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#### BATS FROM THE MEXICAN STATE OF HIDALGO

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The state of Hidalgo (20,870 square kilometers in area) lies just south of the Tropic of Cancer in eastern México. All but the extreme eastern part of the state, adjacent to Veracruz and northern Puebla, was included in Hershkovitz' (1958) Transition Zone between the Nearctic and Neotropical regions. The Neotropical portion of Hidalgo extends up the eastern face of the Sierra Madre Oriental to an elevation of approximately 1500 meters. A narrow band of sub-temperate coniferous forest (sometimes ill-defined from the tropical cloud forest that occurs at elevations from 1200 to 1500 meters on the eastern versant of the Sierra) extends the length of the state from northwest to southeast along the eastern summit of the mountains. Adjacent to the southwest lies a broader, drier zone of pine-oak forest. Beyond, the Mexican Plateau is incised by the arid drainage basin of the Río Tulancingo, which flows northwest from the city of that name. Short grass, cactus, and acacia scrub dominate the Plateau, and isolated peaks support pine-oak forest.

Despite the varied ecological conditions in Hidalgo, the state has received little attention from zoologists. It is not surprising, therefore, that only 15 species of bats have been listed from there previously, and many of these records were based on single specimens. Thirty-three species are reported here, 18 of which are new to the state. Those Hidalgan bats first reported in this paper were obtained by participants in the summer field course in vertebrate zoology at Texas Tech University; one field party collected in Hidalgo from 1 to 21 July 1972, and another was there from 22 July to 18 August

1973. Specimens are on deposit in The Museum of Texas Tech University.

All measurements are recorded in millimeters and weights are given in grams. Fig. 1 is a map of Hidalgo on which place names used in the accounts beyond are identified.

#### LOCALITIES

Localities visited by field parties of The Museum of Texas Tech University are described briefly below. Original works should be consulted for descriptions of localities recorded by other authors. Topography and vegetation were described for parts of Hidalgo by Goldman (1951). However, many changes in vegetational composition and distribution have occurred since E. A. Goldman traveled in Hidalgo in the period 1893 to 1898.

*Huejutla* (21°08'N, 98°25'W). — Huejutla de Reyes is situated at the northeastern foot of the Sierra Madre Oriental, on the border with Veracruz. The lowland rainforest that once dominated this region has been replaced mostly with pastures, banana groves, and small fields of row crops (principally corn). Second growth forest there was restricted to small, scattered tracts. The locality 2 km. S and 2 km. W Huejutla, 200 m., was located along a small river, which was bordered in some places with low, thick, riparian second growth, and in others with scattered trees of considerable size. Away from the river, the habitat was similar to that described for the general vicinity of Huejutla.

*Metzquitlán* (20°32'N, 98°39'W). — This small town is located in an arid intermontane river basin varying in elevation from approximately 1400 to 1600 meters. The locality 10 km. N Metzquitlán, 2000 m., is equivalent to the one listed as 7 km. S Zacualtipán, 2000 m., and is described under the heading Zacualtipán.

*San Felipe Orizatlán* (21°11'N, 98°37'W). — Although this town of approximately 5000 inhabitants appears on most maps as Orizatlán, it was referred to locally as San Felipe Orizatlán; it is located in the northeastern foothills of the Sierra Madre Oriental. The habitat in the vicinity of 4 km. E San Felipe Orizatlán, ca. 500 m., consists of second growth tropical broadleaf (or semideciduous) forest, pastures and small fields, or groves, principally of sugar cane, corn, bananas, and coffee.

*Tehuacán* (21°02'N, 98°31'W). — The elevation of this small town of less than 1000 inhabitants is approximately 200 meters. It is situa-

