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Bats of the Chiricahua Mountains, Cochise County, Arizona

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In the course of the banding of a number of bats at and near the Southwestern Research Station of the American Museum of Natural History at Portal, Arizona, observations were made on the abundance, seasonal and ecological distribution, and life history of several bats. The abundance and diversity of bats taken led to the following survey of the bats of the Chiricahua Mountains, in which the Southwestern Research Station is located.

The Chiricahua Mountain Range is one of a series of isolated ranges in southeastern Arizona. It extends approximately 40 miles in a general north to south direction and is approximately 20 miles wide at the widest point. From the surrounding plateau of about 4200 feet it rises to peaks in excess of 9000 feet. Both Chiricahua and Fly peaks reach an elevation of 9795 feet.

Three major types of vegetation occur in and around the Chiricahua Mountains (Nichol, 1952). The areas around the base of the range are characteristically desert grasslands. The lower slopes are predominantly chaparral and oak woodlands, while the higher elevations are regions of forest trees. As has been worked out in considerable detail for the Huachuca Mountains to the westward (Wallmo, 1955, pp. 466–480), a number of plant zones can be recognized in the Chiricahua Mountains. These zones appear to be primarily associated with differences in elevation (and resultant climatic conditions), although slope and exposure differences cause deviations from strictly altitudinal zonation. These plant zones follow.

Desert Grasslands
Below 5000 feet

Desert Scrub Zone: (Primarily at elevations below 4500 feet). This zone is characterized by the presence of whitethorn (*Acacia constricta*), creosote bush (*Larrea tridentata*), mesquite (*Prosopis juliflora*), and yuccas (*Yucca elata*).

Desert Grassland Zone: (4500 to 5000 feet). This is a zone with various species of grasses well developed. Plains lovegrass (*Eragrostis intermedia*), various species of grama (*Bouteloua*), and curly mesquite (*Hilaria belangeri*) occur in numbers. Yuccas and other mesquites occur to some extent in this zone.

Chaparral and Oak Woodlands
Between 5000 and 7000 feet

Chaparral and oak woodlands develop zonally between 5000 and 7000 feet. The amount of available moisture appears to determine whether the plants present take on a chaparral or a woodlands appearance. At the higher elevations of this zone a number of conifers appear. Wallmo (1955, pp. 473–479) divides the chaparral and oak woodlands into the following zones:

Oak-Woodland Zone: The oak woodland zone is best developed on north-facing slopes and in the canyons. A number of species of oaks occur in the oak woodland, some of which occur to some extent at higher elevations. The more common species and their usual altitudinal ranges are as follows: Mexican blue oak (*Quercus oblongifolia*), 5000 to 5200 feet; Emory oak (*Q. emoryi*), 5100 to 7000 feet; Arizona white oak (*Q. arizonica*), 5100 to 7600 feet; silverleaf oak (*Q. hypoleucoides*), 5200 to 82 feet; netleaf oak (*Q. reticulata*), 6500 to 8900 feet; and Gambel oak (*Q. gambelii*), 7000 to 9000 feet.

Chaparral Zone: In the drier parts of the elevations between 5000 and 7000 feet the oaks and other trees are dwarfed, resulting in a chaparral area. Dwarfed alligator juniper (*Juniperus deppeana*) and mountain mahogany (*Cercocarpus breviflorus*) occur in the upper parts of this area.

Chaparral with Conifers: At higher elevations large areas of chaparral have a mixture of small pines and some Douglas fir (*Pseudotsuga taxifolia*). Such areas may be designated as chaparral with conifers.

Pine-Oak Woodland: At higher elevations, from approximately 5500 feet upward, the oak-woodland zone has a mixture of pines including Chihuahua pine (*Pinus chihuahuana*), Apache pine (*P. latifolia*), and ponderosa pine (*P. ponderosa*).

FOREST ZONE
Above 7000 feet

PINE-DOUGLAS FIR-OAK ZONE: This zone occurs in the more xeric areas above 7000 feet. The most abundant trees present are: Douglas fir, Mexican or limber pine (*Pinus flexilis*), and Gambel oak.

PINE-FIR FOREST: Stands of white fir (*Abies concolor*), Douglas fir, several species of pines, and aspen (*Populus tremuloides*) occur on northern slopes and at the higher elevations in the Forest Zone.

ENGELMANN SPRUCE ZONE: On the north slope of Fly and Chiricahua peaks and on the elevation south of Round Park are small areas of Engelmann spruce (*Picea engelmannii*). These small areas represent the highest vegetational zone in the Chiricahua Mountains.

Wallmo's (1955, p. 479) comments concerning the lack of zonal arrangement of the many subtypes of vegetation in the Huachuca Mountains apply equally well to the Chiricahua Mountains: "As a result of the dissected nature of the mountains each mountainside is covered with a complex mixture of alternes rather than with distinct elevational zones of vegetation. One may step, literally in a few steps, from conifer forest into a cactus garden . . . , into a yucca or an agave stand, or into xeric woodland or chaparral."

This study was undertaken by the senior author as a part of the investigations of the mammals of Arizona, supported by the National Science Foundation Research Grant G-333. This grant furnished most of the financial aid for the field investigations and for visits to museums where specimens from the Chiricahua Mountains are already on deposit.

The facilities at the Southwestern Research Station of the American Museum of Natural History, at Portal, Arizona, were made available to the senior author in the summer and fall of 1955. These facilities and the aid and cooperation of the resident staff made the summer investigations much more enjoyable and indeed contributed directly in many ways to the findings herein reported.

The junior author was a member of the resident staff of the Southwestern Research Station and continued the studies in the absence of the senior author.

Many persons have contributed materially in time and effort in helping with the collecting and banding of bats carried out in this study. Among the many who warrant special thanks are Dr. Mont A. Cazier, Dr. Willis Gertsch, Messrs. Rudolph Schrammel and John G. Anderson, all of the Southwestern Research Station staff; Messrs. Keith E. Justice, Jack Hensley and Lee D. Beatty, students in the Department

of Zoology at the University of Arizona, and Mrs. Irma Cockrum, who has served as a field assistant on many trips and has helped with the mechanics of preparing the manuscript.

Finally the senior author wishes to thank officials of each of the following institutions for permitting him to examine the specimens in their charge. The abbreviations are those used in the lists of specimens given in the account of each species.

A.M.N.H., the American Museum of Natural History
C.N.H.M., Chicago Natural History Museum, Chicago, Illinois
C.N.M., Chiricahua National Monument, Dos Cabezas, Arizona
S.D.S.N.H., San Diego Society of Natural History, San Diego, California
U.A., Zoological collections, University of Arizona, Tucson, Arizona
U.M., Museum of Zoology, University of Michigan, Ann Arbor, Michigan
U.S.B.S., United States Biological Surveys Collections, Washington, D. C.
U.S.N.M., United States National Museum, Washington, D. C.

GAZETTEER OF LOCALITIES

The following is the list of localities at which bats have been taken from the Chiricahua Mountains. For each locality the dates of collection, the collector, and the kind and number of bats taken are indicated.

1. Chiricahua National Monument headquarters, approximately 5300 feet. This locality is in the Pine-Oak Woodland Zone. In the collection at the Monument headquarters are two specimens of *Antrozous* taken on July 30 and August 10, 1952, from a night roost in a garage and one individual of *Pipistrellus*, with no data as to date of collection.

2a. Buckelew Cave, west end of Blue Mountain, approximately 500 feet, 17 miles south of San Simon. This cave is in the Desert Scrub Zone. This natural cave has been visited several times between late June and early September. To date only two kinds of bats, *Leptonycteris* and *Myotis thysanodes*, have been taken here. See the account of visits listed under the discussion of *Leptonycteris*.

2b. Mesquite Wash and Pond, west end of Blue Mountain, approximately 5000 feet, 17 miles south of San Simon. This locality is in a wash near Buckelew Cave. Harold Broadbooks, Joseph T. Marshall, Jr., and a class from the University of Arizona collected three individuals of *Pipistrellus* at this locality on August 11, 1951. Lee D. Beatty and E. L. Cockrum netted *Antrozous* and *Tadarida brasiliensis* over the pond on the night of July 26, 1954.

2c. Six miles northeast of Paradise. Thirteen specimens of *Antrozous,* taken at this locality on June 29, 1931, are in the San Diego Society of Natural History collection. Perhaps this locality is near Buckelew Cave.

3. Mine tunnels, 1 mile north of Paradise, 5200 feet. These mine tunnels are at the edge of a road in a riparian association. In one tunnel a

colony of *Leptonycteris* was observed in the summers of 1954 and 1955. Approximately 50 yards to the south of this tunnel is a second tunnel in which six specimens of *Choeronycteris* were collected in the summer of 1955.

4. Paradise, 5500 feet. This locality is in the Oak-Woodland Zone. A single specimen of *Myotis evotis* with no data other than the fact that it was collected by "P. Waughtal," is in the United States National Museum. On August 14, 1955, Prentice Bloedel and E. L. Cockrum took two specimens of *Corynorhinus* from an abandoned building, the "Last Chance Hotel."

5. Eight miles west of Paradise. The first record of *Choeronycteris* for the United States was taken here on August 17, 1904, by Philip Waughtall. This locality may be approximately 6000 feet in elevation.

6a. Virtue Mine, one-half mile west of AVA Ranch, Portal, 5000 feet. This abandoned mine, on a south-facing slope, is in an area of Desert Scrub. It extends approximately 350 yards back into the side of the mountain. In the summer months *Corynorhinus* and *Myotis thysanodes* occur here.

6b. Northwest of Portal. Two specimens of *Corynorhinus* in the Museum of Zoology at the University of Michigan were collected by Victor Cahalane on July 23, 1933, probably from Virtue Mine.

6c. One-half mile northwest of Portal. Five specimens of *Corynorhinus* in the Museum of Zoology, University of Michigan, collected on July 23, 1933, by Victor Cahalane probably were taken from Virtue Mine. Cahalane wrote (1939, p. 422) that these were taken from an abandoned mine tunnel "about a half mile northwest of Portal postoffice."

