.*

RANGE IN OAXACA: Arid tropical regions from the north-central districts south across the Isthmus of Tehuantepec east to Reforma and west to include the district of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 173–187; hind foot, 22–25; tail less than half of total length, bicolored, sparsely haired; pelage short, ears small, not bordered with white; resembling *P. m. fulvus* in size and color but pelage shorter, tail longer and less hairy, ears smaller, and preauricular patches absent. Skull without supraorbital ridges; palatine foramina short; bullae small.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Cuicatlán: Cuicatlán, one, two (U.M.). Juchitán: Reforma, one (U.M.). Tehuantepec: Cerro Marzorca, two; Guiengola, four; Huilotepec, three; Jalapa, two; Tehuantepec, six, two (U.M.). Yautepec: Cerro de Armadillo, 13.

Peromyscus leucopus incensus Goldman

Text figure 65

TYPE LOCALITY: Metlatoyuca, Puebla, Mexico, altitude 800 feet.

RANGE IN OAXACA: Tropical lowlands in the northern part of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 158–185; hind foot, 21–24.5; tail less than half of total length; closely allied to *P. l. affinis* but upper parts less grayish and more suffused with buff. Skull very similar to that of *P. l. affinis* but averaging somewhat smaller.

MEASUREMENTS: In table 27.

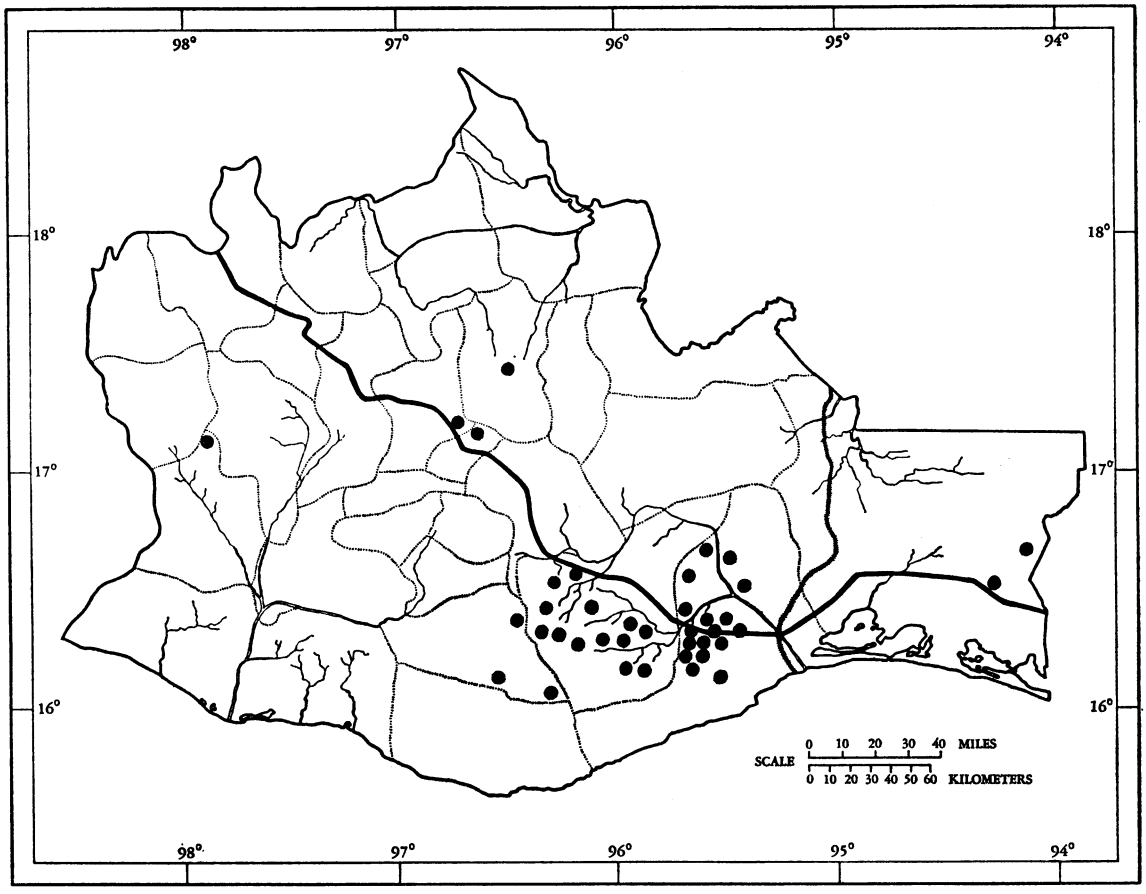


FIG. 66. Records of *Peromyscus boylii* in Oaxaca. ● *P. b. levipes.*

SPECIMENS EXAMINED: Mixes: Nueva Raza, 3.

SPECIMENS RECORDED: (Goldman, 1942, p. 158). Juchitán: San Juan Guichicovi, one (U.S.N.M.).

Peromyscus leucopus lachiguiriensis Goodwin

Text figure 65

TYPE LOCALITY: San José Lachiguirí, Oaxaca, Mexico, altitude 4000 feet.

RANGE IN OAXACA: Known only from the vicinity of the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 190; hind foot, 19–20; tail less than half of total length; color grayish brown strongly suffused with dusky; about same size as *P. l. affinis* and *P. l. incensus* but color darker and grayer, tail longer, and interorbital region of skull more elevated. Skull relatively long and narrow; braincase small and narrow.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Miahuatlán: San José Lachiguirí, seven; San Juan Guivini, one.

Peromyscus boylii levipes Merriam

Plate 21, figure 2; plate 22, figure 2; text figure 66

TYPE LOCALITY: Mount Malinche, Tlaxcala, Mexico, altitude 8400 feet.

RANGE IN OAXACA: Widely distributed in the mountains throughout the state; altitudinal range from about 3000 feet to 13,000 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 180–213; hind foot, 21–23; tail equal to or slightly longer than length of head and body, hairy and sharply bicolored; color varying from Russet to Prout's Brown; smaller and darker than *Peromyscus evides*, mixture of dusky hairs in upper parts usually more copious, pelage longer and softer, and upper surface of hind

feet white instead of dusky. Skull short and broad, bullae and molariform teeth large; anterior palatine foramina long and broad; supraorbital border not sharply angled.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Etla: Cerro San Felipe, one. Ixtlán: Llanlo de los Flores, five (U.M.). Juchitán: Río Mono Blanco, one; Río Negro, four. Miahuatlán: Lovene, two; San José Lachiguirí, seven. Oaxaca: San Felipe del Agua, one. Putla: San Andrés Chicahuaxtla, one. Tehuantepec: Aguaje Sepotal, two; Arroyo Coyote, two; Arroyo La Manga, four; Arroyo Palmar, five; Arroyo San Juan, 10; Cerro Arenal, 21; Cerro de Chorro, 11; Cerro de Flores, four; Cerro Pastle, one; Cerro Otate, 13; Cerro Polle, seven; Cienga, four; Las Majadas, four; Llano de Ocote, 17; Portillo Zapote, 10; San Miguel, eight; Santa Lucía, 27; Tenango, 10; Tres Cruces, eight. Yautepec: Cerro Jilote, five; Chivagula, one; Chontecomatlán, four; El Paderón, three; Guieloche, three; Leapi, two; Río Costoche, one; San Juan Acaltepec, three; San Matías Petacaltepec, two; San Pedro Jilotepec, four; San Sebastián Jilotepec, eight; Santa María Ecatepec, 22; Santiago Lachivía, four; Santo Domingo Lachivito, three; Santo Tomás Quierí, one; Santo Tomás Teipan, six; Zapotitlán, three.

REMARKS: This form is common and widely distributed throughout the mountainous parts of central and southern Oaxaca but is scarce in most of Oaxaca east of the Isthmus of Tehuantepec. Specimens from the high humid regions average darker and grayer than the more brightly colored specimens from the lower arid regions, but individual and geographical variation is relatively small in the Oaxaca series.

Peromyscus evides Osgood

Plate 21, figure 3; plate 22, figure 3; text figure 67

Peromyscus hylocetes yautepecus GOODWIN, 1955, p. 4.

TYPE LOCALITY: Juquila, Oaxaca, Mexico, altitude, 5000 feet.

RANGE IN OAXACA: Chiefly in the mountains of southern and northern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 198–220; hind foot, 24–27; tail bicolored, longer than length of head and body; color cinnamon mixed with black; hind foot usually with wedge-shaped dusky area extending from tarsal joint nearly to base of toes. Skull relatively large; supraorbital border shelflike but not beaded; rostrum and nasals long; audital bullae relatively large; interpterygoid space wide, palatal slits long; molariform teeth large; maxillary tooth rows nearly parallel.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Ixtlán: San Isidro Comaltepec, two. Jamiltepec: Bocadillo, one. Juchitán: Cerro Baul, three; Río Mono Blanco, two; Sierra Madre north of Zanatepec, four. Juquila: Juquila, one, five (U.S.-N.M.); Nopala, three; Temascaltepec, four; Teotepec, four; Yaitepec, one. Miahuatlán: Río Molino, three. Mixes: "Nueva Raza," two. Putla: San Vicente, four. Tehuantepec: Agua Zarca, two; Arroyo Coyote, one; Media Loma, two. Yautepec: Santo Tomás Teipan, six.

REMARKS: The present series of *Peromyscus evides* shows considerable local and individual variation. The type specimen of *Peromyscus hylocetes yautepecus* from Santo Tomás Teipan, here referred to *P. evides*, has a broader and flatter skull and a larger braincase than those of any of the topotypes of *P. evides*. Specimens from the Sierra Madre north of Zanatepec average larger than the topotypes of *P. h. yautepecus*, but come within the range of variation of the series of *P. evides* now available for comparison. *Peromyscus evides* was regarded by Musser (1964, p. 9) as a full species.

Peromyscus oaxacensis Merriam

Plate 21, figure 10; plate 22, figure 10; text figure 67

TYPE LOCALITY: Cerro San Felipe, Mexico, altitude 10,000 feet.

RANGE IN OAXACA: High altitudes west of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 240–260; hind foot, 25–28; tail about equal to length of head and body; color tawny but variable; about size of *P. mexicanus* but color more tawny, tail more hairy, and evenly bicolored instead of irregularly blotched with dusky below as is *mexicanus*, and maxillary tooth rows parallel instead of converging posteriorly; similar in color and general characters to *P. boylii*

TABLE 27

MEASUREMENTS (IN MILLIMETERS) OF *Peromyscus* FROM OAXACA

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Bony Palate, Length	Nasal Length	Interorbital Width	Zygomatic Width	Mastoid Width	Maxillary Tooth Row
Peromyscus maniculatus fulvus												
U.M. No. 91776, Ejutla	♀ ad	155	60	18.0	24.9	22.5	3.6	10.4	3.9	12.5	10.5	3.7
U.M. No. 94009, Nochixtlán	♂ ad	140	63	19.0	24.6	22.2	3.7	10.3	4.0	12.2	10.7	3.8
U.M. No. 91773, Oaxaca de Juárez	♂ ad	157	70	19.0	25.3	23.1	3.7	10.5	3.7	12.4	10.6	3.6
U.M. No. 102949, Tlacolula	♀ ad	156	64	20.0	24.8	23.0	4.0	10.3	3.6	12.6	10.3	3.8
U.M. No. 102950, Tlacolula	♀ sub	141	55	19.0	23.4	21.5	3.7	9.0	3.9	11.9	10.3	3.6
Peromyscus leucopus affinis												
U.S.N.M. No. 9382/8665,[a] El Barrio	♀ ad	—	—	—	26.9	—	4.2	11.0	4.2	13.5	—	3.5
U.M. No. 96712, Reforma	♀ ad	182	87	22.0	26.3	23.7	—	10.6	4.0	13.4	10.8	3.9
U.M. No. 96691, Cuicatlán	♀ ad	173	75	22.0	26.3	23.9	4.2	10.8	4.3	14.0	11.0	3.7
U.M. No. 96701, Cuicatlán	♀ ad	187	84	22.0	26.3	24.2	4.1	10.6	4.2	14.0	11.5	3.7
A.M.N.H. No. 13894, Cuicatlán	♀ ad	182	84	23.0	26.5	24.3	4.5	10.4	4.5	14.2	11.3	3.7
U.M. No. 102966, Tehuantepec	♀ sub	174	79	21.0	25.5	23.5	3.5	10.5	4.1	13.1	10.9	3.6
U.M. No. 102969, Tehuantepec	♂ ad	176	80	21.0	25.7	23.7	4.3	10.0	4.1	13.3	11.0	3.3
A.M.N.H. No. 142566, Tehuantepec	♂ ad	187	75	27.0	25.7	23.7	3.9	10.1	4.1	13.4	11.3	3.6
A.M.N.H. No. 147728, Guiengola	♂ ad	182	75	20.0	26.0	23.9	4.2	10.5	4.2	13.8	11.0	3.6
A.M.N.H. No. 145738, Jalapa	♂ ad	180	75	21.0	26.0	23.9	4.2	10.5	4.1	13.2	11.0	3.7
A.M.N.H. No. 143334, Huilotepec	♀ ad	169	79	22.0	26.3	24.0	4.4	10.3	4.0	13.7	11.0	3.7
A.M.N.H. No. 143347, Huilotepec	♂ ad	158	72	24.0	25.7	23.3	4.0	10.3	4.1	13.7	10.6	3.7
A.M.N.H. No. 145724, Cerro de Armadillo	♂ ad	168	70	20.0	26.1	23.7	4.3	10.0	4.0	13.3	11.0	3.8
A.M.N.H. No. 145725, Cerro de Armadillo	♀ ad	172	78	21.0	24.8	22.6	3.8	10.2	4.4	12.8	10.6	3.5
Peromyscus leucopus lachiguiriensis												
A.M.N.H. No. 145284, San José Lachiguirí	♂ sub	150	69	18.0	24.7	21.1	4.2	8.6	4.2	12.5	10.5	3.5
A.M.N.H. No. 146063, San José Lachiguirí	♂ sub	175	84	20.0	25.4	22.8	4.5	10.3	4.2	12.8	10.6	3.6
A.M.N.H. No. 146064, San José Lachiguirí	♀ ad	190	90	19.0	24.2	21.8	4.2	8.5	4.1	12.4	10.9	3.4
A.M.N.H. No. 146070,[a] San José Lachiguirí	♂ ad	190	90	20.0	26.5	24.1	4.6	10.2	4.3	13.2	10.9	3.7
A.M.N.H. No. 206907, San Juan Guivini	♂ ad	175	82	22.0	26.7	25.1	5.0	10.1	4.4	14.1	11.5	3.8
Peromyscus boylii levipes												
A.M.N.H. No. 175170, San Sebastian Jilotepec	♂ ad	191	89	23.0	27.2	25.0	4.2	10.5	4.3	14.2	12.5	4.4

TABLE 27—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Bony Palate, Length	Nasal Length	Interorbital Width	Zygomatic Width	Mastoid Width	Maxillary Tooth Row
A.M.N.H. No. 175171, San Sebastian Jilotepec	♂ ad	194	94	22.0	27.5	24.5	4.3	10.1	4.4	13.2	11.7	4.2
A.M.N.H. No. 175172, San Sebastian Jilotepec	♀ ad	213	104	22.0	28.4	25.5	4.5	11.5	4.5	14.5	12.0	4.3
A.M.N.H. No. 175173, San Sebastian Jilotepec	♀ ad	207	94	22.0	27.8	24.8	4.4	11.0	4.3	14.2	12.0	4.5
A.M.N.H. No. 175174, San Sebastian Jilotepec	♂ ad	188	91	22.0	27.6	24.7	4.2	11.1	4.4	13.7	11.7	4.5
A.M.N.H. No. 175175, San Sebastian Jilotepec	♀ ad	195	92	23.0	27.4	24.5	4.3	11.2	4.5	14.2	11.6	4.3
A.M.N.H. No. 175176, San Sebastian Jilotepec	♀ ad	213	104	23.0	28.2	25.2	4.2	11.6	4.4	14.0	11.3	4.3
A.M.N.H. No. 185056, Cerro San Felipe	♂ ad	206	111	23.0	27.8	25.0	4.4	11.0	4.5	14.0	11.6	4.2
A.M.N.H. No. 149076, Cerro Arenal	♂ ad	202	102	23.0	28.5	25.8	4.6	11.2	4.3	14.4	12.0	4.5
A.M.N.H. No. 149080, Cerro Arenal	♂ ad	197	104	22.0	27.5	24.5	4.5	10.5	4.5	13.8	11.6	4.1
A.M.N.H. No. 149081, Cerro Arenal	♀ ad	192	101	22.0	27.6	24.4	4.5	10.2	4.5	13.7	11.3	4.1
A.M.N.H. No. 149087, Cerro Arenal	♀ ad	197	106	23.0	27.3	24.5	4.2	10.5	4.5	14.0	11.5	4.2
A.M.N.H. No. 149094, Cerro Arenal	♂ ad	195	100	23.0	27.5	24.8	4.0	11.3	4.5	13.5	11.7	4.4
A.M.N.H. No. 167425, Sto. Domingo Lachivitó	♂ ad	200	99	21.0	28.5	25.5	4.5	11.5	4.7	14.2	12.3	4.3
A.M.N.H. No. 167426, Sto. Domingo Lachivitó	♂ ad	180	93	21.0	27.0	23.7	4.4	11.5	4.5	13.5	11.5	4.2
A.M.N.H. No. 167427, Sto. Domingo Lachivitó	♀ ad	—	—	22.0	29.1	26.2	4.5	13.1	4.0	13.5	11.8	4.5
Peromyscus evides												
U.S.N.M. No. 71426,[a] Juquila	♂ ad	215	110	25.0	28.8	27.4	4.7	11.4	4.6	14.3	12.1	5.1
U.S.N.M. No. 71427, Juquila	♂ ad	198	94	24.0	28.1	26.5	4.5	11.1	4.9	14.0	12.0	4.8
U.S.N.M. No. 71428, Juquila	♂ ad	220	118	24.5	28.5	26.6	4.6	11.4	4.7	14.3	12.3	5.1
U.S.N.M. No. 71429, Juquila	♂ ad	223	116	27.0	—	—	4.8	11.5	4.7	—	—	5.0
U.S.N.M. No. 71430, Juquila	♂ sub	203	95	24.0	28.4	26.4	4.5	10.9	4.7	13.9	11.9	4.9
U.S.N.M. No. 73741, Juquila	♀ sub	—	—	—	27.9	26.1	4.5	10.8	4.6	—	11.8	4.8
A.M.N.H. No. 189242, San Vicente	♀ ad	208	103	23.5	28.6	26.1	4.9	11.1	4.9	14.0	11.7	4.8
A.M.N.H. No. 146059, Sto. Tomás Teipan	♀ ad	207	107	25.0	29.5	26.7	5.2	11.0	4.8	15.5	12.2	4.9
A.M.N.H. No. 146060,[b] Sto. Tomás Teipan	♂ ad	220	105	26.0	30.3	27.5	5.2	12.9	4.9	16.1	12.7	4.9
A.M.N.H. No. 205305, Sierra Madre, Zanatepec	♀ ad	225	115	25.0	30.5	29.2	5.4	12.5	4.7	14.9	12.1	5.1
A.M.N.H. No. 205306, Sierra Madre, Zanatepec	♂ ad	228	115	23.0	31.0	27.5	5.1	12.7	5.0	15.3	12.4	4.6
A.M.N.H. No. 207439, Sierra Madre, Zanatepec	♀ ad	210	100	25.0	29.9	26.0	4.8	11.0	5.0	14.2	12.1	4.8
Peromyscus oaxacensis												
U.M. No. 94549, Cerro San Felipe	♂ ad	234	122	25.0	30.8	28.0	5.2	13.0	5.0	14.8	12.4	5.0
U.M. No. 94559, Cerro San Felipe	♀ ad	253	124	26.0	32.0	29.0	5.2	13.4	5.2	16.0	12.6	5.1

TABLE 27—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Bony Palate, Length	Nasal Length	Interorbital Width	Zygomatic Width	Mastoid Width	Maxillary Tooth Row
U.M. No. 94461, Cerro San Felipe	♂ ad	207	109	26.0	30.0	27.1	5.0	12.0	4.8	14.3	12.0	5.0
U.M. No. 94566, Cerro San Felipe	♂ ad	210	105	27.0	30.4	27.3	5.2	11.8	4.9	15.2	12.3	5.2
U.M. No. 109576, Ixtlán de Juárez	♀ ad	235	113	26.0	31.3	28.6	5.8	13.5	4.6	15.0	12.3	5.0
U.M. No. 109581, Ixtlán de Juárez	♂ ad	237	118	27.0	32.1	28.8	5.6	12.4	5.2	16.0	12.7	5.0
A.M.N.H. No. 178718, Cerro Lachiguirí	♂ ad	228	113	25.0	30.8	28.0	5.3	11.9	5.0	15.5	12.3	5.3
A.M.N.H. No. 178719, Cerro Lachiguirí	♂ ad	228	115	25.0	31.0	29.8	5.3	13.1	4.9	16.3	12.5	5.2
A.M.N.H. No. 178720, Cerro Lachiguirí	♂ ad	242	113	27.0	32.5	29.9	5.4	14.3	5.0	16.3	12.7	5.4
Peromyscus truei gratus												
A.M.N.H. No. 142263, Tlaxiaco	♂ juv	160	88	23.0	25.8	22.5	4.7	8.8	4.5	12.5	12.2	4.1
A.M.N.H. No. 189278, Tlaxiaco	♀ ad	190	105	22.0	26.8	23.5	3.7	11.0	4.5	13.0	11.5	4.5
Peromyscus truei zapotecae												
U.M. No. 94547, Huajuápam	♂ ad	203	114	22.0	27.0	24.2	5.2	10.0	4.4	13.0	11.8	4.0
U.M. No. 103048, Tlacolula	♂ ad	—	—	21.0	27.3	23.9	4.9	10.1	4.2	12.5	11.2	3.9
U.M. No. 103050, Tlacolula	♂ ad	198	108	22.0	26.8	23.9	5.0	10.2	4.3	13.2	11.8	3.8
U.M. No. 103088, Tlacolula	♂ ad	193	106	22.0	26.5	23.4	5.2	10.3	4.2	12.7	11.5	3.8
U.M. No. 103090, Tlacolula	♀ ad	—	—	22.0	27.5	24.3	5.5	10.2	4.4	13.5	12.0	3.8
Peromyscus difficilis amplus												
T.C.W.C. No. 7829, 2 mi. SE. Yanhuitlán	♂ ad	244	127	25.0	30.0	26.6	4.4	11.5	4.4	14.0	13.0	4.6
T.C.W.C. No. 7830, 2 mi. SE. Yanhuitlán	♂ ad	222	120	26.0	30.5	27.3	4.5	12.6	4.2	14.7	12.9	4.6
U.S.N.M. No. 70158,[a] Coixtlahuaca	♀ ad	—	—	—	30.4	—	4.6	11.3	4.5	10.4	—	4.8
Peromyscus difficilis felipensis												
A.M.N.H. No. 13890, Cerro San Felipe	♀ ad	247	128	26.5	29.5	27.3	4.6	11.3	4.5	14.7	13.0	4.9
U.M. No. 94572, Cerro San Felipe	♂ ad	220	111	25.0	29.8	26.5	4.5	11.5	4.5	14.9	13.0	4.6
U.M. No. 94573, Cerro San Felipe	♀ ad	220	115	25.0	30.5	27.3	—	11.5	4.7	14.9	13.4	4.9
A.M.N.H. No. 148841, Arroyo Agua Fría	♂ ad	240	124	27.0	31.0	28.5	4.5	12.0	4.4	15.8	13.7	4.9
A.M.N.H. No. 148842, Arroyo Agua Fría	♀ ad	231	121	27.0	31.0	28.0	4.5	11.5	4.5	15.4	12.7	4.8
A.M.N.H. No. 148870, Arroyo Agua Fría	♀ ad	247	130	26.0	31.8	28.3	4.7	12.5	4.5	15.4	13.5	5.1
A.M.N.H. No. 18845, Guish-gal	♂ sub	228	125	26.0	30.3	27.2	5.1	9.2	4.5	15.2	13.5	4.9
A.M.N.H. No. 18853, Guish-gal	♀ ad	232	122	26.0	30.1	27.8	4.5	11.5	4.6	15.2	13.3	4.8
A.M.N.H. No. 18868, Guish-gal	♂ ad	232	120	23.0	—	28.8	4.9	12.0	4.6	16.3	13.9	4.8
U.S.N.M. No. 68409,[a] Cerro San Felipe	♂ ad	—	—	—	32.2	—	4.7	13.1	4.7	15.3	—	4.9

TABLE 27—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Bony Palate, Length	Nasal Length	Interorbital Width	Zygomatic Width	Mastoid Width	Maxillary Tooth Row
Peromyscus melanophrys melanophrys												
A.M.N.H. No. 143283, Guiengola	♀ ad	261	145	27.0	33.0	30.0	4.8	12.2	4.8	15.5	13.0	4.6
A.M.N.H. No. 143288, Guiengola	♀ ad	255	146	26.0	31.3	28.5	4.5	11.5	4.6	15.5	12.5	4.2
A.M.N.H. No. 143322, Pozo Río	♀ ad	260	144	28.0	31.6	29.0	4.8	12.2	5.0	15.2	13.0	4.3
A.M.N.H. No. 143324, Pozo Río	♀ ad	259	146	27.0	31.4	28.5	4.7	12.0	5.0	15.4	13.0	4.4
A.M.N.H. No. 145743, Hierba Santa	♀ ad	284	150	28.0	31.6	28.2	5.1	12.0	4.8	14.6	12.8	4.4
A.M.N.H. No. 145744, Hierba Santa	♂ ad	243	129	29.0	32.8	29.9	5.0	12.5	4.8	15.7	13.0	4.5
A.M.N.H. No. 146034, Jalapa	♂ ad	245	138	26.0	29.5	27.0	4.8	11.0	5.0	14.7	13.0	4.2
A.M.N.H. No. 146035, Jalapa	♂ ad	240	126	27.0	31.2	28.5	4.6	11.5	5.0	14.9	12.5	4.6
A.M.N.H. No. 146037, Jalapa	♀ ad	277	157	28.0	32.7	29.6	5.3	12.2	4.7	15.6	13.0	4.3
A.M.N.H. No. 146040, Jalapa	♂ ad	266	150	28.0	31.6	28.5	4.4	11.5	5.1	15.3	13.0	4.3
A.M.N.H. No. 147634, Tenanago	♀ ad	277	148	28.0	33.3	29.8	5.0	12.5	5.2	15.4	13.0	4.5
A.M.N.H. No. 176860, Tapanatepec	♂ ad	273	152	27.0	32.0	29.0	4.6	11.5	5.2	14.4	13.1	4.7
U.M. No. 91798, Sola de la Vega	♀ ad	254	144	23.0	30.1	27.2	5.0	11.6	4.9	15.1	13.2	4.2
U.M. No. 109654, 7 mi. NNE. Oaxaca de Juárez	♀ ad	254	135	25.0	29.3	28.2	5.0	11.5	4.7	15.2	13.1	4.5
A.M.N.H. No. 175091, La Reforma	♂ ad	261	149	27.0	30.5	27.6	4.8	11.7	5.0	16.0	13.2	4.4
A.M.N.H. No. 175092, Tehuantepec	♀ ad	281	137	26.0	32.5	30.0	4.5	12.3	5.1	15.6	13.2	4.4
Peromyscus lepturus												
A.M.N.H. No. 13892, Mt. Zempoaltepec	♀ ad	238	119	27.0	29.3	26.7	4.2	11.3	4.5	15.2	12.5	4.8
Peromyscus ixtlani												
U.M. No. 109639, Llano de las Flores	♀ old	229	103	27.0	31.0	28.5	4.8	12.0	4.5	15.7	12.8	4.9
U.M. No. 109642, Llano de las Flores	♀ ad	239	118	27.0	30.4	27.6	4.9	10.9	4.6	15.5	12.2	5.3
U.M. No. 10945, Llano de las Flores	♀ ad	246	122	28.0	30.9	28.5	5.2	12.6	4.6	16.3	13.0	5.0
U.M. No. 10946, Llano de las Flores	♂ ad	243	126	28.0	30.4	28.0	5.2	11.7	4.8	16.0	12.9	5.0
U.M. No. 10947, Llano de las Flores	♀ ad	263	139	29.0	31.5	28.6	5.5	12.6	4.5	16.1	12.4	5.1
A.M.N.H. No. 182098, Cerro Machín	♂ ad	247	131	29.0	31.0	24.0	5.6	13.0	4.6	15.0	12.2	5.0
A.M.N.H. No. 182099,[a] Cerro Machín	♂ ad	247	126	29.0	31.7	28.6	5.5	13.0	4.6	15.9	12.8	5.2
A.M.N.H. No. 182101, Cerro Machín	♀ ad	266	143	28.0	30.9	28.7	5.3	12.5	4.8	15.6	12.8	5.2
A.M.N.H. No. 182103, Cerro Machín	♂ old	260	141	29.0	31.0	28.2	5.6	12.6	4.6	15.4	12.2	5.2
A.M.N.H. No. 182143, Cerro Machín	♀ ad	—	—	—	31.8	28.9	5.7	12.2	4.6	15.2	12.2	5.1

TABLE 27—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Bony Palate, Length	Nasal Length	Interorbital Width	Zygomatic Width	Mastoid Width	Maxillary Tooth Row
Peromyscus mexicanus mexicanus												
A.M.N.H. No. 145315, Cerro Atravesado	♀ ad	237	120	24.5	31.7	28.5	5.6	12.5	5.0	15.7	12.8	4.7
A.M.N.H. No. 145316, Cerro Atravesado	♀ ad	—	—	27.0	32.8	29.9	4.8	12.5	4.8	16.2	13.1	4.5
A.M.N.H. No. 145317, Cerro Atravesado	♀ ad	250	123	26.0	32.1	28.4	5.8	13.1	5.1	15.5	13.2	5.2
A.M.N.H. No. 145321, Cerro Atravesado	♂ ad	235	125	25.0	31.1	28.3	5.3	13.2	5.1	15.4	12.4	4.8
A.M.N.H. No. 145323, Cerro Atravesado	♂ ad	247	128	25.0	33.0	29.3	5.2	13.9	5.5	15.7	13.0	4.7
A.M.N.H. No. 145325, Cerro Atravesado	♀ ad	235	110	25.0	31.5	27.5	5.2	13.1	5.1	15.9	13.0	5.0
A.M.N.H. No. 175143, Tenochtitlán	♂ ad	224	124	25.0	31.5	27.8	4.5	12.1	5.0	15.2	13.0	4.3
A.M.N.H. No. 175146, Tenochtitlán	♂ ad	257	125	27.0	32.9	—	4.5	12.6	5.1	15.5	12.4	4.7
A.M.N.H. No. 175148, Tenochtitlán	♀ ad	214	111	27.0	32.7	—	5.2	12.7	5.2	15.5	12.4	4.7
A.M.N.H. No. 172822, Tolosita	♂ ad	228	106	27.0	32.2	29.0	5.4	13.0	5.3	15.7	12.6	4.6
A.M.N.H. No. 172832, Tolosita	♂ ad	228	114	26.0	32.5	29.5	5.3	12.7	5.2	16.6	12.9	4.7
A.M.N.H. No. 172834, Tolosita	♂ ad	221	111	25.0	32.0	28.4	4.6	12.7	5.0	14.7	12.0	4.4
A.M.N.H. No. 172838, Tolosita	♂ ad	227	107	27.0	32.4	29.3	5.3	13.1	5.3	16.1	13.0	4.5
A.M.N.H. No. 147655, Cerro San Pedro	♀ ad	242	124	27.0	33.0	29.5	4.8	13.5	5.0	14.5	12.4	4.7
A.M.N.H. No. 149100, Cerro San Pedro	♀ ad	221	121	26.0	33.4	29.6	4.9	12.4	5.2	15.5	12.9	4.5
A.M.N.H. No. 166026, Río Mono Blanco	♂ ad	248	127	26.0	33.5	—	5.0	13.5	5.2	16.1	13.5	4.9
A.M.N.H. No. 166027, Río Mono Blanco	♀ ad	256	130	26.0	33.5	—	5.3	14.3	5.0	16.4	—	4.9
A.M.N.H. No. 166028, Río Mono Blanco	♂ ad	277	143	28.0	35.7	—	5.2	14.7	5.4	16.2	—	4.9
A.M.N.H. No. 175126, Cerro Baul	♀ ad	250	140	26.0	34.0	30.5	4.6	14.4	5.3	16.0	13.1	4.9
A.M.N.H. No. 147646, Tapanatepec	♀ ad	254	130	27.0	33.7	30.2	4.8	13.0	4.8	15.3	12.5	4.5
Peromyscus mexicanus totontepecus												
A.M.N.H. No. 13893, Totontepec	♀ ad	244	124	29.0	33.1	29.5	5.5	13.4	5.2	16.2	13.0	4.9
A.M.N.H. No. 175141, Cerro Lachiguirí	♂ ad	247	126	27.0	32.2	—	5.0	13.3	5.3	15.9	—	4.7
A.M.N.H. No. 178711, Cerro Lachiguirí	♀ ad	264	138	28.0	33.8	—	4.9	12.7	4.7	16.4	—	4.9
A.M.N.H. No. 178714, Cerro Lachiguirí	♂ ad	270	141	28.0	34.4	30.5	5.3	13.2	5.3	17.0	13.4	4.9
A.M.N.H. No. 178715, Santiago Lachiguirí	♂ ad	277	132	27.0	34.1	30.5	5.0	13.5	5.3	16.5	12.9	4.8
A.M.N.H. No. 145711, Ixcuintepec	♂ ad	270	139	30.0	35.0	31.5	5.0	15.0	5.2	16.2	13.5	4.4
A.M.N.H. No. 145712, Ixcuintepec	♀ ad	233	113	28.0	33.2	29.3	5.0	13.2	5.2	16.2	12.7	4.7
A.M.N.H. No. 167443, Ixcuintepec	♂ ad	234	115	26.0	32.7	29.2	5.0	13.0	5.2	16.3	13.0	4.7
A.M.N.H. No. 167446, Ixcuintepec	♂ ad	235	124	27.0	31.8	29.0	4.5	13.1	5.2	15.7	12.7	5.0

TABLE 27—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Bony Palate, Length	Nasal Length	Interorbital Width	Zygomatic Width	Mastoid Width	Maxillary Tooth Row
A.M.N.H. No. 167447, Ixcuintepec	♀ ad	236	123	27.0	32.5	29.0	4.7	13.0	5.3	16.0	13.2	5.0
A.M.N.H. No. 167448, Ixcuintepec	♀ ad	231	115	28.0	32.8	29.2	4.7	12.9	5.2	15.8	13.0	4.9
A.M.N.H. No. 167449, Ixcuintepec	♀ ad	225	116	26.0	32.0	28.5	5.5	12.8	5.3	15.7	12.5	4.7
Peromyscus mexicanus putlaensis												
A.M.N.H. No. 189248,[a] San Vicente	♂ ad	238	127	27.0	31.6	28.4	4.65	12.0	5.0	15.5	12.3	4.6
A.M.N.H. No. 189249, San Vicente	♂ ad	243	130	26.0	31.9	28.3	4.6	12.9	5.0	—	12.1	4.6
A.M.N.H. No. 189251, San Vicente	♀ ad	257	125	26.0	31.4	28.2	4.9	12.0	5.0	15.2	12.4	4.5
A.M.N.H. No. 189252, San Vicente	♂ ad	247	130	26.0	32.8	29.0	5.2	13.2	5.2	15.1	12.6	4.8
Peromyscus banderanus angelensis												
U.S.N.M. No. 71442, Puerto Angel	♀ ad	235	123	26.5	31.3	—	4.8	11.7	5.2	15.0	—	4.6
A.M.N.H. No. 143308, Santa Lucía	♂ sub	221	111	27.0	32.8	29.7	5.3	11.6	5.2	15.0	12.9	4.3
A.M.N.H. No. 144533, Santa Lucía	♀ ad old	252	132	27.0	34.0	30.7	5.2	13.0	5.4	15.7	12.8	4.2
A.M.N.H. No. 144534, Santa Lucía	♀ ad	246	128	27.0	33.4	30.0	5.1	13.2	5.2	15.4	12.7	4.4
A.M.N.H. No. 144535, Santa Lucía	♀ ad	257	133	27.0	33.2	29.8	5.2	12.9	5.4	15.1	13.2	4.4
A.M.N.H. No. 144540, Santa Lucía	♂ ad	253	129	28.0	33.5	29.8	5.2	12.1	5.4	16.0	13.2	4.2
A.M.N.H. No. 147678, Tres Cruces	♂ ad	249	131	27.0	33.7	30.3	5.0	12.5	5.5	15.5	13.0	4.5
A.M.N.H. No. 147681, Tres Cruces	♀ ad	246	126	26.0	33.8	30.0	5.5	12.6	5.4	15.8	13.0	4.2
A.M.N.H. No. 149077, Cerro Arenal	♂ sub	222	120	27.0	31.2	27.8	5.1	11.5	4.9	14.3	12.3	4.3
A.M.N.H. No. 149097, Cerro Arenal	♂ sub	223	121	28.0	29.5	26.7	4.5	10.5	4.5	14.5	12.6	4.5
A.M.N.H. No. 149107, Zarzamora	♀ sub	247	129	27.0	33.2	29.4	5.3	11.6	5.2	15.4	12.8	4.3
A.M.N.H. No. 149112, Zarzamora	♂ ad	253	143	28.0	33.2	29.2	5.4	12.5	5.3	15.3	13.2	4.4
A.M.N.H. No. 149118, Zarzamora	♀ ad	235	130	28.0	32.8	29.5	5.2	12.3	5.4	15.7	13.2	4.3
A.M.N.H. No. 147632, Tenango	♀ ad	250	132	28.0	33.5	29.7	5.3	11.6	5.3	15.5	13.0	4.4
Peromyscus banderanus coatlanensis												
A.M.N.H. No. 167453,[a] Agua Zarca	♀ ad	245	130	26.0	34.0	30.5	5.5	13.0	5.3	16.5	13.3	4.4
Peromyscus banderanus sloeops												
A.M.N.H. No. 166026,[a] Río Mono Blanco	♂ ad	248	127	26.0	33.0	—	5.2	12.8	5.2	16.2	13.4	4.9
A.M.N.H. No. 166027, Río Mono Blanco	♀ ad	256	130	26.0	34.0	—	5.2	14.0	4.9	16.2	—	4.5
A.M.N.H. No. 166028, Río Mono Blanco	♂ ad	277	143	28.0	35.0	—	5.0	14.4	5.4	15.9	—	4.9

TABLE 27—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Bony Palate, Length	Nasal Length	Interorbital Width	Zygomatic Width	Mastoid Width	Maxillary Tooth Row
A.M.N.H. No. 171711, Cerro Azul	♂ ad	265	130	28.0	34.5	31.1	5.5	13.5	5.3	16.0	13.0	4.9
Peromyscus megalops megalops												
U.S.N.M. No. 71592,[a] near Ozolotepec	♂ old	282	150	31.0	34.0	—	5.0	13.0	5.4	17.0	—	5.3
A.M.N.H. No. 167420, Cerro Madreña	♂ ad	287	150	29.0	34.9	30.7	5.0	13.7	5.7	17.1	13.8	5.2
A.M.N.H. No. 167421, Cerro Madreña	♂ old	282	149	28.0	34.3	30.3	5.3	13.2	5.7	16.4	13.6	5.3
A.M.N.H. No. 146030, Sto. Tomás Teipan	♀ sub	250	145	30.0	33.3	30.1	5.2	12.4	5.5	16.2	13.6	5.2
A.M.N.H. No. 146032, Sto. Tomás Teipan	♂ sub	244	131	31.0	33.0	28.5	4.6	12.9	5.4	15.7	13.5	5.1
A.M.N.H. No. 146033, Sto. Tomás Teipan	♂ ad	270	140	31.0	34.7	30.5	4.7	13.5	5.7	16.0	14.0	5.1
A.M.N.H. No. 167424, Sto. Tomás Teipan	♂ juv	242	129	28.0	32.5	29.1	4.6	12.0	5.3	15.0	13.5	4.9
Peromyscus megalops auritus												
U.S.N.M. No. 68438,[a] near Oaxaca	♀ old	288	148	30.5	34.8	—	5.4	14.3	5.5	16.8	—	5.0
A.M.N.H. No. 186918, San Andrés Chicahuaxtla	♀ ad	277	146	29.0	34.1	30.7	5.4	14.5	5.6	15.7	13.4	5.0
Peromyscus megalops melanurus												
U.S.N.M. No. 71385,[a] Pluma	♂ ad	—	—	—	33.1	—	4.8	12.4	5.3	16.2	—	5.4
A.M.N.H. No. 171601, Soledad	♀ ad	220	110	25.4	31.2	36.4	4.4	12.0	5.0	146.	12.5	4.8
A.M.N.H. No. 17122, Soledad	♂ ad	250	120	27.0	33.3	29.3	5.1	12.6	5.3	15.9	13.0	5.3
Peromyscus megalops azulensis												
A.M.N.H. No. 171710,[a] Cerro Azul	♂ ad	249	119	29.0	35.1	31.8	4.7	13.5	5.6	16.5	12.8	5.3
A.M.N.H. No. 189258, Estancia	♂ ad	253	130	28.0	—	29.0	—	14.0	—	—	—	4.7
Peromyscus melanocarpus												
U.S.N.M. No. 68610,[a] Mt. Zampoaltepec	♀ sub	241	125	27.0	31.6	—	4.4	12.0	5.4	15.4	—	5.0
A.M.N.H. No. 182105, San Isidro	♂ ad	242	123	30.0	32.5	28.7	4.3	12.5	5.3	15.4	12.9	4.7
A.M.N.H. No. 182111, San Isidro	♂ sub	229	117	28.0	30.7	27.0	5.1	11.6	5.4	15.1	12.7	5.1
A.M.N.H. No. 186917, Puerto Elijio	♂ ad	—	—	27.0	32.1	28.3	4.8	12.5	5.4	15.2	12.4	4.8
A.M.N.H. No. 207440, Puerto Soledad	♀ ad	220	115	25.0	32.4	29.0	4.4	12.7	5.3	15.4	13.0	4.7
Peromyscus thomasi cryophilus												
U.M. No. 112865, Cerro Pelon	♂ ad	300	155	31.0	35.6	32.1	6.5	14.6	5.4	18.2	13.7	6.3
U.M. No. 112867, Cerro Pelon	♀ ad	330	180	31.0	36.4	32.9	6.5	15.1	5.5	19.5	14.3	6.2

[a] Type.

[b] Type of *Peromyscus hylocetes yautepecus.*

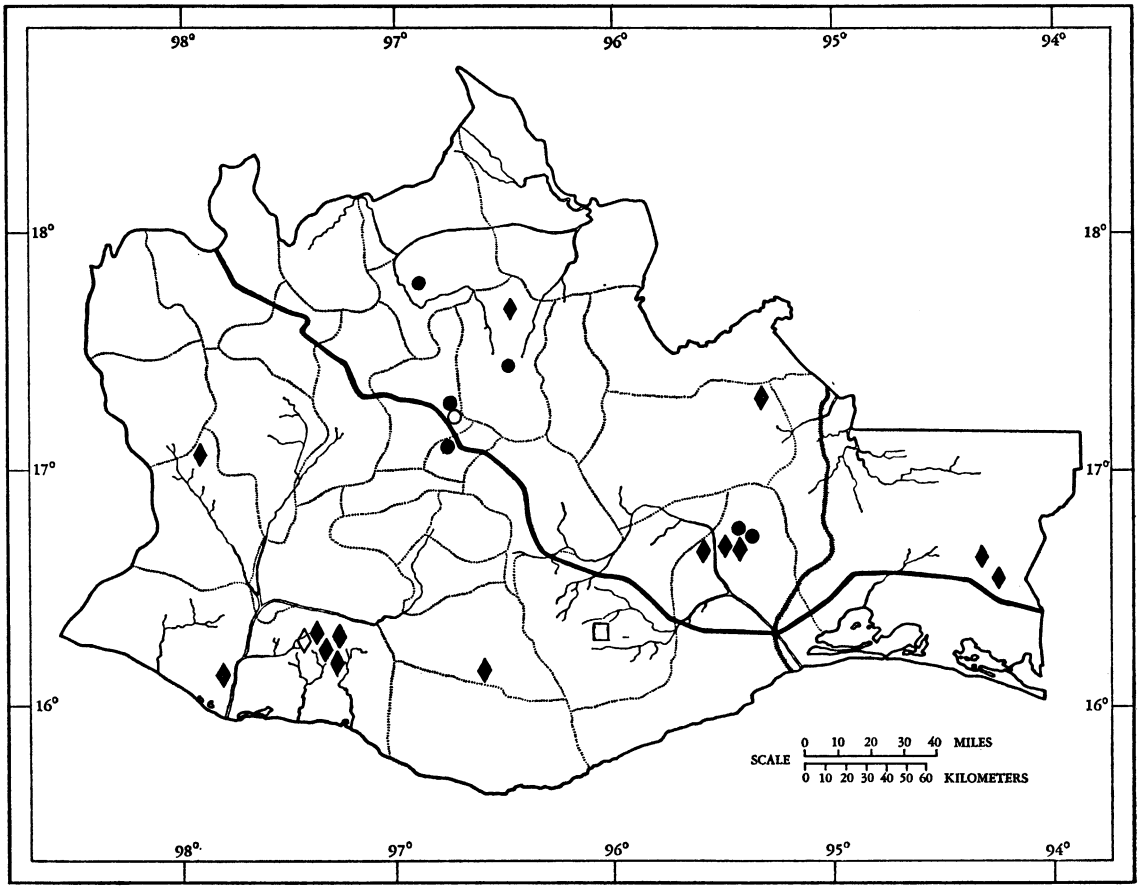


FIG. 67. Records of *Peromyscus evides* and *Peromyscus oaxacensis* in Oaxaca. ◆ *P. evides.* ◇ Type locality of *P. evides.* ● *P. oaxacensis.* ○ Type locality of *P. oaxacensis.* □ Type locality of *P. hylocetes yautepecus* (=*P. evides*).

aztecus but size larger, tail longer, and occurring at higher elevations. Skull broad and low; braincase broad and flattened; rostrum heavy, supraorbital border sharp-angled but not beaded; bullae small but larger than that of *P. mexicanus;* maxillary teeth large and broad, tooth rows parallel; palatine slits long and wide; interpterygoid space nearly as wide as bony palate.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Cuicatlán: Reyes, four (U.S.N.M.). Etla: Cerro San Felipe, six (U.M.). Ixtlán: Twelve miles north of Ixtlán de Juaréz, four (U.M.). Tehuantepec: Cerro de Lachiguirí, three; Agua Zarca, one.

REMARKS: *Peromyscus oaxacensis* is not known to occur east of the Isthmus of Tehuantepec in Oaxaca. Specimens from Cerro Atravesado, Juchitán, listed as *P. oaxacensis* (Goodwin, 1955, p. 1), resemble *oaxacensis* in having the upper parts Ochraceous-Tawny and an evenly bicolored tail, but the molar teeth are smaller than in *oaxacensis*, and the maxillary tooth rows converge posteriorly as in *P. m. mexicanus*, to which they are here referred.

Peromyscus truei zapotecae Hooper

Plate 21, figure 7; plate 22, figure 7; text figure 68

TYPE LOCALITY: One mile east of Tlacolula, Oaxaca, Mexico, altitude 5700 feet.

RANGE IN OAXACA: Arid rocky country of the central highlands.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 189–212; hind foot, 21–22; tail longer than length of head and body; similar to *P. t. gratus* from Tlalpan,

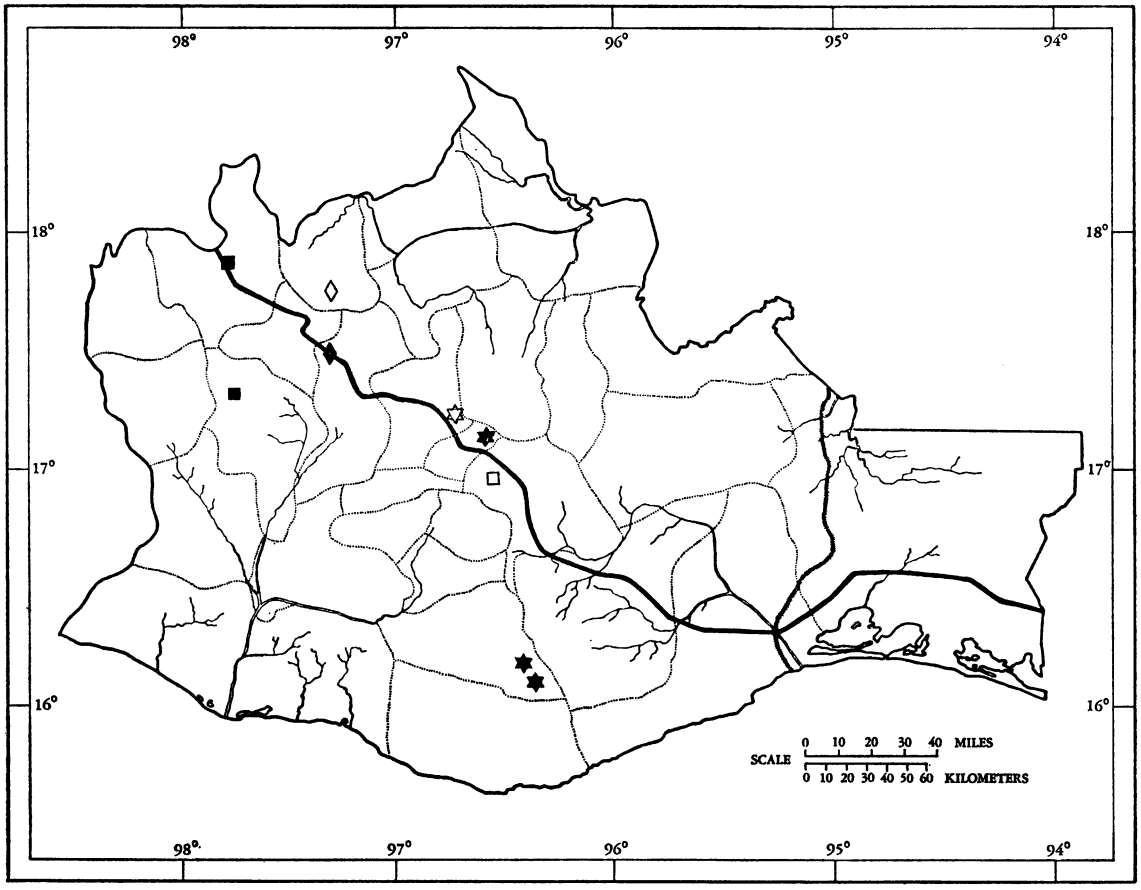


FIG. 68. Records of *Peromyscus truei* and *Peromyscus difficilis* in Oaxaca. ■ *P. t. zapotecae.* □ Type locality of *P. t. zapotecae.* ◆ *P. d. amplus.* ◇ Type locality of *P. d. amplus.* ★ *P. d. felipensis.* ☆ Type locality of *P. d. felipensis.*

Distrito Federál, but color paler, tail longer, hind foot smaller. Skull similar to that of *P. t. gratus*, but bullae smaller, braincase narrower, and molar teeth smaller.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Huajuápam: Huajuápam, one (U.M.). Tlacolula: Tlacolula, four (U.M.). Tlaxiaco: Tlaxiaco, two.

Peromyscus difficilis amplus Osgood

Text figure 68

TYPE LOCALITY: Coixtlahuaca, Oaxaca, Mexico, altitude 7000 feet.

RANGE IN OAXACA: Mountains of the north central districts.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 235–260; hind foot, 26–28; tail considerably longer than length of head and body; ears large; pelage Clay Color, long, and lax; similar in size and general characters to *P. d. felipensis* but color much paler, resembling *P. melanophrys* in this respect, but distinguishable from *melanophrys* by absence of supraorbital ridge on parietals, by larger audital bullae, and by shorter tail.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Nochixtlán: Two miles southeast of Yanhuitlán, two (T.C.W.C.).

Peromyscus difficilis felipensis Merriam

Plate 21, figure 8; plate 22, figure 8; text figure 68

TYPE LOCALITY: Cerro San Felipe, Oaxaca, Mexico, altitude 10,200 feet.

RANGE IN OAXACA: High elevations in the mountains northeast and south of Oaxaca de Juárez.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 225–248; hind foot, 25–27; tail considerably longer than length

of head and body; pelage long, woolly, and dark; ears large; similar in general characters to *P. f. amplus* but much darker, resembling *P. lepturus* in color but considerably larger and teeth relatively smaller.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Etla: Cerro San Felipe, one, two (U.M.). Miahuatlán: Arroyo Agua Fría, four: Guish-gal, 14.

REMARKS: The distribution of *P. d. felipensis* is curiously interrupted, the Oaxaca series being quite isolated from other localities farther north from which the form is known, whereas *P. d. amplus* is found in the intervening region.

Peromyscus melanophrys melanophrys (Coues)
Plate 21, figure 14; plate 22, figure 14; text figure 69

TYPE LOCALITY: Santa Efigenia, Oaxaca, Mexico.

RANGE IN OAXACA: Arid regions in the southern and northern districts of the state; altitudinal range from sea level to 6000 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 254–277; hind foot, 23–29; tail considerably longer than half of total length, coarsely annulated, well haired and frequently broadly tipped with white; ears large and naked; general color uniform pale Buffy. *Peromyscus m. melanophrys* resembles *P. difficilis amplus* in color and external characters but can be distinguished from the latter by its longer tail and well-developed supraorbital shelf.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Ixtlán: Sierra de Juárez, one (U.M.). Juchitán: Arroyo Encantado, one; Nizanda, one; Mazahuito, two; 5 miles north of Tapanatepec, one. Miahuatlán: Miahuatlán, one (U.M.); San

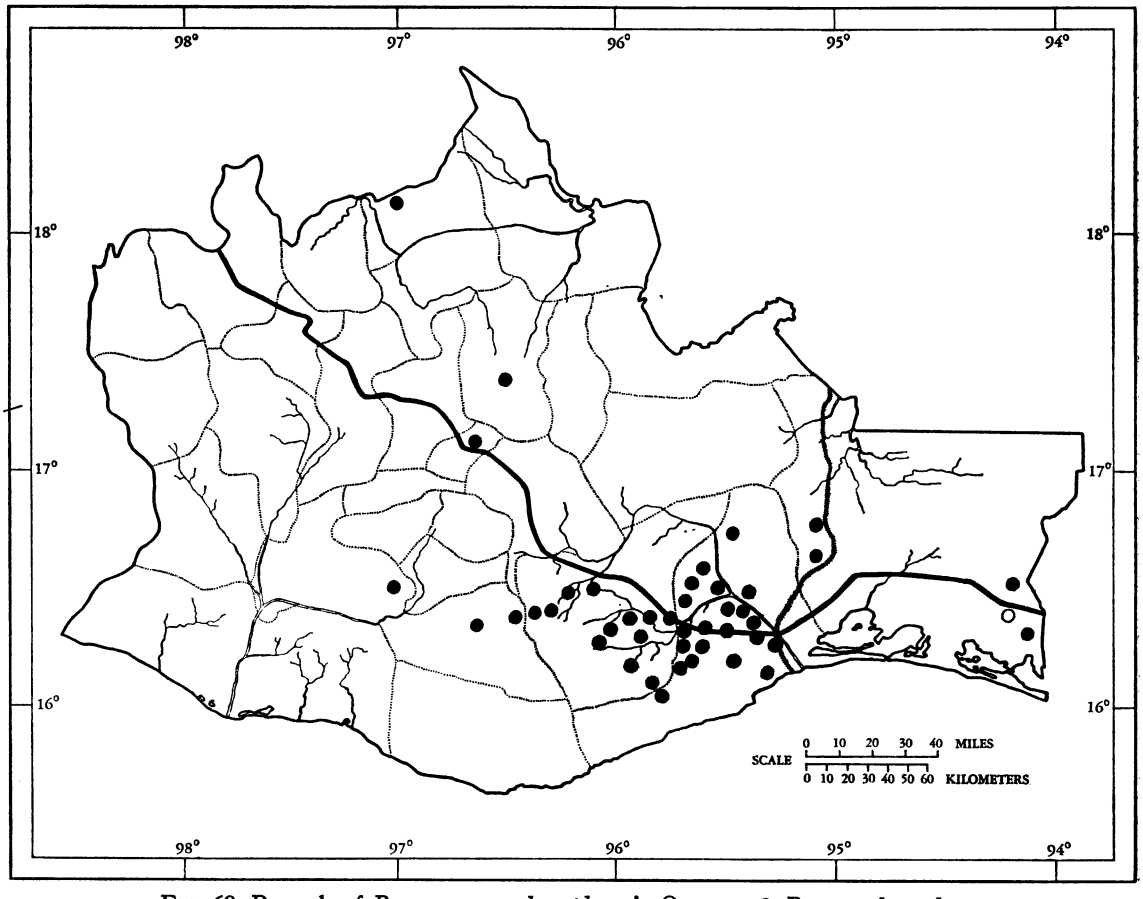


FIG. 69. Records of *Peromyscus melanophrys* in Oaxaca. ● *P. m. melanophrys.* ○ Type locality of *P. m. melanophrys.*

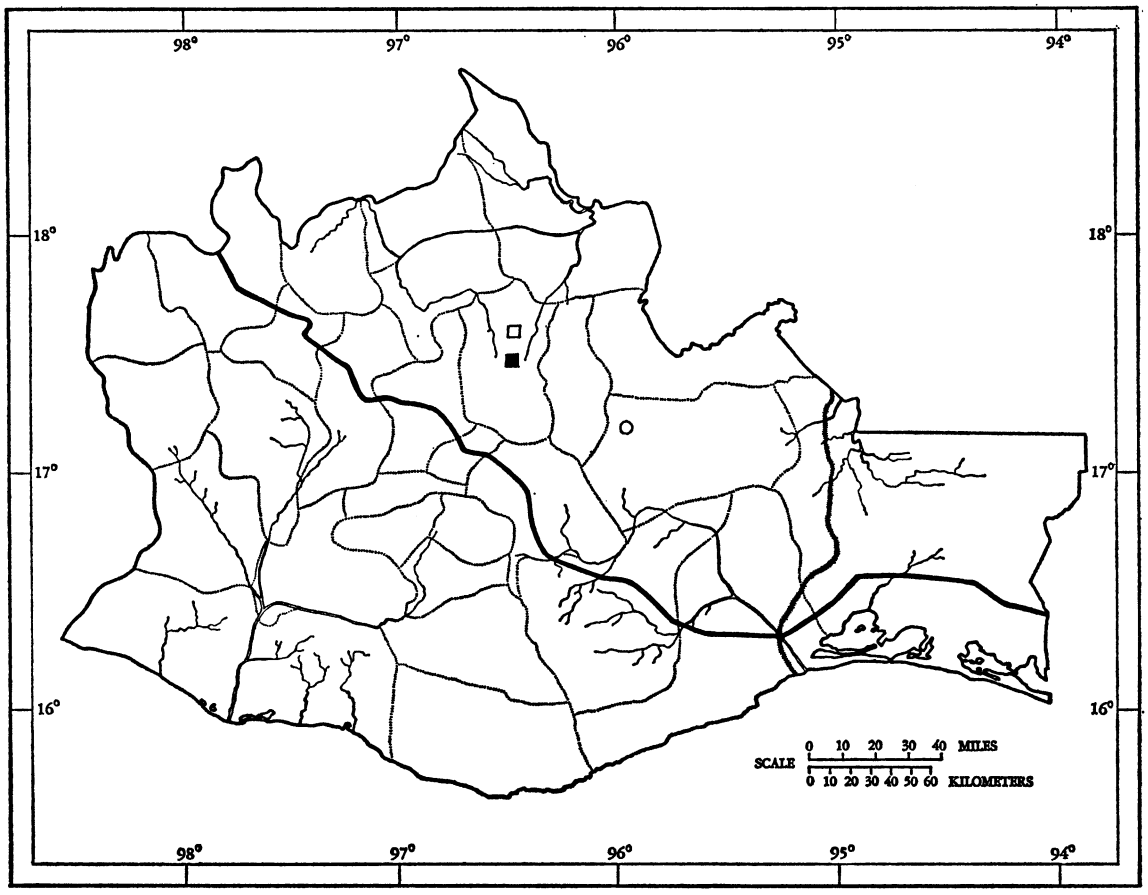


FIG. 70. Records of *Peromyscus lepturus* and *Peromyscus ixtlani* in Oaxaca. ○ Type locality of *P. lepturus*. ■ *P. ixtlani*. □ Type locality of *P. ixtlani*.

José Lachiguirí, three. Oaxaca: Seven miles northeast of Oaxaca de Juárez, one (U.M.). Sola de Vega: Sola de Vega, one (U.M.). Tehuantepec: Aguaje Sapotal, one; Agua Zarca, one; Aguaje Tres Cabezas, one; Arroyo Coyote, two; Arroyo La Manga, two; Arroyo San Juan, one; Caja de Agua, one; Cantera, one; Cerro Pastle, one; Cerro San Pedro, two; Cerro de Tigre, two; Escurano, four; Guiengola, 18; Hierba Santa, three; Huamelula, one; Jalapa, eight; Portillo Zapote, one; Pozo Río, three; Río Chile, four; Salazar, 10; San Antonio, 18; Santa Lucía, 19; Cerro Tablon, three; Tehuantepec, two; 10 miles west of Tehuantepec, one (U.M.); Tenango, eight. Yautepec: Arroyo Sauce, six; Buena Vista, three; Chontecomatlán, one; Limón, four; Manteca, one; Petacaltepec, one; Reforma, one; Río Costoche, one; Río Grande, two; San Pedro Jilotepec, five; Santa Catarina Quioquitani, one; Santa María Ecatepec, four; Santo Tomás Teipan, one; Zarzamora, one.

SPECIMENS RECORDED: (Hall and Kelson, 1959, p. 645). Teotitlán: Teotitlán, one (U.M.).

REMARKS: *Peromyscus m. melanophrys* is the representative from Oaxaca of a rather strikingly marked group of long-tailed, white-footed mice inhabiting the more arid regions of this state. Although there is some variation in color due to age, geographical origin, and individual differences, variation in the present long series is slight.

Peromyscus lepturus Merriam

Plate 21, figure 4; plate 22, figure 4; text figure 70

TYPE LOCALITY: Mt. Zempoaltepec, Oaxaca, Mexico, altitude 8200 feet.

RANGE: High mountains in the eastern central part of the state west of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 218–238; hind foot, 26–28; tail about equal to or longer than length of head and body; pelage full, long, lax, and dusky; similar in general form to *P. boylii levipes* but larger and darker in color; resembling *P. mexicanus totontepecus* and *P. melanocarpus* in color, but smaller, with a flatter and more slender skull, and with larger teeth than either.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Mixes: Mt. Zempoaltepec, one.

REMARKS: *Peromyscus lepturus* is the second largest in a group of species that includes *P. lophurus*, *P. hondurensis*, *P. simulatus*, and *P. ixtlani*. From the first three species it is distinguishable by its larger size, more coarsely haired tail, and flatter skull, and from the last species by its smaller size.

Peromyscus ixtlani Goodwin

Plate 23, figures 1, 2; text figure 70

Peromyscus ixtlani GOODWIN, 1964, p. 3.

TYPE LOCALITY: Cerro Machín, 5 kilometers northeast of Macuiltianguis, District of Ixtlán, Oaxaca, Mexico, altitude 9000 feet.

RANGE IN OAXACA: High mountains in the north-central part of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 239–266; hind foot, 28–29; similar to *Peromyscus lepturus* Merriam in color (Cinnamon-Buff) and cranial characters, but much larger throughout, tail more distinctly bicolored and relatively longer, and well-defined dusky patch that usually extends well onto hind foot in *P. lepturus* lacking.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Ixtlán: Cerro Machín, nine; Llano de las Flores, one; five (U.M.).

Peromyscus mexicanus mexicanus (Saussure)

Text figure 71

TYPE LOCALITY: Mexico; assumed to be in the vicinity of Mirador, Veracruz, by Osgood (1909, p. 199); restricted to 10 kilometers east of Mirador by Dalquest (1950, p. 8).

RANGE IN OAXACA: Tropical regions of eastern and southeastern parts of the state and north across the Isthmus of Tehuantepec to the Veracruz state line.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 221–277; hind foot, 24–28; tail about equal to half of total length, coarsely annulated, usually blotched irregularly on under side with yellowish white, seldom evenly bicolored. Color Cinnamon-Buff mixed with black; about size of *P. oaxacensis*, but color paler, tail less hairy, hind feet narrower, skull narrower, and molariform teeth smaller.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Juchitán: Arroyo Escantado, one; Cerro Atravesado, 12; Cerro Baul, six; Cerro Madre north of Zanatepec, 30; Chivela, one; Las Lagunas, two; 18 miles north of Matías Romero, one; Mogoñé, two; Monte Rico, one; Nizanda, five; Paso Monte Rico, two; Paso Venado, two; Río Mono Blanco, 16; Río Blanco, two; Santa María Chimalpa, seven; Tenochitutlán, 10; Tapanatepec, two; Tolosita, 21; Ubero, one. Miahuatlán: Lachillo, one. Tehuantepec: Cerro Arenal, three; Cerro San Pedro, 10; Escurano, two; Mixtequilla, one; Salazar, three; 10 miles west of Tehuantepec, two (U.M.); Tehuantepec, three (U.S.N.M.).

REMARKS: Variation in external and cranial characters of *P. m. mexicanus* from Oaxaca is great; each series shows some deviation from the general type. Specimens from Tolosita have skulls that are short, broad, and heavy as compared with the skull of typical *mexicanus* and show a tendency to intergrade with *P. m. totontepecus* and *P. m. teapensis*. From the mountains north of Zanatepec, three specimens, A.M.N.H. Nos. 205282, 205289, and 205295, have a relatively longer and more evenly bicolored tail than specimens of typical *mexicanus*, but are included with this species on cranial characters.

Peromyscus mexicanus totontepecus Merriam

Plate 21, figure 13; plate 22, figure 13; text figure 71

TYPE LOCALITY: Totontepec, Oaxaca, Mexico.

RANGE IN OAXACA: Mountains of the east-central part of the state west of the Isthmus of Tehuantepec.

