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Bats of the Bogota Savanna, Colombia, with Notes on Altitudinal Distribution of Neotropical Bats

by

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Many bats in mountainous regions exhibit a wide range in vertical distribution with disregard for zonal limits. However, although bats are generally more abundant in numbers and species in tropical and subtropical zones at lower elevations, chiropteran faunas at higher elevations in mountains of the Neotropics are generally depauperate and unreported. An abundant insect fauna, many individuals transported by convection diurnal air currents from below, accounts for the presence of insectivorous bats at high mountain altitudes (2) seasonal flowering and fruiting of trees such as pear, peach, other native fruits and flowers, accounts for activities of frugivorous and nectarivorous bats. Invasion by bats from lower elevations, however, may be only temporary and correlated with seasonal food supply. Many bats are migratory, but only those of the genus *Lasiurus,* with a range from Canada to Chile and Argentina (12), apparently migrate within the Neotropical region (27). The chiropteran fauna of an area of high elevation in mountains of equatorial regions should therefore consist of permanent residents as well as short or long term transients. Included in the last category would be those whose presence is by chance, i. e., accidentally transported by strong winds or by other agents. This is apparently the case of the chiropteran fauna of the Bogotá Savanna, Colombia.

The topography of the Andean cordilleras of Colombia is characterized by great savannas or plateaus at high elevations. One of these is the Bogotá Savanna in the East Andes Cordillera of Colombia. This savanna is approximately 100 km in a north-south and 50 km in an east-west direction, and the western slopes of the Andean chain bound the savanna on the east and west. The altitudinal

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ranger of the area is from 2,500 to 3,600 m. Formed on the flat bed of a former lake, the Bogotá Savanna has rich soils and is extensively used for pasturage and agricultural purposes. Partly grassy slopes covered by growths of bushes and low trees are found throughout the Savanna, and in many areas dense growths of eucalyptus, pine, juniper and oak are conspicuous. Bogotá (4º 35' N, 74º 04' W), the capital of Colombia, is situated near the southeastern edge of the savanna to which it gives its name.

According to the classification of HOLDRIDGE (28), the Bogotá Savanna is found in the Lower Montane Dry Forest Formation. Rain, however, falls in every month, and in 1961 at Bogotá most rain fell in April, June, July, October and November, the yearly average being 925 mm. Temperatures may reach extremes, and the 1961 annual minimum was - 1.1º C and the annual maximum 23.0º C; the annual temperature mean was 13.4º C. The annual mean relative humidity for 1961 at Bogotá was 79 per cent (18).

The present work summarizes the results of published records and unpublished reports of bats from the Bogotá Savanna. Collections by the authors are deposited in the Colección de Historia Natural of the Universidad de los Andes (ANCH) and in the Instituto de Ciencias Naturales of the Universidad Nacional (ICNC), Bogotá, Colombia.

ANNOTATED LIST OF SPECIES

Anoura geoffroyi peruana (Tschudi)

This bat, which is limited to the Andean Zone of Colombia, Ecuador and Perú (12), has been recorded from several localities on the Bogotá Savanna. SANBORN (32) recorded specimens from Bogotá, 2,599 m, and Boquerón de San Francisco, 2,730 m, and the Instituto La Salle has specimens from Bogotá and Zipaquirá, 2,651 m. Its has also been taken at a higher elevation in the Paramó de Choachí, 3,300 m, east of Bogotá (32).

In west central Colombia this race has a wide altitudinal range outside of the Tropical Zone and has been recorded in the Subtropical Zone of the Dept. of Cundinamarca from Mesitas del Colegio, 1,210 m (38), Santandercito, 1,600 m (ILSC), Sasaima, 2,415 m (ILSC) and Sesquilé, 2,640 m (ILSC). It has been reported from other high Andean localities in Ecuador, at Loja, 2,226 m, and Cuenca, 2,579 m, and in Perú, at Huancabamba, 1,957 m, by SANBORN (32). Nectar and soft pulp of ripe fruit form the diet of this species (24), and permanent populations apparently can be maintained at higher elevations, where pear, other fruit trees and many species of flowering plants flourish.