6d. One mile northwest of Portal. The specimen of *Myotis thysanodes* in the Museum of Zoology at the University of Michigan, collected on July 23, 1933, by Victor Cahalane, was probably taken from Virtue Mine. Cahalane wrote (1939, p. 422) that it was taken from an abandoned mine tunnel "about a half mile northwest of Portal postoffice."

7a. Portal, 4750 feet. Portal is in a riparian association between the Oak-Woodland Zone on the slope to the south and the Desert Grasslands on the slope to the north. One specimen of *Antrozous* was taken from a house near here on September 6, 1932.

7b. One-half mile west of Portal, approximately 4800 feet. *Pipistrellus* and *Lasiurus borealis* were caught with a salmon landing net over water holes in Cave Creek at this location in July, 1933, by Cahalane (1939, p. 422).

8. One mile west of Portal, approximately 4800 feet. The specimen of *Myotis volans* in the Museum of Zoology at the University of Michigan taken on July 23, 1933, at this locality is probably the same one reported by Cahalane (1939, p. 422) as having been taken in a salmon landing net at a small tank at the Sierra Linda Ranch.

9a. South Fork of Cave Creek, 4 miles southwest of Portal, 5300 feet. Cahalane (1939, p. 422) took two specimens of *Eptesicus* (July 27 and August 5, 1932) and one individual of *Myotis volans* (August 5, 1932) at this locality. These specimens are in the Museum of Zoology at the University of Michigan. South Fork is a riparian community surrounded by Oak-Woodland Zone.

9b. South Fork, 1 mile above the junction with Cave Creek, 5300 feet. This is in a riparian community surrounded by the oak-juniper association. On the night of June, 1955, Keith Justice and Jack Hensley set a mist net over a small water hole at the locality. They took a total of 14 bats of the following kinds: *Tadarida brasiliensis,* one; *Eptesicus,* one; *Myotis evotis,* three; *Myotis thysanodes,* one; *Myotis californicus,* two; *Myotis subulatus,* one; *Myotis volans,* four.

10. Southwestern Research Station (= Old Reed Ranch), 5400 feet. The station is near a riparian community in the oak-juniper association. In the front lawn of the station is a spring-fed swimming pool, 60 feet long and 16 feet wide. One or more Japanese mist nets were stretched across this pool almost every night from late May through late October, 1955. The following kinds and numbers of bats were taken: *Pipistrellus,* 18; *Eptesicus,* 104; *Lasiurus cinereus,* 33; *Lasionycteris,* six; *Idionycteris,* one; *Antrozous,* four; *Tadarida brasiliensis,* 630; *Tadarida molossa,* 52.

11. Crystal Cave, 5700 feet, approximately ¾ mile west-northwest of the Southwestern Research Station (= Old Reed Ranch). A colony of *Corynorhinus* occurs in this natural cave in the summer.

12. John Hands Dam, 1 mile west of the Southwestern Research Station, 5600 feet. This locality is in the oak-juniper association. On the night of May 30, 1955, Keith Justice, Jack Hensley, and E. L. Cockrum set a Japanese mist net across a small water hole at this location. Six bats of the following species were taken: *Myotis evotis,* one; *Myotis volans,* two; *Eptesicus,* two; *Lasiurus cinereus,* one.

13. Fly Park, 9000 feet. This is a small meadow at the upper edge of the Transition Life Zone. *Tadarida molossa, Tadarida brasiliensis, Lasionycteris, Myotis volans,* and *Eptesicus* were taken here in the summer of 1894 and are in the collection of the American Museum of Natural History.

14. Rustler Park, 8500 feet. A series of 16 specimens of *Myotis volans* taken from this locality between June 21 and July 3, 1931, are in the collection of the San Diego Society of Natural History. Cahalane took one individual of *Eptesicus* here on July 8, 1933.

15. Pinery Canyon, 6000 feet. A specimen of *Myotis californicus* in the United States Biological Surveys collection was taken at this location on July 6, 1919.

16. Wilgus Post Office, 5400 feet. Three specimens of *Lasiurus borealis* (adult female with two young) were in a peach tree on June 27, 1894.

17. Riggs Ranch, mouth of Pinery Canyon, 5000 feet. A specimen of *Myotis velifer* in the United States Biological Surveys collection was taken here on May 2, 1927.

18. Sawmill on Rock Creek, perhaps at 5650 feet. *Myotis californicus* and *Eptesicus* taken here in the summer of 1894 are in the collection of the American Museum of Natural History.

19. Mouth of Rucker Cañon, approximately 5300 feet. A specimen of *Pipistrellus* taken here on June 2, 1894, is in the collection of the American Museum of Natural History.

KEY TO THE SPECIES OF BATS KNOWN OR EXPECTED TO OCCUR IN THE CHIRICAHUA MOUNTAINS

Species marked with an asterisk (*) have not yet been recorded in the Chiricahua Mountains and are discussed in the hypothetical list.

1. Nose with leaf-like projections or chin with plate-like projections; no diastema in upper incisor series; two upper incisors on each side. ..... family Phyllostomatidae, 3

   Nose and chin without projections (sides of rostrum may have raised lumps); distinct diastema usually present in upper incisor series (if diastema appears to be absent, then upper incisors only one on each side); upper incisors various 2

2(1). Tail projecting conspicuously beyond free edge of short interfemoral membrane; fifth finger much shortened; diastema in upper incisor series present or absent ..... family Molossidae, 22

   Tail not projecting conspicuously beyond free edge of interfemoral membrane (may project for a few millimeters); fifth finger not greatly shortened; diastema in upper incisor series present ..... family Vespertilionidae, 6

3(1). No leaf-like appendage on nose; plate-like outgrowths on lower lip present; skull short, rostrum and braincase as broad as or broader than long; entire braincase so elevated that the face of the foramen magnum is above the level of the top of the rostrum..... *Mormoops megalophylla**

   Distinct leaf-like appendage on nose; no plate-like outgrowths on lower lip; skull long and slender; rostrum narrow and tapering; braincase not so elevated 4

4(3). Ears more than twice the length of hind foot; tail more than twice the length of the hind foot; nine teeth in each half of lower jaw.. ..... *Macrotus californicus**

   Ears approximately length of hind foot; tail less than two times length of hind foot; seven or eight teeth in each half of lower jaw. 5

5(4). Tail extremely reduced (no external evidence of tail; interfemoral membrane approximately 7 mm. in length); zygomatic arch complete; lower incisors one on each side ..... *Leptonycteris nivalis*

   Tail more than 8 mm. in length (interfemoral membrane extends approximately 7 mm. beyond end of tail); zygomatic arch incomplete; no lower incisors ..... *Choeronycteris mexicana*

6(2). One upper incisor on each side 7

   Two upper incisors on each side 9

7(6). Upper surface of interfemoral membrane completely furred; total number of teeth, 32 8

   Upper surface of interfemoral membrane entirely bare or furred slightly at extreme base; total number of teeth, 28 ..... *Antrozous pallidus*

8(7). Color of body hoary (brown mixed with grayish white); total length more than 120 mm. ..... *Lasiurus cinereus*

   Color of body reddish or yellowish brown; total length less than

120 mm. ..... *Lasiurus borealis*

9(6). Dorsal surface of interfemoral membrane densely furred for more than one-half of total length; total number of teeth, 36 (width across canines 5 mm. or more; skull flat topped) .... *Lasionycteris noctivagans*

Dorsal surface of interfemoral membrane entirely bare or densely furred on basal one-third only; total number of teeth, 32, 34, 36, or 38 (if 36, then width across canines less than 5 mm.; skull arched, round topped) 10

10(9). Ears less than 25 mm.; total number of teeth 32, 34, or 38 (if 34, then greatest length of skull less than 14 mm.) 11

Ears more than 25 mm.; total number of teeth, 34 or 36 (if 34, then greatest length of skull more than 14 mm.) 20

11(10). Interfemoral membrane slightly furred on basal one-third; height of tragus from notch usually less than half of the height of the ear from notch; total number of teeth, 34 ..... *Pipistrellus hesperus*

Interfemoral membrane bare or furred only at extreme base; height of tragus from notch usually more than half of the height of the ear from notch; total number of teeth, 32 or 38 12

12(11). Tragus broadly rounded at tip; total length more than 105 mm.; total number of teeth, 32 ..... *Eptesicus fuscus*

Tragus usually long, slender and pointed at tip; total length less than 105 mm.; total number of teeth, 38 13

13(12). Under side of wing furred to level of elbow; skull with rostrum shortened and occiput unusually elevated; calcar with well-developed keel ..... *Myotis volans*

Under side of wing not furred to level of elbow; skull with normal rostrum and occiput; calcar keeled or not keeled 14

14(13). Calcar with well-developed keel; foot small, the ratio of its length to that of the tibia usually ranging from about 40 to 46 15

Calcar with rudimentary keel or none; foot normal or large, the ratio of its length to that of the tibia usually ranging from 48 to 60 16

15(14). Third metacarpal not so long as forearm; hairs on back with long shiny tips; skull larger, with flattened braincase and gradually rising profile ..... *Myotis subulatus*

Third metacarpal usually as long as forearm; hairs on back dull tipped; skull smaller, with rounded braincase and abruptly rising profile ..... *Myotis californicus*

16(14). Ears relatively long, more than 16 mm.; a fringe of stiff hairs on free edge of interfemoral membrane (not always conspicuous); calcar with keel rudimentary or absent 17

Ears relatively short, less than 16 mm.; no stiff hairs on free edge of interfemoral membrane; calcar without keel 18

17(16). Ear twice as long (or more) as hind foot; fringe of hair on free edge of interfemoral membrane not conspicuous; calcar with rudimentary keel ..... *Myotis evotis*

Ear less than twice as long as hind foot; fringe of hair on free edge of interfemoral membrane conspicuous; calcar without keel .....