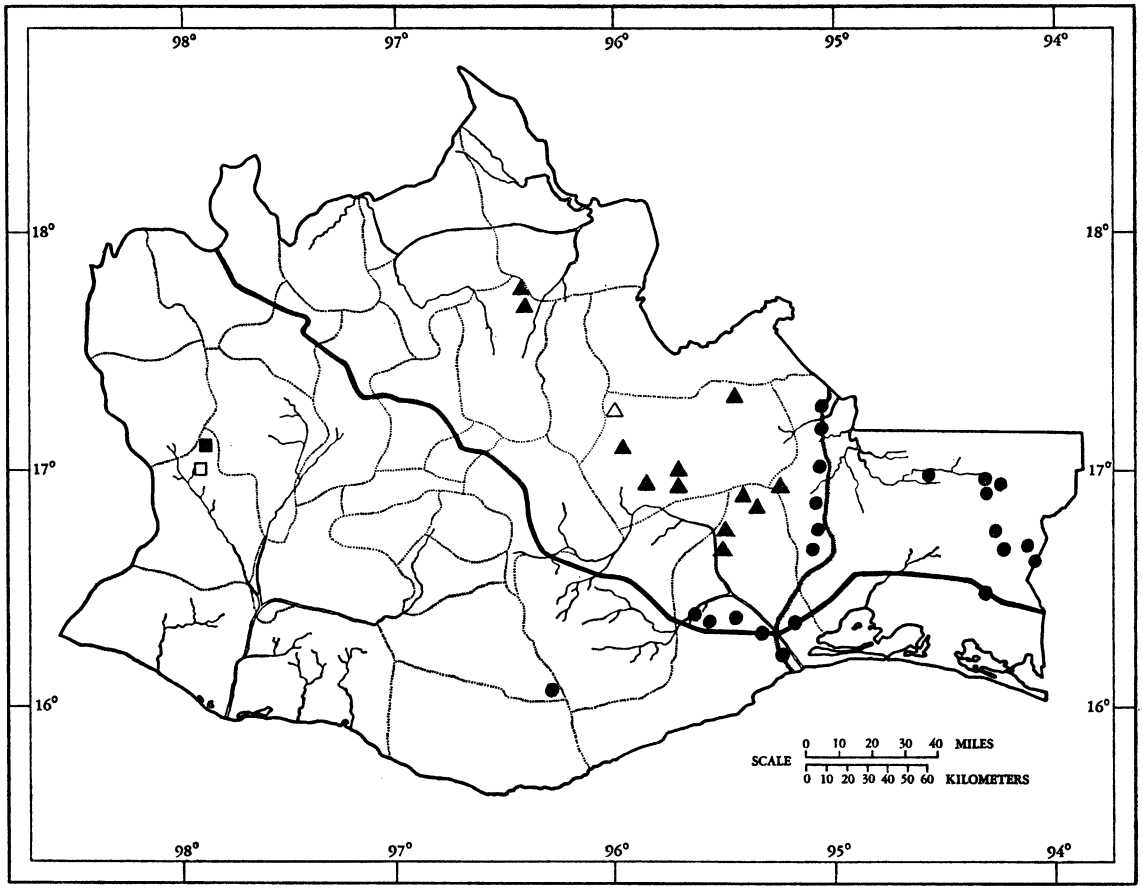


FIG. 71. Records of *Peromyscus mexicanus* in Oaxaca. ● *P. m. mexicanus.* ▲ *P. m. totontepecus.* △ Type locality of *P. m. totontepecus.* ■ *P. m. putlaensis.* □ Type locality of *P. m. putlaensis.*

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 225–277; hind foot, 26–30; tail slightly more than half of total length, irregularly blotched with dusky below; pelage long, soft, and blackish brown; similar to *P. m. mexicanus* but larger, pelage longer and darker, skull and molariform teeth larger. Skull long and narrow; braincase low and broad; rostrum slender, supraorbital border sharp-angled, with a slight but distinct bead; molariform teeth small but relatively large for *mexicana* group; maxillary tooth rows converging slightly posteriorly.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Ixtlán: Tarabundí, four; Campamento Vista Hermosa, one. Juchitán: Arroyo Las Conchas, one, Mixes: Alotepec, one; Arroyo de Chili, eight; Chusnavan, three; Ixcuintepec, 29; Jaltepec, three; Totontepec, one. Tehuantepec: Cerro de Lachiguirí, six; Coatlán, one; El Campanario, two; Guigovalaga, two; Santiago Lachiguirí, three; Las Cuevas, one.

Peromyscus mexicanus putlaensis Goodwin

Text figure 71

Peromyscus mexicanus putlaensis GOODWIN, 1964, p. 5.

TYPE LOCALITY: San Vicente, District of Putla, Oaxaca, Mexico, altitude 4000 feet.

RANGE IN OAXACA: Known only from the vicinity of the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 222–257; hind foot, 25–27; about size of typical *Peromyscus mexicanus* (Saussure), but closely resembling *P. m. totontepecus* Merriam in texture of pelage and coloration and differing from both forms

in some cranial characters. Skull relatively small and broad, supraorbital beading scarcely indicated; rostrum long and narrow; incisive foramina large and reaching posteriorly to a plane across front of anterior molars; mesopterygoid fossa broad; auditory bullae comparatively large.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Putla: San Vicente, seven; Santo Domingo Chicahuastla, three.

Peromyscus banderanus angelensis Osgood

Text figure 72

TYPE LOCALITY: Puerto Angel, Oaxaca, Mexico.

RANGE IN OAXACA: Arid regions in the southern districts of the state from the Rio Tehuantepec west to Pinotepa near the Oaxaca-Guerrero border; altitudinal range from near sea level up to about 3500 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 222–258; hind foot, 26–28; tail about equal to length of head and body, indistinctly bicolored; pelage short, soft, Cinnamon-Buff; under parts white, with elongate buffy pectoral marking; about size and color of *P. m. mexicanus* but pectoral marking more sharply defined, narrower, and more elongate. Skull smaller than that of *P. mexicanus* or that of *P. melanophrys;* teeth smaller and braincase broader; rostrum long and slender; supraorbital border angular, forming shelf over orbit, and distinctly beaded; anterior palatine foramina short, elliptical, and not reaching a line across anterior border of upper molars; interpterygoid space narrow; molariform teeth small; maxillary tooth rows converging posteriorly.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Jamiltepec: Pino-

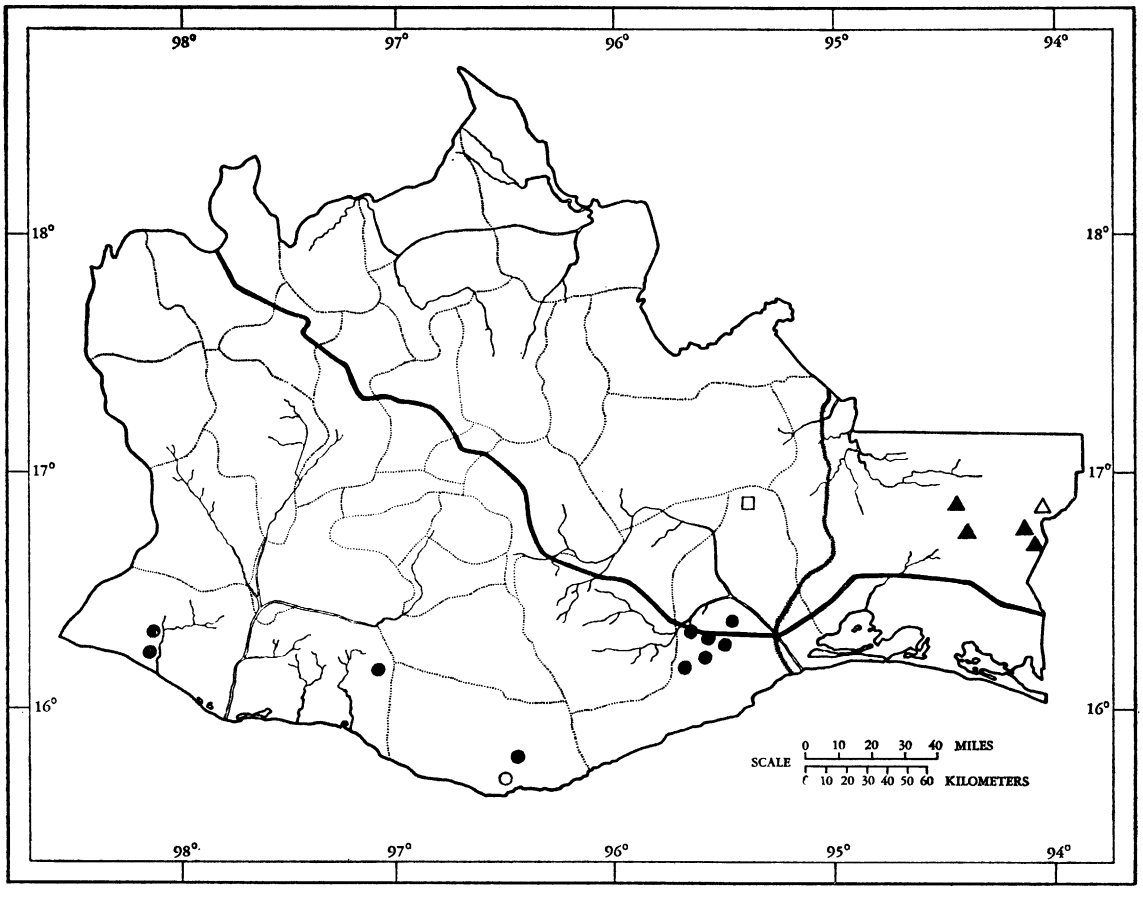


FIG. 72. Records of *Peromyscus banderanus* and *Peromyscus sloeops* in Oaxaca. ● *P. b. angelensis.* ○ Type locality of *P. b. angelensis.* □ Type locality of *P. b. coatlanensis.* ▲ *P. sloeops.* △ Type locality of *P. sloeops.*

tepa de Don Luis, two; Pinotepa Nacional, one (U.S.N.M.). Juchitán: Nopala, one. Juquila: San Gabriel Mixtepec, eight. Pochutla: Pluma, one (U.S.N.M.); Puerto Angel, three (U.S.N.M.). Tehuantepec: Arroyo San Juan, three; Cerro Arenal, three; Cerro Otate, two; La Concepción, one; San Antonio, one; Santa Lucía, 44. Yautepec: Santa María Ecatepec, two; Zarzamora, five.

Peromyscus banderanus coatlanensis Goodwin

Plate 21, figure 12; plate 22, figure 12; text figure 72

TYPE LOCALITY: Agua Zarca, approximately 7 kilometers southwest of Coatlán, District of Tehuantepec, Oaxaca, Mexico, altitude 3500 feet.

RANGE IN OAXACA: Known only from the vicinity of the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Similar in general characters to *P. b. angelensis*, but skull noticeably larger, supraorbital shelf more strongly beaded, and pelage with a stronger mixture of dusky hairs.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Tehuantepec: Agua Zarca, three.

REMARKS: This is a geographic variety of *P. banderanus*, occurring in the region over the divide from *P. b. angelensis* in Tehuantepec and in the Gulf drainage. The range of *angelensis* is restricted to southern Oaxaca west of the Río Tehuantepec on the Pacific drainage. The skull of the type of *coatlanensis* is noticeably larger than any skull among the 70 specimens of *angelensis* examined.

Peromyscus banderanus sloeops Goodwin

Text figure 72

TYPE LOCALITY: Río Blanco, District of Juchitán, Oaxaca, Mexico, altitude about 3000 feet.

RANGE IN OAXACA: Moderate elevations in the mountains of the eastern part of the district of Juchitán.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 246–277; hind foot, 26–28; pelage long, soft, and lax; color buffy; tail bicolored, longer than head and body. Skull strongly beaded, supraorbital ridges well developed; lacrimal region swollen, molariform teeth small; upper tooth rows converging posteriorly; palate wide, 6.5–6.9 across molars.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Juchitán: Río Mono Blanco, four; Cerro Azul, one; Arroyo Cardón, three; Cerro Baul, three.

REMARKS: The material from eastern Oaxaca now available indicates that *Peromyscus sloeops* is a subspecies of *P. banderanus*, as it was originally regarded. *Peromyscus b. sloeops* may be confused with *P. m. mexicanus* but can usually be distinguished from the latter by its soft, downy pelage, the swollen lacrimal region, and by the beaded supraorbital ridges.

Peromyscus megalops megalops Merriam

Plate 21, figure 11; plate 22, figure 11; text figure 73

TYPE LOCALITY: Mountains near Ozolotepec, Oaxaca, Mexico.

RANGE IN OAXACA: High elevations in the south-central part of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 275–282; hind foot, 30–31; tail considerably longer than head and body, coarsely haired, and irregularly bicolored; ears large; pelage long, lax, and blackish brown mixed with tawny; decidedly larger and with larger teeth and longer tail than *P. mexicanus totontepecus*. Skull large; braincase broad; frontals broad, distinctly beaded on supraorbital border and depressed in median line, forming a shallow pit immediately behind nasals; nasals long; audital bullae relatively small; palatine slits long and widely open.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Yautepec: Cerro Madreña, four; Santo Tomás Teipan, seven. Miahuatlán: Río Molino, one.

REMARKS: The species *P. megalops* is exceeded in size only by *P. thomasi* among species of the genus *Peromyscus* found in Oaxaca.

Peromyscus megalops auritus Merriam

Text figure 73

TYPE LOCALITY: Mountains 15 miles west of Oaxaca de Juárez, Oaxaca, Mexico, altitude 9300 feet.

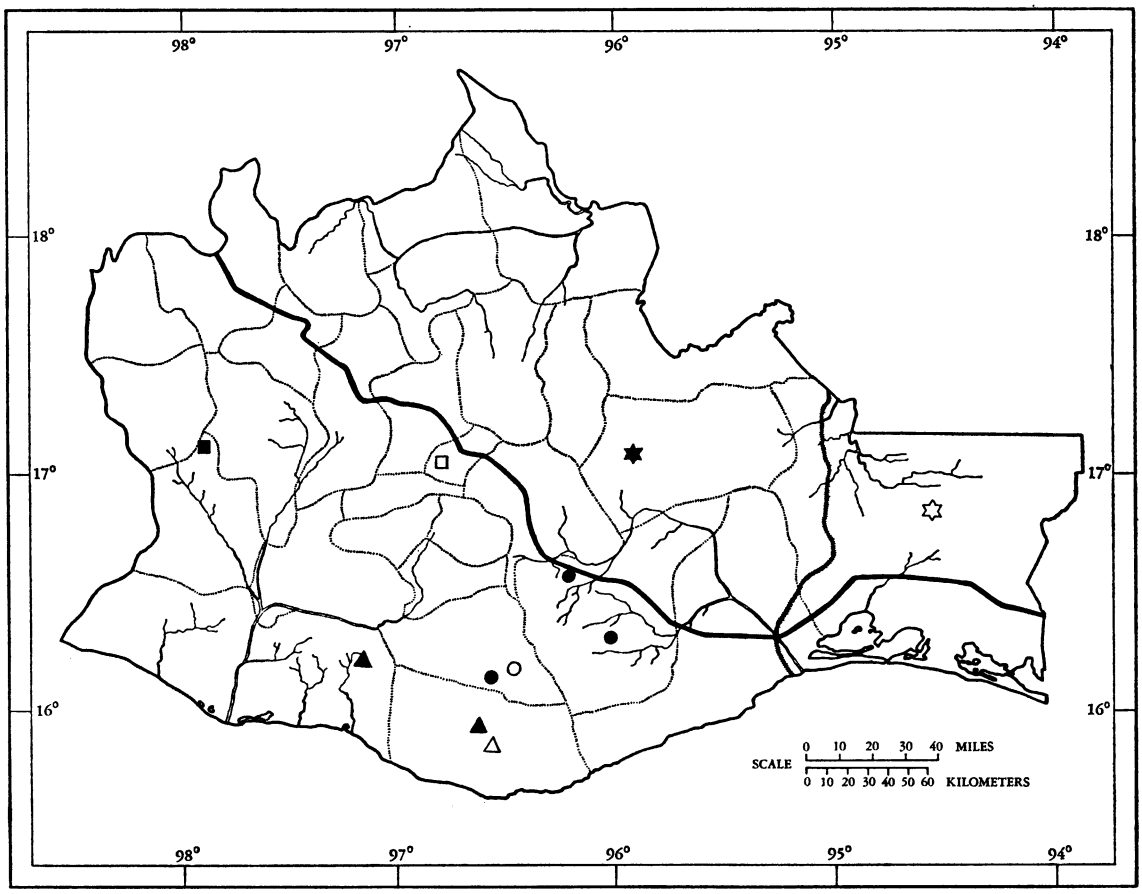


FIG. 73. Records of *Peromyscus megalops* in Oaxaca. ● *P. m. megalops.* ○ Type locality of *P. m. megalops.* ■ *P. m. auritus.* □ Type locality of *P. m. auritus.* ★ *P. m. azulensis.* ☆ Type locality of *P. m. azulensis.* ▲ *P. m. melanurus.* △ Type locality of *P. m. melanurus.*

RANGE IN OAXACA: High mountains in the western districts.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 273–288; hind foot, 30–32; tail considerably more than half of length of head and body, but shorter than half of total length; ears large; pelage long and lax. Very similar in color, size, and external characters to *P. m. megalops*, but audital bullae decidedly larger and nasals slightly longer.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Putla: San Andrés Chicahuaxtla, one.

Peromyscus megalops azulensis Goodwin

Text figure 73

TYPE LOCALITY: Cerro Azul, District of Juchitán, Oaxaca, Mexico, altitude 7000 feet.

RANGE IN OAXACA: High mountains in the eastern part of the state from Juchitán District to the District of Mixes.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 249–255; hind foot, 28–29; tail about equal to or slightly longer than head and body; similar in size, color, and general characters to *P. m. megalops*, but skull relatively longer and narrower, braincase decidedly narrower, and tail relatively and actually shorter.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Juchitán: Cerro Azul, one. Mixes: Estancia, one.

REMARKS: *Peromyscus m. azulensis* is a well-marked form with broad forefeet and hind feet and an exceptionally short tail for the species *megalops*.

Peromyscus megalops melanurus Osgood

Text figure 73

TYPE LOCALITY: Pluma Hidalgo, Oaxaca, Mexico, altitude 4600 feet.

RANGE IN OAXACA: Coastal highlands in the south-central part of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 238–278; hind foot, 26–28.5; tail considerably longer than length of head and body; pelage relatively short for species. Similar to typical *megalops* but smaller, pelage shorter, and skull smaller. Skull similar to that of *megalops*, but smaller and more strongly built; teeth and audital bullae smaller; interparietal large and produced posteriorly; frontals wide and distinctly beaded.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Pochutla: La Soledad, two. Juquila: Lachão, nine.

Peromyscus melanocarpus Osgood

Plate 21, figure 9; plate 22, figure 9; text figure 74

TYPE LOCALITY: Mt. Zempoaltepec, Oaxaca, Mexico, altitude 8000 feet.

RANGE IN OAXACA: High mountains in the east-central parts of the state west of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 241–262; hind foot, 27–30; tail unicolored, slightly longer than head and body; pelage dark (Mummy Brown), long, and soft; similar in general characters to *P. megalops* but smaller; similar in size and color to *P. mexicanus totontepecus* and occurring in same locality but differing in distinctive cranial characters; similar in pelage and color to *P. lepturus*, which also occurs at same localities, but decidedly darker; forefeet and hind feet more or less dusky brownish to base of toes. Skull large, braincase broad, supraorbital border slightly beaded; rostrum long, nasals ending posteriorly on a plane with ascending branches of premaxilla; anterior palatine foramina long and widely open, similar to those of *megalops* but smaller; nasals shorter and molariform teeth larger than those of *totontepecus*.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Ixtlán: Puerto Elijio, one; San Isidoro, Comaltepec, five. Teotitlán: Huehuetlán, four.

SUBGENUS **MEGADONTOMYS** MERRIAM

Peromyscus thomasi cryophilus Musser

Plate 23, figures 3, 4; text figure 74

Peromyscus thomasi cryophilus MUSSER, 1964, p. 13.

TYPE LOCALITY: Cerro Pelon, 13 miles northeast of Llano de las Flores, District of Ixtlán, Oaxaca, Mexico, altitude 9200 feet.

RANGE IN OAXACA: Known only from the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 300–331; hind foot, 31–33; tail longer than length of head and body; color Ochraceous-Buff; body heavy; ears relatively small for species. Skull large; rostrum long and slender; nasals long; supraorbital border beaded; anterior palatine foramina long; molar teeth large; anterior border of interpterygoid fossa broadly rounded.

MEASUREMENTS: In table 27.

SPECIMENS EXAMINED: Ixtlán: Cerro Pelon, two (U.M.).

SUMMARY OF *Peromyscus* OF OAXACA

Sixteen of the 23 forms here recognized of *Peromyscus* in Oaxaca range in the high mountains and upland regions. Seven forms occur in the hills and brush country at comparatively low elevations. The ranges of some of the forms of these two groups overlap at elevations from 2000 to 4000 feet.

Peromyscus boylii levipes, a rather small, hairy-tailed form, is the most abundant and widely distributed member of the genus in the mountains, whereas an allied species, *P. evides*, a somewhat larger, tawnier form, is not uncommon in the southern part of the state. *Peromyscus oaxacensis*, a buffy-colored form, also of the *boylii* group, is larger and occurs at higher and drier elevations than *levipes* and *evides*. *Peromyscus mexicanus totontepecus* is dark and soft-furred, and inhabits high mountains. *Peromyscus lepturus*, *P. melanocarpus*, and *P. ixtlani* resemble *totontepecus* in having soft, dark-colored pelage and may occur at the same localities. *Peromyscus megalops* (all subspecies) is dark and inhabits high mountains.

Peromyscus difficilis felipensis inhabits high mountains, is soft-furred and dark, and has ears that are relatively larger than those of any other species of Oaxacan *Peromyscus*.

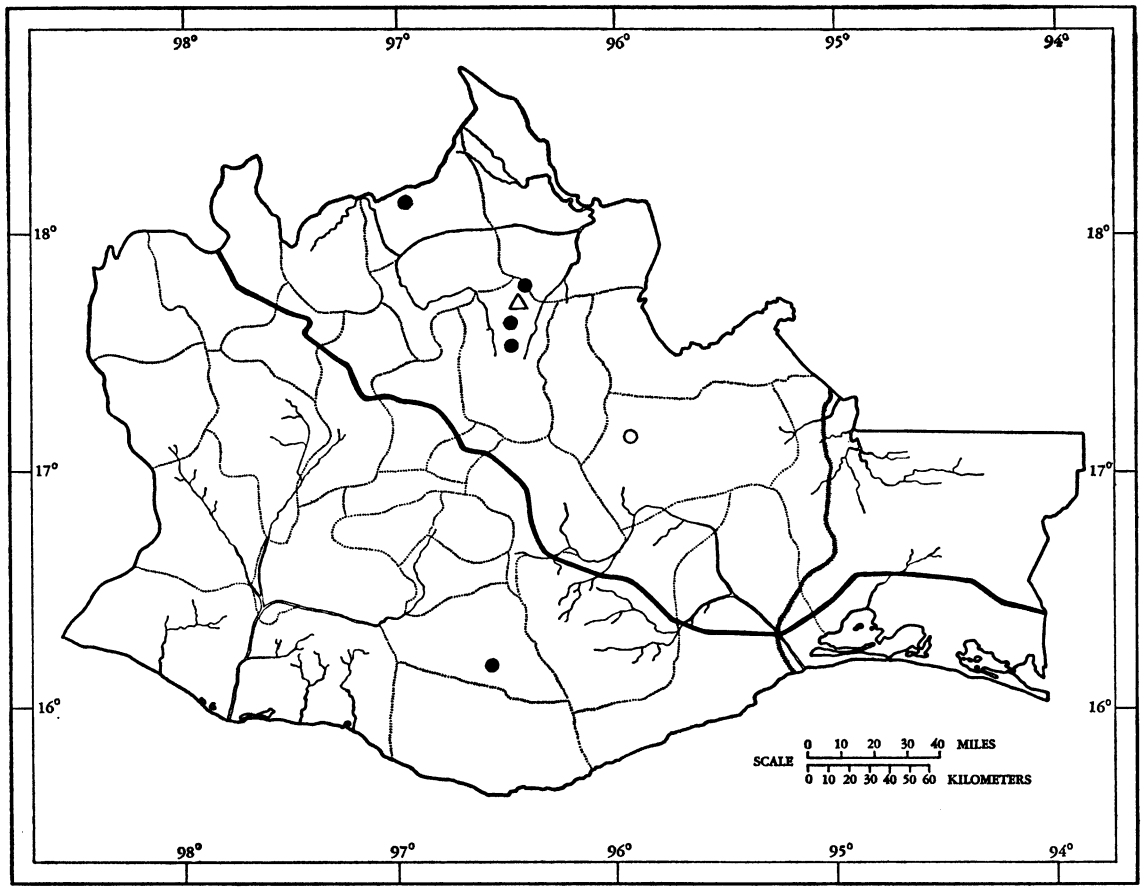


FIG. 74. Records of *Peromyscus melanocarpus* and *Peromyscus thomasi* in Oaxaca. ● *P. melanocarpus.* ○ Type locality of *P. melanocarpus.* △ Type locality of *P. t. cryophilus.*

Peromyscus difficilis amplus is paler than *felipensis* and occurs at somewhat lower elevations. *Peromyscus truei gratus* and *P. t. zapotecae* are also soft-furred, big-eared, montane forms but are much smaller and have a shorter tail than members of the *difficilis* group. *Peromyscus maniculatus fulvus* is the smallest and shortest-tailed of the montane species of *Peromyscus* in Oaxaca and is the southernmost representative of the widely distributed *maniculatus* group.

Peromyscus mexicanus mexicanus resembles *P. oaxacensis* in size and color but occurs at lower elevations and is most prevalent in eastern Oaxaca. *Peromyscus mexicanus putlaensis* is about the size of typical *P. m. mexicanus* but occurs at higher elevations and has darker and softer fur. *Peromyscus banderanus angelensis* is a well-marked race native to the tropical lowlands of southern Oaxaca. It is about the same size and color as *P. m. mexicanus*, but can be readily distinguished from other local forms by a sharply defined elongate marking in the pectoral region; *P. banderanus coatlanensis* is a slightly larger subspecies. *Peromyscus melanophrys melanophrys*, a long-tailed, lightly colored form, is common in the low, arid regions of southeastern Oaxaca but also occurs at somewhat higher elevations. *Peromyscus leucopus affinis* and two other subspecies of *P. leucopus* are about the same size and color as *P. maniculatus fulvus*, but have shorter, coarser pelage and a longer and less hairy tail and occur in more arid regions and at lower elevations than *fulvus*. *Peromyscus thomasi cryophilus* is the largest species of *Peromyscus* known to occur in Oaxaca and has been taken only in the north-central part of the state.

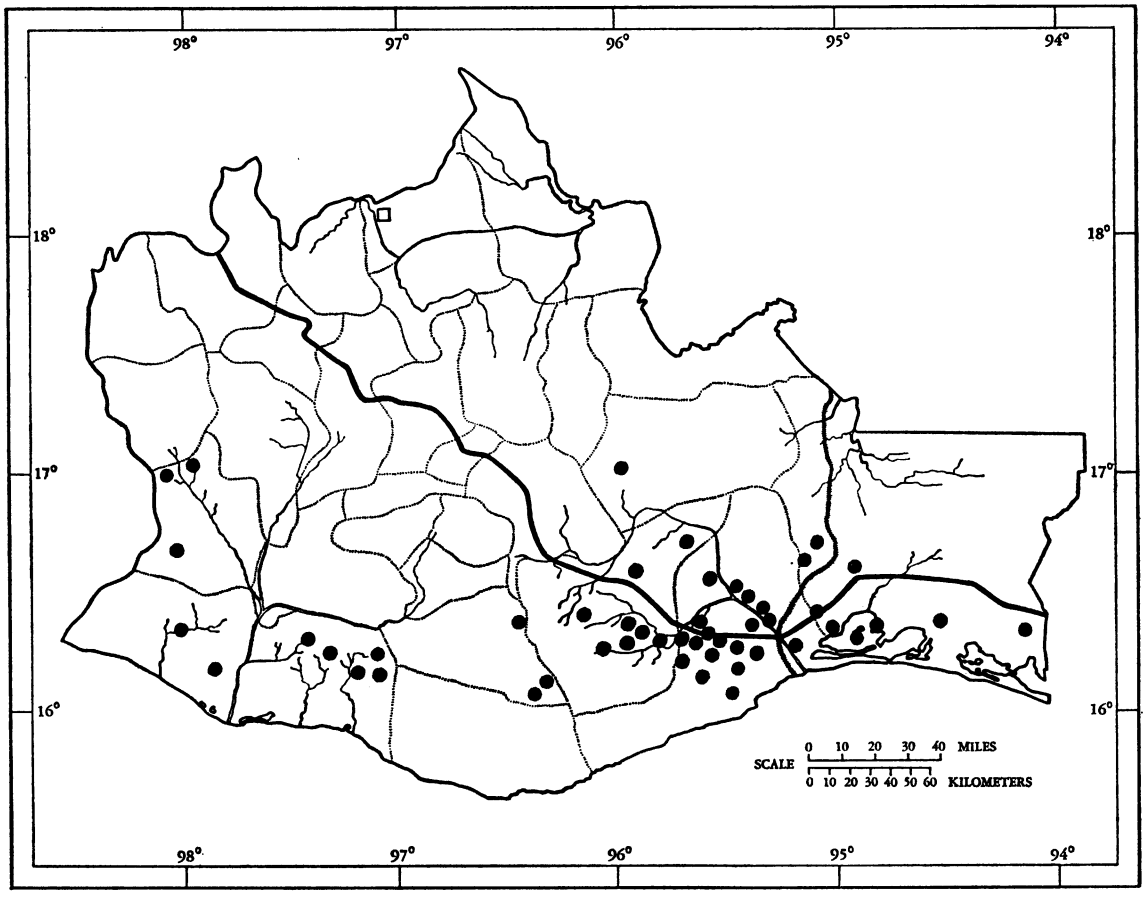


FIG. 75. Records of *Baiomys musculus* in Oaxaca. ● *B. m. pallidus.* □ Type locality of *B. m. infernatis.*

GENUS **BAIOMYS** TRUE

PYGMY MICE

Baiomys musculus pallidus Russell

Plate 23, figures 9, 10; text figure 75

TYPE LOCALITY: Twelve kilometers northwest of Axochiapan, Morelos, Mexico, altitude 3500 feet.

RANGE IN OAXACA: Throughout southern Oaxaca from near sea level up to 6550 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 110–126; hind foot, 15–16; tail short, about one-third of total length. *Baiomys musculus pallidus* is one of the smallest rodents in Oaxaca and can be distinguished from typical *Mus musculus* by its paler Buffy Brown color, shorter tail, and whitish under parts. Skull small, dorsal outline evenly arched; nasals short and broad; interorbital space broad and rather sharp-angled; palatine slits long and nearly parallel-sided.

MEASUREMENTS: In table 28.

SPECIMENS EXAMINED: Jamiltepec: Jamiltepec, two; Pinotepa, two. Juchitán: Buena Vista, one; Chivela, one; Estero de Perros, three; Isla Natar Dac, five; Juchitán, six; La Ventosa, two; Nizanda, one; Reforma, 13; Tapanatepec, 35. Juquila: San Gabriel Mixtepec, 15; San Juan Lachão, one; Nopala, three; Juquila, one; Teotepec, three. Miahuatlán: San Felipe Lachilló, one; San José Lachiguirí, two; Xanaguia, one. Mixes: Estancia, one. Putla: Zacatepec, two; Mesones, two; San Vicente, nine. Tehuantepec: Arroyo Palmar, six; Arroyo San Juan, one; Cerro Arenal, one; Cerro Pastle, six; Cerro Mazorca, two; Cerro Ocotepec, one; Cerro Otate, three; Bambita, five; El Campanario, one; Limón, one; Gueladú, six; Guiengola, five;

TABLE 28

MEASUREMENTS (IN MILLIMETERS) OF *Baiomys* FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Zygomatic Breadth	Interorbital Breadth	Incisive Foramina Length	Maxillary Tooth Row
Baiomys musculus pallidus									
OAXACA									
A.M.N.H. No. 189279, Estancia	♂ ad	105	45	15.0	18.6	10.0	3.7	3.8	3.0
A.M.N.H. No. 171659, Morro Mazatlán	♂ ad	102	42	15.0	18.4	8.8	4.0	3.3	2.8
A.M.N.H. No. 171661, Morro Mazatlán	♀ ad	130	57	15.0	19.4	10.0	3.7	4.3	2.9
A.M.N.H. No. 175246, Nizanda	♀ ad	122	50	15.0	18.3	9.6	3.4	4.0	3.2
A.M.N.H. No. 189280, Zacatepec	♀ ad	107	45	14.0	19.5	—	4.1	4.3	3.2
A.M.N.H. No. 189281, Zacatepec	♀ ad	118	47	15.0	20.3	10.5	3.7	4.0	3.3
A.M.N.H. No. 175236, San Bartolo Yautepec	ad	108	43	16.0	18.3	9.7	3.8	3.8	3.2
A.M.N.H. No. 171669, Tehuantepec	♀ ad	103	43	15.0	18.0	9.2	3.7	3.7	2.9
A.M.N.H. No. 175234, Tehuantepec	♂ ad	110	40	14.0	19.0	9.5	3.8	3.7	3.0
A.M.N.H. No. 178727,[a] Xanaguia	♂ ad	114	45	16.0	20.1	10.4	4.2	4.1	3.3
A.M.N.H. No. 190363, San Gabriel Mixtepec	♂ ad	124	49	17.0	20.5	10.9	3.9	3.9	3.3
A.M.N.H. No. 190365, San Gabriel Mixtepec	♂ ad	128	51	17.0	20.2	10.5	4.0	4.5	3.3
A.M.N.H. No. 190368, San Gabriel Mixtepec	♀ ad	125	45	15.0	20.8	11.0	4.0	4.3	3.3
A.M.N.H. No. 190371, San Gabriel Mixtepec	♂ ad	130	54	16.0	20.5	10.7	3.9	4.4	3.3
Baiomys musculus infernatis									
OAXACA									
U.M., Teotitlán	♀ ad	106	41	13.0	19.7	10.2	3.9	4.4	3.1
U.M., Teotitlán	♀ ad	122	46	16.0	20.4	10.6	4.1	4.6	3.3
Baiomys musculus brunneus									
VERACRUZ									
A.M.N.H. No. 12535/10845,[a] Jalapa	♀ ad	120	50	15.0	19.5	10.2	3.9	4.2	3.0

[a] Type.

Huilotepec, three; La Concepción, one; Mixtequilla, two; Morro Mazatlán, five; Rincón Bamba, 11; San Blas, two; Santa Lucía, 25; Tehuantepec, 11; Tenango, four; Tres Cruces, 10. Yautepec: Agua Blanca, 11; Asuncion, one; Cerro de Armadillo, three; Cerro Verde, seven; Manteca, one; San Juan Acaltepec, five; San Pedro Jilotepec, one; Santa Catalina Quieri, three; Santa María Ecatepec, three; Santo Domingo Chontecomatlán, one; Zarzamora, two.

REMARKS: Oaxacan specimens of *B. m. pallidus* show considerable local variation in size and color; a series from San Gabriel Mixtepec are not only almost black in color, but have skulls that are appreciably larger than the average for specimens from other parts of the state. These variations, however, seem to be no more than incipient subspecific characters.

Baiomys musculus infernatis Hooper

Text figure 75

TYPE LOCALITY: Teotitlán, Oaxaca, Mexico.

RANGE IN OAXACA: Arid interior basin drained by Río Salado and Río Quiotepec in northern Oaxaca; altitudinal range 3100 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 106–122; hind foot, 13–16; tail shorter than length of head and body. Similar to *B. m. pallidus* but color of upper parts paler and under parts grayer. Skull similar to that of *B. m. pallidus* but incisive foramina longer (4.4–5.6 in *infernatis* as compared with 4.2–4.7 in *pallidus*).

MEASUREMENTS: In table 28.

SPECIMENS RECORDED: (Hooper, 1952, p. 96). Teotitlán: Teotitlán, 12 (U.M.).

Baiomys musculus brunneus
(J. A. Allen and Chapman)

TYPE LOCALITY: Jalapa, Veracruz, Mexico.

RANGE IN OAXACA: No specimens are known from Oaxaca, but probably the subspecies occurs in the northeastern part of the state.

GENERAL CHARACTERS: (Based on Veracruz specimens). Total length, 112–127; hind foot, 14.5–16.5; tail shorter than length of head and body. Similar to *B. m. pallidus* and *B. m. infernatis*, but basic color a deeper reddish brown.

MEASUREMENTS: In table 28.

REMARKS: The name *Baiomys m. brunneus* was originally applied to the dark brown mice from the higher elevations in central Veracruz, but paler specimens from the coastal plains are now included in this subspecies. When specimens from extreme northeastern Oaxaca are available, they will probably prove to be allied more closely to *brunneus* than to *pallidus*.

SUMMARY OF *Baiomys* OF OAXACA

The pygmy mouse seems to be locally abundant from sea level up to elevations of 3000 feet in southern Oaxaca but becomes scarcer at higher elevations. *Baiomys m. pallidus*, a medium-sized, pale buffy-colored form, is widely distributed at moderate elevations over most of Oaxaca except for a broad margin along the Veracruz border. *Baiomys m. infernatis* is a pale grayish form restricted in Oaxaca to the northwest central part of the state. The range of *Baiomys m. brunneus*, a moderately large, dark reddish brown form known from the mountains of Veracruz, may extend into the highlands of extreme northeastern Oaxaca.

GENUS **SCOTINOMYS** THOMAS

BROWN MICE

Scotinomys teguina subnubilus Goldman

Plate 20, figures 11, 12; text figure 76

TYPE LOCALITY: Ocuilapa, 10 miles northwest of Ocozocoautla, and about 25 miles west of Tuxtla Gutiérrez, Chiapas, Mexico, altitude 3500 feet.

RANGE IN OAXACA: Grasslands in the Sierra Madre north of Zanatepec, Juchitán District.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 112–128; pelage almost unicolored, dark reddish brown; tail unicolored, shorter than length of head and body; forefeet and hind feet dark reddish brown. Skull smoothly rounded, rostrum slender; interorbital space wide; anterior palatine foramina reaching posteriorly to a line across front of anterior molars, upper molars narrow.

MEASUREMENTS: In table 29.

SPECIMENS EXAMINED: Juchitán: Sierra Madre north of Zantepec, three.

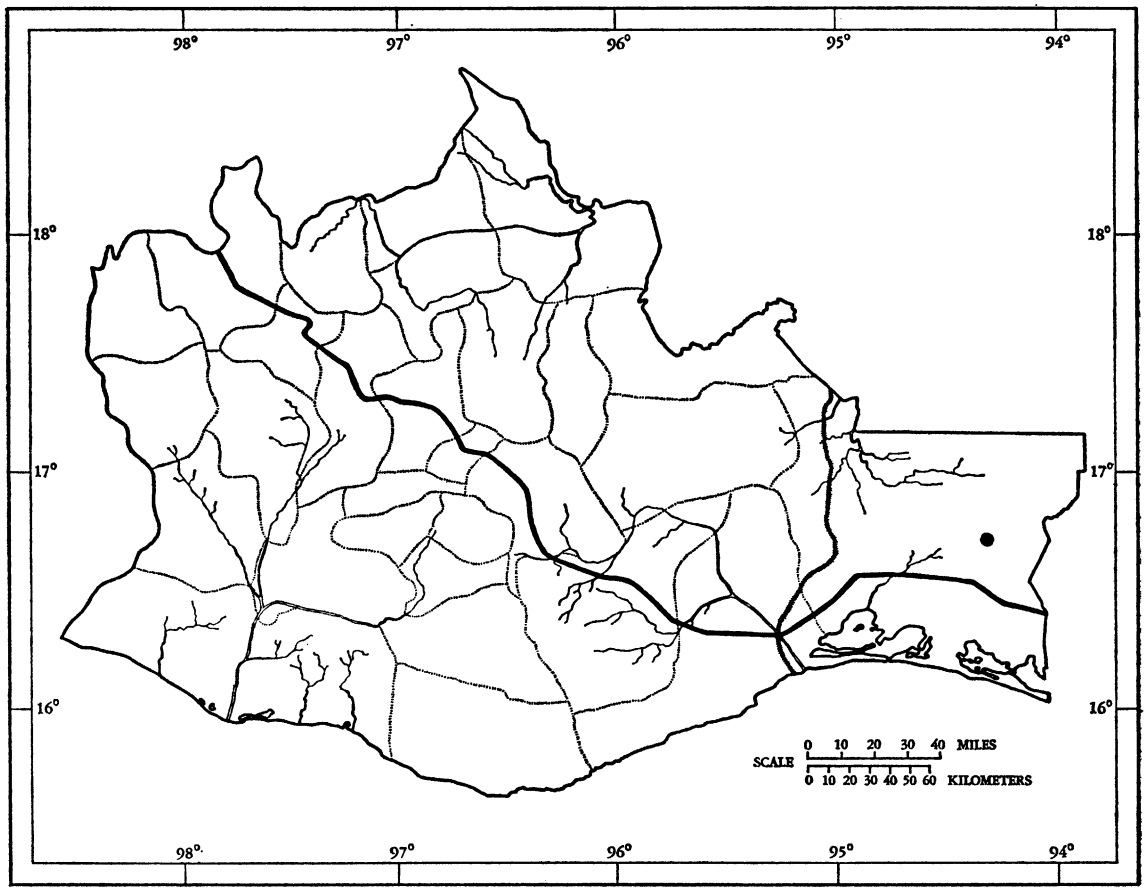


FIG. 76. Records of *Scotinomys teguina* in Oaxaca. ● *S. t. subnubilus.*

SUMMARY OF *Scotinomys* OF OAXACA

Three specimens of *Scotinomys t. subnubilus* from the Sierra Madre at 5000 feet, north of Zanatepec, represent the western limit known for the range of the genus.

The present series is dark in color and corresponds with the type of *S. t. subnubilus* in this respect and in measurements.

GENUS **SIGMODON** SAY AND ORD

COTTON RATS

Sigmodon hispidus saturatus V. Bailey

Plate 24, figure 2; plate 25, figure 2; plate 26, figure 2; text figure 77

TYPE LOCALITY: Teapa, Tabasco, Mexico.

RANGE IN OAXACA: Mountain slopes at moderate elevations in the districts of Juchitán and Tuxtepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 224–286; length of tail less than half of total length; pelage short, coarse, dark reddish brown. Skull angular, short, and broad; supraorbital ridges well developed; rostrum broad; interparietal short and wide; supraoccipital median ridge strongly developed; molariform teeth small.

MEASUREMENTS: In table 30.

SPECIMENS EXAMINED: Juchitán: La Gloria, seven; Río Jaltepec, 9 miles south of Veracruz border, seven; mountains near Santo Domingo, three (U.S.N.M.); Río Negro, three; Santa María Chimalapa, five; Tolosita, 13. Mixes: Nueva Raza, four. Pochutla: Soledad, two (K.U.). Tuxtepec: Chiltepec, seven; Tuxtepec, four (U.S.N.M.); Valle Nacional, one.

REMARKS: The two specimens of *S. h. saturatus* from Soledad are a brighter and more uniform shade of reddish brown, with softer pelage, than the average. They are, however, similar in other external characters

TABLE 29

MEASUREMENTS (IN MILLIMETERS) OF *Scotinomys teguina subnubilus* FROM OAXACA AND CHIAPAS

	Ocuilapa, Chiapas	Sierra Madre North of Zanatepec, Oaxaca		
	♂ ad	♂ sub	♂ ad	♀ old
	U.S.N.M. No. 76353[a]	A.M.N.H. No. 204704	A.M.N.H. No. 205311	A.M.N.H. No. 205312
Total length	120.0	99.0	112.0	128.0
Tail length	49.0	45.0	44.0	49.0
Hind foot	19.0	16.0	17.5	17.0
Skull, greatest length	20.8	20.0	21.6	22.0
Condylobasal length	20.0	—	19.2	19.9
Nasal length	8.7	7.7	7.4	9.0
Zygomatic breadth	11.3	10.3	11.0	11.0
Interorbital breadth	4.4	4.2	4.4	4.3
Braincase breadth	10.5	9.2	9.6	10.4
Palate breadth across molars	—	4.3	4.7	4.9
Maxillary tooth row	3.8	3.9	4.0	3.9

[a] Type.

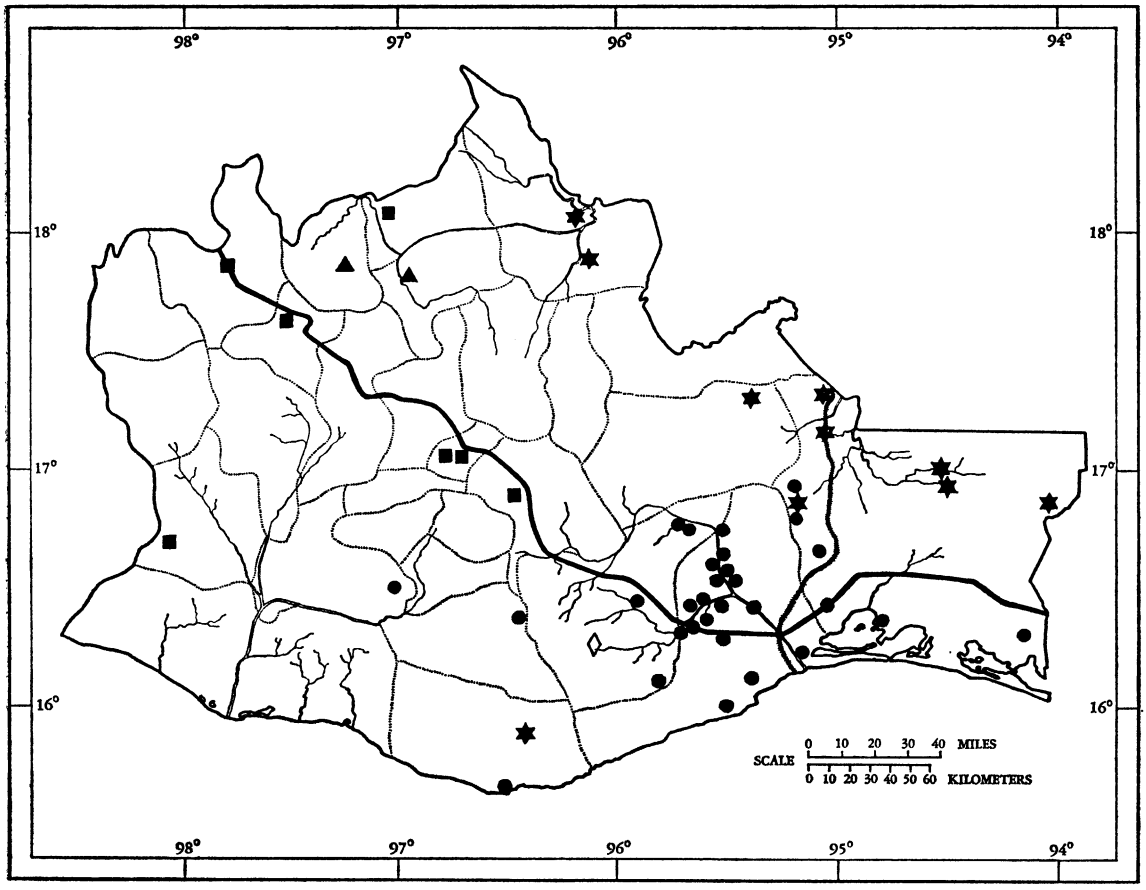


FIG. 77. Records of *Sigmodon hispidus* in Oaxaca. ★ *S. h. saturatus.* ▲ *S. h. toltecus.* ● *S. h. mascotensis.* ■ *S. h. obvelatus.* ◇ Type locality of *S. h. ischyrus.*

and in all essential cranial details to typical specimens of *saturatus*.

Sigmodon hispidus toltecus (Saussure)
Text figure 77

TYPE LOCALITY: Mountains of Veracruz, Mexico (probably near Mirador, according to Dalquest, 1953, p. 163).

RANGE IN OAXACA: Mountain slopes in the northwestern parts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Very similar in external and cranial characters to *S. h. saturatus* but darker and grayer in color. Skull angular, short, and broad; rostrum broad; supraorbital ridges strongly developed; median vertical supraoccipital ridge well developed; interparietal short and wide; molariform teeth small, indistinguishable from those of *S. h. saturatus*.

MEASUREMENTS: In table 30.

SPECIMENS EXAMINED: Coixtlahuaca: Tierra Blanca, four (K.U.). Cuicatlán: Cuicatlán, one, one (U.S.N.M.).

SPECIMENS RECORDED: (Hall and Kelson, 1959, p. 675). Tuxtepec: Five kilometers west of Tuxtepec, one (K.U.).

REMARKS: The subspecies *toltecus* and *saturatus* probably intergrade in northern Oaxaca somewhere between Tuxtepec and Coixtlahuaca. The present specimens from Cuicatlán are too immature for subspecific identification.

Sigmodon hispidus mascotensis J. A. Allen
Plate 24, figure 1; plate 25, figure 1; plate 26, figure 1; text figure 77

TYPE LOCALITY: Mineral San Sebastian, Mascota, Jalisco, Mexico.

RANGE IN OAXACA: Pacific coast region from near sea level up to about 4000 feet in the southern parts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 288–335; length of tail equal to half of total length; hind feet large; pelage coarse, hispid, dull brownish gray; differing from *S. h. saturatus*, *S. h. toltecus*, and *S. a. alticola* in being much larger and having relatively longer tail and coarser pelage. Skull strongly ridged, long, angular, slightly swollen in interorbital region; braincase narrow; supraorbital ridges strongly developed; interparietal wide and relatively long, median supraoccipital ridge extended in a sharp pronounced keel in adult; zygomatic arches comparatively narrow; anterior palatine foramina long and narrow; bullae relatively small, molariform teeth large.

MEASUREMENTS: In table 30.

SPECIMENS EXAMINED: Juchitán: Buena Vista San Dianisio, five; Juchitán, five; Nizanda, one; Santo Domingo, one, three (U.S.N.M.); Tapanatepec, nine; 50 miles north of Tehuantepec, one. Miahuatlán: San José Lachiguirí, one. Pochutla: Puerto Angel, five (U.S.N.M.). Sola de Vega: Sola de la Vega, one (U.M.). Tehuantepec: Bambita, one; Buqueton, one; Cerro Calderona, one; Cerro Palma del Oro, one; Cerro Pozo Río, three; Cerro Sombrerito, one; Cerro Tigre, two; Escurano, one; Guiengola, 23; Huilotepec, one; Jalapa, six; 5 miles north of Las Cuevas, five; Limón, one; Mixtequilla, one; Morro Mazatlán, one; Patata (Tequisistlán), one; Rincon Bamba, five; San Antonio, three; Santa Lucía, 300 feet, one; Santiago Lachiguirí, four; Tehuantepec, 19. Yautepec: Agua Blanca, one; Buena Vista, one; La Reforma, one; San Pedro Jilotepec, three.

REMARKS: *Sigmodon h. mascotensis* is in a group of several subspecies of very large, long-tailed, coarse-haired cotton rats that range from Arizona in western North America south along the slopes and plains of the Pacific coast in Mexico to Tonala, Chiapas. Measurements of the non-Oaxacan subspecies are included in table 30 for comparison. Selected specimens from Oaxaca could be referred to any one of these forms as well as to *mascotensis*. *Sigmodon h. mascotensis* does not intergrade with the smaller short-tailed cotton rats of the *hispidus* group that are prevalent on the Gulf drainage.

Sigmodon hispidus obvelatus Russell
Text figure 77

TYPE LOCALITY: Five miles south of Alpuyeca, Morelos, Mexico, altitude 3700 feet.

RANGE IN OAXACA: Central and northwestern parts of the state at elevations from 3000 to 7000 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 245–295; tail slightly shorter than length of head and body; pelage coarse, hispid, pale buff; similar in general characters to *S. h. mascotensis*, but smaller and

TABLE 30

MEASUREMENTS (IN MILLIMETERS) OF *Sigmodon* FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Mastoid Breadth	Maxillary Tooth Row
Sigmodon hispidus saturatus											
OAXACA											
A.M.N.H. No. 173041, Tolosita	♂ ad	224.0	114.0	30.0	31.8	30.7	12.0	18.5	4.7	13.1	6.0
A.M.N.H. No. 173045, Tolosita	♂ ad	241.0	94.0	32.0	33.0	31.3	12.3	18.0	5.2	13.9	5.9
A.M.N.H. No. 173047, Tolosita	♀ ad	230.0	92.0	28.0	32.8	31.2	12.9	18.4	4.8	13.5	6.1
A.M.N.H. No. 173050, Tolosita	♀ ad	229.0	90.0	30.0	31.0	29.2	11.3	17.3	5.5	13.1	6.0
A.M.N.H. No. 177085, Río Jaltepec	♂ ad	240.0	100.0	29.0	34.5	32.4	13.7	19.2	5.4	13.8	6.0
A.M.N.H. No. 177091, Río Jaltepec	♂ ad	235.0	101.0	33.0	31.5	29.7	12.1	17.8	5.0	13.0	5.5
A.M.N.H. No. 166006, La Gloria	♂ ad	250.0	108.0	29.0	32.9	31.8	12.1	18.3	5.4	13.3	6.0
K.U. No. 63075, Soledad	♀ ad	255.0	102.0	31.0	32.5	30.7	12.7	18.8	5.0	13.5	6.0
K.U. No. 63076, Soledad	♀ ad	242.0	102.0	32.0	31.7	29.8	12.5	18.3	5.0	12.6	5.8
U.S.N.M. No. 65463, Tuxtepec	♂ ad	286.0	114.0	32.0	35.5	34.7	14.4	20.5	5.2	14.0	6.4
TABASCO											
U.S.N.M. No. 99998,[a] Teapa	♂ sub	263.0	109.0	31.5	33.4	31.8	12.6	19.3	5.1	13.3	5.9
Sigmodon hispidus toltecus											
OAXACA											
K.U. No. 89954, Tierra Blanca	♂ sub	215.0	91.0	30.0	31.2	29.3	13.0	17.5	5.0	12.5	6.2
K.U. No. 89962, Tierra Blanca	♂ ad	256.0	111.0	32.0	33.4	32.2	12.3	19.0	5.2	13.2	6.0
K.U. No. 89964, Tierra Blanca	♂ sub	216.0	87.0	30.0	30.0	28.7	11.2	17.3	5.0	13.0	5.5
K.U. No. 89965, Tierra Blanca	♂ ad	230.0	88.0	31.0	33.5	32.0	13.0	18.5	5.0	13.7	6.2
Sigmodon hispidus mascotensis											
OAXACA											
A.M.N.H. No. 143430, Huilotepec	♀ sub	288.0	150.0	36.0	32.8	31.1	11.6	18.5	5.4	13.4	6.0
A.M.N.H. No. 143432, Guiengola	♀ ad	308.0	144.0	35.0	36.4	35.2	13.7	21.0	5.5	14.5	6.0
A.M.N.H. No. 147709, Guiengola	♂ ad	315.0	142.0	40.0	40.5	37.8	15.6	22.1	6.2	16.5	6.6
A.M.N.H. No. 143421, Bambita	♀ ad	303.0	161.0	35.0	36.0	33.9	13.9	20.7	5.4	14.2	6.0
A.M.N.H. No. 145996, Buena Vista	♂ ad	322.0	144.0	36.0	35.5	33.0	13.7	19.5	5.5	14.2	6.0
A.M.N.H. No. 147713, Tehuantepec	♂ ad	312.0	158.0	39.0	37.5	35.2	13.3	20.0	5.5	14.7	6.9
A.M.N.H. No. 171616, Tehuantepec	♀ ad	300.0	152.0	40.0	35.4	33.6	12.8	20.2	5.4	14.2	6.6
A.M.N.H. No. 171617, Tehuantepec	♂ ad	332.0	159.0	38.0	38.3	37.2	14.3	21.3	5.7	15.4	6.8
A.M.N.H. No. 148822, Rincón Bamba	♀ ad	320.0	154.0	37.0	36.0	33.5	14.4	20.6	5.4	15.0	6.1
A.M.N.H. No. 148823, Rincón Bamba	♂ ad	327.0	162.0	36.0	35.7	33.2	13.0	19.6	6.3	15.0	6.2
A.M.N.H. No. 175188, Jalapa	♀ ad	305.0	136.0	35.0	37.5	35.5	14.7	20.5	5.2	14.7	6.5

TABLE 30—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Mastoid Breadth	Maxillary Tooth Row
A.M.N.H. No. 177097, Tapanatepec	♀ ad	310.0	155.0	35.0	35.0	33.4	13.5	19.5	5.5	13.7	6.0
U.S.N.M. No. 73316, Sto. Domingo	♂ ad	335.0	152.0	32.0	37.4	35.2	14.6	20.4	5.5	14.4	6.3
U.S.N.M. No. 73317, Sto. Domingo	♂ ad	236+	73+	32.0	35.3	33.5	15.0	19.6	5.5	14.3	6.2
Sigmodon hispidus tonalensis											
CHIAPAS											
U.S.N.M. No. 75144,[a] Tonalá	♂ ad	350.0	166.0	41.0	39.3	37.0	15.0	21.9	5.7	14.4	6.6
Sigmodon hispidus major											
SINALOA											
U.S.N.M. No. 96275,[a] Sierra de Choix	♂ sub	365.0	156.0	40.5	40.8	39.2	16.0	23.5	5.2	16.4	7.0
Sigmodon hispidus arizonae											
ARIZONA											
A.M.N.H. No. 2370/1841,[a] Fort Verde	♂ ad	320.0	121.0	35.0	40.0	36.8	15.0	22.0	5.8	16.0	6.5
Sigmodon hispidus ischyrus											
OAXACA											
A.M.N.H. No. 171600,[a] "El Arco"	♂ ad	295.5	145.5	34.5	37.7	36.0	15.0	21.2	5.2	15.0	6.5
Sigmodon hispidus obvelatus											
OAXACA											
U.M. No. 89264, Teotitlán	♂ sub	273.0	134.0	31.0	32.4	30.2	11.5	18.2	5.2	13.5	6.0
U.M. No. 89264, Teotitlán	♂ sub	263.0	107.0	21.0	32.8	30.2	11.6	18.1	4.8	13.4	6.0
U.M. No. 91602, Teotitlán	♂ sub	245.0	117.0	31.0	29.5	28.4	11.0	17.5	4.8	13.0	6.0
K.U. No. 71681, Oaxaca de Juárez	♂ sub	248.0	118.0	35.0	30.5	29.0	—	17.0	—	—	6.3
K.U. No. 71682, Oaxaca de Juárez	♂ sub	252.0	124.0	33.0	31.0	29.0	11.5	17.3	4.9	—	6.2
K.U. No. 71683, Oaxaca de Juárez	♀ sub	233.0	115.0	32.0	30.3	—	10.5	—	—	—	6.0
K.U. No. 71685, Mitla	♀ sub	248.0	119.0	32.0	32.4	30.2	11.5	18.1	5.2	13.0	6.2
U.S.N.M. No. 68652, Oaxaca de Juárez	♂ ad	281.0	137.0	33.0	33.6	32.0	12.9	18.8	5.4	13.9	6.1
U.S.N.M. No. 68653, Oaxaca de Juárez	♀ ad	280.0	141.0	33.0	33.5	31.2	12.7	19.0	5.0	13.2	6.3
U.S.N.M. No. 68654, Oaxaca de Juárez	♂ ad	292.0	135.0	33.0	35.0	32.5	13.3	—	5.2	13.0	5.8
U.S.N.M. No. 68230, Oaxaca de Juárez	♀ ad	275.0	130.0	31.0	32.6	30.7	12.5	19.0	5.0	12.7	6.0
MORELOS											
T.C.W.C. No. 4921,[a] Alpuyeca	♀ ad	295.0	147.0	34.0	36.0	—	14.5	19.1	5.5	—	6.5
T.C.W.C., Alpuyeca	♂ ad	288.0	132.0	35.0	35.2	—	13.8	—	—	—	6.6
Sigmodon macdougalli											
OAXACA											
A.M.N.H. No. 146003, Arroyo Palmar	♀ ad	228.0	105.0	32.0	30.2	28.9	11.2	17.5	5.1	12.4	5.9

TABLE 30—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Mastoid Breadth	Maxillary Tooth Row
A.M.N.H. No. 146004, Arroyo Palmar	♀ ad	232.0	106.0	32.0	29.4	28.4	—	17.5	4.8	12.5	6.1
A.M.N.H. No. 146005, Arroyo Palmar	♂ ad	265.0	125.0	33.0	33.0	31.0	12.4	18.2	4.9	12.7	6.1
A.M.N.H. No. 149099, Cerro Arenal	♀ ad	240.0	122.0	32.0	31.5	29.2	11.8	17.2	5.1	12.6	6.1
A.M.N.H. No. 146006, Cerro del Chorro	♀ ad	—	—	33.0	31.2	29.3	12.0	17.0	5.0	12.5	5.8
A.M.N.H. No. 146001, Cerro de Pastle	♀ ad	235.0	110.0	33.0	30.2	28.3	11.0	17.5	4.9	12.4	6.1
A.M.N.H. No. 145998, Cerro Pollé	♀ sub	224.0	102.0	32.0	30.7	28.5	11.7	17.2	5.0	12.2	5.9
A.M.N.H. No. 145999, Cerro Pollé	♂ ad	242.0	110.0	34.0	32.0	30.0	12.1	17.4	5.0	13.0	5.8
A.M.N.H. No. 146000, Cerro Pollé	♀ ad	242.0	121.0	32.0	30.4	28.5	12.1	17.1	5.0	12.5	6.1
A.M.N.H. No. 143428, Santa Lucía	♀ sub	222.0	120.0	33.0	29.5	28.0	10.8	17.2	4.7	12.3	6.0
A.M.N.H. No. 143431, Santa Lucía	♀ sub	212.0	109.0	30.0	29.2	27.5	10.0	16.6	5.0	13.0	6.2
A.M.N.H. No. 143433, Santa Lucía	♀ ad	256.0	116.0	34.0	33.0	31.0	12.0	19.0	5.0	13.5	6.4
A.M.N.H. No. 149011, Santa Lucía	♀ sub	229.0	111.0	32.0	30.3	28.0	11.7	16.4	4.7	12.0	5.9
A.M.N.H. No. 149016, Santa Lucía	♂ ad	266.0	122.0	33.0	33.3	31.5	12.5	19.2	5.3	13.9	6.2
A.M.N.H. No. 146007, Tres Cruces	♀ ad	264.0	126.0	34.0	—	—	13.0	18.5	5.5	—	5.8
A.M.N.H. No. 146008, Tres Cruces	♀ ad	247.0	117.0	32.0	32.7	31.4	13.0	18.0	5.0	12.9	6.0
A.M.N.H. No. 146009, Tres Cruces	♀ ad	233.0	110.0	31.0	32.5	30.5	12.5	17.5	5.2	12.5	5.9
A.M.N.H. No. 147718, Tres Cruces	♂ ad	263.0	127.0	32.0	32.8	31.0	12.2	18.4	5.0	13.2	6.1
A.M.N.H. No. 149122,[a] Sto. Tomás Teipan	♀ ad	262.0	125.0	33.0	32.0	30.0	12.5	17.8	5.1	13.0	6.2
Sigmodon planifrons											
OAXACA											
U.S.N.M. No. 71918,[a] Juguila	♀ ad	207.0	88.0	29.0	28.7	27.0	11.0	—	4.3	12.0	5.8
U.S.N.M. No. 73728, Juguila	♀ ad	—	—	—	29.5	27.9	11.2	17.3	4.7	12.0	5.9
A.M.N.H. No. 143429, Sta. Lucía	♀ ad	220.0	111.0	29.0	29.4	27.9	10.8	16.7	4.5	12.0	5.4
A.M.N.H. No. 142536, Cerro San Pedro	♀ ad	250.0	120.0	32.0	30.8	28.6	11.5	17.6	4.7	13.0	5.9
Sigmodon alticola alticola											
OAXACA											
U.S.N.M. No. 68231,[a] Cerro San Felipe	♂ sub	230.0	101.0	28.5	31.7	30.5	11.0	17.7	4.9	13.4	6.2
U.S.N.M. No. 68232, Mts. W. Oaxaca de Juárez	♂ ad	—	—	30.0	32.7	32.0	12.0	19.0	4.9	13.6	6.0
U.S.N.M. No. 68233, Mts. W. Oaxaca de Juárez	♀ sub	210.0	84.0	28.0	28.5	27.4	10.0	17.5	4.8	11.8	5.6

[a] Type.

paler in color and with less angular skull. Skull moderately large, narrow, shallow, and slender; nasals relatively long; auditory bullae small; molar teeth small.

MEASUREMENTS: In table 30.

SPECIMENS EXAMINED: Huajuápam: Huajuápam, four (U.S.N.M.). Oaxaca: Oaxaca de Juárez, four (U.S.N.M.); 3 miles east-southeast of Oaxaca de Juárez, three (K.U.). Putla: Sacatepec, one. Teotitlán: Teotitlán, three (U.M.). Teposcolula: Tamazulápam, two (U.S.N.M.). Tlacolula: Four miles west of Mitla, one (K.U.).

REMARKS: The differences between specimens of *S. h. obvelatus* from Oaxaca and those of *S. h. mascotensis*, although slight, are consistent. Specimens of the large, long-tailed cotton rats from northwestern Oaxaca represent a gradation from the big, dark-colored *mascotensis* to the smaller, paler *obvelatus* but are nearest to the latter.

Sigmodon hispidus ischyrus Goodwin

Plate 24, figure 3; plate 25, figure 3; plate 26, figure 3; text figure 77

TYPE LOCALITY: "El Arco," gorge of Rio Grande, Santo Domingo Chontecomatlán, District of Yautepec, Oaxaca, Mexico, altitude above 4000 feet.

RANGE IN OAXACA: Known only from the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 295; tail slightly shorter than length of head and body; form robust; pelage hispid, thick, long, and Ochraceous-Tawny, similar to that of *S. h. mascotensis* but denser and of a different color; hind feet broad, dusky above. Skull angular, about size of that of *mascotensis*, but more robust and differing in other cranial details.

MEASUREMENTS: In table 30.

SPECIMENS EXAMINED: Yautepec: El Arco, one.

REMARKS: *Sigmodon hispidus ischyrus* appears to be a well-marked form. It resembles *S. macdougalli* in color and approaches *S. h. mascotensis* in size, but the characters pointed out are quite distinct.

Sigmodon macdougalli Goodwin

Plate 24, figure 5; plate 25, figure 5; plate 26, figure 5; text figure 78

TYPE LOCALITY: Cloud forest, Santo Tomás Teipan, 13 kilometers south of San Bartolo Yautepec, District of Yautepec, Oaxaca, Mexico, altitude 7000 feet.

RANGE IN OAXACA: Mountains of southern Oaxaca at elevations from 4000 to 7000 feet west of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 224–266; tail slightly shorter than length of head and body; pelage long, thick, soft, and buffy. (Length of guard hairs on rump, 24.5; fur, 17.5.) Compared with *S. a. alticola*, *S. macdougalli* has a longer and less heavy tail, is darker in color, and differs in distinctive cranial details. Skull relatively smooth, slender, and depressed in interorbital region. Supraorbital ridges finely developed; rostrum slender; nasals flattened, truncate posteriorly; bullae moderately large; interparietal short and wide, with a dividing suture in middle in some specimens; maxillary tooth row long and narrow.

MEASUREMENTS: In table 30.

SPECIMENS EXAMINED: Tehuantepec: Arroyo La Manga, two; Arroyo Palmar (Tequistlán), three; Cerro Arenal, three; Cerro del Chorro, one; Cerro Pastle (Tenango), one; Cerro Otate, one; Cerro Polle (Tenango), three; Cerro San Pedro, one; La Concepción, one; Llano de Ocote, two; Santa Lucía (4000 feet), six; Tres Cruces, five. Yautepec: La Chacahua (San Bartolo Yautepec), one; Río Costoche (Santa María Ecatepec), one; Santiago Lachivía, one; Santo Tomás Teipan, one.

REMARKS: There is considerable local and individual variation in color in the present series of *S. macdougalli*. Specimens from Tres Cruces, Cerro Polle, and Arroyo Palmar are considerably darker, with less white on the under parts, than typical specimens, but they agree with the type in the size and length of tail, and have similar long, soft pelage.