Taxonomic confusion once existed when ALLEN (5) erroneously described a specimen of this species from Boquerón de San Francisco as *Glossophaga longirostris apolinari.*

Carollia perspicillata perspicillata (Linnaeus)

In August 1963 an example (ICNC) of this frugivorous bat was found by Hernández on a doorstep of a house in downtown Bogotá. In the Neotropics this species ir normally altitudinally limited to the Tropical and Subtropical Zones, and in Colombia it has not been reported previously above an altitude of 1,210 m (38). It is possible that the single example thus far recorded from the Bogotá Savanna was accidentally introduced by wind currents from lower elevations, but it is also possible that the altitudinal range of this species is much greater than previous records have indicated.

Sturnira ludovici Anthony

In the Bogotá Savanna this bat has been found at Bogotá (36, 38, 40) and at Suba, 2,658 m (ILSC). TAMSITT and VALDIVIESO (38) obtained their specimens from mist nets set in dense vegetation at the base of a steep ravine below Cerro Monserrate, Bogotá.

Throughout its range this species occurs in both Subtropical and Temperate Zones. HERSHKOVSTZ (26) had specimens from Sierra Negra, 1,265 m, in the Sierra de Perijá of northern Colombia, and in west central Colombia the lowest elevation from which it has been recorded is 1,210 m at Mesitas del Colegio in the Subtropical Zone of the Dept. of Cundinamarca (38, 40). The type locality is Gualea, 1,188 m, Pichincha, in northwestern Ecuador (9). In Central America GOODWIN (20) had specimens from La Paz, 915 m, Honduras, and A. Starrett (*pers. comm.*) found this bat from 1,524 to 2,439 m on the slopes of Volcán Turrialba, Costa Rica. In Central and South America *S. ludovici* is altitudinally complementary to the related species *S. lilium,* which typically is an inhabitant of Tropical and Subtropical Zones.

SHAMEL (36) erroneously described a specimen of *S. ludovici* from Bogotá as *S. lilium bogotensis.*

Myotis nigricans nigricans (Schinz)

TAMSITT and VALDIVIESO (38) recorded a specimen of this insectivorous bat from 22 km north of Bogotá, and and additional specimen (ANCH Nº 1545), an adult male, was taken 24 April 1962 from an apartment in downtown Bogotá. This species has a wide altitudinal range in Colombia and it has been found at sea level at Bonda, Dept. of Magdalena (26), and at an intermediate altitude, San Vicente, in Suesca, 2,170 m, Dept. of Cundinamarca (ILSC).

In Neotropical regions this and other species of the genus *Myotis* have been taken at high altitudes. ALLEN (4) had a specimen of *M. n. nigricans* from Inca Mines, 1,829 m, Perú, and TAMSITT and VALDIVIESO (37) found a large colony of this bat in a small cave at Baños, near Cuenca, 2,579 m, Ecuador. *M. chiloensis oxyotus* apparently occurs in higher elevations of the Andean region of Ecuador and Perú (12) and should occur as well in the Colombian

Andes, since there are no barriers to a continuous distribution between Ecuador and Colombia. In México DAVIS and RUSSELL (16, 17) found *M. v. velifer* common in the highlands in association with pine-fir forests, and A. Starrett (*pers. comm.*) encountered *Myotis* sp. at an elevation of 2,896 m on Volcán Turrialba, Costa Rica. Species of this insectivorous genus particularly show a wide range of adaptation to various altitudes, and resultant temperature changes do not apparently act as limiting factors to their vertical distribution.

Eptesicus fuscus miradorensis (H. Allen)

A specimen of this insectivorous bat was taken from the patio of the Instituto La Salle, 2, 630 m, Bogotá (ILSC).

