

A REVIEW OF THE BATS OF TRINIDAD AND TOBAGO

DESCRIPTIONS, RABIES INFECTION,
AND ECOLOGY

GEORGE G. GOODWIN AND
ARTHUR M. GREENHALL

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INTRODUCTION

SINCE THE EARLY PERIOD of settlement in Trinidad, between the late 1700's and early 1800's both city and country people have been bat conscious. Such a fact is not surprising, as these winged mammals frequently invaded their homes and churches, fed upon their fruit crops, attacked their livestock and poultry, and occasionally assaulted the people themselves.

In addition to a large fauna of bats, Trinidad has a character of folklore, the *soucouyant*, which is believed to sail through the air at night in search of human blood to suck. Many of the country people, even at the present time, are firmly convinced that, although vampire bats attack their animals, it is the *soucouyant* that bites the people and feeds on their blood.

During the two days of carnival each year, the Monday and Tuesday preceding Ash Wednesday, masqueraders appear in the streets dressed in bat costumes so authentic in detail as to teeth, nose leafs, and flying membranes that it is possible to identify the species that are portrayed.

Because of these socio-economic relationships between man and bat, the large and varied bat population of Trinidad, and to a lesser extent that of Tobago, have long held the interest of laymen, local naturalists, and zoologists, and more recently they have attracted the attention of medical men, veterinarians, and ecologists.

HISTORY

Charles Kingsley seems to have been the first author to have drawn attention to the bats of Trinidad. In his book "At last" (1871, p. 132) he wrote: "As it grew dark, dark things came trooping over the sea, by twos and threes, then twenty at a time, all past us toward a cave near by. Birds we fancied them at first, of the colour and size of starlings; but they proved to be bats, and bats too, which have the reputation of catching fish." G. H. Kingsley who, as did his brother, visited Trinidad and watched these bats fishing, published an article (1888, p. 53) in which he stated: "They came out in the gloaming and fluttered and splashed on the top of the water, and somehow or other

caught tiny fish. I floated about many a hot evening to see how it was done; but, though I was close to them—close enough to be nauseated by their detestable scent, I could never quite make up my mind on the subject."

The historian de Verteuil wrote (1884, p. 85): "Bats may be said literally to swarm in Trinidad, both in town and country; sometimes an immense number of them take their lodging in the hollow of some large tree from which they are seen issuing by hundreds to venture on depredatory excursions. Many live on fruits, and some others by sucking the blood, not only of animals, but of man; they are so numerous in some parts, that instances of persons having been bitten several times in the same night are not rare." The same situation holds true at the present time, even in well-developed and populated areas.

In 1891 the Trinidad Field Naturalists' Club was formed, and its journal was first published in 1892. Early club members, such as H. Caracciolo, J. H. Hart, T. I. Potter, and F. W. Urich, were interested in bats as an obvious and little-known segment of Trinidad's mammalian fauna and not particularly from the agricultural or public health point of view. Popular and semi-technical articles on the natural history and taxonomy of bats appeared in the club journal and in the local newspapers. Late in the 1800's specimens of Trinidad bats were sent to the British Museum (Natural History) for identification, and Oldfield Thomas named two new species, *Vampyrops caracciolae* and *Artibeus hartii*, in honor of their collectors and published an original paper in the journal of the field naturalists' club (1892b, pp. 158-162).

In 1893 and 1894, Frank M. Chapman of the American Museum of Natural History made two trips to Trinidad, on which 523 mammal specimens were collected, including the types of *Choeronycteris intermedia*, in 1893, and of *Artibeus palmarum*, in 1897. Allen and Chapman (1897, p. 13), in their report, wrote that these collections formed a satisfactory basis for a review of the mammals of Trinidad and stated, "Doubtless some others are still to be added, especially among the Bats." This prophecy has also

been made by others, and it is of interest to note the high percentage of bats (roughly 30% or 16 of the 58 varieties listed to date) that have been described originally from so small an area as Trinidad. With more intensive and improved collecting techniques, there will be additional records and possibly new forms, especially among the rarer solitary tree or free-living bats.

The first key to the bats of Trinidad was published by R. W. Hayman of the British Museum (Natural History) in 1932 (p. 312), and after bat rabies appeared, a number of papers covering the natural history and public health aspects of Trinidad bats, especially vampires, were published in the middle 1930's.

In 1947, the Chicago Natural History Museum sent a collector to Trinidad, who found the second known specimen of *Micronycteris brachyotis*, described by Dobson in 1878. Colin C. Sanborn, former Curator of Mammals of the same museum, visited Trinidad in 1954 to study the local bats and remarked that Trinidad was the only country in which he had collected bats where the local people did not think his interest strange and where so many people referred to bats by their scientific names. It is not at all unusual to hear "*Desmodus rufus*, *Hemiderma*, and *Artibeus*" mentioned in everyday conversation and to have the speakers point out that they are talking about a "rabies or poison bat."

RABIES AND OTHER INFECTIOUS AGENTS IN BATS

The sudden appearance of rabies in Trinidad bats and the resultant loss of livestock and human lives in 1925 made city dwellers and farmers extremely aware of their bat problem. The disease first appeared among cattle and was erroneously diagnosed as botulism, or food poisoning. Then in 1929 it appeared in human beings and was diagnosed, again incorrectly, as a type of poliomyelitis. Rabies in bats is apparently endemic, and it reached epidemic proportions between the years 1925 and 1935, when it caused the deaths of 89 human beings, the highest mortality from rabies-infected bats thus far recorded anywhere, and livestock losses numbering into the thousands. The last

human death from rabies on Trinidad was reported in 1937. Since 1935, the incidence of rabies in bats has been cyclic in nature, a major epidemic occurring in 1954, with sporadic cases and outbreaks continuing up to the quite recent epidemic of 1959, which involved only livestock, primarily cattle, goats, and donkeys, with the surprising development in pigs during October, 1959.

The late J. L. Pawan, Government Pathologist of Trinidad, conducted experiments under severe handicaps during the first epidemic years which proved that bats, particularly vampire bats (*Desmodus*), were transmitters of rabies in Trinidad. Actually the first bat to be proved rabid by Pawan was a fruit bat, *Artibeus jamaicensis trinitatis* (Pawan, 1936a, p. 106). At that time, other bats, including *Desmodus*, *Carollia*, and *Diclidurus*, were caught during the daytime either fighting among themselves, acting abnormally, or making unprovoked attacks on human beings and animals, which subsequently proved to be rabid by Pawan's tests. At the present time, in addition to other factors, abnormal bat behavior usually presages outbreaks. Pawan also reported that vampire bats, either with or without the external symptoms of rabies after natural or artificial infection, were capable of transmitting rabies for up to five and one-half months, and that they may also recover from the furious form of the disease and spread infection for prolonged periods.

In 1934 the Trinidad authorities inaugurated an anti-rabies program administered by the Medical Department, with Pawan examining the bats for rabies and F. W. Urich, Government Entomologist of Trinidad, in charge of the natural history studies on bats. Bat destruction crews were sent over the island in an attempt to reduce the vampire bat population. Little attention was paid to other species of bats in this early effort, because *Desmodus* was the most obvious offender to human beings and livestock.

From 1937 to 1939 Pawan (1948, pp. 173-177) conducted experiments with *Artibeus* and commented (p. 176): "As with the blood-sucking vampire bat, fruit-eating *Artibeus* bats may prove refractory to infection with rabies virus; but, though they may not manifest any evidence of disease, their saliva may

carry infection. Fruit-eating bats, when infected with rabies, may bite mammals, not necessarily with the object of obtaining blood for food, but on account of a change in habit through being rabid. Mammals so bitten may develop rabies."

An anti-rabies program is administered at the present time by the Trinidad and Tobago Ministry of Agriculture, Lands, and Fisheries, through the Department of Agriculture, and an advisory Paralytic Rabies Control Committee has also been established. Because bats infected with rabies have never been reported from Tobago, a livestock vaccination program is carried on only in Trinidad. Routine examinations for livestock diseases, including rabies, are conducted at the veterinary diagnostic laboratory located at the Central Experimental Station, Centeno. The close attention presently paid to the epidemiological picture is due to the interest shown by the staff of the Trinidad Regional Virus Laboratory who, although not considering rabies as part of their studies, nevertheless have done a certain amount of rabies work in connection with other studies on bats.

It has been impossible to assess the percentages of rabid bats in Trinidad. Microscopic examination alone cannot be relied upon, because rabies strains in bats frequently fail to produce Negri bodies. When Negri bodies are not positively identified, animal inoculation tests for rabies must be carried out. As rabies studies on bats have usually involved the examination of large numbers of bats, the procedure of pooling brain and salivary gland material was used for reasons of speed and economy. Recent studies have indicated that the pooling method is unreliable. Kleckner (1958, p. 207), in describing this situation, stated: "Evidently, this low concentration of virus in bat tissues was the cause of many positives being missed when the pooling method was used. The per cent concentration of each individual specimen in suspension is increased four times when the bat is processed individually."

The study of bat behavior may predict rabies outbreaks. The 1958 Annual Report of the Department of Agriculture of Trinidad and Tobago, in discussing the Greenhall bat studies for the year (Bain, 1958, p. 35), stated: "It would be reasonable to anticipate

a serious rabies epidemic in 1959. The last major outbreak was in 1953-54. The intensification of bat biting of humans and livestock, the recent outbreaks in the Southern and Eastern parts of the island, and the recently noted aggressiveness of vampires, and indirectly, the existing numbers of non-immunized livestock, all tend to point to an anticipated outbreak in 1959." Such an outbreak actually occurred.

By the end of October, 1959, the following species of Trinidad bats had been found to be infected with rabies: *Diclidurus albus*, *Pteronotus davyi*, *Carollia perspicillata*, *Artibeus jamaicensis*, *Artibeus lituratus*, *Desmodus rotundus*, *Diaemus youngi*, and *Molossus major*. The rates of occurrence of rabies in Trinidad non-vampire bats, however, appear to be as low as or lower than rates in some parts of the United States (Trinidad Regional Virus Laboratory, 1958, p. 27).