Sigmodon alticola alticola V. Bailey

Plate 24, figure 4; plate 25, figure 4; plate 26, figure 4; text figure 78

TYPE LOCALITY: Cerro San Felipe, Oaxaca, Mexico, altitude 10,000 feet.

RANGE IN OAXACA: High mountains in the central part of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). About same size as *S. h. saturatus*, but pelage longer and softer and Ochraceous-

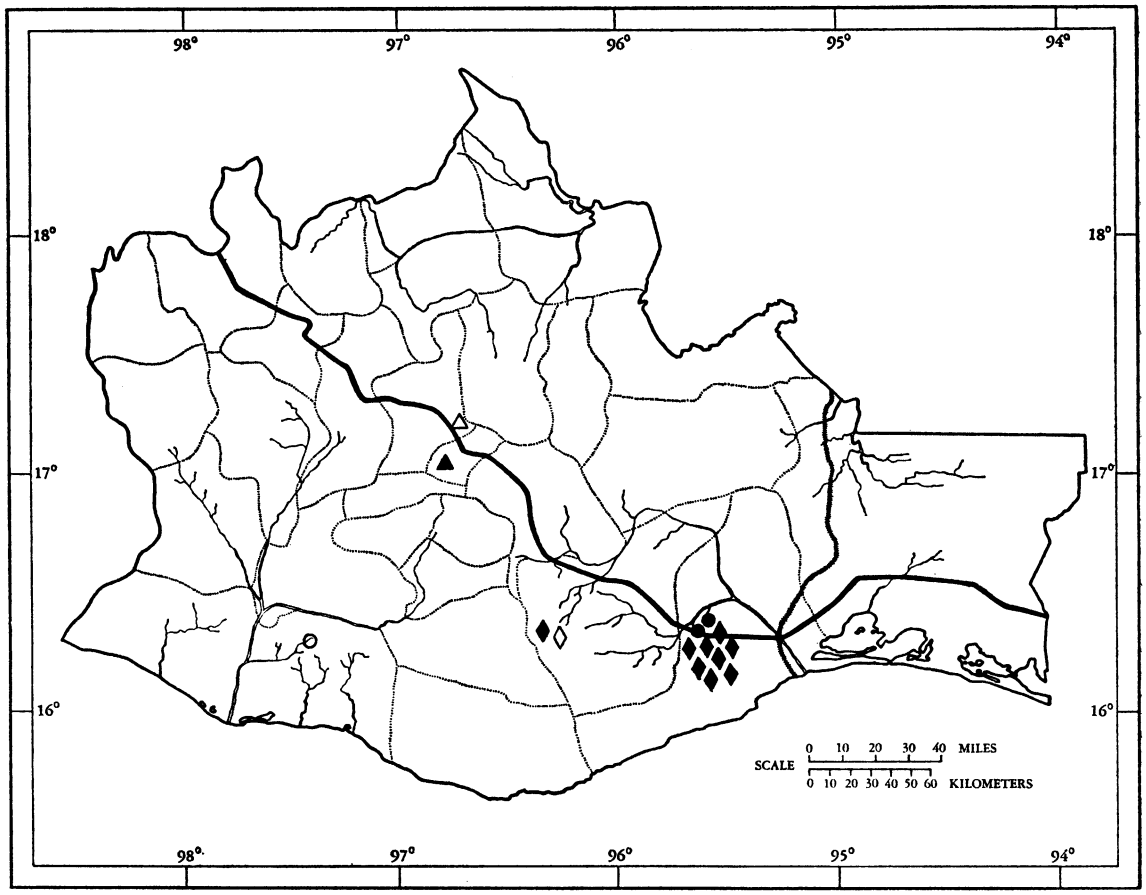


FIG. 78. Records of *Sigmodon macdougalli*, *Sigmodon alticola*, and *Sigmodon planifrons* in Oaxaca. ◆ *S. macdougalli*. ◇ Type locality of *S. macdougalli*. ▲ *S. a. alticola*. △ Type locality of *S. a. alticola*. ● *S. planifrons*. ○ Type locality of *S. planifrons*.

Tawny; tail more hairy, and cranial details different. Skull short and wide, superior outline evenly arched; zygomatic arches wide, braincase broad, rostrum narrow and slender; interorbital space narrow; supraorbital ridges extending across parietal to supraoccipital border; interparietal narrow, divided medially by a suture; supraoccipital without median ridge and sloping strongly forward at expense of interparietal; molariform teeth relatively large.

MEASUREMENTS: In table 30.

SPECIMENS EXAMINED: Oaxaca: Mountains 15 miles west of Oaxaca de Juárez, altitude 9500 feet, two (U.S.N.M.).

REMARKS: *Sigmodon alticola* is not known to intergrade with forms of the *hispidus* group in Oaxaca. In size, color, length of pelage, and length of tail, *alticola* is not unlike some specimens of *saturatus* from Santa María Chimalpa. In cranial details, however, *alticola* can be specifically separated from *saturatus* by more widely spreading zygomatic arches, somewhat larger bullae, more slender rostrum, narrower interparietal, and very low, median, vertical ridge on the supraoccipital.

Sigmodon planifrons Nelson and Goldman

Plate 24, figures 6, 7; plate 25, figures 6, 7; plate 26, figures 6, 7; text figure 78

TYPE LOCALITY: Juquila, southern Oaxaca, Mexico, altitude 5000 feet.

RANGE IN OAXACA: Mountains of southern part of the state from the District of Juquila east to the District of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 207–250; tail equal

to length of head and body; pelage long, soft, grayish brown. Skull and teeth smaller than those of other species of *Sigmodon* found in Oaxaca.

MEASUREMENTS: In table 30.

SPECIMENS EXAMINED: Juquila: Juquila, one (U.S.N.M.). Tehuantepec: Santa Lucia, one; Cerro San Pedro, one.

REMARKS: The inclusion of *S. macrodon* and *S. p. setzeri* in synonymy under *S. planifrons* seems to be justified. The type of *macrodon*, an old female in worn pelage, is a relatively large individual, and has coarse, thin pelage, a large, broad, angular skull, and large, broad, well-worn cheek teeth. In the type of *setzeri*, an adult but not old female in unworn pelage, the fur is soft and dense, the skull is narrow and slender, and the cheek teeth are unworn, small, and narrow. When the variation in other forms of *Sigmodon* is taken into consideration, it seems reasonable to assume that *macrodon* and *setzeri* represent the extremes in individual variation of *planifrons* because of age and wear, and are not separable as named forms. The name *setzeri* Goodwin (1959b) replaced *minor* Goodwin (1955), which was preoccupied.

SUMMARY OF *Sigmodon* OF OAXACA

Geographic variation in Oaxacan *Sigmodon* has the following pattern: Dark-colored, medium-sized, and short-tailed forms occupy the Gulf drainage. These forms are *S. h. saturatus*, a reddish brown form in northeastern Oaxaca; *S. h. toltecus*, a dark gray form in northwestern Oaxaca; and *S. a. alticola*, the tawny, soft-furred, hairy-tailed form of the central highlands found at elevations of about 10,000 feet. Individuals of *Sigmodon* occurring on the Pacific coast drainage are long-tailed and usually light-colored; *S. h. mascotensis*, the largest, ranges along the entire arid south coast and inland to the coastal mountain ranges; *S. h. obvelatus*, a slightly smaller and paler-colored subspecies than *mascotensis*, ranges over the dry upland plains of west-central Oaxaca; *S. h. ischyrus*, a large, robust form with brown feet, is known only from an arid mountainous region in south-central Oaxaca. *Sigmodon macdougalli*, a small, long-tailed form with long, soft pelage, occurs in the higher humid mountain slopes of south-central Oaxaca. In this same general region is *S. planifrons*, much the smallest of the species from Oaxaca.

GENUS **NEOTOMA** SAY AND ORD

WOOD RATS

SUBGENUS **NEOTOMA** SAY AND ORD

Neotoma mexicana isthmica Goldman

Plate 27, figures 1, 2; text figure 79

TYPE LOCALITY: Huilotepec, 8 miles south of Tehuantepec, Oaxaca, Mexico, altitude 100 feet.

RANGE IN OAXACA: From the Pacific coast region on the south side of the Isthmus of Tehuantepec north to the Veracruz border, west of Coixtlahuaca in northwestern Oaxaca, and east to the Chiapas state line.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 330–390; tail about as long as head and body, blackish and usually nearly unicolored; ears large; pelage moderately long, soft, and Ochraceous-Tawny; feet short and broad. Skull large and elongated; rostrum long and slender; interpterygoid fossa large, broadly excavated, and rounded anteriorly; palate bridge equal to or shorter than incisive foramina; bullae rather small and rounded.

MEASUREMENTS: In table 31.

SPECIMENS EXAMINED: Juchitán: Juchitán, one. Tehuantepec: Arroyo Ocotito, five; Buena Vista, five; Cerro Arenal, one; Cerro San Pedro, one; Escurano, three; Guiengola, one; Las Barras, five; Las Cuevas, seven; Rincón Bamba, one; road from Catarino to Juchitán, two; Salazar, four; San Antonio, two; Santa Lucía, one; Tehuantepec, six; Tequisistlán, nine. Yautepec: San Pedro Jilotepec, one.

Neotoma mexicana picta Goldman

Plate 27, figures 3, 4; text figure 79

TYPE LOCALITY: Mountains near Chilpancingo, Guerrero, Mexico, altitude 10,000 feet.

RANGE IN OAXACA: Sierra Madre of the southern parts of the state west of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 294–320; similar in color to *N. m. isthmica* but averaging smaller. Skull similar to that of *N. m. isthmica* but smaller, lighter, and less arched across anterior roots of zygomata.

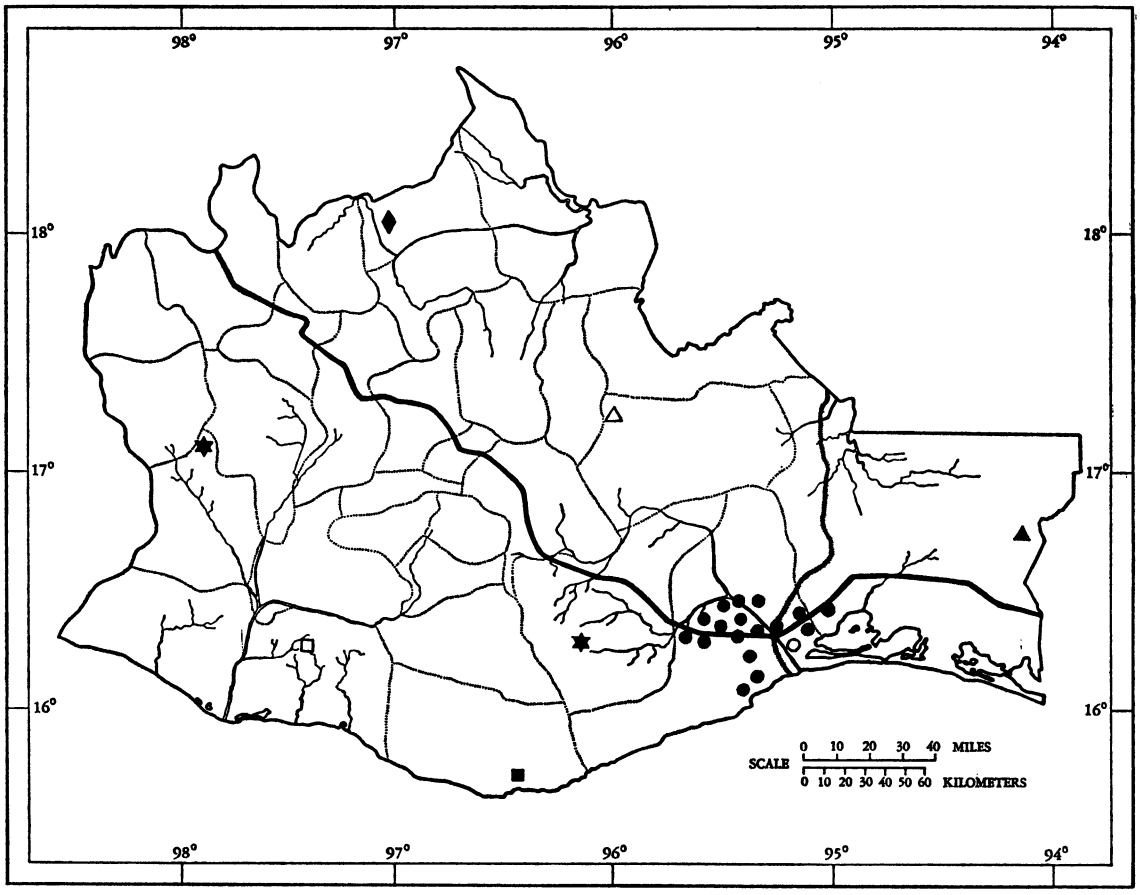


FIG. 79. Records of *Neotoma mexicana* and *Neotoma alleni* in Oaxaca. ● *N. m. isthmica.* ○ Type locality of *N. m. isthmica.* ★ *N. m. picta.* ■ *N. m. parvidens.* □ Type locality of *N. m. parvidens.* ▲ *N. m. tropicalis.* △ Type locality of *N. m. tropicalis.* ◆ *N. a. vetula.*

MEASUREMENTS: In table 31.

SPECIMENS EXAMINED: Yautepec: Chontecomatlán, one. Putla: San Andrés Chicahuaxtla, one.

REMARKS: The specimen from Chontecomatlán shows intergradation with *isthmica.*

Neotoma mexicana parvidens Goldman

Text figure 79

TYPE LOCALITY: Juquila, Oaxaca, Mexico, altitude 5000 feet.

RANGE IN OAXACA: Southwestern Oaxaca, from Juquila east to Punta Angel.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 295; similar in color to *N. m. picta* but much smaller. Color of upper parts varying from Ferruginous to Orange Rufous; color of under parts white; forefeet yellowish white; hind feet to toes clouded with dusky, toes white; tail dusky above, paler below. Skull similar to that of *N. m. picta* but smaller and lighter, with narrower nasals and smaller teeth.

MEASUREMENTS: In table 31.

SPECIMENS EXAMINED: Juquila: Juquila, one (U.S.N.M.).

SPECIMENS RECORDED: (Hall and Kelson, 1959, p. 698). Pochutla: Punta Angel, one (K.U.).

Neotoma mexicana tropicalis Goldman

Plate 27, figures 5, 6; text figure 79

TYPE LOCALITY: Totontepec, Oaxaca, Mexico, altitude 6500 feet.

RANGE IN OAXACA: Mountains of the northeastern part of the state.

TABLE 31

MEASUREMENTS (IN MILLIMETERS) OF *Neotoma* FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
Neotoma mexicana isthmica												
OAXACA												
U.S.N.M. No. 73187,[a] Huilotepec	♀ ad	395	198	38.0	48.4	—	19.0	23.7	6.2	—	—	9.0
A.M.N.H. No. 142521, Arroyo Ocotita	♀ ad	387	200	35.0	46.0	42.8	18.5	23.2	6.6	15.4	8.2	8.6
A.M.N.H. No. 142515, Arroyo Ocotita	♀ ad	298	107	24.0	44.3	41.5	17.4	23.0	6.5	14.8	8.5	8.0
A.M.N.H. No. 142512, Buena Vista	♀ ad	375	201	37.5	43.5	41.6	17.5	23.3	6.8	16.0	8.1	8.4
A.M.N.H. No. 142519, Buena Vista	♂ ad	379	176	36.0	45.5	42.9	16.7	23.2	6.2	15.4	8.6	8.6
A.M.N.H. No. 142503, Las Barras	♂ ad	385	186	38.0	44.4	42.1	16.4	22.7	5.8	15.4	8.8	8.4
A.M.N.H. No. 142520, Las Barras	♀ ad	390	188	36.0	44.0	41.0	16.0	21.5	6.0	15.5	8.8	8.5
A.M.N.H. No. 145830, Salazar	♀ ad	369	184	34.0	44.0	40.5	18.4	21.7	5.5	15.0	8.1	8.4
A.M.N.H. No. 143392, Tequisistlán	♂ ad	289+	115+	33.0	45.2	42.2	17.5	22.7	7.0	15.0	8.1	8.0
Neotoma mexicana picta												
GUERRERO												
U.S.N.M. No. 70050,[a] Chilpancingo	♂ ad	368	180	37.0	43.3	—	17.4	23.0	5.0	—	—	8.7
OAXACA												
A.M.N.H. No. 185058, Chontecomatlán	♂ ad	294+	125+	31.0	43.6	39.8	17.4	22.2	5.7	15.2	8.5	8.7
A.M.N.H. No. 189290, San Andrés Chicahuaxtla	♂ ad	320	155	32.0	42.6	39.8	15.3	21.1	5.6	15.8	8.3	8.5
Neotoma mexicana parvidens												
OAXACA												
U.S.N.M. No. 71586,[a] Juquila	♀ ad	295	141	31.0	40.5	—	15.2	20.7	5.3	—	—	7.4
Neotoma mexicana tropicalis												
OAXACA												
U.S.N.M. No. 68593,[a] Totontepec	♂ ad	325	156	34.0	41.3	—	16.7	22.3	5.9	—	—	8.5
A.M.N.H. No. 189289, Río Mono Blanco	♂ ad	310	145	32.0	39.0	35.7	14.5	20.4	5.5	15.2	7.7	8.5
Neotoma alleni vetula												
PUEBLA												
U.S.N.M. No. 63656,[a] Tehuacan	♂ ad	380	166	38.0	47.0	—	—	25.0	—	—	—	9.0
OAXACA												
U.M. No. 91603, Teotitlán	♀ ad	375	180	36.0	48.0	45.0	17.1	24.9	5.5	15.5	9.6	10.0

[a] Type.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 310; resembling *N. m. parvidens* but darker and larger. Color of upper parts Fulvous, darkened by blackish-tipped hairs; under parts white, basal portion of fur broadly Plumbeous; tail dusky above, paler below. Skull larger and flatter than that of *N. m. parvidens* and braincase more smoothly rounded; nasals longer and teeth larger.

MEASUREMENTS: In table 31.

SPECIMENS EXAMINED: Juchitán: Río Mono Blanco, one.

SUBGENUS **HODOMYS** MERRIAM

Neotoma alleni vetula (Merriam)

Plate 27, figures 7, 8; text figure 79

TYPE LOCALITY: Tehuacán, Puebla, Mexico.

RANGE IN OAXACA: Mountains of the northwestern part of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 375; pelage reddish brown, long, and lax; tail blackish, shorter than length of head and body; ears large, naked. Color of upper parts Ochraceous-Tawny mixed with dusky-colored hairs; forefeet and hind feet grayish white; head more or less Neutral Gray; tail blackish above, soiled whitish below; under parts whitish or buffy white, hairs broadly Plumbeous from base for most of length. Skull long and narrow; rostrum long and slender; bullae small, molariform teeth large; enamel pattern on M^3 S-shaped.

MEASUREMENTS: In table 31.

SPECIMENS EXAMINED: Teotitlán: Teotitlán, one (U.M.).

SUMMARY OF *Neotoma* OF OAXACA

Two subgenera, two species, and five subspecies of *Neotoma* are known to occur in Oaxaca. *Neotoma alleni vetula*, subgenus *Hodomys*, is a large, soft-furred form that is known only from the northwestern part of the state and is apparently the most easterly representative of the *N. alleni* group. *Neotoma mexicana*, subgenus *Neotoma*, is represented in Oaxaca by four Ferruginous-colored subspecies. *Neotoma m. isthmica* is the largest and most widely distributed form in the state and is most abundant in the arid regions at low and moderate elevations on the Pacific watershed of the Isthmus of Tehuantepec. *Neotoma m. picta* is a somewhat smaller form than *N. m. isthmica* which ranges in the Sierra Madre of western Oaxaca. *Neotoma m. tropicalis* is a small form but somewhat larger and grayer than *N. m. parvidens* of southwestern Oaxaca, and inhabits the humid forested tropical mountain slopes of northeastern Oaxaca.

GENUS **RHEOMYS** THOMAS

WATER MICE

SUBGENUS **NEORHEOMYS** GOODWIN

Rheomys mexicanus Goodwin

Plate 23, figures 5, 6; text figure 80

TYPE LOCALITY: San José Lachiguirí, District of Miahuatlán, Oaxaca, Mexico, altitude 4000 feet.

RANGE IN OAXACA: Cool mountain streams of southeastern Oaxaca, from San José Lachiguirí in the District of Miahuatlán east to Unión Hidalgo in the District of Juchitán; altitudinal range from near sea level to 4000 feet.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 281–304; tail thick, bicolored, longer than length of head and body; hind feet large, heavily fringed with long hairs along both sides; forefeet small; pelage long, lax, and Ochraceous-Tawny; under fur long, thick, and woolly. Skull large and low, slightly depressed in interorbital region; braincase large, low, and broad; bullae small and flattened; incisors above and below slender and narrow; upper molar teeth large and broad, with deep re-entrant folds.

MEASUREMENTS: In table 32.

SPECIMENS EXAMINED: Juchitán: Unión Hidalgo, 14. Miahuatlán: San José Lachiguirí, 11.

REMARKS: Specimens of *Rheomys mexicanus* from San José Lachiguirí were taken in a rather slowly moving rocky stream passing through dry cactus country. Those labeled Unión Hidalgo were taken below the town in the Río Chiapa, where the water flows rapidly from the mountains and is still cold.

The stomachs and intestinal tracts of 16 specimens of *Rheomys mexicanus* from San José Lachiguirí and Unión Hidalgo contained legs, wings, and other parts of various kinds of insects and a quantity of body casings of

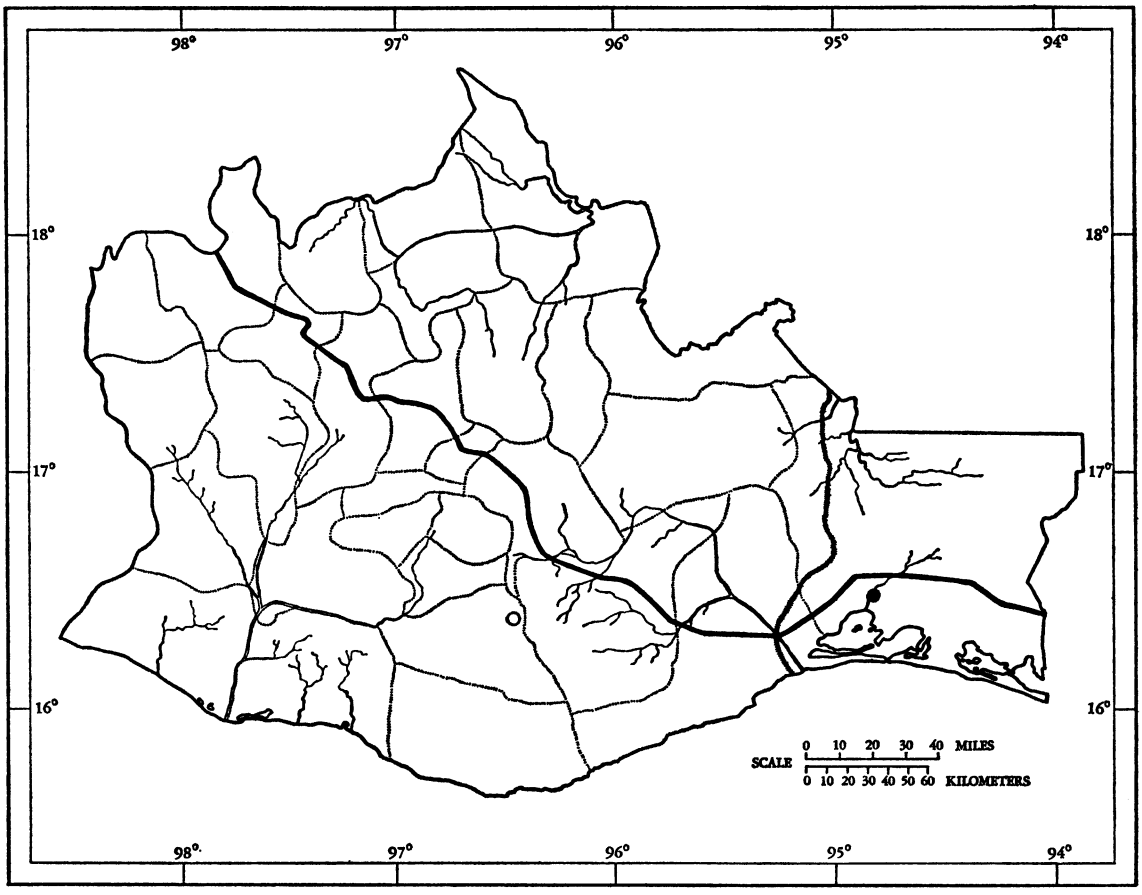


FIG. 80. Records of *Rheomys mexicana* in Oaxaca. ● *R. mexicana.* ○ Type locality of *R. mexicana.*

beetle larvae, probably of the family Hydrophilidae. The stomach of one individual, A.M.N.H. No. 185015, from Unión Hidalgo, contained the scales of a fish, probably *Herichthys cyanoguttatus*, a small species 4 to 5 inches in length.

SUBFAMILY **MICROTINAE** MILLER

GENUS **MICROTUS** SCHRANK

MEADOW VOLES

SUBGENUS **MICROTUS** SCHRANK

Microtus mexicanus fulviventer Merriam

Plate 28, figures 1, 2; text figure 81

TYPE LOCALITY: Cerro San Felipe, Oaxaca, Mexico, altitude 10,200 feet.

RANGE IN OAXACA: Mountains of central Oaxaca west of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 125–155; tail short; pelage Mummy Brown, long, and lax; ears small and more or less concealed in fur. Skull short and broad; zygomatic arches widely spreading; interorbital space narrow; braincase broad and low, squared anteriorly; rostrum short; bullae large; palatine foramina short and narrow.

MEASUREMENTS: In table 33.

SPECIMENS EXAMINED: Ixtlán: Cerro Machín, one; Macuiltianguis, one; Llano de las Flores, one. Miahuatlán: San Pedro Mixtepec, six. Etla: Cerro San Felipe, three. Putla: San Andrés Chicahuaxtla, four.

Microtus oaxacensis Goodwin

Plate 28, figures 3, 4; text figure 81

TYPE LOCALITY: Tarabundí, District of Ixtlán, Oaxaca, Mexico, altitude about 5000 feet.

TABLE 32

MEASUREMENTS (IN MILLIMETERS) OF *Rheomys mexicanus* FROM OAXACA

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot Length	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
A.M.N.H. No. 179970,[a] San José Lachiguirí	♀ ad	300	160	40.5	32.0	31.6	12.7	16.5	5.4	14.6	7.2	5.0
A.M.N.H. No. 179971, San José Lachiguirí	♂ ad	281	160	39.5	30.5	30.0	11.5	—	5.2	—	7.0	5.2
A.M.N.H. No. 182138, San José Lachiguirí	♂ ad	281	154	41.0	32.2	31.4	12.5	16.4	5.2	15.0	7.2	5.2
A.M.N.H. No. 186922, San José Lachiguirí	♀ ad	270	140	35.0	30.3	29.3	11.0	15.5	5.2	14.5	6.8	5.0
A.M.N.H. No. 205321, San José Lachiguirí	♂ ad	302	168	35.0	31.5	30.6	11.5	16.5	5.2	15.0	6.8	5.0
A.M.N.H. No. 189291, Unión Hidalgo	♂ ad	280	145	38.0	30.5	29.9	11.7	15.7	5.2	14.7	6.5	5.0
A.M.N.H. No. 205315, Unión Hidalgo	♂ ad	289	151	32.0	32.8	32.1	12.9	16.1	5.3	15.4	7.0	5.1
A.M.N.H. No. 205316, Unión Hidalgo	♂ ad	285	144	36.0	32.0	31.4	12.0	17.2	5.2	15.1	6.8	4.8
A.M.N.H. No. 205319, Unión Hidalgo	♂ ad	299	165	38.0	32.0	31.2	—	16.9	5.5	15.4	7.2	5.2

[a] Type.

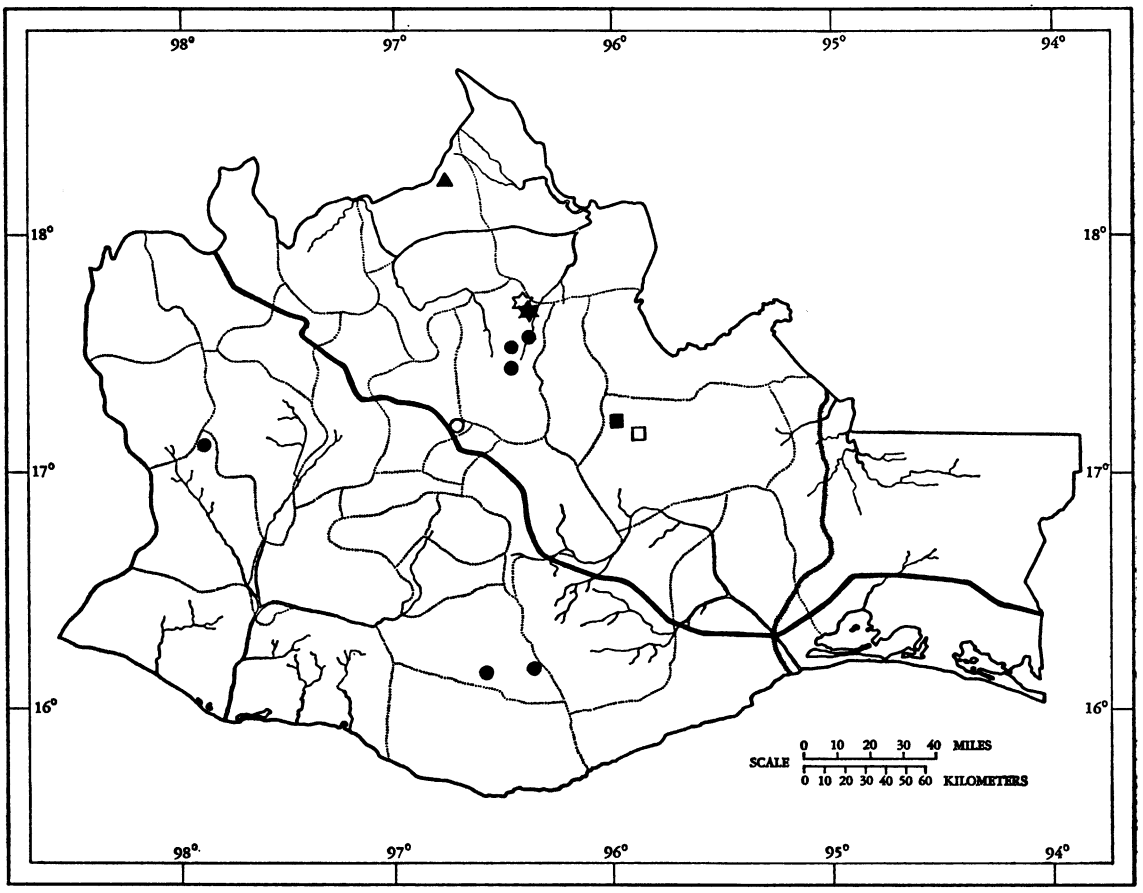


FIG. 81. Records of *Microtus mexicanus*, *Microtus umbrosus*, *Microtus oaxacensis*, and *Microtus quasiater* in Oaxaca. ● *N. m. fulviventer.* ○ Type locality of *N. m. fulviventer.* ★ *M. oaxacensis.* ☆ Type locality of *M. oaxacensis.* ■ *M. umbrosus.* □ Type locality of *M. umbrosus.* ▲ *M. quasiater.*

RANGE IN OAXACA: Known only from the vicinity of the type locality.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 159–163; pelage long, soft, and somewhat woolly; color blackish brown; all four feet blackish. Skull elongate, less angular than that of average individuals of *Microtus;* molariform teeth large and broad, salient angles on occlusal surface of molar teeth sharp; M^3 with five closed triangles; braincase long and narrow; interorbital region broad and flat.

MEASUREMENTS: In table 33.

SPECIMENS EXAMINED: Ixtlán: Tarabundí, one.

SPECIMENS RECORDED: (Jones and Genoways, 1967, p. 320). Ixtlán: Cloud forest 6½ and 10 miles south-southwest of Campamento Vista Hermosa, two (K.U.). Described from type only by Goodwin (1966).

SUBGENUS **ORTHRIOMYS** MERRIAM

Microtus umbrosus Merriam

Plate 28, figures 5, 6; text figure 81

TYPE LOCALITY: Mt. Zempoaltepec, Oaxaca, Mexico, altitude 8200 feet.

RANGE IN OAXACA: High mountains in the vicinity of Mt. Zempoaltepec and Totontepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 170–184; tail relatively long, about 35 per cent of total length; ears short and almost concealed in fur; pelage long, soft, and Mummy Brown. Skull relatively long; braincase long; interorbital region broad; zygomatic arches not widely spreading;

TABLE 33

MEASUREMENTS (IN MILLIMETERS) OF *Microtus* FROM OAXACA AND SOME SPECIMENS FROM VERACRUZ

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot Length	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
Microtus mexicanus fulviventer												
OAXACA												
A.M.N.H. No. 13889, Cerro San Felipe	♂ ad	155	39	20.0	27.5	—	7.4	11.5	3.8	—	—	6.5
A.M.N.H. No. 185057, Cerro San Felipe	♂ ad	128	31	19.0	25.5	25.3	7.5	14.9	3.6	10.8	5.6	6.5
A.M.N.H. No. 182116, Macuiltianguis	♂ ad	143	35	20.0	26.5	26.4	7.8	15.2	3.9	10.6	5.6	7.3
A.M.N.H. No. 186925, San Andrés Chicahuaxtla	♀ ad	128	29	20.0	25.7	25.3	8.8	15.2	3.6	11.3	5.5	6.5
A.M.N.H. No. 186927, San Andrés Chicahuaxtla	♂ ad	152	26	20.0	26.1	26.0	8.0	15.0	3.8	12.0	5.8	6.6
A.M.N.H. No. 186928, San Andrés Chicahuaxtla	♀ ad	134	29	19.0	25.6	—	7.0	14.8	4.0	11.3	5.5	6.2
A.M.N.H. No. 148830, San Pedro Mixtepec	♂ sub	124	28	17.0	24.9	24.6	6.8	13.9	3.7	10.6	5.4	6.6
A.M.N.H. No. 148831, San Pedro Mixtepec	♀ sub	126	27	18.0	23.6	23.5	6.6	13.1	3.5	10.7	5.2	6.2
A.M.N.H. No. 148833, San Pedro Mixtepec	♂ ad	120	26	19.0	26.0	25.5	—	14.1	3.2	10.9	5.1	6.3
A.M.N.H. No. 148835, San Pedro Mixtepec	♀ ad	134	34	19.0	26.3	—	7.0	14.9	3.5	10.8	5.4	6.7
Microtus oaxacensis												
OAXACA												
A.M.N.H. No. 208952,[a] Tarabundí	♂ ad	—	—	22.5	28.1	27.8	7.8	15.8	4.4	11.0	5.7	7.5
K.U. No. 100046, Vista Hermosa	♂ ad	163	38	22.0	—	28.6	8.1	16.2	4.0	—	—	7.8
K.U. No. 100047, Vista Hermosa	♀ ad	159	31	21.0	—	28.2	7.9	15.8	3.6	—	—	7.7
Microtus umbrosus												
OAXACA												
U.S.N.M. No. 68480,[a] Mt. Zempoaltepec	♀ ad	184	65	23.0	27.4	—	7.3	16.0	—	—	—	7.0
U.S.N.M. No. 68469, Mt. Zempoaltepec	♀ ad	174	59	23.0	27.8	27.4	8.0	15.1	4.2	11.0	5.6	6.9
U.S.N.M. No. 68478, Mt. Zempoaltepec	♂ sub	170	60	24.0	26.1	25.5	7.4	15.1	4.0	10.8	5.4	6.4
U.S.N.M. No. 68494, Mt. Zempoaltepec	♀ ad	164	49	23.5	27.1	26.9	8.1	15.3	4.4	11.0	5.3	6.9
U.S.N.M. No. 68510, Totontepec	♂ ad	188	58	23.0	27.8	27.7	8.0	15.8	3.9	10.3	5.3	6.9
A.M.N.H. No. 13891, Totontepec	♀ ad	180	59	22.0	28.0	—	7.5	15.7	4.2	11.2	5.6	6.9
Microtus quasiater												
OAXACA												
A.M.N.H. No. 186923, Huautla	♂ sub	115	17	18.0	25.2	25.0	6.4	14.7	4.2	10.6	5.6	6.8
A.M.N.H. No. 186924, Huautla	♂ sub	114	19	18.0	25.5	25.3	6.3	14.5	4.2	11.7	5.6	6.3
VERACRUZ												
A.M.N.H. No. 12469, Jalapa	♂ ad	150	20	18.0	28.0	27.7	7.5	16.7	4.2	12.0	5.6	6.8
A.M.N.H. No. 12472, Jalapa	♀ sub	115	17	16.5	23.7	23.5	6.5	13.7	4.0	10.7	5.1	6.0

[a] Type.

incisive foramina relatively short; molariform teeth large and broad.

MEASUREMENTS: In table 33.

SPECIMENS EXAMINED: Mixes: Totontepec, one, one (U.S.N.M.); Zempoaltepec, three (U.S.N.M.).

SUBGENUS **PITYMYS** McMURTRIE

Microtus quasiater (Coues)

Plate 28, figures 7, 8; text figure 81

TYPE LOCALITY: Jalapa, Veracruz, Mexico, altitude 9000 feet.

RANGE IN OAXACA: Mountains of the northern districts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 114–115; tail very short (18–18); ears small; pelage moderately long, soft, and full, color Prout's Brown. Skull large and broad; zygomatic arches widely spread; rostrum short; nasals short and depressed anteriorly; braincase large and broad; bullae moderately large; anterior palatine foramina short.

MEASUREMENTS: In table 33.

SPECIMENS EXAMINED: Teotitlán: Huautla, two.

SUMMARY OF *Microtus* OF OAXACA

Three species represent three subgenera, *Microtus*, *Orthriomys*, and *Pitmys*, of *Microtus* in Oaxaca and two of the species are restricted to this state. The short-tailed field mouse, *M. mexicanus fulviventer*, is not uncommon in the mountains of central Oaxaca and is closely allied to other subspecies of *M. mexicanus* from Mexican states north of Oaxaca. *Microtus umbrosus* in a long-tailed, highland field mouse known only from the mountains in northeastern Oaxaca but west of the Isthmus of Tehuantepec. The pine mouse, *Microtus quasiater*, occurs in the Gulf drainage basin of extreme northwestern Oaxaca. The two specimens of *M. quasiater* from Teotitlán are apparently adult although probably not fully grown; both specimens are richer in color than typical specimens from Jalapa, Veracruz, but the differences in color may be due to a temporary immersion of the Oaxacan specimens in formaldehyde. *Microtus oaxacensis* is a comparatively newly named species distinct from other species of *Microtus* known to occur in Oaxaca. It was taken in a rain forest in north-central Oaxaca at an elevation of 5000 feet.

FAMILY **MURIDAE** GRAY

SUBFAMILY **MURINAE** MURRAY

GENUS **RATTUS** FISCHER

INTRODUCED HOUSE RATS

Rattus rattus rattus (Linnaeus)

Text figure 82

TYPE LOCALITY: Uppsala, Sweden.

RANGE IN OAXACA: Introduced and widely established in the southern districts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 350–420; tail naked, coarsely annulated, longer than head and body. Color Bluish Black. Skull angular, superior outline nearly straight; supraorbital ridges strongly developed and evenly bowed outward; rostrum long and slender; upper molars with three longitudinal rows of tubercles.

MEASUREMENTS: In table 34.

SPECIMENS EXAMINED: Juchitán: Matías Romero, two. Yautepec: San Juan la Farcia, one.

Rattus rattus alexandrinus
(E. Geoffroy Saint-Hilaire)

Plate 19, figures 5, 6; text figure 82

TYPE LOCALITY: Alexandria, Egypt.

RANGE IN OAXACA: Introduced and widely established in most of the districts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 350–450; tail considerably longer than length of head and body; pelage coarse; color Ochraceous-Buff, under parts grayish. Skull similar in general characters to that of *R. rattus rattus*.

MEASUREMENTS: In table 34.

SPECIMENS EXAMINED: Tehuantepec: Huamelula, one. Tuxtepec: Chiltepec, seven.

Rattus rattus frugivorus (Rafinesque)

Text figure 82

TYPE LOCALITY: Sicily.

RANGE IN OAXACA: Introduced and widely established in most districts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 350–450; similar in general characters to *R. r. alexandrinus* but under parts white. Skull closely resembling that of *R. r. alexandrinus*.

MEASUREMENTS: In table 34.

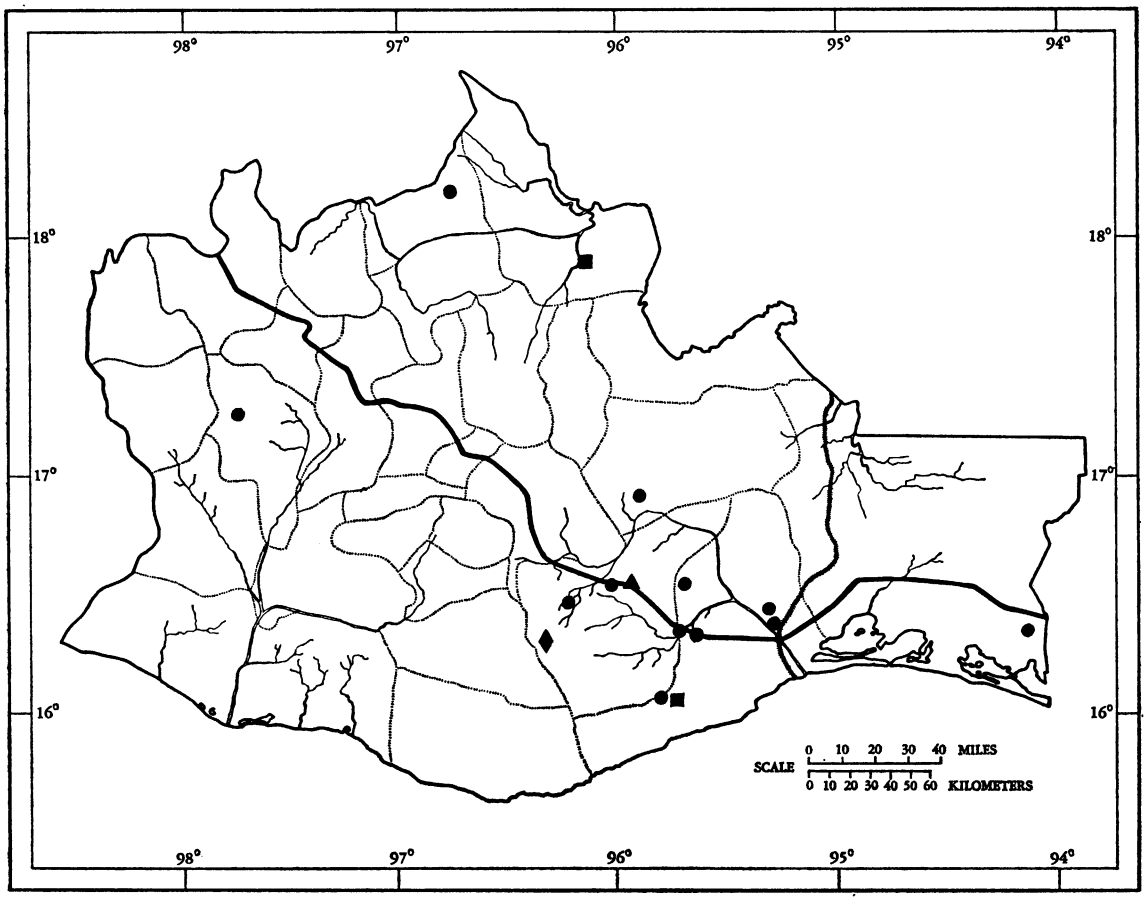


FIG. 82. Records of *Rattus rattus* and *Rattus norvegicus* in Oaxaca. ▲ *R. r. rattus.* ■ *R. r. alexandrinus.* ● *R. r. frugivorus.* ◆ *R. norvegicus.*

SPECIMENS EXAMINED: Juchitán: Tapanatepec, one. Mixes: Chusnavan, one. Tehuantepec: Finca Santa Teresa, two; Huamelula, one; Mixtequilla, four; Tehuantepec, one; Tequisistlán, one. Teotitlán: Huautla, one. Tlaxiaco: Tlaxiaco, one. Yautepec: San Carlos Yautepec, two; San Juan la Jarica, two; San Pedro Jilotepec, one.

Rattus norvegicus (Berkenhout)

Plate 19, figures 7, 8; text figure 82

TYPE LOCALITY: England.

RANGE IN OAXACA: Introduced and widely established in the southern districts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 300–400; tail naked, coarsely annulated and usually shorter than length of head and body; pelage coarse and reddish brown. Skull angular, moderately long and narrow, the superior outline arched in orbital region; supraorbital ridges strongly developed and angular at frontal parietal suture; upper molar teeth with three longitudinal rows of tubercles.

MEASUREMENTS: In table 34.

SPECIMENS EXAMINED: Yautepec: Santiago Lachivía, four.

GENUS **MUS** LINNAEUS

INTRODUCED HOUSE MICE

Mus musculus brevirostris Waterhouse

Plate 28, figures 9, 10; text figure 83

TYPE LOCALITY: Maldonado, Uruguay, South America.

RANGE IN OAXACA: Introduced and widely

TABLE 34

MEASUREMENTS (IN MILLIMETERS) OF *Rattus* AND *Mus* FROM OAXACA

Species, Museum Number and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
Rattus rattus rattus												
A.M.N.H. No. 143944, Matías Romero	♂ sub	362	203	34.0	39.5	37.2	15.2	18.8	6.6	16.2	7.4	6.5
Rattus rattus alexandrinus												
A.M.N.H. No. 182117, Huamelula	♂ ad	400	200	40.0	40.7	38.8	15.0	19.8	6.9	16.2	8.0	7.0
A.M.N.H. No. 190396, Chiltepec	♂ ad	387	215	36.0	41.0	37.5	14.5	17.0	6.7	16.0	7.2	6.4
A.M.N.H. No. 190397, Chiltepec	♀ ad	415	235	36.0	44.2	41.0	16.0	19.5	6.0	17.2	7.5	6.4
Rattus rattus frugivorus												
A.M.N.H. No. 178782, Tehuantepec	♀ ad	440	240	37.0	44.7	42.5	16.4	21.7	6.7	16.7	9.0	7.0
A.M.N.H. No. 172291, Tapanatepec	♂ ad	338	200	21.0	38.6	36.4	13.2	18.2	5.9	15.5	7.8	7.0
A.M.N.H. No. 145826, Finca Sta. Teresa	♀ ad	405	227	37.0	—	—	—	—	—	—	—	—
Rattus norvegicus												
A.M.N.H. No. 145345, Santiago Lachivía	♀ sub	320	150	32.0	36.8	34.8	14.3	17.0	6.2	15.0	7.2	6.1
A.M.N.H. No. 145346, Santiago Lachivía	♂ sub	325	150	35.0	37.5	35.0	13.5	17.3	5.4	15.5	7.4	6.0
Mus musculus brevirostris												
A.M.N.H. No. 142262, Sto. Tomás Ocotepec	♀ ad	158	77	18.0	20.5	19.8	7.3	11.0	3.7	10.0	4.6	3.3
A.M.N.H. No. 171692, Jalapa	♀ ad	151	78	16.0	20.5	19.9	7.3	10.7	4.2	9.4	4.2	3.4
A.M.N.H. No. 175103, Juchitán	♂ ad	—	—	—	20.7	19.7	7.0	10.5	3.4	9.3	4.3	3.3
A.M.N.H. No. 175118, Huilotepec	♂ ad	—	—	—	20.5	19.6	7.0	10.5	3.7	9.4	4.3	3.3

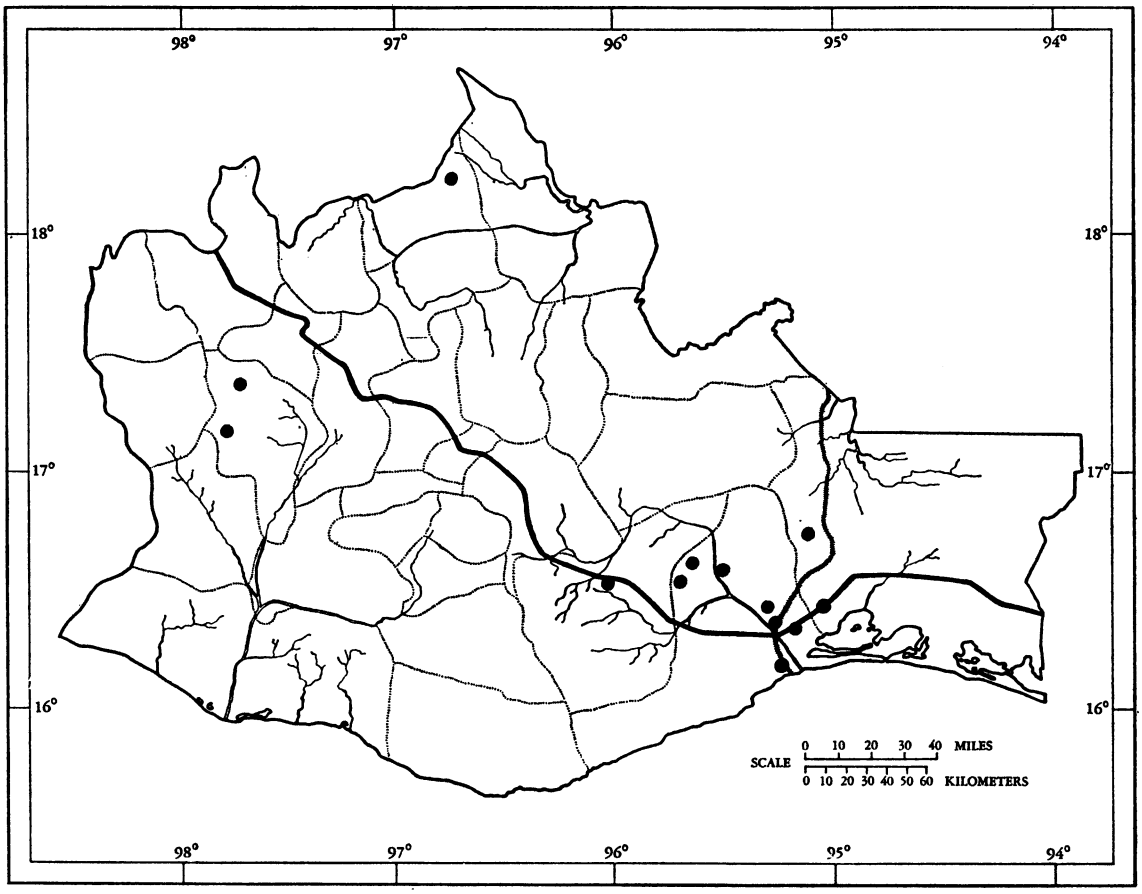


FIG. 83. Records of *Mus musculus* in Oaxaca. ● *M. m. brevirostris.*

distributed from low to moderate elevations throughout the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 125–190; tail naked, slightly longer than head and body; pelage grayish, coarse, and close; color of under parts not in contrast with color of back. Skull small and slender; braincase large; incisors, when viewed from side, having distinct notch on cutting edge; upper surface of molar teeth with three longitudinal rows of tubercles.

MEASUREMENTS: In table 34.

SPECIMENS EXAMINED: Juchitán: Juchitán, four; Nizanda, four. Teotitlán: Huautla, one. Tehuantepec: Cerro Verde, one; Jalapa, six; Huilotepec, 11; Mixtequilla, nine; Salina Cruz, one; Tehuantepec, 28. Tlaxlaco: Santo Tomás Ocotepec, one; Tlaxiaco, one. Yautepec: San Bartolo Yautepec, seven; San Pedro Jilotepec, one.

SUMMARY OF THE MURIDAE OF OAXACA

All species of murids in Oaxaca are introduced. The house mouse, *Mus musculus brevirostris*, is common in the state, especially in and around large cities. The house rats of Oaxaca are of two easily separable species: the short-tailed form, *Rattus norvegicus*, and the three long-tailed forms of *Rattus rattus*. *Rattus norvegicus* is not uncommon in Oaxaca. None of the four available Oaxacan specimens is fully grown; they have relatively small, narrow, molar teeth. The three subspecies of *Rattus rattus* that occur in Oaxaca are the black *R. r. rattus*, the white-bellied *R. r. frugivorus*, and the gray-bellied *R. r. alexandrinus*. Most of the Oaxacan specimens of *R. rattus* are readily assignable to subspecies on the basis of color. There is one instance in which two of the subspecies of *R. rattus* were taken at one locality.

FAMILY **ERETHIZONTIDAE** THOMAS

GENUS **COENDOU** LACÉPÈDE

PREHENSILE-TAILED PORCUPINES

Coendou mexicanus mexicanus (Kerr)

Plate 23, figures 7, 8; text figure 84

TYPE LOCALITY: Mountains of Mexico.

RANGE IN OAXACA: Moderate elevations of the northern districts of the state and across the Isthmus of Tehuantepec to southeastern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 689–900; tail long, prehensile, limbs short; body long; pelage coarse and mixed with sharp, stiff, barbed, yellowish white spines. Skull long and narrow; rostrum short and broad; interorbital region strongly inflated; bullae long and well inflated; incisor teeth long and slender; molar crown pattern complex.

MEASUREMENTS: In table 35.

SPECIMENS EXAMINED: Juchitán: La Ventosa, 11; Mogoñé, one; Sarabia, one. Tehuantepec: La Concepción, one.

SUMMARY OF *Coendou* OF OAXACA

The records of *Coendou* taken in Oaxaca indicate that its range extends across the Isthmus of Tehuantepec from Veracruz to the District of Tehuantepec and east across the eastern part of Oaxaca. There appears to be little variation in the external characters of the present series. Individual cranial variation in a series from La Ventosa is noticeable. Regardless of sex or age, some specimens have a comparatively short, broad cranium with relatively small, rounded bullae; other individuals have a long, narrow skull, with elongated bullae.

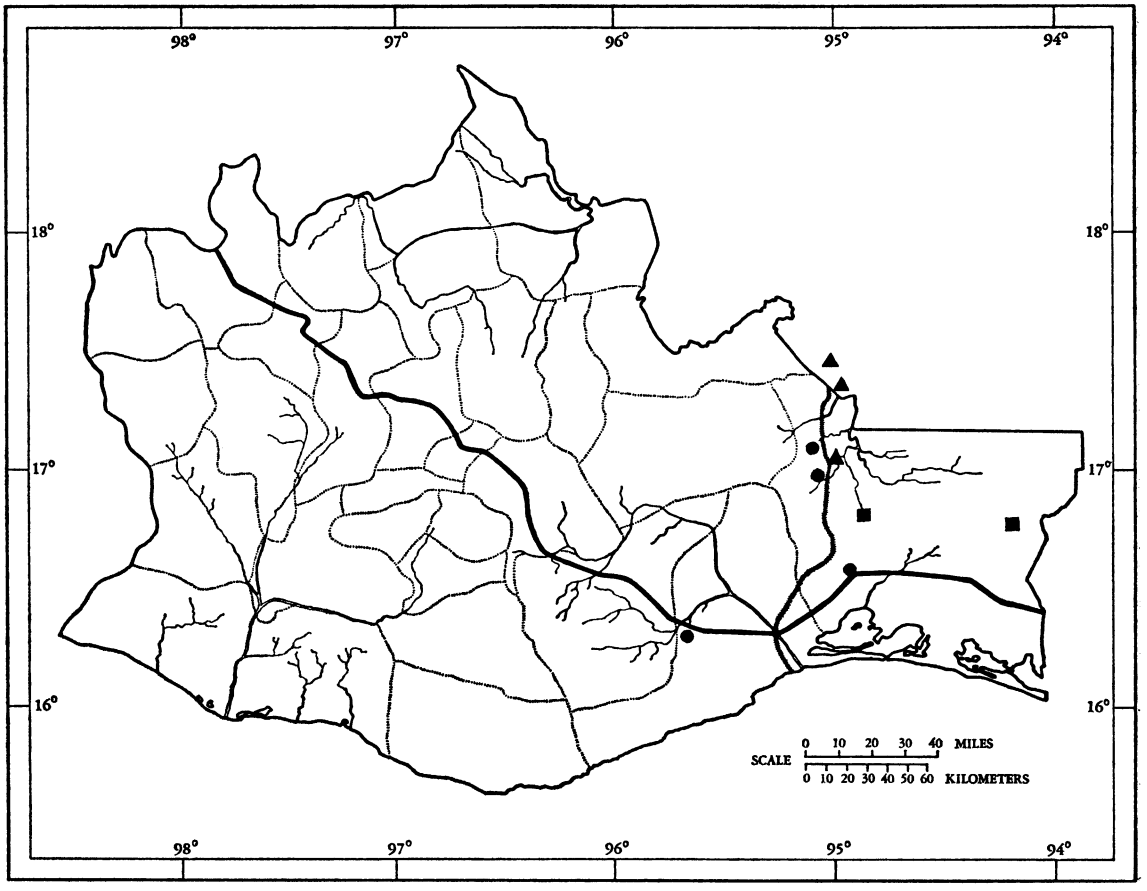


FIG. 84. Records of *Coendu mexicanus*, *Agouti paca*, and *Dasyprocta mexicana* in Oaxaca.
● *C. m. mexicanus.* ■ *A. p. nelsoni.* ▲ *D. mexicana.*

TABLE 35

MEASUREMENTS (IN MILLIMETERS) OF *Coendou mexicanus mexicanus* FROM OAXACA

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
A.M.N.H. No. 145983, La Concepcíon	♂ ad	625	295	70.0	85.7	81.5	32.6	48.8	30.0	33.2	19.4	19.3
A.M.N.H. No. 143969, Mogoñé	♂ ad	755	355	82.0	91.3	85.7	35.0	49.5	31.5	32.3	17.6	19.6
A.M.N.H. No. 190419, La Ventosa	♀ ad	870	410	85.0	95.0	88.0	33.5	48.9	33.4	33.0	19.7	19.8
A.M.N.H. No. 190423, La Ventosa	♀ ad	800	390	85.0	—	—	—	—	—	—	—	—
A.M.N.H. No. 190424, La Ventosa	♀ ad	810	380	85.0	94.0	88.7	33.4	50.0	33.2	36.0	18.6	20.5
A.M.N.H. No. 190425, La Ventosa	♂ ad	720	380	82.0	90.5	86.0	35.5	50.5	31.5	34.0	18.0	19.7
A.M.N.H. No. 190426, La Ventosa	♂ ad	900	440	95.0	102.9	95.1	38.3	50.6	32.8	34.4	20.4	21.3

FAMILY **DASYPROCTIDAE** SMITH

SUBFAMILY **CUNICULINAE** MILLER AND GIDLEY

GENUS **AGOUTI** LACÉPÈDE

PACAS

Agouti paca nelsoni Goldman

Plate 29, figures 1, 2; text figure 84

TYPE LOCALITY: Catemaco, Veracruz, Mexico.

RANGE IN OAXACA: Coastal plains and mountain slopes of Juchitán District.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 665–795; tail very short; body large; limbs relatively short; pelage short and close, dark brown, and marked with longitudinal white lines and spots. Skull large and massive; zygomatic region greatly modified, outgrowths from maxillary and jugal forming bony cheek plates that extend downward and conceal a large part of mandible, outer surface of plates rugose; cheek teeth hypsodont, semirooted, and with deep reëntrant folds; incisor teeth compressed laterally.

MEASUREMENTS: In table 36.

SPECIMENS EXAMINED: Juchitán: Río Grande, two; Río Mono Blanco, one.

SUBFAMILY **DASYPROCTINAE** MURRAY

GENUS **DASYPROCTA** ILLIGER

AGOUTIS

Dasyprocta mexicana Saussure

Plate 29, figures 3, 4; text figure 84

TYPE LOCALITY: "Hot zone of Mexico"; probably in the State of Veracruz.

RANGE IN OAXACA: Low to moderate elevations on the Gulf drainage of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Veracruz and Oaxacan specimens). Total length, 412–620; tail rudimentary; limbs long and slender; pelage coarse and black; hair on rump longer than on back; three digits on hind feet, four digits on forefeet. Skull large, long, and smoothly rounded; nasals short; zygomatic arches not expanded; bullae moderately large; palatine foramina small and short; cheek teeth hypsodont; molar crown pattern complex; incisors narrow.

MEASUREMENTS: In table 36.

SPECIMENS EXAMINED: Veracruz: Río Jaltepec, one; Zuchil, one.

SPECIMENS RECORDED: (Schaldach, 1964, p. 137). Juchitán: Río Sarabia, one (L.A.C.M.).

Dasyprocta punctata chiapensis Goldman

TYPE LOCALITY: Huehuetan, Chiapas, Mexico.

RANGE IN OAXACA: No specimens known from Oaxaca.

GENERAL CHARACTERS: (Based on Chiapas specimens). Total length, 492–565; resembles *Dasyprocta mexicana* in size and build, but is reddish rather than blackish. Skull similar in general characters to that of *D. mexicana*.

MEASUREMENTS: In table 36.

REMARKS: Thomas MacDougall reports seeing the red agoutis in the forested regions of southeastern Oaxaca near the Chiapas state line; one was killed, but was carried off by a dog before it could be retrieved.

SUMMARY OF THE DASYPROCTIDAE OF OAXACA

In Oaxaca the family Dasyproctidae is represented by two genera, *Agouti* and *Dasyprocta*. Both genera are recorded only from the humid forested regions on the Gulf drainage in the northeastern areas of the state. There is, however, sufficient reason to believe that the range of the Chiapas agouti, *D. p. chiapensis*, extends westward in the Pacific coastal region to southeastern Oaxaca.

ORDER **CARNIVORA** BOWDICH

CARNIVORES

FAMILY **CANIDAE** GRAY

SUBFAMILY **CANINAE** GILL

GENUS **CANIS** LINNAEUS

COYOTES AND WOLVES

Canis latrans cagottis (Hamilton-Smith)

Text figure 85

TYPE LOCALITY: Río Frío, west slope of Mt. Iztaccihuatl, Mexico.

RANGE IN OAXACA: Highlands of the central districts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 1132; muzzle pointed; ears long and erect; tail long and bushy; pelage long, dark reddish brown, and heavily overlain with black. Skull elongate; rostrum long and slender; zygomatic arches strongly developed and widely spread; sagittal crest

TABLE 36

MEASUREMENTS (IN MILLIMETERS) OF *Agouti* AND *Dasyprocta* FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
Agouti paca nelsoni												
OAXACA												
A.M.N.H. No. 143471, Río Grande	♂ ad	705	37	122.0	152.0	140.0	54.3	106.7	43.2	—	—	36.0
A.M.N.H. No. 143472, Río Grande	♀ sub	613	29	116.0	133.5	116.0	44.1	80.5	35.5	54.5	25.0	26.4
A.M.N.H. No. 165990, Río Mono Blanco	♀ ad	665	23	114.0	141.0	—	47.0	87.3	38.0	—	—	28.5
VERACRUZ												
U.S.N.M. No. 65952,[a] Catemaco	♂ ad	794	29	127.0	154.8	147.5	55.7	111.7	43.5	—	—	30.0
Dasyprocta mexicana												
VERACRUZ												
A.M.N.H. No. 172283, Río Jaltepec	♂ sub	412	20	110.0	93.8	80.0	31.5	45.0	28.2	—	—	18.5
A.M.N.H. No. 178708, Zuchil	♀ ad	620	10	113.0	106.5	—	—	50.3	32.2	40.0	22.4	20.5
Dasyprocta punctata chiapensis												
CHIAPAS												
U.S.N.M. No. 77997,[a] Huehuetán	♀ ad	492	30	120.0	102.8	95.2	38.5	48.2	28.5	—	—	19.5

[a] Type.

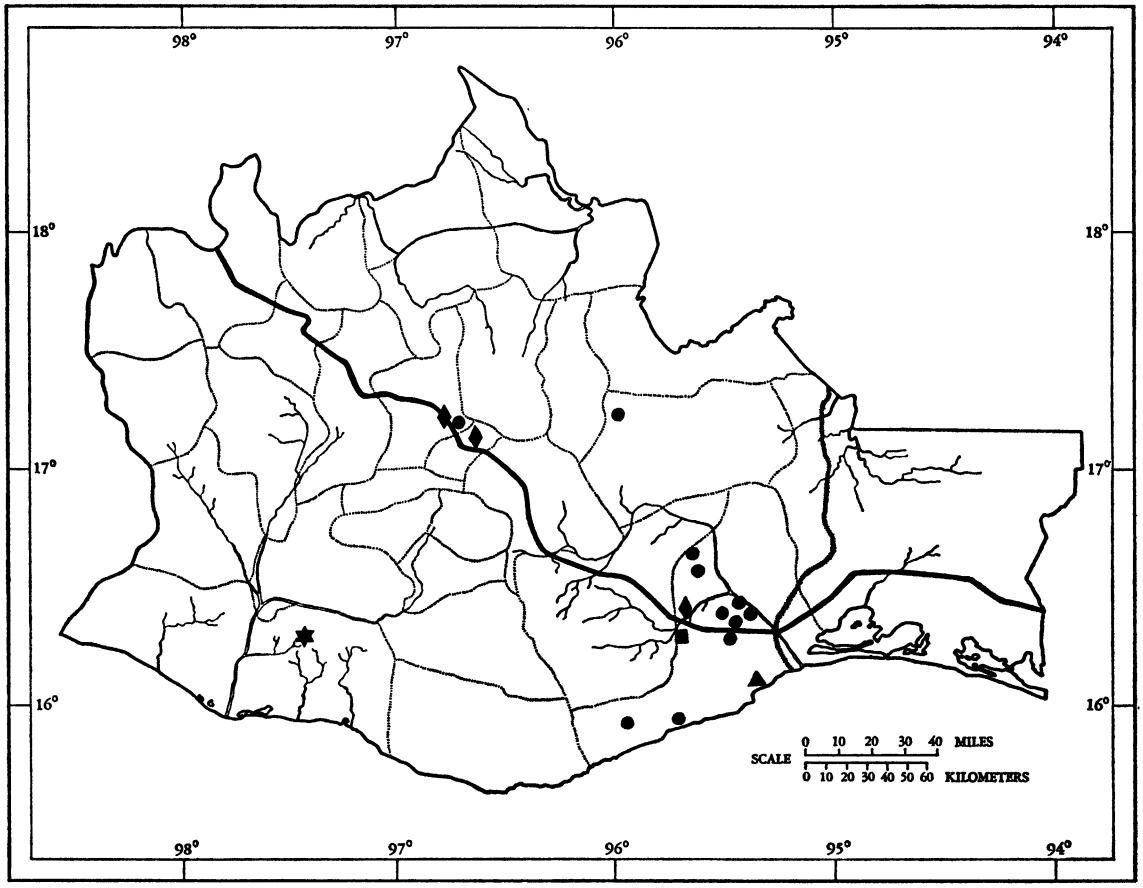


FIG. 85. Records of *Canis latrans*, *Canis lupus* and *Urocyon cinereoargenteus* in Oaxaca. ◆ *C. latrans cagottis*. ▲ *C. latrans goldmani*. ■ *C. lupus baileyi*. ● *U. c. orinomus*. ★ *U. c. nigrirostris*.

well developed in adult; bullae low and not greatly inflated; canine teeth long and pointed; upper incisors small, bilobed; carnassial teeth large and having well-developed cutting edge.