..... *Myotis thysanodes*

18(16). Length of forearm more than 37 mm.; total length more than 80 mm.; sagittal and occipital crests well defined when viewed dorsally; cheek teeth exceptionally large 19

Length of forearm less than 37 mm.; total length less than 80 mm.; sagittal and occipital crests not well defined; cheek teeth not exceptionally large ..... *Myotis yumanensis*

19(18). Length of forearm less than 41 mm.; fur glossy, usually cinnamon or grayish brown; braincase low and flattened when viewed laterally; rostrum enlarged ..... *Myotis occultus**

Length of forearm more than 41 mm.; fur dull, sepia or drab; braincase high and rounded when viewed laterally; rostrum not enlarged ..... *Myotis velifer*

20(10). Ears joined across forehead by a band of membrane; dorsal surface blackish, with three patches of white; total number of teeth, 34 ..... *Euderma maculata**

Ears not joined across forehead; dorsal surface never blackish with white spots; total number of teeth, 36 21

21(20). A pair of accessory lappets between the bases of the ears; total length more than 110 mm. ..... *Idionycteris phyllotis*

No accessory lappets between the bases of the ears; total length less than 110 mm. ..... *Corynorhinus townsendii*

22(2). Forearm more than 70 mm.; upper lips without deep vertical grooves; skull more than 30 mm. in length ..... *Eumops perotis**

Forearm less than 70 mm.; upper lips with deep vertical grooves; skull less than 30 mm. in length 23

23(22). Second phalanx of fourth finger more than 5 mm.; forearm usually less than 45 mm.; ears not united at base; skull considerably wider anteriorly than at the least interorbital breadth; skull less than 18 mm. in length .....*Tadarida brasiliensis*

Second phalanx of fourth finger less than 5 mm.; forearm usually more than 45 mm.; ears united at base; skull scarcely wider anteriorly than at the least interorbital breadth; skull more than 18 mm. in length 24

24(23). Forearm more than 53 mm. in length; skull more than 21 mm. in length ..... *Tadarida molossa*

Forearm less than 53 mm. in length; skull less than 21 mm. in length ..... *Tadarida femorosacca**

ACCOUNTS OF SPECIES

Leptonycteris nivalis nivalis (Saussure)

LONG-NOSED BAT

SPECIMENS EXAMINED: Buckelew Cave, west end of Blue Mountain, approximately 5000 feet, 17 miles south of San Simon, 10 (U.A.); Mine tunnel, 1 mile north of Paradise, 5200 feet, 12 (U.A.).

The long-nosed bat is a nectar- and pollen-feeding bat that is known

to occur in southern Arizona only in the warm season. The presence of a colony of long-nosed bats in Buckelew Cave has been known for several years, although it has not been reported in the literature. On August 11, 1951, Harold Broadbooks and Joseph T. Marshall visited this cave with a class of students from the University of Arizona. Three adult males collected on this trip are in the zoological collections of the University of Arizona. As can be seen in table 1, this cave has been visited several times in the past few years.

FIG. 1. Female long-nosed bat, *Leptonycteris nivalis* Saussure, taken from a mine tunnel 1 mile north of Paradise, Cochise County, Arizona, on August 19, 1955. Photograph by George Olin.

From the observations made on these visits, it appears that in early summer this colony is composed of males and a few non-gravid females. At this same time of the year maternity colonies containing only adult females with young are known from other places in southern Arizona.

In Colossal Cave, Pima County, for instance, adult females arrive the last of April, young are born in early May, and all bats, mothers and young, leave in late July.

To date no known critical analysis has been made on the age composition of the population in early summer. On July 26, 1954, when Lee D. Beatty and E. L. Cockrum visited this cave, a number of bats that appeared to be subadults were found. Certainly they were not young of the year, although six juveniles were found in the sample

TABLE 1

NUMBERS OF THE LONG-NOSED BAT, *Leptonycteris nivalis*, OBSERVED AND RECORDED IN BUCKELEW CAVE ON VARIOUS DATES

Date	Adults		Juveniles		Estimated Total Population	Observer
	Males	Females	Males	Females		
June 29, 1954	17	0	0	0	?	Whitelock (*in litt.*)
July 14, 1954	46	3	0	0	1600	Beatty and Justice
July 16, 1955	10	0	0	0	300	Ordway
July 26, 1954	46	34	3	3	1500	Cockrum and Beatty
August 11, 1951	3	—	—	—	?	Marshall and Broadbooks
August 15, 1955	5	14	1	0	1500	Cockrum
August 16, 1955	4	6	0	0	1500	Cockrum
August 25, 1952	—	—	—	—	2000	Constantine (*in litt.*)
September 6, 1952	11	10	8	3	?	Whitelock (*in litt.*)

studied. On August 15, 1955, of 14 adult females taken from the cave, nine had lactated earlier in the year, while five showed no signs of having lactated that season.

On September 5, 1954, George Olen and Jerry Cannon of Tucson, Arizona, discovered a colony of long-nosed bats in an abandoned mine tunnel 1 mile north of Paradise. Two clusters, totaling approximately 400 bats, were seen. When disturbed, the bats flew out into the daylight but, after Olen and Cannon left the tunnel and were standing

outside its entrance, most of the bats were observed returning to the mine tunnel.

On August 14, 1955, E. L. Cockrum, P. Bloedel, and Irma Cockrum visited this mine tunnel. The air temperature outside the mine tunnel at 11.30 A.M. was 33° C.; the temperature in the mine was 23° C. Approximately 150 individuals of *Leptonycteris* were present. Of 46 examined, 32 were males, and 14 were females. The males had the testes enlarged. Of 10 females examined and prepared as specimens, three had lactated earlier in the year and none contained embryos. Five of the remaining seven contained one tiny embryo each. The largest embryo had a crown to rump length of 10 mm.

On August 19, 1955, the population of the mine tunnel was estimated to be 100 bats. Of 16 banded on this date, six were males, and 10 were females. Ellen Ordway found that these bats were still present on September 15, 1955, but that they had all left by September 21, 1955.

Most bats have only one breeding season per year, and, in most, the young are born in a restricted part of the year. Among the typical insectivorous bats of North America, the season of birth varies somewhat with species and locality but is usually in June. A few species of tropical and subtropical bats are known to be polyestrous, with young being born at almost any time of the year (Cockrum, 1956).

Unlike other known species of bat, *Leptonycteris* appear to have two distinct periods for giving birth to young. When the adult females arrive at the maternity colony in Colossal Cave, Pima County, Arizona, in late April and early May, the embryos are in an advanced stage of development. Most of the young are born, one to each adult female, before May 15 (Beatty, MS). Presumably these bats had spent the winter months somewhere in Mexico where nectar was available. While maternity colonies are in existence, groups of males and reproductively inactive females exist in colonies such as the one occurring in Buckelew Cave in the Chiricahua Mountains. In late July, when the young of the year are large enough to forage for themselves, the maternity colonies apparently break up. At this time adult males and females as well as juvenile males and females can be found in Buckelew Cave. By the middle of August females that had not lactated earlier in the year are gravid. It was not determined if the lactating females became gravid at a slightly later date. No long-nosed bats have been found in Arizona after September 15. Members of this same species are known to occur in the warmer parts of Mexico in the winter months. Probably the individuals from southern Arizona move southward into Mexico where the gravid females again set up maternity colonies.

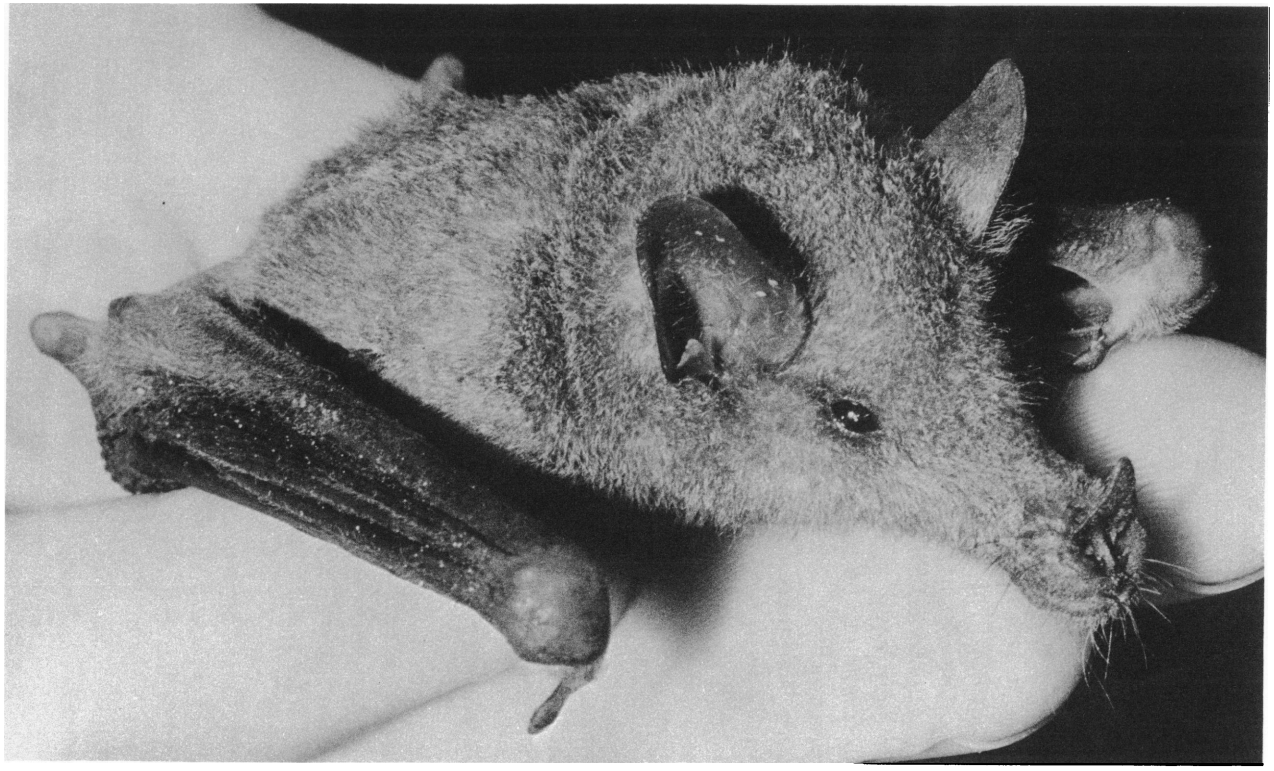

FIG. 2. Female hog-nosed bat, *Choeronycteris mexicana* Tschudi, taken from a mine tunnel 1 mile north of Paradise, Cochise County, Arizona, on August 18, 1955. Photograph by George Olin.