In 1956 and 1957, the Trinidad Regional Virus Laboratory (1958, p. 122) isolated virus strains, which superficially resemble rabies in live bats, from *Artibeus jamaicensis trinitatis* and *Artibeus lituratus palmarum*. The agent kills young mice and, irregularly, adult mice. It is not neutralized by rabies-immune serum. Intracytoplasmic inclusion bodies, of the type that rabies workers call "non-specific," have been observed in brain smears of inoculated sick mice (Seller's stain)

Histoplasma capsulatum, the causative agent of histoplasmosis, is a type of pathogenic fungus which grows naturally in soil fertilized by avian or mammalian droppings. It is disseminated to human beings and animals by the inhalation of the spores. During 1956 and 1957, the Trinidad Regional Virus Laboratory sent soil-guano samples from the caves of Aripo and Oropuche, inhabited by oilbirds and bats, and Tamana, inhabited by bats only, to Libero Ajello of the United States Public Health Service, who isolated *Histoplasma capsulatum* in all samples. During 1958, a number of positive isolations were made from bat roosts, mainly hollow trees, located in various parts of Trinidad, which involved the following bat genera individually and in various combinations: *Saccopteryx*, *Noctilio*, *Carollia*, and *Desmodus*. The Trinidad Regional Virus Laboratory (1958, p. 25) stated: "A selected group of individuals in

Trinidad, namely the bat catching crew, have had histoplasmin skin tests, with a high incidence of positive reactors. Clinical cases of histoplasmosis have never been reported from Trinidad."

BAT CONTROL

Under normal circumstances bats are useful and beneficial, and their feeding habits should be carefully considered before any wholesale destruction of any species is contemplated. Diets vary according to species and include insects, fish, nectar, fruit, and flesh, in addition to blood. It has been estimated that some bats consume from one-half of their full weight in insects in one night, and there would most certainly be a great overabundance of insects in tropical countries if there were not some agency to hold their numbers down to a reasonable balance.

Nine families of the Suborder Microchiroptera occur in the Western Hemisphere, and all nine are represented by one or more species in Trinidad. Bats of the families Emballonuridae, Natalidae, Furipteridae, Thyropteridae, Vespertilionidae, and Molossidae are all insectivorous. In Trinidad, the Noctilionidae are largely piscivorous, but feed to some extent on insects. With few exceptions, members of these families should be regarded as beneficial. Only the genus *Molossus* of the Molossidae is an acute house-bat problem in Trinidad and Tobago, because, by a change in roosting habits, it has become an economic and public health hazard. Bat control is indicated for this genus; it may be accomplished, not by resorting to wholesale destruction, but by bat-proofing buildings before human occupancy and by the use of repellants, chemical, mechanical, or possibly electronic, after bat infestation. The members of the Phyllostomidae differ in roosting and feeding habits. Those that feed upon insects and nectar, such as the Chilonycterinae and Glossophaginae, and the Phyllostominae, including the frugocarnivorous *Phyllostomus*, the carnivorous *Vampyrus* and the lizard-eating *Trachops*, may be considered to be beneficial. The remaining subfamilies of the Phyllostomidae (the Carolliinae, Sturnirinae, and Stenoderminae) are all frugivorous and undoubtedly propagate a number of economically important trees by

the dissemination of seeds. Present findings suggest that only *Carolliia* and the larger *Artibeus* should be subjected to control. These two groups are extremely abundant throughout Trinidad and Tobago and, owing to their wasteful feeding habits, damage a wide variety of wild and cultivated fruits. They also defile buildings, both inside and outside, by their droppings, in addition to their involvement with viral and fungal diseases.

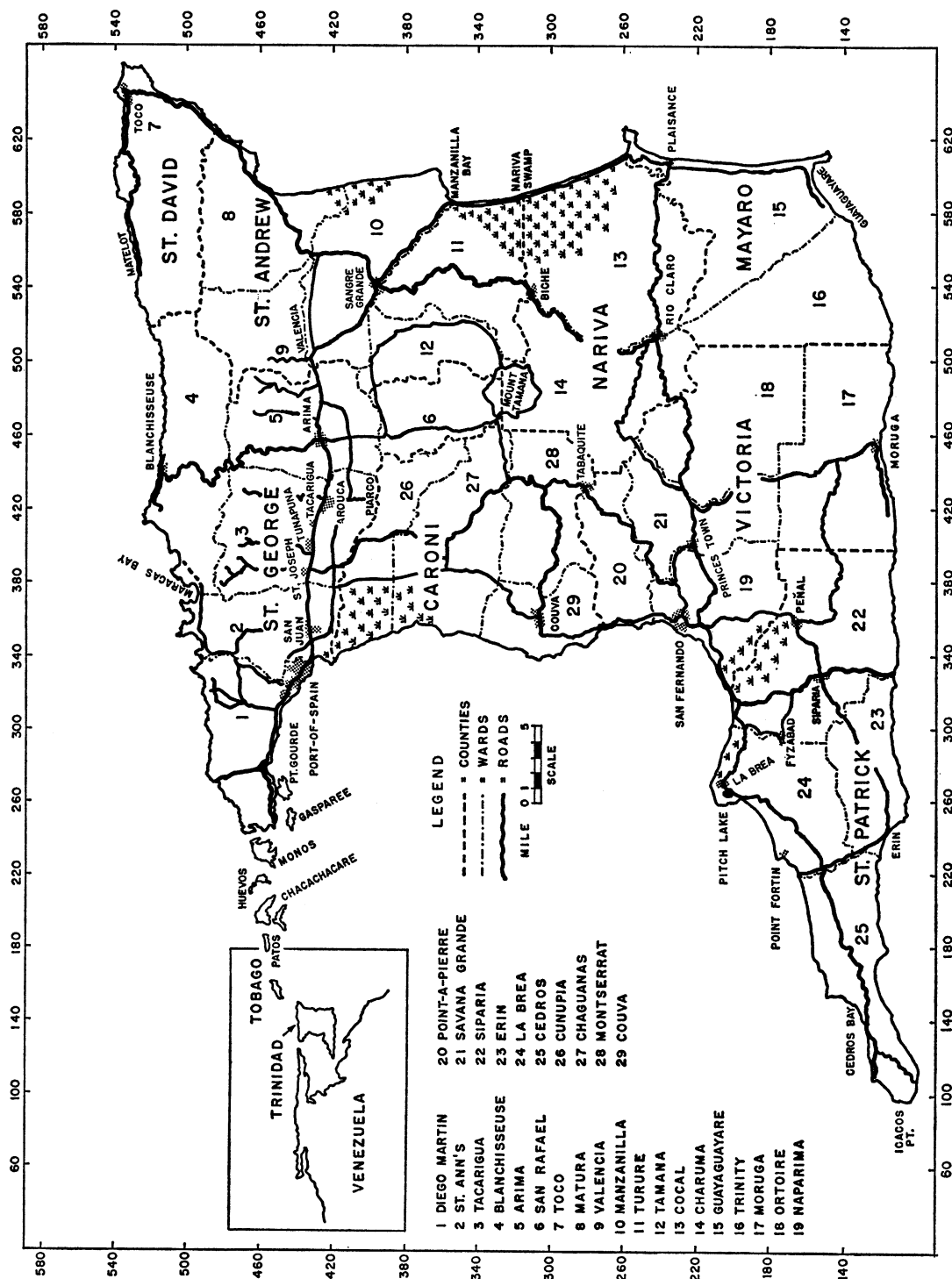
The Desmodontidae fed upon the blood of wild animals and birds before the arrival of the white man and his domestic animals in Trinidad. It is obvious that present-day vampire bats find a more accessible and palatable diet in domestic livestock, poultry, and people which has resulted in an overpopulation of *Desmodus*.

Present methods of bat collecting and vampire eradication include the use of fire-arms, various types of nets and traps, occasionally smoke, if properly used, and a poisoning technique in which a drop of sugar syrup containing strychnine is applied to a fresh wound made by a vampire bat during the previous night. One bat may visit the same animal night after night and bite the animal in the same spot or close to a previous wound.

GEOGRAPHY AND TOPOGRAPHY OF TRINIDAD

Trinidad, the second largest island of the newly federated West Indies, formerly the British West Indies, is roughly about the size of Rhode Island or Lancashire, England, comprising 1864 square miles. It is the most southern of the Lesser Antilles, lying between latitude 10° 3' N. and 10° 50' N. and longitude 60° 55' W. and 61° 15' W. It is located northeast of Venezuela at the mouth of the Orinoco River and is approximately 6½ miles from the South American continent. The northern peninsula, Paria, is separated from Venezuela by the islands of the Bocas del Dragón, namely, Monos, Huevos, and Chacachacare, the last being 6½ miles from Punta Peñas, Peninsula de Paria, Venezuela. In the south, Icacos Point of the Cedros Peninsula is 8 miles from Venezuela and is separated from it by the Boca de la Sierpe, or Serpent's Mouth.

Lying between Trinidad and Venezuela is



MAP 1. Trinidad, showing principal collecting stations. Based on the 1:150,000 map of the Lands and Surveys Department, Port-of-Spain, Trinidad, 1926.

the small island of Patos, or Goose Island, which formerly belonged to Trinidad but was ceded to Venezuela in 1942. It is $6\frac{1}{2}$ miles from Chacachacare and $2\frac{1}{2}$ miles from the mainland.

There are three mountain chains in Trinidad. The Northern and Southern ranges extend across the entire width of the island, parallel to each other, with the Central Range extending diagonally across the middle. The highest peaks in the Northern Range are El Cerro del Aripo (3085 feet), El Tucuche (3072 feet), and Morne Bleu (2781 feet). Mount Tamana, a limestone table mountain, at 1009 feet is the highest in the Central Range, while the Trinity Hills in the Southern Range are the highest at 1070 feet.

Between the Northern and Central ranges, forming a northern plain, are a number of old alluvial terraces formed of detrital material from the northern mountains in the Pleistocene. It is thought that the Orinoco River once flowed through this area and that the terraces are small river channels. The remainder of the island in the south consists of a rolling dissected peneplain which in certain areas has rather steep slopes.

Near the coasts there are a number of large swamps, the largest being the Nariva Swamp on the east coast and the Caroni Swamp on the west coast near Port-of-Spain. Other important but smaller swamp areas are found in southwest Trinidad and carry the names of Icacos, Roussillac, Los Blanquizales, and Oropuche lagoons.

The rivers of Trinidad are numerous and very small, none being navigable except by small boats. The Ortoire River (formerly the Guataro) is the longest, 31 miles, and flows eastward into the Atlantic Ocean. The Caroni River is the next longest, 25 miles, and flows westward into the Gulf of Paria.

GEOLOGY OF TRINIDAD

The geological structure is diversified. Igneous rocks are not present except for an outcrop at Toco. The Northern Range is composed primarily of metamorphic rocks of the Jurassic and Cretaceous periods which appear to have been folded during the middle Eocene. The Central and Southern ranges are composed of Tertiary rock beds, while the peneplain of the south consists mainly of

Miocene deposits. Already mentioned is the northern plain which was probably formed during the Pleistocene. Oil-bearing strata of the Miocene are found in south Trinidad and the Gulf of Paria. Also found in the south are a number of mud "volcanoes" which probably allow gas to escape from nearby oil deposits and have nothing in common with true volcanic activity. These mud flows cover areas from several square miles to only a few feet; Moruga Bouffe is the most active field. A large deposit of asphalt is found at the famous Pitch Lake of La Brea which has an area of 127 acres and is estimated to be 285 feet at its greatest depth. Earthquakes are frequent but have not been particularly severe. The Government Printing Office in Trinidad published a geological map of Trinidad in 1952. (For the general geology of Trinidad, see Sutton, 1955.)