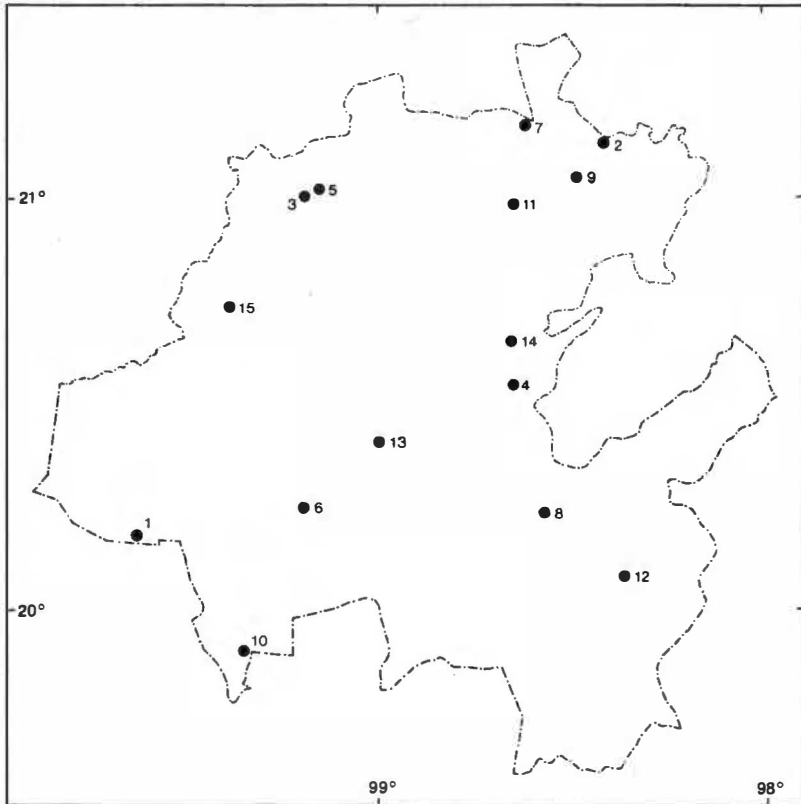


FIG. 1.—Map of Hidalgo on which localities mentioned in text are plotted as follows: 1, Escandón; 2, Huejutla; 3, Jacala; 4, Metzquitlán; 5, Pinalito; 6, Progreso; 7, San Felipe Orizatlán; 8, San Miguel Regla; 9, Tehuetlán; 10, Tepeji del Río; 11, Tlanchinol; 12, Tulancingo; 13, Xoxafi; 14, Zacualtipán; 15, Zimapán.

ted on a river by the same name, which here forms an incursion into the northeastern flank of the Sierra Madre Oriental. Southwest of Tehuetlán, the Sierra rises abruptly to an expanse of undulating highlands at a mean elevation of approximately 1500 meters. The habitat at lower elevations in the vicinity of the town was similar to that around Huejutla, except that second growth forest and cafetales were more common on the lower slopes of the Sierra. Forested areas were more extensive above 700 meters; cloud forest occupied the slopes above 1100 meters. Our camp, at 1200 meters, was 2 km. S and 10 km. W Tehuetlán. The habitat there and at other nearby localities was dominated by cloud forest.

*Tlanchinol* (20° 59'N, 98° 39'W). — Tlanchinol is situated near the northeastern edge of the undulating highlands of the Sierra Madre Oriental. The wet montane tropical forest in this area had been disturbed little by logging and agriculture, most of which was pastoral.

*Zacualtipán* (20° 39'N, 98° 36'W). — The dominant vegetation in the vicinity of this small town, located below the crest on the southwestern versant of the Sierra at an elevation of approximately 2000 meters, was pine-oak forest — pine predominating in some places, oak in others. Small orchards, milpas, and meadows were thinly scattered in the area.

#### ACCOUNTS OF SPECIES

##### *Pteronotus personatus psilotis* (Dobson, 1878)

A male of this species was netted over a stream 4 km. E San Felipe Orizatlán at an elevation approximating 500 meters.

##### *Mormoops megalophylla megalophylla* Peters, 1864

Four specimens netted over a stream 11 km. S and 1 km. W Zacualtipán, 1980 m., constitute the second locality of record for this ghost-faced bat from the state. Alvarez and Ramírez-Pulido (1972) earlier reported a single male from Cueva Xoxaí, 6 km. N Lagunillas, 2000 m.

Our specimens were netted over a stream in mixed hardwood-pine forest. None of three females (10 August) evinced gross reproductive activity.

##### *Macrotus waterhousii bulleri* H. Allen, 1890

This species has been reported from Hidalgo from Jacala by Anderson and Nelson (1965) and from Colonia Santa María (cave W Pinalito) by Villa-R. (1967).