Throughout its range this widely distributed bat genus is found in montane environments. BURT and STIRTON (11) have specimens from Los Esesmiles, 2,195 m, in El Salvador. HALL and VILLA (25) recorded a specimen from Apo, 1,829 m, in Michoacán, México. DAVIS and RUSSELL (16, 17) have specimens from coniferous forests in the higland of Morelos, México, and A. Starrett (*pers. comm.*) took *Eptesicus* sp. at 2,896 m on Volcán Turrialba, Costa Rica. In southern Arizona COCKRUM and ORDWAY (14) recorded the related form *E. fuscus pallidus* from 2,591 m at Rustlers Park in the Chiricahua Mountains.

Histiotus montanus colombiae Thomas

The type locality of this form is Choachí, 1,966 m, Dept. of Cundinamarca, Colombia (39), and from the Bogotá Savanna is has been recorded at Bogotá (ILSC). The related species, *H. macrotus,* occurs at lower elevations in Chile (29), but PEARSON (30) found colonies of this bat in houses near Lake Titicaca, Perú, at 3,659 m. *H. macrotus* has also been taken at Cuzco, 3,500 m, in Perú by C. Bendenzú (*pers. comm.*). The genus *Histiotus* is endemic to the Andean region of South America, and its species appear to be primarily Temperate Zone inhabitants.

Lasiurus cinereus villosissimus (Geoffroy)

A single specimen of this species has been taken on the Bogotá Savanna. The example (ICNC) was taken during the day from a tree near the church on Cerro Monserrate, 3,152 m, Bogotá, by Hernández. The only other record of this species from Colombia is from near sea level at Bonda, Dept. of Magdalena (3). At other South American localities, however, it has been taken at high altitudes. SANBORN (34) had a specimen from Limacpunco, 2,400 m, Perú, and C. Bendezú (*pers. comm.*) has two examples from Cuzco, 3,500 m, Perú. In the opinion of Dr. Bendezú, however, this strongly migratory species is only a transient at the Cuzco locality. The related bat *L. c. cinereus* has been recorded from 1,645 m in southern Arizona (14) and from 2,195 m at El

Fortín, Oaxaca, México (15). It is likely that all high altitude records of this insectivorous species represent migratory individuals.

Tadarida aurispinosa (Peale)

SANBORN (33) originally described the species *Tadarida similis* on the basis of a specimen from Bogotá, but CARTER and DAVIS (13) consider *similis* to be indistinct from the species *aurispinosa.* Sanborn defended the recognition of *similis* as a distinct species mainly beacuse he considered the altitude of Bogotá to be high for a tropical bat. Additional specimens have not been taken in the Bogotá region since the original description by Sanborn, but a wide altitudinal range is attested by records from Huajyumbe, 3,195 m, Cuzco, Perú, and from near Antiguo Morelos, 152 m, Tamaulipas, México (13).

Tadarida brasiliensis (Geoffroy)

This wide ranging insectivorous bat has been taken at Bogotá (35,38). It is the common bat in Chile, and OSGOOD (29) and ALLEN (1) have records from regions of definite temperate climate in southern Chile. The greatest elevation from which this species has been taken is a record by SCHWARTZ (35) from Cuzco, 3,500 m, Perú. Altitudinally high records outside of tropical regions are those of BAKER (10) from Pico de Jimulco, 1,524 m, in Coahuila, México, and ANDERSON (8) from 2,073 m in Colorado.

Eumops glaucinus (Wagner)

The only record of this species from the Bogotá Savanna is that of TAMSITT and VALDSVIESO (38), who found an example in a classroom at the Universidad de los Andes, Bogotá, 2,750 m. Previously this large free-tailed bat had been recorded in Colombia only from low edevations, at Honda, 229 m, Dept. of Tolima, and at Santa Marta, sea level. Dept. of Magdalena (31). An altitudinally intermediate record is that of GOODWIN (20), who had a specimen from La Paz, 915 m, Honduras.