MEASUREMENTS: In table 37.

SPECIMENS EXAMINED: Etla: Cerro San Felipe, one. Oaxaca: San Felipe del Agua, one immature. Tehuantepec: Tequisistlán, one skin.

Canis latrans goldmani Merriam

Plate 29, figures 7, 8; text figure 85

TYPE LOCALITY: San Vicente, Chiapas, Mexico.

RANGE IN OAXACA: Arid regions of the southeastern districts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 1270; similar to *C. l. cagottis* but larger, color paler, and forelimbs usually without black markings on anterior surface. Skull large and broad, audital bullae relatively large; dentition heavy as compared with that of *C. l. cagottis*.

MEASUREMENTS: In table 37.

SPECIMENS EXAMINED: Tehuantepec: San Antonio, one.

Canis lupus baileyi Nelson and Goldman

Plate 29, figures 5, 6; text figure 85

TYPE LOCALITY: Colonia Garcia, Chihuahua, Mexico, altitude, 6700 feet.

RANGE IN OAXACA: Tablelands of the central districts of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 1600; size relatively small for species; head large, ears small; tail long and normally bushy; pelage moderately long and dark buffy brown in color. Skull large and massive; zygomatic arches strongly

TABLE 37

MEASUREMENTS (IN MILLIMETERS) OF *Canis* AND *Urocyon* FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
Canis latrans cagottis												
OAXACA												
U.S.N.M. Cerro San Felipe	♂ sub	1132	304	195	—	173.2	—	99.4	30.7	—	—	79.8
A.M.N.H. No. 212412, Cerro San Felipe	ad	—	—	—	187.0	185.0	69.5	103.0	32.6	59.4	57.0	85.2
VERACRUZ												
K.U., Piedras Negras	♂ ad	1189	360	188	—	179.2	—	100.0	31.5	—	—	84.6
Canis latrans goldmani												
CHIAPAS												
U.S.N.M. No. 133204,[a] San Vicente	♀ ad	1220	355	216	—	177.4	—	100.0	31.2	—	—	86.9
OAXACA												
A.M.N.H. No. 206831,[b] San Antonio	♂ ad	1270	340	210	—	—	—	—	—	—	—	—
Canis lupus baileyi												
CHIHUAHUA												
U.S.N.M. No. 98312,[a] Colonia García	♂ ad	1570	410	260	232.1	221.4	—	129.7	44.5	—	—	100.2
OAXACA												
A.M.N.H. No. 175261,[b] Tequisistlán	♂ ad	1600	410	255	—	—	—	—	—	—	—	—

TABLE 37—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
Urocyon cinereoargenteus orinomus												
OAXACA												
U.S.N.M. No. 68171, Cerro San Felipe	♀ ad	930	370	120	116.5	115.8	34.5	64.2	22.3	46.4	32.3	49.5
A.M.N.H. No. 142555, La Presa	♂ ad	825	240	130	115.2	112.0	30.8	66.5	22.9	44.2	33.3	47.5
A.M.N.H. No. 143464, San Pablo	♀ ad	904	382	126	120.5	116.0	36.0	63.8	22.5	42.8	31.8	49.2
A.M.N.H. No. 143465, Arroyo Sauce	♀ ad	924	388	119	112.0	111.0	35.0	61.0	24.2	43.9	31.0	44.8
A.M.N.H. No. 144585, Las Tejas	♀ ad	850	360	111	105.1	104.0	30.5	61.4	21.6	43.6	30.0	43.5
A.M.N.H. No. 145161, San Pedro Jilotepec	ad	558	327	125	113.0	111.5	36.2	63.1	22.4	45.4	32.5	46.0
A.M.N.H. No. 145162, Las Pilas	♀ ad	860	375	110	111.6	108.5	36.4	59.9	21.4	42.2	30.9	47.0
A.M.N.H. No. 145163, Salazar	♀ ad	780	305	111	114.0	113.0	33.4	61.2	22.4	43.0	32.5	47.6
A.M.N.H. No. 145164, Astata	♂ ad	840	290	95	—	—	—	—	—	—	—	—
A.M.N.H. No. 145649, Garrapatera	♂ ad	830	280	100	111.0	107.0	32.0	60.7	21.1	41.5	31.4	44.7
VERACRUZ												
U.S.N.M. No. 58411,[a] Orizaba	♀ ad	935	358	128	111.6	109.3	35.9	65.1	22.0	42.3	—	48.8
Urocyon cinereoargenteus nigrirostris												
COLIMA												
U.S.N.M. No. 33519,[c] Colima	♂ ad	960	410	138	117.0	116.0	37.3	65.6	24.0	44.2	—	50.4
OAXACA												
U.S.N.M. No. 74675, Juquila	♂ ad	990	355	110	115.0	112.4	33.6	65.9	22.5	42.0	31.8	47.7

[a] Type.
[b] Dry skin.
[c] Type of *U. c. colimensis.*

developed and widely spread; braincase relatively small; sagittal crest well developed in adult; rostrum long and broad; dentition strong, carnassials and canines large.

MEASUREMENTS: In table 37.

SPECIMENS EXAMINED: Tehuantepec: Tequisistlán, one skin.

SUMMARY OF *Canis* IN OAXACA

Two subspecies of *Canis latrans* occur in Oaxaca. The relatively small and dark *C. l. cagottis* is associated with the humid forested regions of the central and northern parts of the state. *Canis l. goldmani* is larger and lighter-colored than *C. l. cagottis*, and frequents the arid regions of southeastern Oaxaca. An old male wolf, *C. lupus baileyi*, that was preying on donkeys was killed in March, 1945, in the vicinity of Tequisistlán, and the hide was turned in for the bounty. This skin hung in one of the municipal buildings for a number of years. It is reddish in color due to bark tanning. A large head, large feet, small ears, and the color pattern of the hair on the neck and shoulders are definitely wolf characteristics. The pelage over the rest of the body is thin, and the tail is scantily haired for a wolf, characters that could be attributed to wear and old age. At the time, two so-called wolves were preying on the domestic stock in the vicinity, but, since the killings did not stop when the first wolf was killed, bounty was paid on only the second wolf when the raids on the domestic stock ended.

GENUS **UROCYON** BAIRD

GRAY FOXES

Urocyon cinereoargenteus orinomus Goldman

Plate 29, figures 9, 10; text figure 85

TYPE LOCALITY: Orizaba, Veracruz, Mexico, altitude 4000 feet.

RANGE IN OAXACA: Low to high elevations throughout the state except in the southwestern districts.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 780–930; head long and pointed; ears large and erect; tail long and bushy, with a concealed mane of stiff hairs down upper surface; pelage relatively coarse and dark grayish in color, with bright tawny markings. Skull broad; palate long; rostrum slender; braincase large, postorbital processes well developed; temporal ridges widely separated and lyre-shaped; bullae large.

MEASUREMENTS: In table 37.

SPECIMENS EXAMINED: Mixes: Totontepec, one (U.S.N.M.). Etla: Cerro San Felipe, one (U.S.N.M.). Tehuantepec: Astata, one; La Presca, one; Las Pilas, one; Las Tijas, one; San Pablo, one; Salinera Garrapatera, one; Salazar, one. Yautepec: Arroyo Sauce, one; San Pedro Jilotepec, one.

Urocyon cinereoargenteus nigrirostris (Lichtenstein)

Text figure 85

TYPE LOCALITY: Real Arriba [= Temascaltepec], Estado de Mexico, Mexico.

RANGE IN OAXACA: Pacific coast region of the southwestern districts.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 990; resembling *U. c. orinomus* but averaging larger and paler, upper parts less heavily overlain with black and reddish postauricular areas a paler shade of Ochraceous-Tawny.

MEASUREMENTS: In table 37.

SPECIMENS EXAMINED: Juquila: Juquila, one (U.S.N.M.).

SUMMARY OF *Urocyon* IN OAXACA

The gray fox is common in southern Oaxaca. Two geographical forms are recognized. *Urocyon c. orinomus* is a dark-colored form with bright tawny postauricular markings and has a range that covers most of Oaxaca. *Urocyon c. nigrirostris* averages larger and is paler than *orinomus* and is known only from southwestern Oaxaca.

FAMILY **PROCYONIDAE** BONAPARTE

SUBFAMILY **PROCYONINAE** GILL

GENUS **BASSARISCUS** COUES

CACOMISTLES

Bassariscus astutus astutus (Lichtenstein)

Text figure 86

TYPE LOCALITY: Near city of Mexico.

RANGE IN OAXACA: High plateau region of northern districts west of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 850–890; body long

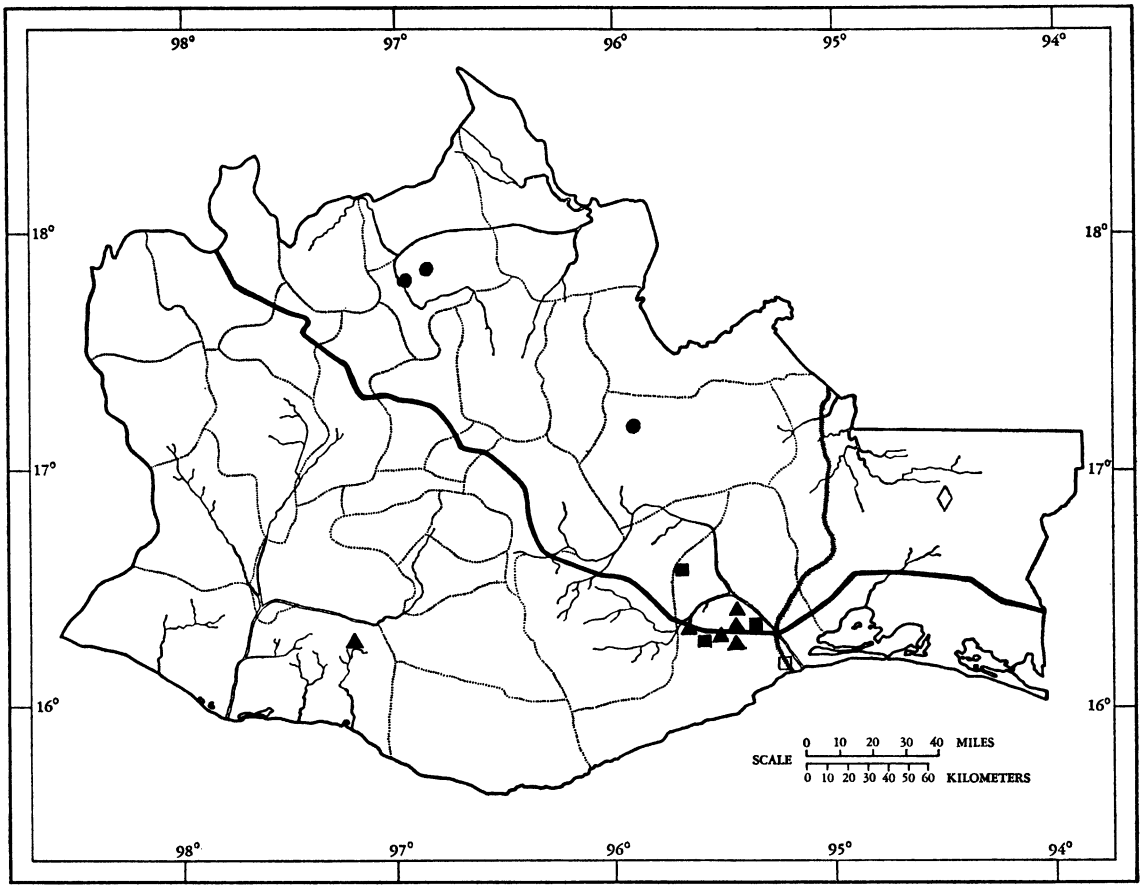


FIG. 86. Records of *Bassariscus astutus* and *Bassariscus sumichrasti* in Oaxaca. ● *B. a. astutus.* ■ *B. a. macdougalli.* □ Type locality of *B. a. macdougalli.* ▲ *B. s. sumichrasti.* ◇ Type locality of *B. s. oaxacensis.*

and slender; limbs short, claws somewhat retractile, soles of forefeet and hind feet densely haired around pads; tail as long as or longer than head and body, bushy and banded with numerous, sharply contrasting, alternating broad black-and-white bands; pelage moderately long and Light Ochraceous Buff; under fur thick; ears large and triangular in shape. Skull relatively large and smooth; sagittal crest present in adult males; braincase large and long; postorbital processes well developed, each drawn out to a sharp point; audital bullae relatively small and low; dentition relatively large; upper carnassials triangular in form but with a well-developed posterior-internal cusp; cusps in large molariform teeth strongly trenchant and with sharp connecting ridges.

MEASUREMENTS: In table 38.

SPECIMENS EXAMINED: Cuicatlán: Cuicatlán, two (U.S.N.M.); Reyes, one (U.S.N.M.). Mixes: Mt. Zempoaltepec, one (U.S.N.M.).

Bassariscus astutus macdougalli Goodwin

Plate 30, figures 1, 2; text figure 86

TYPE LOCALITY: La Ventosa, Salina Cruz, Oaxaca, Mexico, altitude near sea level.

RANGE IN OAXACA: Pacific coastal lowlands in the vicinity of the Isthmus of Tehuantepec and the adjacent foothills.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 825–900; similar to *B. astutus astutus* but averaging smaller and having shorter and coarser pelage. Skull relatively strong and broad, zygomatic arches widely spreading; braincase depressed behind orbits; area of postorbital constriction elongated.

TABLE 38

MEASUREMENTS (IN MILLIMETERS) OF PROCYONIDS FROM OAXACA AND OF SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
Bassariscus astutus astutus												
OAXACA												
U.S.N.M., Cuicatlán	♂ ad	858	419	92	90.5	89.7	—	57.7	16.6	—	—	33.5
U.S.N.M., Cuicatlán	♀ ad	886	433	82	87.2	85.0	—	55.7	18.2	—	—	32.8
Bassariscus astutus macdougalli												
OAXACA												
A.M.N.H. No. 148977,[a] Salina Cruz	♀ ad	825	420	70	85.4	83.9	—	53.0	16.3	—	—	32.4
A.M.N.H. No. 182119, San Pedro Jilotepec	♀ old	860	440	75	84.8	83.3	—	52.8	16.5	32.7	28.5	34.1
A.M.N.H. No. 147573, Tenango	♂ juv	800	425	80	84.0	81.3	18.4	48.0	15.7	36.0	27.5	34.0
A.M.N.H. No. 178701,[b] Tehuantepec	♂ ad	900	480	80	—	—	—	—	—	—	—	—
Bassariscus astutus bolei												
GUERRERO												
F.M.N.H. No. 551,[a] Chilpancingo	♂ ad	850	420	80	84.8	84.5	—	56.5	16.0	—	—	31.7
Bassariscus sumichrasti sumachristi												
OAXACA												
A.M.N.H. No. 145160, Guiengola	♀ ad	905	490	62	86.7	82.4	24.5	57.0	18.0	35.8	26.3	33.4
A.M.N.H. No. 178706, Limón	♂ ad	955	491	93	93.1	90.3	21.5	56.1	16.6	36.2	27.0	35.4
A.M.N.H. No. 147574, Tenango	♂ ad	992	515	94	—	—	—	66.3	19.7	35.7	29.0	—
A.M.N.H. No. 148804, Tres Cruces	♂ sub	980	510	95	95.3	89.3	19.2	53.6	19.7	36.8	26.7	34.8
Bassariscus sumichrasti oaxacensis												
OAXACA												
A.M.N.H. No. 148975,[a] La Gloria	♂ ad	994	552	90	90.6	85.0	—	58.5	17.0	36.3	—	33.5
CHIAPAS												
A.M.N.H. No. 177074, Pueblo Nuevo	♂ old	932	500	95	92.5	88.0	—	64.2	19.0	36.0	26.4	34.3

TABLE 38—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
Bassariscus sumichrasti campechensis												
CAMPECHE												
U.S.N.M., La Tuxpena	♂ ad	974	506	89	87.8	83.0	—	60.8	17.2	34.8	—	32.4
U.S.N.M. No. 108291,[a] Apazota	♂ ad	905	500	92	90.0	84.7	—	59.8	18.5	—	—	32.8
Procyon lotor hernandezii												
DISTRITO FEDERAL												
U.S.N.M., Tlalpam	♂ ad	905	283	122	122.9	116.9	—	86.0	25.2	—	—	45.7
VERACRUZ												
A.M.N.H. No. 204286, Veracruz	♀ ad	800	300	110	117.7	113.2	30.6	74.4	23.5	49.0	39.8	45.7
A.M.N.H. No. 204287, Alemon	♀ old	—	—	—	126.0	124.0	—	84.5	24.8	49.5	41.7	46.8
OAXACA												
A.M.N.H. No. 190429, Sola de Vega	♂ sub	849	240	109	114.2	113.2	27.7	68.8	23.4	45.7	40.5	44.6
Procyon lotor shufeldti												
OAXACA												
A.M.N.H. No. 145645, Sta. María del Mar	♂ ad	870	310	120	120.9	—	30.9	82.7	27.0	51.0	40.6	45.2
A.M.N.H. No. 145646, Sta. María del Mar	♂ ad	920	336	120	124.1	119.3	—	86.0	26.0	52.8	42.2	45.7
A.M.N.H. No. 148802, Santa Lucía	♂ ad	860	304	120	—	—	—	—	—	—	—	—
A.M.N.H. No. 148979, Las Cuevas	♀ old	900	302	120	122.5	—	—	80.4	23.2	48.5	39.4	43.8
A.M.N.H. No. 148981, Tequisistlán	♂ ad	803	255	106	118.0	113.7	30.7	81.0	24.7	52.5	42.4	44.7
A.M.N.H. No. 148985, Tres Cruces	♂ ad	860	320	125	123.1	—	29.3	76.8	24.0	48.7	40.3	44.5
A.M.N.H. No. 148986, San Antonio	♀ ad	867	280	118	123.6	118.4	30.4	75.0	24.0	51.0	38.3	45.5
Nasua narica narica												
OAXACA												
A.M.N.H. No. 143968, Cerro San Pedro	♂ ad	1136	585	120	—	—	—	—	—	—	—	—
A.M.N.H. No. 145932, Escurano	♂ ad	1185	515	114	134.5	128.0	—	80.0	29.8	46.7	37.6	52.7
A.M.N.H. No. 145652, Salina Garrapatera	♂ ad	1330	600	120	140.0	135.5	—	78.3	32.0	47.8	39.0	54.5
A.M.N.H. No. 145153, Cerro de Campanaria	♀ ad	1021	513	95	126.8	120.0	44.5	61.2	27.0	46.5	34.5	49.0

TABLE 38—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
A.M.N.H. No. 145200, Cerro Atravesado	♂ ad	1095	600	104	129.5	124.0	—	73.8	25.8	43.8	35.2	50.0
A.M.N.H. No. 145650, Cerro San Pedro	♂ ad	1175	545	106	140.7	131.5	—	72.5	27.0	44.5	36.0	49.4
A.M.N.H. No. 145651, Escurano	♀ ad	1104	556	112	128.7	123.4	—	65.2	28.5	45.0	35.0	50.1
A.M.N.H. No. 145933, Cerro San Pedro	♂ ad	1165	565	110	134.0	126.5	—	77.0	29.2	44.0	36.0	51.5
A.M.N.H. No. 145973, La Mata	♀ ad	1070	485	108	124.5	121.8	—	58.8	25.5	43.3	34.0	47.0
Potos flavus aztecus												
OAXACA												
A.M.N.H. No. 145950, La Concepción	♀ ad	970	505	100	93.7	89.5	—	65.8	20.9	40.6	26.0	27.0
A.M.N.H. No. 147572, Santiago Lachiguirí	♂ sub	960	475	115	96.7	—	20.5	58.5	19.8	42.3	27.2	28.4
A.M.N.H. No. 148988, Tres Cruces	♀ ad	980	500	105	95.1	—	—	64.4	19.9	41.2	26.4	28.0
A.M.N.H. No. 172181, Tapanetepec	♂ ad	954	434	118	93.8	89.2	—	62.2	22.3	40.8	25.1	28.0
A.M.N.H. No. 172184, Tapanetepec	♀ ad	992	525	114	98.0	93.0	—	63.6	20.8	41.8	25.1	28.3
A.M.N.H. No. 176659, Río Jaltepec	♀ ad	1002	455	107	96.0	90.1	—	62.0	21.2	39.5	25.2	26.5
A.M.N.H. No. 176660, Río Jaltepec	♀ ad	998	465	100	91.0	85.8	—	60.7	19.3	38.6	24.2	27.0
A.M.N.H. No. 176661, Río Jaltepec	♂ ad	1010	475	115	94.3	90.5	—	65.7	21.0	41.0	25.8	27.3
A.M.N.H. No. 176662, Río Jaltepec	♂ ad	1330	835	166	—	—	—	—	—	—	—	—
A.M.N.H. No. 18428, El Jícaro	♂ ad	1042	549	105	93.7	90.0	—	65.8	21.5	43.2	24.7	27.3
A.M.N.H. No. 190430, La Ventosa	♂ ad	968	494	113	93.5	90.0	—	61.8	22.2	41.6	25.4	28.0
A.M.N.H. No. 190431, La Ventosa	♀ ad	946	455	100	86.5	82.5	—	58.8	18.5	39.0	24.5	25.5
A.M.N.H. No. 190433, La Ventosa	♂ sub	1034	474	111	93.5	86.0	17.5	57.2	21.0	41.6	25.5	28.2
A.M.N.H. No. 190434, La Ventosa	♀ ad	948	494	110	90.0	86.5	—	59.6	20.0	41.0	24.2	28.3
A.M.N.H. No. 190435, La Ventosa	♂ ad	1058	528	115	95.5	92.0	—	64.5	23.5	41.0	26.0	29.3
A.M.N.H. No. 190436, La Ventosa	♀ ad	939	455	95	88.4	83.5	—	61.0	21.7	39.5	24.7	27.0
A.M.N.H. No. 207421, Guevéa	♀ ad	—	—	—	88.8	84.5	—	62.3	19.5	42.4	26.5	26.6

[a] Type.
[b] Native skin.

MEASUREMENTS: In table 38.

SPECIMENS EXAMINED: Tehuantepec: La Ventosa, one; Tehuantepec, one skin; Tenango, one. Yautepec: San Pedro Jilotepec, two.

Bassariscus sumichrasti sumichrasti (Saussure)

Text figure 86

TYPE LOCALITY: Mirador, Veracruz, Mexico.

RANGE IN OAXACA: Forested regions at moderate elevations west of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 905–992; body long and slender; limbs short; claws strong, recurved, and not retractile; tail usually longer than length of head and body and with alternating bands of black and Light Buff, light rings becoming obsolescent and not confluent on under side of tail, toward tip. Skull relatively long; rostrum slender; braincase long and narrow; zygomatic arches slender and not widely spreading; interpterygoid long and narrow; molariform teeth small; sagittal crest well developed in fully adult males; skulls of males larger and more angular than those of females.

MEASUREMENTS: In table 38.

SPECIMENS EXAMINED: Tehuantepec: Guiengola, one; Limón, one; Tenango, one; Tequisistlán, one; Tres Cruces, two. Juquila: Río Sal, Lacháo, one.[1]

Bassariscus sumichrasti oaxacensis (Goodwin)

Plate 30, figures 3, 4; text figure 86

TYPE LOCALITY: La Gloria, 10 kilometers southeast of Santa María Chimalapa, Juchitán, Oaxaca, Mexico.

RANGE IN OAXACA: Tropical rain forests of northeastern Juchitán District.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 994; similar in external characters to *Bassariscus s. sumichrasti*, but skull smaller; pelage longer, darker, and more richly colored.

MEASUREMENTS: In table 38.

SPECIMENS EXAMINED: Oaxaca: Juchitán: La Gloria, one. Chiapas: Pueblo Nuevo Solistahuacan, one.

[1] Native skin, color exceptionally dark, almost black; light tail bands indistinct; this specimen may be referable to *Bassariscus s. latrans* (Davis and Lukens, 1958); type from Omiltemi, Guerrero.

SUMMARY OF *Bassariscus* OF OAXACA

Two species of *Bassariscus* occur in Oaxaca, *astutus* and *sumichrasti*, and their ranges overlap. Each of the species is represented by two subspecies.

The nominate form, *Bassariscus a. astutus*, is comparatively large for the species, has relatively long pelage and dense under fur, and occupies the mountains and high plateaus of central and northern Oaxaca. *Bassariscus a. macdougalli* is the subspecies from the Pacific coastal lowlands of southern Oaxaca. It is distinguishable from *B. a. bolei* of the mountains of Guerrero by its larger size and its coarser and shorter pelage. A specimen from Tenango, Oaxaca, has the soft dense fur of *B. a. bolei*, but it is too immature for positive identification and is referred here to *macdougalii* on geographical grounds. *Bassariscus sumichrasti* is larger and darker than *B. astutus* and is more arboreal than the latter, having non-retractile claws (retractile in *B. astutus*). *Bassariscus s. sumichrasti* is a large, relatively light-colored subspecies occupying relatively arid regions in Oaxaca west of the Isthmus of Tehuantepec. *Bassariscus s. oaxacensis* is smaller, darker, and more richly colored than *B. s. sumichrasti*, and frequents the humid rain forests of northeastern Oaxaca. Compared with *B. s. campechensis* from the Yucatan Peninsula, *B. s. oaxacensis* is larger, darker, and more richly colored.

GENUS **PROCYON** STORR

RACCOONS

SUBGENUS **PROCYON** STORR

Procyon lotor hernandezii Wagler

Text figure 87

TYPE LOCALITY: Valley of Mexico; fixed by Nelson and Goldman (1931, p. 17) as Tlalpam, Distrito Federal, Mexico.

RANGE IN OAXACO: Tableland or plateau region west of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan and Veracruz specimens). Total length, 825–905; facial mask black; tail bushy, shorter than length of head and body, conspicuously banded with from five to seven rings of light buffy and dark brown; head short and broad, muzzle pointed; pelage relatively long, grayish, and heavily overlain with black. Skull

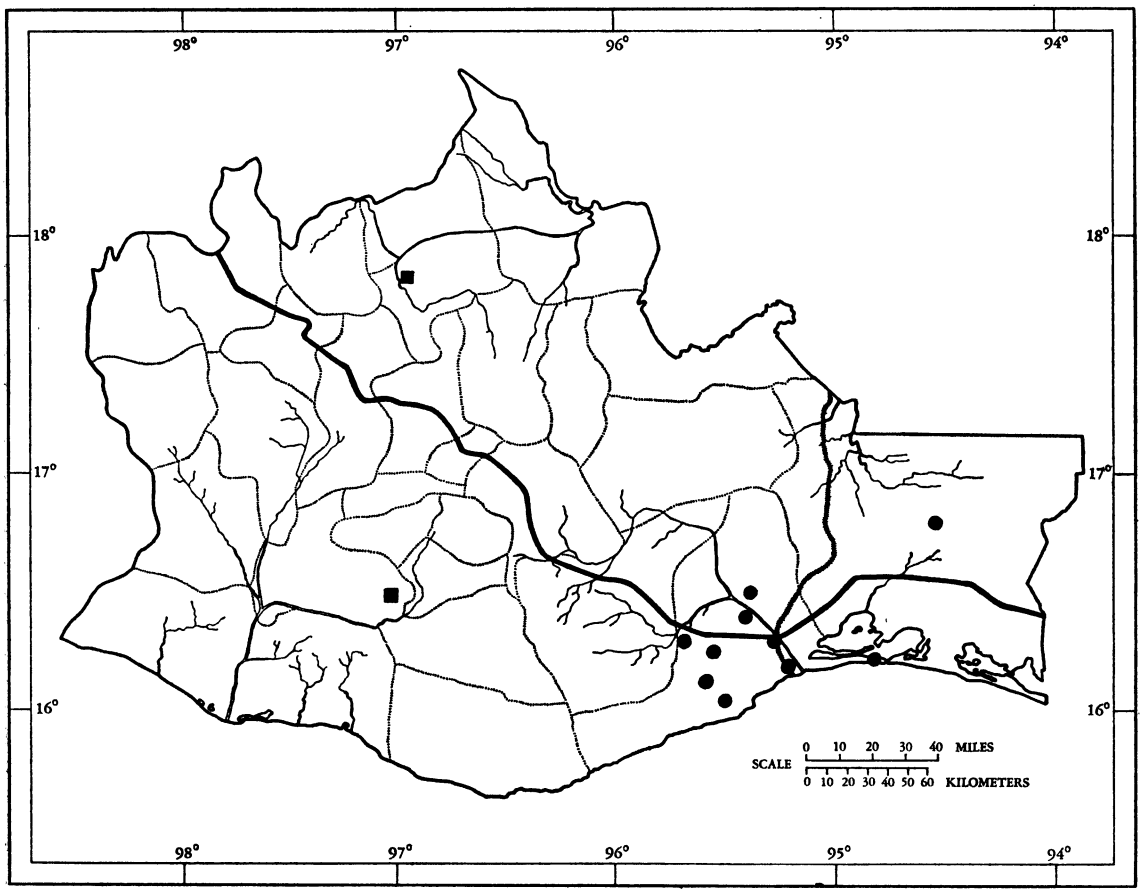


FIG. 87. Records of *Procyon lotor* in Oaxaca. ■ *P. l. hernandezii.* ● *P. l. shufeldti.*

broad; sagittal crest present or absent; dentition heavy; crown of fourth upper premolar subquadrate; crown of upper molar slightly broader than long and having four principal cusps; second upper molar subtriangular.

MEASUREMENTS: In table 38.

SPECIMENS EXAMINED: Sola de Vega: Sola de Vega, one.

SPECIMENS RECORDED: (Goldman, 1950, p. 65). Cuicatlán: Cuicatlán, one (U.S.N.M.).

Procyon lotor shufeldti Nelson and Goldman

Plate 30, figures 5, 6; text figure 87

TYPE LOCALITY: La Tuxpena, Champoton, Campeche, Mexico.

RANGE IN OAXACA: Forested mountain slopes east of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 870–920; pelage short and close; similar to *P. l. hernandezii* but pelage shorter, color paler and duller; top of head grayer and back less modified with black-tipped hairs.

MEASUREMENTS: In table 38.

SPECIMENS EXAMINED: Juchitán: Cerro Atravesado, two; Santa María del Mar, four. Tehuantepec: Las Cuevas, three; Salazar, one; Salina Cruz, two; San Antonio, one; Santa Lucía, one; Tehuantepec, one; Tequisistlán, two; Tres Cruces, one.

SUMMARY OF *Procyon* OF OAXACA

Two subspecies of *Procyon lotor* occur in Oaxaca. *Procyon l. shufeldti* is a short-haired, light-colored subspecies common in the Pacific coastal region of the Isthmus of Tehuantepec. Two specimens from Cerro Atravesado in east-central Oaxaca are darker and have longer hair than the average of specimens from near the coast. Both of these specimens are immature, and their darkness may in

part be an age character. *Procyon l. hernandezii* is a comparatively long-haired, dark grayish subspecies with the upper parts extensively overlain with black, especially on the crown of the head. *Procyon l. hernandezii* appears to be less common than *P. l. shufeldti*, and its range in Oaxaca is restricted to the western parts of the state.

Genus **NASUA** Storr
Coatis
Nasua narica narica (Linnaeus)

Plate 30, figures 7, 8; text figure 88

Type Locality: Achotal, Isthmus of Tehuantepec, Veracruz, Mexico, according to Hershkovitz (1951, p. 560).

Range in Oaxaca: Lowlands and lower mountain slopes throughout the state.

General Characters: (Based on Oaxacan specimens). Total length, 1000–1330; tail longer than length of head and body, tapered toward tip and indistinctly banded with alternate dark and somewhat lighter bands; head long; ears small and rounded; snout long and mobile, extending well forward beyond lower lip; limbs short; claws strong, nearly straight; toes united near base. Skull long and narrow; rostrum long and slender; sagittal crest well developed in adult males; frontal region swollen, sloping downward to rostrum; bony palate long; molariform teeth small but strong; canine teeth sharp-edged.

Measurements: In table 38.

Specimens Examined: Juchitán: Cerro Atravesado, one; La Mata, one. Tehuantepec: Arroyo Ocotita, four; Cerro Arenal, one; Cerro Campanaria, six; Cerro de Tigre, one; Cerro San Pedro, five; Escurano, two; La Concepción, two; Portillo Guayaba, two; Salinera Garrapatera, one; San Antonio, five. Yautepec: San Pedro Jilotepec, one.

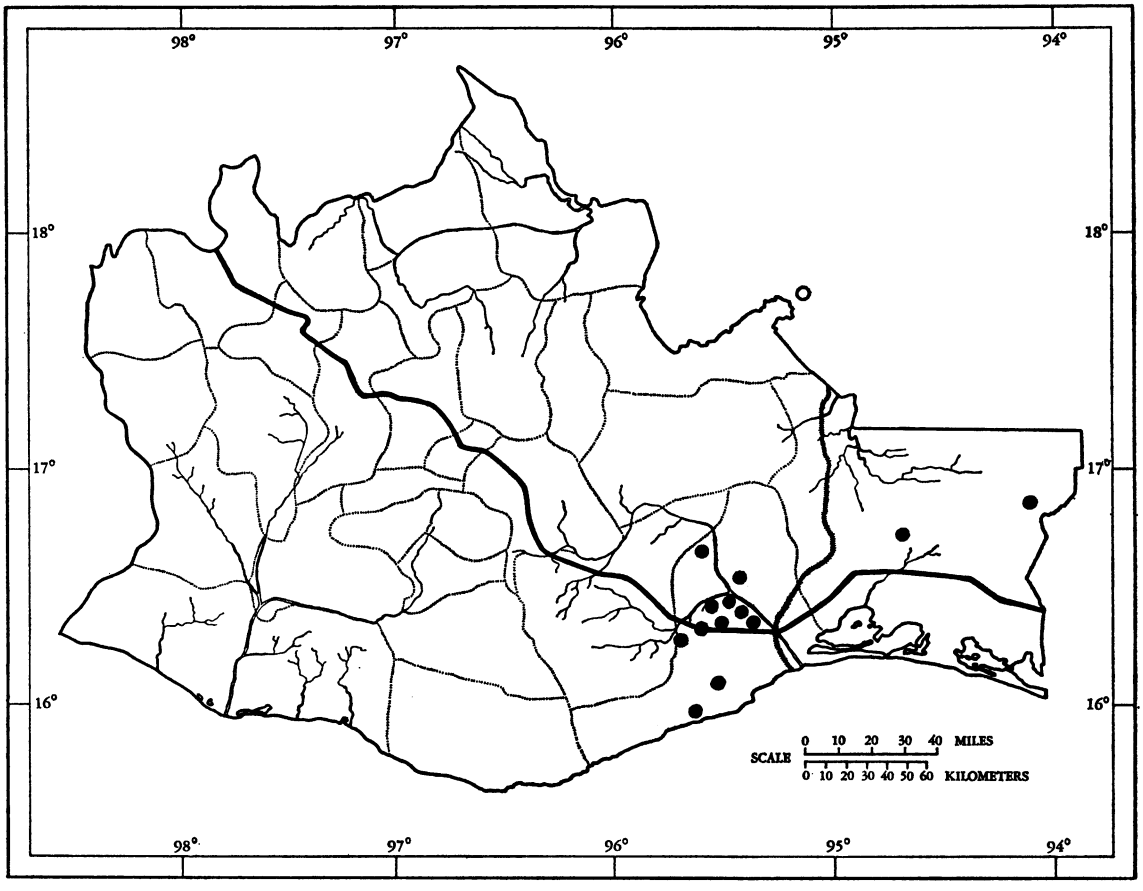


Fig. 88. Records of *Nasua narica* in Oaxaca. ● *N. n. narica.* ○ Type locality of *N. n. narica.*

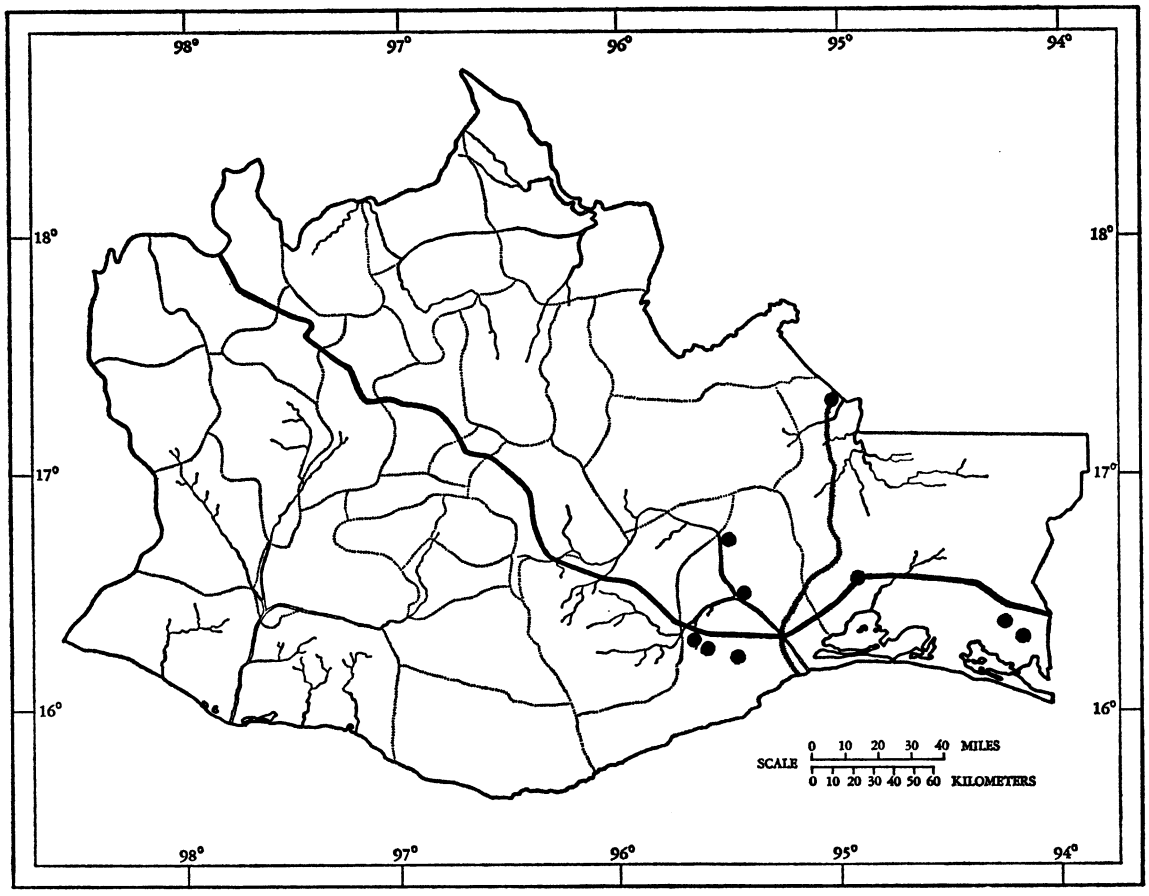


FIG. 89. Records of *Potos flavus* in Oaxaca. ● *P. f. aztecus.*

SUMMARY OF *Nasua* OF OAXACA

Individual variation in the color of specimens of *Nasua narica* from Oaxaca is great. Specimens vary from pale buffy gray to almost black. Cranial and dental variation is as great and even more significant than the variation in color. Adult males of about the same age may show a marked diversity in the size of the skulls and size of the dentition.

Three subspecies of *Nasua narica* have been recorded from Oaxaca: *Nasua n. narica* (Linnaeus) in the northwestern part of the state; *N. n. molaris* Merriam in the southwest (this subspecies was described from Colima and represents the pale northern Mexican coati); and *N. n. isthmicus* Goldman from the Isthmus of Tehuantepec eastward. Selected individual specimens taken in the same general area could be considered as typical of the three named forms. A conservative evaluation of the characters of the present series indicates that all forms of *Nasua* from Oaxaca can be best referred to the nominate race.

GENUS **POTOS** E. GEOFFROY SAINT-HILAIRE AND G. CUVIER

KINKAJOUS

Potos flavus aztecus Thomas

Plate 30, figures 9, 10; text figure 89

TYPE LOCALITY: Atoyac, Veracruz, Mexico.

RANGE IN OAXACA: Tropical forested regions of the northern and southern districts.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 930–1330; body elongated; limbs short; tail prehensile, equal to length of head and body, rounded and tapered to tip; ears short, rounded; head rounded; muzzle pointed; pelage short and dense, nearly unicolored Ochraceous-Buff;

digits partly webbed at base. Skull short, rounded; zygomatic arches widely spread; rostrum short; braincase long and narrow; frontal region sharply elevated from nares; postorbital processes well developed; bullae flat; sagittal crest well developed in adult males; palate flat and short; dentition heavy; molars flat-crowned.

MEASUREMENTS: In table 38.

SPECIMENS EXAMINED: Juchitán: El Jícaro, one; La Ventosa, seven; Río Jaltepec, four; Tapanatepec, two. Tehuantepec: Guevea, one; La Concepción, one; Santiago Lachiguirí, one; Tres Cruces, one; Limón, one.

SUMMARY OF *Potos* OF OAXACA

The present specimens of *Potos* from Oaxaca are all from the eastern part of the state. Although there is some local variation within Oaxaca, especially in color, the differences are not sufficient to warrant recognition of more than one subspecies. Specimens from La Ventosa average paler and duller in color than the rich Ochraceous-Buff specimens from Tapanatepec and El Jícaro and are not so shaded with dark-tipped hairs as are specimens from the Tehuantepec District and from the Río Jaltepec.

The Oaxacan kinkajous are referred to *P. f. aztecus* because the series as a whole is closely comparable with material from Catemaco and San Andrés in Veracruz that is considered typical of *aztecus*.

FAMILY **MUSTELIDAE** SWAINSON

SUBFAMILY **MUSTELINAE** GILL

GENUS **MUSTELA** LINNAEUS

WEASELS

Mustela frenata perotae Hall

Text figure 90

TYPE LOCALITY: Cofre de Perote, Veracruz, Mexico, altitude 12,500 feet.

RANGE IN OAXACA: Highlands of the central districts.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 418; body long and slender; limbs short; neck long; head small, blackish, with distinct white facial markings, white spot between eyes; broad white bands on sides of head confluent with color of under parts; posterior half of upper lip white; black on remainder of sides, top of head, and anterior fourth of neck back to shoulders; black spot posterior to angle of mouth; tail about two-fifths of length of head and body and tipped with black; throat, chest, and chin white; rest of under parts Ochraceous-Buff, this color extending on posterior sides of forelegs and feet and on medial sides of hind limbs to feet. Skull long and narrow, braincase long and rounded, precranial part of skull short; anterior upper and lower premolars small; carnassial teeth well developed.

MEASUREMENTS: In table 39.

SPECIMENS EXAMINED: San Felipe del Agua, one juvenile.

SPECIMENS RECORDED: (Hall, 1951, p. 355). Cerro San Felipe, one (U.S.N.M.).

REMARKS: *Mustela frenata perotae* differs from *M. f. macrophonius* and *M. f. goldmani* in having the same color on the hind feet as on the under parts, and from *M. f. leucoparia* in having more restricted white facial markings, the white spot between the eyes usually not being confluent with the white stripes in front of each ear.

Mustela frenata leucoparia (Merriam)

Text figure 90

TYPE LOCALITY: Pátzcuaro, Michoacán, Mexico.

RANGE IN OAXACA: Highlands of the southwestern districts and east to Miahuatlán District.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 400–486; color pattern similar to that of *M. f. goldmani*, but white facial markings more extensive; broad white bands on sides of head confluent with white spot between eyes and with color of under parts; color of under parts less restricted and more extended on legs, black tip of tail shorter; a dark spot posterior to angle of mouth; under parts, including inner sides of limbs and forefeet and hind feet, Ochraceous-Buff.

MEASUREMENTS: In table 39.

SPECIMENS EXAMINED: Miahuatlán: San Juan Mixtepec, one; San Pedro Mixtepec, one.

Mustela frenata macrophonius (Elliot)

Plate 31, figures 1, 2; text figure 90

TYPE LOCALITY: Achotal, Veracruz, Mexico.

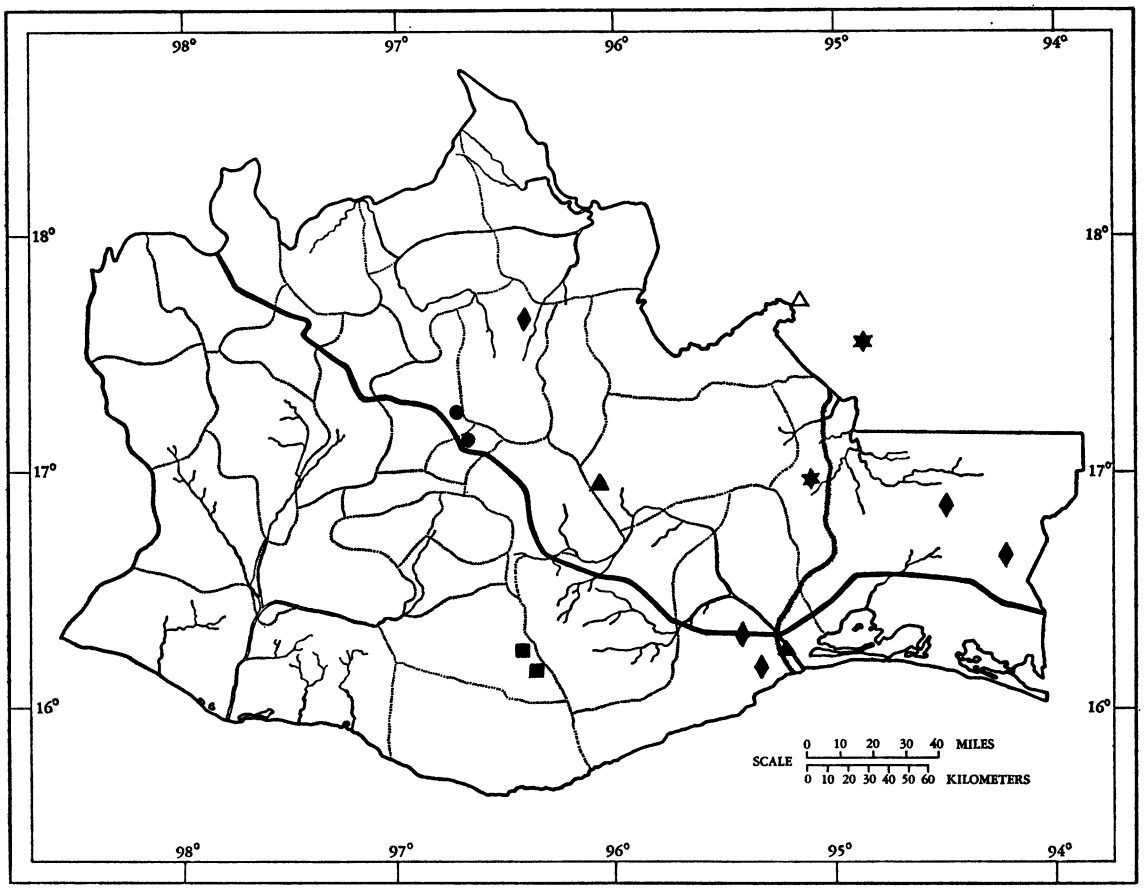


FIG. 90. Records of *Mustela frenata*, *Eira barbara*, and *Galictis allamandi* in Oaxaca and of some specimens from other areas. ● *M. f. perotae.* ■ *M. f. leucoparia.* ▲ *M. f. macrophonius.* △ Type locality of *M. f. macrophonius.* ◆ *E. b. senex.* ★ *G. a. canaster.*

RANGE IN OAXACA: Tropical lowland and adjacent mountain slopes in the vicinity of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length of adult male, 550; similar in color to *M. f. perotae* but considerably larger and lacking extension of color of under parts on hind feet, present in *perotae.*

MEASUREMENTS: In table 39.

SPECIMENS EXAMINED: Mixes: Ayutla, one subadult. Tehuantepec: Limón, one.

Mustela frenata goldmani (Merriam)

TYPE LOCALITY: Pinabete, Chiapas, Mexico.

RANGE IN OAXACA: No specimens are known from Oaxaca, but, according to Hall and Kelson (1959, p. 911), the species probably occurs in southeastern Juchitán District.

GENERAL CHARACTERS: (Based on Chiapas specimen). Total length, 512; similar in color pattern to *M. f. perotae*, but size larger and color darker.

MEASUREMENTS: In table 39.

REMARKS: *Mustela f. goldmani* is smaller than *M. f. macrophonius*, but is larger and darker than *M. f. perotae.* Compared with *M. f. leucoparia, goldmani* differs in the non-extension of the color of the under parts onto the hind feet and the longer black tip of the tail (two-fifths rather than one-fourth of the length of the tail).

SUMMARY OF *Mustela* OF OAXACA

Three, or possibly four, subspecies of *Mustela frenata* range into Oaxaca. The unrecorded subspecies, *M. f. goldmani*, may occur in the mountains of southeastern Oaxaca east of the Isthmus of Tehuantepec.

Mustela f. leucoparia has extensive white facial markings and buffy white feet and occurs in the mountains of southwestern Oaxaca. A large, dark-colored form, *M. f. macrophonius*, ranges in northeastern Oaxaca in the vicinity of the Isthmus of Tehuantepec. The plateau and mountain regions of northwestern Oaxaca come within the range of *M. f. perotae*. A specimen in the United States National Museum from Cerro San Felipe (10,000 feet) was referred by Hall (1951, p. 355) to *perotae* with the provision that it was not typical but matched the description of that subspecies best. The specimen from San Felipe del Agua is too immature for satisfactory identification. It appears to be intermediate between *M. f. leucoparia* and *M. f. macrophonius* but is listed here as *M. f. perotae* because of the geographical position of San Felipe del Agua.

Subfamily **TAYRINAE** Pocock

Genus **EIRA** Hamilton-Smith

Tayra

Eira barbara senex (Thomas)

Plate 31, figures 3, 4; text figure 90

Type Locality: Hacienda Tortugas, Jalapa, Veracruz, altitude 600 feet.

Range in Oaxaca: Tropical forests throughout the state.

General Characters: (Based on Oaxacan specimens). Total length, 1000–1095, males larger than females; body long; limbs short; claws strong and non-retractile, soles of feet naked; neck relatively long; ears short and rounded; tail hairy, shorter than length of head and body; pelage coarse and short, entire body, including limbs, feet, and tail, black. Skull strong and massive; braincase long; rostrum short; zygomatic arches strong; postorbital processes strongly developed; sagittal crest low in males, bullae flat and rather narrow.

Measurements: In table 39.

Specimens Examined: Juchitán: La Gloria, one; Río Porta Moneda, one. Ixtlan: Tarabundí, one. Tehuantepec: Cerro del Zapote (San Antonio), one; Escurano, one.

Summary of *Eira* in Oaxaca

The tayra is not uncommon in forested tropical areas and is represented by one subspecies, *E. barbara senex*, in Oaxaca. The series now available shows little individual variation and little or no geographic variation.

Subfamily **GRISONINAE** Pocock

Genus **GALICTIS** Bell

Grisons

Galictis allamandi canaster Nelson

Plate 31, figures 5, 6; text figure 90

Type Locality: Tunkás, Yucatán, Mexico.

Range in Oaxaca: Tropical areas on the Gulf slopes of the Isthmus of Tehuantepec.

General Characters: (Based on Panamanian specimen). Total length, 730; body and neck long, limbs short; tail short and bushy; ears low and rounded; pelage coarse and short, grizzled on dorsal area; black face, limbs, and feet, black area on face limited posteriorly by well-defined white or yellowish white stripe extending across forehead above eyes and reaching back across cheeks to sides of neck. Skull strong, massive, and low; braincase broadly V-shaped in superior outline; zygomatic arches strongly developed, bullae flattened, dentition relatively large and strong.

Measurements: In table 39.

Specimens Examined: Veracruz: 20 kilometers east-northeast of Jesús Carranza, one (K.U.).

Specimens Recorded: (Schaldach, 1964, p. 137). Juchitán: Paso Guayabo, 14 kilometers northeast of Matías Romero, one (I.B.).

Subfamily **MEPHITINAE** Gill

Genus **SPILOGALE** Gray

Spotted Skunks

Spilogale putorius tropicalis A. H. Howell

Plate 31, figures 7, 8; text figure 91

Type Locality: San Mateo del Mar, Oaxaca, Mexico.

Range in Oaxaca: Arid tropical regions from low to moderate elevations of central and southern districts.

General Characters: (Based on Oaxacan specimens). Total length, 300–419; tail bushy, shorter than length of head and body; limbs short; pelage long, soft, and black, marked with numerous white lines not broken into spots; feet black, with occasional white

TABLE 39

MEASUREMENTS (IN MILLIMETERS) OF MUSTELIDS FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Length of Nasals	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
Mustela frenata leucoparia												
MICHOACÁN												
U.S.N.M. No. 34914, Pátzcuaro	♂ ad	523	215	58.0	—	—	—	—	—	—	17.5	15.5
JALISCO												
A.M.N.H. No. 26153, Artenkiki	♀ ad	412	159	41.0	46.5	46.5	—	25.8	10.0	20.0	16.0	13.8
A.M.N.H. No. 27258, Las Masos	♂ ad	590	235	52.5	—	—	—	—	—	—	—	—
OAXACA												
A.M.N.H. No. 175178, San Pedro Mixtepec	♀ ad	400	160	40.0	48.3	48.3	7.5	24.2	9.8	21.0	15.5	13.1
A.M.N.H. No. 186937, San Juan Mixtepec	♂ ad	486	190	56.0	—	—	—	—	—	—	—	—
Mustela frenata perotae												
VERACRUZ												
U.S.N.M. No. 54278,[a] Cofre del Perote	♀ ad	418	160	45.0	45.8	45.8	—	25.5	10.3	20.7	15.2	13.2
OAXACA												
U.S.N.M., Cerro San Felipe	♂ ad	500	205	52.0	—	—	—	29.2	11.7	—	—	—
Mustela frenata macrophonius												
VERACRUZ												
C.M.N.H. No. 14063,[a] Achotal	♂ ad	598	246	59.0	56.7	56.7	—	33.6	12.9	23.0	19.2	17.3
OAXACA												
A.M.N.H. No. 206920, Ayutla	♂ juv	215	127	45.0	48.6	47.5	8.3	25.5	10.5	24.7	16.7	14.5
A.M.N.H. No. 208956, Limón	♂ ad	550	200	52.5	57.5	57.8	—	31.5	11.5	22.2	17.5	16.5
Mustela frenata goldmani												
CHIAPAS												
U.S.N.M. No. 77519,[a] Pinabete	♂ ad	512	207	58.0	52.8	52.8	—	31.8	—	22.9	—	16.5
Eira barbara senex												
OAXACA												
A.M.N.H. No. 145948, La Gloria	♀ ad	1025	414	118.0	113.4	105.6	—	68.8	26.3	47.6	36.2	32.6

TABLE 39—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Length of Nasals	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
A.M.N.H. No. 145949, Cerro del Zapote	♀ ad	1048	511	110.0	109.5	108.5	—	65.0	26.3	44.6	34.4	32.7
A.M.N.H. No. 147575, Río Porta Moneda	♂ ad	1030	430	120.0	117.5	—	—	70.5	27.5	48.3	36.2	35.6
A.M.N.H. No. 148805, Escurano	♀ sub	1095	435	88.0	—	—	18.5	61.7	23.2	45.5	32.6	32.0
A.M.N.H. No. 148806, Escurano	♂ juv	1070	410	84.0	110.0	—	15.6	60.0	23.0	50.5	35.5	31.0
Galictis allamandi canaster												
VERACRUZ												
K.U. No. 32222, 20 km. ENE. Jesus Carranza	♀ ?ad	—	—	—	90.5	90.5	12.3	54.2	22.8	41.2	29.8	26.0
PANAMA												
A.M.N.H. No. 173910, La Jaqua River	♂ ad	730	182	92.0	92.5	92.5	15.8	56.0	22.4	42.8	31.0	28.3
Spilogale putorius tropicalis												
OAXACA												
A.M.N.H. No. 145193, Basilana	♀ sub	335	107	38.0	49.0	47.8	7.5	27.8	12.8	21.3	16.2	16.5
A.M.N.H. No. 145194, Basilana	♀ sub	339	116	37.0	48.4	46.5	6.5	28.0	12.4	21.3	17.4	15.4
A.M.N.H. No. 205323, Cerro San Felipe	♀ ad	—	—	33.8	44.8	44.2	6.5	27.3	12.1	21.6	16.4	15.0
A.M.N.H. No. 205322, Cerro San Felipe	♀ sub	—	—	34.5	45.0	43.6	7.6	26.5	12.0	21.7	16.5	15.1
A.M.N.H. No. 186938, San Felipe del Agua	♂ ad	377	120	41.0	50.5	49.6	6.0	30.4	13.0	23.7	17.4	16.1
A.M.N.H. No. 186939, San Felipe del Agua	♀ ad	—	—	36.5	45.4	44.2	—	27.2	12.0	21.0	16.5	14.7
A.M.N.H. No. 186940, San Felipe del Agua	♀ ad	—	—	38.5	49.0	47.2	6.5	29.5	13.6	22.7	17.8	16.1
A.M.N.H. No. 149920, Cerro San Pedro	♀ sub	370	120	40.0	47.8	46.4	7.3	28.0	13.2	22.0	16.9	15.0
A.M.N.H. No. 148808, Escurano	♂ sub	352	105	35.0	48.2	47.4	7.2	29.6	13.3	21.5	17.4	15.4
A.M.N.H. No. 142549, La Presa	♀ sub	320	114	37.0	46.7	46.0	6.5	28.2	12.5	21.0	17.2	15.2
A.M.N.H. No. 145627, La Presa	♂ sub	—	—	—	50.7	48.0	7.2	31.0	13.8	22.9	17.7	16.1
A.M.N.H. No. 143379, Salazar	♀ sub	316	115	34.0	47.6	45.5	6.5	27.7	12.3	21.0	16.9	15.5
A.M.N.H. No. 148989, Salina Cruz	♀ sub	330	125	35.0	46.0	44.8	7.0	26.0	12.5	20.8	16.6	15.3
A.M.N.H. No. 182120, San Bartolo Yautepec	♀ sub	310	100	35.0	46.0	—	6.5	—	—	20.0	16.1	15.0
A.M.N.H. No. 145192, Santa María del Mar	♂ ad	410	140	38.0	52.5	51.8	9.0	30.7	15.0	22.5	17.5	16.0
A.M.N.H. No. 145626, Santa María del Mar	♀ ad	336	120	36.0	46.4	45.0	—	27.6	13.0	21.3	17.2	15.5

TABLE 39—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Length of Nasals	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
A.M.N.H. No. 176669, Tapanatepec	♂ ad	440	150	45.0	—	—	—	—	—	—	—	—
A.M.N.H. No. 176670, Tapanatepec	♀ ad	340	105	41.0	4.70	46.0	—	29.3	12.8	21.0	18.1	15.6
A.M.N.H. No. 178738, Tehuantepec	♂ ad	320	120	35.0	47.9	46.3	—	29.0	13.4	22.0	17.0	16.0
A.M.N.H. No. 147580, Tres Cruces	♀	320	120	37.0	46.0	44.7	7.5	28.1	13.1	21.5	16.5	14.4
Spilogale pygmaea												
OAXACA												
A.M.N.H. No. 143373, Las Cuevas	♂ sub	248	69	33.0	43.3	41.2	—	25.0	11.7	19.5	16.3	14.0
A.M.N.H. No. 175183, Tehuantepec	♂ ad	271	84	35.0	44.5	43.2	—	24.5	11.7	18.5	15.7	14.1
Mephitis macroura macroura												
OAXACA												
A.M.N.H. No. 177070, Acatlan	♂ ad	700	346	47.0	66.2	62.5	—	41.7	21.0	26.7	25.0	20.5
A.M.N.H. No. 142585, Juchitán	♀ ad	600	300	54.0	63.5	60.0	—	39.9	20.7	27.5	24.4	21.0
A.M.N.H. No. 145971, Las Cuevas	♂ ad	672	347	65.0	70.6	66.7	12.0	44.0	19.7	28.0	24.7	21.3
A.M.N.H. No. 148991, Las Cuevas	♀ old	605	330	60.0	61.8	57.6	—	38.7	19.2	25.9	24.5	19.4
A.M.N.H. No. 190437, La Ventosa	♀ ad	636	346	65.0	62.0	59.3	—	39.3	19.0	27.3	23.8	21.2
A.M.N.H. No. 186429, Salina Cruz	♂ old	635	332	65.0	66.5	64.4	—	45.1	21.0	28.7	23.7	21.7
A.M.N.H. No. 185185, Sta. María del Mar	♀ ad	500	270	50.0	60.5	56.9	—	38.0	18.4	26.2	24.6	20.2
A.M.N.H. No. 145187, Sta. María del Mar	♂ sub	560	270	50.0	61.7	57.4	11.8	37.3	18.5	25.9	21.5	19.0
A.M.N.H. No. 145188, Sta. María del Mar	♂ sub	560	252	47.0	63.0	60.0	13.0	37.8	18.5	28.0	23.0	20.5
A.M.N.H. No. 145189, Sta. María del Mar	♀ ad	570	262	52.0	63.0	58.9	—	40.2	19.0	26.0	23.1	20.1
A.M.N.H. No. 145190, Sta. María del Mar	♂ ad	580	280	57.0	65.2	61.2	14.7	39.3	19.6	27.0	23.1	20.6
A.M.N.H. No. 145191, Sta. María del Mar	♀ ad	565	275	50.0	59.0	54.8	—	36.5	18.5	25.0	22.9	20.2
A.M.N.H. No. 145616, Sta. María del Mar	♀ old	595	315	50.0	64.7	60.4	—	38.4	18.3	26.3	23.3	21.5
A.M.N.H. No. 145618, Sta. María del Mar	♂ old	595	300	52.0	65.5	61.0	—	41.5	20.0	26.2	24.2	21.1
A.M.N.H. No. 145619, Sta. María del Mar	♂ ad	572	302	53.0	62.4	58.5	—	41.0	19.6	26.1	24.2	20.0

TABLE 39—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Length of Nasals	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
A.M.N.H. No. 145620, Sta. María del Mar	♂ old	650	305	57.0	623.0	580.0	—	39.1	19.0	26.2	—	—
A.M.N.H. No. 145621, Sta. María del Mar	♀ sub	540	315	56.0	62.8	57.0	—	35.0	17.5	26.4	22.0	19.9
A.M.N.H. No. 145622, Sta. María del Mar	♀ sub	575	295	55.0	65.3	60.0	17.2	40.8	19.2	27.4	24.6	20.3
A.M.N.H. No. 145623, Sta. María del Mar	♀ ad	587	321	57.0	66.1	61.8	—	40.5	18.9	27.4	24.5	21.5
Conepatus mesoleucus mesoleucus												
OAXACA												
A.M.N.H. No. 145968, Buena Vista	♂ ad	779	349	89.0	84.3	79.9	—	54.3	27.0	34.0	31.0	25.3
A.M.N.H. No. 145969, Buena Vista	♀ ad	700	287	70.0	75.6	70.9	—	48.0	24.5	32.4	27.7	23.2
A.M.N.H. No. 171717, Guigovéo	♀ sub	—	—	—	75.0	72.1	—	42.5	22.8	31.2	27.5	22.2
A.M.N.H. No. 145973, La Concepción	♂ ad	760	340	90.0	86.7	80.4	—	56.5	28.5	35.5	29.4	26.3
A.M.N.H. No. 176665, Tapanatepec	♂ ad	740	180	80.0	84.2	78.5	—	50.4	28.0	34.3	29.3	24.4
A.M.N.H. No. 176666, Tapanatepec	♀ sub	537	203	65.0	71.5	67.3	—	43.5	22.0	31.7	27.3	22.2
A.M.N.H. No. 176667, Tapanatepec	♂ juv	672	270	79.0	77.0	72.2	13.1	46.0	24.0	32.5	30.4	23.3
A.M.N.H. No. 176668, Tapanatepec	♀ sub	630	265	69.0	74.2	70.3	12.9	44.3	23.0	32.2	29.0	24.2
Conepatus mesoleucus filipensis												
OAXACA												
U.S.N.M. No. 68172, Cerro San Felipe	♂ ad	630	265	74.0	—	—	—	47.5	—	—	—	—
Conepatus semistriatus conepatl												
VERACRUZ												
U.S.N.M. No. 63650, Motzorongo	♂ ad	575	129	74.0	—	—	—	50.5	—	—	—	—
A.M.N.H. No. 1721, Pasa Nueva	♀ ad	540	120	65.0	73.2	70.0	—	45.4	21.2	33.0	27.9	22.4
Lutra annectens annectens												
JALISCO												
A.M.N.H. No. 6678, Laguna de Juanactlan	♂ ad	—	—	—	115.0	114.5	—	82.5	25.2	62.0	38.2	35.5

[a] Type.

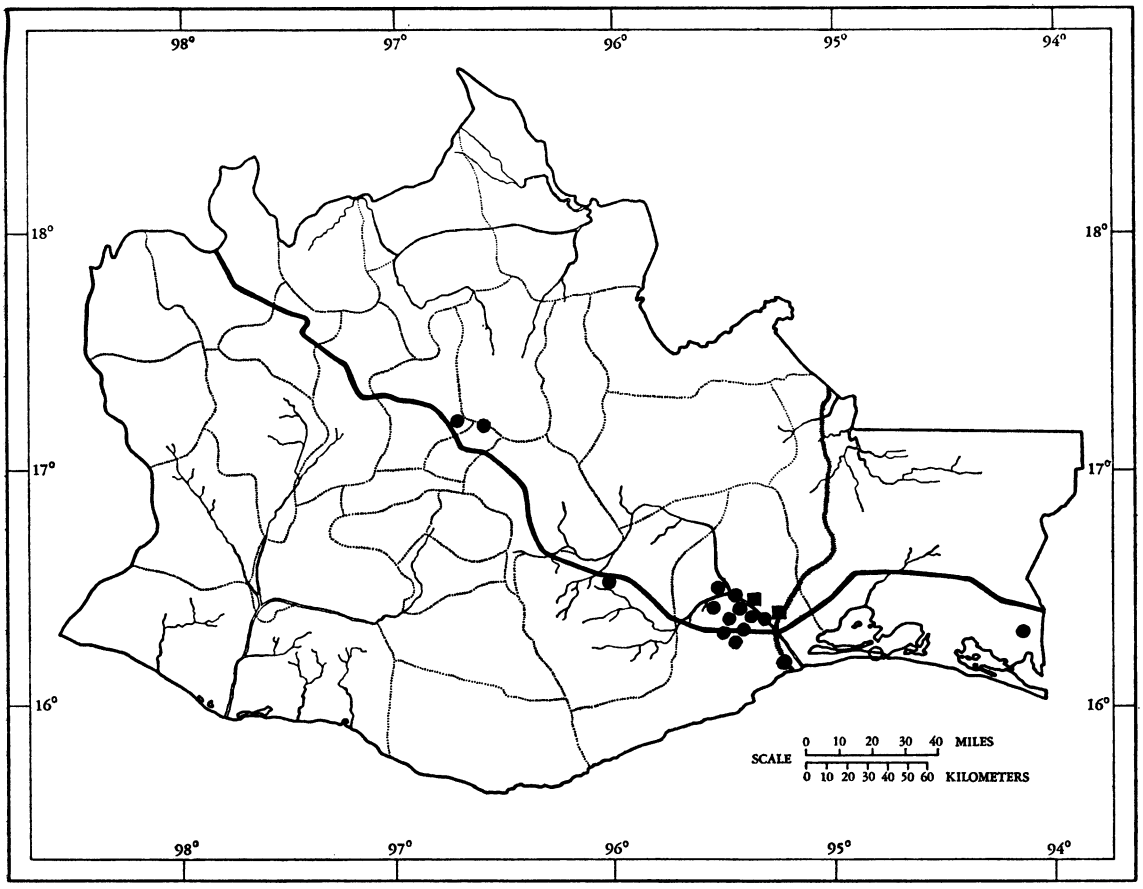


FIG. 91. Records of *Spilogale putorius* and *Spilogale pygmaea* in Oaxaca. ■ *S. p. tropicalis.* ○ Type locality of *S. p. tropicalis.* ■ *S. pygmaea.*

markings. Skull low, rostrum slightly depressed below plane of upper surface; bullae inflated; mastoid processes obsolete; postorbital processes weakly developed; zygomata arched; bony palate terminating with last molars; upper molar teeth roughly quadrangular, broader than long.

