# A SMALL COLLECTION OF BATS FROM PANAMA.

By Gerrit S. Miller, Jr.,

*Curator, Division of Mammals, United States National Museum.*

## INTRODUCTION.

Mr. August Busck, while collecting insects for the Smithsonian Biological Survey of Panama during April and May, 1911, obtained 29 bats representing 11 species. Three of these have not hitherto been described, and a fourth is exceedingly rare in collections. More than half of the specimens were taken near Alhajuela, on the Chilibrillo River, in some extensive caves, a locality so little known and so interesting that I have asked Mr. Busck to prepare for publication the following rather detailed account of his visit.

## THE CHILIBRILLO BAT CAVE.

The large cave in which these bats were collected is formed in a broad limestone area, which crosses the Chagres River between Alhajuela and San Juan, Panama. The cave is made by a subterranean stream, which empties into the Chilibrillo River about 7 to 8 miles south of Alhajuela. Neither the cave nor the Chilibrillo River (which is a tributary to the Chilibri River) is shown on the late American map made by the Canal Commission, but was found indicated on an old French map. The region is uninhabited for many square miles and is rarely visited, even by the natives from the nearest settlements along the Chagres, none of whom knew about the cave. There are no roads or tracks leading to the cave, but it may be found by going due south from Alhajuela until reaching the Chilibrillo, which at this point runs nearly east to west, with the next turn at right angles to south. By following this river down its course for 2 or 3 miles the outlet of the subterranean stream is found in a little brook on the left, the first tributary met with on that side. At this spot the course of the Chilibrillo is southwest with the next turn to the left.

The river bed of the Chilibrillo is solid limestone, and walking during the dry season is reasonably easy, wading shoe top to breast deep in

crystal clear water, swarming with many-colored fishes. To a naturalist the natural highways of the small streams are extremely profitable in the dry season, when the higher land is as dry as dust. Birds, mammals, and insect life necessarily seek the limited areas of humidity along the creeks.

The brook leading to the cave was at the time of the visit—April 14, the very end of the dry season—a series of stagnant pools. For the first 300 or 400 feet the bed is 25 to 30 feet wide and fairly smooth limestone, with gullies and potholes a foot or two deep; then the gullies deepen and the rock is cut out in fantastic longitudinal curved and twisted shapes. Near the cave these gullies are very deep and narrow and were plainly at one time part of the cave, of which the roof now has fallen in. The gullies lead to the mouth of the cave, which is some 20 feet high and 8 feet in width, with water nearly waist deep. During the rainy season it would be impossible to enter this part of the cave. The passage soon forks and one branch runs some 200 feet straight east, with various narrow cross-passages at right angles, which are again crossed at right angles by numerous similar channels resembling the streets in a city. By keeping to the right one comes round a block, back to the starting point. There appeared to be some 20 such large blocks, but there may be many more. Sometimes the passages are several feet in width and 20 to 30 feet or more high, with breast-deep water; other passages were narrow, low, and dry. Bats nearly everywhere, the roof either hung with them or with stalactites or covered by a delicately formed layer of lime deposit, scintillating in the light of the lantern; in two or more places, narrow chimneys leading to the green world above.

The other main passage to the left from the mouth of the cave leads, after being cut by several cross alleys, through a place where the roof of the cave has fallen down some 60 feet to another quite different part of the cave, a dry long room nearly 40 feet wide and from 30 to 50 feet high. About 400 feet in from the mouth of this cave was a large, uninviting stagnant pool reeking with bat manure and too deep to cross without swimming. By the faint light of the lantern it could be seen that the cave continues on the other side of the pool to the left. The cave at this point was some 60 to 70 feet high. Thousands of bats of several species swarmed in and out, and a few samples were secured in the insect net, stunned, and placed in tight tin boxes in order to secure their numerous parasites at leisure at home.

Through a very narrow and low channel to the right, about the middle of this cave, where it was necessary to crawl on all fours for some 80 or 100 feet, a third and still larger cave was reached—an enormous amphitheater some 250 feet in diameter with a low hemispherical roof 20 feet over the floor in the middle, hung with large and small delicate stalactites never touched by human hands.

The floor, which consisted of soft bat manure, was studded with thousands of peculiar knob-like stalagmites. Only a few bats were seen in this cave, which, however, may well have had one or more unobserved side galleries. A long winding upwardly sloping corridor guarded by giant stalactites led to a small exit hole some 300 yards from the mouth of the first cave. The time did not permit further exploring, but it is probable that only a fraction of the cave area was inspected and that it will be found to stretch for miles along the course of the subterranean stream, toward the picturesque cliffs on the Chagres River between Alhajuela and Vijia.

## ANNOTATED LIST OF SPECIES.

### CHILONYCTERIS RUBIGINOSA Wagner.

Ten adult males from the Chilibrillo cave. The length of forearm ranges from 58 to 61.5 mm. Extremes of cranial measurements: Greatest length, 21.8–22.8 mm.; condylobasal length, 20.8–21.8; mandible, 16–17; maxillary tooth row (exclusive of incisors), 9.6–10; mandibular tooth row (exclusive of incisors), 10–10.6.