##### *Glossophaga soricina leachii* (Gray, 1844)

*Specimens examined* (10). — 4 km. E San Felipe Orizatlán, ca. 500 m., 7; 1 km. N, 4km. W Tehuetlán, ca. 600 m., 2; 8 km. S Tlanchinol [ca. 1300 m.], 1.

Most specimens of *G. soricina* were taken in mist nets stretched over stream beds or along pathways adjacent to plantations. Of several females collected, only one (4 July) was pregnant. A subadult animal was shot in a cave on 31 July.

*Leptonycteris nivalis* (Saussure, 1860)

Seven *L. nivalis* were netted along the rim of a canyon 11 km. S and 1 km. W Zacualtipán, 1980 m. Individuals were observed feeding on blooming agave at this place. A female taken on 13 August was not reproductively active. Testes of males collected in mid-August ranged in length from 3.5 to 4.5.

This species can be distinguished easily from *L. sanborni* by the presence of a thin fringe of long hairs on the interfemoral membrane, a less well-developed presphenoid ridge, an emarginate (as opposed to broadly V-shaped) posterior palatal border, and, in most instances, pitting of the bony palate adjacent to the premolars and molars, or actual loss of teeth, owing to oral mites that evidently do not parasitize *sanborni*.

Ramírez-Pulido and Alvarez (1972) reported Hidalgan specimens of this species from Xoxaflí, 6 km. N Lagunillas, 2000 m.

*Leptonycteris sanborni* Hoffmeister, 1957

Five specimens of this long-nosed bat were netted over a stream 4 km. E San Felipe Orizatlán, ca. 500 m. None of four females taken on 2 July was pregnant or lactating.

*L. sanborni* has been reported previously from Hidalgo (as *L. yerbabuena*) by Ramírez-Pulido and Alvarez (1972) from Jacala and Xoxaflí, 6 km. N Lagunillas, 2000 m. In using the specific name *sanborni*, we follow Watkins *et al.* (1972).

*Anoura geoffroyi lasiopyga* (Peters, 1868)

*Specimens examined* (18). — 10 km. N Metzquitlán, 2000 m., 1; 4 km. E San Felipe Orizatlán, ca. 500 m., 4; 13 km. WSW Tehuetlán, ca. 1500 m., 13.

Near Tehuetlán, this glossophagine was taken in nets set along a trail in wet montane tropical forest. Specimens from east of San Felipe Orizatlán were netted over water and along a trail bordered by banana groves and cafetales; the one from near Metzquitlán was taken in a net set in a field of agave that was adjacent to a stream and surrounded by pine forest. Three of five July-taken adult females were lactating; males taken in the same month had testes that ranged from 1 to 5 in length. One subadult was captured on 19 July.

*Choeronycteris mexicana* Tschudi, 1844

Two males of this species are among our specimens from Hidalgo. One was netted over water in pine-oak forest 7 km. S Zacualtipán,

2000 m., along with *Lasiurus borealis* and two species of *Myotis*. The second was taken along with *Leptonycteris* 11 km. S and 1 km. W Zacualtipán, 1980 m., in a net set along the top of a steep canyon wall. Davis (1944) previously reported specimens from the Río Tasquillo, 26 km. E Zimapán, 5000 ft., and Alvarez and Gonzalez Quintero (1970) listed one from Xoxafi (6 km. N Lagunillas, 2000 m.).

*Carollia brevicauda* (Schinz, 1821)

Our four specimens of *C. brevicauda* (one from 4 km. E San Felipe Orizatlán, ca. 500 m., and three from 1 km. S and 7 km. W Tehuetlán, 900 m.) were netted in habitats typical of the tropical zone below 1000 meters in eastern Hidalgo. A pregnant female was taken on 31 July; two males collected on that same date each had testes 3 in length.

*Sturnira lilium parvidens* Goldman, 1917

*Specimens examined* (33).—2 km. S, 2 km. W Huejutla, 200 m., 2; 4 km. E San Felipe Orizatlán, ca. 500 m., 27; 3 km. N, 1 km. E Tehuetlán, 200 m., 1; 1 km. N, 4 km. W Tehuetlán, ca. 600 m., 3.