CLIMATE OF TRINIDAD

Trinidad has a warm and humid climate, with a dry and a rainy season. The dry season starts in January and generally ends in May but occasionally lasts until June. The remainder of the year is the rainy season, except for a short dry spell which usually is to be expected between September and November. The temperature ranges between 70° F. in the night to about 88° F. during the day, with extremes ranging from 60° F. during the night in the early part of the dry season to 93° F. during the hottest days of the rainy season. The mean temperature is 76° F. The relative humidity is generally very high, frequently approaching 100 per cent during the nights of the rainy season and dropping to around 50 to 60 per cent during the afternoons of the dry season and to around 75 per cent during the rainy season. Sunshine averages from six to seven hours every day. The trade winds, which are particularly constant during the dry season, tend to temper the heat. Trinidad and Tobago lie just on the southern edge of the West Indian hurricane zone and are seldom touched by these storms.

Annual rainfall figures are uneven and range from 140 inches in the northeastern portion of the Northern Range to about 50 inches in the west, particularly the drier islands off the northwest peninsula opposite

the Peninsula de Paria, Venezuela, and also a small area in the southwest near Erin.

VEGETATION OF TRINIDAD

The factors of climate, rainfall, and a fertile soil are responsible for a great variety of vegetation. According to Beard (1946, p. 25): "The local flora appears to show affinities of a remote nature to the flora of West Africa, agreeing with the geological view of a possible land connection across the middle Atlantic during the Tertiary era. A consideration of tree species alone showed that of the 155 genera and 239 species in Trinidad, 47 genera and 12 species occur in West Africa. Six of the species are literally of the kind propagated by ocean currents.

"As regard nearer relations, the affinities of the local flora are South American rather than Antillean, again in accordance with geology. There may have been a land bridge with the southernmost Antilles as far up as St. Vincent (but no farther) during the Pliocene, whereas Trinidad has been united to Venezuela comparatively recently.

"The Lesser Antilles belong to a separate and quite distinct floristic region. Tobago belongs with Trinidad and Venezuela, but there is a sharp floristic boundary between Tobago and Grenada."

Beard (1946, p. 36) divided the plant communities of Trinidad into two groups, "climatic" and "edaphic," depending on whether climate, or topography and soil, exerted the greater influence. Beard's formations are:

CLIMATIC

1. Seasonal Formations
 - a. Evergreen Seasonal Forest
 - b. Semi-evergreen Seasonal Forest
 - c. Deciduous Seasonal Forest
2. Dry Evergreen Formations
 - a. Littoral Woodlands
3. Montane Formations
 - a. Lower Montane Rain Forest
 - b. Montane Rain Forest
 - c. Elfin Woodland
4. Intermediate Formation
 - a. Seasonal Montane Forest

EDAPHIC

5. Swamp Formations
 - a. Swamp Forest
 - b. Palm Swamp

- c. Herbaceous Swamp
 - d. Mangrove Woodland
6. Marsh Formations
 - a. Marsh Forest
 - b. Palm Marsh
 - c. Savanna

TERRESTRIAL AND AQUATIC MAMMALS OF TRINIDAD, EXCLUSIVE OF THE BATS

Didelphidae: Opossums

Didelphis marsupialis insularis, J. A. Allen = *Didelphis marsupialis marsupialis* Linnaeus, according to Cabrera (1957, pp. 42-43). Black-eared Opossum, "manicou"

Marmosa mitis chapmani J. A. Allen. Greater Trinidadian Murine Opossum

Marmosa carri (J. A. Allen and Chapman). Lesser Trinidadian Murine Opossum

Caluromys philander trinitatis (Thomas). Woolly Opossum, "manicou gros-yeux"

Chironectes minimus minimus (Zimmermann). Yapok, Water Opossum

Cebidae: Monkeys

Alouatta seniculus insularis Elliot. Red Howler, "macaque rouge"

Cebus albifrons trinitatis Pusch. Capuchin, "weeping capuchin," "matchin"

Myrmecophagidae: Anteaters

Tamandua longicaudata longicaudata (Wagner). Three-toed Anteater, "yellow tamandua," "mataperro," "matapel"

Cyclopes didactylus didactylus (Linnaeus). Two-toed Anteater, "silky anteater," "poor-me-one," "sloth," "ai paresseux"

Dasypodidae: Armadillos

Dasybus novemcinctus novemcinctus Linnaeus. Nine-banded Armadillo, "tatu," "tattoo"

Sciuridae: Squirrels

Sciurus granatensis chapmani J. A. Allen. Trinidadian Squirrel, "écuriel," squirrel

Muridae: Rats and Mice

Oryzomys concolor speciosus J. A. Allen and Chapman. Arboreal Rice Rat

Oryzomys trinitatis J. A. Allen and Chapman = *Oryzomys concolor speciosus* J. A. Allen and Chapman, according to Hershkovitz (1960, p. 553)

Oryzomys laticeps velutinus J. A. Allen and Chapman. Terrestrial Rice Rat

Oryzomys delicatus delicatus J. A. Allen and Chapman. Pygmy Rice Rat

Akodon urichi J. A. Allen and Chapman. Grass Mouse

Akodon frustrator J. A. Allen and Chapman = *Zygodontomys brevicauda brevicauda* (J. A. Allen and Chapman), according to Gyldenstolpe (1932, p. 112)

- Rhipidomys couesi* (J. A. Allen and Chapman). Tree Rat
Nectomys squamipes palmipes J. A. Allen and Chapman. Trinidadian Water Rat
Zygodontomys brevicauda brevicauda (J. A. Allen and Chapman). Trinidadian Cane Rat
Rattus rattus rattus (Linnaeus). Black Rat (introduced)
Rattus rattus alexandrinus (É. Geoffroy-Saint-Hilaire). Gray-bellied or Alexandria Rat or Roof Rat (introduced)
Rattus rattus frugivorus (Rafinesque). White-bellied or Fruit Rat (introduced)
Rattus norvegicus (Berkenhout). Norway Rat, Wharf Rat (introduced).
Mus musculus brevirostris Waterhouse. House Mouse (introduced)
Heteromyidae: Spiny Pocket Mice
Heteromys anomalus anomalus (Thompson). Trinidadian Spiny Pocket Mouse, "pouched rat"
Echimyidae: Spiny Rats
Echymys armatus castaneus (J. A. Allen and Chapman). Greater Trinidadian Spiny Rat, "pilori," "porcupine rat"
Proechimys guyannensis trinitatis (J. A. Allen and Chapman). Lesser Trinidadian Spiny Rat, "long-tailed pilori"
Erethizontidae: Porcupines
Coendu prehensilis longicaudatus Lacépède. Prehensile-tailed Porcupine, "porc é pic," "coendu"
Dasyproctidae: Agoutis
Dasyprocta agouti (Linnaeus). Agouti
Agouti (Cuniculus) paca (Linnaeus). Paca, "lappe," "lapa"
Procyonidae: Raccoons
Procyon cancrivorus cancrivorus (Cuvier). Crab-eating Raccoon, "mangrove dog," "chien mangué"
Mustelidae: Weasels
Lutra enudris F. Cuvier. Otter, "water dog," "chien de l'eau"
Eira barbara trinitatis Thomas. Tayra, "high woods dog," "chien bois"
Viverridae: Mongooses.
Herpestes auro punctatus (Hodgson). Indian Mongoose (introduced)
Felidae: Cats
Felis pardalis Linnaeus. Ocelot, "tiger cat," "chat tigre"
Trichechidae: Sea Cows
Trichechus manatus (Linnaeus). Manatee, "lamantin"
Tayassuidae: Peccaries
Tayassu tajacu (Linnaeus). Collared Peccary, "quenk," "quank," "wild hog"
Cervidae: Deer
Mazama americana trinitatis J. A. Allen. Red

Brocket, Deer, "biche"

Bovidae: Cattle

Bubalis bubalis (Linnaeus). Indian Buffalo, Water Buffalo, "bison" (introduced as a beast of burden)

GEOGRAPHY AND TOPOGRAPHY OF TOBAGO

Tobago lies 19 miles northeast of Trinidad at latitude 11° 09' N. and longitude 60° 12' W. Crown Point, its southwestern extremity, is about 72 miles southeast of Saint David's Point, Grenada, and about 120 miles southwest of the island of Barbados. Tobago embraces an area of about 116 square miles and is 26 miles long and 7½ miles wide at its greatest breadth.

A ridge of hills extends for two-thirds of the length of the island from the northeastern end. The summits of the ridge are irregular but rounded and lack any volcanic features. The northern side of the ridge has very steep slopes, while on the southern side, between the hills and extending to the coast, are a number of well-watered valleys. The southwestern part of the island contains low-lying plains from which rise a number of hills. The highest point (unnamed) on Tobago is 1890 feet. Pigeon Peak is 1800 feet in elevation, while French Hill is 801 feet in elevation.

The principal rivers all flow into the Atlantic Ocean and are from about 5 to 6 miles in length. They are the Goldsborough River, the Louis d'Or River, and the Courland River.

Tobago is less humid than Trinidad. The average annual temperature is about 80° F. The rainfall is about 90 inches in the northern districts and about 60 inches in the southern and western areas where there is very little forest. Forest, where present, consists primarily of Deciduous Seasonal and some Lower Montane Rain Forest in addition to some Swamp Formations.

Lying northeast 1½ miles off Tobago is the island of Little Tobago, at the present time a sanctuary for some Lesser Birds of Paradise that were introduced from New Guinea in 1909.