Choeronycteris mexicana Tschudi
HOG-NOSED BAT

SPECIMENS EXAMINED: Eight miles west of Paradise, one (U.S.N.M.); Mine tunnel, 1 mile north of Paradise, 5200 feet, four (U.A.).

The hog-nosed bat is a nectar- and pollen-feeding bat that is known to occur in Arizona only in the warmer months of the year. The specimen from 8 miles west of Paradise was taken on August 17, 1904, by Philip Waughtall. It was the first record of the genus and species for the United States (Miller, 1906, p. 96) and, until 1955, the only record for the Chiricahua Mountains. On August 18, 1955, E. L. Cockrum and Irma Cockrum found five or six hognose bats hanging in a mine tunnel approximately 1 mile north of Paradise. This tunnel, approximately 50 yards south of the tunnel containing the longnose bats, had no other species present. One hog-nosed bat was hanging at the entrance of the tunnel; the others were more than 100 yards back, near the end of the tunnel, and in total darkness. As with the long-nosed bats, none of the bats seen were dormant but, wide awake, took flight long before they came within range of hand nets. Of the four taken, two were adult females (still lactating) and two were juvenile males (both adult size). To date no adult male of this species has been taken in Arizona.

Two bats, thought to be of this species, were observed but not collected in a shallow cave in the South Fork of Cave Creek on September 17, 1955.

Myotis californicus californicus (Audubon and Bachman)
CALIFORNIA MYOTIS

SPECIMENS EXAMINED: Pinery Canyon, 6000 feet, one (U.S.B.S.); South Fork, 1 mile above Cave Creek, two (U.A.); Crystal Cave, ¾ mile west-northwest of Southwestern Research Station, one (U.A.).

OTHER RECORDS: Sawmill on Rock Creek, one (J. A. Allen, 1895, p. 248).

Joel A. Allen (1895, p. 248) reported a female of this species under the name *Vespertilio nitidus* from "saw mill on Rock Creek, . . . on June 29." Miller and Allen (1928, p. 154) reported a skin and an alcoholic specimen in the United States National Museum from the "Chiricahua Mountains." One of these is probably the specimen in the United States Biological Surveys collection, an adult female, taken on July 6, 1919, at 6000 feet in Pinery Canyon. Two adult males of this species were netted the night of June 2, 1955, at a small pool in South Fork, 1 mile above Cave Creek. On the night of August 16, 1955, a net was placed across the exit of Crystal Cave. At approximately 9.00 P.M.

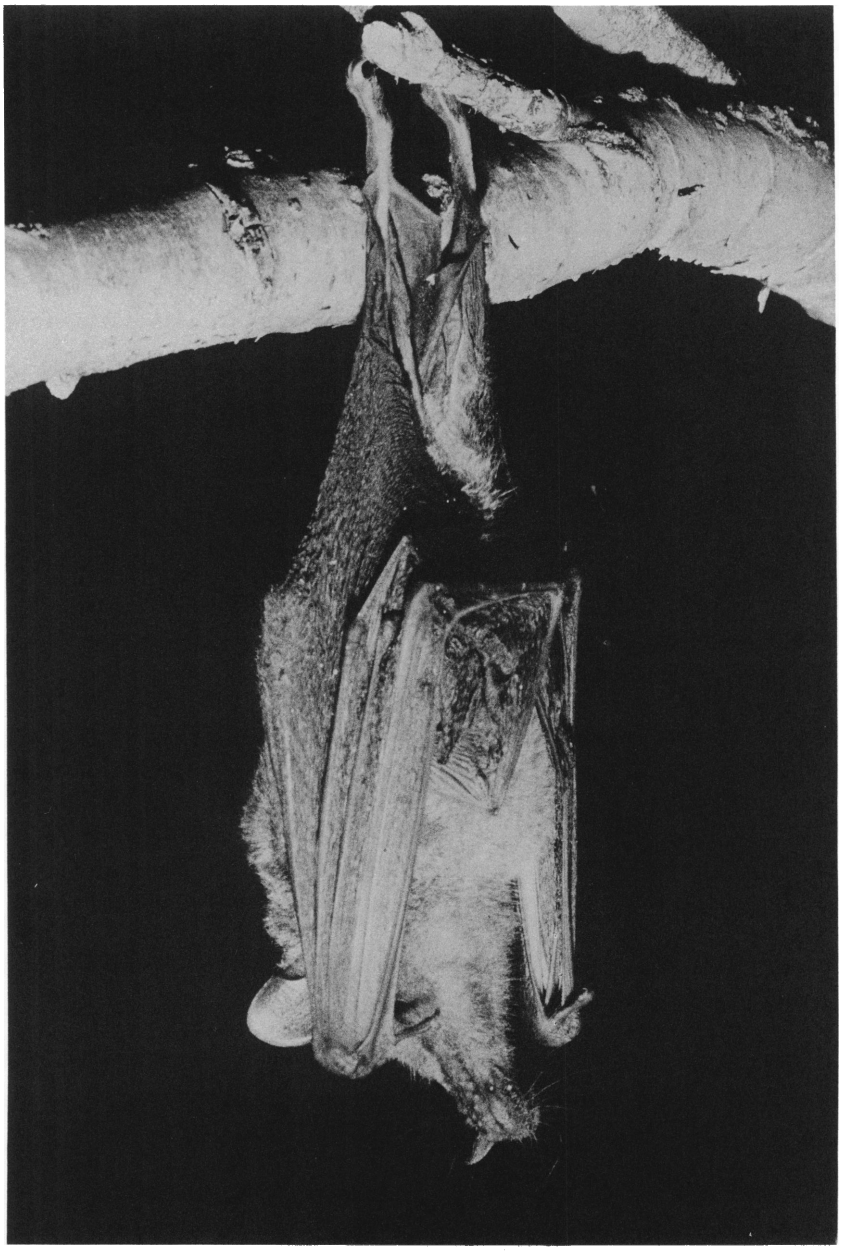

FIG. 3. Female hog-nosed bat, *Choeronycteris mexicana* Tschudi, taken from a mine tunnel 1 mile north of Paradise, Cochise County, Arizona, on August 18, 1955. Photograph by George Olin.

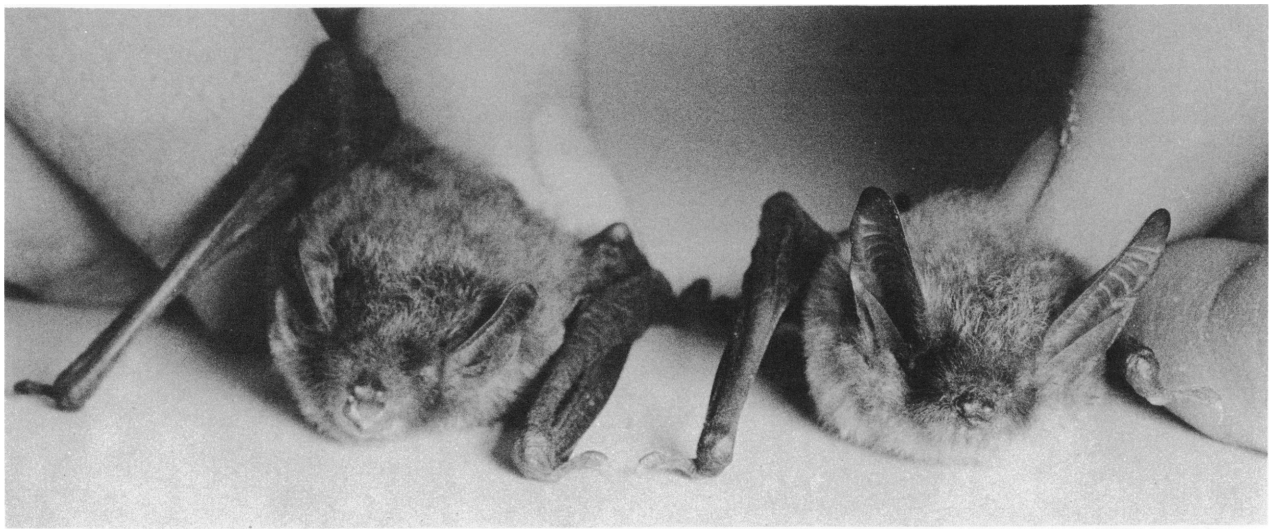

FIG. 4. Long-eared myotis, *Myotis evotis* (H. Allen), on right, and a long-legged myotis, *Myotis volans* Miller, on left, taken in net at swimming pool, Southwestern Research Station, Portal, Arizona, on August 18, 1955. Photograph by George Olin.

an adult male California myotis was captured as it tried to fly into the cave. No other bats of this species were seen in the cave.

Measurements and weights of the three males are as follows: total length, 81, 82, 83; tail, 39, 41, 40; hind foot, 8, 7, 7; ear, 13, 14, 12; tragus, 8, 8, 6; weight in grams, 3.5, 3.7, —.

Myotis evotis evotis (H. Allen)

LONG-EARED MYOTIS

SPECIMENS EXAMINED: Paradise, two (U.S.N.M.); Chiricahua Mountains, one (A.M.N.H.); South Fork, 1 mile above junction of Cave Creek, two (U.A.).

Cahalane (1939, p. 422) reported this species from the Chiricahaus under the name *Myotis evotis chrysonotus*, basing his reports on the specimens in the United States National Museum and the American Museum of Natural History. Two specimens of this species were taken on the night of June 2, 1955, in a net over a small pool in the South Fork, 1 mile above its junction with Cave Creek, by Keith Justice and Jack Hensley. One was a gravid female, with a single embryo that measured 19 mm. in crown to rump length. The second was an adult male.

Measurements and weights of the male and female are as follows: total length, 98, 92; tail, 44, 45; hind foot, 10, 8; ear, 21, 21; tragus, 11, 11; weight in grams, 5.0, 6.5.