DISCUSSION

Of the 10 bat species we have recorded from the Bogotá Savanna, seven (70 per cent) belong to the insectivorous families Vespertilionidae and Molossidae. Only a few species (three or 30 per cent) are members of the frugivorous or nectarivorous family Phyllostomidae. Records of three species previously reported from near or on the Bogotá Savanna we consider to be either improbable or erroneous.

K. ANDERSON (7) recorded a specimen of *Micronycteris m. megalotis* (Gray) from Bogotá under the name *M. m. mexicana,* but is is unlikely that this typically Tropical and Subtropical Zone inhabitant reaches such a high eleva-

tion unless accidentally introduced. In west central Colombia the highest elevation from which it as been recorded is Mesitas del Colegio, 1,210 m, in the Subtropical Zone of the Dept. of Cundinamarca (38,40).

GOODWIN (22) refers to specimens of *Tonatia s. sylvicola* (D Orbigny) from "Río Quatequía, near Bogotá". This locality is evidently a misspelling for Río Guatiquía, a tributary of the Río Meta, approximately 75 km southeast of Bogotá and in the Llanos Orientales, the flat grazing lands at a lower elevation (approximately 400 m) east of the Andean cordilleras. GOODWIN (22) and ALLEN (3) cite several localities in Colombia less than 1,000 m in elevation for this species, and it is questionable if this bat is found at higher elevations in the Andes unless accidentally transported.

A specimen of *Rhoggessa t. tumida* H. Allen in the British Museum with locality data as "Bogotá?" was reported by GOODWIN (23), but thus far we have not collected this bat in the Bogotá Savanna. Other records which GOODWIN (23) has for *R. tumida* from South America are generally from low altitudes, and the highest record from west central Colombia is from Mesitas del Colegio, 1,210 m, Dept. of Cundinamarca (37). In Central America this species has been taken from 0 to 1,098 m in El Salvador (11) and at sea level in Costa Rica (21).

A fourth species, *Artibeus cinereus bogotensis* Anderson, could well be among the high altitude fauna of the Bogotá Savanna, but as yet it is unreported. The type locality of this small bat is listed by ANDERSON (6) as "Curiche, near Bogotá, Colombia", but this locality, a suburb of the small town of El Peñón, is found in the north of the Dept. of Cundinamarca, 75 km northwest of Bogotá at a much lower elevation (1,311 m). TAMSITT and VALDIVIESO (38) recorded this species from Puente Nacional, 1,620 m, Dept. of Santander, the highest locality thus far from which it has been taken in west central Colombia. W. B. Davis (*pers. comm.*) informed us that the species *A. aztecus* occurs at 2,439 m in pine-fir forest on the volcano Popocatepetl in México, and it is possible that a small *Artibeus* does occur in the vicinity of Bogotá but has not been collected.

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SUMMARY

Of the 10 species of bats recorded from the Bogotá Savanna (2,500-3,600 m), Colombia, seven belong to the insectivorous families Vespertilionidae and

Molossidae. Only three species are members of the frugivorous or nectarivorous family Phyllostomidae. Records of three species (*Micronycteris megalotis, Tonatia sylvicola, Rhogeessa tumida*) previously reported from near or on the Bogotá Savanna are considered to be improbable or erroneous. A fourth species (*Artibeus cinereus*), although as yet not reported, could well be among the high altitude fauna of the Bogotá Savanna.

RESUMEN

De las 10 especies de quirópteros colectados en la Sabana de Bogotá (2.500-3.600 m), Colombia, siete pertenecen a las familias insectívoras Vespertilionidae y Molossidae. Sólo tres especies son miembros frugívoros o nectarívoros de la familia Phyllostomidae. Datos de tres especies (*Micronycteris megalotis, Tonatia sylvicola, Rhogeessa tumida*), previamente reportadas de las vecindades o de la Sabana de Bogotá, se consideran como improbables o erróneos. Una cuarta especie (*Artibeus cinereus*), aunque no reportada todavía, bien podría considerarse como una de las formas pertenecientes a la fauna quiróptera de la Sabana de Bogotá.

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