### LONCHORHINA AURITA Tomes.

Two specimens of this very rare bat were taken in the Chilibrillo cave. Their measurements, adult male and female, are respectively: Head and body, 60 and 62 mm.; tail, 57 and 58; tibia, 21 and 20.4; foot, 12.6 and 13; forearm, 49.6 and 50; thumb, 10.6 and 10; third finger, 101 and 101; fifth finger, 70 and 70; ear from meatus, 29 and 28; width of ear, 22 and 23; posterior surface of noseleaf, 22 and 21; condylobasal length of skull, 18.4 and 19.2; zygomatic breadth, 11 and 10.8; interorbital constriction, 5 and 5; mastoid breadth, 11 and 10.6; lachrymal breadth, 6.6 and 6.4; depth of brain case at middle, 6.8 and 6.8; mandible, 13.2 and 13; maxillary tooth row, 6.6 and 6.6; mandibular tooth row, 7.2 and 7.2.

### PHYLLOSTOMUS HASTATUS (Pallas).

Adult male, Cabima. Head and body, 128 mm.; tail, 28; tibia, 34; foot, 23.6; forearm, 91; thumb, 16.4; third finger, 174; fifth finger, 116; ear from meatus, 31; width of ear, 21.4; condylobasal length of skull, 36.2; zygomatic breadth, 22.6; interorbital constriction, 7.8; mastoid breadth, 21.4; depth of brain case at middle, 12.2; mandible, 28.2; maxillary tooth row, 15; mandibular tooth row, 17.

### LONCHOPHYLLA ROBUSTA, new species.

*Type.*—Adult male (in alcohol), No. 173854, U.S.N.M. Collected in cave on Chilibrillo River, Panama, April 14, 1911, by August Busck.

*Diagnosis.*—Size decidedly greater than in *Lonchophylla mordax* and *L. thomasi* (forearm about 43 mm., condylobasal length of skull

about 25 mm.); skull large and robust (not narrowed and *Chœronycteris*-like, as in the equally large *L. hesperia* G. M. Allen*), its size and general appearance much like that of *Leptonycteris nivalis;* teeth peculiar in the unusual development of inner lobe of $pm^4$ and the subquadrate outline of crown in $m^1$ and $m^2$.

*External characters.*—Essentially like *L. mordax,* apart from the larger size, but foot not so long relatively to tibia, and interfemoral membrane apparently wider.

*Color.*—Upper parts between mars-brown and raw-umber, the hairs becoming much paler (approaching ecru-drab) at base; underparts light isabella-color tinged with raw-umber, not contrasted noticeably with back.

*Skull and teeth.*—Apart from its large size and robust general form the skull does not differ essentially from that of *Lonchophylla mordax.* Rostrum less elongate in proportion to its depth; mesopterygoid space relatively shorter and wider; basisphenoid pits with anterior border less sharply defined.

Incisors and canines as in *L. mordax,* except that the cutting edge of lower incisors is less distinctly trilobate. Premolars like those of the smaller animal, but small basal cusps tending to be better developed, and inner root of $pm^4$ situated decidedly behind middle of tooth. Upper molars much less reduced than in *L. mordax,* the length of the inner portion of tooth so great as to give the crown a decidedly squarish outline, especially in $m^1$ and $m^2$; outer portion of tooth, representing the styles and commissures, unusually well developed, the margin of the ridge standing more nearly at level of points of main cusps than in the related species. Lower molars with relatively wider crowns and higher cusps than in *L. mordax,* but details of their structure showing no special peculiarities.

*Measurements.*—Type and adult female: Head and body, 56 and 60 mm.; tail, 6† and 10; width of interfemoral membrane at middle, 15 and 15; tibia, 17.6 and 17; foot, 10.4 and 10.4; forearm, 43.6 and 43; thumb, 11 and 12; third finger, 88 and 86; fifth finger, 59 and 56; ear from meatus, 16 and 14; condylobasal length of skull, 25.2 and 25.4; breadth of rostrum over roots of canines, 4.2 and 4.2; interorbital constriction, 5.2 and 5.4; breadth of brain case, 10.2 and 10; mastoid breadth, 11.2 and 11; depth of brain case at middle, 7.4 and 7.2; mandible, 18.4 and 18.8; maxillary tooth row, exclusive of incisors, 9.8 and 10; mandibular tooth row, exclusive of incisors, 10.2 and 10.

*Specimens examined.*—Four, all from the Chilibrillo cave.

* Through the kindness of Mr. Samuel Henshaw and Dr. Glover M. Allen I have been enabled to examine the type of this species. The animal is so different from the other known forms of *Lonchophylla* that it can hardly be regarded as a member of the same genus.

† Apparently injured at tip.

HEMIDERMA PERSPICILLATUM AZTECUM Hahn.

One specimen from the Chilibrillo cave.

VAMPYROPS HELLERI Peters.

Two immature males from Cabima. Forearm 39 and 39.6 mm.

VAMPYRESSA MINUTA, new species.

*Type.*—Immature female (permant dentition in place, but basal suture not closed and finger joints not fully formed) in alcohol, No. 173832, U.S.N.M. Collected at Cabima, Panama, May, 1911, by August Busck.