Myotis subulatus melanorhinus (Merriam)

SMALL-FOOTED MYOTIS

SPECIMENS EXAMINED: South Fork, 1 mile above junction of Cave Creek, one (U.A.).

This species has not been previously reported for the Chiricahua Mountains. On the night of June 2, 1955, Keith Justice and Jack Hensley took one adult female in a mist net set across a small water hole in the South Fork, 1 mile above its junction with Cave Creek.

External measurements and weight of this specimen: total length, 83; tail, 38; hind foot, 7; ear, 14; tragus, 8; weight in grams, 3.7.

Myotis thysanodes Miller

FRINGED MYOTIS

SPECIMENS EXAMINED: One mile northwest of Portal (= Virtue Mine), one (U.M.); Buckelew Cave, west end of Blue Mountain, approximately 5000 feet, 17 miles south of San Simon, six (U.A.); South Fork, 1 mile above junction of Cave Creek, one (U.A.).

Cahalane (1939, p. 422) reported taking a single specimen of this species on July 23, 1933, in an abandoned mine tunnel "about a half mile northwest of Portal postoffice." This is probably the mine tunnel now known as Virtue Mine and is probably the specimen in the collection of the Museum of Zoology at the University of Michigan (No. 77364, 1 mile northwest of Portal, a male taken on July 23, 1933). On August 17, 1955, one adult female, which had lactated earlier in the year, was found dormant 75 yards inside the tunnel.

A small summer breeding colony of fringed myotis occurs in Buckelew Cave. On July 19, 1954, Lee D. Beatty and Keith Justice estimated that 200 of these bats were present. All adults examined were lactating females with young attached. On July 26, 1954, Lee Beatty and E. L. Cockrum estimated that the cluster contained approximately 250 individuals. All the adults examined were females. Twenty-three bats taken at random were: 14 adult females, four juvenile females, and five juvenile males. All the young seen were able to fly, although the forearm lengths were not so great as those of the adults. The forearms of the juveniles ranged from 41.5 to 44.0 mm.; those of the adult females ranged from 44.2 to 46.3 mm. The population of this summer colony appeared to be considerably smaller in 1955. On July 16, 1955, Ellen Ordway, Tom Poulson, and Fred Gehlbach saw only six or seven in Buckelew Cave, while on August 14, 1955, P. Bloedel and E. L. Cockrum estimated the population at 50.

On the night of June 2, 1955, Keith Justice and Jack Hensley took an adult male in a net over a small water hole in South Fork, 1 mile above its junction with Cave Creek.

External measurements of two adult females are as follows: total length, 90, 93; tail, 37, 34; hind foot, 11, 10; ear, 18, 18; tragus, 11, 10.

Myotis velifer brevis Vaughan
CAVE MYOTIS

SPECIMENS EXAMINED: Riggs Ranch, mouth of Pinery Canyon, one (U.S.B.S.); San Bernardino Ranch, four (U.S.N.M.).

The specimens from San Bernardino Ranch in the United States National Museum were taken by E. H. Mearns and Holzner, September 6 to 8, 1892. All four were females. The specimen from Riggs Ranch, a male, was taken on May 2, 1927. No specimens of this bat were taken or banded in the present study. Probably investigations in the grasslands surrounding the mountains will reveal the cave myotis to be much more common in this region than the present records indicate.

Myotis volans interior Miller
LONG-LEGGED MYOTIS

SPECIMENS EXAMINED: Chiricahua Mountains, one (C.N.H.M.); 1 mile west of Portal (= Sierra Linda Ranch, Cave Creek, 4700 feet, of Cahalane, 1939, p. 422), one (U.M.); Fly Park, one (U.S.B.S.); Rustler Park, 16 (S.D.S.N.H.); John Hands Dam, 1 mile west of Southwestern Research Station, two (U.A.); South Fork, 1 mile above junction of Cave Creek, three (U.A.); South Fork of Cave Creek, 4 miles southwest of Portal, 5300 feet, one (U.M.).

Cahalane (1939, p. 422) reported shooting two of this species, one on August 5, 1932, on South Fork of Cave Creek, 5300 feet, and one on July 20, 1933, at a tank at the Sierra Linda Ranch.

Sixteen specimens (13 adult females, one of which was noted as lactating, two subadult males, and one subadult female) were taken from Rustlers Park at an elevation of 8500 feet between June 21 and July 3, 1931, and are in the collection of the San Diego Society of Natural History.

Five specimens were taken with nets at small water holes in stream beds near the Southwestern Research Station. On May 31, 1955, Justice, Hensley, and E. L. Cockrum took two at the John Hands Dam, 3 miles west of the Southwestern Research Station. In the night of June 2, 1955, Justice and Hensley took three at a pool in South Fork, 1 mile above its junction with Cave Creek. Four of the five were gravid females, each containing a single embryo measuring 13 to 14 mm. in crown to rump length.

Average and extreme external measurements and weights of four females are as follows: Total length, 100.5 (90–104); tail, 43.5 (40–46); hind foot, 9.0 (8–10); ear, 13.7 (13–14); tragus, 8.0 (7–9); weight in grams, 7.6 (7.1–8.3).

Pipistrellus hesperus apus Elliot
WESTERN PIPISTREL

SPECIMENS EXAMINED: One-half mile west of Portal, one (U.M.); Chiricahua National Monument, one (C.N.M.); Mesquite Wash and Pond, west end of Blue Mountain, 17 miles south of San Simon, two (U.A.); South Fork, 1 mile above junction of Cave Creek, one (U.A.); Southwestern Research Station, six (U.A.).

ADDITIONAL RECORDS: Mouth of Rucker Cañon, one (J. A. Allen, 1895, p. 247).

W. W. Price (*in* J. A. Allen, 1895, p. 247) wrote, "A single specimen [a female] was shot flying over an alfalfa field at the mouth of Rucker

Canon on June 2. A small bat, supposed to be this species, was one of the earliest to be seen evenings at my camp in Rucker Cañon. They lived in cliffs on the canon side and flew high, with a wavering flight." Cahalane (1939, p. 422) took a specimen on July 20, 1933, at a "tank in Cave Creek near Portal."

At the swimming pool at the Southwestern Research Station this was the first species to appear in the evening. The bats appeared shortly after sundown while dragonflies, swifts, and swallows were still flying. For example, on August 13, 1955, pipistrels appeared at the pool at 7.20 P.M. and continued in numbers until 9.00 P.M. No evidence of their presence could be seen after 9.00 P.M.

The pipistrels rarely became tangled in the net, but usually bounced off the net and occasionally fell into the water. Once in the water a pipistrel would swim towards the nearest edge of the pool where, if not captured, it would climb up to the surrounding edge, rest a while, and take off. A beam of light from a flashlight directed at a bat as it swam towards the edge would cause the bat to change direction and swim towards the opposite edge. These same actions were observed in the big brown bat (*Eptesicus fuscus*) and the Mexican free-tailed bat (*Tadarida braziliensis*). Although pipistrels visited the pool almost every night, relatively few were captured in the nets. On the nights of the following dates in 1955 the following numbers were taken at the pool: May 29, two males; May 30, two males; June 14, one male; August 13, two males; August 14, two males, one female; August 16, four males; September 30, one female; October 1, one male; October 14, one female; October 19, one female.

Eptesicus fuscus pallidus Young
Big Brown Bat

Specimens Exammed: Chiricahua Mountains (Fly's Park and sawmill on Rock Creek), one (U.S.B.S.); Rustlers Park, 8500 feet, one (U.M.); South Fork of Cave Creek, 4 miles southwest of Portal, two (U.M.); Southwestern Research Station, 5400 feet, six (U.S.).

W. W. Price (*in* J. A. Allen, 1895, pp. 247–248) wrote, "At Fly's Park, on the summit of the Chiricahua range, bats of this species were the first to appear after sundown. They had homes in the dense forest of firs which walled one side of the glade, and with *L. noctivagans* appeared to be the only bats that lived on the summit of the Chiricahua Mountains. At the sawmill on Rock Creek, on the west slope of the Chiricahuas, every evening these bats, singly and in companies of fours and fives, were seen flying down the canon."

Cahalane (1939, p. 422) took an adult male from Rustlers Park at an elevation of 8500 feet on July 8, 1933.

At the Southwestern Research Station in 1955, big brown bats visited the swimming pool almost every night from May 29 through October 26. The following numbers were taken: May, 34 males, one female; June, 19 males, no females; July, seven males, two females; August, six males, two females; September, four males, nine females; October, six males, 12 females. From an examination of these figures it becomes obvious that there was a shift in the sex ratio of big brown bats present at the Research Station. In May and June females were rare (53 males to one female), while in September and October there were approximately two females to each male (10 males to 21 females).

Big brown bats are in the group of insectivorous vespertilionid bats in which spermatogenesis normally occurs in early fall, the testes soon regressing. Insemination occurs at any time in the fall, during the winter, or in early spring. Ovulation occurs in the spring, and fertilization can result from spermatozoa stored in the female reproductive tract from an insemination occurring the previous autumn. The big brown bats of the Chiricahua Mountains are apparently no exception to this rule, for on the morning of September 28, 1955, Ellen Ordway observed a pair of bats copulating in a cage in which they had been placed prior to being banded and released.

Eisentraut (1953, p. 211) reported that, in Germany, evening flights of *Eptesicus serotinus* followed fixed routes, with the succession of visits to various "hunting-fields" appearing to be fixed. Some evidence that the same behavior may occur in the big brown bat is furnished by the following incident. A male *Eptesicus fuscus* was captured between 8.00 and 9.00 P.M. on May 29, 1955, in the net over the swimming pool at the Southwestern Research Station. It was banded and released at the point of capture on the morning of May 30. Mont Cazier recovered this same individual at 8.00 P.M. on May 30 at the point of capture. It was again recovered at 8.00 P.M. on June 3 at the same place.

Measurements and weights of two females are as follows: total length, 121, 121; tail, 48, 47; hind foot, 12, 10; ear, 18, 17; tragus, 9, 8; weight in grams, 20.4, 21.3.