This species was netted over water and in lowland tropical habitats modified by man at elevations below 700 meters in eastern Hidalgo. *S. lilium* was found to occur most commonly in association with banana groves and cafetales; its distribution in eastern Hidalgo appears to be more restricted than does that of *S. ludovici*. Pregnant or lactating females were taken in July; subadults with incompletely fused phalangeal epiphyses were collected in July and August. Testes of 10 adult males ranged from 3 to 6 in length in July and August.

*Sturnira ludovici ludovici* Anthony, 1924

*Specimens examined* (93).—2 km. S, 2 km. W Huejutla, 200 m., 1; 10 km. N Metzquititlán, 2000 m., 1; 4 km. E San Felipe Orizatlán, ca. 500 m., 24; 3 km. N, 1 km. E Tehuetlán, 200 m., 1; 1 km. S, 7 km. W Tehuetlán, 900 m., 8; 1 km. S, 4 km. W Tehuetlán, ca. 600 m., 4; 2 km. S, 12 km. W Tehuetlán, 1200 m., 3; 2 km. S, 10 km. W Tehuetlán, 1200 m., 23; 13 km. WSW Tehuetlán, 1500 m., 2; 10 km. WSW Tehuetlán, 1200 m., 1; 7 km. WSW Tehuetlán, 900 m., 9; 5 km. WSW Tehuetlán, 700 m., 1; 2 km. N, 3 km. E Tlanchinol, 1300 m., 3; 1 km. N, 2 km. E Tlanchinol [ca. 1300 m.], 1; 5 km. E Zacualtipán, 2100 m., 6; 7 km. S Zacualtipán, 2000 m., 5.

*Sturnira ludovici* occurs commonly in a variety of habitats in the lowlands of eastern Hidalgo and on the eastern versant and highlands of the Sierra Madre Oriental. At elevations below 700 meters,

this species commonly was taken along with *S. lilium* in banana groves and cafetales; *S. ludovici* continued to be one of the most common bats at elevations above 700 meters. Pregnant as well as lactating females were captured both in July and in August, and subadults with incompletely fused phalangeal epiphyses also were netted in both months.

***Chiroderma villosum jesupi* J. A. Allen, 1900**

Two males (testes 4 and 5 in length) taken 4 km. E San Felipe Orizatlán, ca. 500 m., in early July provide the northernmost record for this species in the lowlands of eastern México. One was netted over a stream and the other along a path between banana groves and a cafetal.

***Artibeus aztecus aztecus* Andersen, 1906**

Davis (1969) recorded a male *A. aztecus* from 6 mi. NE Jacala, 6000 ft., which we also have examined.

***Artibeus jamaicensis yucatanicus* J. A. Allen, 1904**

We collected only 12 specimens of this species in Hidalgo, four from 2 km. S and 2 km. W Huejutla, ca. 200 m., and eight from 4 km. E San Felipe Orizatlán, ca. 500 m. It does not appear to enjoy so wide a distribution, particularly altitudinally, in eastern Hidalgo as does *A. lituratus* nor to be so common as the latter.

A female taken on 30 July carried a fetus measuring 34 (crown-rump). Our July-taken sample also includes several individuals with incompletely fused phalangeal epiphyses.

***Artibeus lituratus intermedius* J. A. Allen, 1897**

*Specimens examined* (74). — 2 km. S, 2 km. W Huejutla, 200 m., 16; 4 km. E San Felipe Orizatlán, ca. 500 m., 20; 3 km. N, 1 km. E Tehuetlán, 200 m., 30; 1 km. N, 4 km. W Tehuetlán, ca. 600 m., 4; 1 km. S, 7 km. W Tehuetlán, 900 m., 2; 2 km. S, 10 km. W Tehuetlán, 1200 m., 2.

This species evidently is one of the more common bats in lowland habitats in eastern Hidalgo. Pregnant as well as lactating females were taken both in July and in August, and flying young with incompletely fused phalangeal epiphyses also were captured in both months.

We tentatively use the subspecific name *intermedius*, which we suspect (Jones *et al.*, 1977) applies to populations of this species on

the Middle American mainland. Villa-R. (1967) previously reported a specimen in alcohol from Jacala.