MEASUREMENTS: In table 39.

SPECIMENS EXAMINED: Juchitán: Santa María del Mar, three; Tapanatepec, two. Etla: Cerro San Felipe, two. Oaxaca: San Felipe del Agua, five. Tehuantepec: Basilana, two; Cerro San Pedro, two; Escurano, two; Jalapa, one; La Presa, two; Las Tejas, one; Salazar, two; Salina Cruz, one; San Antonio, one; Tres Cruces, two; Tehuantepec, five. Yautepec: San Bartolo Yautepec, one.

Spilogale pygmaea Thomas

Plate 31, figures 9, 10; text figure 91

TYPE LOCALITY: Rosario, Sinaloa, Mexico.

RANGE IN OAXACA: Pacific coast region of the Tehuantepec District to the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 248–271; color pattern in general much like that of *Spilogale p. tropicalis* except that two median white dorsal stripes continue from head in uninterrupted lines to base of tail and these lines strongly shaded with black.

MEASUREMENTS: In table 39.

SPECIMENS EXAMINED: Tehuantepec: Las Cuevas, one; Tehuantepec, one.

SUMMARY OF *Spilogale* OF OAXACA

Two species of the spotted skunk occur in Oaxaca: *Spilogale putorius* and *Spilogale pygmaea. Spilogale putorius* is larger and has a wider range than *S. pygmaea*, being found from low to moderate elevations over most

of the state. *Spilogale pygmaea* is known only from the Pacific coast region.

GENUS **MEPHITIS** E. GEOFFROY SAINT-HILAIRE

HOODED SKUNKS

Mephitis macroura macroura Lichtenstein

Plate 31, figures 11, 12; text figure 92

TYPE LOCALITY: Mountains northwest of the city of Mexico, Mexico.

RANGE IN OAXACA: Eastern Pacific coastal regions from low to moderate elevations and north to Mixes and Oaxaca districts.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 575–700; tail bushy and longer than length of head and body; hairs on nape of neck elongated and forming a hood; pelage long, soft, and dense; head small; limbs short; occurring in two color phases: upper parts white more or less mixed with black, or upper parts nearly all black, with a narrow white lateral line from ear to base of tail. Skull short and broad; interpterygoid fossa rounded, palate without posterior median notch or spine; anterior palatine foramina large and oval; mastoid processes and sagittal crest moderately developed.

MEASUREMENTS: In table 39.

SPECIMENS EXAMINED: Juchitán: Santa María del Mar, 16; Tapanatepec, one; 20 miles northeast of La Ventosa, one. Mixes: Acatlan, one. Tehuantepec: Las Cuevas, three; road from Tehuantepec to Juchitán, one; Salina Cruz, one; San Pablo, two.

SPECIMENS RECORDED: (Hall and Dalquest, 1950, p. 578). Oaxaca: Fifteen miles west of Oaxaca de Juárez, one (U.S.N.M.).

SUMMARY OF *Mephitis* OF OAXACA

The Oaxacan specimens of the hooded skunk are referred to *Mephitis macroura*

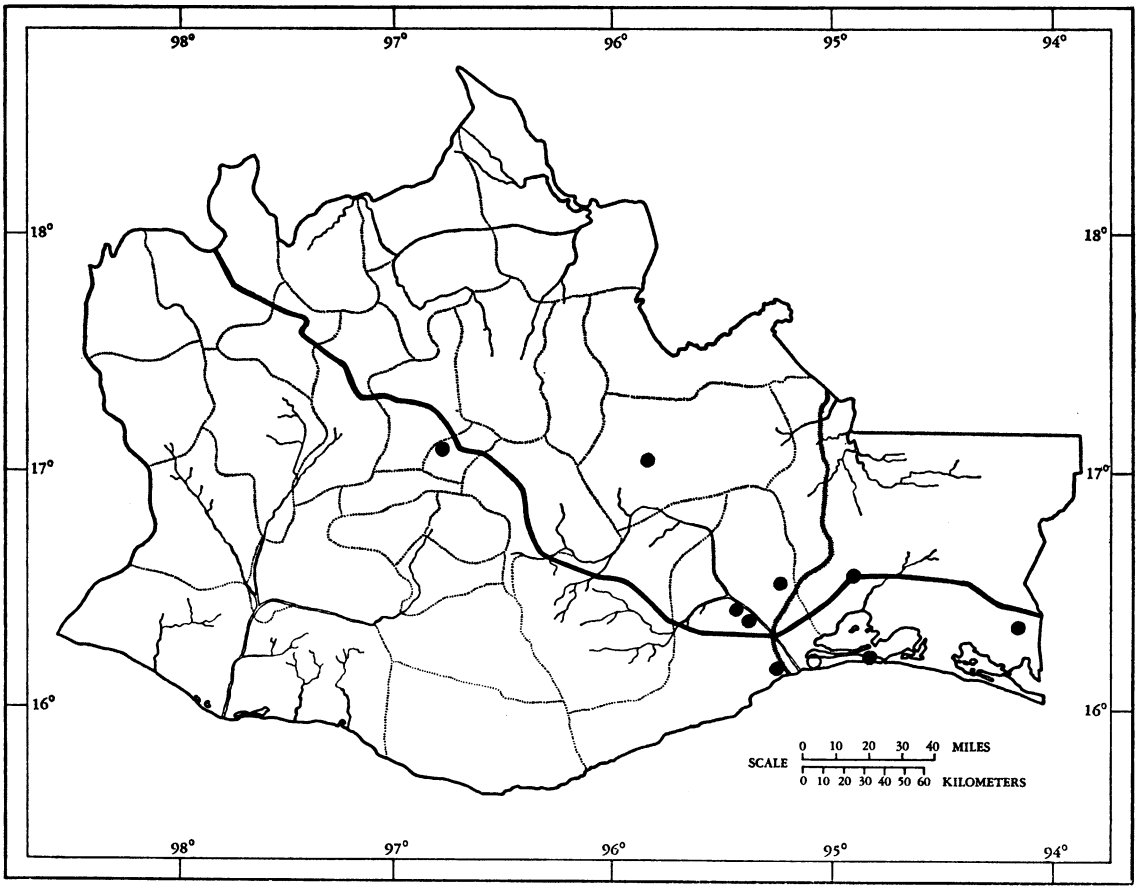


FIG. 92. Records of *Mephitis macroura* in Oaxaca. ● *M. m. macroura.* ○ Type locality of *M. m. vittata.*

macroura. The present series shows considerable local and individual variation not only in color pattern but in size and in cranial characters. A specimen from Acatlan and one from Las Cuevas are clearly referable to *M. m. macroura*. Some specimens from the grasslands of Santa María del Mar are smaller and have smaller upper molar teeth that those of typical specimens of *macroura* and represent a variation described as *M. m. vittata* Lichtenstein. The type of *M. m. vittata* is from San Mateo del Mar, Oaxaca. Some individuals from Santa María del Mar are, however, as large as or even larger than specimens of the same sex and age of *M. m. macroura* from other localities. The average differences seem to be slight, and *Mephitis m. vittata* should not be recognized as a subspecies. A large percentage of specimens from Santa María del Mar have frontal lesions, and in some skulls the frontals are not only greatly swollen but are perforated by numerous holes. The distortion of the skulls takes place at an early age and may have a tendency to retard growth.

Genus **CONEPATUS** Gray

Hog-nosed Skunks

Conepatus mesoleucus mesoleucus (Lichtenstein)

Plate 32, figures 1, 2; text figure 93

Type Locality: Chico, Hidalgo, Mexico.

Range in Oaxaca: Pacific coastal lowlands and mountain slopes of Juchitán and Tehuantepec districts and probably at moderate elevations throughout the state, excepting highlands of the northwestern districts.

General Characters: (Based on Oaxacan specimens). Total length, 630–800; head small; limbs short; claws on forefeet long; muzzle long and projecting forward beyond lower jaws; ears short and rounded; tail bushy, shorter than length of head and body; pelage coarse; color black and white, but not broken into lines; upper parts, from top of head to end of tail, white. Skull large and elevated, superior outline evenly convex; constricted in postorbital region; sagittal crest present in adult specimens; opening of infraorbital canal usually single.

Measurements: In table 39.

Specimens Examined: Juchitán: Buena Vista, two; Tapanatepec, four. Tehuantepec: Guigovéo, one; La Concepción, one.

Conepatus mesoleucus filipensis Merriam

Text figure 93

Type Locality: Cerro San Felipe, Oaxaca, Mexico, altitude 10,000 feet.

Range in Oaxaca: Forests of pine and oak on summit of Cerro San Felipe from altitudes of 9000 to 10,000 feet.

General Characters: (Based on Oaxacan specimen). Total length of adult male, 630; similar to *Conepatus m. mesoleucus* in general characters but smaller, pelage softer, and white dorsal area more restricted. Skull smaller and with smaller teeth, length of upper molar of type, an adult male, on outer edge, 7.5 as compared with 8.5–9.2 in males of typical *mesoleucus*.

Measurements: In table 39.

Specimens Examined: Etla: Cerro San Felipe, one (U.S.N.M.).

Conepatus semistriatus conepatl (Gmelin)

Plate 32, figures 3, 4; text figure 93

Type Locality: Motzorongo, Veracruz, Mexico.

Range in Oaxaca: No specimens are known from the state, but since specimens are known from across the Veracruz-Oaxaca state line on the Isthmus of Tehuantepec, the range of the subspecies can be expected to extend into northeastern Oaxaca.

General Characters: (Based on Veracruz specimen). Total length, 540; similar in general characters to *C. mesoleucus*, but smaller and white on back divided by narrow, median, black stripe. Skull much like that of *C. mesoleucus* but smaller; dorsal profile uneven, tips of nasals upturned, frontals bulged in interorbital region; anterior opening of infraorbital canal divided into two or more apertures instead of a single vacuity as in *C. mesoleucus*.

Measurements: In table 39.

Specimens Examined: Veracruz: Pasa Nueva, one.

Summary of *Conepatus* of Oaxaca

Two subspecies of the species *C. mesoleucus* are known from Oaxaca. A second species, *C. semistriatus*, probably occurs there also. *Conepatus mesoleucus mesoleucus* is the largest form

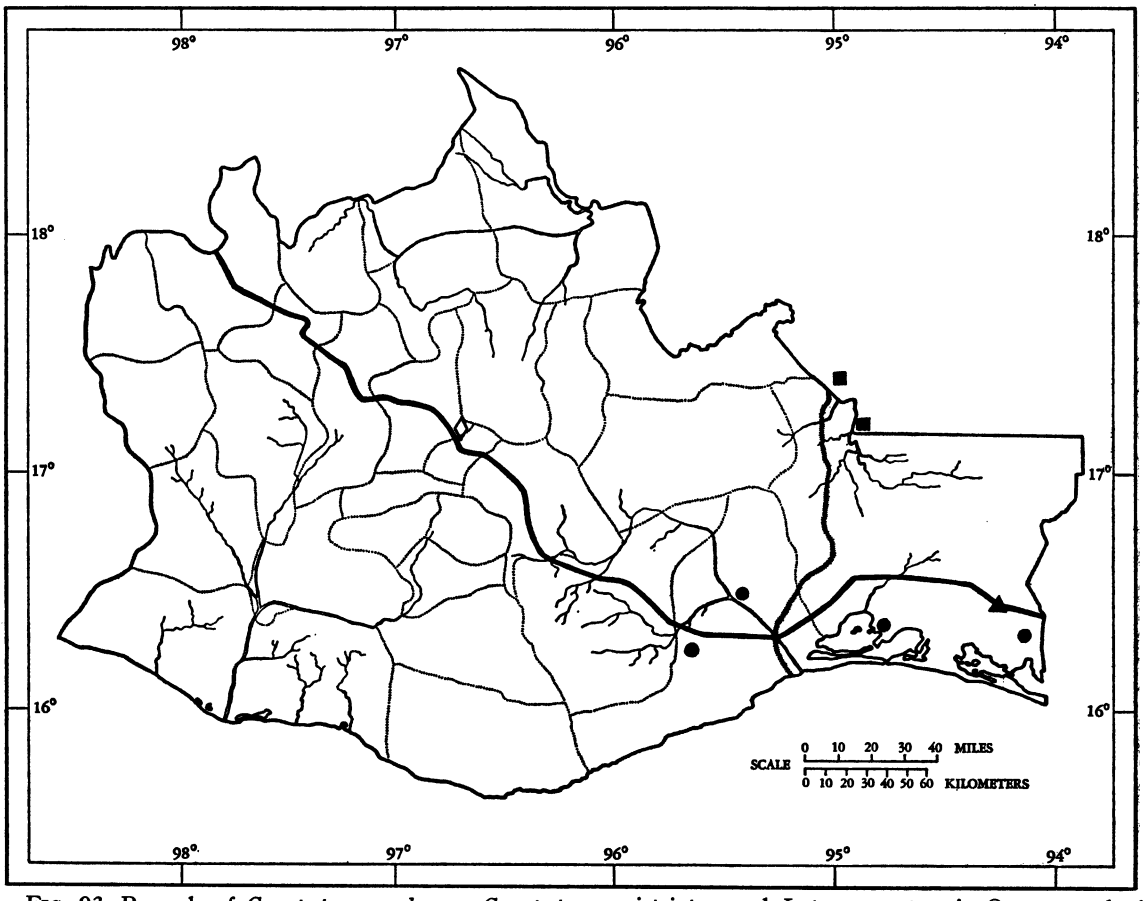


FIG. 93. Records of *Conepatus mesoleucus*, *Conepatus semistriatus*, and *Lutra annectens* in Oaxaca and of some specimens from other areas. ● *C. m. mesoleucus*. ◇ Type locality of *C. m. filipensis*. ■ *C. s. conepatl*. ▲ *L. a. annectens*.

and is common in southeastern Oaxaca. *Conepatus m. filipensis* is relatively small and is known only from the Cerro San Felipe at elevations from 9000 to 10,500 feet in Oaxaca. A specimen of *Conepatus semistriatus conepatl* in the University of Kansas, recorded by Hall and Kelson (1959, p. 943), was taken at 35 kilometers southeast of Jesus Carranza, Veracruz, a locality so close to the Veracruz-Oaxaca border that this subspecies can be expected to occur in Oaxaca also.

SUBFAMILY **LUTRINAE** BAIRD

GENUS **LUTRA** BRISSON

RIVER OTTERS

Lutra annectens annectens Major

Plate 32, figures 5, 6; text figure 93

TYPE LOCALITY: Río de Tepec, Nayarit, Mexico.

RANGE IN OAXACA: Known from southeastern Juchitán District, but probably occurring on the larger rivers across the state.

GENERAL CHARACTERS: (Based on Nicaraguan specimen). Total length, 1015; body long and cylindrical; head short and flattened; neck long and about as wide as head; legs short, toes broadly webbed; tail long, thick at base, and tapered to tip; eyes small; ears short and rounded; pelage relatively short, close, near Cinnamon-Brown. Skull flattened, superior outline nearly straight; rostrum very short; zygomatic arches strong and widely spread; sagittal crest slightly developed in adult males; postorbital processes strongly developed; infraorbital foramen large; mastoid processes widely expanded.

MEASUREMENTS: In table 39.

SPECIMENS EXAMINED: Jalisco: Laguna de Juanacatlán, one skull.

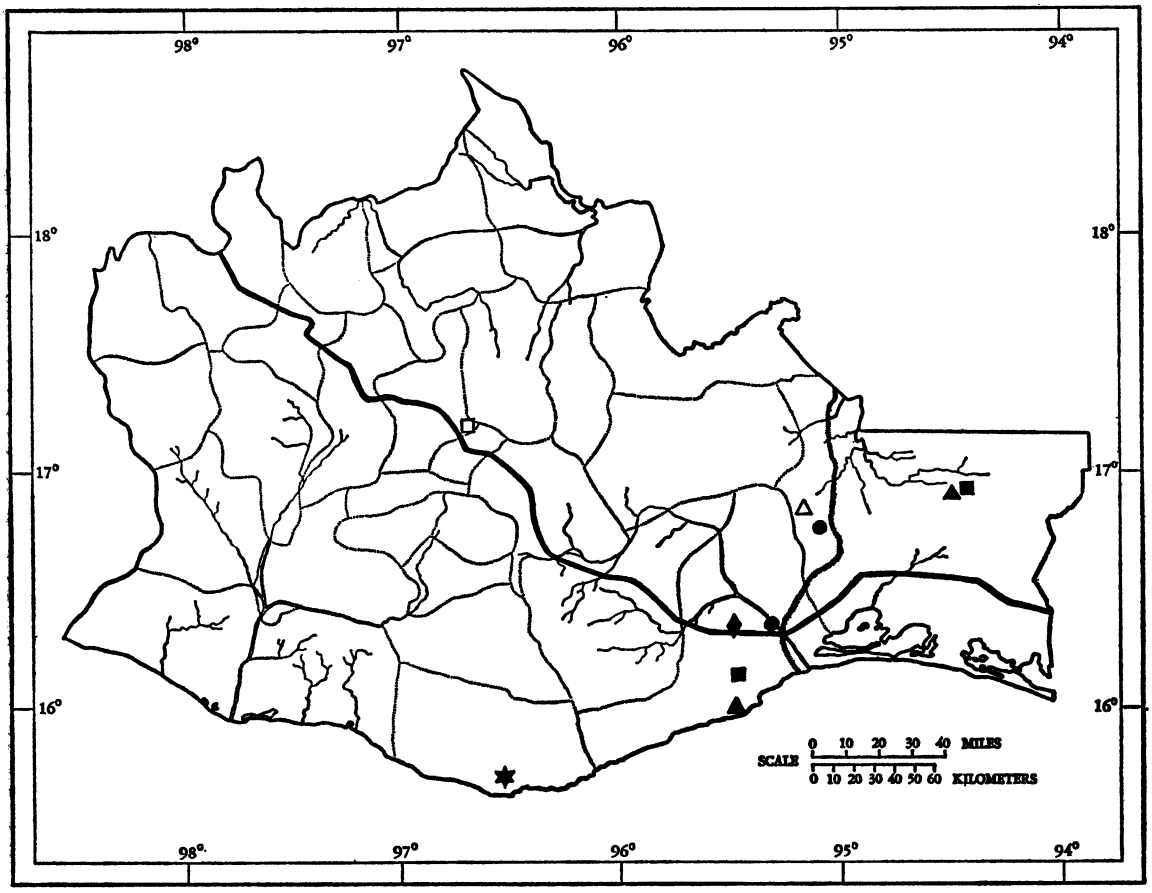


FIG. 94. Records of *Felis onca, Felis concolor, Felis pardalis,* and *Felis wiedii* in Oaxaca. ● *F. o. hernandesii.* ◆ *F. c. mayensis.* ▲ *F. p. pardalis.* ★ *F. p. nelsoni.* ■ *F. w. oaxacensis.* □ Type locality of *F. w. oaxacensis.* △ *F. w. yucatanica.*

SPECIMENS RECORDED: (Miller and Kellogg, 1955, p. 766). Juchitán: Santa Efigenia, one (U.S.N.M.).

FAMILY **FELIDAE** GRAY

GENUS **FELIS** LINNAEUS

CATS

Felis onca hernandesii (Gray)

JAGUAR

Plate 33, figures 1, 2; text figure 94

TYPE LOCALITY: Mazatlán, Sinaloa, Mexico.

RANGE IN OAXACA: Tropical forested regions of the Isthmus of Tehuantepec and probably throughout the state.

GENERAL CHARACTERS: (Based on Sinaloa specimens). Total length, 1725–1766; pelage short, yellowish, and profusely marked with small black spots and rings; tail short, about half of length of head and body; ears small, short, and rounded. Skull short and broad; zygomatic arches widely spread; sagittal crest well developed in adult; rostrum short and broad; postorbital processes well developed; bullae large and well inflated.

MEASUREMENTS: In table 40.

SPECIMENS EXAMINED: Sinaloa: Agua Brava, one; Escuinapa, three.

SPECIMENS RECORDED: (Goldman, 1943, p. 236). Juchitán: Chivela, one skull (U.S.N.M.). Tehuantepec: Tehuantepec, two skulls (U.S.N.M.).

Felis concolor mayensis Nelson and Goldman

MOUNTAIN LION

Plate 33, figures 3, 4; text figure 94

TYPE LOCALITY: La Libertad, Petén, Guatemala.

RANGE IN OAXACA: Tropical forested areas of the Isthmus of Tehuantepec and probably throughout the state.

GENERAL CHARACTERS: (Based on Guatemalan specimens). Total length, 1590–1710; tail long, more than half of length of head and body; head small; ears small and rounded; pelage short, uniformly tawny. Skull short and broad, strongly elevated in interorbital region; rostrum short; sagittal and occipital crests well developed in adult; zygomatic arches strong and widely spread; nasals strongly elevated behind nares; audital bullae large and well inflated.

MEASUREMENTS: In table 40.

SPECIMENS EXAMINED: Tehuantepec: Limón, one skull.

Felis pardalis pardalis Linnaeus
OCELOT
Plate 34, figures 1, 2; text figure 94

TYPE LOCALITY: State of Veracruz, Mexico.

RANGE IN OAXACA: Tropical lowlands and slopes of interior mountains of the Isthmus of Tehuantepec and east to the Chiapas border.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 1080–1180; tail about equal to or shorter than length of head and body; pelage short and close, grayish brown, heavily marked with elongate black spots and rings. Skull long and evenly arched in superior outline; rostrum truncated; braincase elongated; postorbital processes strongly developed; zygomatic arches heavy and widely spread; sagittal and occipital crests strongly developed in adult; bullae large and elongate.

MEASUREMENTS: In table 40.

SPECIMENS EXAMINED: Juchitán: La Gloria, one. Tehuantepec: Salina Garrapatera, one.

Felis pardalis nelsoni Goldman
Text figure 94

TYPE LOCALITY: Manzanillo, Colima, Mexico, altitude 50 feet.

RANGE IN OAXACA: Pacific coastal lowlands and mountain slopes of the southwestern districts.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 1000; similar to *Felis pardalis pardalis* except for smaller size; color pattern as in *F. p. pardalis;* skull usually smaller than in *pardalis*, zygomatic arches more evenly bowed outward and sides more nearly parallel than in latter.

MEASUREMENTS: In table 40.

SPECIMENS RECORDED: (Goldman, 1943, p. 378). Pochutla: Puerto Angel, one (U.S.N.M.).

Felis wiedii oaxacensis Nelson and Goldman
Text figure 94

TYPE LOCALITY: Cerro San Felipe, near Oaxaca City, Oaxaca, Mexico, altitude 10,000 feet.

RANGE IN OAXACA: Interior forested mountain slopes of the state.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 885–910; limbs relatively short; tail relatively long and thick, but shorter than length of head and body; pelage moderately long and soft, buffy and marked with numerous black lines, spots, and rings. Skull with rostrum sharply elevated above nares; braincase smoothly rounded; rostrum truncated; postorbital processes well developed; sagittal crest undeveloped; bullae large, elongated, and well inflated.

MEASUREMENTS: In table 40.

SPECIMENS EXAMINED: Juchitán: La Gloria, two. Tehuantepec: Santa Lucía, one skull.

Felis wiedii yucatanica Nelson and Goldman
MARGAY
Plate 34, figures 3, 4; text figure 94

TYPE LOCALITY: Mérida, northern Yucatán, Mexico.

RANGE IN OAXACA: Arid tropical region of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 1016; pelage short and close; similar in general characters to *F. w. oaxacensis*, but black markings narrower, more elongated, and more sharply defined. Skull similar to that of *oaxacensis*, but larger and dentition heavier, upper carnassials broader.

MEASUREMENTS: In table 40.

SPECIMENS EXAMINED: Juchitán: Ocotal, one.

Felis yagouaroundi fossata Mearns
JAGUARUNDI
Plate 34, figures 5, 6; text figure 95

TYPE LOCALITY: Mérida, Yucatán, Mexico.

TABLE 40

MEASUREMENTS OF *Felis* AND *Lynx* FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot, Length	Skull, Greatest Length	Condylo-basal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Carnassials	Maxillary Tooth Row
Felis onca hernandesii												
SINALOA												
A.M.N.H. No. 25008, Agua Brava	♂ ad	1766	610	230	—	—	60.5	176.0	52.6	—	86.7	76.5
A.M.N.H. No. 25009, Escuinapa	♂ sub	1727	622	230	232.0	207.0	—	157.0	43.7	77.0	82.7	76.5
A.M.N.H. No. 25010, Escuinapa	♂ ad	—	—	—	241.0	213.0	56.5	159.0	44.5	83.0	83.3	74.5
A.M.N.H. No. 25011, Escuinapa	♀ ad	1725	500	—	208.0	188.0	50.3	142.0	41.5	73.2	77.0	70.6
Felis concolor mayensis												
GUATEMALA												
U.S.N.M. No. 244856, La Libertad	♂ ad	1710	660	240	183.0	163.7	—	127.2	37.7	—	—	56.4
U.S.N.M. No. 244857, La Libertad	♀ ad	1590	620	220	160.4	147.5	—	107.9	31.8	—	—	51.5
OAXACA												
A.M.N.H. No. 206992, Limón	ad	—	—	—	194.0	173.0	50.0	130.1	34.3	69.6	74.6	59.0
Felis pardalis pardalis												
OAXACA												
A.M.N.H. No. 148992, La Gloria	♀ sub	—	—	—	119.7	113.6	24.0	77.8	21.5	51.7	49.0	38.9
A.M.N.H. No. 145641, Salina Garrapatera	♂ ad	1180	350	140	129.5	122.0	24.2	86.8	24.4	50.7	47.6	41.6
VERACRUZ												
U.S.N.M., Catemaco	♂ ad	1130	375	164	150.4	137.5	—	102.4	26.0	—	—	41.6
U.S.N.M., Mirador	♂ sub	—	—	—	144.4	134.5	—	90.5	—	—	—	41.8
Felis pardalis nelsoni												
COLIMA												
U.S.N.M. 32642,[a] Manzanillo	♂ ad	1140	362	166	143.8	131.4	—	95.9	25.4	—	—	39.0
OAXACA												
U.S.N.M., Puerto Angel	♀ ad	1000	325	143	121.8	112.5	—	82.5	23.8	—	—	38.0
Felis wiedii oaxacensis												
OAXACA												
U.S.N.M. No. 68160,[a] Cerro San Felipe	♂ ad	910	368	130	96.5	89.7	18.0	67.3	17.8	44.4	—	28.8

TABLE 40—(*Continued*)

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot, Length	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Breadth	Interorbital Breadth	Braincase Breadth	Palate Breadth Across Carnassials	Maxillary Tooth Row
A.M.N.H. No. 148993, La Gloria	♂ ad	—	—	—	99.5	91.8	16.2	66.5	19.7	46.0	35.8	29.3
A.M.N.H. No. 148994, La Gloria	♀ ad	885	355	110	95.5	89.2	14.0	63.7	17.0	44.5	34.5	28.0
A.M.N.H. No. 143476, Santa Lucía	♀ sub	—	—	—	90.0	—	16.0	62.3	—	42.4	31.6	27.6
Felis wiedii yucatanica												
CHIAPAS												
U.S.N.M., Tecpactan	♀ sub	835	382	120	90.0	84.1	15.0	54.8	14.8	44.0	—	26.7
OAXACA												
A.M.N.H. No. 143473, Ocotal	♂ ad	1016	435	133	106.3	99.2	17.4	56.8	18.5	45.4	36.0	31.9
Felis yagouaroundi fossata												
OAXACA												
A.M.N.H. No. 143466, Arroyo Ocotita	♂ sub	1100	441	142	97.7	92.8	24.5	62.0	16.7	44.2	37.6	30.7
A.M.N.H. No. 178704, Limón	♂ ad	—	—	—	100.8	99.7	23.4	67.0	17.5	45.3	38.7	31.2
A.M.N.H. No. 178705, Limón	♂ ad	—	—	—	101.3	96.3	22.2	66.0	18.1	45.7	39.8	31.2
A.M.N.H. No. 145640, Salina Garrapatera	♀ ad	810	340	90	—	—	—	—	—	—	—	—
A.M.N.H. No. 147577, San Antonio	♀ sub	940	385	92	86.2	84.2	19.8	52.5	13.2	41.0	33.2	27.3
Lynx rufus oaxacensis												
OAXACA												
A.M.N.H. No. 189300,[a] Los Nanches	♀ ad	870[b]	—	—	107.9	99.5	22.1	77.3	20.3	51.0	44.2	35.0
A.M.N.H. No. 185370, Mitla	♂ ad	970[b]	150	170	—	—	26.5	78.5	24.7	—	46.5	37.5
A.M.N.H. No. 189301, Mitla	♂ sub	870[b]	135	150	113.5	102.7	21.8	78.0	20.7	51.9	44.4	35.0
A.M.N.H. No. 180269, Tequisistlán	♀ sub	780[b]	110	165	—	—	23.5	70.3	18.9	49.6	43.0	34.0

[a] Type.
[b] External measurement from dry skin.

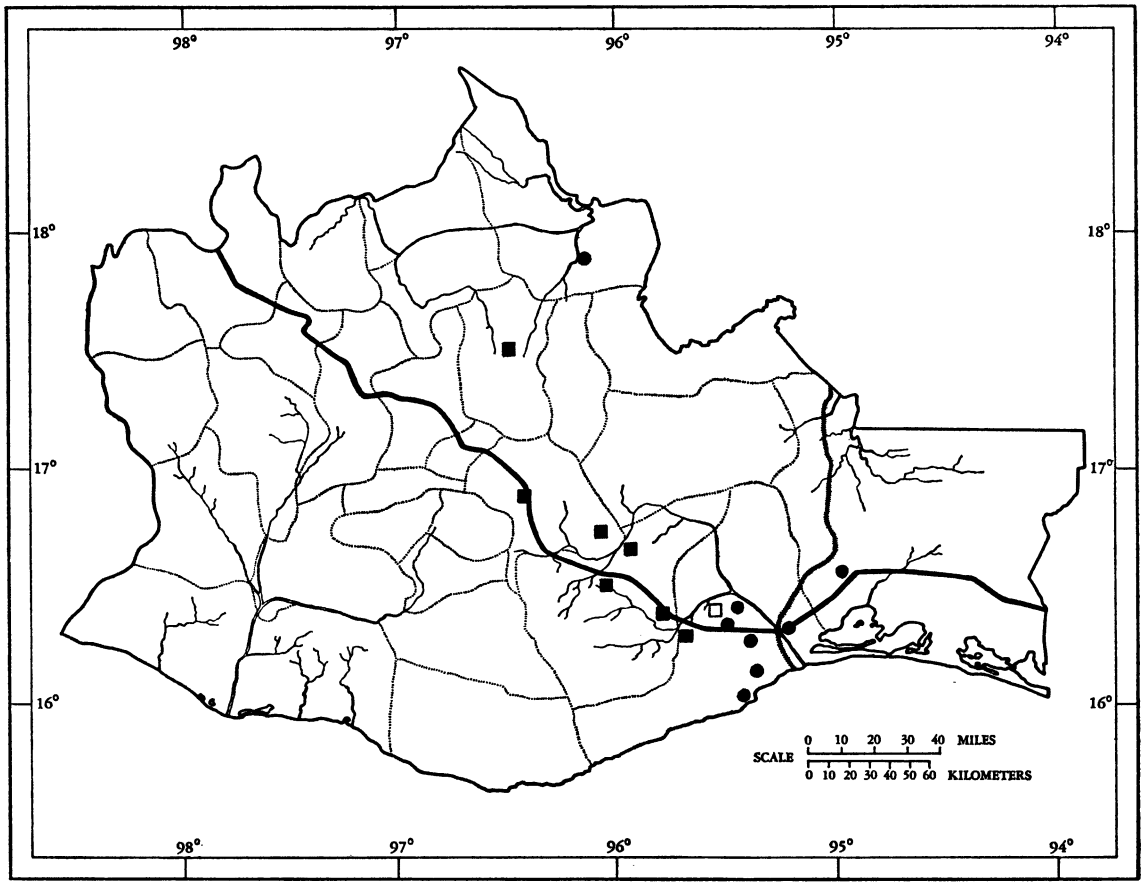


FIG. 95. Records of *Felis yagouaroundi* and *Lynx rufus* in Oaxaca. ● *F. y. fossata.* ■ *L. r. oaxacensis.* □ Type locality of *L. r. oaxacensis.*

RANGE IN OAXACA: Tropical regions of the eastern districts and probably the southwestern districts.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 900–1300; body slender; head small, ears small and rounded; limbs short; tail long, more than half of length of head and body; pelage short and coarse, and occurring in gray and red color phases. Skull elongate, narrow, and high; rostrum short, compressed, and elevated above nares; postorbital processes well developed; braincase elongate, smoothly rounded; sagittal crest undeveloped; bullae elongate and inflated; zygomatic arches not greatly expanded.

MEASUREMENTS: In table 40.

SPECIMENS EXAMINED: Juchitán: Twenty miles northeast of La Ventosa, four skins. Tuxtepec: Chiltepec, one skin. Tehuantepec: Arroyo Ocotita, one; Limón, two; Salina Garrapatera, one skin; San Antonio, one; San Miguel, one skin; Tehuantepec, one skin.

REMARKS: According to Hall and Kelson (1959, p. 965), the range of the subspecies *Felis y. tolteca* may extend into southwestern Oaxaca, but no specimens of jaguarundi have been recorded from this part of the state.

GENUS **LYNX** KERR

BOBCAT

Lynx rufus oaxacensis Goodwin

Plate 34, figures 7, 8; text figure 95

TYPE LOCALITY: Los Nanches, San Pedro Jilotepec, District of Yautepec, Oaxaca, Mexico.

RANGE IN OAXACA: Uplands of central and southern Oaxaca, from the districts of Tlax-

laco and Ixtlan south to the districts of Yautepec and Tehuantepec; not known to occur east of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 860–960; tail short, less than length of hind foot; head rounded; ears erect, tips tufted; jowl ruffs or dependent cheek ruffs well developed; body short, limbs long; paws large; pelage moderately long and soft, mixed Light Buff and black, not spotted or lined on dorsum. Skull short and broad, superior outline evenly rounded; zygomatic arches widely spread; postorbital processes strongly developed but slender; bullae large and well inflated; sagittal crest represented by two separated, low, lyrate ridges.

MEASUREMENTS: In table 40.

SPECIMENS EXAMINED: Ixtlán: Macuiltianguis, one skin. Tehuantepec: Tequisistlán, one. Tlacolula: Mitla, two; San Pedro Quiatoni, one skin. Yautepec: Los Nanches, one; Los Tunillos, one skin; San Bartolo Yautepec, one; Santa Ana Tavela, one skin.

SUMMARY OF THE FELIDAE OF OAXACA

The felids of Oaxaca belong to two genera, six species, and eight subspecies. The jaguar, *Felis onca hernandesii*, is the largest cat in the state. The mountain lion is the second largest cat in Oaxaca and belongs to the smallest subspecies of *concolor* in Mexico, *F. c. mayensis*. Two forms of ocelot occur in the state. *Felis pardalis pardalis* is common in the lowlands and mountain slopes of eastern Oaxaca; *Felis pardalis nelsoni* occurs in the coastal region of southwestern Oaxaca. Two subspecies of the margay, *Felis wiedii*, occur in Oaxaca. Specimens from the central highlands are referable to the dark-colored, softly furred form, *F. w. oaxacensis*, but one specimen from Ocotal on the Isthmus of Tehuantepec is light-colored, short-furred, and referable to *F. w. yucatanica*. The jaguarundi, *Felis yagouaroundi*, is common in the state of Oaxaca, and specimens are here referred to the subspecies *F. y. fossata*. The bobcat, *Lynx rufus*, ranges east in Mexico to the Isthmus of Tehuantepec, and specimens from Oaxaca are referable to the subspecies *L. r. oaxacensis*.

ORDER **PERISSODACTYLA** OWEN

ODD-TOED UNGULATES

FAMILY **TAPIRIDAE** BURNETT

GENUS **TAPIRUS** BRUNNICH

TAPIRS

SUBGENUS **TAPIRELLA** PALMER

NORTH AMERICAN TAPIRS

Tapirus bairdii (Gill)

Plate 35, figures 1, 2; text figure 96

TYPE LOCALITY: Isthmus of Panama (Canal Zone), Panama.

RANGE IN OAXACA: Forested mountain slopes of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Veracruz specimens). Total length, 2000–2020; body thickset; hair scanty, blackish brown; neck long; upper lip prehensile; ears short, tail short; legs stocky; four toes on forefeet, three toes on hind feet. Skull long, narrow, and elevated behind rostrum; postorbital processes undeveloped, anterior nasal opening greatly enlarged; nasal bones small and arched; zygomatic arches strongly developed, compressed laterally; rostrum long; bullae small; molar teeth bilophodont.

MEASUREMENTS: In table 41.

SPECIMENS EXAMINED: Juchitán: Zanatepec (above town, 1000 feet elevation), two skulls. Veracruz: Achotal, two (F.M.N.H.).

REMARKS: Both tapirs (Nos. 14898 and 14899) in the Field Museum of Natural History, from Achotal, Veracruz, are immature, judged by the third molar, which, although visible through the alveolus, has not begun to erupt in either skull.

SUMMARY OF *Tapirus* OF OAXACA

The tapir is common in the mountains east of the Isthmus of Tehuantepec. On occasion individuals may follow the river courses down to comparatively low elevations.

ORDER **ARTIODACTYLA** OWEN

EVEN-TOED UNGULATES

FAMILY **TAYASSUIDAE** PALMER

GENUS **TAYASSU** G. FISCHER

PECCARY

Tayassu tajacu humeralis Merriam

Plate 35, figures 3, 4; text figure 96

TYPE LOCALITY: Armeria, Colima, Mexico.

RANGE IN OAXACA: Tropical regions at moderate elevations throughout the state except parts of the Gulf drainage.

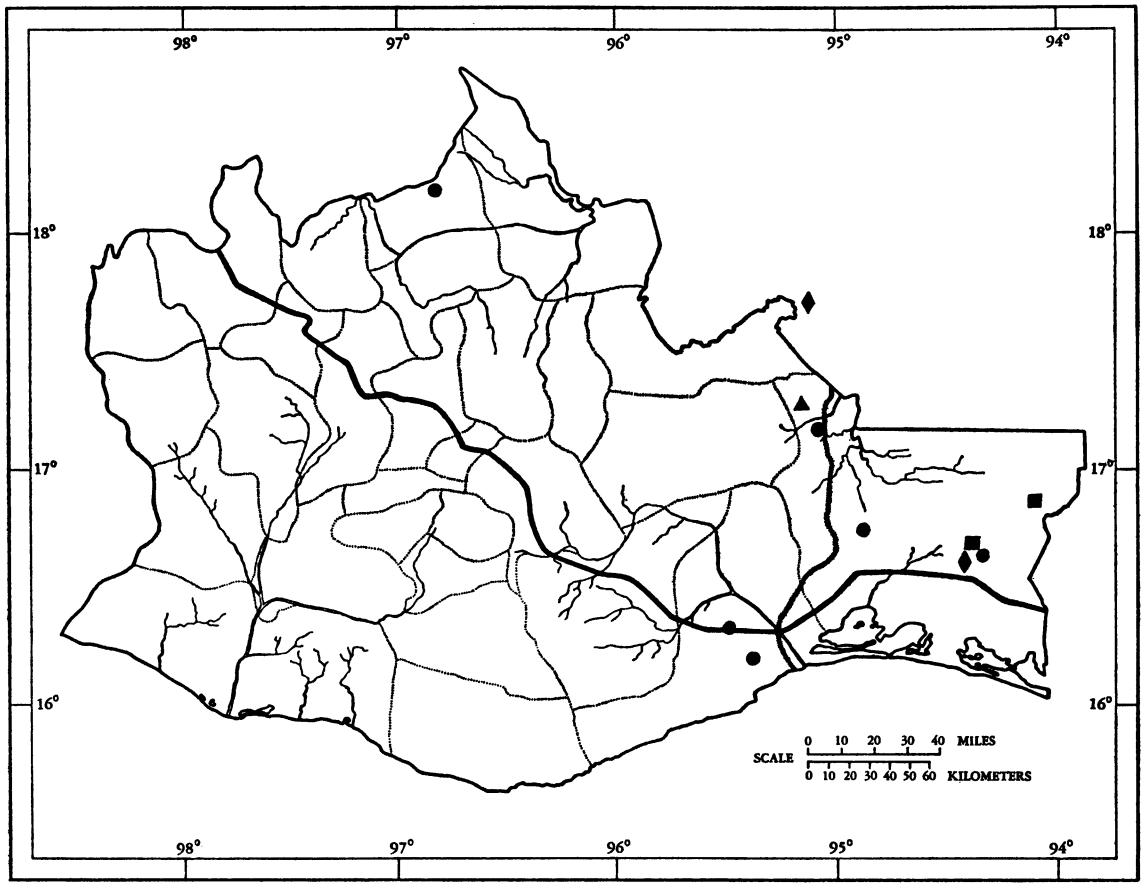


FIG. 96. Records of *Tapirus bairdii*, *Tayassu tajacu*, and *Tayassu pecari* in Oaxaca and of some specimens from other areas. ◆ *T. bairdii*. ● *T. t. humeralis*. ▲ *T. t. crassus*. ■ *T. p. ringens*.

TABLE 41

MEASUREMENTS (IN MILLIMETERS) OF *Tapirus bairdii* FROM OAXACA AND VERACRUZ

	Zanatepec, Oaxaca		Achotal, Veracruz	
	♂ ad A.M.N.H. No. 206834	♂ ad A.M.N.H. No. 208259	♂ sub F.M.N.H. No. 14898	♂ im F.M.N.H. No. 14899
Total length	—	—	2020.0	1980.0
Tail length	—	—	70.0	130.0
Hind foot	—	—	375.0	370.0
Skull, greatest length	400.0	400.0	409.0	378.0
Condylobasal length	—	390.0	391.0	356.0
Nasal length	63.4	—	83.0	72.0
Zygomatic breadth	186.0	195.0	176.0	171.0
Interorbital breadth	91.0	95.0	90.0	85.0
Braincase breadth	89.0	73.0	—	—
Palate width across molars	113.0	117.2	—	—
Maxillary tooth row	199.0	200.0	184.0	169.0

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 940–960; light-colored shoulder stripes forming a collar; body short and stocky; head wedge-shaped; ears small; nose terminating in a flattened circular disk; tail short; tusks or canine teeth large; large, well-developed musk gland on middorsal line of rump; hair coarse, bristly, and mixed Ochraceous-Tawny and black. Skull high and narrow, evenly tapered anteriorly; rostrum elongated, axis of face sloping downward; frontals broad; postorbital processes small; nasals long; palate long, narrow, and extending posteriorly beyond posterior molars; occipital crest elevated and strongly developed backward; upper canines large, directed downward; lower canines large, directed upward; premolar and molar teeth forming a continuous series, gradually increasing in size from first to last; true molars having square quadricuspidate crowns.

MEASUREMENTS: In table 42.

SPECIMENS EXAMINED: Juchitán: Mountains north of Zanatepec, one skull; Nizanda, one skull. Tehuantepec: Escurano, six; San Antonio, one; no exact locality, two.

SPECIMENS RECORDED: (Hall and Kelson, 1959, p. 997). Teotitlán: Jayacatlán, number and location of specimens not available. Juchitán: Tolosa, one (K.U.).

REMARKS: Hall and Kelson (1959, p. 997) recorded *Tayassu t. crassus* Merriam from the Gulf drainage in Oaxaca and also indicated that the collared peccary from the eastern part of Juchitán District on the Pacific drainage may be referable to *T. t. nelsoni* (Goldman).

Tayassu pecari ringens Merriam

Plate 35, figures 5, 6; text figure 96

TYPE LOCALITY: Apazote, Campeche, Mexico.

RANGE IN OAXACA: Forested mountain slopes at moderate elevations of the Pacific drainage in eastern part of Juchitán District.

GENERAL CHARACTERS: (Based on Costa Rican specimen). Total length, 1040; similar in structure to *T. tajacu humeralis*, but larger; pelage very coarse and usually uniform blackish except for white markings about chin and throat. Skull similar to that of *T. t. humeralis*, but larger and more massive.

MEASUREMENTS: In table 42.

SPECIMENS EXAMINED: Juchitán: Sierra Madre, north of Zanatepec, one skull; Río Mono Blanco, one lower canine tooth.

SUMMARY OF *Tayassu* OF OAXACA

Two species of peccaries occur in Oaxaca. The white-lipped peccary, *Tayassu pecari*, is restricted in the state to the mountains east of the Isthmus of Tehuantepec and is referable to the subspecies *ringens*. The collared peccary, *Tayassu tajacu*, has a more or less state-wide distribution from low to moderate elevations. Specimens of *tajacu* from southern Oaxaca are referable to the subspecies *humeralis*. Hall and Kelson (1959, p. 997) listed a specimen from Tolosa near the Veracruz border on the Isthmus of Tehuantepec as *T. t. crassus* and also gave the probable range of *T. t. nelsoni* as extending across the border of Chiapas west to the Isthmus of Tehuantepec in southern Oaxaca. The six from Escurano show so much individual variation in color and in some cranial details that it seems reasonable to assume that the specimen from Tolosa and the two from east of the Isthmus of Tehuantepec are intermediate between *humeralis* to the west and *crassus* or *nelsoni* to the east.

FAMILY **CERVIDAE** GRAY

SUBFAMILY **ODOCOILEINAE** POCOCK

GENUS **ODOCOILEUS** RAFINESQUE

WHITE-TAILED DEER

Odocoileus virginianus oaxacensis
Goldman and Kellogg

Text figure 97

TYPE LOCALITY: Mountains 15 miles west of Oaxaca de Juárez, Oaxaca, Mexico.

RANGE IN OAXACA: High mountains of central Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, 1340; antlers directed forward terminally, branched, with about three prongs rising vertically from main beam and a subbasal vertical spike; tail relatively long, conspicuously white on under side; pelage dark brown or Bister, longer and darker than in other subspecies of *Odocoileus virginianus* that occur in Oaxaca. Skull relatively small.

TABLE 42

MEASUREMENTS (IN MILLIMETERS) OF *Tayassu* FROM OAXACA

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
Tayassu tajacu humeralis												
A.M.N.H. No. 143976, Escurano	ad	—	—	—	245.5	207.0	—	97.9	49.4	54.5	42.3	92.3
A.M.N.H. No. 145962, Escurano	♀ sub	944	35	70	235.0	—	—	96.5	49.8	54.5	43.5	96.0
A.M.N.H. No. 145963, Escurano	♀ sub	940	35	77	234.0	202.0	—	101.5	47.0	58.2	43.0	93.7
A.M.N.H. No. 144646, Nizanda	sub	—	—	—	244.0	207.0	—	107.0	—	53.4	44.6	97.7
A.M.N.H. No. 149141, San Antonio	♀ ad	995	52	79	233.0	201.0	—	—	51.0	55.2	44.5	94.1
A.M.N.H. No. 145647, Tehuantepec	♀ ad	—	—	—	233.0	198.0	—	95.8	52.7	54.2	43.5	93.5
A.M.N.H. No. 145648, Tehuantepec	♂ sub	—	—	—	240.0	209.0	—	95.8	52.5	57.4	42.3	97.5
A.M.N.H. No. 206835, Zanatepec	ad	—	—	—	246.0	215.0	—	105.0	53.6	55.7	45.8	100.0
Tayassu pecari ringens												
A.M.N.H. No. 207423, Zanatepec	ad	—	—	—	267.0	237.0	—	109.0	58.5	67.0	50.4	116.0

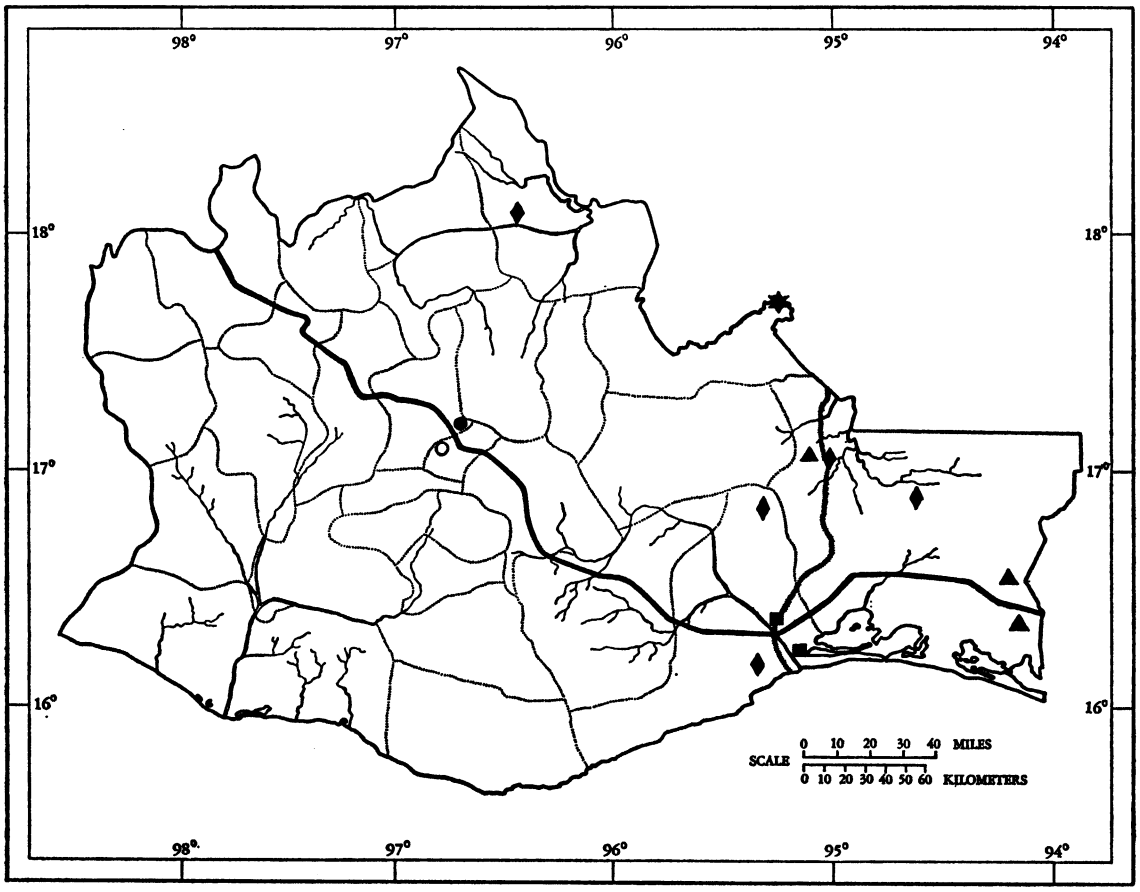


FIG. 97. Records of *Odocoileus virginianus* and *Mazama americana* in Oaxaca and of specimens from other areas. ● *O. v. oaxacensis.* ○ Type locality of *O. v. oaxacensis.* ■ *O. v. acapulcensis.* ▲ *O. v. thomasi.* ★ *O. v. toltecus.* ◆ *M. a. temama.*

MEASUREMENTS: In table 43.

SPECIMENS RECORDED: (Goldman and Kellogg, 1940, p. 85) Oaxaca: Fifteen miles west of Oaxaca de Juárez, one (U.S.N.M.). Etla: Cerro San Felipe, one (U.S.N.M.).

Odocoileus virginianus acapulcensis (Caton)

Plate 36, figures 1, 2; text figure 97

TYPE LOCALITY: Acapulco, Guerrero, Mexico.

RANGE IN OAXACA: Pacific coastal plains and adjacent mountain slopes west of the Isthmus of Tehuantepec.

GENERAL CHARACTERS: (Based on Guerrero specimen). Total length, 1394; similar to *O. v. oaxacensis*, but pelage shorter, paler, drabber instead of dark brown or Bister, and antlers straighter.

MEASUREMENTS: In table 43.

SPECIMENS EXAMINED: Tehuantepec: Tehuantepec, two.

SPECIMENS RECORDED: (C. O. Handley, Jr., *in litt.*). Tehuantepec: Huilotepec, one (U.S.N.M.); Tehuantepec, two (U.S.N.M.).

REMARKS: The antler structure and some peculiarities in cranial details of *Odocoileus* from Tehuantepec examined suggest the possible recognition of a specific status for *acapulcensis.*

Odocoileus virginianus thomasi Merriam

Text figure 97

TYPE LOCALITY: Huehuetán, Chiapas Mexico.

RANGE IN OAXACA: Pacific coastal plains and mountain slopes east of the Isthmus of Tehuantepec and north across the Isthmus of Tehuantepec to Veracruz.

TABLE 43

MEASUREMENTS (IN MILLIMETERS) OF *Odocoileus* AND *Mazama* FROM OAXACA AND SOME SPECIMENS FROM OTHER AREAS

Species, Museum Number, and Locality	Sex and Age	Total Length	Tail Length	Hind Foot	Skull, Greatest Length	Condylobasal Length	Nasal Length	Zygomatic Width	Interorbital Width	Braincase Width	Palate Width Across Molars	Maxillary Tooth Row
Odocoileus virginianus oaxacensis												
OAXACA												
U.S.N.M. No. 68242,[a] 15 mi. W. Oaxaca de Juárez	♂ ad	1340	170	362	—	230.0	—	—	—	—	—	68.0
Odocoileus virginianus acapulcensis												
OAXACA												
A.M.N.H. No. 208958, Tehuantepec	♀ ad	—	—	—	—	—	64.0	88.2	49.6	62.6	61.0	64.8
A.M.N.H. No. 208959, Tehuantepec	♂ ad	—	—	—	220.0	—	50.0	96.3	55.5	64.5	62.7	59.5
U.S.N.M., Tehuantepec	♂ ad	1394	195	385	—	224.0	—	—	—	—	—	—
Odocoileus virginianus thomasi												
CHIAPAS												
U.S.N.M. No. 77866,[a] Huehuetán	♂ ad	1544	153	420	—	—	—	—	—	—	—	—
OAXACA												
A.M.N.H. No. 172200, Tapanatepec	♀ sub	1620	193	—	218.0	206.0	60.5	87.3	50.5	62.2	63.1	67.5
A.M.N.H. No. 185275, Sarabia	♂ im	—	—	—	—	—	62.8	91.5	56.2	61.2	65.3	69.7
VERACRUZ												
A.M.N.H. No. 17265, Pasa Nueva	♂ ad	—	—	—	256.0	246.5	72.5	105.0	57.7	71.0	62.8	65.5
Mazama americana temama												
OAXACA												
A.M.N.H. No. 185273, Sarabia	♂ ad	—	—	—	—	—	43.7	86.4	41.3	58.0	59.3	54.0
A.M.N.H. No. 185274, Sarabia	♀ sub	—	—	—	173.0	170.0	41.8	77.7	34.5	53.5	53.2	55.3

[a] Type.

GENERAL CHARACTERS: (Based on Oaxacan specimens). Total length, 1544–1620; similar to *O. v. acapulcensis* but more vividly Tawny; paler Tawny than *O. v. toltecus*.

MEASUREMENTS: In table 43.

SPECIMENS EXAMINED: Juchitán: Sarabia, one skull; Tapanatepec, one.

SPECIMENS RECORDED: (C. O. Handley, Jr., *in litt*). Juchitán: Santa Efigenia, one (U.S.N.M.).

Odocoileus virginianus toltecus (Saussure)

Text figure 97

TYPE LOCALITY: Orizaba, Veracruz, Mexico.

RANGE IN OAXACA: Mountain slopes along the northern boundaries of Choapam and Juchitán districts, especially in the rain forests on the slopes facing the Gulf of Mexico.

GENERAL CHARACTERS: (Based on Veracruz specimen). External measurements not available; similar to *O. v. thomasi*, but color a darker shade of Tawny and antlers more strongly curved forward.

SPECIMENS RECORDED: Miller and Kellogg, 1955, p. 80). Choápam: Achotal, one (U.S.N.M.).

REMARKS: The town of Achotal is in Veracruz just across the Oaxaca state line; the specimen recorded by Miller and Kellogg as from Achotal, Oaxaca, indicates that it was taken in the vicinity of Achotal but south of the Veracruz state border.

GENUS **MAZAMA** RAFINESQUE

BROCKETS

Mazama americana temama (Kerr)

Plate 36, figures 3, 4; text figure 97

TYPE LOCALITY: Restricted to Mirador, Veracruz, Mexico, by Hershkovitz (1951, p. 567).

RANGE IN OAXACA: Coastal plains and adjacent mountain slopes of the southeastern districts and across the Isthmus of Tehuantepec to northeastern Oaxaca.

GENERAL CHARACTERS: (Based on Oaxacan specimen). Total length, about 1200; antlers simple spikes; body thickset for a deer; limbs slender; tail short; ears moderately large; face elongated; facial glands well developed but small; color of neck dull brownish, contrasting with bright Tawny of back. Skull similar to that of *Odocoileus*, but smaller and antlers simple instead of branched.

MEASUREMENTS: In table 43.

SPECIMENS EXAMINED: Juchitán: La Gloria, one skin; Sarabia, two skulls. Tehuantepec: San Antonio, one juvenile; Santiago Guevéa, one skull.

SPECIMENS RECORDED: (Hall and Kelson, 1959, p. 1013). Tuxtepec: Playa de Carrizo, 30 kilometers west of Tuxtepec, one (K.U.).

SUMMARY OF THE CERVIDAE OF OAXACA

Two genera of deer occur in Oaxaca. The small red brocket, *Mazama americanus*, is represented by one subspecies, *temama*, which has a range covering the northern and eastern forested areas of the state. The white-tailed deer, *Odocoileus virginianus*, is represented in Oaxaca by three subspecies, and possibly by a fourth. *Odocoileus v. oaxacensis* is a dark subspecies that occurs in the high mountains of central Oaxaca; *Odocoileus v. acapulcensis* is a brightly colored subspecies ranging along the Pacific coastal region from Guerrero east to the Isthmus of Tehuantepec. *Odocoileus v. thomasi* is similar to *O. v. acapulcensis* but is even brighter and ranges in Oaxaca from the Isthmus of Tehuantepec east to Chiapas. *Odocoileus v. toltecus* is a dark tawny form that ranges on the Gulf slopes of southern Veracruz and probably south across the boundary into northern Oaxaca. Because the range of individual variation in the Oaxacan forms is considerable and the four subspecies represented intergrade in the state, it is not possible to prepare a satisfactory key to the Oaxacan subspecies of *Odocoileus virginianus*.

GAZETTEER OF PRINCIPAL LOCALITIES AND COLLECTING STATIONS IN OAXACA

Acatlan, Mixes District: Town 30 kilometers southeast of Zacatepec, the district capital.

Agua Blanca, Yautepec District: Town in northeastern Yautepec, about 9 miles northwest of San Pedro Jilotepec, oak woods and grassland, altitude about 4000 feet.

Agua Fría, Juchitán District: Stream 3 miles northeast of La Ventosa, dry woods, low country.

Agua Zarca, Tehuantepec District: Uninhabited place 10 miles north of Santiago Lachiguirí, pine and oak woods with large rocks, altitude about 3000 feet.

Aguaje Guayabo, Tehuantepec District: Small rocky stream in an uninhabited place 15 miles west of Tehuantepec, pine and oak woods and grassland, altitude about 3000 feet. (Aguaje means spring or waterhole.)

Aguaje las Animas, Tehuantepec District: Uninhabited place 12 miles southwest of Tehuantepec, dry oak woods and rocky grassland, altitude about 3000 feet.

Aguaje Sapotal, Tehuantepec District: Uninhabited place 14 miles west of Tehuantepec near Potrero Villalobos; most area with *Achras sapota* trees.

Aguaje Tres Cabezas, Tehuantepec District: Uninhabited place 10 miles west of Tequisistlán, dry woods.

Alotepec, Mixes District: Town 27 miles west of Mazatlán.

Arroyo Agua Fría, Miahuatlán District: Stream 5 miles south of San Pedro Mixtepec, pine woods, some hardwoods, altitude about 10,500 feet.

Arroyo Cardón, Juchitán District: Small rocky stream 18 miles north of Tapanatepec near the Chiapas state boundary, pine and oak woods and grassland, altitude about 4000 feet.

Arroyo Coyote, Yautepec District: Stream near San Pedro Jilotopec, pine and oak woods, altitude about 3000 feet.

Arroyo de Chile, Mixes District: Stream below and east of Ixcuintepec, rain forest, altitude about 3000 feet.

Arroyo Encantado, Juchitán District: Stream on the headwaters of the Río Porta Moneda, 22 miles north of Tapanatepec close to the Chiapas state border, woodland (with *Liquidamber*), altitude about 3000 feet.

Arroyo La Manga, Tehuantepec District: Stream in unsettled place 8 miles southwest of Tehuantepec, mixed woods, rocky terrain.

Arroyo Las Conchas, Juchitán District: Stream 7 miles southeast of Mazatlán, moist wooded country, altitude about 2500 feet.

Arroyo Ocotita, Tehuantepec District: Stream in unsettled place (dry except after rains), 12 miles northwest of Tehuantepec and south of the Tehuantepec River, xerophytic woods.

Arroyo Palmar, Tehuantepec District: Stream in ranch area 3 miles south of Tequisistlán, dry woods, altitude about 1500 feet.

Arroyo San Juan, Tehuantepec District: Stream 15 miles west of Tehuantepec between Buenos Aires and La Concepción.

Arroyo Sauce, Yautepec District: Stream south of San Pedro Jilotepec, pine and oak woods, altitude about 4000 feet.

Astata, Tehuantepec District: Town on coastal plain, 37 miles southwest of Tehuantepec, xerophytic woods and cultivated areas.

Asuncion, Yautepec District: West of Tehuantepec, below 3000 feet.

Ayutla, Mixes District: Town 20 miles southwest of Zacatepec.

Bambita, Tehuantepec District: Settlement 5 miles south of Tequisistlán, dry woods on rocky slopes.

Bisilana (or Aguaje Bisilana), Tehuantepec District: A stream near Gueladú, 13 miles west of Tehuantepec.

Boca del Río, Tehuantepec District: Settlement near mouth of Río Tehuantepec, flat land, milpas.

Bocadilla, Jamiltepec District: Town 20 miles southeast of Jamiltepec on the Río Verde.

Boquerón, Tehuantepec District: Rocky bluff overlooking river south of Tequisistlán, xerophytic forest, altitude about 1000 feet.

Buena Vista (San Dionisio del Mar), Juchitán District: Rocky headland at eastern end of Laguna Superior, dry woods, milpas.

Buena Vista, Tehuantepec District: Settlement 15 miles northwest of Tehuantepec and south of the Río Tehuantepec, dry woods, altitude about 1000 feet.

Buena Vista, Yautepec District: Unsettled area 5 miles north of Huamelula, pine and oak woods and large rocks, altitude about 3000 feet.

Caja de Agua, Tehuantepec District: See San Miguel Caja de Agua.

Cajonos (San Matéo), Villa Alta District: Town in the highlands 45 kilometers east of Oaxaca de Juárez.

Cantera, Tehuantepec District: Onyx quarries near Tequisistlán, xerophytic forest, altitude about 600 feet.

Canteral, Tehuantepec District: Uninhabited area near Tehuantepec.

Carrizal, Tehuantepec District: Settlement on coastal plain 3 miles southwest of Mazatlán, dry woods.

Cerro Arenal, Tehuantepec District: Uninhabited hill 19 miles west of Tehuantepec, open pine and oak woods, grassland, coarse "sandstone," altitude about 3500 feet.

Cerro Atravesado, Juchitán District: Large, flat-topped hill 18 miles southeast of Santa María Chimalapa, open pine stands, grass and rocks, patches of "cloud forest" at north end, some ranches on lower slopes, altitude about 4750 feet.

"Cerro Azul," Juchitán District: Local name for high parts of the Sierra Madre, 25 miles northwest of Zanatepec, "cloud forest," high north-facing slopes swept by gale-force winds, altitude of peaks about 8000 feet, collections from 4000 to 7000 feet.

"Cerro Baul," Juchitán District: Highest peak of Sierra Madre near Oaxaca-Chiapas state border, 15 miles north of Tapanatepec, upper part of peak cloud forest, top mostly "heath bald," stands of *Cupressus "benthamii"* on upper slopes.

Cerro Calderona, Tehuantepec District: Uninhabited hill 8 miles southeast of Jalapa de Diaz, dry woods and rocks, altitude about 3000 feet.

Cerro Campanaria, Tehuantepec District: Hill 9 miles east of Jalapa de Diaz, rocky grassland, altitude about 3000 feet.

Cerro de Armadillo, Yautepec District: Hill 10 miles southeast of San Pedro Jilotepec, grassland under open stands of oak, altitude about 3000 feet.

Cerro de las Flores (or Cerro Lachiguirí), Tehuantepec District: Peak 5 miles northeast of Santiago Lachiguirí, cloud forest, oak woods and rocks, altitude about 7000 feet.

Cerro de Tigre, Tehuantepec District: Hill between Cerro San Pedro and Cerro Arenal, dry woods, grassland, dwarf thickets, pine, "sandstone," altitude about 3000 feet.

Cerro de Tigre, Tehuantepec District: Rocky hill at edge of Tehuantepec City, altitude about 500 feet.

Cerro del Chorro, Tehuantepec District: Hill 10 miles east of Tenango, rocky woods, altitude about 3000 feet.

Cerro Guieloche, Yautepec District: Hill 9 miles east of Quiechapa, pine and oak forest and some ranches, altitude about 6000 feet.

Cerro Guiengola, Tehuantepec District: See Guiengola.

Cerro Humo Chico, Ixtlán District: Hill 5 miles east of Comaltepec, open stands of *Pinus hartwegii*, many ericaceous spp. in ground cover, oaks and other trees along streams, altitude about 10,000 feet.

Cerro Jilote, Yautepec District: Rocky peak 2 miles north of San Pedro Jilotepec, tall pine and oak woods, altitude about 7000 feet.

Cerro Lachiguirí, Tehuantepec District: See Cerro de las Flores.

Cerro Machín, Ixtlán District: Hill 3 miles east of Macuiltianguis with good forest of pine and oak not fully exposed to the moist north winds, lumber camp settlement along the highway at the "base" of Cerro Machín, altitude 9000–9500 feet.

Cerro Madreña, Yautepec District: Hill 3 miles southeast of Quiechapa, pine and oak woods, summit cloud forest, altitude 7000–8000 feet.

Cerro Manteca, Yautepec District: Hill 3 miles southeast of San Carlos Yautepec, altitude about 5000 feet.