Lasiurus borealis teliotis (H. Allen)
Red Bat

Specimens Examined: Chiricahua Mountains [= Wilgus post office], three (C.N.H.M.); ½ mile west of Portal, six (U.M.).

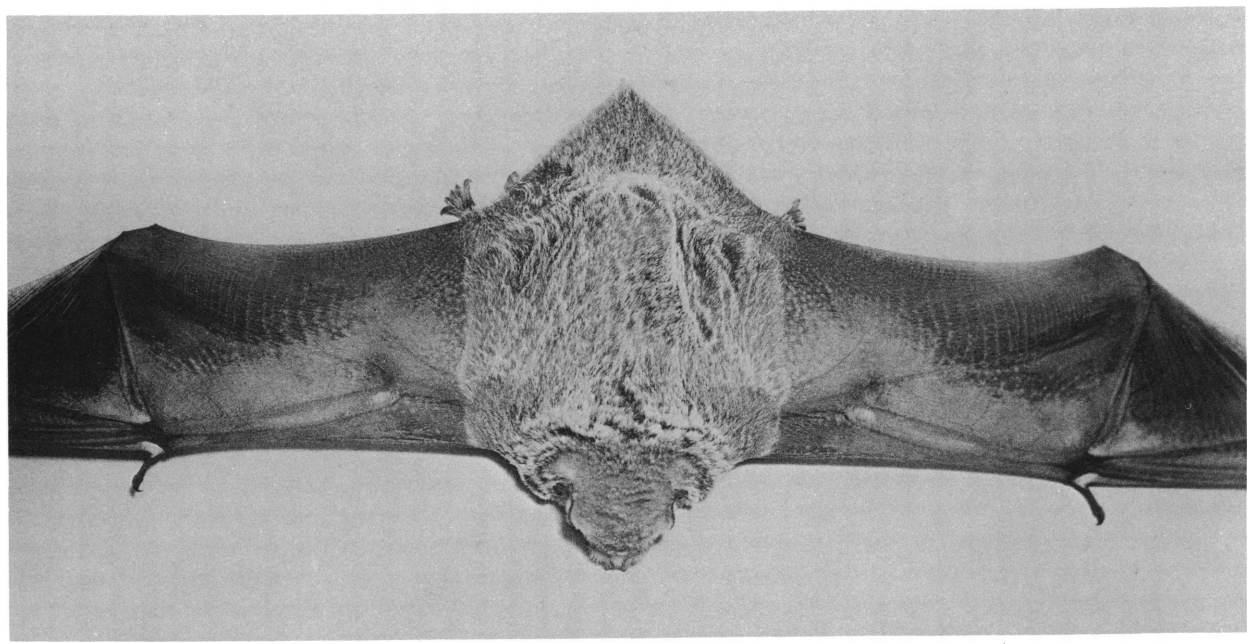

FIG. 5. Adult male hoary bat, *Lasiurus cinereus* (Beauvois), taken in a net at the swimming pool, Southwestern Research Station, Portal, Arizona, on August 18, 1955. Photograph by George Olin.

Under the name *Atalapha borealis*, W. W. Price (*in* J. A. Allen, 1895, p. 246) reported: "A nursing female with two young a few days old was taken from the thick foliage of a peach tree at Wilgus P. O., at the west base of the Chiricahua Mountains, on June 26." These are probably the same three specimens (an adult female, a juvenile male, and a juvenile female) that are in the Chicago Natural History Museum. According to labels on these specimens, they were prepared on June 27, 1894. Cahalane (1939, p. 422) found: "This was the most abundant of the species of bats frequenting the water holes of the Cave Creek near Portal in the last half of July 1933. It was not found elsewhere."

Cahalane's findings are in contrast to our findings. Except for one bat seen flying just after sundown near Portal on August 14, 1955, and tentatively identified as a red bat, no obseravtions were made on this species. At least in the summer of 1955 this was not the most abundant species of bat in the Cave Creek region.

Lasiurus cinereus cinereus (Beauvois)

Hoary Bat

Specimens Examined: Southwestern Research Station, 5400 feet, seven (U.A.).

The hoary bat has not been previously recorded from the Chiricahua Mountains. It is large, insectivorous, non-colonial tree bat that, at least in the northern part of its range (southern Canada and northern United States), is presumed to be migratory.

In late May, 1955, the hoary was common in the region of the Southwestern Research Station. In the last three nights of May 1955, 15 of the 84 bats netted at the swimming pool were hoary bats. As the season progressed, the following numbers were captured: May, 14 males, one female; June, four males, one female; July, two males, one female; August, three males, no females; September, one male, no females; October, six males, no females. None of the females showed any evidence of reproductive activity.

Average and extreme measurements and weights of five males are: total length, 135.2 (130–140); tail, 50.4 (43–55); hind foot, 12.4 (11–14); ear, 15.6 (14–17); tragus, 7.2 (5–11); weight in grams, 26.1 (23.6–27.3).

Lasionycteris noctivagans Le Conte

Silver-haired Bat

Specimens Examined: Fly Park, three (A.M.N.H.); Southwestern Research Station, 5400 feet, four (U.A.).

As is the hoary bat, the silver-haired bat is a non-colonial tree bat that is presumed to be migratory in the northern part of its range.

W. W. Price (*in* J. A. Allen, 1895, p. 248) reported: "Three specimens were taken and several others seen at Fly's Park, on the summit of the Chiricahua Mountains. They inhabited the forest of firs, and at nightfall came into the glade to feed." These were taken between June 11 and June 23, 1894. Cahalane (1939, p. 422) did not find any silver-haired bats in the Chiricahua Mountains from June 25 to September 24, 1932, and June 21 to August 24, 1933.

In the summer of 1955, a total of six silvered-haired bats were taken in the nets at the swimming pool at the Southwestern Research Station. These were taken between May 29 and June 2. None was taken later in June, July, August, September, October, or November, although nets were set at least some nights in each of these months.

Silver-haired bats came to the pool in greatest abundance between 8.00 and 9.00 P.M. On May 30, bats thought to be this species were observed flying at 7.45 P.M. The six specimens taken were four males and two females. Neither of the females showed any sign of reproductive activity.

The presence of silvered-haired bats at the Southwestern Research Station (elevation 5400 feet), their absence later in the year, and their presence at Fly Park (elevation 9000 feet) in the middle of June suggest that the silver-haired bat shows seasonal altitudinal migration in the Chiricahua Mountains. Further investigations are needed to give a clearer picture of the activities of this species.

Measurements and weights of three males are: total length, 106, 101, 103; tail, 40, 44, 45; hind foot, 10, 8, 8; ear, 16, 16, 16; tragus, 7, 5, 6; weight in grams, 6.9, 7.5, 7.3.

Corynorhinus townsendii pallescens Miller
Western Big-eared Bat

Specimens Examined: Cave Canyon, seven (U.A.); northwest of Portal, two (U.M.); ½ mile northwest of Portal, five (U.M.); Virtue Mine, ½ mile west of AVA Ranch, Portal, six (U.A.); Last Chance Hotel, Paradise, two (U.A.); Crystal Cave, approximately ¾ mile west-northwest of Southwestern Research Station, six (U.A.).

Cahalane (1939, p. 422) found a colony of *Corynorhinus* in "an abandoned mine tunnel about a half-mile northwest of Portal post-office." This mine tunnel is probably the old Virtue Mine, ½ mile northwest of the AVA Ranch. Virtue Mine is a horizontal tunnel that extends approximately 350 yards back into the side of the mountain.

FIG. 6. Western big-eared bat, *Corynorhinus townsendii pallescens* Miller, taken in Crystal Cave, Chiricahua Mountains, Cochise County, Arizona. Photograph by George Olin.

On May 31, 1955, Justice, Hensley, and Cockrum visited this tunnel. Approximately 25 big-eared bats were observed, of which 11 were captured, all adult females. Nine of these were banded and released at the Southwestern Research Station. One of the females contained a single embryo that was 18 mm. in crown to rump length.

On June 6, 1955, Charles M. Bogert visited Virtue Mine and took two adult females, including one that had been banded on May 31. One of the females had a single young attached. On August 17, 1955,

E. L. Cockrum found five long-eared bats and one *Myotis thysanodes* in the mine tunnel. One of the *Corynorhinus*, an adult female, had also been banded on May 31. Thus at least two of the bats taken from the tunnel, and banded and released at the Southwestern Research Station, had returned an air-line distance of 5 miles to the point of original capture.

Approximately ¾ of a mile west-northwest of the Southwestern Research Station, at an elevation of 5700 feet, is an extensive natural cave called Crystal Cave. On June 1, 1955, Mont Cazier, Justice, Hensley, and E. L. Cockrum observed two clusters of approximately 50 long-eared bats hanging from the ceiling of the main cavern. One adult female was captured in a side tunnel. This female was gravid, carrying a single embryo 18 mm. in crown to rump length.

On July 17, 1955, Charles M. Bogert collected 47 specimens of *Corynorhinus* in Crystal Cave and took them to the Southwestern Research Station, where Ellen Ordway and Rudolph Schrammel banded and released the bats. These 47 included 13 adult females, eight adult males, 14 juvenile females, and 12 juvenile males. Some of the adult females had young attached. One of the adult females was a recovery, having been taken from Virtue Mine and banded and released at the Southwestern Research Station on May 31, 1955.

Some of the juveniles were apparently too young to fly back to the cave. When E. L. Cockrum visited the Station on July 23, two young were still hanging to the porch screen. These young, and another dead one, all females, had the following measurements: total length, 85, 79, 84; tail, 36, 34, 34; hind foot, 11, 11, 11; ear, 28, 28, 27; tragus, 13, 12, 12; forearm, 39, 39, 38.

On August 14, 1955, P. Bloedel and E. L. Cockrum found two long-eared bats, one adult male and one adult female, hanging in an abandoned building, the Last Chance Hotel, in Paradise.