TERRESTRIAL MAMMALS OF TOBAGO, EXCLUSIVE OF THE BATS

The following list of Tobago mammals is based largely on species collected by Franklin

TABLE 1
LIST OF PARASITES AND THEIR BAT HOSTS IN TRINIDAD

Parasites	Hosts
Cestoda	
Unidentified cestode	<i>Phyllostomus hastatus hastatus</i>
Nematoda	
Unidentified nematode	<i>Micronycteris megalotis megalotis</i>
Trematoda	
Unidentified trematodes	<i>Noctilio leporinus leporinus</i> <i>Peropteryx macrotis trinitatis</i> <i>Phyllostomus discolor discolor</i> <i>Phyllostomus hastatus hastatus</i>
Sarcoptidae (mites)	
<i>Teinocoptes</i> sp.	<i>Artibeus jamaicensis trinitatis</i> <i>Noctilio leporinus leporinus</i>
Spinturnicidae (mites)	
<i>Spinturnix</i> sp.	<i>Micronycteris brachyotis</i>
Dermanyssidae (mites)	
<i>Ichoronyssus</i> sp.	<i>Molossus major major</i>
Myobiidae (mites)	
<i>Myobia</i> sp.	<i>Molossus major major</i>
Ixodidae (ticks)	
<i>Ixodes downsi</i>	<i>Anoura geoffroyi geoffroyi</i>
<i>Ornithodoros azteci</i>	<i>Desmodus rotundus rotundus</i>
<i>Ornithodoros dunni</i>	<i>Molossus ater ater</i> <i>Noctilio leporinus leporinus</i>
<i>Ornithodoros viguerasi</i>	<i>Chilonycteris rubiginosa fusca</i> <i>Mormoops megalophylla tumidiceps</i> <i>Pteronotus davyi davyi</i>
Trombiculidae (chiggers)	
<i>Beamerella acutascuta</i>	<i>Carollia perspicillata perspicillata</i> <i>Chilonycteris rubiginosa fusca</i> <i>Micronycteris hirsuta</i>
<i>Euschöngastia anops</i>	<i>Carollia perspicillata perspicillata</i> <i>Chilonycteris rubiginosa fusca</i>
<i>Euschöngastia colombiae</i>	<i>Carollia perspicillata perspicillata</i> <i>Desmodus rotundus rotundus</i> <i>Glossophaga soricina soricina</i>
<i>Euschöngastia desmodus</i>	<i>Carollia perspicillata perspicillata</i> <i>Micronycteris megalotis megalotis</i> <i>Mormoops megalophylla tumidiceps</i>
<i>Euschöngastia lipoglana</i>	<i>Desmodus rotundus rotundus</i>
<i>Euschöngastia megastyrax</i>	<i>Uroderma bilobatum bilobatum</i>
<i>Eutrombicula batatas</i>	<i>Artibeus cinereus cinereus</i>
<i>Eutrombicula göldii</i>	<i>Saccopteryx bilineata perspicillifer</i> <i>Micronycteris hirsuta</i>
<i>Spelecola secunda</i>	<i>Phyllostomus discolor discolor</i>
<i>Trombicula carmenae</i>	<i>Mormoops megalophylla tumidiceps</i>
<i>Trombicula discors</i>	<i>Desmodus rotundus rotundus</i>
<i>Trombicula longicalcar</i>	<i>Mormoops megalophylla tumidiceps</i>
<i>Trombicula macrozota</i>	<i>Mormoops megalophylla tumidiceps</i>
<i>Trombicula monops</i>	<i>Desmodus rotundus rotundus</i>
<i>Trombicula pecari</i>	<i>Desmodus rotundus rotundus</i>
<i>Trombicula saccopteryx</i>	<i>Desmodus rotundus rotundus</i> <i>Saccopteryx bilineata perspicillifer</i>
<i>Trombicula tibbettsi</i>	<i>Chilonycteris rubiginosa fusca</i> <i>Mormoops megalophylla tumidiceps</i>
<i>Trombicula vesperuginis</i>	<i>Artibeus jamaicensis trinitatis</i>

TABLE 1—(Continued)

Parasites	Hosts
	<i>Carollia perspicillata perspicillata</i>
	<i>Desmodus rotundus rotundus</i>
	<i>Micronycteris hirsuta</i>
	<i>Micronycteris megalotis megalotis</i>
	<i>Saccopteryx bilineata perspicillifer</i>
	<i>Vampyrum spectrum spectrum</i>
<i>Whartonia nudosetosa</i>	<i>Desmodus rotundus rotundus</i>
<i>Whartonia trinidadensis</i>	<i>Mormoops megalophylla tumidiceps</i>
Streblidae (bat flies)	
<i>Aspidoptera clovisi</i>	<i>Anoura geoffroyi geoffroyi</i>
<i>Aspidoptera megastigma</i>	<i>Noctilio leporinus leporinus</i>
<i>Euctenodes</i> sp.	<i>Diaemus youngi</i>
	<i>Molossus ater ater</i>
<i>Euctenodes mirabilis</i>	<i>Saccopteryx bilineata perspicillifer</i>
	<i>Chilonycteris rubiginosa fusca</i>
	<i>Carollia perspicillata perspicillata</i>
	<i>Desmodus rotundus rotundus</i>
	<i>Glossophaga soricina soricina</i>
	<i>Phyllostomus discolor discolor</i>
	<i>Phyllostomus hastatus hastatus</i>
<i>Nycterophilus coxata</i>	<i>Chilonycteris rubiginosa fusca</i>
<i>Paradyschiria dubia</i>	<i>Noctilio leporinus leporinus</i>
<i>Paratrachobius longicrus</i>	<i>Artibeus lituratus palmarum</i>
<i>Pterellipsis</i> sp.	<i>Artibeus cinereus cinereus</i>
<i>Pterellipsis aranea</i>	<i>Artibeus jamaicensis trinitatis</i>
	<i>Artibeus lituratus palmarum</i>
<i>Speiseria ambigua</i>	<i>Anoura geoffroyi geoffroyi</i>
	<i>Carollia perspicillata perspicillata</i>
	<i>Chilonycteris rubiginosa fusca</i>
	<i>Glossophaga soricina soricina</i>
	<i>Micronycteris brachyotis</i>
<i>Strebla vespertilionis</i>	<i>Desmodus rotundus rotundus</i>
<i>Trichobius coecus</i>	<i>Chilonycteris rubiginosa fuscus</i>
<i>Trichobius costalimai</i>	<i>Phyllostomus discolor discolor</i>
<i>Trichobius dugesii</i>	<i>Anoura geoffroyi geoffroyi</i>
	<i>Carollia perspicillata perspicillata</i>
	<i>Chilonycteris rubiginosa fusca</i>
	<i>Desmodus rotundus rotundus</i>
	<i>Diaemus youngi</i>
	<i>Enchisthenes hartii</i>
	<i>Glossophaga soricina soricina</i>
	<i>Micronycteris brachyotis</i>
<i>Trichobius mixtus</i>	<i>Phyllostomus hastatus hastatus</i>
	<i>Anoura geoffroyi geoffroyi</i>
	<i>Phyllostomus discolor discolor</i>
	<i>Phyllostomus hastatus hastatus</i>
<i>Trichobius parasiticus</i>	<i>Carollia perspicillata perspicillata</i>
	<i>Chilonycteris rubiginosa fusca</i>
	<i>Desmodus rotundus rotundus</i>
<i>Trichobius perspicillatus</i>	<i>Phyllostomus discolor discolor</i>
	<i>Desmodus rotundus rotundus</i>
Cimicidae (bedbugs)	
<i>Latrocimex</i> sp.	<i>Noctilio leporinus leporinus</i>
Polyctenidae (blood-sucking bugs)	
<i>Hesperoctenes fumarius</i>	<i>Molossus ater ater</i>

Thurab in 1960 for the American Museum of Natural History.

Didelphidae: Opossums

Didelphis marsupialis insularis J. A. Allen.
Black-eared Opossum

Marmosa mitis subsp. Greater Trinidadian Murine Opossum. A comparatively large, short-tailed species; the ratio of the length of head and body to the length of tail is 95 per cent

Marmosa tobagi Thomas. Tobago Murine Opossum. A comparatively small, long-tailed species; the ratio of the length of head and body to the length of tail is 71 per cent

Dasypodidae: Armadillos

Dasypus novemcinctus Linnaeus. Nine-banded Armadillo

Sciuridae: Squirrels

Sciurus granatensis tobagensis Osgood. Tobago Squirrel

Muridae: Rats and Mice

Akodon urichi J. A. Allen and Chapman. Grass Mouse

Rhipidomys sp. Tobago Little Tree Rat

Zygodontomys brevicauda brevicauda (J. A. Allen and Chapman). Trinidadian Cane Rat

Rattus rattus frugivorus (Rafinesque). White-bellied or Fruit Rat (introduced)

Mus musculus brevirostris Waterhouse. House Mouse (introduced)

Heteromyidae: Spiny Pocket Mice

Heteromys anomalus anomalus (Thompson). Spiny Pocket Mouse.

Echimyidae: Spiny Rats

Echimyus armatus castaneus (J. A. Allen and Chapman). Greater Trinidadian Spiny Rat

Dasypodidae: Agoutis

Dasypus agouti (Linnaeus). Agouti

Cervidae: Deer

Mazama americana trinitatis J. A. Allen. Red Brocket.

Odocoileus virginianus (Zimmerman). White-tailed Deer (introduced)

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TABLE 2
ALPHABETICAL LIST OF TRINIDAD AND TOBAGO BATS

	Trinidad	Tobago
<i>Ametrida centurio</i> Gray	x	—
<i>Anoura geoffroyi geoffroyi</i> Gray	x	—
<i>Artibeus cinereus cinereus</i> (Gervais)	x	x
<i>Artibeus jamaicensis trinitatis</i> Andersen	x ^a	x
<i>Artibeus lituratus palmarum</i> J. A. Allen and Chapman	x ^a	x
<i>Carollia perspicillata perspicillata</i> (Linnaeus)	x	x
<i>Centurio senex</i> Gray	x	x
<i>Chilonycteris personata personata</i> Wagner	x	—
<i>Chilonycteris rubiginosa fusca</i> J. A. Allen	x	—
<i>Chiroderma trinitatum</i> Goodwin	x ^a	—
<i>Chiroderma villosus villosus</i> Peters	x	x

TABLE 2—(Continued)