***Artibeus toltecus toltecus* (Saussure, 1860)**

*Specimens examined* (9). —  $\frac{1}{2}$  km. W Huejutla, 300 m., 1; 2 km. S, 2 km. W Huejutla, ca. 200 m., 2; 4 km. E San Felipe Orizatlán, ca. 500 m., 5; 1 km. S, 7 km. W Tehuetlán, 900 m., 1.

Individuals were netted in a cafetal, over a stream, and along a pathway between banana groves and a cafetal. Females taken on 3 July, 4 July (two), and 14 July carried fetuses measuring 24, 15, 14, and 27, respectively. Two July-taken animals were young with incompletely fused phalangeal epiphyses. Greatest length of skull ranges from 20.1 to 21.2 in our series; weights of four adult males and one nonpregnant adult female varied from 13.0 to 15.5.

This species has been reported previously from Hidalgo by Villa-R. (1967) on the basis of a specimen from San Miguel de Regla.

***Centurio senex senex* Gray, 1842**

Two lactating females of this wrinkle-faced bat were netted 2 km. S and 10 km. W Tehuetlán, at an elevation of 1200 meters, in second growth forest on a hillside on 28 July. *Artibeus lituratus* and *Sturnira ludovici* were taken along with *Centurio*.

***Desmodus rotundus murinus* Wagner, 1840**

*Specimens examined* (28). — 2 km. W Huejutla, 200 m., 1; 10 km. N Metzquitlán, 2000 m., 3; 4 km. E San Felipe Orizatlán, ca. 500 m., 4; 3 km. N, 1 km. E Tehuetlán, 200 m., 4; 1 km. N, 4 km. W Tehuetlán, ca. 600 m., 1; 1 km. S, 7 km. W Tehuetlán, 900 m., 1; 3 km. S Zacualtipán, 11; 7 km. S Zacualtipán, 2000 m., 3.

Our specimens were netted in a variety of situations or, in one case (3 km. S Zacualtipán), taken from a day-time roost in a sandstone cave. A lactating female and a pregnant female (fetus 23 in crown-rump length), along with several juveniles, are among the series collected on 18 August from the cave. Flying young were taken on several dates in July. Davis (1944) reported six *Desmodus* from Jacala, 4000 ft., and Villa-R. (1967) recorded one from Cueva de la Mariposa, 1415 m., at Jacala, and another from Zacualtipán.

***Diphylla ecaudata centralis* Thomas, 1903**

Málaga Alba and Villa-R. (1957) reported this vampire from Jacala, Hidalgo. Subsequently, Villa-R. (1967) mapped this record but listed no Hidalgo specimens as examined.



*Myotis californicus mexicanus* (Saussure, 1860)

Nine specimens of *M. californicus* were trapped in mid-August in mist nets set over water 7 km. S Zacualtipán, 2000 m. (seven specimens) and 11 km. S and 1 km. W Zacualtipán, 1980 m. (two). The former locality is in pine-oak forest, whereas the latter is somewhat drier and less wooded in an area where agave, acacia, and oak predominate. None of four females was pregnant or lactating; five males had testes ranging in length from 3 to 7.

*Myotis nigricans nigricans* (Schinz, 1821)

A male (testes 3 long on 31 July) was taken in a mist net in a cafetal 1 km. S and 7 km. W Tehuetlán at an elevation of 900 meters. *Carollia*, *Desmodus*, *Artibeus lituratus*, and *A. toltecus* were netted at this same locality.

*Myotis thysanodes thysanodes* Miller, 1897

Seven specimens of this fringe-tailed species were netted between 4 and 16 August over water or along a canyon rim in pine-oak forest 7 km. S Zacualtipán at an elevation of 2000 meters. Four of the seven were young-of-the-year ranging in weight from 5.4 to 6.1. Three adult females, two of which still were lactating, weighed from 7.0 to 8.2.

We tentatively refer our specimens to the subspecies *thysanodes*. They are darker in color, both dorsally and ventrally, than are typical *M. t. thysanodes* from Texas and in this regard evidently approach *M. t. aztecus* (see Miller and Allen, 1928), presently reported from as far north in México and the Río Frío in the states of Puebla and México (Alvarez and Ramírez-Pulido, 1972). We discern no noticeable cranial differences between our specimens and those from Texas, however.