No individual of *Corynorhinus* was taken in nets over water at any-time during these investigations, although nets were set over water for 57 nights in the summer and fall of 1955, within ¾ mile of Crystal Cave. Probably *Corynorhinus* is able to detect and avoid such nets. Some evidence of this was obtained the night of August 16, 1955, when Cockrum and Ellen Ordway set a net across the exit of Crystal Cave. The trapped big-eared bats in the cave flew up to the net, paused and appeared to hover for a split second, and then flew back into the cave. An occasional bat actually alighted on the net, and a few, invariably young of the year, actually flew into the net.

Measurements and weights of two females and one male from Virtue

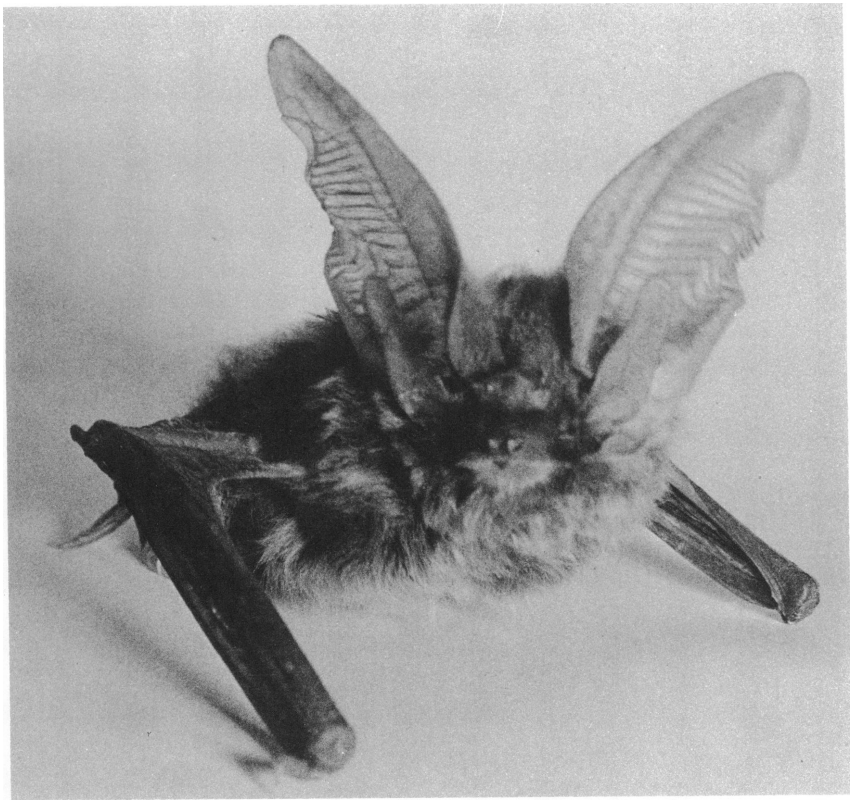

FIG. 7. Adult male Mexican big-eared bat, *Idionycteris phyllotis* (G. M. Allen), taken on October 18, 1955, in a net at a water hole in the South Fork of Cave Creek, Chiricahua Mountains, Cochise County, Arizona. Photograph by George Olin.

Mine are as follows: total length, 108, 101, 100; tail, 47, 47, 47; hind foot, 11, 10, 10; ear, 34, 35, 31; tragus, 15, 11, 15; weight in grams, 9.6, 11.5, —.

Idionycteris phyllotis (Allen)
MEXICAN BIG-EARED BAT

SPECIMENS EXAMINED: Southwestern Research Station, 5400 feet, one (U.S.N.M.); South Fork, 1.3 miles above junction with Cave Creek, one (U.A.).

Idionycteris is one of the rarest bats in North America, and its occurrence in the United States was completely unexpected. Handley

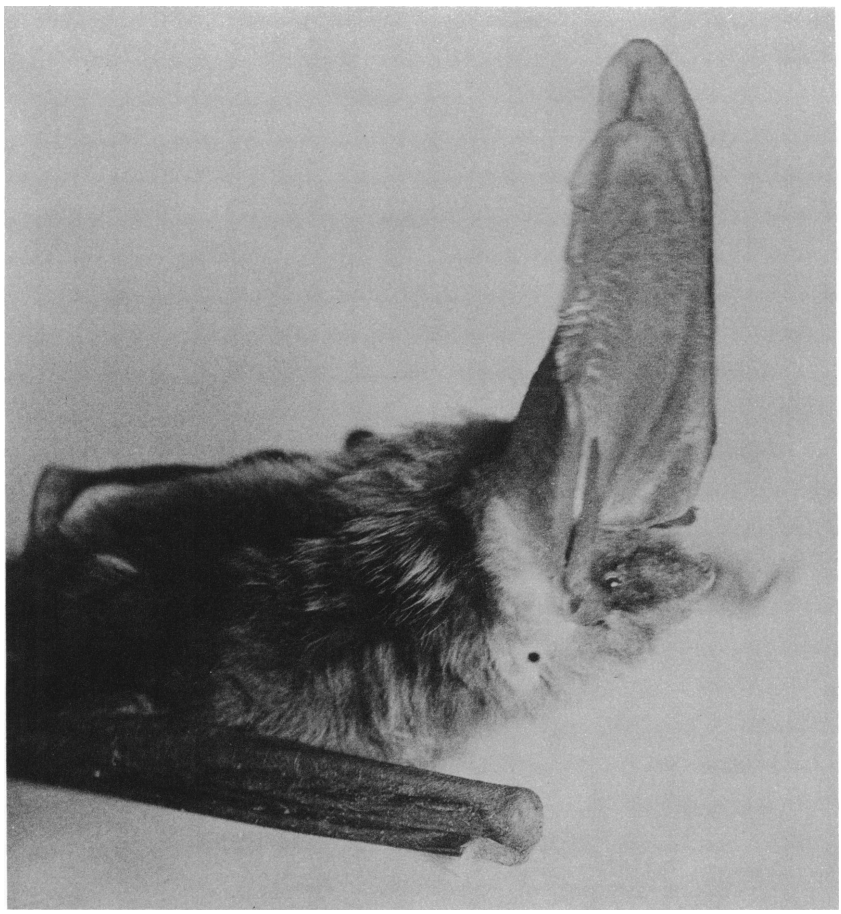

FIG. 8. Mexican big-eared bat, *Idionycteris phyllotis* (G. M. Allen), taken on October 18, 1955, in a net at a water hole in the South Fork of Cave Creek, Chiricahua Mountains, Cochise County, Arizona. Photograph by George Olin.

(1956) has reviewed the taxonomic history of the two known specimens. The first was secured on March 24, 1878, in San Luis Potosi, Mexico, and was named *Corynorhinus phyllotis* by G. M. Allen (1916, p. 352). The second, a female, was taken on June 17, 1922, at Miquihauna, Tamaulipas, Mexico, and was described as a new genus and a new species under the name *Idionycteris mexicanus* by Anthony (1923, p. 1). Handley (1956) pointed out that these are actually conspecific and that this bat should be known as *Idionycteris phyllotis* (Allen).

Two specimens have recently been taken in the Chiricahua Moun-

tains. One specimen was taken at the Southwestern Research Station in a net stretched across the swimming pool. It was taken from the net at approximately 1.00 A.M. on May 30, 1955, by Jack Hensley, who had been "standing a watch" at the net. The second specimen was taken in a net over a water hole in South Fork, 1.3 miles above its junction with Cave Creek. This specimen was taken at approximately 9.30 P.M. on April 28, 1956, by Mont A. Cazier and Wesley Lanyon.

Measurements and weight of the Mexican big-eared bat are as follows: total length, 118; tail, 52; hind foot, 11; ear, 40; tragus, 16; weight in grams, 20.1.

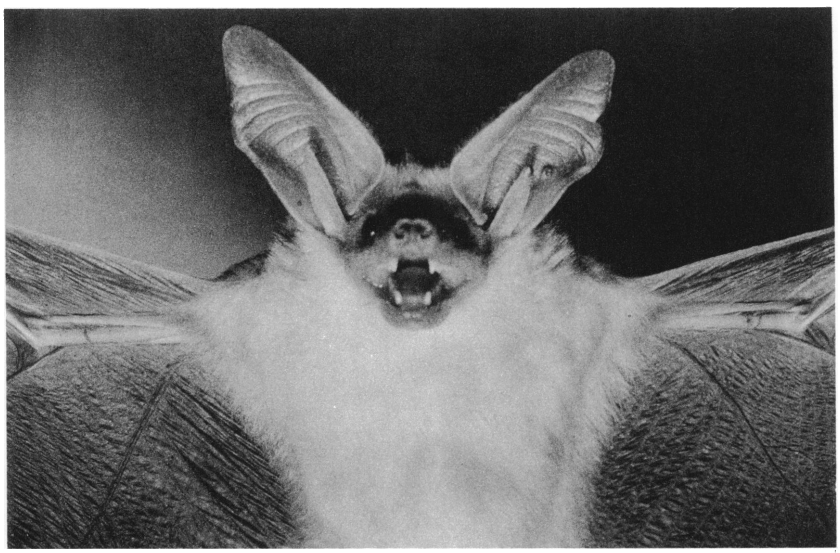

FIG. 9. Adult female pallid bat, *Antrozous pallidus pallidus* (Le Conte), taken in the summer of 1956 in Tucson, Pima County, Arizona. Photograph by George Olin.

Antrozous pallidus pallidus (LeConte)
PALLID BAT

SPECIMENS EXAMINED: Portal, one (U.M.); 6 miles northeast of Paradise, 13 (S.D.S.N.H.); Chiricahua National Monument Headquarters, two (C.N.M.); Pond, 17 miles south of San Simon, two (U.A.); Southwestern Research Station, 5400, one (U.A.).

The pallid bat appears, from the available information, to be rare in the wooded elevations of the Chiricahua Mountains but not uncommon at the lower elevations. Cahalane (1939, p. 422) reported:

"One specimen, a female, was captured September 6, 1932, in a house near Portal and was presented to me by Elliot Sowell. This locality is at the upper edge of the Lower Sonoran Zone. The record seems to be the only one for this area."

Twelve adult females and one half-grown male were taken 6 miles northeast of Paradise on June 29, 1931. According to a note on the specimen label, one of the females was lactating. These specimens are on deposit in the collection of the San Diego Society of Natural History.