	Trinidad	Tobago
<i>Choeroniscus intermedius</i> (J. A. Allen and Chapman)	x ^a	—
<i>Dasypterus ega panamensis</i> Thomas	x	—
<i>Desmodus rotundus rotundus</i> (É. Geoffroy-Saint-Hilaire)	x	—
<i>Diaemus youngi</i> (Jentink)	x	—
<i>Diclidurus albus</i> Wied-Neuwied	x	—
<i>Enchisthenes hartii</i> (Thomas)	x ^a	—
<i>Eptesicus melanopterus</i> (Jentink)	—	x
<i>Furipterus horrens</i> (F. Cuvier)	x	—
<i>Glossophaga longirostris major</i> Goodwin	x ^a	x
<i>Glossophaga soricina soricina</i> (Pallas)	x	—
<i>Lasiurus borealis frantzii</i> (Peters)	x	—
<i>Lonchorhina aurita aurita</i> Tomes	x ^a	—
<i>Micronycteris brachyotis</i> (Dobson)	x	—
<i>Micronycteris hirsuta</i> (Peters)	x	—
<i>Micronycteris megalotis megalotis</i> (Gray)	x	x
<i>Micronycteris minuta</i> (Gervais)	x	—
<i>Micronycteris nicefori</i> Sanborn	x	—
<i>Micronycteris sylvestris</i> (Thomas)	x	—
<i>Mimon crenulatum crenulatum</i> (É. Geoffroy-Saint-Hilaire)	x	—
<i>Molossops greenhalli</i> (Goodwin)	x ^a	—
<i>Molossus ater ater</i> É. Geoffroy-Saint-Hilaire	x	—
<i>Molossus major major</i> (Kerr)	x	x
<i>Molossus trinitatus</i> Goodwin	x ^a	—
<i>Mormoops megalophylla tumidiceps</i> Miller	x ^a	—
<i>Myotis nigricans nigricans</i> (Schinz)	x	x
<i>Natalus tumidirostris haymani</i> Goodwin	x ^a	—
<i>Noctilio leporinus leporinus</i> (Linnaeus)	x	x
<i>Peropteryx macrotis macrotis</i> (Wagner)	—	x
<i>Peropteryx macrotis trinitatis</i> Miller	x ^a	—
<i>Phyllostomus discolor discolor</i> Wagner	x	—
<i>Phyllostomus hastatus hastatus</i> (Pallas)	x	x
<i>Promops centralis</i> Thomas	x	—
<i>Pteronotus davyi davyi</i> Gray	x ^a	—
<i>Rhogeessa parvula minutilla</i> Miller	x	—
<i>Rhogeessa tumida riparia</i> Goodwin	x	—
<i>Rhynchiscus naso</i> (Wied-Neuwied)	x	—
<i>Saccopteryx bilineata perspicillifer</i> Miller	x ^a	—
<i>Saccopteryx leptura</i> (Schreber)	x	x
<i>Sturnira lilium lilium</i> (É. Geoffroy-Saint-Hilaire)	x	—
<i>Sturnira tildae</i> De la Torre	x ^a	—
<i>Tadarida europs</i> (H. Allen)	x	—
<i>Tadarida brasiliensis antillarum</i> (Miller)	—	x
<i>Thyroptera tricolor tricolor</i> Spix	x	—
<i>Tonatia bidens</i> (Spix)	x	—
<i>Tonatia minuta</i> Goodwin	x	—
<i>Trachops cirrhosus</i> (Spix)	x	—
<i>Uroderma bilobatum bilobatum</i> Peters	x	—
<i>Vampyroides caracciolo caracciolo</i> (Thomas)	x ^a	x
<i>Vampyroops helleri</i> Peters	x	—
<i>Vampyrus spectrum spectrum</i> (Linnaeus)	x	—

° Type.

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Mrs. Elizabeth Rusk Greenhall, who accompanied the junior author on many of his field trips in Trinidad and Tobago, has rendered much-appreciated assistance in the preparation of the introduction and in compiling the field notes.

COLLECTIONS REPRESENTED

The present report is based principally on 760 specimens of bats from Trinidad and Tobago in the American Museum of Natural History, 197 in the United States National Museum, and 61 in the Museum of Comparative Zoölogy at Harvard College at the

present time. Most of the material is preserved in spirits. Some substantiated records of specimens in other museums are included. A large part of the working material was donated to the American Museum of Natural History by the Department of Agriculture of Trinidad and Tobago and the Royal Victoria Institute Museum, Trinidad. After the publication of the present report, a representative series of the bats of Trinidad and Tobago will be returned to Trinidad.

TREATMENT, MEASUREMENTS, WEIGHTS, AND ABBREVIATIONS

Most of the headings in the text are standard in mammalogy, but one is given some explanation.

Range under the named forms does not cover the entire distribution of the species or subspecies but refers only to records for Trinidad and Tobago.

All measurements are given in millimeters. The length of the forearm is taken from the elbow to the proximal extremity of the folded fingers of the wing. The length of the skull is taken from the front of the incisors to the posteriormost extension of the braincase. The condylobasal length is inclusive of the incisors. Measurements in the keys to species, given in parentheses, immediately preceding a named form apply only to the particular form indicated and are not key characters. The weights are given in grams and were taken from freshly killed specimens.

The names of colors that are capitalized in the descriptions are from Ridgway (1912).

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

- A.M.N.H., the American Museum of Natural History
- B.M., British Museum (Natural History)
- C.N.M.H., Chicago Natural History Museum
- L.S.U., Louisiana State University
- M.C.Z., Museum of Comparative Zoölogy at Harvard College
- M.N.H.N., Muséum National d'Histoire Naturelle, Paris
- R.N.H.L., Rijksmuseum van Natuurlijke Historie, Leiden
- U.F., University of Florida
- U.A.N.M., Universidad Nacional Autónoma de Mexico
- U.S.N.M., United States National Museum

CHANGES IN NOMENCLATURE

A list of the presently recognized bats of Trinidad and Tobago is given in table 2. The following names that have appeared in published lists and in the literature have been changed and brought up to date. An explanation of these changes will be found in the text under the remarks concerning the valid genera and forms.

Chilonycteris parnellii, Koopman = *Chilonycteris rubiginosa fusca* J. A. Allen
Chilonycteris rubiginosa rubiginosa, Greenhall = *Chilonycteris rubiginosa fusca* J. A. Allen
Cynomops greenhalli Goodwin = *Molossops greenhalli* (Goodwin)
Cynomops planirostris planirostris, Greenhall = *Molossops greenhalli* (Goodwin)
Dasypterus ega ega, Greenhall = *Dasypterus ega panamensis* Thomas
Eptesicus brasiliensis, Koopman = *Eptesicus melanopterus* (Jentink)
Glossophaga major Goodwin = *Glossophaga longirostris major* Goodwin
Molossus rufus, Miller = *Molossus ater ater* E. Geoffroy-St.-Hilaire
Mormoops megalophylla megalophylla, Greenhall = *Mormoops megalophylla tumidiceps* Miller
Micronycteris platyceps Sanborn = *Micronycteris brachyotis* (Dobson)
Natalus stramineus, Sanborn = *Natalus tumidirostris haymani* Goodwin
Platyrrhinus helleri, Hall and Kelson = *Vampyrops helleri* Peters
Rhogeessa io, Greenhall = *Rhogeessa parvula minutella* Miller

Rhogeessa tumida, Greenhall = *Rhogeessa tumida ripaira* Goodwin
Rhynchonycteris naso, Hall and Kelson = *Rhynchiscus naso* (Wied-Neuwied)
Tadarida brasiliensis brasiliensis, Greenhall = *Tadarida europs* (H. Allen)
Thyroptera tricolor albigula, Greenhall = *Thyroptera tricolor tricolor* Spix
Tonatia venezuelae, Sanborn = *Tonatia minuta* Goodwin

The records on which three species (*Myotis albescens*, Greenhall, 1956, p. 18; *Myotis argentatus*, Koopman, 1958, p. 433; and *Pipistrellus subflavus*, Koopman, 1958, p. 433) were included in recent lists of Trinidad bats prove to be erroneous. The specimens on which these records were based have now been identified as *Myotis lucifugus* and *Pipistrellus subflavus*. They are all labeled Indian Oven Caves, a locality in the State of New York, not Trinidad.

Fifty-eight named forms are now recorded from Trinidad. Seventeen species are known to occur on Tobago, including three forms not represented in Trinidad: *Peropteryx macrotus macrotus*, *Eptesicus melanopterus*, and *Tadarida brasiliensis antillularum*. All the named forms recorded from Trinidad and Tobago with the exception of *Echisthenes hartii*, *Eptesicus melanopterus* (M.C.Z.), and *Tadarida brasiliensis antillularum* (U.S.N.M.) are represented in the American Museum of Natural History collections at the present time.

SYSTEMATIC ACCOUNTS

ORDER **CHIROPTERA** BLUMENBACH

BATS

WARM-BLOODED, placental mammals highly modified in structure for flight; bones of forelimbs, especially fingers, enormously elongated for support of flying membranes; fingers joined together by a double layer of thin resilient skin that extends down forearm and is attached to back or sides of body and hind legs to ankles and usually extended between hind limbs, enclosing tail, when present. Calcar usually but not always drawn out in a long spur for added support of membranes, absent in some genera; thumb not greatly elongated, with a small, hooked claw, free and not enclosed in membrane; ears large to extremely large; hind leg rotated 180 degrees so that knee bends backward; clavicle well developed, sternum generally with well-developed keel for attachment of flight muscles.

SUBORDER **MICROCHIROPTERA**

DOBSON

LESSER BATS

Second finger closely associated with, and unable to act independently of, third, outer margin of external ear not forming a complete ring, tragus present in American forms.

The Microchiroptera include all the bats except the Megachiroptera. The Megachiroptera include fruit-eating genera of the tropical and subtropical regions of the Old World in which a tragus is not present, the outer margin of the ear forms a complete ring, the cheek teeth of the upper and lower jaws closely resemble one another, and the mandibular incisors are never more than 2-2.

KEY TO THE FAMILIES OF BATS OF TRINIDAD AND TOBAGO

1. Nose leaf and prominent dermal outgrowths on chin absent 2
Nose leaf or prominent dermal outgrowths on chin present 8
2. Two phalanges on third finger 3
Three phalanges on third finger. 5
3. Tail shorter than length of interfemoral membrane 4
Tail as long as interfemoral membrane and ex-

- ceeding length of head and body. Natalidae
4. Proximal phalanx of third finger reflexed, thumb well developed . . . Emballonuridae
Proximal phalanx of third finger flexed, thumb rudimentary Furipteridae
5. Suction disks on thumb and foot, third phalanx of third finger bony . . . Thyropteridae
No suction disks on thumb and foot, third phalanx of third finger largely cartilaginous. 6
6. Tail shorter than interfemoral membrane, feet and claws greatly enlarged . . Noctilionidae
Tail as long as or longer than interfemoral membrane, feet and claws normal. . . . 7
7. Tail extending to but not appreciably beyond posterior border of interfemoral membrane, muzzle well haired, wings broad
. Vespertilionidae
Tail extending conspicuously beyond posterior border of interfemoral membrane, muzzle nearly naked, wings very narrow
. Molossididae
8. Prominent triangular nose leaf or large flat dermal plates on chin usually present, calcar well developed, upper incisors much smaller than canines Phyllostomidae
Nose leaf rudimentary, calcar rudimentary or absent, upper incisors considerably larger than canines, with a triangular, pointed tip and long, sharp, cutting edge.
. Desmodontidae

SUPERFAMILY **EMBALLONUROIDEA** WEBER

SAC-WINGED, TOMB, BULLDOG, MOUSE, AND SHEATH-TAILED BATS

Small to large-sized, insect-eating bats with a slender tail, usually shorter than interfemoral membrane but extremely long in *Rhinopoma*; nose and chin without dermal outgrowths or folds of naked skin; third finger in no instance with more than two phalanges.