Cerro Marzorca, Tehuantepec District: Hill 3 miles east of Tequisistlán, dry woods and rocks.

Cerro Mixtequilla, Tehuantepec District: Range of hills 5 miles north of Mixtequilla, mixed woods, grass and rocks, altitude about 3000 feet.

Cerro Ocotepec, Tlaxiaco District: Hill 5 miles south of Santo Tomás Ocotepec, pine and oak woods, mixed hardwoods, grazing areas, altitude about 8000 feet.

Cerro Ocotepec, Yautepec District: Conical peak 8 miles west of Tequisistlán, open pine woods and grasslands with some cornfields on slopes, altitude about 4000 feet.

Cerro Otate, Tehuantepec District: Hill 2 miles east of Tenango, woods with stands of otate ("bamboo"), altitude about 5000 feet.

Cerro Palma de Oro, Tehuantepec District: Hill 8 miles southeast of Tequisistlán, near Cerro Tres Cruces, altitude about 4000 feet.

Cerro Pastle, Tehuantepec District: Hill 3 miles north of Tenango, pine and oak woods, altitude 4000–5000 feet.

Cerro Pecho Blanco, Juchitán District: Hill with rock cone peak 18 miles northeast of Tapanatepec on or near the Oaxaca-Chiapas boundary, pine woods, rocky, altitude about 5000 feet.

Cerro Pelon, Ixtlán District: Hill 25 miles north of Ixtlán and 5 miles east of Yolox, upper part grass with scattered pines, lower slopes with oaks and some *Pinus ayacahuite*, altitude about 10,000 feet.

Cerro Polle, Tehuantepec District: Hill 3 miles north of Tenango.

Cerro Pozo Río, Tehuantepec District: Rocky "sawtooth" ridge 4 miles west of Tehuantepec, dry woods and large rocks, altitude about 1500 feet.

Cerro San Felipe, Etla District: High peak and ridge 8 miles north of Oaxaca de Juárez, upper part "forest reservation" covered by virgin stands of pine, oak, and other trees, altitude 10,000–10,500 feet.

Cerro San Pedro, Tehuantepec District: Hill 10 miles west of Mixtequilla, summit rocky, upper slopes largely grass but with some stands of pine and dry woods, altitude 3750 feet.

Cerro Santa Lucía, Tehuantepec District: Hill 8 miles northeast of Tenango, same as "Cerro Tres Cruces" of Santa Lucía, a former settlement.

Cerro Sombrerito, Tehuantepec District: Hill 10 miles northeast of Tenango, north of Limón.

Cerro Tablón, Tehuantepec District: Hill near dam site (Presa "Presidente Benito Juárez") 8 miles southeast of former site of Jalapa, dry woods, rocky.

Cerro Tres Cruces, Tehuantepec District: Hill 8 miles east of Tenango, altitude about 4000 feet.

Cerro Verde, Tehuantepec District: Hill 13 miles north of Tequisistlán, pine and oak forest, altitude about 5000 feet.

Cerro Zempoaltepec, Mixes District: See Zempoaltepec.

Chahuites, Juchitán District: Town 5 miles south of Tapanatepec, xerophytic woods of coastal plain.

Chiltepec, Tuxtepec District: Town 10 miles south of Tuxtepec on the Río Valle Nacional.

Chivaguela, Yautepec District: Town 8 miles southwest of San Carlos Yautepec, pine woods, altitude about 5000 feet.

Chivela, Juchitán District: Town 19 miles north of Juchitán, general area much cut-over, moderately moist, altitude about 600 feet.

Choápam, Choápam District: District capital, oak woods and open grassland, altitude 2800–3000 feet.

Chontecomatlán, Yautepec District: Town 19 miles southeast of San Carlos Yautepec, above the Río Grande, steep rocky woodland along river, milpas above town, altitude about 6500 feet.

Chusnaván, Mixes District: Settlement west of Quetzaltepec, and 10 miles northwest of Ixcuintepec, humid area, coffee and grazing.

Cienaga Santa Lucía, Tehuantepec District: Swamp near Santa Lucía (former settlement) 8 miles northeast of Tenango.

Coatlán, Tehuantepec District: Mije town 15 miles north of Santiago Lachiguirí, moist area, altitude about 3000 feet.

Coixtlahuaca, Coixtlahuaca District: District capital.

Colotepec, Pochutla District: Town 50 kilometers northwest of Puerto Angel.

Comaltepec, Choápam District: Town 6 miles southwest of Choápam, altitude 1900 feet.

Comaltepec, Ixtlán District: Town in northern Ixtlán District 30 miles southeast of Cuicatlán; town is on dry side of the Sierra de Juárez (collections were made on wet slopes at considerable distances from the town), altitude about 7000 feet.

Cotzocón, Mixes District: Town 7 miles southeast of Zacatepec.

Cuicatlán, Cuicatlán District: District capital, dry country in Tomellin Canyon, irrigated areas near town, with tropical fruits and sugarcane.

Diana Liesa, Tehuantepec District: Cave in valley of Río Tehuantepec.

Ejutla, Ejutla District: District capital, mostly farm land with bare cut-over hills, altitude about 5000 feet.

"El Arco," Yautepec District: Gorge or rocky canyon of Río Grande below Chontecomatlán, and hardwood country with a few pines, altitude about 4000 feet.

El Barrio, Juchitán District: Town 4 miles southeast of Santo Domingo Petapa on moist (north) side of Isthmus of Tehuantepec, little or no rain forest, altitude less than 1000 feet.

El Campanario, Tehuantepec District: Place in the township of Jalapa.

El Fortin, Nochixtlán District: Village 65 miles by road northwest of Oaxaca de Juárez, altitude 7200 feet.

El Jícaro, Juchitán District: Zapotec settlement 5 miles northwest of Tapanatepec, thorn forest, cleared agricultural land, savannas, and caves.

El "Paderón," Yautepec District: Cliff above Chivaguela, 7 miles southwest of San Carlos Yautepec, pine- and oak-covered hills, altitude about 5000 feet.

El Palmar, Juchitán District: Settlement 10 miles west of San Miguel Chimalapa, hills of grass, pines, oaks with wooded streams.

El Salado, Tehuantepec District: Ranch on highway 5 miles east of Tequisistlán.

Escurano, Tehuantepec District: Place on slopes of Cerro San Pedro 12 miles west of Mixtequilla, rocky stream, large trees bordered by grassland, altitude about 1500 feet.

Estancia Guadalupe, Mixes District: Settlement 12 miles south of San Pedro Ocotepec, general area above settlement pine woods and cloud forest.

Estero de Perros, Juchitán District: Mouth of Río Perros at western end of Laguna Superior, sea level.

Finca Santa Teresa, Tehuantepec District: Ranch 2 miles north of Tehuantepec, irrigated land, banana fields, milpas, formerly a large, privately owned ranch house and settlement, with plantations of sugarcane.

Fulta: See Tutla.

Gueladú, Tehuantepec District: Uninhabited grassy hills 9 miles east of Jalapa de Diaz.

Guevéa, Tehuantepec District: Town 13 miles northeast of Santiago Lachiguirí.

Guichicovi, Juchitán District: Town 8 miles southwest of Mogoñé and 10 miles northwest of Matías Romero, moist country but with dry hills with pine, coffee and pineapples raised here, altitude 900 feet.

Guichina, Yautepec District: Town 3 miles south of San Carlos Yautepec, some cane fields, altitude about 3000 feet.

Guiengola, Tehuantepec District: Large hill with truncated tops 7 miles west of Mixtequilla, unin-

habited, covered with dry woods, including stands of pine, *P. michoacana*, altitude 3000–3500 feet.

Guiengola ruins, Tehuantepec District: On slopes of Guiengola, dry woods with much limestone, altitude about 1350 feet.

Guigovelaga, Tehuantepec District: Town 5 miles southeast of Coatlán, moist woods, coffee-growing area.

Guigovéo, Tehuantepec District: Settlement below Benito Juárez Dam, 5 miles southeast of Jalapa on the Río Tehuantepec, dry woods except along river bottom.

Guiloche, Yautepec District: See Cerro Guieloche.

Guish-gal, Miahuatlán District: Place 4 miles south of San Pedro Mixtepec, pine zone with some fir, potato-growing ranches in area, altitude about 11,000 feet.

Hacienda Cinco Señores, Tehuantepec District: Ranch 5 miles west of San Antonio.

Hierba Santa, Tehuantepec District: Entrance to settlements 10 miles west of Tehuantepec, dry woods, rocky, small stream.

Huajuápam de León, Huajuápam District: District capital, open valley, altitude 5500 feet.

Huamelula, Tehuantepec District: Town 35 miles southwest of Tehuantepec on edge of coastal plains, with higher land to the north, cane fields and corn.

Huautla, Teotitlán District: A town 15 miles east of Teotitlán, moist coffee-growing area but much cut over for corn, altitude about 5000 feet.

Huehuetlán, Teotitlán District: See Portillo de la Soledad.

Huilotepec, Tehuantepec District: Town 7 miles south of Tehuantepec, coastal plain, xerophytic woods, a high rocky hill at edge of town.

Ingenio Santo Domingo, Juchitán District: Sugar refinery and town east of Ixtepec surrounded by sugarcane fields, altitude near seal level.

Isla Natar Dac, Juchitán District: Island in Laguna Superior, stands of sabal palms, thickets, dry woods, mangroves at one bay, igneous rocks.

Ixcuintepec, Mixes District: Town 18 miles north of San Pedro Jilotepec, small coffee plantations, some rain forest, altitude about 3000 feet.

Ixhuatán, Juchitán District: Village 13 miles southwest of Zanatepec, altitude about 100 feet.

Ixtepec (San Geronimo), Juchitán District: Town 10 miles north of Juchitán.

Ixtlán de Juárez, Ixtlán District: Capital of the district, altitude about 7000 feet.

Jalapa de Diaz, Tehuantepec District: Town formerly on the Río Tehuantepec 18 miles northwest of Tehuantepec, dry sandy soil, short-thorn woods with much *Opuntia* spp.

Jaltepec, Mixes District: "Nueva Raiza," new agrarian colony about 10 miles north of San Juan Jaltepec, low-altitude rain forest.

Jamiltepec, Jamiltepec District: Capital of the district.

Jayacatlán, Teotitlán District: A small town 10 kilometers north of Huautla.

Jilotepec, Yautepec District: See San Pedro Jilotepec.

Juchitán, Juchitán District: District capital.

Juquila, Juquila District: District capital, coffee-growing area, altitude 5000 feet.

Kilometer 183, Pochutla District: A highway mark above the district capital, Pochutla, cloud forest composed of tropical hardwoods mixed with pines and oaks, altitude 1700 meters.

La Chacahua, Yautepec District: Cultivated area 3 miles south of San Bartolo Yautepec, rocky, strips of sugarcane and bananas, along a stream.

La Concepción, Putla District: Settlement 4 miles east of Putla.

La Concepción, Tehuantepec District: Settlement 7 miles northeast of Tenango, pines, oaks, and milpas, altitude about 4000 feet.

La Esperanza, Juchitán District: Settlement 15 miles west of Matías Romero, rain forest, coffee country.

La Gloria, Juchitán District: Settlement 7 miles south of Santa María Chimalapa, coffee plantations and milpas, rain forest, altitude about 1500 feet.

La Mata, Juchitán District: Town 13 miles north of Juchitán, good, partly irrigated arable land, hillsides rocky and covered with xerophytic woods, altitude 10–500 feet.

La Muralla, Tlaxiaco District: Highest rocky peak of Cerro Yucumino, 8 miles south of Tlaxiaco, pine and oak woods, altitude about 10,500 feet.

La Pájima, Tehuantepec District: Settlement 3 miles southwest of Tequisistlán, on Tequisistlán River, irrigated strip extends up margins of Tequisistlán River, but not to La Pájima.

La Parada, Etla District: Ranch 15 miles northeast of Oaxaca de Juárez, altitude about 8000 feet.

La "Presa," Tehuantepec District: Diversion dam 3 miles west of Mixtequilla, dry woods, organos, and thickets.

La Reforma, Yautepec District: Ranchería north of Santa María Ecatepec on Pan American Highway.

La Soledad, Pochutla District: Coffee plantation 10 miles northwest of Pluma Hidalgo on the Oaxaca-Pochutla highway, altitude about 5000 feet.

La Ventosa, Juchitán District: A settlement 15 kilometers northeast of the district capital.

La Ventosa, Tehuantepec District: Fishing settlement 2 miles east of Salina Cruz, caves along beach between Salina Cruz and La Ventosa.

Lacháo, Juquila District: Town 10 miles southeast of Juquila.

Lachibé (Danibé), Miahuatlán District: Uninhabited hill 5 miles south of San Pedro Mixtepec, pine

woods, altitude about 11,000 feet.

Lachivía, Yautepec District: Town 10 miles southwest of Yautepec.

Lagunas, Juchitán District: Town 50 miles north of Tehuantepec, highest point on the Trans-Isthmus Railroad, good average yearly rainfall, but land poor, altitude about 800 feet.

Las Barras, Tehuantepec District: Settlement halfway between Tehuantepec and Juchitán, flat land, dry woods, *Amphipterygium adstringens* dominant tree.

Las Conchas, Tehuantepec District: Dry, open monte near coast.

Las Cuevas, Tehuantepec District: Uninhabited rocky hill with bat caves in bed of Río Tehuantepec, 10 miles northwest of Tehuantepec.

"Las Lagunas" (Lakes of Sol and Luna), Juchitán District: Two sunken lakes 10 miles east of Zanatepec, rocky wooded area, surrounding hills dry, grassy, with scattered trees, altitude about 2000 feet.

Las Majadas, Yautepec District: Settlement on highway 8 miles west of Tequisistlán, rocky grassland, thickets along stream.

Las Pilas, Tehuantepec District: Uninhabited area 7 miles northwest of Tehuantepec, dry woods with much limestone, water tanks here formerly used in the preparation of indigo dye.

Las Tejas, Tehuantepec District: Small settlement 8 miles west of Tehuantepec where highway crosses the Río Tejas; dry woods, flat land, little water in Río Tejas, except during rains, or upstream.

Las Vacas, Yautepec District: Abandoned settlement 12 miles west of Tequisistlán and about ½ mile from La Reforma, dry stream, scattered trees, altitude about 3000 feet.

Las Vigas, Juchitán District: Five miles southeast of Zanatepec.

Leapi (San Pedro Leapi), Yautepec District: Town 10 miles south of San Carlos Yautepec.

Limón, Tehuantepec District: Settlement or agrarian colony, moderately dry woods ("Monte Cerrado," a term for brush that resists penetration), altitude 1000–2000 feet.

Llano de las Flores, Ixtlán District: A large, grassy meadow surrounded by slopes covered with oak and conifers, 12 miles north of Ixtlán de Juárez, now field headquarters for the paper and pulp mills at Tuxtepec, Oaxaca, altitude 9500 feet.

Llano Grande, Jamiltepec District: Settlement 12 miles northwest of Pinotepa Nacional, altitude about 200 feet.

Llano Grande, Putla District: Town 24 miles south of Putla.

Llano Inglés, Etla District: Grassy plain in the Cerro San Felipe 8 miles north of Oaxaca de Juárez, altitude from 7000 to 10,000 feet.

Llano Ocotal, Tehuantepec District: Settlement 5 miles northeast of Tenango, pine and oak woods, altitude about 4000 feet.

Los Nanches, Yautepec District: Ranch 2 miles west of San Pedro Jilotepec, pine and oak woods except along streams, altitude about 4000 feet.

Los Tunillos, Yautepec District: Settlement 5 miles west of Tequisistlán, altitude about 4500 feet.

Lovene, Miahuatlán District: Town 5 miles south of San Juan Ozolotepec, mixed woods, grassland, shrubs, and rocks, moderately dry, altitude about 6000 feet.

Macuiltianguis, Ixtlán District: Town 35 miles northeast of Oaxaca de Juárez, collections were made at Cerro Machín 3 miles east of the town and 2 miles southwest of town, the latter a dry area, much cut-over except in rugged spots.

Manteca, Yautepec District: Settlement a few miles east of Guichina and southeast of San Carlos Yautepec, dry pine and oak woods, altitude about 4000 feet.

Matías Romero, Juchitán District: Town on the Trans-Isthmus Railroad 40 miles north of Tehuantepec, grassland with oaks and *hojamán* (*Curatella americana*), altitude about 500 feet.

Mazahuito (Masahuite or Masahui), Juchitán District: Settlement 18 miles south of Matías Romero on the Trans-Isthmus highway, dry woods, rocky limestone area, altitude about 600 feet.

Mazatlán, Mixes District: Town 10 miles north of Coatlán, generally moist, coffee-growing country, altitude 1500 feet.

Media Loma, Tehuantepec District: Place north of Lachiguirí.

Mesones, Putla District: Town 15 miles southwest of Putla.

Mitla, Tlacolula District: Town 28 miles southeast of Oaxaca de Juárez, at eastern end of the Valley of Oaxaca de Juárez, surrounding hills are cut over and rocky, altitude 5000–6000 feet.

Mixtequilla, Tehuantepec District: Town 3 miles north of Tehuantepec, a rocky limestone hill above town, xerophytic trees, many cacti, altitude about 500 feet.

Mixtequilla-Tlacotepec, Tehuantepec District: Border area between towns of Mixtequilla and Tlacotepec 8 miles north of Tehuantepec, xerophytic woods on coastal plain.

Mogoñé, Juchitán District: Town 7 miles north of Matías Romero, wooded streams, farm land, moist country but little rain forest left, altitude about 400 feet.

Montebello, Juchitán District: Ranch 24 miles north of Matías Romero, originally evergreen forest, now cut over and burned.

Monte Rico, Juchitán District: Area on north side of Río Coatzacoalcos 7 miles east of Santa María Chimalapa, virgin rain forest with oak on ridges.

Morro Mazatlán, Tehuantepec District: Town 17 miles southwest of Tehuantepec, coastal plains with hills, xerophytic woods, altitude 500 feet.

Mount Zempoaltepec, Mixes District: See Zempoaltepec.

Nejapa, Yautepec District: Town 20 kilometers northeast of San Carlos Yautepec.

Nizanda, Juchitán District: Town 15 miles north of Juchitán, collection was made 2 miles north of town in "rock garden," rocky limestone hill with cacti, agaves, and trees, altitude about 500 feet.

Nochixtlán, Nochixtlán District: District capital, wheat- and corn-producing country, hillsides cut over and badly eroded, altitude 2200 meters.

Nopala, Juquila District: Town 12 miles southeast of Juquila.

Nueva Raza, Mixes District: New colony on Río Jaltepec, 20 miles northwest of Palomares, clearing in rain forest, low altitude.

Oaxaca de Juárez, Oaxaca District: State capital.

Ocotal, Juchitán District: Settlement near Matías Romero.

Ocotita, Tehuantepec District: See Arroyo Ocotita.

Ojo de Agua, Yautepec District: Small stream 7 miles northeast of Leapi, pine and oak woods, altitude about 6000 feet.

Ozolotepec, Miahuatlán District: See San Juan Ozolotepec.

Palomares, Juchitán District: Town 20 miles north of Matías Romero, considerable areas of rain forest, altitude 1–300 feet.

Pápalo, Cuicatlán District: See Reyes Pápalo.

Parras (Perros), Juchitán District: Settlement on the west bank of the Río Perros and east of Tehuantepec.

Paso Guayabo, Yautepec District: River crossing 13 miles west of Tequisistlán, rocks and trees along Río Costoche, a suspension foot bridge for use during floods, one or two ranches in area.

Paso Monte Rico, Juchitán District: Place adjacent to Paso Venado on Río Coatzacoalcos, altitude about 1000 feet.

Paso Tileme, Tehuantepec District: Shallow water, foot trail across the lagoon "Tileme," the strip of sandy scrub land between Tileme and the Laguna Superior.

Paso Venado, Juchitán District: Río Coatzacoalcos crossing east of Santa María Chimalapa, altitude about 1000 feet.

Pateta, Tehuantepec District: Settlement near Tequisistlán, dry woods.

Petacaltepec, Yautepec District: See San Matías Petacaltepec.

Pinotepa de Don Luis: See Pinotepa Nacional.

Pinotepa Nacional, Jamiltepec District: Town 10 miles from coast in southwestern Oaxaca, altitude 300 feet.

Pluma Hidalgo, Pochutla District: Town 20 miles from the coast in southern Oaxaca and 10 miles northeast of Pochutla, coffee-growing center, rain and cloud forest, altitude about 4000 feet.

Portillo, Miahuatlán District: Pass 2 miles south of San Juan Ozolotepec, uninhabited, mainly oaks, altitude about 9000 feet.

Portillo de la Soledad, Teotitlán District: Pass 20 miles east of Teotitlán.

Portillo Guayabo, Tehuantepec District: See Aguaje Guayabo.

Portillo Lacháo, Juquila District: Pass 10 miles east of Juquila near San Juan Lacháo, altitude 6400 feet.

Portillo Limón, Yautepec District: Pass on highway 9 miles west of Tequisistlán, near La Reforma.

Portillo Nejapa, Yautepec District: Pass 13 miles northeast of San Carlos Yautepec, pine and oak woods, altitude about 5000 feet.

Portillo Zapote, Tehuantepec District: Pass 2 miles north of Tenango, pine and oak woods, sandstone.

Potrero Gueladú, Tehuantepec District: Pasture lands on Cerro Gueladú 10 miles east of Jalapa de Diaz.

Potrero Villalobos, Tehuantepec District: Settlement 10 miles west of Tehuantepec, woods and milpas.

Pozo Río, Tehuantepec District: Place adjacent to Cerro Pozo Río.

Pueblo Viejo, Yautepec District: Pre-Colombian site 3 miles northwest of San Bartolo Yautepec, uninhabited, also known as Palacio San Bartolo, partly open areas and partly dry woods, many large *Dioon spinulosa* on cliffs, altitude about 4000 feet.

Puerto Angel, Pochutla District: Small seaport on Pacific coast, vegetation is of xerophytic to deciduous woods.

Puerto Elijio, Ixtlán District: Settlement of Comaltepec on Oaxaca-Tuxtepec highway 50 miles south of Tuxtepec, small coffee plantations in rain forest.

Puerto Escondido, Juquila District: Small seaport 20 miles south of San Pedro Mixtepec.

Puerto Escondido-San Pedro Mixtepec, Juquila District: Place in the Pacific lowlands 5 miles southeast of San Pedro Mixtepec.

Puerto Soledad: See Portillo de la Soledad.

Putla, Putla District: District capital.

Rancho Santa Rita, Tehuantepec District: Ranch 12 miles east of Tenango, pine woods.

Rancho Sauce, Yautepec District: Ranch 10 miles southeast of San Pedro Jilotepec, chiefly pine and oak, very rocky; a stream, Arroyo Sauce, runs here, altitude about 3000 feet.

Reforma, Juchitán District: Town 8 miles southwest of Zanatepec, xerophytic woods, also palm flats, altitude 1–500 feet.

Reyes Pápalo, Cuicatlán District: Village 10 miles northeast of Cuicatlán, altitude 6700 feet.

Rincón Bamba, Tehuantepec District: Town 7 miles southwest of Morro Mazatlán, coastal plain, dry woods.

Río Blanco, Juchitán District: River 15 miles north of Zanatepec, altitude 1000 feet.

Río Blanco, Veracruz State: River 12 miles west of Piedras Negras.

Río Chalchijapa, Juchitán District: River 38 kilometers southeast of Jesús Carranza.

Río Chicapa, Juchitán District: Río Chicapa, between Unión Hidalgo and Laguna Superior, area has been largely cleared for milpas and ranching.

Río Chile, Tehuantepec District: River north of Tequisistlán crossed by Cristóbal Colón Highway.

Río Costoche, Yautepec District: See Paso Guayabo.

Río de Iguana, Tehuantepec District: Stream in vicinity of Tehuantepec.

Río del Corte, Juchitán District: Name for Río Coatzacoalcos in its upper reaches, east of river is (or was) almost entirely virgin rain forest.

Río Grande, Tehuantepec District: Settlement on the headwaters of the Río Perras, across the river from Amatal.

Río Grande, Yautepec District: Upper part of the Tequisistlán River, area is mixed woods (dry), becoming pine and oak on the slopes above the river.

Río Guajalote, Miahuatlán District: Small river in the cloud forest near the Río Molino but lower down the mountain on the Pacific side.

Río Hondo, Yautepec District: Settlement on Río Hondo 15 miles west of Tequisistlán; the river, with steep rocky banks and dry woods above, is crossed by the Cristóbal Colón Highway 50 miles east of Tehuantepec and the settlement is at this point.

Río Jaltepec, Juchitán District: River 9 miles south of Veracruz-Oaxaca border.

Río Molino, Miahuatlán District: River in the cloud forest, mainly pine and oak (2250 meters elevation) and in the township of San Miguel Suchixtepec.

Río "Mono Blanco," Camp 1, Juchitán District: Upper part of Río Encajosiedo near junction with Río "Porta Moneda" 25 miles north of Tapanatepec; hills along river mainly pine and oak, except in river flats, mixed tree species growing tall and dense, leaving ground heavily shaded and nearly free from undergrowth; altitude about 2500 feet.

Río "Mono Blanco," Camp 2, Juchitán District: Camp midway between headwaters of Río "Mono Blanco" and junction with Río "Porta Moneda" near Chiapas border 20 miles north of Tapanatepec, river flats larger and frequent, large white pines (*P. strobus* var. *chiapensis*) and *Liquidamber* along river.

Río "Mono Blanco," Camp 3, Juchitán District: Camp at headwaters of Río "Mono Blanco" near Chiapas border 15 miles north of Tapanatepec, many thickets of undergrowth palms (*Chamaedorea* spp.) in this area, many trees of *Liquidamber* along river, altitude about 4000 feet. (Camps 1, 2, and 3 are not differentiated on listed specimens.)

Río "Negro," Juchitán District: (Río Grijalva system). Junction of Río Negro with Río "Porta Monedo" near Chiapas border 29 miles north of Tapanatepec, heavy shade of trees in river flat, many mammal tracks along edge of river.

Río "Negro," Juchitán District: (Río Grijalva system). Camp 5 miles west of junction of Río Negro with Porta Monedo near Chiapas border, many tree ferns, hill to south is rain forest, climbing made easy by tapir trails.

Río Ostuta, Juchitán District: River flowing into Laguna Inferior, collection from 4 miles west of Zanatepec.

Río Porta Moneda, Juchitán District: Headwaters of Río Encajonado near the Chiapas border 19 miles north of Tapanatepec, large trees and rocks along river.

Río Sarabia, Juchitán District: Tributary of Río Coatzacoalcos, Isthmus of Tehuantepec.

Río Sauce, Yautepec District: See Rancho Sauce.

Río Tonto, Tuxtepec District: River 9 miles north-northwest of Tuxtepec.

Salazar, Tehuantepec District: Uninhabited area at foot of Cerro Guiengola 5 miles west of Mixtequilla, dry woods and rocky except along river, altitude about 200 feet.

Salina Cruz, Tehuantepec District: Town on Pacific coast 12 miles south of Tehuantepec.

Salina Garrapatera, Tehuantepec District: Settlement near Pacific coast between Río Bamba and Río Zaachila, dry woods.

San Agustin Loxicha, Pochutla District: Town 30 kilometers northwest of Pochutla.

San Andrés Chicahuaxtla, Putla District: Town 10 miles northeast of Putla, mainly pine and oak woods but many other tree species, including *Chiranthodendron pentadactylon*, moderately moist, altitude about 8000 feet.

San Antonio, Tehuantepec District: Settlement about 15 miles west of Tehuantepec near Río Las Tejas, dry woods and a few scattered ranches, larger trees and less dry upstream.

San Bartolo Yautepec, Yautepec District: Town 10 miles southeast of San Carlos Yautepec, center of mezcal liquor production, much land planted with magueyes (*Agave tequilana*), altitude about 3000 feet.

San Blas, Tehuantepec District: Town adjoining

Tehuantepec, dry land, woods of mixed species and milpas.

San Carlos Yautepec, Yautepec District: District capital, dry region with small irrigated areas, altitude about 3000 feet.

San Dionisio de Mar (Buena Vista), Juchitán District: Town on eastern side of Laguna Superior, name also applies to the rocky headland here, dry woods.

San Felipe del Agua, Oaxaca District: Town 3 miles north of Oaxaca de Juárez.

San Felipe Lachilló, Miahuatlán District: Town 5 miles south of Lovene.

San Gabriel Mixtepec, Juquila District: Town 17 miles southeast of district capital, Juquila.

San Geronimo (Ixtepec), Juchitán District: See Ixtepec.

San Isidro, Ixtlán District: Settlement 8 miles northeast of Comaltepec on Oaxaca de Juárez-Tuxtepec Highway. The settlement of San Isidro is some 2000 feet below the highway. There is now a shelter at the point of departure on the highway, rain or cloud forest, collections were made at temporary road construction camp a mile or so farther down the highway.

San José Chacalapa, Yautepec District: Settlement 69 miles by road southeast of Oaxaca de Juárez and 12 miles northwest of El Camarón on north side of Río Camarón, borders on Pochutla District.

San José del Palmar, Tehuantepec District: Settlement near San Juan Caja de Agua toward the coast, dry woods.

San José Lachiguirí, Miahuatlán District: Town 18 miles northeast of district capital, Miahuatlán, stands of *Aloe vera*, dry cut-over land, limestone, altitude about 5000 feet.

San Juan Acaltepec, Yautepec District: Town 25 miles west of Tenango, large, coarse-grained "sandy" rocks, pine and oak woods, altitude about 5500 feet.

San Juan Guichicovi, Juchitán District: Town 8 miles southwest of the railroad station of Mogoñé on the northern slope of the Isthmus of Tehuantepec, altitude 900 feet.

San Juan Guivini, Miahuatlán District: Town 5 miles northeast of Lovene.

San Juan la Jarcia, Yautepec District: Town 13 miles west of San Carlos Yautepec.

San Juan Lachâo, Juquila District: See Lachâo.

San Juan Ozolotepec, Miahuatlán District: Town 5 miles north of Lovene.

San Lorenzo Mixtepec, Miahuatlán District: Town 17 miles east of District capital Miahuatlán, altitude about 6000 feet.

San Martín Toxpalan, Teotitlán District: Town 3 miles south of Teotitlán.

San Matéo del Mar, Tehuantepec District: Town on Pacific coast 10 miles east of Río Tehuantepec, "islands" of tree and brush thickets in open grassland, sabal palm stands, and dry woods.

San Matías Petacaltepec, Yautepec District: Town 22 miles southwest of Tenango, pine and oak woods, scrub, much cut-over land, altitude about 5000 feet.

San Miguel Caja de Agua, Tehuantepec District: Settlement 15 miles west of Salina Cruz near Santa Rita and Rincón Moreno, dry woods, rocky.

San Miguel Suchixtepec, Miahuatlán District: See Suchixtepec.

San Pablo, Tehuantepec District: Uninhabited area adjoining Salazar 2 miles west of Mixtequilla, some ranches near Río Tehuantepec.

San Pablo Ayutla, Mixes District: Town 15 miles south of Totontepec.

San Pedro Jilotepec, Yautepec District: Town 22 miles northwest of Jalapa de Diaz, mainly milpas, pine and oak woods, altitude about 5000 feet.

San Pedro Mixtepec, Miahuatlán District: Town 20 miles southeast of district capital, Miahuatlán, moderately dry, pine and oak country, altitude about 7000 feet.

San Pedro Quiatoni, Tlacolula District: Town 25 miles southeast of Mitla.

San Sebastián Fustes, Sola de Vega District: Town 3½ miles southeast of Oaxaca de Juárez.

San Sebastián Jilotepec, Yautepec District: Town 3 miles southwest of San Pedro Jilotepec, pine and oak woods, altitude 6000–7000 feet.

San Vicente, Putla District: Town 5 miles northeast of Putla, moderately moist, mixed pine and oak woods, altitude about 4000 feet.

Santa Ana Tavela, Yautepec District: Town 10 miles west of San Sebastián Jilotepec, dry woods, altitude about 3000 feet.

Santa Catalina Quierí, Yautepec District: Town 17 miles southwest of San Carlos Yautepec, mixed hardwoods and pine stands, milpas clearings at and below town, wheat fields in clearings of pine woods above town, altitude about 6000 feet.

Santa Catarina Quioquitani, Yautepec District: Town adjoining Lachindove, 15 miles southwest of San Carlos Yautepec, open rocky area, brush, dry and much cut-over land, altitude about 4600 feet.

Santa Efigenia, Juchitán District: Former settlement 8 miles north of Tapanatepec near the Chiapas boundary in southeastern Oaxaca, scattered ranches, dry woods, altitude 550 feet.

Santa Lucía, Tehuantepec District: Former settlement 17 miles west of Tehuantepec, pine stands, hardwoods, and milpas, altitude about 4000 feet.

Santa Lucía de Arroyo "Palmar," Tehuantepec District: Former settlement south of Cerro de Chorro 15 miles southwest of Tehuantepec, altitude about 3000 feet.

Santa María Chimalapa, Juchitán District: Town 25 miles east of Matías Romero.

Santa María del Mar, Juchitán District: Town on Pacific coast 7 miles east of San Matéo del Mar, mostly open grassland with water, some dry tree woods and brush, altitude about sea level.

Santa María Ecatepec, Yautepec District: Town 12 miles southeast of San Bartolo Yautepec, pine and oak woods, scrub, altitude about 6000 feet.

Santa María Guienagati, Tehuantepec District: Town 25 miles north of Mixtequilla, coffee plantations.

Santa María Ozolotepec, Miahuatlán District: Town 15 miles west of San Juan Ozolotepec.

Santa María Petapa, Juchitán District: Town 3 miles northwest of the Lagunas station on the railroad across the Isthmus of Tehuantepec.

Santiago Lachiguirí, Tehuantepec District: Town 15 miles northeast of San Pedro Jilotepec, sugarcane and mangoes, rocky, altitude about 2500 feet.

Santiago Lachivía, Yautepec District: Town 12 miles southwest of San Carlos Yautepec, regrowth timber, pine and oak woods, altitude about 6000 feet.

Santo Domingo Chicahuastla, Putla District: Town north of San Vicente.

Santo Domingo Chontecomatlán, Yautepec District: Town 19 miles southeast of San Carlos Yautepec, pine, oak, and mixed hardwood cloud forest, altitude about 6000 feet.

Santo Domingo de Guzmán, Juchitán District: See Santo Domingo Petapa.

Santo Domingo Lachivitó, Yautepec District: Town 12 miles southwest of San Carlos Yautepec, pines with trees, "heath balds" on heights, altitude about 7000 feet.

Santo Domingo Nejapa, Yautepec District: Town 5 miles north of San Bartolo Yautepec.

Santo Domingo Petapa, Juchitán District: Village 7 or 8 miles west of the Lagunas station on the railroad across the Isthmus of Tehuantepec, altitude about 900 feet.

Santo Tomás Ocotepec, Tlaxiaco District: Town 10 miles southwest of Tlaxiaco, pine, oak, and mixed hardwoods, open grazing areas, altitude about 6000 feet.

Santo Tomás Quierí, Yautepec District: Town 12 miles southwest of San Carlos Yautepec, pine woods, rocky, altitude about 6000 feet.

Santo Tomás Teipan, Yautepec District: Town 12 miles south of San Bartolo Yautepec, cloud forest above town, altitude about 7500 feet.

Sarabia, Juchitán District: Town 16 miles north of Matías Romero, open scrub, grass, and agricultural lands, remnants of evergreen forests on ridges.

Sierra de San Felipe Lachilló, Miahuatlán District: Mountain range 5 miles south of Lovene.

Sierra Madre, Juchitán District: Mountain range 15 miles north of Zanatepec and north of Pan-American Highway.

Sierra Madre, Juchitán District: Mountain range 7 miles north of Zanatepec.

Sola de Vega, Sola de Vega District: District capital.

Soledad, Pochutla District: Settlement and coffee plantation 5 miles northwest of Pluma Hidalgo, altitude about 4700 feet.

Suchixtepec, Miahuatlán District: Town 20 miles west of Lovene.

Tamazulápam, Teposcolula District: Town 10 miles north of Teposcolula, arid, almost treeless valley, altitude 7000 feet.

Tapanatepec, Juchitán District: Town 60 miles east of Juchitán on Cristóbal Colón Highway, tropical woods and grass-covered hills.

Tarabundí, Ixtlán District: Ranch at settlement of Campamento Vista Hermosa, cloud forest, altitude about 5000 feet, on Oaxaca de Juárez-Tuxtepec road.

Tehuantepec, Tehuantepec District: District capital on the Río Tehuantepec 10 miles from the coast.

Temaxcaltepec, Juquila District: Town 7 miles southeast of Juquila.

Tenango, Tehuantepec District: Town 25 miles west of Tehuantepec, oak stands, large rocks, and grassland, altitude about 5000 feet.

Tenochtitlán, Chiapas State: Settlement on the Juchitán and Cintalapa, Chiapas, border, 14 miles northeast of Tapanatepec, altitude about 3000 feet.

Teotepec, Juquila District: Town 8 miles southeast of Juquila.

Teotitlán del Camino, Teotitlán District: District capital in a semi-arid valley irrigated for sugarcane, altitude 950 meters.

Tequisistlán, Tehuantepec District: Town 25 miles west of Tehuantepec, dry xerophytic woods, altitude about 600 feet.

Tierra Blanca, Coixtlahuaca District: Town 9 miles north of Coixtlahuaca.

Tlacolula, Tlacolula District: District capital, in the Valley of Oaxaca de Juárez, mainly cultivated land, altitude about 5500 feet.

Tlapacingo (Tlapalcingo), Silacayoapam District: Town 15 miles west of district capital.

Tlaxiaco, Tlaxiaco District: District capital.

Tolosa (Donaji), Juchitán District: Small town 5 kilometers north of Tolosita.

Tolosita, Juchitán District: Town on railroad across the Isthmus of Tehuantepec, 10 miles south of Veracruz border, moist low-altitude area, much lumbered, cleared for ranching.

Totolapan, Tlacolula District: Town 48 miles southeast of Oaxaca de Juárez.

Totontepec, Mixes District: Town 45 miles northeast of Oaxaca de Juárez, dense oak forests with cleared pastures, humid, altitude about 6000 feet.

Tutla, Huajuápam District: Small town on the highway 20 kilometers southeast of Huajuápam.

Tuxtepec, Tuxtepec District: District capital.

Ubero, Juchitán District: Town 5 miles north of Tolosita, climate wet, altitude about 100 feet.

Unión Hidalgo, Juchitán District: Town 12 miles east of Juchitán.

Valle Nacional, Tuxtepec District: Town 25 miles southwest of Tuxtepec on large river of same name; moist land in rich valley, tobacco important crop; within the town are numerous large fruit and other trees, also coconut palms; altitude about 40 feet.

Vista Hermosa, Teposcolula District: Town 6 miles northeast of Tamazulápam.

Vista Hermosa (Campamento), Ixtlán District: Settlement above Valle Nacional.

Xanaguia, Miahuatlán District: Town 4 miles northeast of Lovene, rugged area with large rocks, mixed hardwoods, altitude about 6000 feet.

Yaitepec, Juquila District: Town 2 miles east of Juquila.

Yanhuitlán, Nochixtlán District: Town 50 miles northwest of Oaxaca de Juárez.

Yetla, Tuxtepec District: Town 3 miles southwest of Valle Nacional, altitude 900 feet.

Yolox, Ixtlán District: Town 25 miles north of Ixtlán.

Zaachila, Tehuantepec District: Settlement 7 miles southeast of Huamelula on coastal plains, dry woods and stands of sabal palms (*Sabal mexicana*).

Zacatepec, Putla District: Town 18 miles south of Putla, open rolling grassland, milpas, tobacco patches, soil sandy, climate moderately moist, altitude about 3000 feet.

Zacatepec, Mixes District: District capital.

Zanatepec, Juchitán District: Town 45 miles east of Juchitán on the Cristóbal Colón Highway.

Zanatepec Hills, Juchitán District: Hills 4 miles north of Zanatepec.

Zapotitlán, Yautepec District: Town 32 miles southwest of Tenango, principally oaks and mixed hardwoods, climate moderately dry, altitude about 4000 feet.

Zarzamora, Yautepec District: Abandoned ranch 15 miles west of Tequisistlán, magueyes (*Agave* spp.) and, just above ranch, steep dry slopes with a zone of dwarf oaks (*Quercus "oleoides"*), altitude about 3000 feet.

Zempoaltepec, Mixes District: Mountain peak 14 miles south of Totontepec, altitude 8000–10,500 feet.

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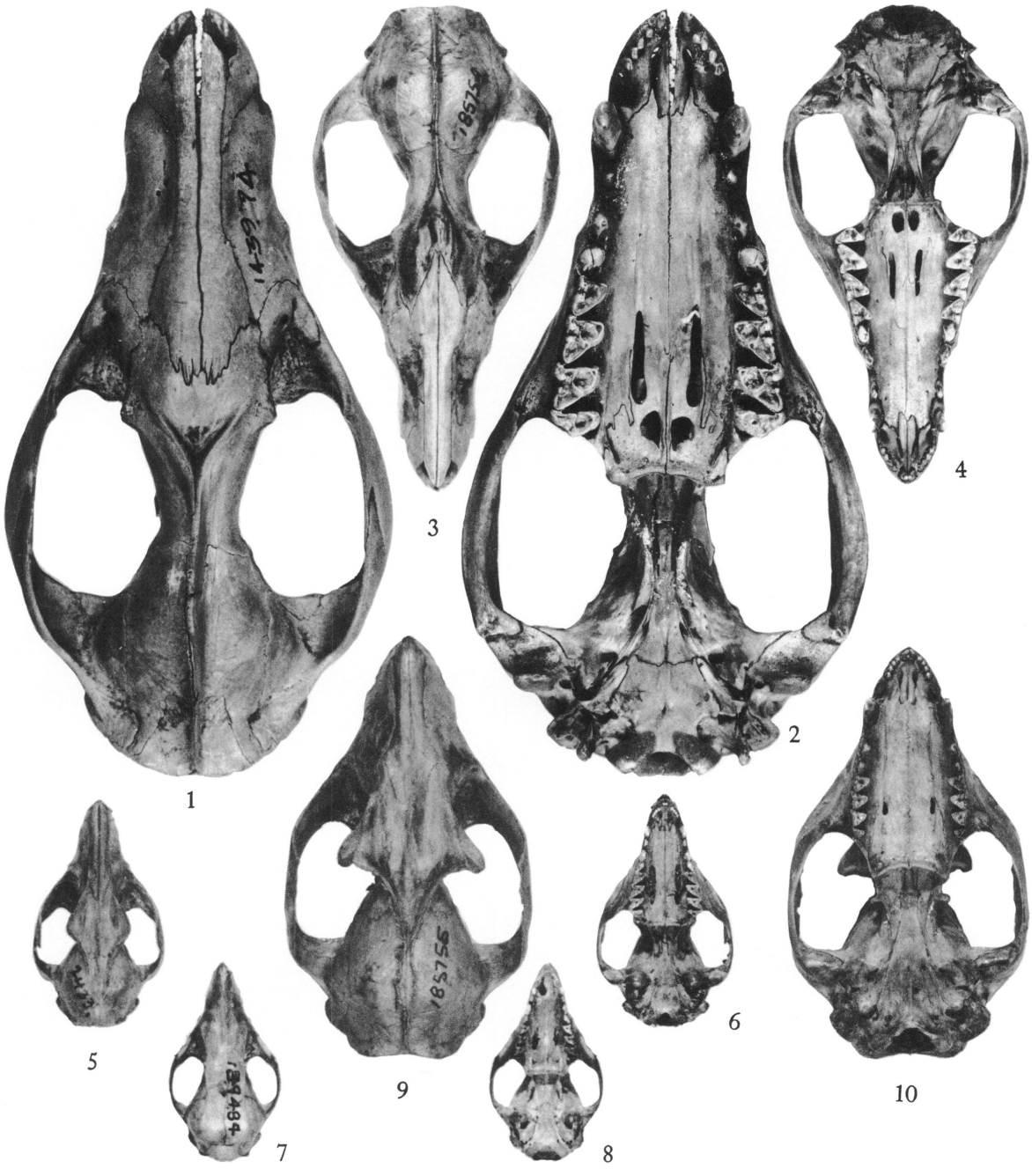
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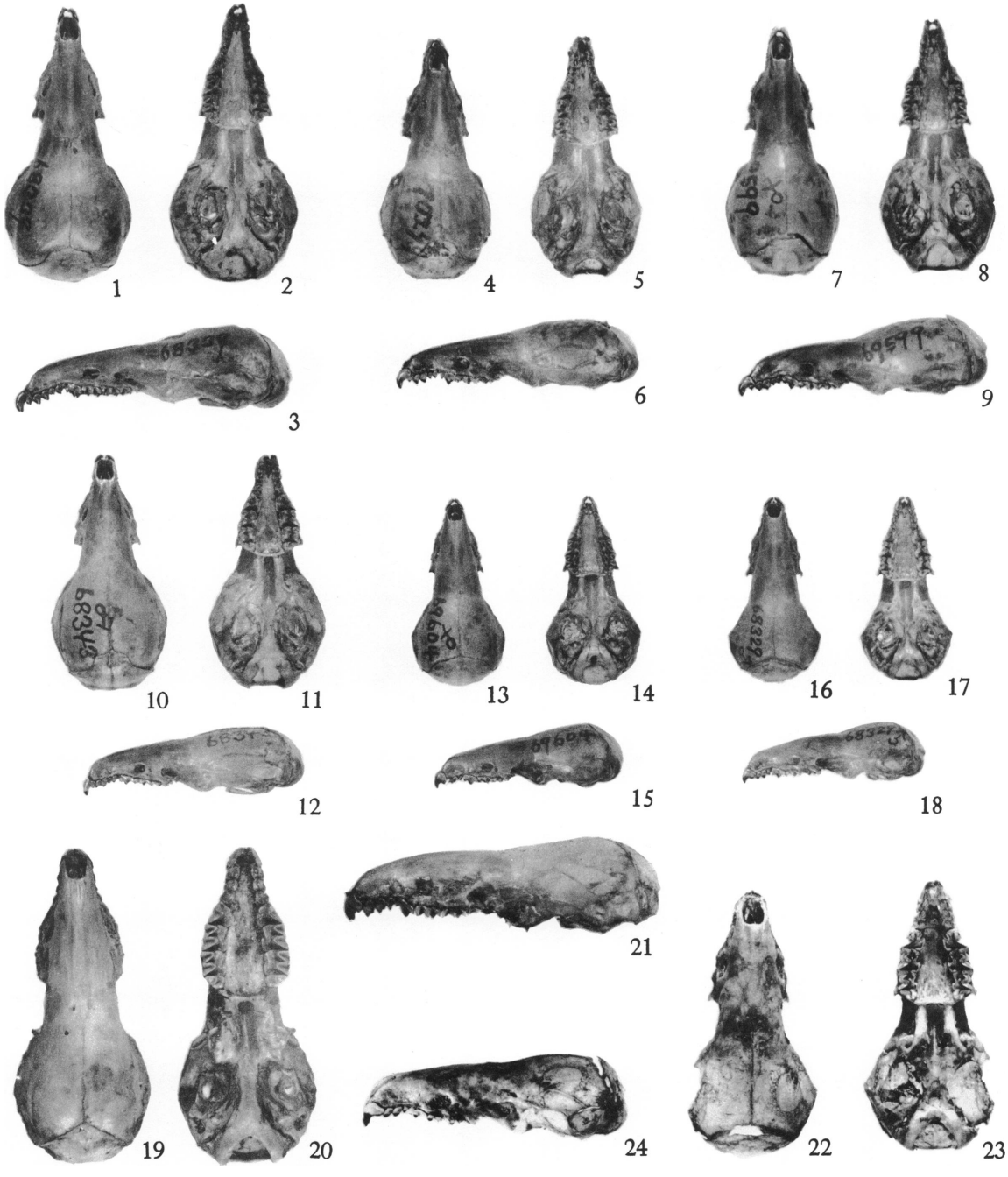
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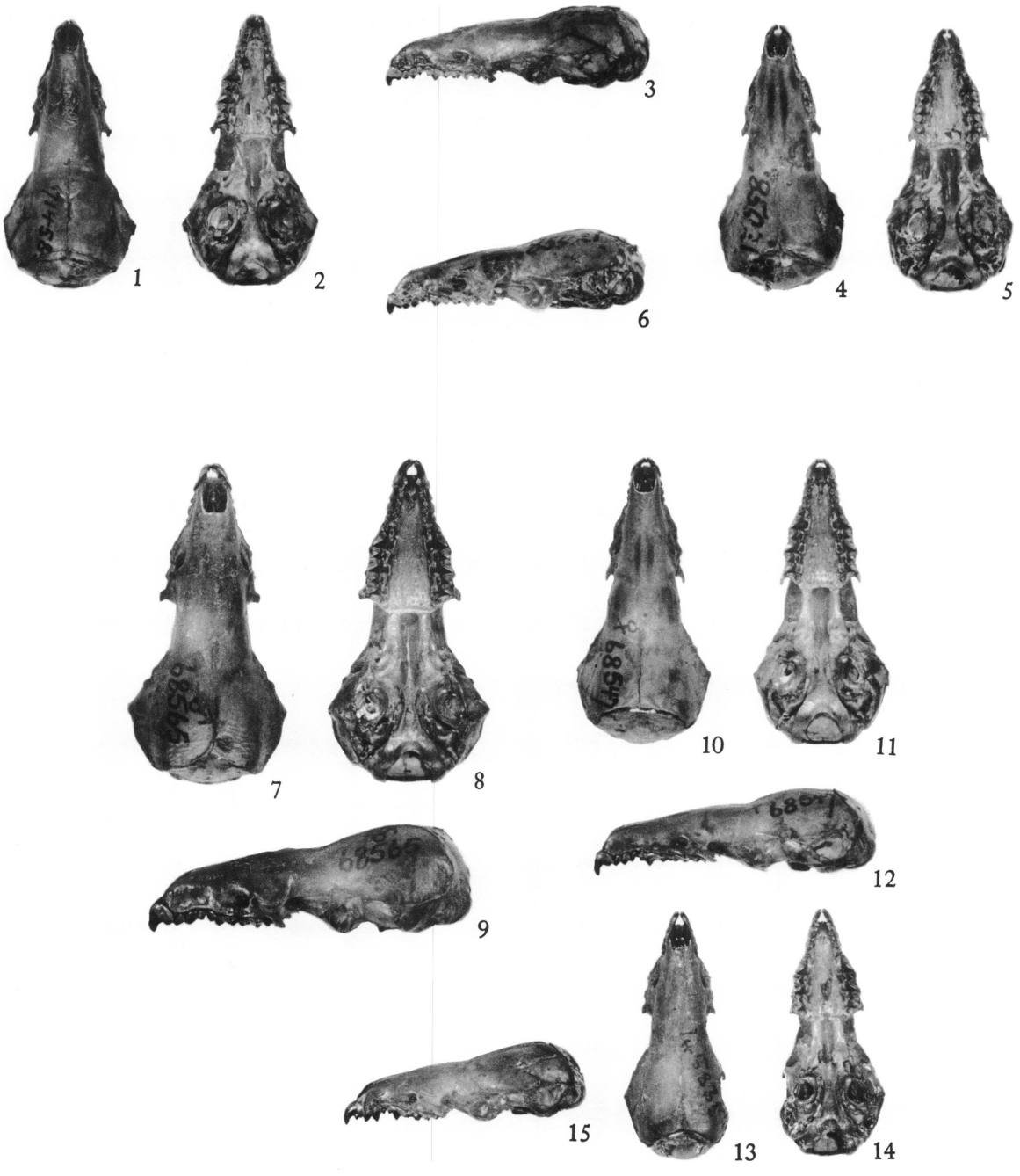
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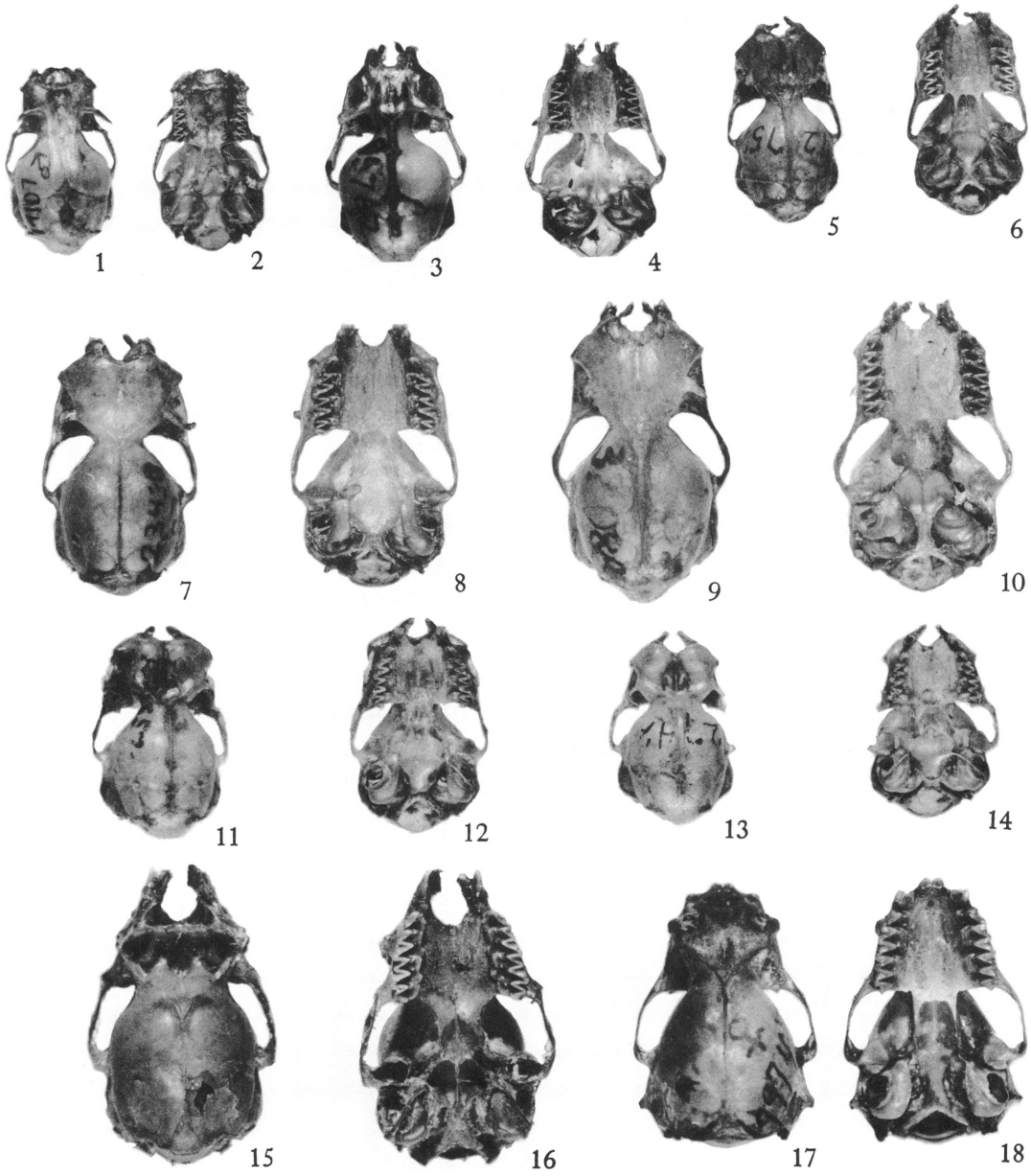
1–10. Dorsal and ventral views, respectively, of crania of *Didelphis*, *Philander*, *Marmosa*, and *Caluromys* from Oaxaca. 1, 2. *Didelphis marsupialis californica*, adult male, A.M.N.H. No. 143974, from Tehuantepec. 3, 4. *Philander opossum pallidus*, adult male, A.M.N.H. No. 185754, from Río Sarabia. 5, 6. *Marmosa canescens canescens*, adult male, A.M.N.H. No. 3111/2433, type, from Santo Domingo de Guzmán. 7, 8. *Marmosa mexicana mexicana*, adult female, A.M.N.H. No. 189484, from San Gabriel Mixtepec. 9, 10. *Caluromys derbianus aztecus*, adult male, A.M.N.H. No. 185756, from Sarabia. All ×1



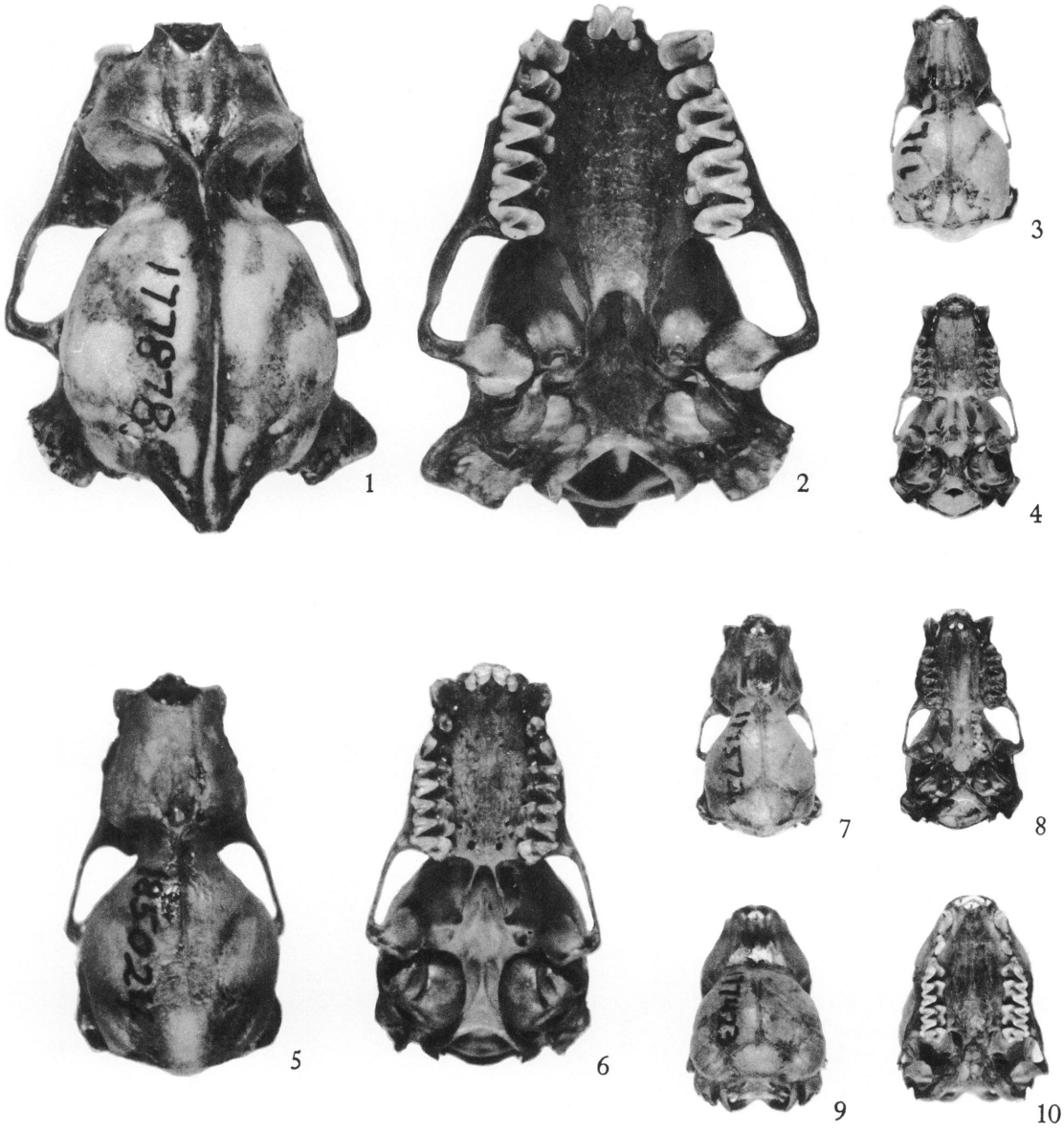
1–24. Dorsal, ventral, and lateral views, respectively, of crania of *Sorex*, *Cryptotis*, and *Notiosorex* from Oaxaca. 1–3. *Sorex veraepacis mutabilis*, adult male, U.S.N.M. No. 68339, from Mt. Zempoaltepec. 4–6. *Sorex saussurei saussurei*, adult female, U.S.N.M. No. 70249, from Tamazulapan. 7–9. *Sorex s. veraecrucis*, adult female, U.S.N.M. No. 69599, from Reyes. 10–12. *Sorex oreopolus ventralis*, adult male, U.S.N.M. No. 68343, from Cerro San Felipe. 13–15. *Cryptotis mexicana mexicana*, adult female, U.S.N.M. No. 69604, from Reyes. 16–18. *Cryptotis m. peregrina*, adult, sex?, U.S.N.M. No. 68329, from 15 miles west of Oaxaca de Juárez. 19–21. *Notiosorex gigas*, adult female, A.M.N.H. No. 212190, from San Vicente. 22–24. *Notiosorex phillipsii*, adult female, I.B. No. 8446, from Guajolote. All ×2



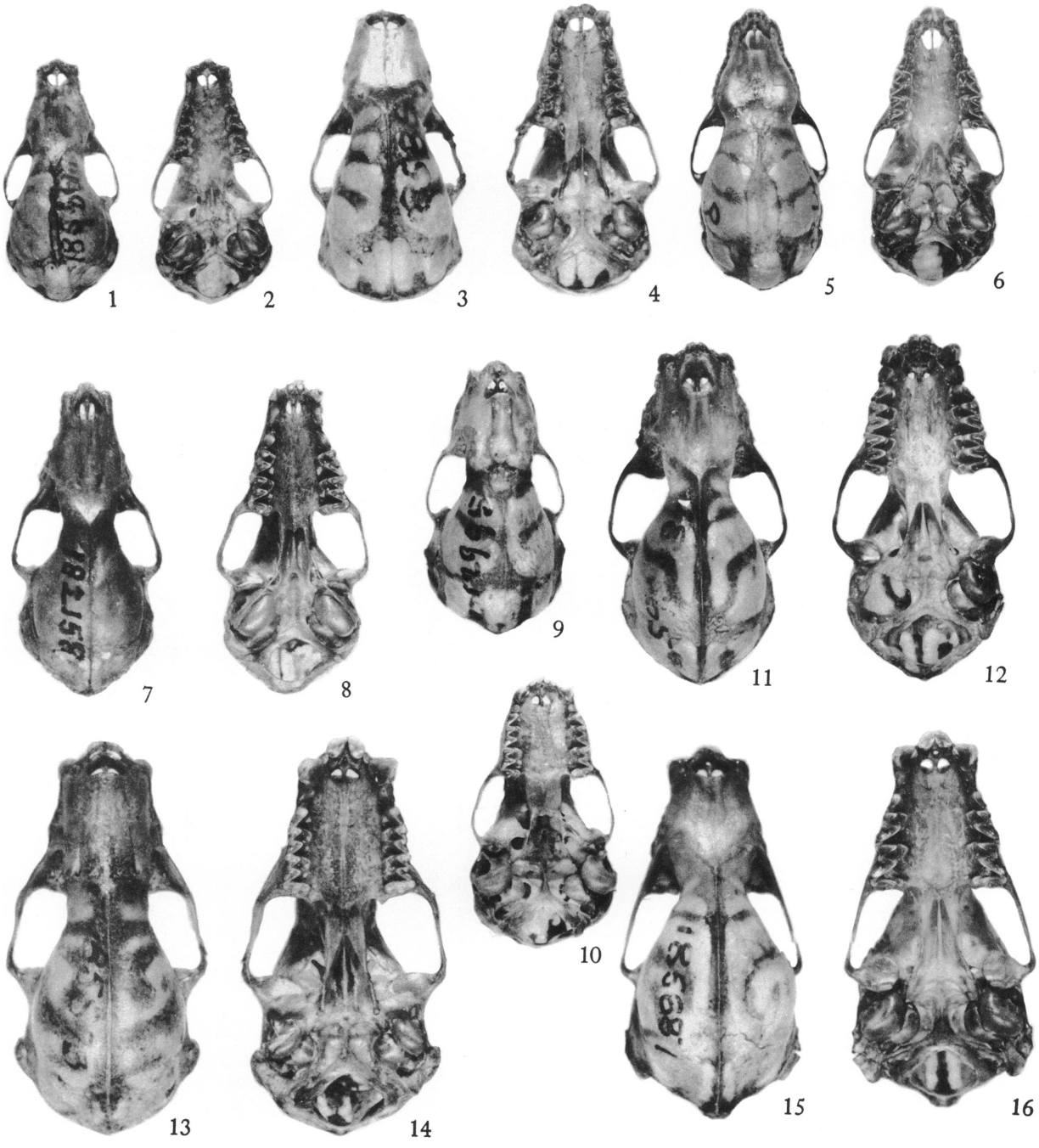
1–15. Dorsal, ventral, and lateral views, respectively, of crania of *Cryptotis* from Oaxaca. 1–3. *Cryptotis mexicana machetes*, adult female, U.S.N.M. No. 71458, from Ozolotepec. 4–6. *Cryptotis frontalis*, adult, A.M.N.H. No. 185021, from Mixtequilla. 7–9. *Cryptotis magna*, adult male, U.S.N.M. No. 68565, from Zempoaltepec. 10–12. *Cryptotis fossor*, adult female, U.S.N.M. No. 68547, from Zempoaltepec. 13–15. *Cryptotis celatus*, adult male, A.M.N.H. No. 145838, type, from Las Cuevas. All ×2