Records at the Chiricahua National Monument indicate that night roosts in some of the monument buildings have existed in the summer months at least since 1945.

On July 26, 1954, Lee Beatty and E. L. Cockrum set a net over a pond near Buckelew Cave, at the west end of Blue Mountain. Two adult females were taken in the net. One of the females had been lactating.

On August 18, 1955, an adult male pallid bat was taken in the net at the pool at the Southwestern Research Station. Three adult females were taken at the same place by Ellen Ordway, one each on the nights of September 30, October 1, and October 16.

External measurements and weights of two females and one male are as follows: total length, 112, 115, 114; tail, 45, 50, 41; hind foot, 13, 13, 12; ear, 32, 30, 32; tragus, 16, 16, 17; weight in grams, 22.7, 22.1, —.

Tadarida brasiliensis mexicana (Saussure)

MEXICAN FREE-TAILED BAT

SPECIMENS EXAMINED: Pond, west end of Blue Mountain, 16 miles south of San Simon, one (U.A.); Southwestern Research Station, 5400 feet, eight (U.A.).

Under the name *Nyctionomus brasiliensis* J. A. Allen (1895, p. 246) reported six specimens from the Chiricahua Mountains (one male, five females, June 19 to 23). According to W. W. Price (*in* Allen, *loc. cit.*), "These bats were abundant on the summit of the Chiricahua Mountains during June. From soon after sunset until too dark to see, a steady procession passed the summit from east to west. They had a rather steady flight, and did not appear to be feeding. Although they always appeared to fly from east to west, in the evening, it is likely they had a breeding place in the jagged cliffs on the east slope of the mountains, and returned there before day break, after feeding on the west slope."

At the Southwestern Research Station, this species of bat was by far

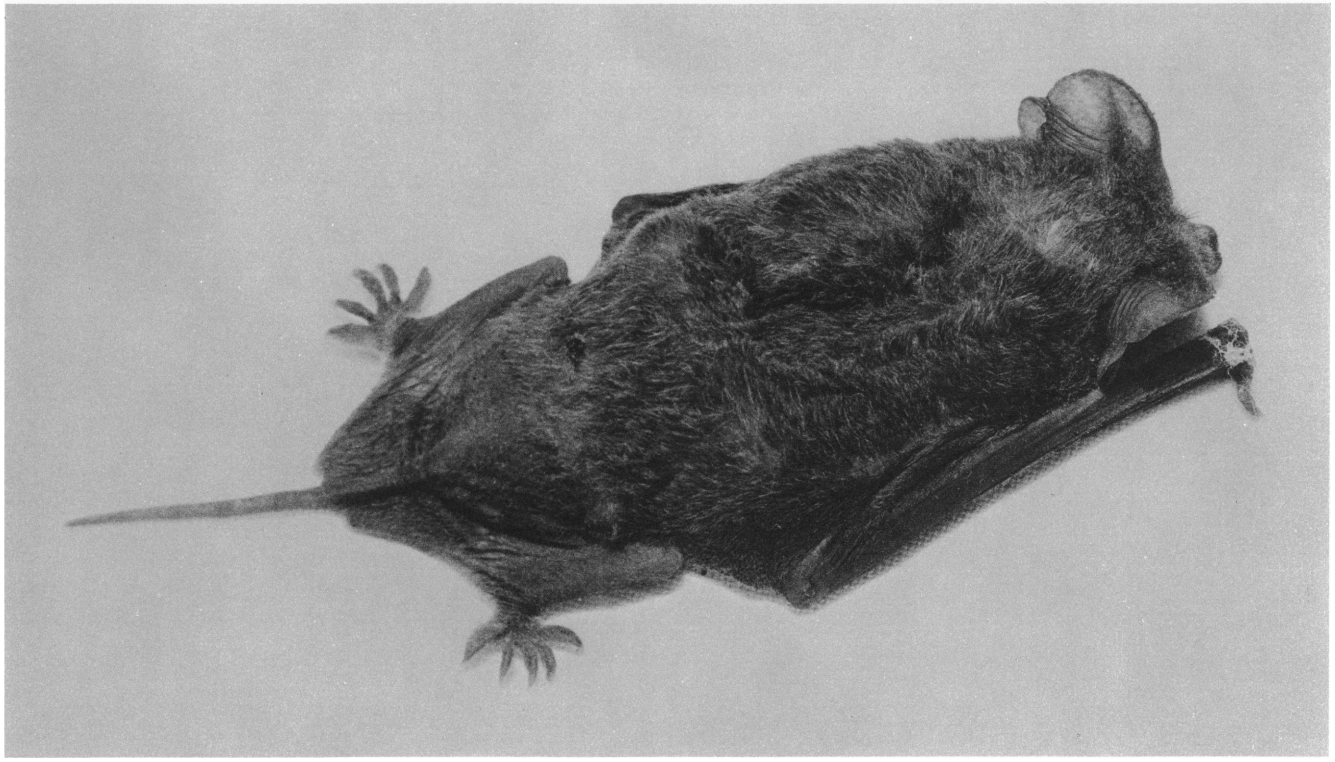

FIG. 10. Adult female Mexican free-tailed bat, *Tadarida brasiliensis mexicana* (Saussure), taken in the spring of 1956 in the Tucson Mountains, Pima County, Arizona. Photograph by George Olin.

the most common bat taken. The following numbers of bats were taken: May, 18 males, six females; June, 75 males, 37 females; July, 24 males, six females; August, 42 males, no females; September, 97 males, 87 females; October, 97 males, 79 females. Thus a total of 630 free-tailed bats (353 males, 277 females) were captured at the swimming pool. Most of these bats were captured, banded, and released by Ellen Ordway.

An adult female, taken at the pool on May 30, 1955, contained one embryo that was 12 mm. in crown to rump length. A female taken June 4, 1955, had one 18-mm. embryo.

External measurements of two males and two females are as follows: total length, 108, 105, 111, 101; tail, 39, 35, 38, 35; hind foot, 11, 10, 10, 10; ear, 18, 17, 19, 19.

Tadarida molossa (Pallas)
Big Free-tailed Bat

Specimens Examined: Fly Park, one (U.S.N.M.); Southwestern Research Station, 5400 feet, four (U.A.).

The big free-tailed bat has been reported in North America north of Mexico from a few scattered specimens and localities. Cockrum (1952, p. 492) summarized the literature records of the known distribution north of Mexico as follows: British Columbia, one; Iowa, two; Utah, three; Colorado, two; Nevada, one; California, two; Oklahoma, one; Arizona, one; and Texas, several. In Texas, Borell (1939, pp. 65–68) found the only colony of this species thus far reported in the United States. This colony was found in a rock crevice in the Chisos Mountains, Brewster County, Texas.

The specimen from Arizona indicated above is the one taken by W. W. Price from Fly Park in the Chiricahua Mountains. This specimen was reported by J. A. Allen (1895, p. 245) under the name *Nyctinomus nevadensis*. According to W. W. Price (*in* Allen, *ibid.*, p. 246): "A single specimen, a female, was taken on the ridge of the Chiricahua Mountains at a small meadow called Fly's Park, at about 9500 feet, on the evening of June 22. Another large bat, supposed to be of this species, was seen on the same evening. These bats were associated with large numbers of *N. brasiliensis*, and were flying from a dark canon on the eastern slope of the range over the summit to the west."

In the summer of 1955, a number of big free-tailed bats were taken in the net at the swimming pool at the Southwestern Research Station. The first, an adult female containing a single embryo with a crown

to rump length of 23 mm., was taken the night of May 29, 1955. Ellen Ordway took the following big free-tailed bats: June 17, two males, one female; June 18, five males, 10 females; June 20, no males, 11 females; June 21, no males, 19 females; June 24, no males, one female; July 9, no males, four females; September 20, one female; and September 23, one female.

External measurements and weights of two adult females are: total length, 147, 132; tail, 57, 47; hind foot, 11, 13; ear, 29, 27; tragus, 5, 5; weight in grams, 27.7, —.

HYPOTHETICAL LIST

Mormoops megalophylla megalophylla Peters
LEAFCHIN BAT

This bat has been recorded from 5 miles northwest of Patagonia, 4450 feet, Santa Cruz County, Arizona (Beatty, 1955, p. 290). It was taken in a net over a water hole located in a riparian community of mature cottonwood, sycamore, and willow in the oak woodland. Similar habitat is found in the Chiricahua Mountains.

Macrotus californicus Baird
CALIFORNIA LEAF-NOSED BAT

Two specimens of this large-eared bat have been taken at Tombstone, Cochise County, and are in the United States Biological Surveys collection. This species is to be expected in the lowlands surrounding the Chiricahua Mountains.

Myotis yumanensis yumanensis (H. Allen)
YUMA MYOTIS

Although not yet recorded from the Chiricahua Mountains, this species has been collected at localities surrounding these mountains and is to be expected at elevations below 6000 feet.

Euderma maculata (J. A. Allen)
SPOTTED BAT

This rare bat is distinctive in that it has large ears and a black color with three large white spots. It has been recorded to the eastward in New Mexico from Mesilla Park (Miller, 1903, p. 165) and to the westward from Yuma, Arizona (Vorhies, 1935, p. 225). It may be expected to occur in the Chiricahua Mountains.

Tadarida femorosacca (Merriam)
POCKETED FREE-TAILED BAT

This species has been recorded to the westward from Fort Huachuca (Cockrum, 1956, p. 282) and may be expected in the Chiricahua Mountains.

Eumops perotis californicus (Merriam)
WESTERN MASTIFF BAT

One specimen of this species from Tombstone, Arizona, is in the zoological collections of the University of Arizona. It may be expected to occur at lower elevations in the Chiricahua Mountains.

SUMMARY

The above preliminary list records observations on the abundance, seasonal and ecological distribution, and life histories of several species of bats that occur in and around the Chiricahua Mountains, an isolated mountain range in southeastern Arizona. Eighteen species, representing three families, are recorded, four for the first time from this mountain range. Six additional species are listed as probably occurring in the region. A key is provided for the species known or expected to occur in the area.

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