FAMILY **EMBALLONURIDAE** DOBSON

REFLEX-WINGED BATS

Text figure 1

Small to medium-sized, slender bats with tip of tail perforating and appearing on upper side of interfemoral membrane; proximal phalanx of third finger reflexed when the wing is at rest (fig. 1). Skull with premaxillaries free, not fused together or to the maxillaries.

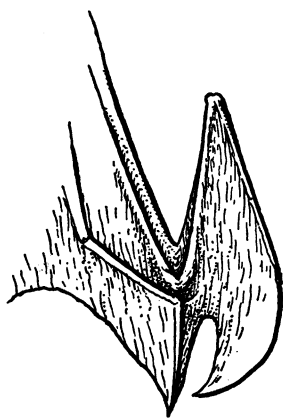


FIG. 1. Dorsal view of third finger of *Saccopteryx bilineata perspicillifer*, showing reflexed proximal phalanx.

KEY TO THE GENERA, SPECIES, AND SUBSPECIES
OF THE EMBALLONURIDAE OF TRINIDAD
AND TOBAGO

1. Glandular sac in membranes absent, forearm with evenly spaced tufts of hair (length of forearm, 35.3–40.7) . . . *Rhynchiscus naso*
Glandular sac in membranes present, forearm without spaced tufts of hair 2
2. Color white, glandular sac in interfemoral membrane (length of forearm, 62.0–63.0)
. *Dididurus albus*
Color blackish, glandular sac in antebrachial membrane 3
3. Glandular sac in antebrachial membrane near forearm, postorbital processes long and broad, a pair of white dorsal lines present. 4
Glandular sac near upper edge of antebrachial membrane, postorbital processes long and slender, white dorsal lines absent 5
4. Color black, with a pair of distinct, white, longitudinal dorsal lines; length of forearm, 41.0–52.0 *Saccopteryx bilineata*
Color dark brown, white dorsal lines indistinct; length of forearm, 37.0–42.0
. *Saccopteryx leptura*
5. Length of forearm, 46.0–48.0
. *Peropteryx macrotis macrotis*
Length of forearm, 41.0–42.0
. *Peropteryx macrotis trinitatis*

SUBFAMILY EMBALLONURINAE FLOWER AND
LYDEKKER
SAC-WINGED BATS

Small, delicately formed bats with long slender legs; tail about half of length of interfemoral membrane; skull with well-developed postorbital processes. Most of the American

genera have a glandular sac in antebrachial membrane.

GENUS *RHYNCHISCUS* MILLER

LONG-NOSED OR PROBOSCIS BATS

Rhynchonycteris PETERS, 1867, Monatsber. Preussischen Akad. Wiss. Berlin, p. 477.

Rhynchiscus MILLER, 1907, Proc. Biol. Soc. Washington, vol. 20, p. 65. Type, *Vespertilio naso* Wied-Neuwied.

Very small, slender bats without glandular sac in flying membranes; tail much shorter than interfemoral membrane and tip appearing on upper side; forearm hairy.

RANGE: From Veracruz, Mexico, south through Central America to Peru and Minas Gerais, Brazil. The genus is monotypic.

REMARKS: Simpson (1945, p. 55) replaced the name *Rhynchiscus* Miller by *Rhynchonycteris* Peters, 1867, on the grounds that the latter name had priority and differed in spelling from *Rhynchonycteris* Tschudi, 1844, by one letter. *Rhynchonycteris* Tschudi is a synonym of *Anoura* Gray. Formerly, *Rhynchonycteris* Peters and *Rhynchonycteris* Tschudi were, according to the International Rules of Zoological Nomenclature, considered homonyms, which led to the virtually universal acceptance of Miller's name *Rhynchiscus*. The Zoological Congress later changed its position and required identical spelling before two names could be considered homonyms (Hemming, 1953, p. 78). However, such a ruling does not change the fact that, when Miller introduced *Rhynchiscus*, the other two names (*Rhynchonycteris* Peters and *Rhynchonycteris*) were both legal homonyms. As Miller's name *Rhynchiscus* was created in accordance with the Rules of the Code of Zoological Nomenclature in force at the time, and as it has become well established, there seems to be no valid reason for changing it at the present time, even though the Rules have been changed. *Rhynchiscus* Miller is, therefore, used for *Vespertilio naso* Wied-Neuwied.

Rhynchiscus naso (Wied-Neuwied)

BRAZILIAN LONG-NOSED OR JACOB'S LADDER BAT

Plate 7, figures 1–3; text figures 2, 3

Vespertilio naso WIED-NEUWIED, 1820, Reise nach Brasilien in den Jahren 1815–1817, vol. 1, p. 251, footnote.

Rhynchiscus naso, MILLER, 1907, Bull. U. S. Natl. Mus., vol. 57, p. 89.

TYPE LOCALITY: Banks of Río Mucuri, near Morro d'Arara, Minas Gerais, Brazil.

RANGE: Trinidad; widely distributed.

GENERAL CHARACTERS: A very small, slender bat with a long, narrow muzzle; no wing sac; forearm dotted with evenly spaced small tufts of fur (fig. 3); interfemoral membrane furred to exertion of tail.

DESCRIPTION: General color of upper parts grizzled or buffy mixed with gray; two buffy lines in the form of an hourglass on the lower back and rump; under parts pale buffy gray. Skull small, with a rounded braincase; post-orbital processes long and slender; no angle between rostrum and forehead; upper incisors minute; lower incisors small, trifid; first upper premolar large, triangular, with small cingulum cusps anteriorly and posteriorly.

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

MEASUREMENT AND WEIGHTS: Three females from Caroni River, Trinidad: Length of forearm, 37.4, 37.5, 37.4. Skull: One male and one female, Caroni River: greatest length, 11.7, 11.0; zygomatic breadth, 7.0, 6.65; length of maxillary tooth row, C-M³, 4.3, 4.3. Weights: Four males, 3.2-4.3; three females, 2.1, 2.4, 3.4; two gravid females, 4.2, 4.6.

SPECIMENS RECORDED: *Trinidad*: Caroni River, three (A.M.N.H.), seven (M.C.Z.); Granville, two (A.M.N.H.); Guanapo, three (A.M.N.H.).

GENERAL HABITS: This bat usually frequents watercourses and roosts in well-lighted situations. Small colonies, rarely exceeding a dozen individuals, may hang from the bark of a tree, under bridges, under the dry curled leaves of the banana (*Musa*) or

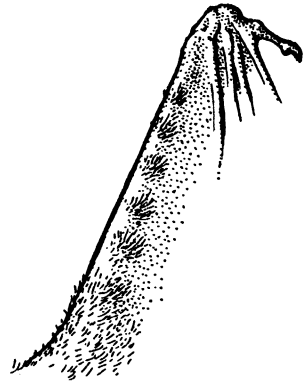


FIG. 3. Dorsal view of forearm of *Rhynchiscus naso*, showing evenly spaced tufts of hair.

the *balisier* (*Heliconia*). There is invariably a well-defined space between each bat whether one roosts above or by the side of another. It prefers a leaning tree to a vertical one. Its color harmonizes so closely with the bark of a tree that this bat is difficult to see until it takes flight. Bright sunlight does not appear to bother the species, and it sometimes flies about in broad daylight and has been seen roosting on a dock piling at mid-day in strong sunlight. This bat is easily disturbed and, when approached, takes off in a rapid weaving flight. It shares, in common with *Saccopteryx* and *Pteropteryx*, the habit of folding its wings at about a 45-degree angle to the body, a position that serves as an identification of this bat when it is at rest. It is not known to roost in association with any other species of bat.

BREEDING: Two gravid females were taken March 23, 1958, with two males.

FOOD: Insects exclusively.

DISEASE: Specimens examined were rabies-negative.

GENUS SACCOPTERYX ILLIGER

WHITE-LINED BATS

Saccopteryx ILLIGER, 1811, *Prodromus systematis mammalium et avium*, p. 121. Type, *Vespertilio lepturus* Schreber.

Small to medium-sized, slender, blackish bats with a pair of longitudinal, white, dorsal lines; a glandular sac in antebrachial membrane; tail shorter than interfemoral membrane, with the tip appearing on upper side.

RANGE: From Veracruz and Colima, Mex-

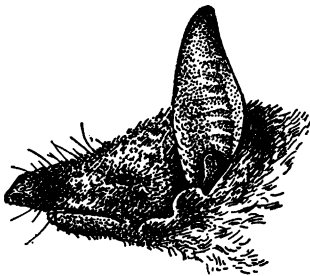


FIG. 2. Lateral view of head of *Rhynchiscus naso*. $\times 2\frac{1}{2}$.

ico, south to Peru and Mato Grosso and São Paulo, Brazil. Two species recorded from Trinidad, one from Tobago.

***Saccopteryx bilineata perspicillifer* Miller**

GREATER SAC-WINGED BAT OR TRINIDADIAN
GREATER WHITE-LINED BAT

Plate 7, figures 4-6; text figures 4-7

Saccopteryx perspicillifer MILLER, 1899, Bull. Amer. Mus. Nat. Hist., vol. 12, p. 176.

Saccopteryx bilineata, SANBORN, 1937, Publ. Field Mus. Nat. Hist., zool. ser., vol. 20, no. 24, p. 378.

Saccopteryx perspicillifer, CABRERA, 1957, Rev. Mus. Argentino Cien. Nat. "Bernardino Rivadavia," cien. zool., no. 1, p. 50.

TYPE LOCALITY: Caura, Trinidad, West Indies.

RANGE: Trinidad; widely distributed and common.

GENERAL CHARACTERS: A medium-sized, slender bat with a glandular sac situated close to the forearm near the elbow and opening on the upper side of the antebrachial membrane (fig. 5). Interfemoral membrane thinly haired to exertion of tail.

DESCRIPTION: General color of upper parts black or blackish brown to roots of hair, with two longitudinal wavy lines of buffy white extending from behind shoulders to rump; under parts more brownish than back. Skull rather large, with a moderately well-developed sagittal crest; postorbital processes long and broad (fig. 6); angle between rostrum and forehead slight; basisphenoid pit large and usually divided by a plate (fig. 7); first upper premolar, pm^2 , a small spicule.

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

MEASUREMENTS AND WEIGHTS: The type, a male, and two females from Trinidad:



FIG. 4. Front view of head of *Saccopteryx bilineata perspicillifer*. $\times 1\frac{1}{2}$.

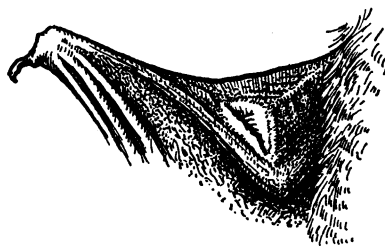


FIG. 5. Dorsal view of antebrachial membrane of *Saccopteryx bilineata perspicillifer*, showing glandular sac on upper side near elbow.