Measurements of the three adult females are, respectively: length of forearm, 40.1, 44.6, 45.2; greatest length of skull (including incisors), 16.5, 16.8, 17.0; zygomatic breadth, 10.0, 10.6, 10.3; breadth of braincase, 7.8, 8.2, 7.9; postorbital constriction, 4.1, 4.2, 4.1; length of maxillary tooththrow, 6.4, 6.4, 6.4.

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

Six specimens of this bat, all adults, were netted at the nearby localities of 10 km. N Metzquititlán and 6-7 km. S Zacualtipán, all at an elevation of 2000 meters. Two August-taken females were reproductively inactive; three males taken in that month had testes

measuring 2.5, 5, and 7. Three adults ranged in weight from 8.4 to 8.6. Miller and Allen (1928) previously reported *M. velifer* from Tulancingo, Hidalgo, and Villa-R. (1967) recorded specimens from Tepeji del Río and Jacala.

***Myotis yumanensis lutosus* Miller and Allen, 1928**

A male (testes 4 in length) and nonpregnant female of this species were netted in pine-oak forest situations 7 km. S Zacualtipán, 2000 m., and 5 km. E Zacualtipán, 2100 m., respectively, in mid-August 1973. Davis (1944) earlier reported a specimen of *M. y. lutosus* from the Río Tasquillo, 26 km. E Zimapán.

***Pipistrellus hesperus maximus* Hatfield, 1936**

Davis (1944) listed a single specimen of this species from the Río Tasquillo, 26 km. E Zimapán.

***Eptesicus fuscus miradorensis* (H. Allen, 1866)**

*Specimens examined* (6). — 10 km. N Metzquitlán, 2000 m., 2; 7 km. S Zacualtipán, 2000 m., 3; 12 km. S Zacualtipán, 1650 m., 1.

All our specimens are adult males ranging in weight from 13.9 to 17.5 and with testes measuring 4 to 10.

***Lasiurus borealis teliotis* (H. Allen, 1891)**

Our collection contains a male red bat that was netted over water in pine-oak forest 7 km. S Zacualtipán, 2000 m. Alvarez and Ramírez-Pulido (1972) earlier reported a specimen from the Río Tula at Progreso.

***Lasiurus ega xanthinus* (Thomas, 1897)**

A male (testes measuring 3) weighing 12.5 was netted over a stream 4 km. E San Felipe Orizatlán, ca. 500 m., on 3 July.

***Lasiurus intermedius intermedius* H. Allen, 1862**

Three nonpregnant females, all netted over water, are among our Hidalgo specimens. Two were collected 2 km. S and 2 km. W Huejutla, ca. 200 m., whereas the third was taken 4 km. E San Felipe Orizatlán, ca. 500 m. The two bats from near Huejutla (30 July) weighed 20.5 and 28.8 (lactating) in contrast to the smaller specimen of *L. ega* listed above.

*Rhogeessa tumida* H. Allen, 1866

A nonpregnant female of this monotypic species was netted over a stream 4 km. E San Felipe Orizatlán, ca. 500 m., on 2 July.

*Plecotus townsendii australis* Handley, 1955

Davis (1944) first reported this big-eared bat from Hidalgo on the basis of a specimen from the Río Tasquillo, 26 km. E Zimapán, 5200 ft. Subsequently, Handley (1959) also listed material from Grutas Xoxafi, 6.6 mi. SE Yoltepec (Xoxafi located 6 km. N Lagunillas according to Ramírez-Pulido and Alvarez, 1972), and from 2 mi. W Jacala, 5500 ft., the type locality of *P. t. australis*, and Villa-R. (1967) reported specimens from Barranca Punta Rosa, 1 km. from Escandón.

*Tadarida brasiliensis mexicana* (Saussure, 1860)

Villa-R. (1967) reported a specimen of this free-tailed bat from Jacala, 1392 meters.

*Molossus ater nigricans* Miller, 1902

*Specimens examined* (10). — 2 km. S, 2 km. W Huejutla, 200 m., 8; 4 km. E San Felipe Orizatlán, ca. 500 m., 1; 3 km. N, 1 km. E Tehuetlán, 200 m., 1.

Our specimens were netted over streams and in one instance in a cafetal. Four of seven females taken on 30 July were lactating. July-taken males had testes ranging in length from 3 to 6.

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