*Diagnosis.*—Noticeably smaller than *Vampyressa pusilla*, as described and figured by Peters; skull with brain case relatively large and rostrum relatively short (this perhaps in part due to immaturity); teeth in general as figured by Peters, but with the following peculiarities: Posterior upper premolar with postero-external cusp less developed, its base not sufficiently projecting to produce a concavity on hinder border of tooth; first upper molar with longitudinal diameter through protocone about equal to length of outer border; the large protocone almost isolated from inner border; second lower molar with crown more narrowed posteriorly.

*Color.*—General color ecru-drab, clear below, overlaid with broccoli-brown above; white face markings barely indicated, the lower stripe disappearing in certain lights.

*Measurements.*—Head and body, 44 mm.; tibia, 11; foot, 7.5; forearm, 31.5; third finger, 70; fifth finger, 46; ear from meatus, 12; width of ear, 8; condylobasal length of skull, 16.2; greatest length, 18; zygomatic breadth, 10; interorbital constriction, 4.4; mastoid breadth, 9.2; breadth of brain case, 8; depth of brain case, at middle, 6.8; mandible, 11.2; maxillary tooth row, 5.6; mandibular tooth row, 6.

*Specimen examined.*—The type.

CHIRODERMA ISTHMICUM, new species.

*Type.*—Adult female (in alcohol), No. 173834, U.S.N.M. Collected at Cabima, Panama, May, 1911, by August Busck.

*Diagnosis.*—Similar in size and essential characters to *Chiroderma villosum* Peters, but ear narrower above, back with an evident whitish median stripe, and skull shorter and proportionally broader.

*External form.*—As in *C. villosum* as figured by Peters, but ear narrowing gradually upward, its widest region about at level of base of anterior border.

*Color.*—Upper parts isabella-color, the individual hairs broccoli-brown (darker than that of Ridgway) through basal third, then abruptly light gray tinged with ochraceous-buff, the extreme tips

again brown like base; in region in front of shoulders the light intermediate area becomes more noticeable, particularly near base of ear and behind nose leaf; a whitish dorsal line less conspicuous than in *C. salvini* and becoming obsolete posteriorly. Underparts ecru-drab, with a slight and very fine variegation caused by minute whitish hair tips and brownish subterminal annulation.

*Skull and teeth.*—The skull differs from that of *Chiroderma villosum* as figured by Peters in its broader general form due to shortening without proportional narrowing. The profile of rostrum immediately behind nasal aperture is concave, while in the related species it is represented as decidedly convex. Teeth like those of *C. villosum*, but incisors apparently more reduced, the outer upper tooth not nearly filling space between inner incisor and canine, the lower teeth distinctly spaced, their cutting edges scarcely bilobed.

*Measurements.*—Type: Head and body, 65 mm.; tibia, 17; foot, 10.4; forearm, 45; thumb, 10.5; third finger, 99; fifth finger, 70; ear from meatus, 18; width of ear, 12.5; condylobasal length of skull, 22 (24.4);[1] greatest length, 24.6 (26.8);[2] zygomatic breadth, 15.6 (—); postorbital constriction, 5.8 (5.8); interorbital constriction, 6.2 (6.4); mastoid breadth, 12.2 (12.8); breadth of brain case, 10.4 (10.4); depth of brain case at middle, 8.4 (—); mandible, 8.8 (10); maxillary tooth row, 8.8 (10); mandibular tooth row, 9.2 (10.6).

*Specimens examined.*—Two, both from the type-locality.

ARTIBEUS JAMAICENSIS JAMAICENSIS (Gosse).

Three adults from Taboga Island and one young (too immature to be positively identified) from the Chilibrillo cave.

DESMODUS ROTUNDUS (Geoffroy).

Adult female from Taboga Island. Measurements: Head and body, 82 mm.; tibia, 27.2; foot, 16; forearm, 59.6; thumb, 16.6; third finger, 98; fifth finger, 77; ear from meatus, 17.4; width of ear, 16; condylobasal length of skull, 21.4; greatest length, 24; zygomatic breadth, 12; postorbital constriction, 5.8; breadth of brain case, 11.8; depth of brain case at middle, 10.6; mandible, 15.2; maxillary tooth row (entire), 6.4; mandibular tooth row (entire), 7.

EUMOPS GLAUCINUS (Wagner).

Adult male, Paraiso, April 28, 1911. Measurements: Head and body, 80 mm.; tail, 48; tibia, 16.4; foot, 11; forearm, 56; thumb, 10; third finger, 114; fifth finger, 55; ear from meatus, 20; width of ear, 22; condylobasal length of skull, 21; greatest length, 23.2; zygomatic breadth, 14; interorbital constriction, 4.4; lachrymal breadth, 8; breadth of brain case, 11; depth of brain case at middle, 7; mandible, 16.6; maxillary tooth row, 9.2; mandibular tooth row, 10.2.

[1] Measurements in parenthesis are those of an adult *C. salvini* from Angostura, Costa Rica (No. 22849).
[2] In *C. villosum* the greatest length is 25.7 mm.; zygomatic breadth, 16.5.