Length of forearm, 48.0, 50.0, 48.7. Skull: The type, one male, and two females: greatest length, 17.2, 17.0, 17.1, 16.8; zygomatic breadth, 10.7, 11.0, 10.7, 10.6; interorbital width, 4.6, 4.6, 4.5, 4.7; interorbital constriction, 2.5, 2.4, 2.8, 2.6; maxillary tooth row, C-M³, 7.4, 7.5, 7.3, 7.2. Weights: Forty-five males, 3.0-9.6; 54 females, 5.2-10.9; 11 gravid females, 7.5-10.9; four lactating females, 7.1-9.2; one suckling female, 2.8.

SPECIMENS RECORDED: *Trinidad*: Arima Valley, two (A.M.N.H.); Caura, two (A.M.N.H.), including the type; Guapo, one (A.M.N.H.); Killdeer Trace, one (A.M.N.H.); Mayaro, three (A.M.N.H.); Port-of-Spain, one (A.M.N.H.), four (U.S.N.M.); Princes Town, two (A.M.N.H.); Todd's Road Station, one (A.M.N.H.); La Brea, one (A.M.N.H.); Fyzabad, St. John's Road, one (A.M.N.H.).

GENERAL HABITS: The Greater White-lined Bat usually occurs in the vicinity of water. Roosting colonies of up to 50 bats may occur, but ordinarily a colony rarely exceeds 15 individuals. When roosting the bat hangs head downward, with wings folded at an angle of about 45 degrees to the body. Roosts have been found in well-lighted caves, near an opening in hollow trees, on tree-trunks, on creepers, vines, and lianas that festoon the buttresses of such trees as the silk-cotton (*Ceiba pentandra*) and mora (*Mora excelsa*), under bridges, in tonka-bean and cocoa-drying sheds, and occasionally in buildings. *Saccopteryx bilineata* has been found roosting in association with *Saccopteryx leptura*, *Pteropteryx macrotis*, *Noctilio leporinus*, *Micronycteris hirsuta*, *Micronycteris megalotis*, *Micronycteris nicefori*, *Micronycteris sylvestris*, *Phyllostomus discolor*, *Phyllostomus hasta-*

tus, *Trachops cirrhosus*, *Glossophaga soricina*, *Carollia perspicillata*, *Desmodus rotundus*, and *Diaemus youngi*. When found with *Noctilio*, *Desmodus*, and *Diaemus*, it is usually roosting at a lower elevation, generally close to the entrance or opening of a cave or hollow tree. Under the fronds of a coconut palm it was taken with *Saccopteryx leptura*, *Artibeus jamaicensis*, *Artibeus lituratus*, and *Uroderma bilobatum*.

It is easily disturbed and, when approached, takes off in a swift, acrobatic flight. It often flies low during the day, feeding upon insects, especially in well-forested valleys where there are streams and waterfalls. A number of individuals have roosted for years on the wall behind the organ loft in a church in Port-of-Spain.

On October 9, 1958, a colony of about 60 individuals was seen roosting on the trunk of a very large silk-cotton tree (*Ceiba pentandra*), and at times the bats were in direct sunlight. From time to time a bat flew from one group to another or flew about the woods for a short time. The bats never bunched close together but were separated by a space of 8 or 10 inches. All hung head downward. A few individuals were seen to wave a folded forearm up and down for about a dozen strokes. Frequently a neighbor ran over and nipped the bat that was waving its wing. Often one bat suddenly took off, turned around, faced another bat, and hovered over it for five or 10 seconds. Both bats were face to face, twittering loudly. When the bat resting on the tree scuttled off in one direction, the hovering bat followed, keeping its head



FIG. 6. Dorsal view of rostrum of *Saccopteryx bilineata perspicillifer*, showing long, broad, post-orbital processes.



FIG. 7. Ventral view of palate of *Saccopteryx bilineata perspicillifer*, showing basisphenoid pit divided by a plate.

in line with the scuttling bat. About 10 out of a group of 50 bats made this curious hovering flight.

BREEDING: Gravid females with non-breeding males and females have been taken in March, April, May, and July; lactating females with young, in June and July.

PARASITES: The Trinidad Regional Virus Laboratory (1958, p. 94) lists the following species of the Streblidae (bat flies) from Trinidad *Saccopteryx bilineata*: *Euctenodes* sp. Brennan and Jones (1960, p. 538) report the following species of the Trombiculidae (chiggers) from Trinidad *Saccopteryx bilineata*: *Eutrombicula göldii*, *Trombicula saccopteryx*, and *T. vesperuginis*.

FOOD: Insects exclusively; captive specimens masticate insects rapidly and store food in their cheek pouches for more thorough chewing later.

DISEASE: Specimens examined were rabies-negative. *Histoplasma capsulatum* has been isolated from roosts in association with *Desmodus*.

REMARKS: Colin Sanborn, in his review of the subfamily Emballonurinae (1937, p. 329), placed *Saccopteryx perspicillifer* Miller in the synonymy of *S. bilineata* Temminck, where it probably belongs. However, Angel Cabrera (1957, p. 50) recognized *S. perspicillifer* Miller as a valid species. Trinidad specimens do average near the maximum in size for the *bilineata* group, but, as they show no other distinguishing characters, it seems best to recognize *perspicillifer* as a subspecies of *bilineata*.

***Saccopteryx leptura* (Schreber)**

LESSER SAC-WINGED OR WHITE-LINED BAT

Plate 7, figures 7-9

Vespertilio lepturus SCHREBER, 1774, Die Saug-

thiere, pt. 1, no. 8, pl. 57 (no. 9, p. 173, vernacular name only, and description).

Saccopteryx lepturus, ILLIGER, 1811, Prodrum systematis mammalium et avium, p. 121.

Saccopteryx leptura, SANBORN, 1937, Publ. Field Mus. Nat. Hist., zool. ser., vol. 20, no. 4, p. 332.

TYPE LOCALITY: Surinam.

RANGE: Trinidad: Widely distributed, but less common than *S. bilineata*. Tobago: Recorded.

GENERAL CHARACTERS: Similar to *Saccopteryx bilineata* but smaller, especially the skull, and of a different color.

DESCRIPTION: General color of upper parts uniform Mummy Brown, marked by two longitudinal buffy white lines extending from upper back to rump, in some specimens and in worn pelage these lines are indistinct; under parts usually a little lighter brown than back. Skull about half of the size of that of *S. bilineata* but similar to it in structure.

MEASUREMENTS AND WEIGHTS: Adult male and female from Trinidad: Length of forearm, 36.2, 37.0. Skull: Adult male from Trinidad: greatest length, 13.0; zygomatic breadth, 8.0; interorbital constriction, 2.1; maxillary tooth row, C-M³, 5.2. Weights: Eight males, 3.6–4.9; four females, 3.7–5.2.

SPECIMENS RECORDED: *Tobago*: No exact locality, number of specimens unknown (B.M.). *Trinidad*: Arima Valley, two (A.M.N.H.); Carenage, three (A.M.N.H.); Caura, eight (A.M.N.H.); Granville, one (A.M.N.H.); Mt. Harris, Manzanilla, one (A.M.N.H.); Port-of-Spain, two (A.M.N.H.); Princes Town, five (A.M.N.H.); no exact locality, eight (U.S.N.M.); Maracas, two (A.M.N.H.); Siparia, three (A.M.N.H.); Point Fortin, one (A.M.N.H.).

GENERAL HABITS: In general the habits of *S. leptura* are much the same as those of *S. bilineata*, except that *S. leptura* roosts in smaller groups, with seldom more than five individuals found together. It also has been found hanging head downward from banana leaves. It is a wary bat and is easily disturbed, especially when it roosts on the trunks of trees or vines.

BREEDING: Gravid females were taken May 8 and 19, 1959, in Maracas Valley and Siparia, respectively.

Saccopteryx leptura has been found roosting

in association with *Saccopteryx bilineata*, *Micronycteris megalotis*, *M. minuta*, *M. hirsuta*, *Carollia perspicillata*, *Vampyrops helleri*, and *Molossus major*, and also under a coconut tree frond with *Saccopteryx bilineata*, *Artibeus jamaicensis*, *Artibeus lituratus*, and *Uroderma bilobatum*.

PARASITES: Unidentified species of trematodes were found in two specimens.

DISEASE: Specimens examined were rabies-negative.

GENUS *PEROPTERYX* PETERS

LITTLE SAC-WINGED BATS

Peropteryx Peters, 1867, Montasber. Preussischen Akad. Wiss. Berlin, p. 472. Type, *Vespertilio caninus* Wied-Neuwied.

Small to medium-sized, slender, blackish bats; no white dorsal lines; glandular sac in antebrachial membrane; tail shorter than interfemoral membrane and tip appearing on upper side.

RANGE: From Veracruz and Oaxaca, Mexico, south to Peru, and to Mato Grosso and São Paulo, Brazil. One subspecies has been recorded from Trinidad; another, from Tobago.

Peropteryx macrotis macrotis (Wagner)

NEOTROPICAL SAC-WINGED BAT

Plate 8, figures 1–3; text figures 8–11

Emballonura macrotis WAGNER, 1943, Archiv f. Naturgesch., yr. 9, vol. 1, p. 367.

Peropteryx macrotis macrotis, G. M. ALLEN, 1935, Jour. Mammal, vol. 16, p. 227.

TYPE LOCALITY: Mato Grosso, Brazil.

RANGE: Tobago; not uncommon.

GENERAL CHARACTERS: Similar in general external characters to *Saccopteryx*, but back lacking whitish dorsal stripes; glandular wing sac near upper edge of the antebrachial membrane, opening outward (fig. 9); tail



FIG. 8. Front view of head of *Peropteryx macrotis macrotis*. $\times 1\frac{1}{2}$.

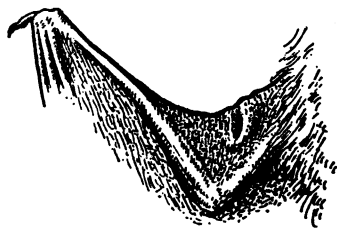


FIG. 9. Dorsal view of antebrachial membrane of *Peropteryx macrotis macrotis*, showing glandular sac near upper edge.

perforating interfemoral membrane and appearing on upper side.

DESCRIPTION: General color of upper parts ranging from dark Buffy Brown through grayish and reddish brown to dark Blackish Brown, hair more or less unicolored but slightly paler at base; under parts about color of back. Skull small, with a very sharp angle between rostrum and braincase; rostrum much inflated; basisphenoid pit not divided by a plate (fig. 11); postorbital processes very slender (fig. 10); upper incisors very small, simple; lower incisors small and trifid.