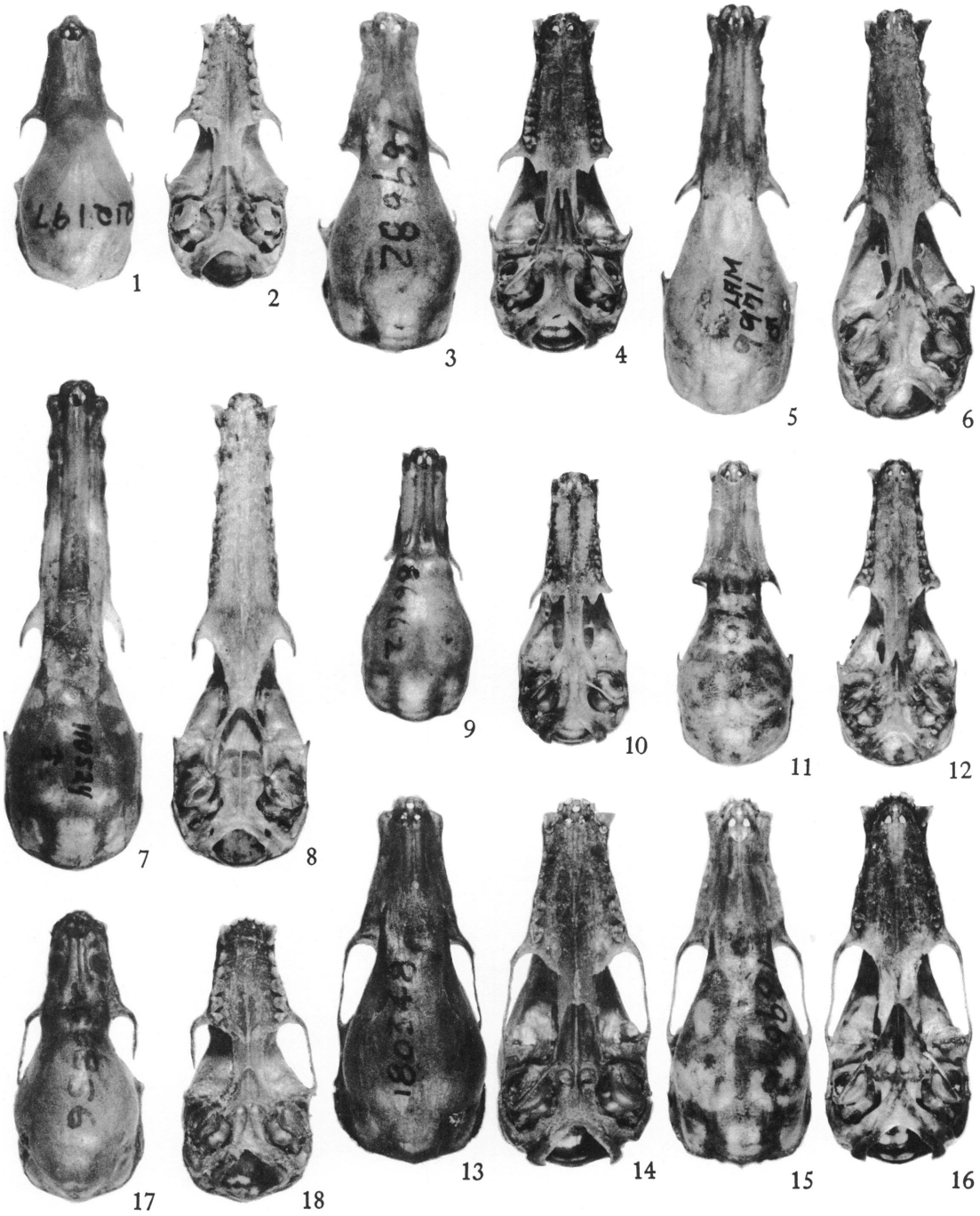
1–18. Dorsal and ventral views, respectively, of crania of emballonurids and a molossid from Oaxaca and some other areas. 1, 2. *Rhynchonycteris naso*, adult male, K.U. No. 19107, from Río Blanco. 3, 4. *Saccopteryx bilineata*, adult female, A.M.N.H. No. 185762, from Río Sarabia. 5, 6. *Peropteryx macrotis macrotis*, adult female, A.M.N.H. No. 172752, from Tolosita. 7, 8. *Peropteryx kappleri kappleri*, adult male, K.U. No. 23438, from Río Chalchijapa. 9, 10. *Centronycteris maximiliani centralis*, adult, sex?, K.U. No. 32088, from Río Chalchijapa. 11, 12. *Balantiopteryx plicata plicata*, adult female, A.M.N.H. No. 189571, from La Ventosa. 13, 14. *Balantiopteryx io*, adult female, A.M.N.H. No. 172742, from 8 miles south of Veracruz-Oaxaca border. 15–16. *Diclidurus albus virgo*, adult female, I.P.M.No. 1881, from Río Tonto. 17, 18. *Molossops greenhalli*, adult female, K. U. No. 99747, from Sola de Vega. All ×2



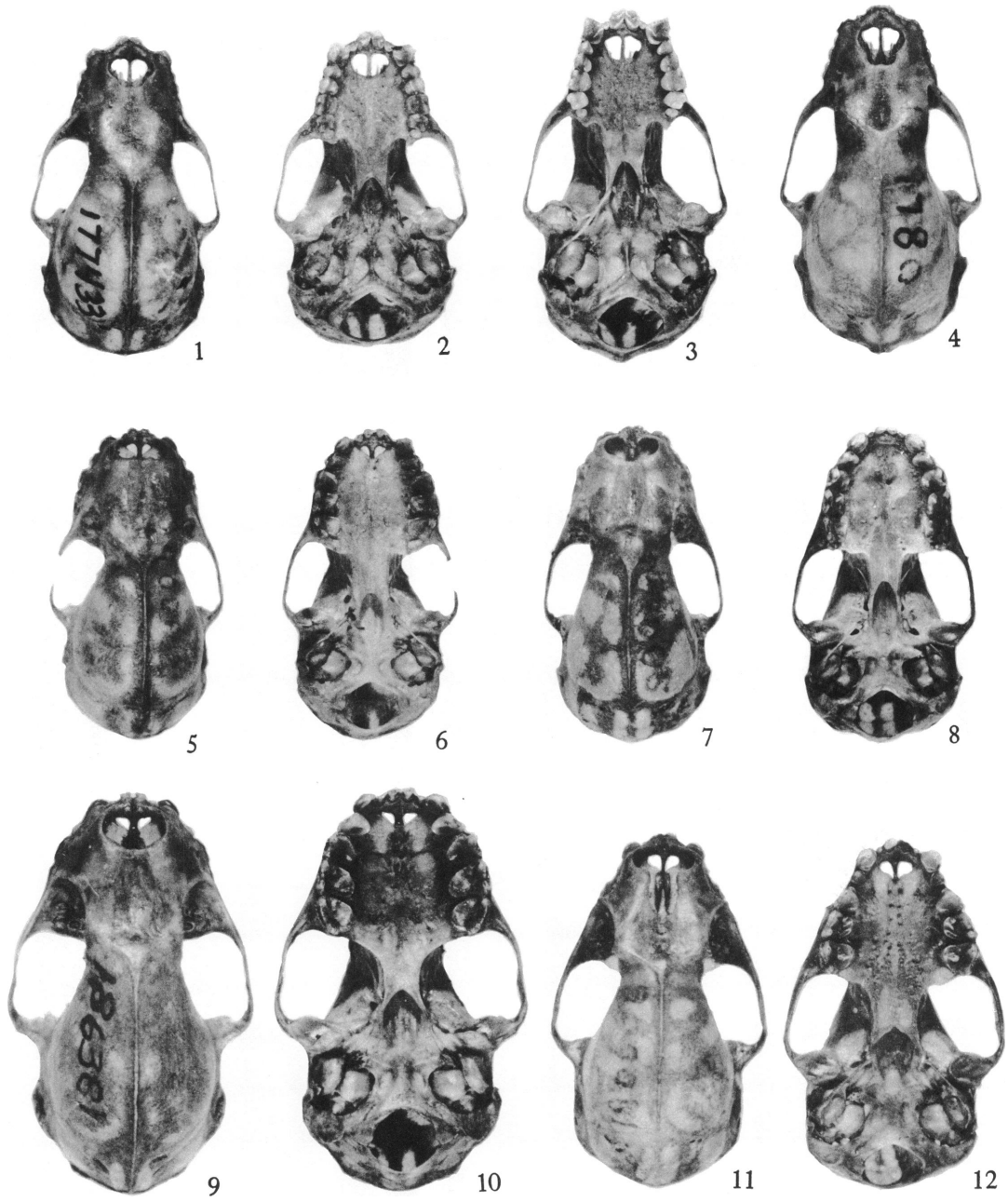
1–10. Dorsal and ventral views, respectively, of crania of noctilionids and the Chilonycterinae from Oaxaca. 1, 2. *Noctilio leporinus mexicanus*, adult male, A.M.N.H. No. 177879, from Tapanatepec. 3, 4. *Pteronotus personata psilotis*, adult male, A.M.N.H. No. 177711, from Tapanatepec. 5, 6. *Pteronotus rubiginosa mexicana*, adult female, A.M.N.H. No. 185024, from Chontecomatlán. 7, 8. *Pteronotus davyi fulvus*, adult male, A.M.N.H. No. 177521, from Tapanatepec. 9, 10. *Mormoops megalophylla megalophylla*, adult male, A.M.N.H. No. 177423, from Tapanatepec. All ×2



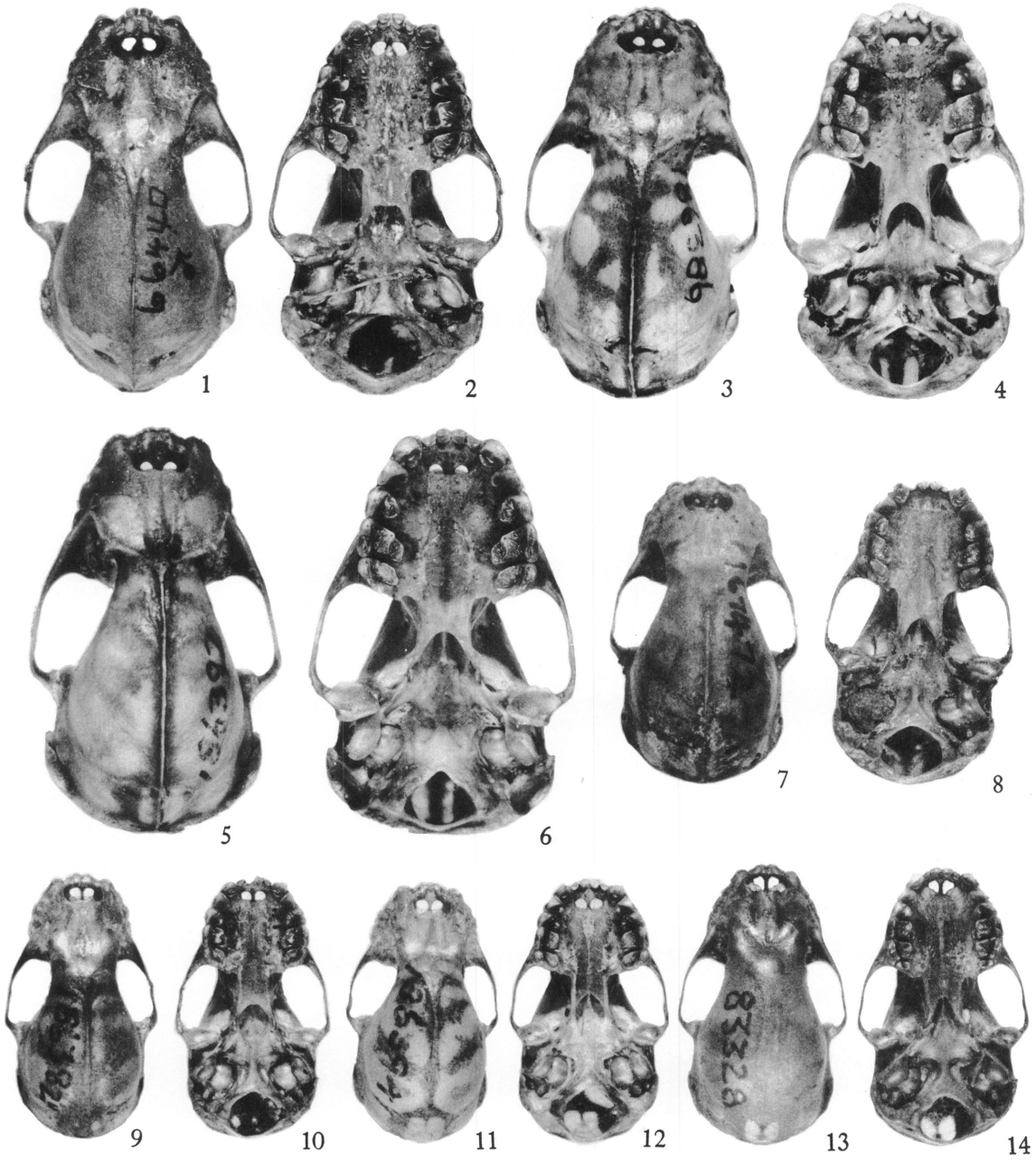
1–16. Dorsal and ventral views, respectively, of crania of the Phyllostominae from Oaxaca. 1, 2. *Micronycteris megalotis mexicana*, adult male, A.M.N.H. No. 189597, from Chiltepec. 3, 4. *Micronycteris brachyotis*, adult male, A.M.N.H. No. 185856, from Mazahuito. 5, 6. *Mictonycteris sylvestris*, adult female, K.U. No. 23645, from Tlacatepec. 7, 8. *Macrotus waterhousii mexicanus*, adult male, A.M.N.H. No. 182158, from Arroyo Ocotita. 9, 10. *Lonchorhina aurita aurita*, adult female, L.A.C.M. No. 12980, from Matías Romero. 11, 12. *Mimon benettii cozumelae*, adult male, A.M.N.H. No. 185865, from Matías Romero. 13, 14. *Phyllostomus discolor verrucosus*, adult male, A.M.N.H. No. 185873, from Río Sarabia. 15, 16. *Trachops cirrhosus coffini*, adult male, A.M.N.H. No. 185887, from Matías Romero. All ×2



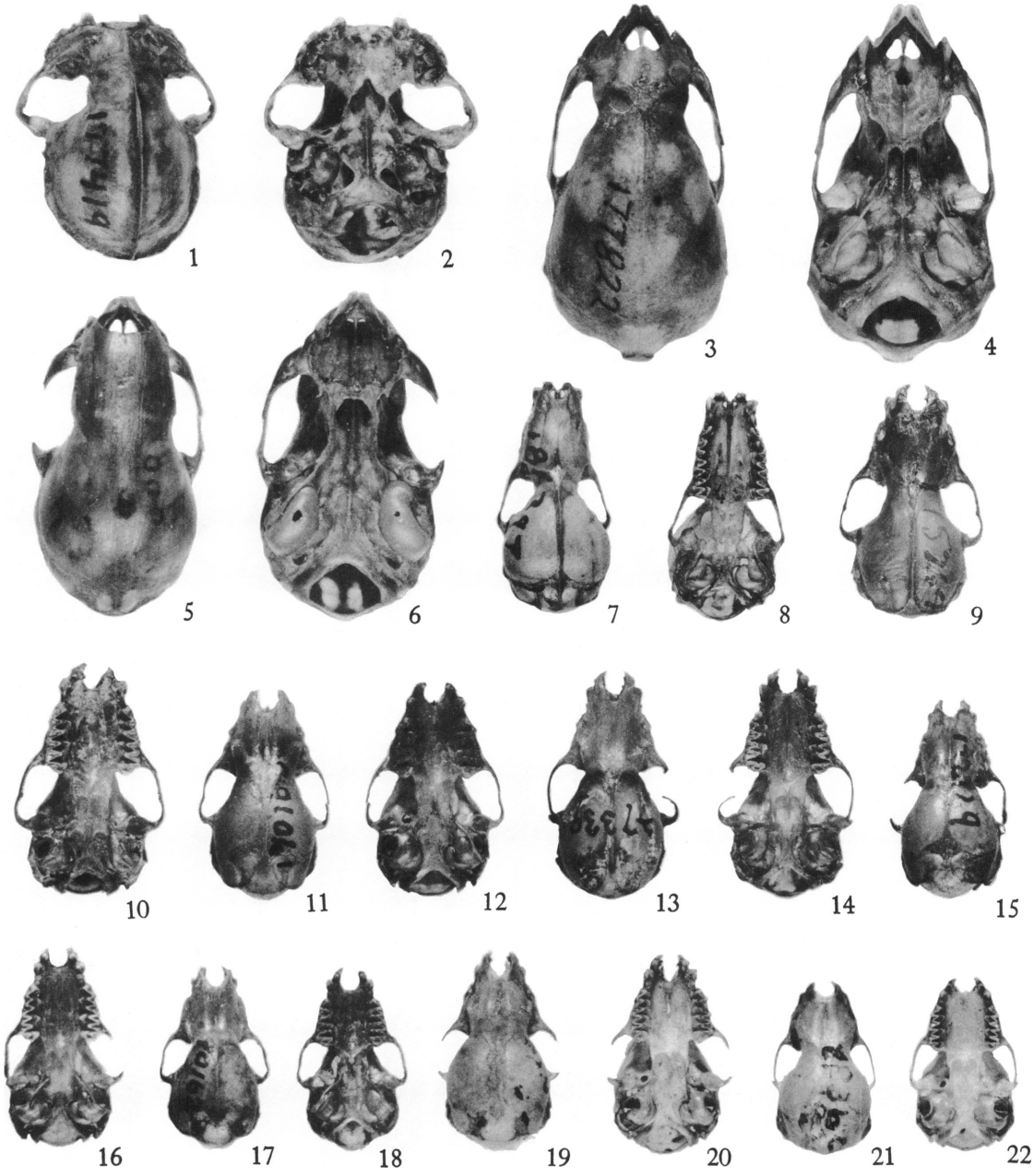
1–18. Dorsal and ventral views, respectively, of crania of the Glossophaginae from Oaxaca and some other areas. 1, 2. *Glossophaga soricina leachii*, adult male, A.M.N.H. No. 212197, from Pinotepa Nacional. 3, 4. *Anoura geoffroyi lasiopyga*, adult male, A.M.N.H. No. 189682, from San Gabriel Mixtepec. 5, 6. *Choeronycteris mexicana*, adult male, L.A.C.M. No. 9971, from Mitla. 7, 8. *Musionycteris harrisoni*, adult male, U.M. No. 110524, from Zumpango. 9, 10. *Choeroniscus godmani*, adult female, A.M.N.H. No. 186162, from Río Sarabia. 11, 12. *Hylonycteris underwoodi*, adult male, A.M.N.H. No. 189687, from Chiltepec. 13, 14. *Leptonycteris nivalis*, adult female, A.M.N.H. No. 180348, from Tequesqui-Tenango. 15, 16. *Leptonycteris verbabuenae*, adult female, A.M.N.H. No. 189696, from Sola de Vega. 17, 18. *Glossophaga commissarisi*, adult male, A.M.N.H. No. 206856, from Sierra Madre north of Zanatepec. All ×2



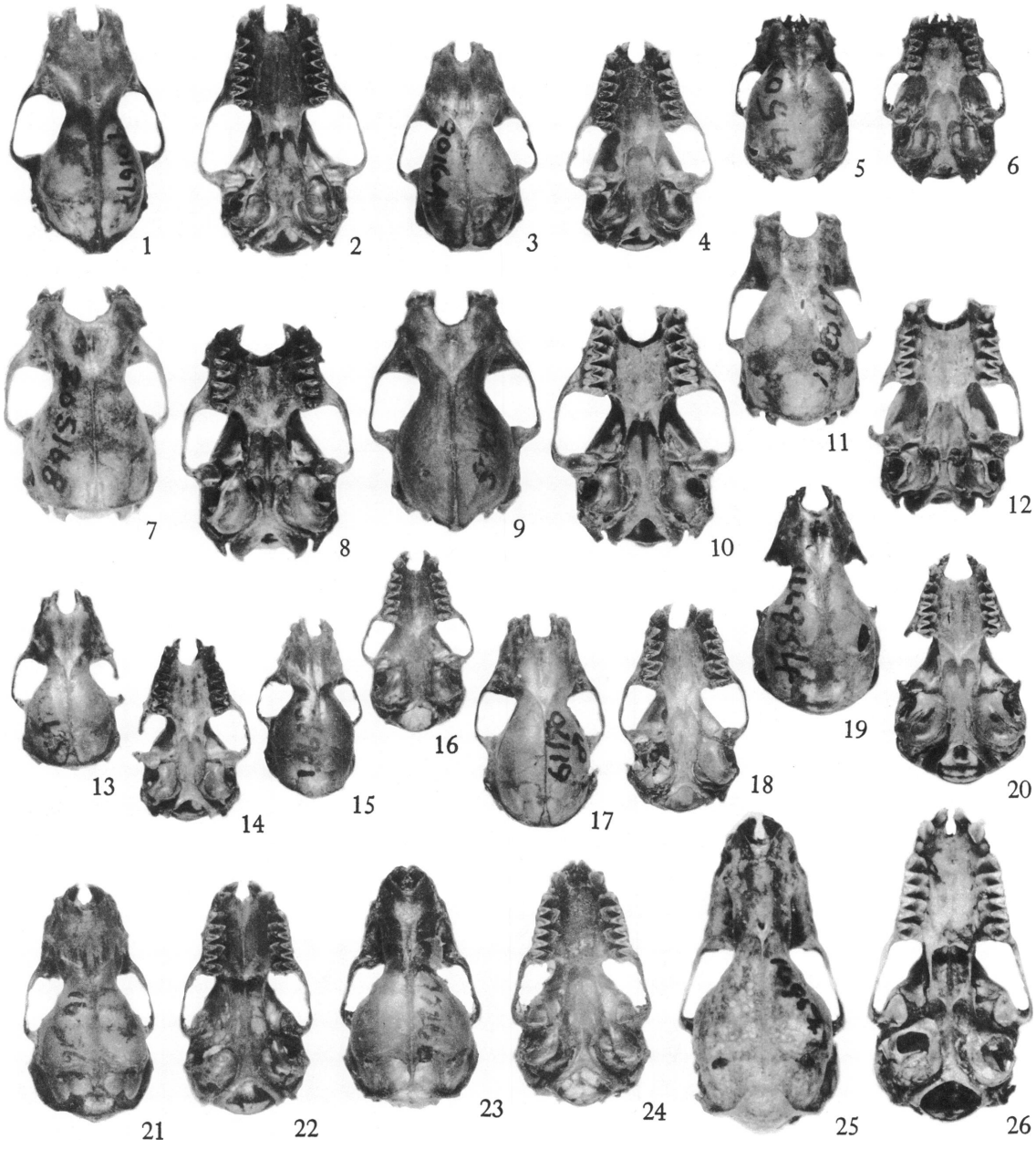
1–12. Dorsal and ventral views, respectively, of crania of the Sturnirinae and Stenoderminae from Oaxaca. 1, 2. *Sturnira lilium parvidens*, adult male, A.M.N.H. No. 177433, from Tapanatepec. 3, 4. *Sturnira ludovici hondurensis*, adult male, A.M.N.H. No. 189780, from 2 miles east of San Gabriel Mixtepec. 5, 6. *Uroderma bilobatum bilobatum*, adult female, A.M.N.H. No. 190002, from La Ventosa. 7, 8. *Vampyrops helleri*, adult female, A.M.N.H. No. 190005, from Chiltepec. 9, 10. *Vampyrodes caraccioloi major*, adult male, A.M.N.H. No. 186381, from Río Sarabia. 11, 12. *Chiroderma villosum jesupi*, adult female, A.M.N.H. No. 190006, from Sola de Vega. All ×2



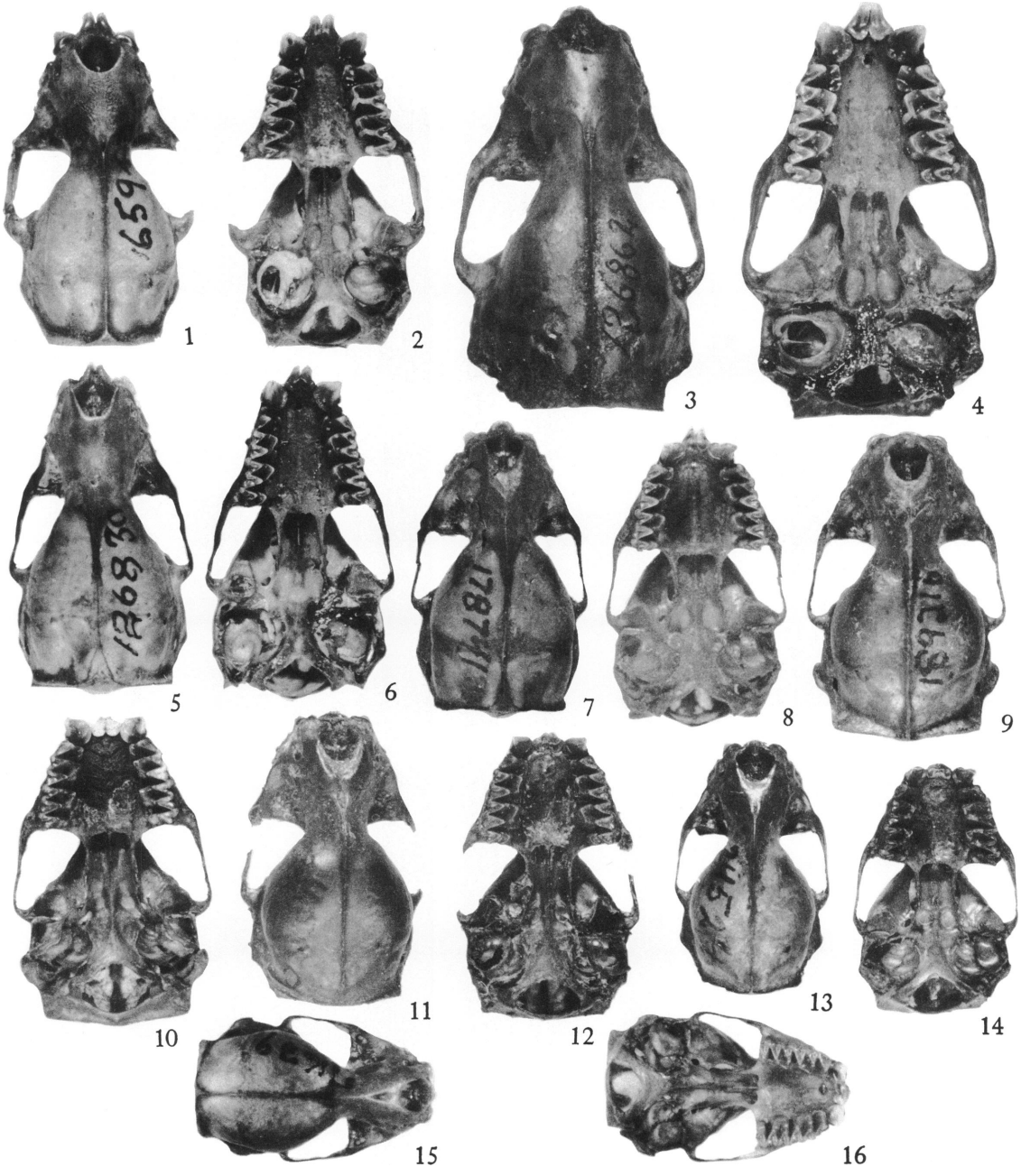
1–14. Dorsal and ventral views, respectively, of crania of the Stenoderminae from Oaxaca and some other areas. 1, 2. *Artibeus hirsutus*, adult male, K.U. No. 66440, from Teloloapan. 3, 4. *Artibeus jamaicensis yucatanicus*, adult male, A.M.N.H. No. 186386, from Río Sarabia. 5, 6. *Artibeus lituratus intermedius*, adult female, A.M.N.H. No. 186392, from Zanatepec. 7, 8. *Artibeus aztecus*, adult male, A.M.N.H. No. 167472, from Santo Tomas Teipan. 9, 10. *Artibeus toltecus*, adult female, A.M.N.H. No. 186382, from Río Sarabia. 11, 12. *Artibeus phaeotis*, adult male, A.M.N.H. No. 186394, from Río Sarabia. 13, 14. *Artibeus hartii*, adult female, F.M.N.H. No. 8338, from Ciudad Guzmán. All ×2



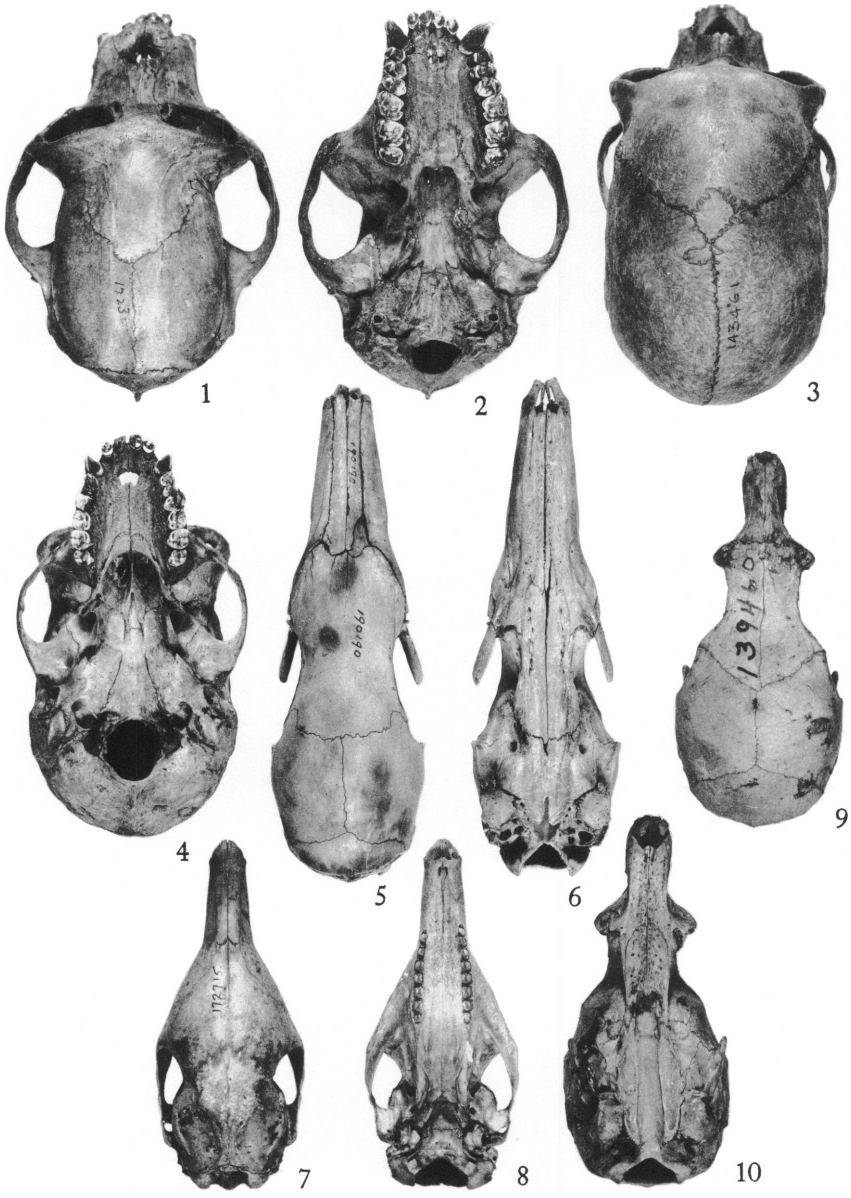
1–22. Dorsal and ventral views, respectively, of crania of the Stenoderminae, desmodontids, natalids, and vespertilionids from Oaxaca and some other areas. 1, 2. *Centurio senex*, adult male, A.M.N.H. No. 177419, from Tapanatepec. 3, 4. *Desmodus rotundus murinus*, adult female, A.M.N.H. No. 177822, from Tapanatepec. 5, 6. *Diphylla ecaudata*, adult male, A.M.N.H. No. 175000, from Xilitla. 7, 8. *Natalus stramineus saturatus*, adult male, A.M.N.H. No. 186397, from El Jicaro. 9, 10. *Myotis velifer velifer*, adult male, A.M.N.H. No. 175264, from Santo Tomas Teipan. 11, 12. *Myotis fortidens*, adult male, A.M.N.H. No. 190163, from Chiltepec. 13, 14. *Myotis thysanodes*, adult, A.M.N.H. No. 27339, from Jalisco. 15, 16. *Myotis californicus mexicanus*, adult male, A.M.N.H. No. 172129, from San Felipe. 17, 18. *Myotis nigricans dalquesti*, adult male, A.M.N.H. No. 190162, from Chiltepec. 19, 20. *Myotis argentatus*, subadult female, U.K. No. 19227, from Río Coatzocoalcos. 21, 22. *Pipistrellus subflavus veraecrucis*, adult male, U.K. No. 29882, from Las Vigas. All ×2



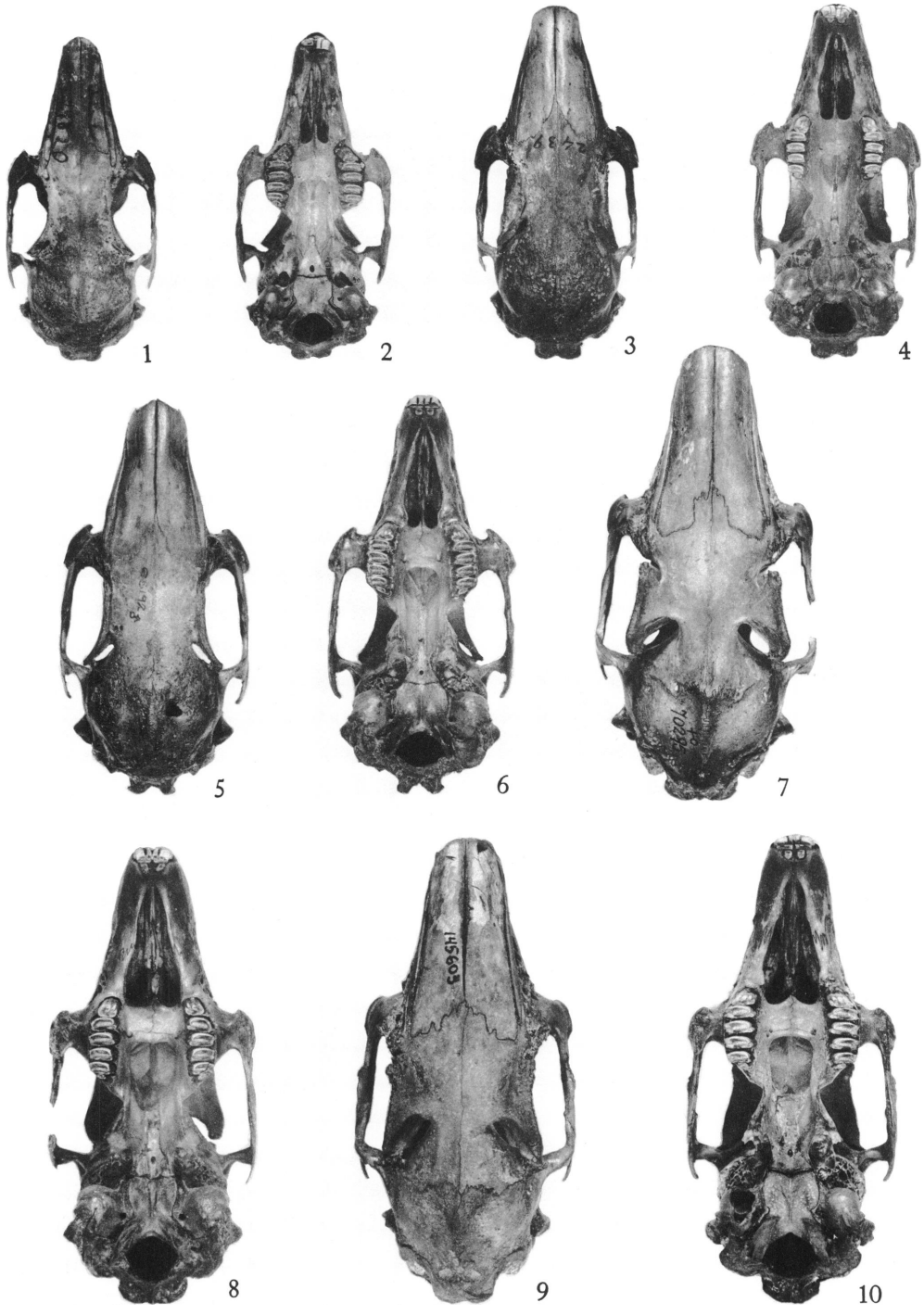
1–26. Dorsal and ventral views, respectively, of crania of vespertilionids and molossids from Oaxaca and some other areas. Vespertilionidae. 1, 2. *Eptesicus fuscus miradorensis*, adult female, A.M.N.H. No. 190167, from Sola de Vega. 3, 4. *Eptesicus gaumeri gaumeri*, adult female, A.M.N.H. No. 90164, from Chiltepec. 5, 6. *Lasiurus borealis frantzii*, adult male, A.M.N.H. No. 97501, from Barrillos. 7, 8. *Lasiurus cinereus cinereus*, adult male, A.M.N.H. No. 205168, from Cerro San Felipe. 9, 10. *Lasiurus intermedius*, adult female, A.M.N.H. No. 167045, from Tehuantepec. 11, 12. *Lasiurus ega panamensis*, adult female, A.M.N.H. No. 190172, from Chiltepec. 13, 14. *Rhogeessa tumida major*, adult male, A.M.N.H. No. 175263, type, from San Bartolo Yautepec. 15, 16. *Rhogeessa gracilis*, adult male, A.M.N.H. No. 186901, from Cerro San Felipe. 17, 18. *Baeodon alleni*, adult male, U.K. No. 61170, from Tamazulapan. 19, 20. *Plecotus townsendii australis*, adult female, A.M.N.H. No. 166984, from Milta. Molossidae. 21, 22. *Tadarida brasiliensis mexicana*, adult, A.M.N.H. No. 165961, from Mazatlán. 23, 24. *Tadarida femorosacca*, adult female, A.M.N.H. No. 175266, from Jalapa. 25, 26. *Tadarida macrotis*, adult male, A.M.N.H. No. 169547, from Cochise County, Arizona. All ×2



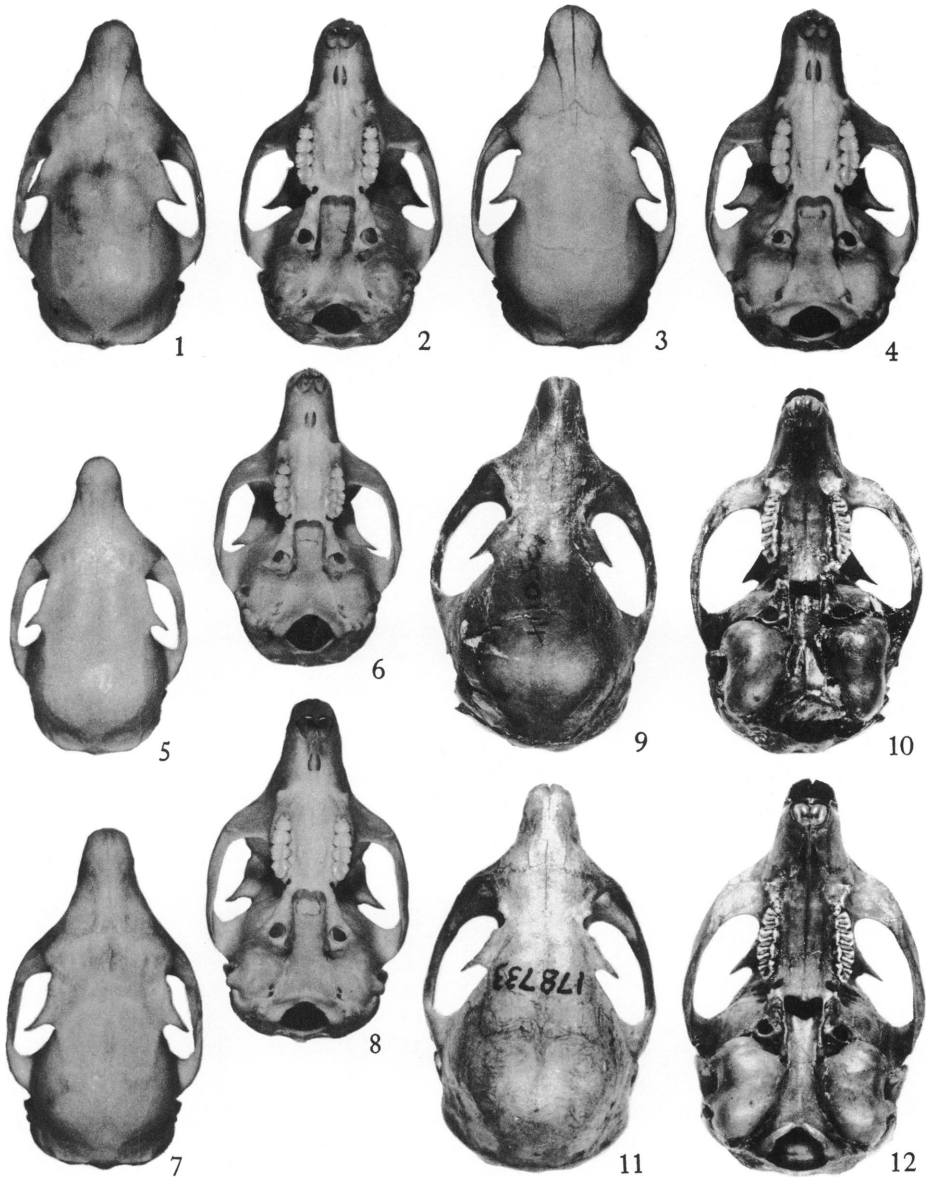
1–16. Dorsal and ventral views, respectively, of crania of molossids from Oaxaca and some other areas. 1, 2. *Eumops auripendulus oaxacensis*, adult male, A.M.N.H. No. 165943, type, from Mazatlán. 3, 4. *Eumops underwoodi underwoodi*, adult male, A.M.N.H. No. 126862, from El Pedrero. 5, 6. *Eumops glaucinus*, adult male, A.M.N.H. No. 126830, from La Cruz Grande. 7, 8. *Promops centralis*, adult male, A.M.N.H. No. 178741, from Tehuantepec. 9, 10. *Molossus ater nigricans*, adult male, A.M.N.H. No. 189216, from Santa María Guienagati. 11, 12. *Molossus macdougalli*, adult female, A.M.N.H. No. 145150, type, from San Blas. 13, 14. *Molossus sinaloae*, adult female, A.M.N.H. No. 24524, type, from Escuinapa. 15, 16. *Molussus aztecus*, adult male, A.M.N.H. No. 171639, from Limón. All ×2



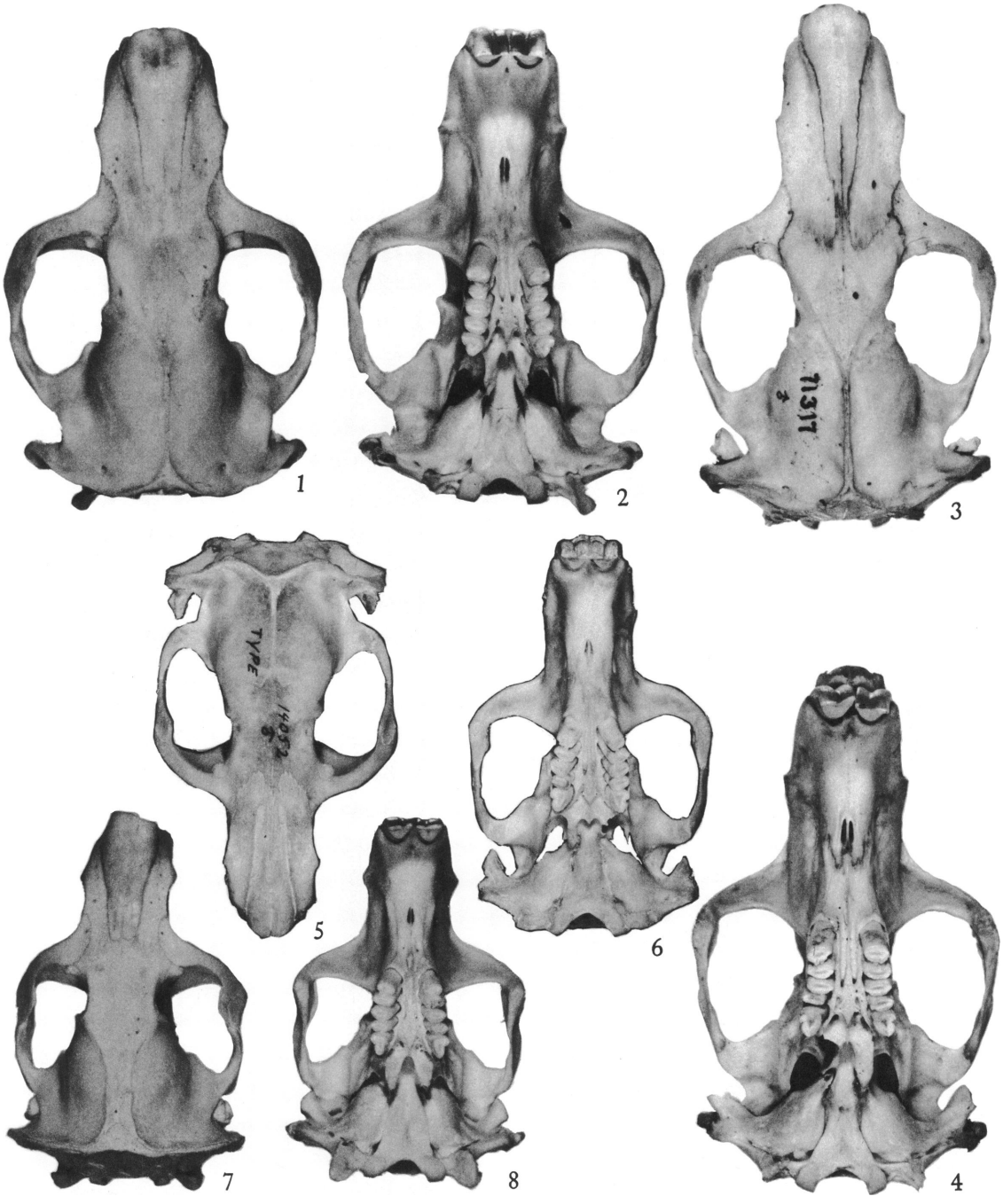
1–10. Dorsal and ventral views, respectively, of primates and edentates from Oaxaca and some other areas. 1, 2. *Alouatta villosa mexicana*, adult male, A.M.N.H. No. 17232, from Pasa Nueva, Veracruz. 3, 4. *Ateles geoffroyi vellerosus*, adult male, A.M.N.H. No. 143461, from Río Grande. 5, 6. *Tamandua tetradactyla mexicana*, adult female, A.M.N.H. No. 190190, from La Ventosa. 7, 8. *Dasypus novemcinctus mexicanus*, adult male, A.M.N.H. No. 172715, from Tapanatepec. 9, 10. *Cyclopes didactylus dorsalis*, adult female, A.M.N.H. No. 139460, from Palmar, Costa Rica. 1–8, ×⅓; 9, 10, ×⅔



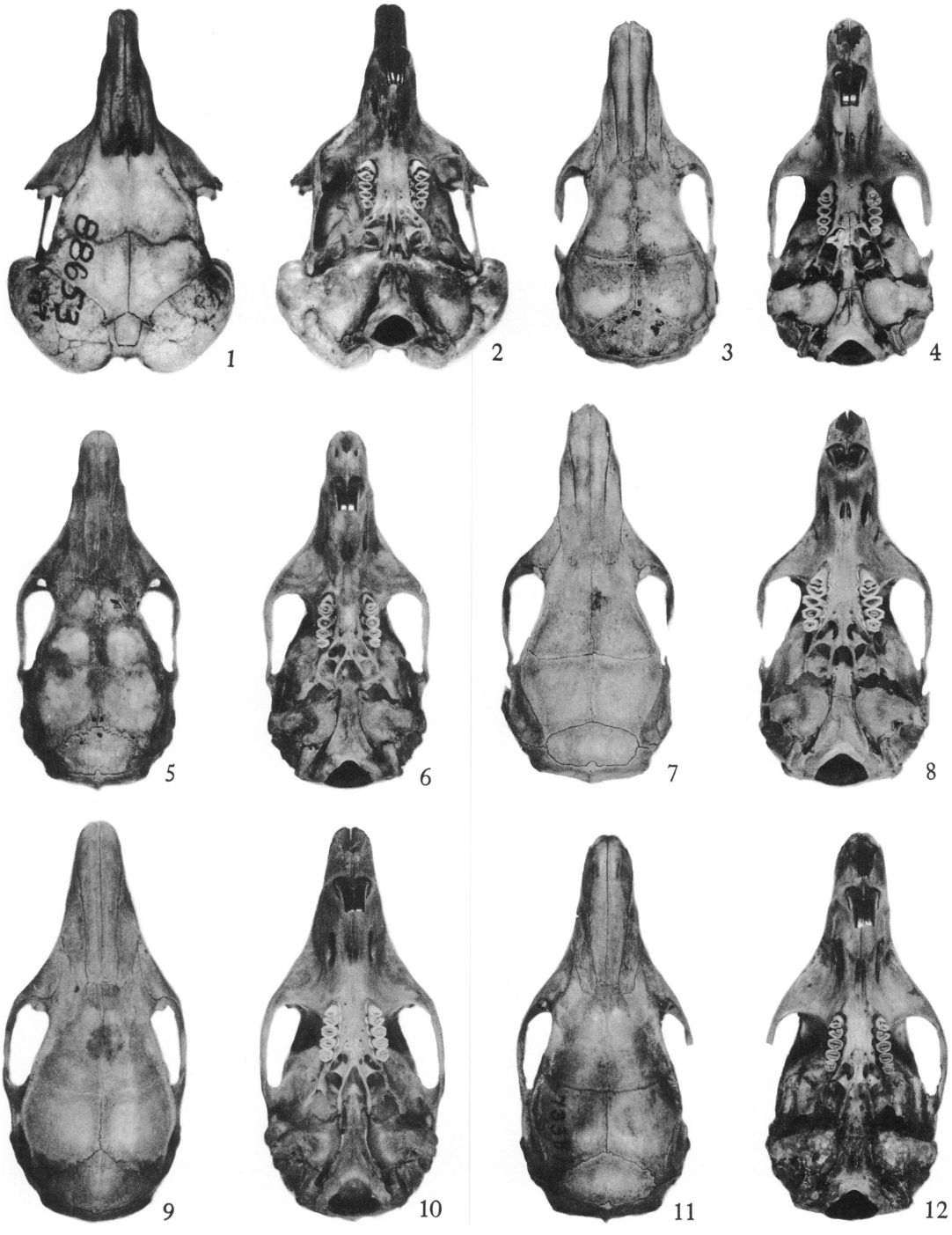
1–10. Dorsal and ventral views, respectively, of crania of *Sylvilagus* and *Lepus* from Oaxaca and some other areas. 1, 2. *Sylvilagus brasiliensis gabbi*, adult female, A.M.N.H. No. 29820, from Pena Blanca. 3, 4. *Sylvilagus floridanus aztecus*, adult male, A.M.N.H. No. 2439, from Tehuantepec. 5, 6. *Sylvilagus cunicularis cunicularis*, adult male, U.S.N.M. No. 68192, from Zempoaltepec. 7, 8. *Lepus callotis callotis*, adult female, U.S.N.M. No. 70295, from Tlapancingo. 9, 10. *Lepus flavigularis*, adult male, A.M.N.H. No. 145603, from Santa María del Mar. All ×½



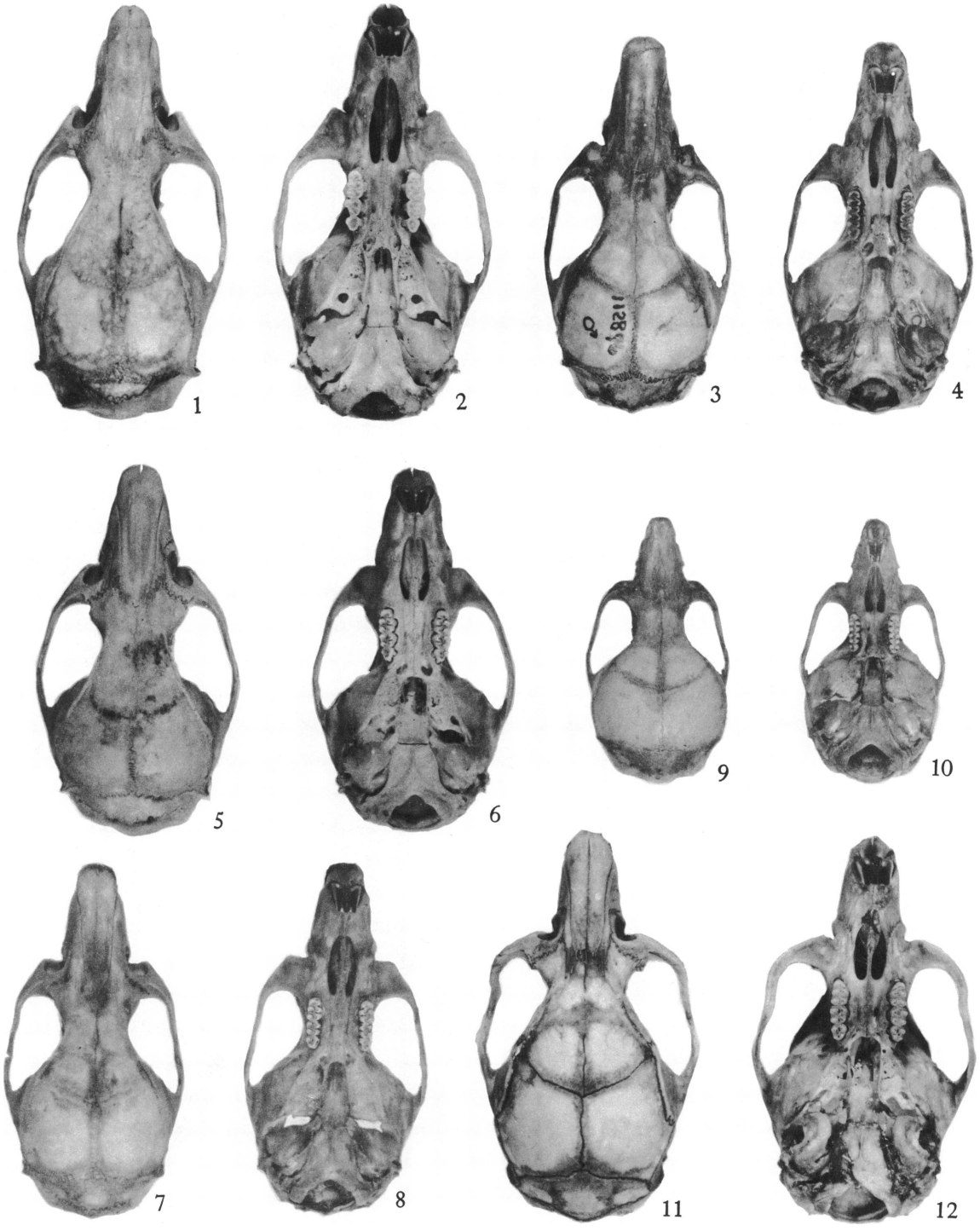
1–12. Dorsal and ventral views, respectively, of crania of *Sciurus* and *Glaucomys* from Oaxaca. 1, 2. *Sciurus aureogaster aureogaster*, adult male, A.M.N.H. No. 186419, from Matías Romero. 3, 4. *Sciurus socialis socialis*, adult female, A.M.N.H. No. 145196, from Potrero Gueladú. 5, 6. *Sciurus deppei deppei*, adult male, A.M.N.H. No. 149003, from La Gloria. 7, 8. *Sciurus poliopus poliopus*, adult male, A.M.N.H. No. 190244, from Sola de Vega. 9, 10. *Glaucomys volans chontali*, adult male, A.M.N.H. No. 185014, type, from Chontecomatlán. 11, 12. *Glaucomys volans oaxacensis*, adult male, A.M.N.H. No. 17833, type, from Jilotepec. 1–8, ×¾; 9–12, ×2



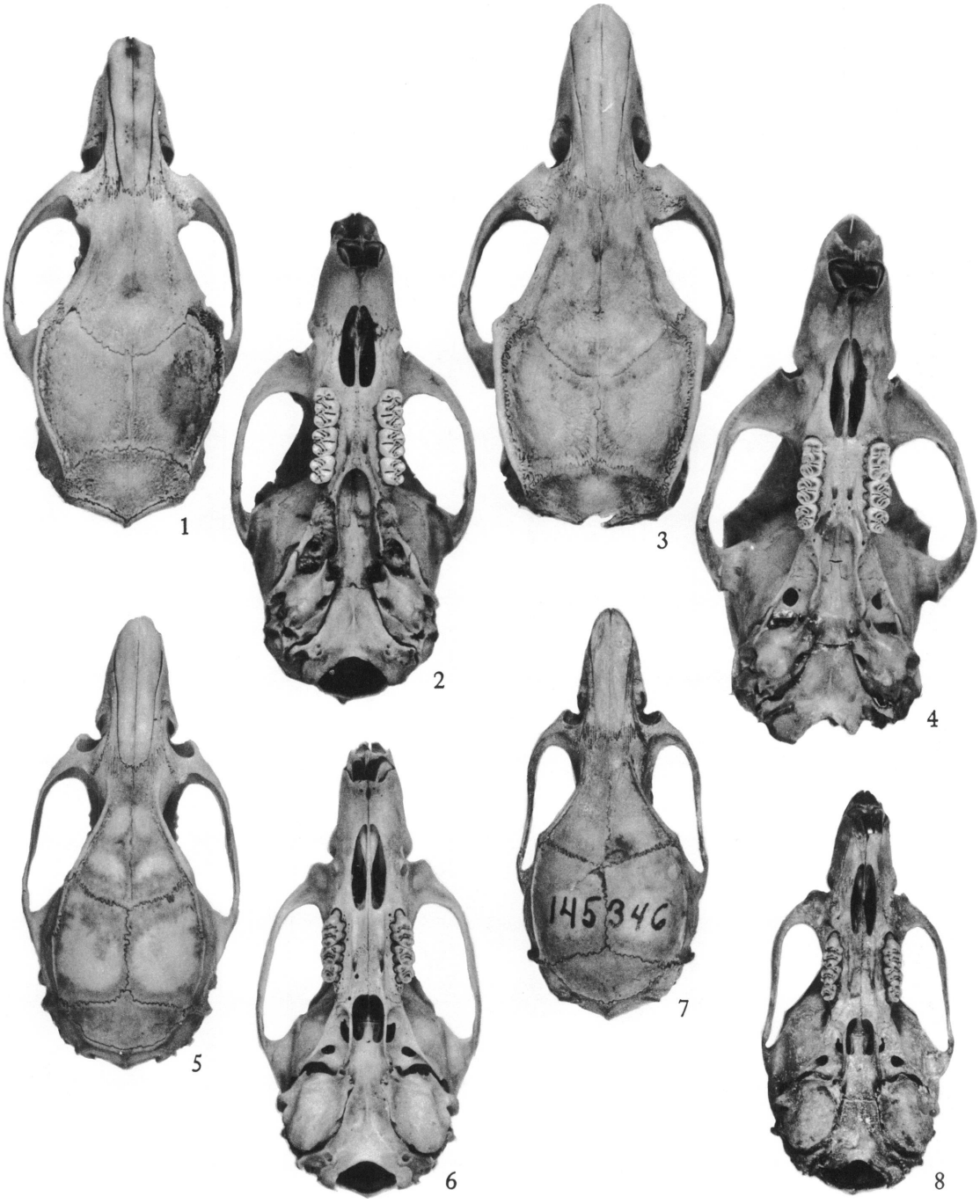
1–8. Dorsal and ventral views, respectively, of crania of *Orthogeomys* and *Heterogeomys* from Oaxaca. 1, 2. *Orthogeomys grandis scalops*, adult male, A.M.N.H. No. 171622, from San Antonio. 3, 4. *Orthogeomys grandis alleni*, U.S.N.M. No. 71317, from Puerto Angel. 5, 6. *Orthogeomys cuniculus*, adult male, F.M.N.H. No. 14052, type, from Zanatepec. 7, 8. *Heterogeomys hispidus tehuantepecus*, adult female, A.M.N.H. No. 165989, from La Gloria. All ×1



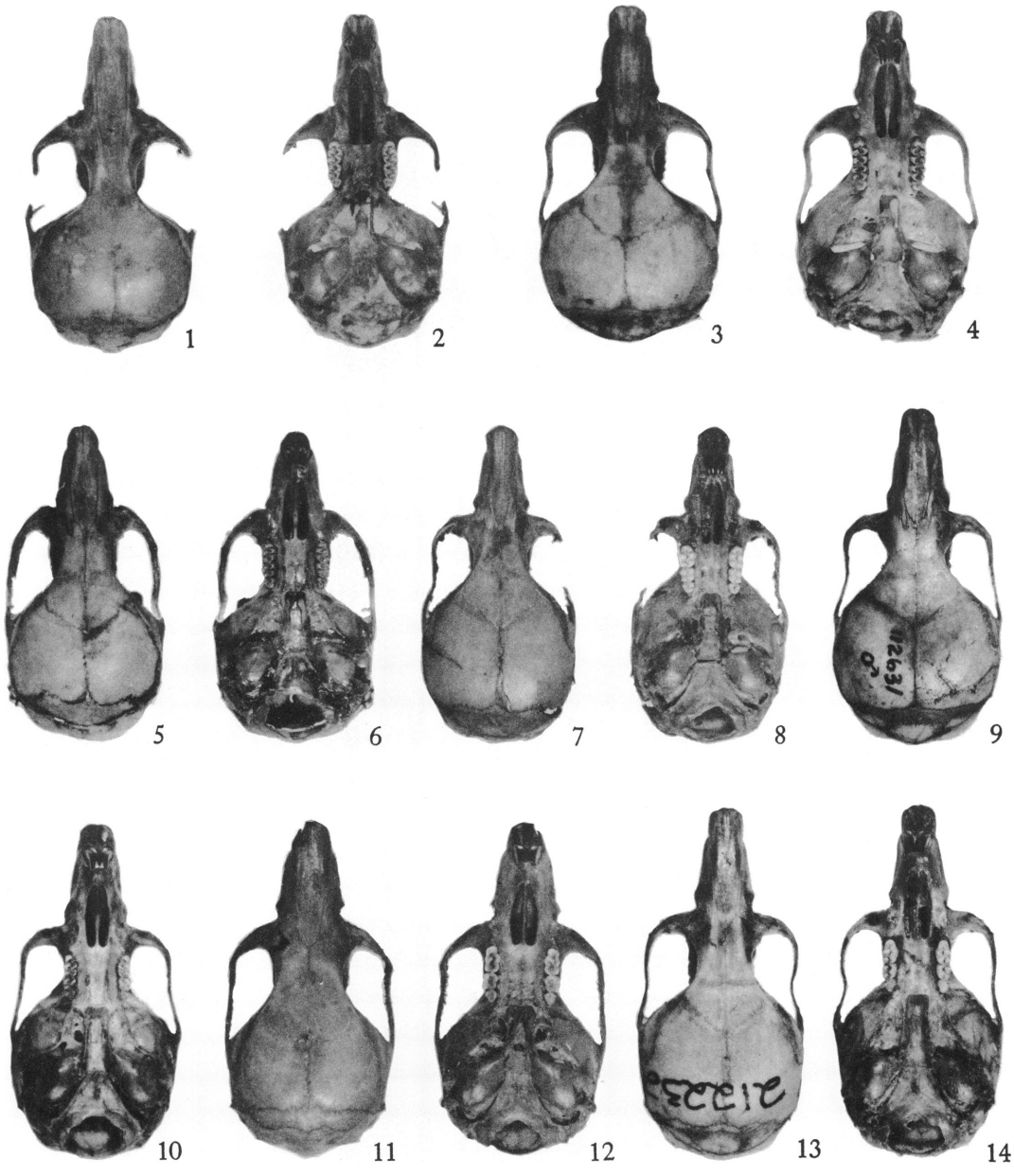
1–12. Dorsal and ventral views, respectively, of crania of heteromyids from Oaxaca. 1, 2. *Dipodomys philipesii oaxacae*, adult male, U.M. No. 88653, from Teotitlán. 3, 4. *Liomys pictus isthmius*, adult male, A.M.N.H. No. 143452, from Santa Lucía. 5, 6. *Liomys annectens*, adult female, A.M.N.H. No. 190273, from San Gabriel Mixtepec. 7, 8. *Liomys irroratus irroratus*, adult male, A.M.N.H. No. 189229, from San Andrés Chicahuaxtla. 9, 10. *Heteromys desmarestianus griseus*, adult female, A.M.N.H. No. 189235, from Río Mono Blanco. 11, 12. *Heteromys lepturus*, adult female, U.S.N.M. No. 73381, from Santo Domingo. All ×1.4



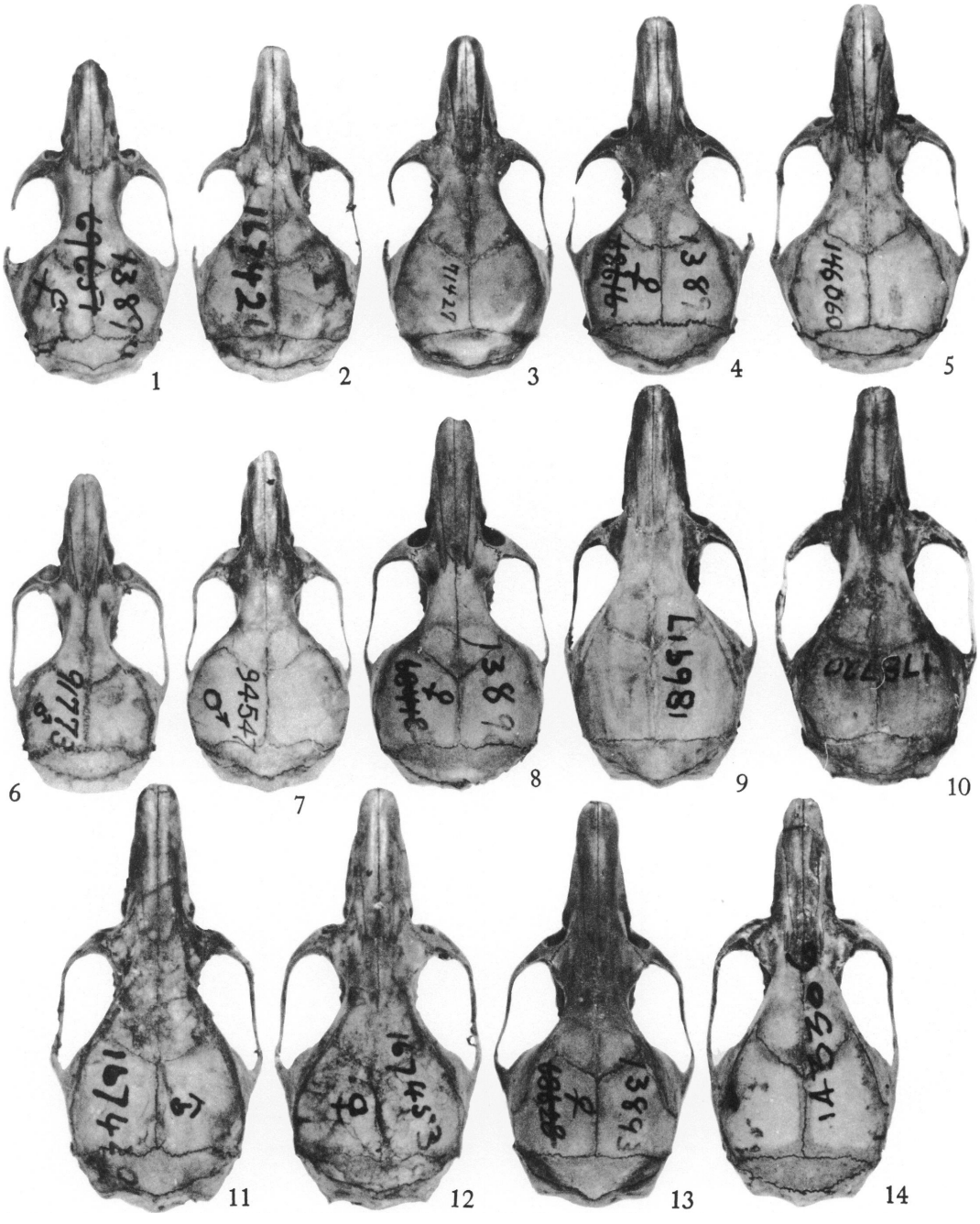
1–12. Dorsal and ventral views, respectively, of crania of *Oryzomys* and *Nyctomys* from Oaxaca. 1, 2. *Oryzomys couesi couesi*, adult male, A.M.N.H. No. 190287, from Chiltepec. 3, 4. *Oryzomys caudatus*, adult male, U.M. No. 112896, from Llano de las Flores. 5, 6. *Oryzomys melanotis rostratus*, subadult male, A.M.N.H. No. 189238, from San Vicente. 7, 8. *Oryzomys altaroi chapmani*, adult female, A.M.N.H. No. 178734, from Santiago Lachiguiri. 9, 10. *Oryzomys fulvescens lenis*, subadult female, A.M.N.H. No. 190329, from San Gabriel Mixtepec. 11, 12. *Nyctomys sumichrasti pallidulus*, adult male, A.M.N.H. No. 145212, from San Antonio. All ×2



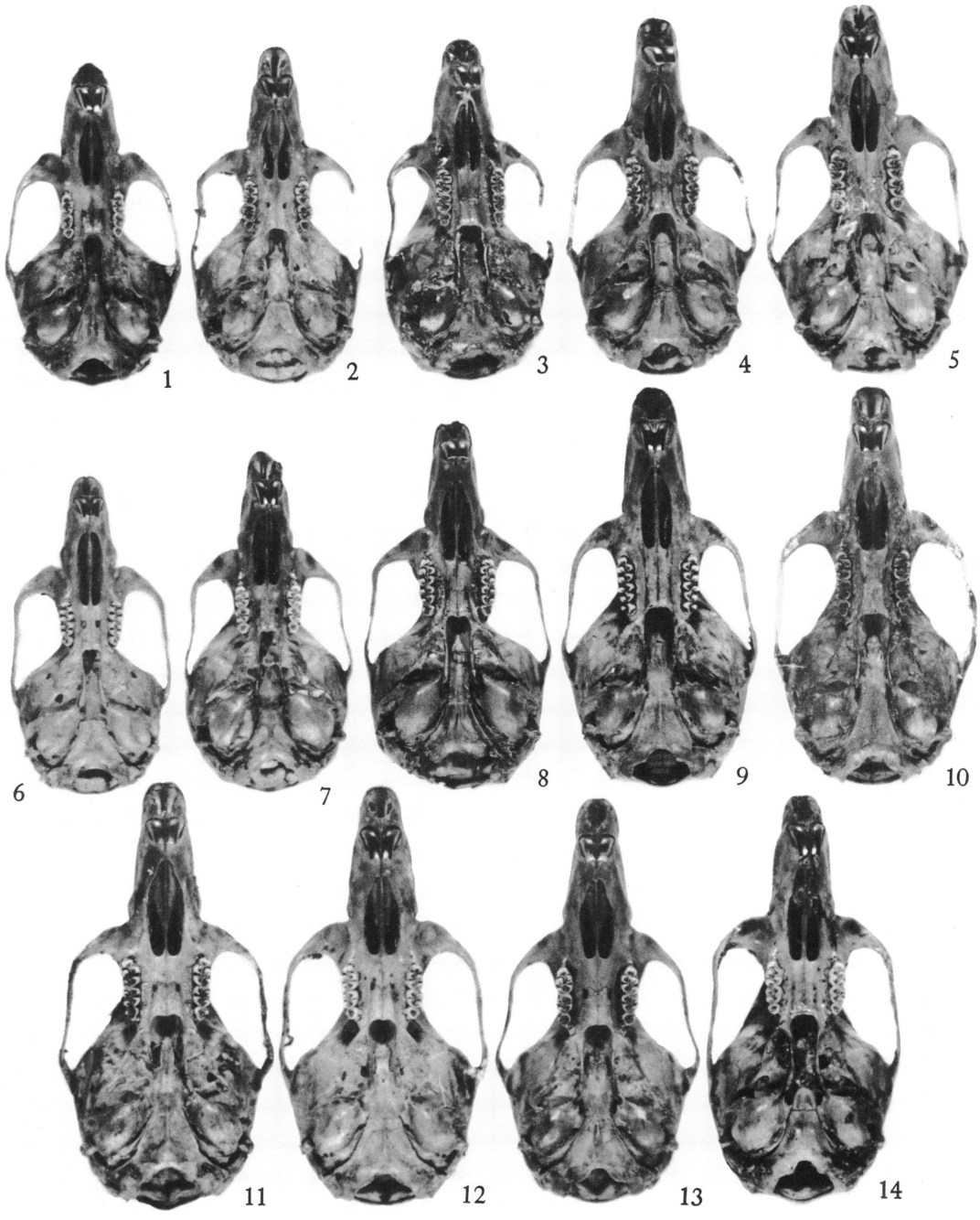
1–8. Dorsal and ventral views, respectively, of crania of *Tylomys* and *Rattus* from Oaxaca. 1, 2. *Tylomys nudicaudus gymnurus*, subadult female, A.M.N.H. No. 148409, from Ixcuintepec. 3, 4. *Tylomys nudicaudus microdon*, adult male, A.M.N.H. No. 165991, type, from La Gloria. 5, 6. *Rattus rattus alexandrinus*, adult female, A.M.N.H. No. 145826, from Finca Santa Teresa. 7, 8. *Rattus norvegicus*, subadult male, A.M.N.H. No. 145346, from Santiago Lachivía. All ×1.4



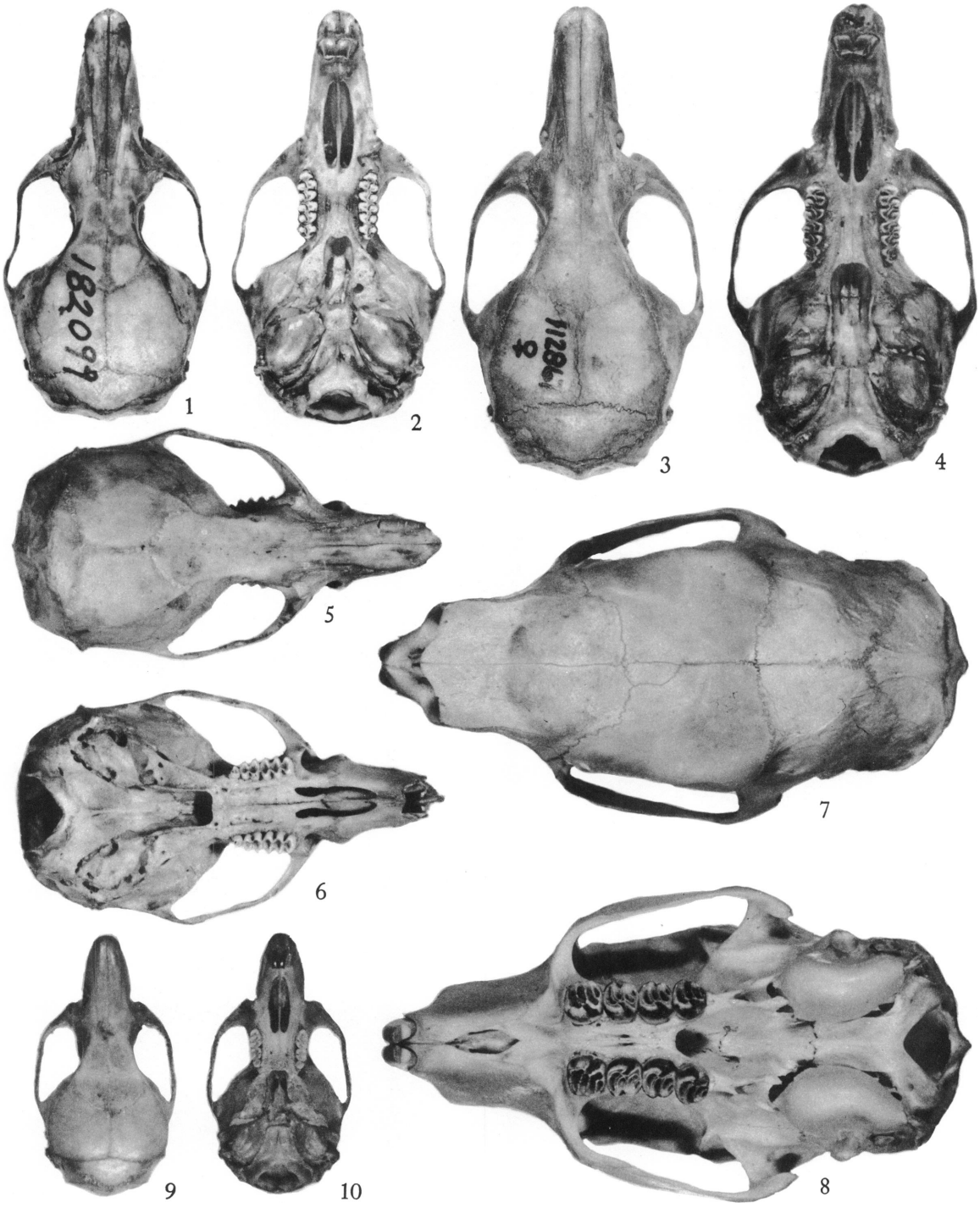
1–14. Dorsal and ventral views, respectively, of crania of *Reithrodontomys* and *Scotinomys* from Oaxaca. 1, 2. *Reithrodontomys megalotis alticolus*, adult female, A.M.N.H. No. 148883, from San Pedro Mixtepec. 3, 4. *Reithrodontomys sumichrasti luteolus*, adult male, A.M.N.H. No. 175242, from Santiago Lachiguirí. 5, 6. *Reithrodontomys fulvescens helvolus*, adult female, A.M.N.H. No. 149047, from Santa Lucía. 7, 8. *Reithrodontomys mexicanus scansor*, adult male, A.M.N.H. No. 206888, from mountains north of Zanatepec. 9, 10. *Reithrodontomys microdon albilobris*, adult male, U.M. No. 112631, from Llano de los Flores. 11, 12. *Scotinomys teguina subnubilus*, adult female, A.M.N.H. No. 205312, from mountains north of Zanatepec. 13, 14. *Reithrodontomys mexicanus mexicanus*, adult male, A.M.N.H. No. 212232, from Tarabundí. All ×2



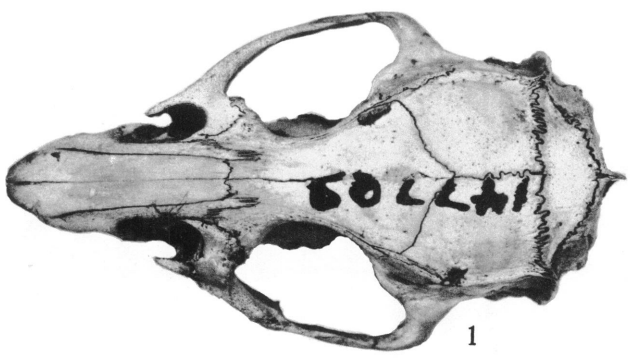
1–14. Dorsal views of crania of *Peromyscus* from Oaxaca. 1. *P. leucopus affinis*, adult female, A.M.N.H. No. 13894, from Cuicatlán. 2. *P. boylii levipes*, adult male, A.M.N.H. No. 167426, from Lachivía. 3. *P. evides*, adult male, U.S.N.M. No. 71427, from Juquila. 4. *P. lepturus*, adult female, A.M.N.H. No. 13892, from Mt. Zempoaltepec. 5. *P. hylocetes yautepecus*, adult male, A.M.N.H. No. 146060, type, from Santo Tomás Teipan (=*P. evides*). 6. *P. maniculatus fulvus*, adult male, U.M. No. 91773, from Oaxaca. 7. *P. truei zapotecae*, adult male, U.M. No. 94547, from Huajuápam. 8. *P. difficilis felipensis*, adult female, A.M.N.H. No. 13890, from Cerro San Felipe. 9. *P. melanocarpus*, sex?, A.M.N.H. No. 186917, from Comaltepec. 10. *P. oaxacensis*, adult male, A.M.N.H. No. 178720, from Cerro Lachiguirí. 11. *P. megalops megalops*, adult male, A.M.N.H. No. 167420, from Cerro Madrena. 12. *P. banderanus coatlanensis*, adult female, A.M.N.H. No. 167453, type, from Agua Zarca. 13. *P. mexicanus totontepecus*, adult female, A.M.N.H. No. 13893, from Totontepec. 14. *P. melanophrys melanophrys*, adult female, A.M.N.H. No. 143306, from Tehuantepec. All ×1.8



1–14. Ventral views of crania of *Peromyscus* from Oaxaca. 1. *P. leucopus affinis*, adult female, A.M.N.H. No. 13894, from Cuicatlán. 2. *P. boylii levipes*, adult male, A.M.N.H. No. 167426, from Lachivía. 3. *P. evides*, adult male, U.S.N.M. No. 71427, from Juquila. 4. *P. lepturus*, adult female, A.M.N.H. No. 13892, from Mt. Zempoaltepec. 5. *P. hylocetes yautepecus*, adult male, A.M.N.H. No. 146060, from Santo Tomás Teipan. 6. *P. maniculatis fulvus*, adult male, U.M. No. 91773, from Oaxaca. 7. *P. truei zapotecae*, adult male, U.M. No. 94547, from Huajuápam. 8. *P. difficilis felipensis*, adult female, A.M.N.H. No. 13890, from Cerro San Felipe. 9. *P. melanocarpus*, adult male, A.M.N.H. No. 186917, from Comaltepec. 10. *P. oaxacensis*, adult male, A.M.N.H. No. 178720, from Cerro Lachiguirí. 11. *P. megalops megalops*, adult male, A.M.N.H. No. 167420, from Cerro Madrena. 12. *P. banderanus coatlanensis*, adult female, A.M.N.H. No. 167453, from Agua Zarca. 13. *P. mexicanus totontepecus*, adult female, A.M.N.H. No. 13893, from Totontepec. 14. *P. melanophrys melanophrys*, adult female, A.M.N.H. No. 143306, from Tehuantepec. All ×1.8



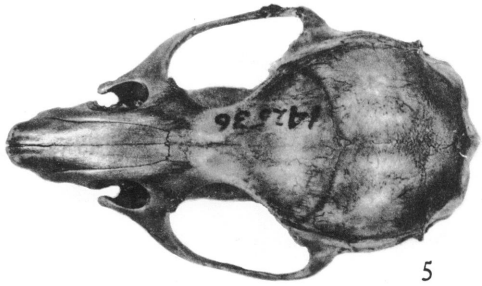
1–10. Dorsal and ventral views, respectively, of crania of *Peromyscus*, *Coendu*, and *Baiomys* from Oaxaca. 1, 2. *Peromyscus ixtlani*, adult male, A.M.N.H. No. 182099, type, from Cerro Machín. 3, 4. *Peromyscus thomasi cryophilus*, adult female, U.M. No. 112867, from Cerro Pelon. 5, 6. *Rheomys mexicanus*, adult male, A.M.N.H. No. 205314, from Unión Hidalgo. 7, 8. *Coendu mexicana mexicana*, adult female, A.M.N.H. No. 190423, from La Ventosa. 9, 10. *Baiomys musculus pallidus*, adult male, A.M.N.H. No. 205310, from Pinotepa. 1–6, 9, 10, ×2; 7, 8, ×1



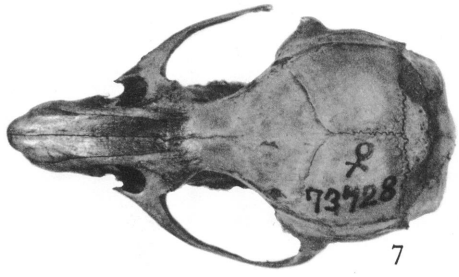




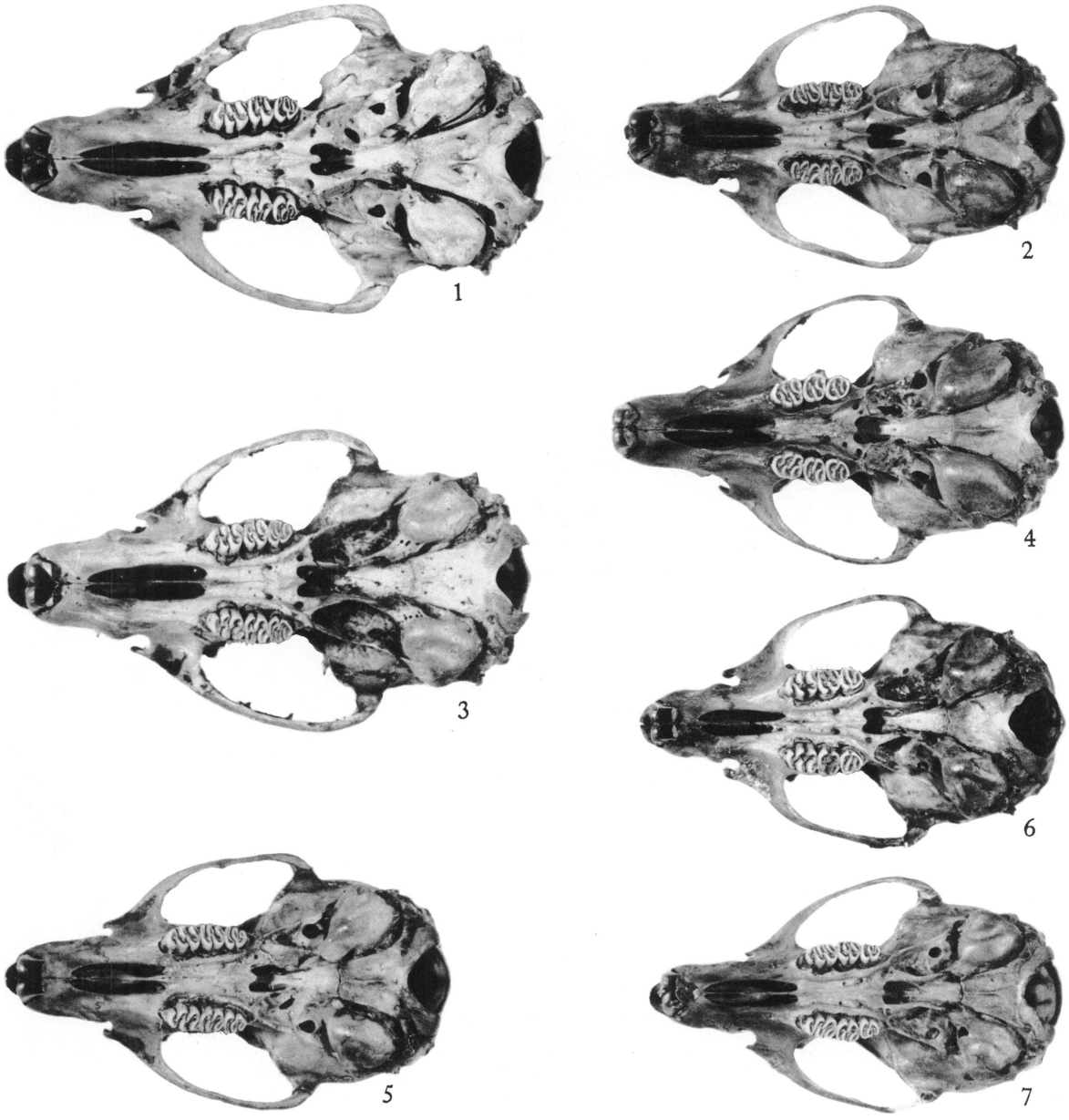




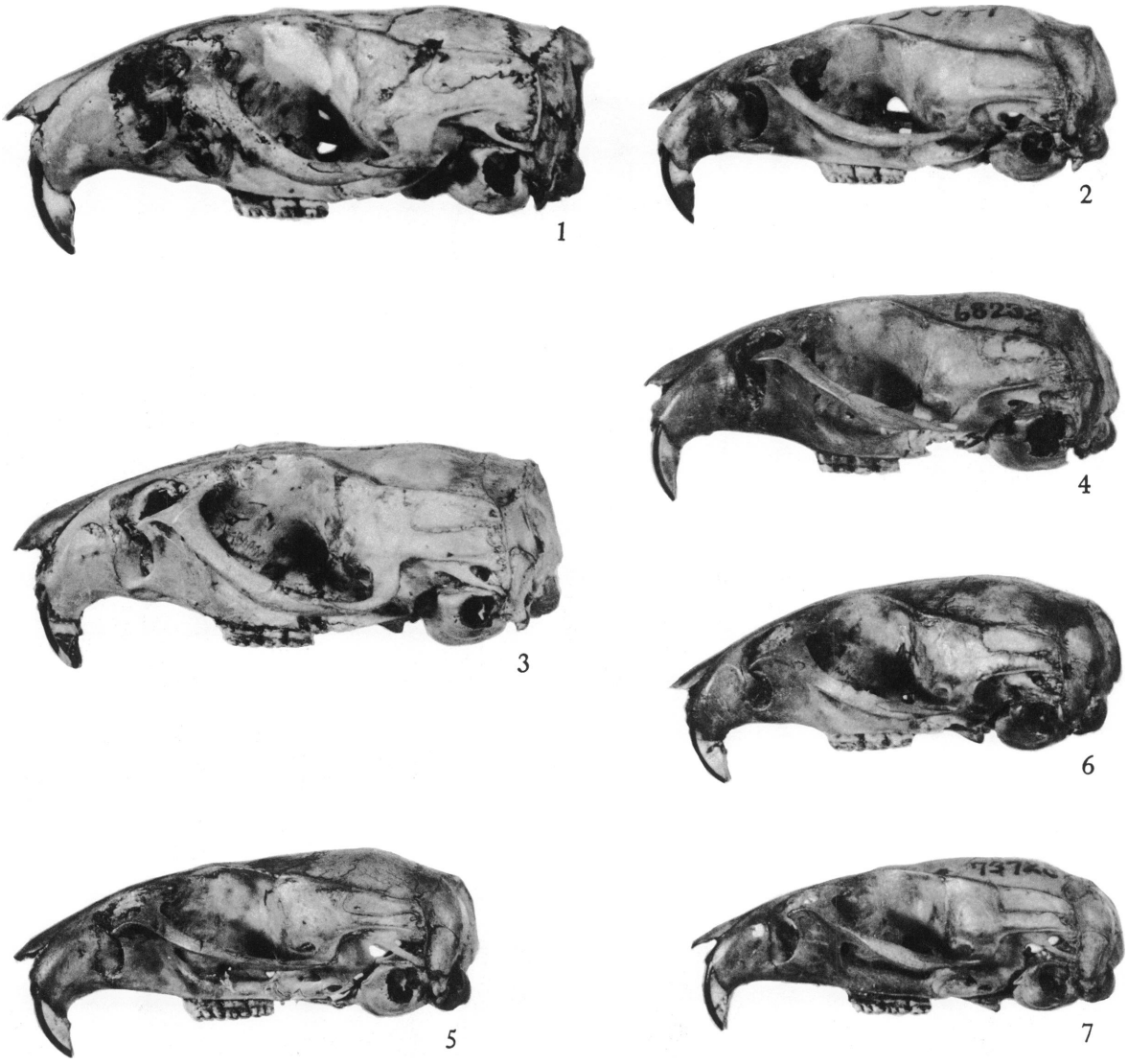




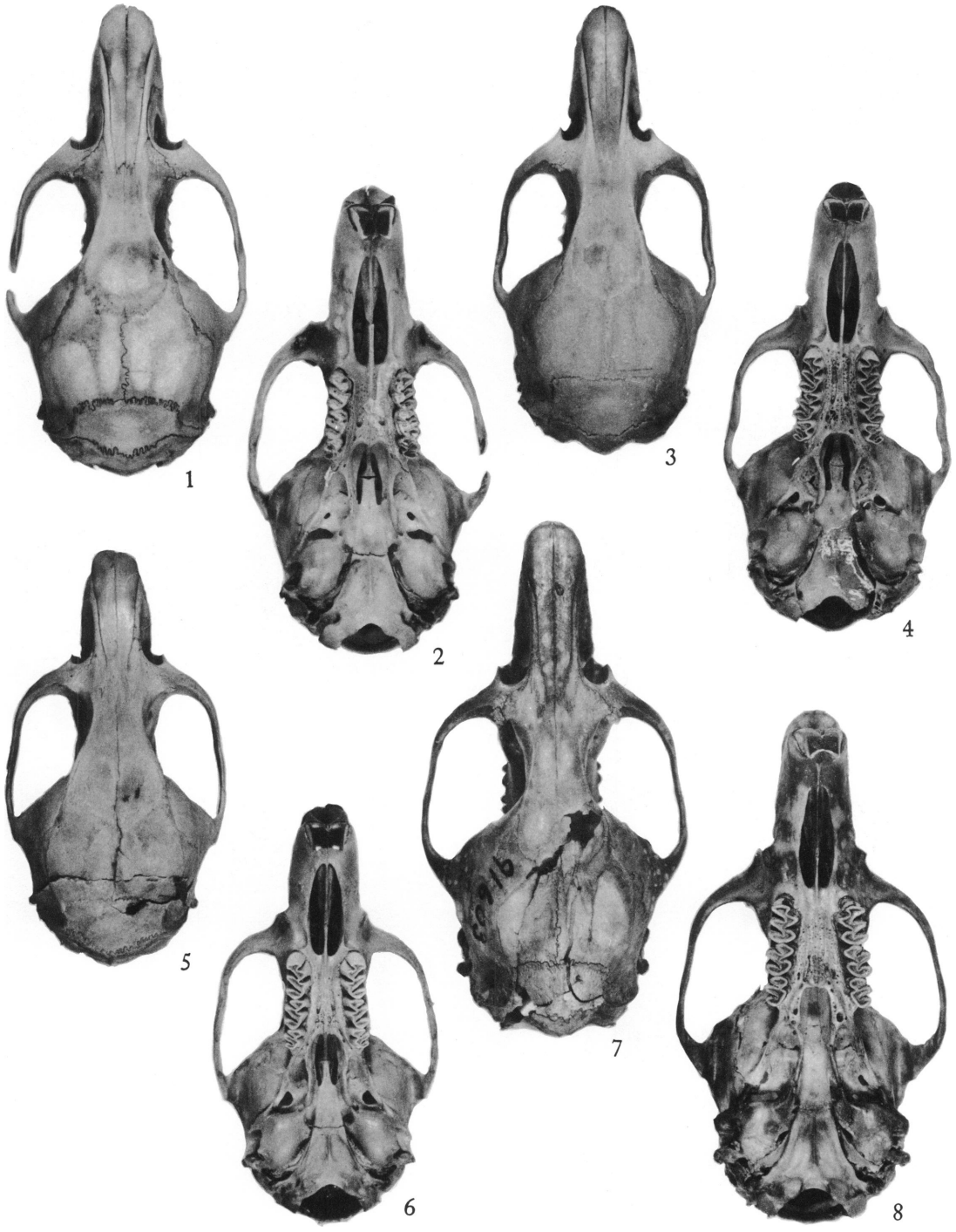
1–7. Dorsal views of crania of *Sigmodon* from Oaxaca. 1. *S. hispidus mascotensis*, adult female, A.M.N.H. No. 147709, from Guiengola. 2. *S. hispidus saturatus*, adult male, A.M.N.H. No. 173041, from Tolosita. 3. *S. hispidus ischyrus*, adult male, A.M.N.H. No. 171600, type, from El Arco. 4. *S. alticola alticola*, adult male, U.S.N.M. No. 68232, from 5 miles east of Oaxaca de Juárez. 5. *S. macdougalli*, adult female, A.M.N.H. No. 149122, type, from Santo Tomás Teipan. 6. *S. macrodon*, adult female, A.M.N.H. No. 142536, type, from Cerro San Pedro. 7. *S. planifrons*, adult female, U.S.N.M. No. 73728, topotype, from Juquila. All ×2



1–7. Ventral views of crania of *Sigmodon* from Oaxaca. 1. *S. hispidus mascotensis*, adult female, A.M.N.H. No. 147709, from Guiengola. 2. *S. hispidus saturatus*, adult male, A.M.N.H. No. 173041, from Tolosita. 3. *S. hispidus ischyrus*, adult male, A.M.N.H. No. 171600, type, from El Arco. 4. *S. alticola alticola*, adult male, U.S.N.M. No. 68232, from 5 miles east of Oaxaca de Juárez. 5. *S. macdougalli*, adult female, A.M.N.H. No. 149122, type, from Santo Tomás Teipan. 6. *S. macrodon*, adult female, A.M.N.H. No. 142536, type, from Cerro San Pedro. 7. *S. planifrons*, adult female, U.S.N.M. No. 73728, topotype, from Juquila. All ×2



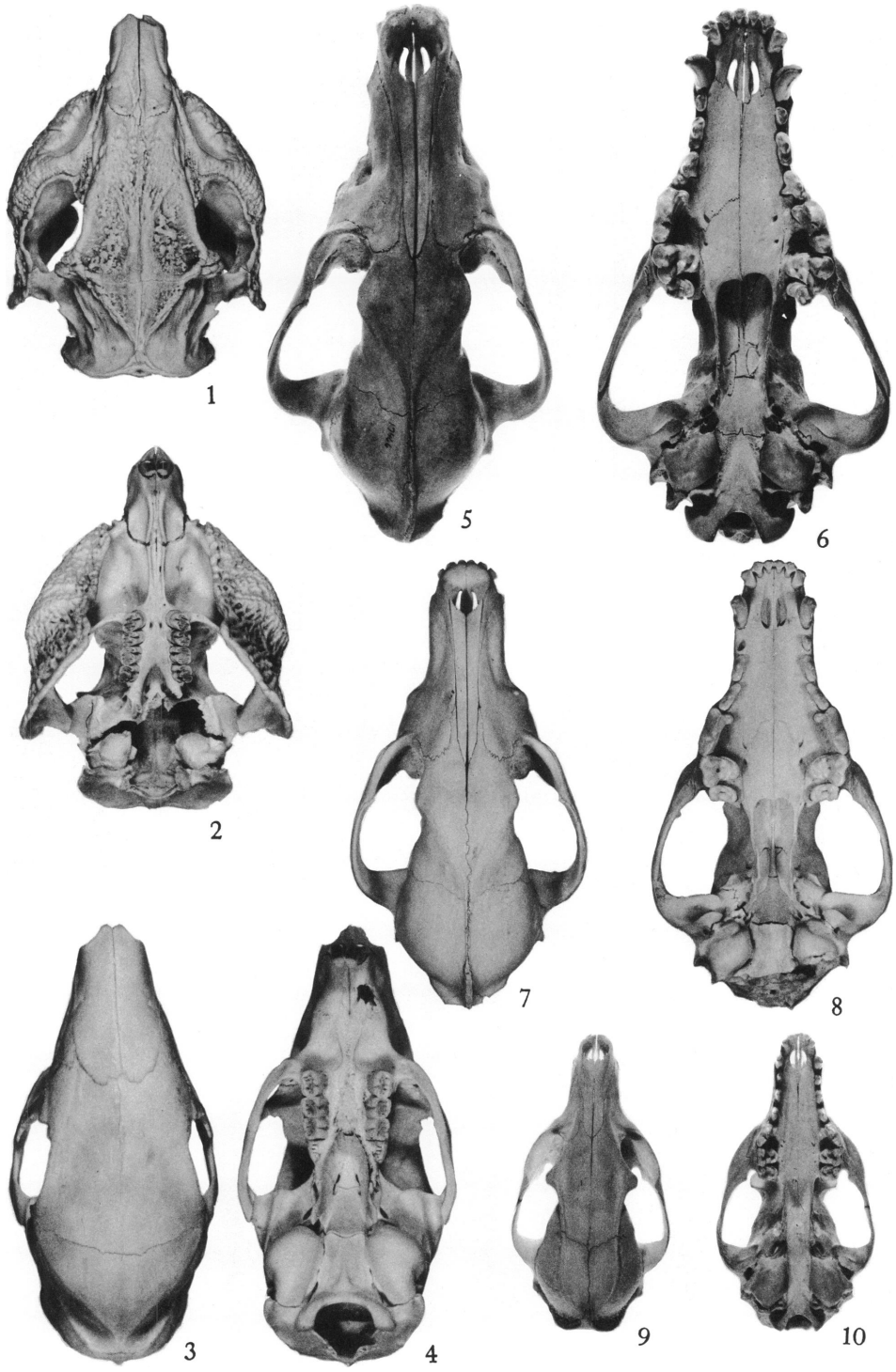
1–7. Lateral views of crania of *Sigmodon* from Oaxaca. 1. *S. hispidus mascotensis*, adult female, A.M.N.H. No. 147709, from Guiengola. 2. *S. hispidus saturatus*, adult male, A.M.N.H. No. 173041, from Tolosita. 3. *S. hispidus ischyrus*, adult male, A.M.N.H. No. 171600, type, from El Arco. 4. *S. alticola alticola*, adult male, U.S.N.M. No. 68232, from 5 miles east of Oaxaca de Juárez. 5. *S. macdougalli*, adult female, A.M.N.H. No. 149122, type, from Santo Tomás Teipan. 6. *S. macrodon*, adult female, A.M.N.H. No. 142536, type, from Cerro San Pedro. 7. *S. planifrons*, adult female, U.S.N.M. No. 73728, topotype, from Juquila. All ×2



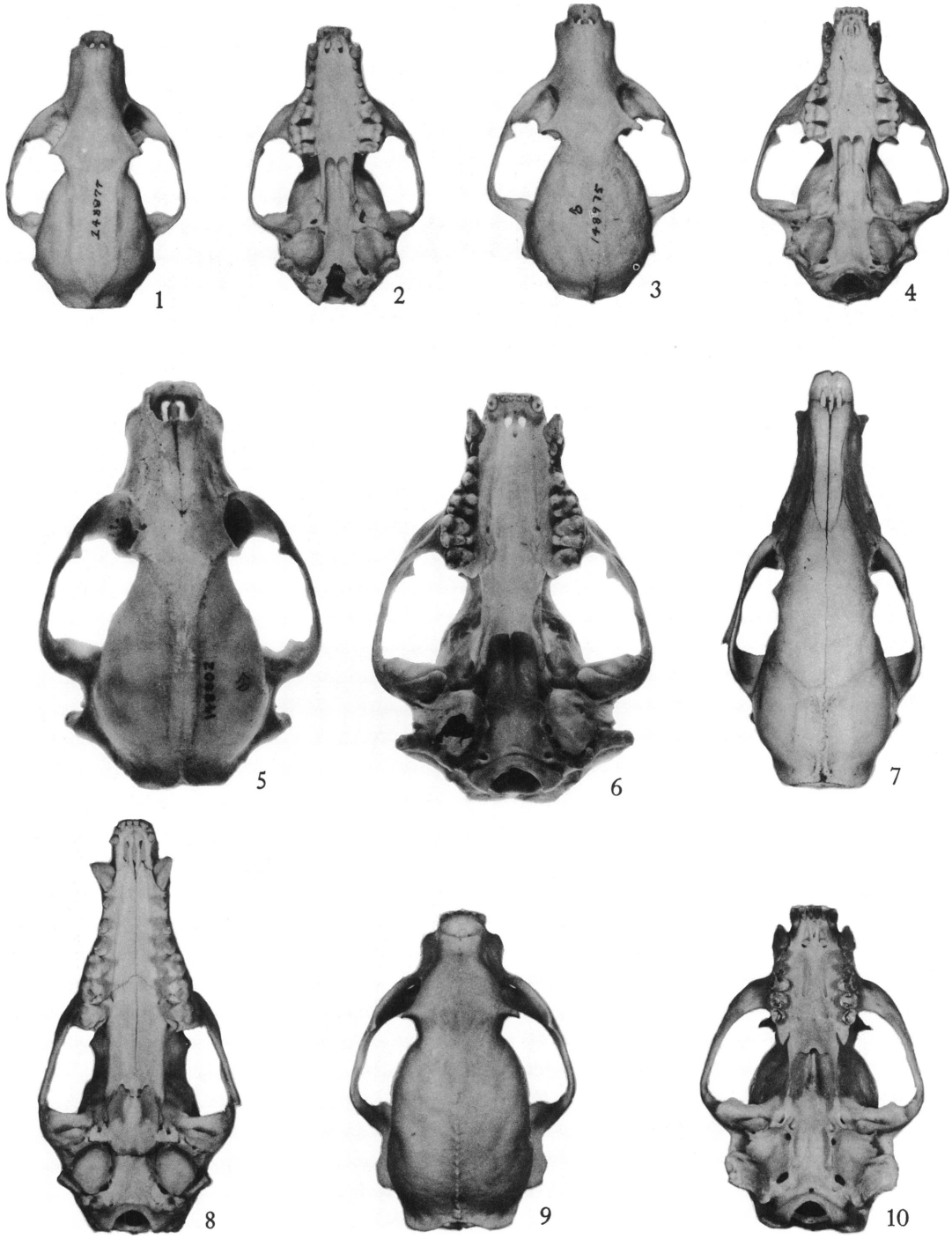
1–8. Dorsal and ventral views, respectively, of crania of *Neotoma* from Oaxaca. 1, 2. *Neotoma mexicana isthmica*, adult male, A.M.N.H. No. 142503, from Las Barras. 3, 4. *Neotoma mexicana picta*, adult male, A.M.N.H. No. 189290, from San Andrés Chicahuaxtla. 5, 6. *Neotoma mexicana tropicatis*, adult male, A.M.N.H. No. 189289, from Río Mono Blanco. 7, 8. *Neotoma alleni vetula*, adult female, U.M. No. 91603, from Teotitlán. All ×1.4



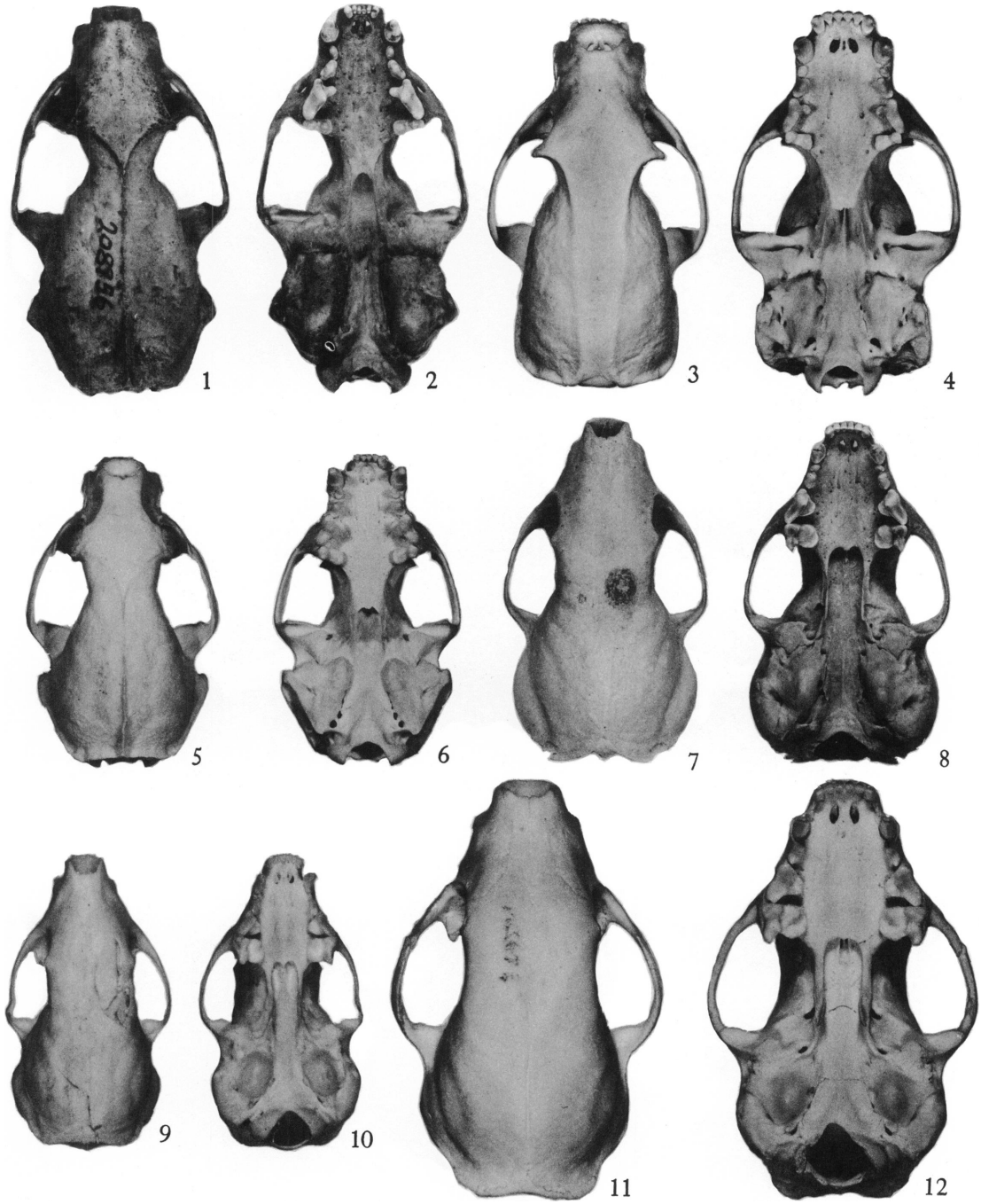
1–10. Dorsal and ventral views, respectively, of crania of *Microtus* and *Mus* from Oaxaca. 1, 2. *Microtus mexicanus fulviventer*, adult male, A.M.N.H. No. 13889, from Cerro San Felipe. 3, 4. *Microtus oaxacensis*, adult male, A.M.N.H. No. 208952, type, from Tarabundí. 5, 6. *Microtus umbrosus*, adult female, A.M.N.H. No. 13891, from Totontepec. 7, 8. *Microtus quasiater*, subadult male, A.M.N.H. No. 186924, from Huautla. 9, 10. *Mus musculus brevirostris*, adult male, A.M.N.H. No. 147730, from Tehuantepec. All ×2



1–10. Dorsal and ventral views, respectively, of crania of *Dasyprocta*, *Agouti*, *Canis*, and *Urocyon* from Oaxaca. 1, 2. *Agouti paca nelsoni*, adult male, A.M.N.H. No. 143471, from Rio Grande. 3, 4. *Dasyprocta mexicana*, subadult male, A.M.N.H. No. 172283, from Jaltepec. 5, 6. *Canis lupus baileyi*, subadult male, A.M.N.H. No. 17466, from Chihuahua. 7, 8. *Canis latrans goldmani*, subadult male, A.M.N.H. No. 206831, from San Antonio. 9, 10. *Urocyon cinereoargenteus orinomus*, adult male, A.M.N.H. No. 145164, from Astata. 1, 2, 5–10, ×¼; 3, 4, ×½



1–10. Dorsal and ventral views, respectively, of crania of *Bassariscus*, *Procyon*, *Nasua*, and *Potos* from Oaxaca. 1, 2. *Bassariscus astutus macdougalli*, adult female, A.M.N.H. No. 148977, type, from La Ventosa. 3, 4. *Bassariscus sumichrasti oaxacensis*, adult male, A.M.N.H. No. 148975, type, from La Gloria. 5, 6. *Procyon lotor shufeldti*, adult male, A.M.N.H. No. 148802, from Santa Lucía. 7, 8. *Nasua narica narica*, adult male, A.M.N.H. No. 143968, from Cerro San Pedro. 9, 10. *Potos flavus aztecus*, adult male, A.M.N.H. No. 176662, from Río Jaltepec. All ×½



1–12. Dorsal and ventral views, respectively, of crania of *Mustela*, *Eira*, *Galictis*, *Spilogale*, and *Mephitis* from Oaxaca and some other areas. 1, 2. *Mustela frenata macrophonius*, adult male, A.M.N.H. No. 208956, from Limón. 3, 4. *Eira barbara senex*, adult female, A.M.N.H. No. 145949, from San Antonio. 5, 6. *Galictis allamandi canaster*, adult male, A.M.N.H. No. 173910, from Panama. 7, 8. *Spilogale putorius tropicalis*, adult female, A.M.N.H. No. 189296, from San Felipe del Agua. 9, 10. *Spilogale pygmaea*, adult male, A.M.N.H. No. 175183, from Tehuantepec. 11, 12. *Mephitis macroura macroura*, adult female, A.M.N.H. No. 145622, from Santa María del Mar. 1, 2, 7–12, ×1; 3–6, ×½



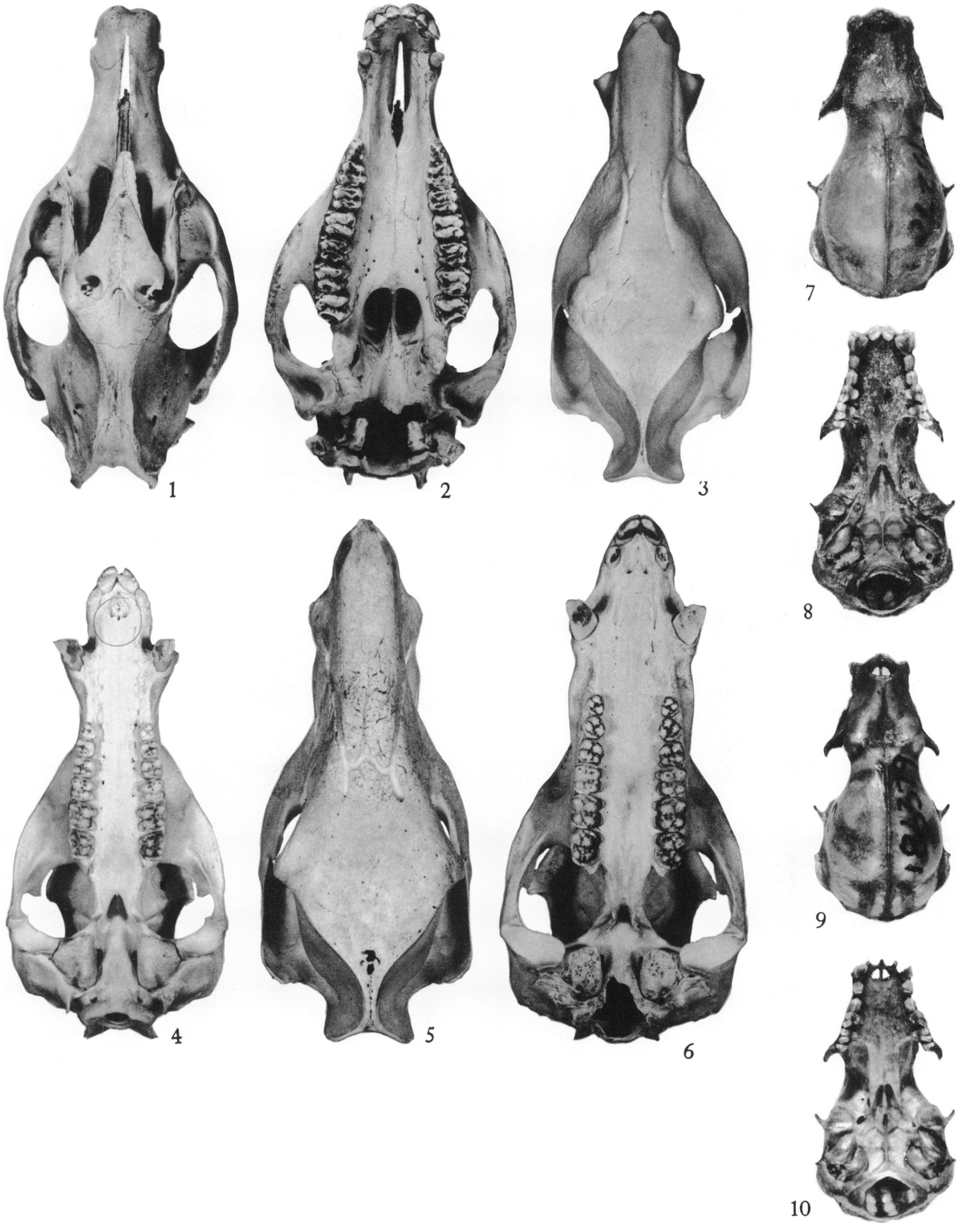
1–6. Dorsal and ventral views, respectively, of crania of *Conepatus* and *Lutra* from Oaxaca and some other areas. 1, 2. *Conepatus mesoleucus mesoleucus*, adult male, A.M.N.H. No. 176665, from Tapanatepec. 3, 4. *Conepatus semistratus coneptal*, adult female, A.M.N.H. No. 1721, from Veracruz. 5, 6. *Lutra annectens annectens*, adult male, A.M.N.H. No. 6678, from Jalisco. 1–4, ×1; 5, 6, ×½



1–4. Dorsal and ventral views, respectively, of crania of *Felis onca* and *Felis concolor* from Oaxaca and Tamaulipas. 1, 2. *Felis onca veraecrucis*, subadult, A.M.N.H. No. 146987, from Tamaulipas. 3, 4. *Felis concolor mayensis*, adult, A.M.N.H. No. 206992, from Limón. All $\times\frac{1}{2}$



1–8. Dorsal and ventral views, respectively, of crania of *Felis pardalis*, *Felis wiedii*, *Felis yagouaroundi*, and *Lynx rufus* from Oaxaca. 1, 2. *Felis pardalis pardalis*, adult, A.M.N.H. No. 148992, from La Gloria. 3, 4. *Felis wiedii yucatanica*, adult male, A.M.N.H. No. 143473, from Ocotal. 5, 6. *Felis yagouaroundi fossata*, adult male, A.M.N.H. No. 143466, from Arroyo Ocotita. 7, 8. *Lynx rufus oaxacensis*, adult female, A.M.N.H. No. 189300, type, from Los Nanches. 1–6, ×½; 7, 8, ×⅔



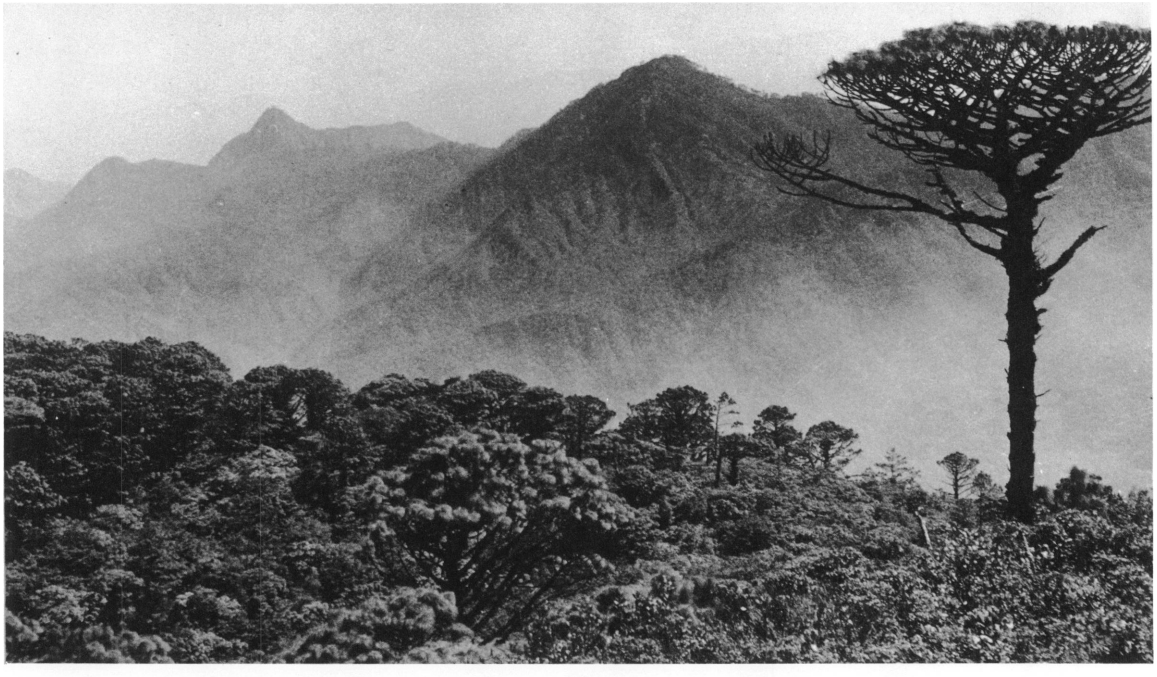
1–10. Dorsal and ventral views, respectively, of crania of *Tapirus*, *Tayassu*, and *Carollia* from Oaxaca. 1, 2. *Tapirus bairdii*, adult male, A.M.N.H. No. 206834, from Zanatepec. 3, 4. *Tayassu tajacu humeralis*, adult, A.M.N.H. No. 206835, from Zanatepec. 5, 6. *Tayassu pecari ringens*, adult, A.M.N.H. No. 207423, from Zanatepec. 7, 8. *Carollia perspicillata azteca*, adult male, A.M.N.H. No. 175270, from Mogoñé. 9, 10. *Carollia subrufa*, adult male, A.M.N.H. No. 186379, from Río Ostuta. 1–6, ×⅓; 7–10, ×2



1–4. Dorsal and ventral views, respectively, of crania of *Odocoileus* and *Mazama* from Oaxaca and some other areas. 1, 2. *Odocoileus virginianus acapulcensis*, subadult male, A.M.N.H. No. 208959, from Tehuantepec. 3, 4. *Mazama americana temama*, adult male, A.M.N.H. No. 185273, from Sarabia. All $\times \frac{1}{3}$

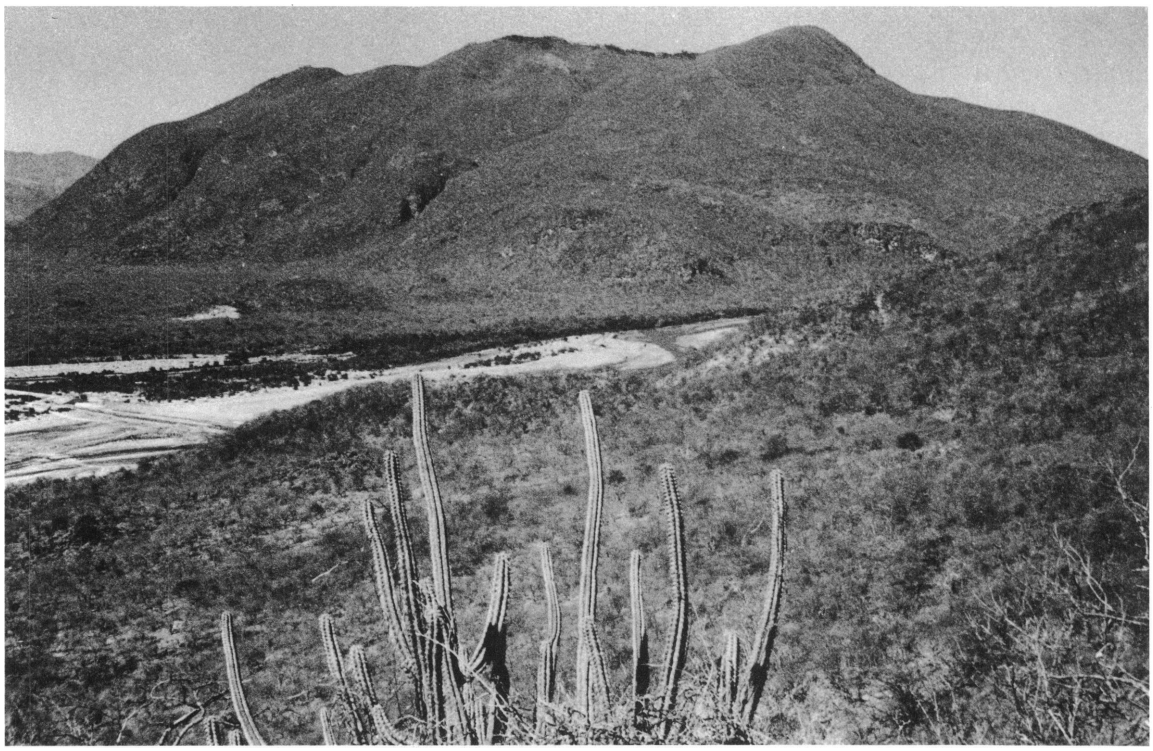


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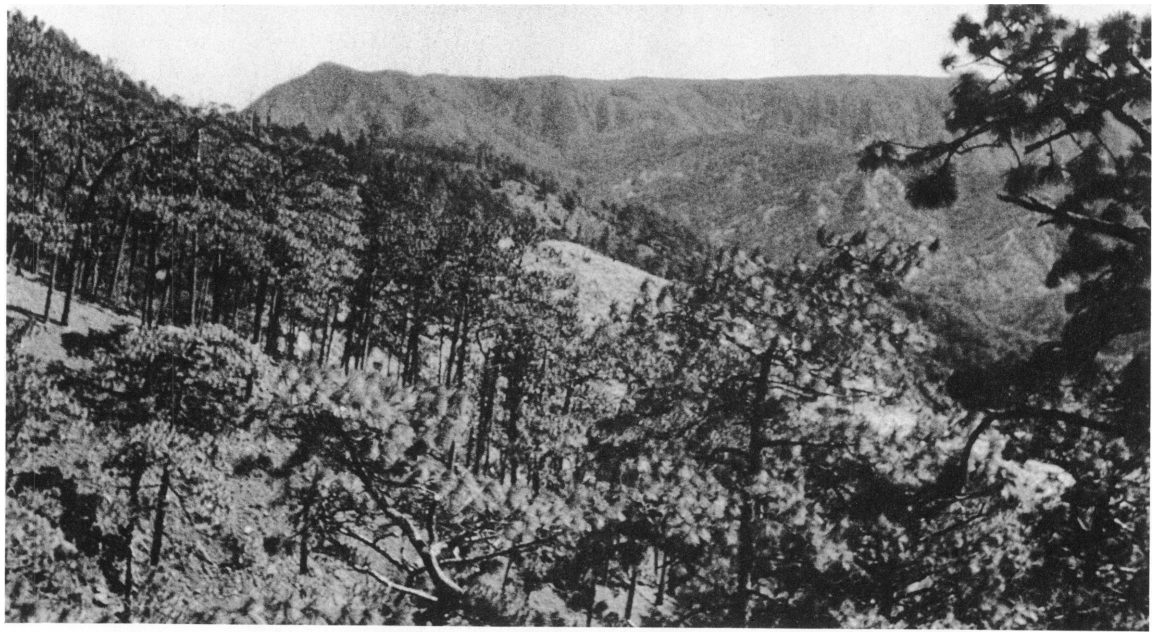


2

1. View from ruins of Guiengola toward the Gulf of Tehuantepec over the plains and river of Tehuantepec
2. Sierra Madre, view to east from Cerro Baul. The small mesa top of Cerro Baul is covered mainly with ericaceous bald myrtle. The peak in view to the left is Cerro Pecho Blanco



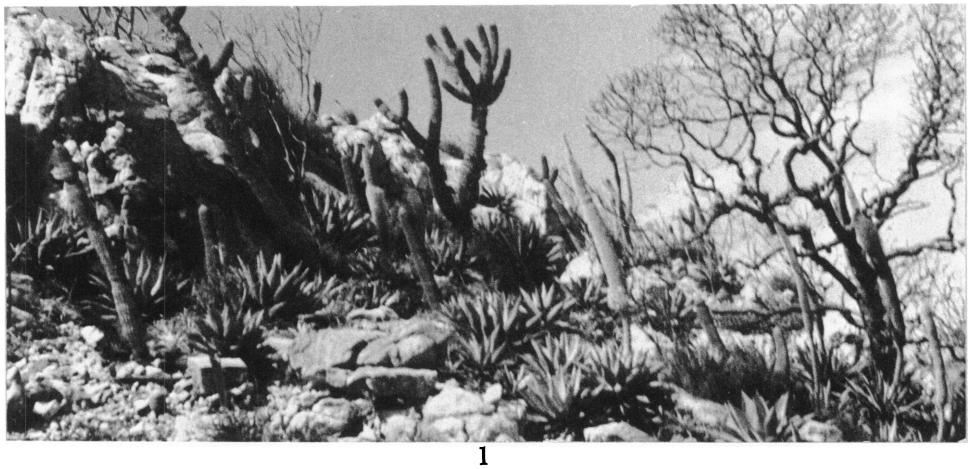
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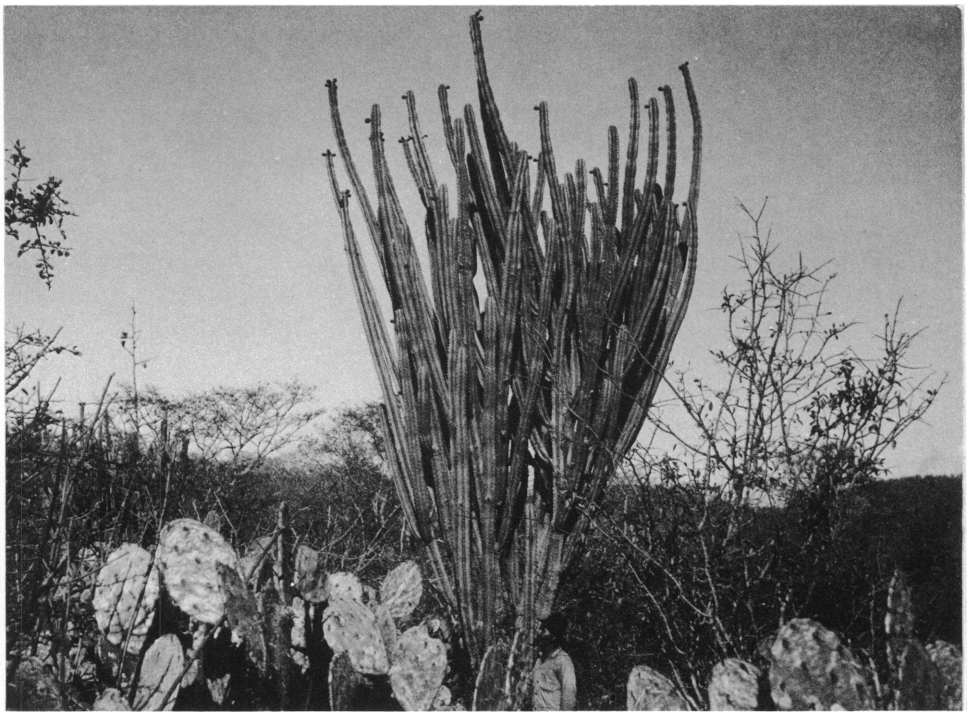
2

1. Cerro Guiengola, stands of pine (*P. michoacana*) on summit surrounded by deciduous trees that extend down to xerophytic growth on lower slopes

2. Cerro Atravesado is at right angles to the main Sierra Madre to which it is joined by a narrow ridge. The mesa on top is pine-covered and fissured by streams. Altitude 5000 feet



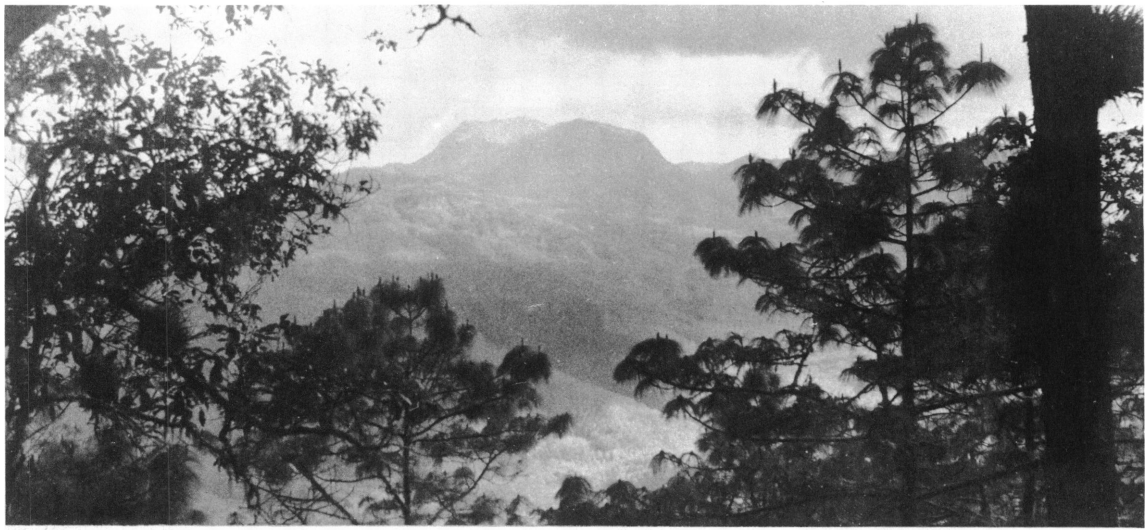
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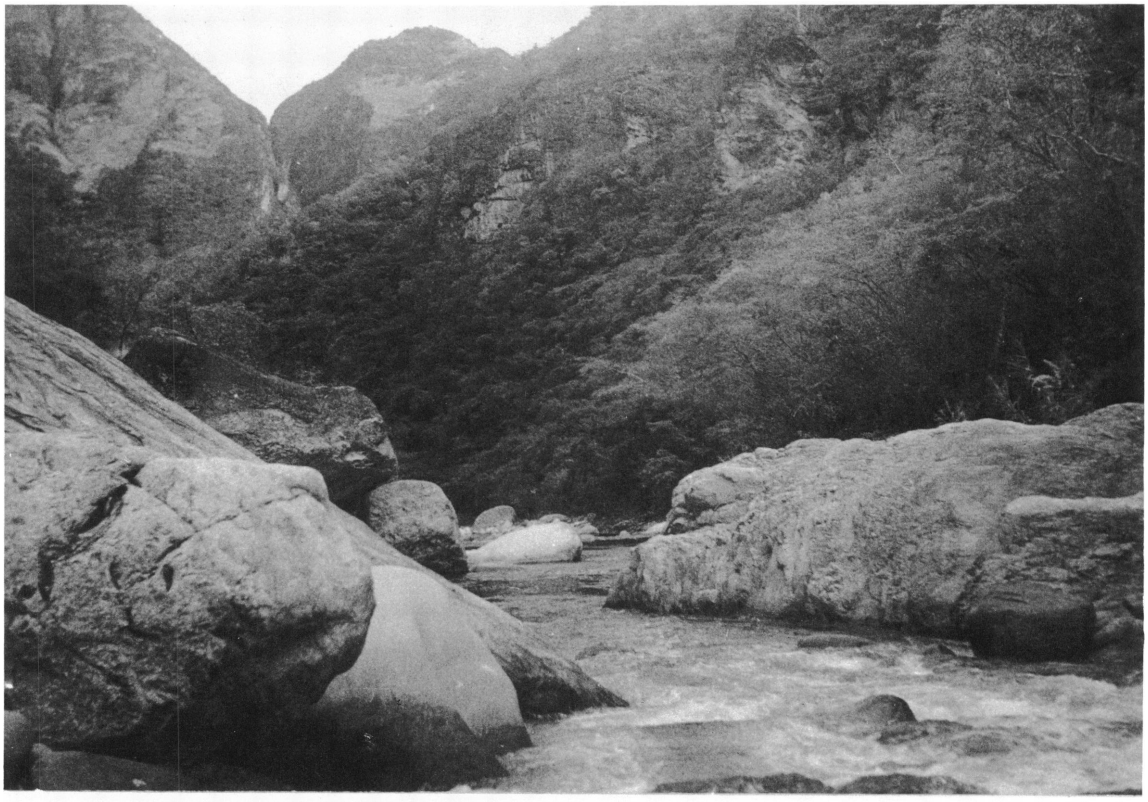
2

1. Rock gardens, Nizanda. Broken limestone rocks at 500 feet make this a natural rock garden

2. Xerophytic "short thorn forest," Tequisistlán. The central plant, *Lemaireocereus pruinosus*, is common here, and the abundant fruit is sold in local markets and is food for many mammals



1



2

1. Valley of Río Mono Blanco, view to south from Cerro Baul. The valley contains rain forest and deciduous trees, flanked on the slopes by pine and oak. Cerro Baul, 6600 feet, has scattered stands of cypress, *Cupressus benthamii*

2. Rio Grande between Santo Tomás Teipan and Santa María Suchixtepec, mainly deciduous trees near river, pine and oak above river