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

MEASUREMENTS: Three females from Tobago: Length of forearm, 46.2, 46.0, 47.2. Skull: Greatest length, 14.7, 14.8, 15.0; zygomatic breadth, 7.9, 8.3, 8.4; maxillary tooth row, C-M³, 5.8, 5.8, 6.0.

SPECIMENS RECORDED: *Tobago:* Robinson Crusoe's Cave, two (A.M.N.H.), five (M.C.Z.).

GENERAL HABITS: This bat has been found on Tobago roosting in association with *Glossophaga longirostris* in well-lighted limestone and coral caves that overlook the ocean.

FOOD: As do other sac-winged bats, *Peropteryx m. macrotis* feeds on insects.

REMARKS: That the larger mainland form of *Peropteryx macrotis* should be found on Tobago is surprising, but the cranial and external measurements clearly indicate that the Tobago series is definitely larger than any of the Trinidad specimens.

***Peropteryx macrotis trinitatis* Miller**

TRINIDADIAN SAC-WINGED BAT

Plate 8, figures 4-6

Peropteryx trinitatis MILLER, 1899, Bull. Amer. Mus. Nat. Hist., vol. 12, p. 178.

Peropteryx macrotis trinitatis, SANBORN, 1937, Publ. Field Mus. Nat. Hist., zool. ser., vol. 20, p. 341.

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

RANGE: Trinidad; recorded from north-western Trinidad but probably has a much wider distribution.

GENERAL CHARACTERS: Like those of *Peropteryx macrotis macrotis* but averaging smaller, with a smaller skull and shorter forearm.

DESCRIPTION: Except for smaller size and the fact that the hairs are slightly paler at base, exactly like *P. m. macrotis*.

MEASUREMENTS AND WEIGHTS: One male and two females from Trinidad, with those of the type, a female, in parentheses: Length of forearm, 42.5, 42.0, 43.0 (41.0). Skull: Greatest length, 13.9, 13.6, 13.2 (13.8); zygomatic breadth, 7.7, 7.7, 7.7 (7.5); interorbital constriction, 2.8, 2.3, 2.6 (2.6); maxillary tooth row, C-M³, 5.3, 5.5, 5.4 (5.4). Weights: Six males, 3.7-8.0; two females, 8.0, 9.2.

SPECIMENS RECORDED: *Trinidad:* Moka Estate, Maraval, two (A.M.N.H.); Port-of-Spain, five (A.M.N.H.), three (U.S.N.M.); Water Fall Road, Maracas, two (A.M.N.H.).

GENERAL HABITS: This bat is usually found roosting in small groups not exceeding six individuals. It has been taken in well-lighted caves, including sea caves; inside buildings, such as churches, that have high dark ceilings and rafters; and underneath houses that have been built on pillars and therefore have sub-basements. It has been found roosting in association with *Saccoteryx bilineata*, *Glossophaga soricina*, and *Carollia perspicillata*. The flight of *Peropteryx* is not particularly swift nor is this bat easily disturbed, even when shot at. The wing sac of a male taken with a female in a

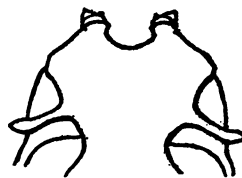


FIG. 10. Dorsal view of rostrum of *Peropteryx macrotis macrotis*, showing long, slender, post-orbital processes.

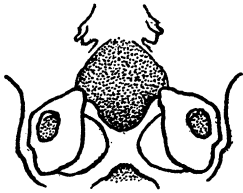


FIG. 11. Ventral view of palate of *Peropteryx macrotis macrotis*, showing basisphenoid pit without dividing plate.

cave on November 21, 1957, had a very strong sweet smell but not an offensive odor, quite different from the musky smell of *Molossus*, *Noctilio*, and *Phyllostomus hastatus*.

PARASITES: Unidentified species of trematodes were found in six specimens.

DISEASE: Specimens examined were rabies-negative.

SUBFAMILY DICLIDURINAE MILLER

WHITE BATS

Small to medium-sized, slender bats with rather long, lax, white or grayish pelage; muzzle simple, without warty outgrowths; ears rounded, usually hairy on outer side; calcar well developed; thumb small, enclosed for most of its length in flying membrane and with a rudimentary claw; proximal phalanx of third finger reflexed when at rest; clavicle expanded, its width at widest point more than one-third of its length; tibia with a deep longitudinal groove; a glandular sac near middle of interfemoral membrane, well developed in some genera.

This subfamily includes *Diclidurus* and the little-known South American genera *Cytarops* and *Depanysteris*.

GENUS DICLIDURUS WIED-NEUWIED

SAC-TAILED BATS

Diclidurus WIED-NEUWIED, 1820, Isis von Oken, for 1819, vol. 5, no. 10, p. 1629. Type, *Diclidurus albus* Wied-Neuwied.

No glandular sac in wing membranes; skull with braincase elevated above rostrum; rostrum depressed, with elevated lateral ridges; postorbital processes undeveloped.

RANGE: From Oaxaca, Mexico, south to Peru and Espírito Santo, Brazil. One species is recorded from Trinidad.

Diclidurus albus Wied-Neuwied

GREATER WHITE OR GHOST BAT, JUMBIE BAT

Plate 9, figures 1-3; text figures 12-14

Diclidurus albus WIED-NEUWIED, 1820, Isis von Oken, for 1819, vol. 5, no. 10, p. 1630.

TYPE LOCALITY: Rio Pardo, Bahia, Brazil.

RANGE: Trinidad; uncommon and known from only one specimen.

GENERAL CHARACTERS: A medium-sized, slender, white bat with a glandular sac near middle of interfemoral membrane on upper side (fig. 13).

DESCRIPTION: Pelage rather long, lax, and everywhere white except at base of hairs where it may be grayish; flying membranes and limbs yellowish white; ears short and rounded; nose simple; eyes large; tail shorter than and perforating interfemoral membrane, its extremity associated with a pouch or structure that appears to be glandular. Skull with a large braincase; rostrum broad and depressed, with elevated lateral ridges; postorbital processes undeveloped (fig. 14); upper incisors small, with anterior and posterior cingulum cusps, separated from canines and from each other; upper canines with a small but distinct subsidiary cusp on a level with tips of incisors; first upper premolar very small; lower incisors small, subequal, and trilobate; tibia long and slender, with a deep longitudinal groove.

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

MEASUREMENTS: An adult, not sexed, from Trinidad and the type (in parentheses); external measurements taken by senior author, cranial measurements from Oken (1826, p. 253): Length of forearm, 62.5 (63); length of radius, 60.0 (61.0); tibia, 23.0 (22.0); calcaneum, 26.5 (21.0); hind foot, 10.5 (10.5). Skull: Greatest length, 17.2+ (17.8); zygo-



FIG. 12. Front view of head of *Diclidurus albus*. $\times 1\frac{3}{4}$.

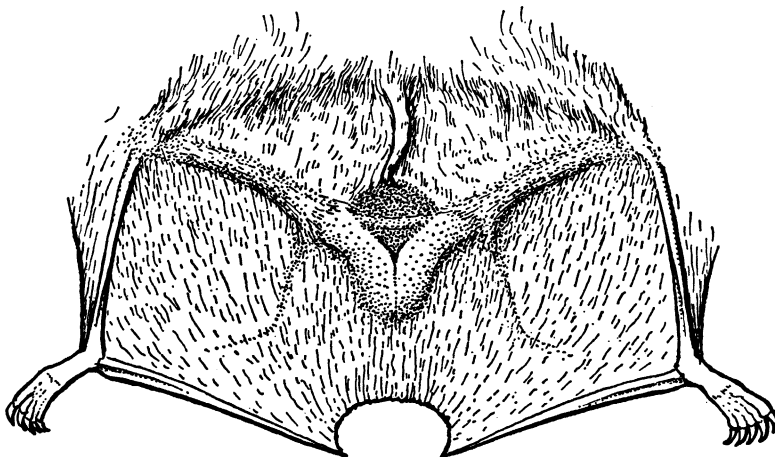


FIG. 13. Dorsal view of interfemoral membrane of *Dichlidurus albus*, showing tail terminating in a glandular sac on upper side.

matic breadth, 12.1 (—); interorbital constriction, 5.8 (—); breadth of rostrum, 8.8 (7.6?); width across upper molars, 8.85 (—); maxillary tooth row, C-M³, 8.1 (8.0); length of mandible, 14.3 (14.0).

SPECIMENS RECORDED: *Trinidad:* Carapichaima Village, Caroni, one (A.M.N.H.).

GENERAL HABITS: The Greater White Bat appears to be solitary and roosts between the leaves of tall coconut-palm trees.

FOOD: As are the other members of the family Emballonuridae, *Dichlidurus* is an insect-eating bat.

DISEASE: The one Trinidad specimen was caught at 11 A.M. on May 10, 1932, resting on the shoulders of a cow. Laboratory tests by Pawan (1936a, p. 106) proved it to be rabies-positive.

REMARKS: The Greater White Bat inhabiting the island of Trinidad appears to be referable to the form *albus*. It compares

closely in detail with the type; unfortunately the skull of the latter cannot be found at the present time and has apparently been destroyed.

Government bat collectors have occasionally seen the "Jumbie Bat," as any white bat is called in Trinidad, between the leaves of high, coconut-palm trees. They may have seen the Lesser White Bat (*Dichlidurus scutatus* Peters), a much smaller species than *albus* which may eventually be found in Trinidad. Peters' type was a skin, without skull and without an exact locality, in the Muséum National d'Histoire Naturelle in Paris. The measurements of an adult female from British Guiana and of the type (in parentheses) are as follows: Length of forearm, 52.2 (51); tibia, 19.8 (19.5); hind foot, 8.5 (8.8); calcaneum, 15.3 (16.6). Skull (pl. 9, figs. 4-6): Greatest length, 16.3; zygomatic width, 10.4; interorbital constriction, 4.7; breadth of braincase, 8.4; breadth of rostrum, 7.1; length of maxillary tooth row, C-M³, 6.4.

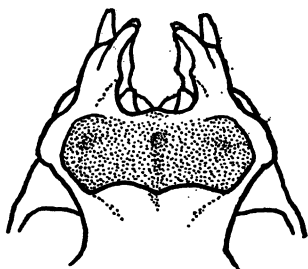


FIG. 14. Dorsal view of rostrum of *Dichlidurus albus*, showing short, rounded, postorbital processes.

FAMILY NOCTILIONIDAE GRAY

BULLDOG BATS

Text figures 15, 16

Bats in this family are from medium to moderately large in size, with narrow, sharp-pointed ears; short, close pelage; very short tail, protruding from upper side of interfemoral membrane; hind limbs extremely long; feet large, with an enormously elon-

gated calcar (fig. 15) and armed with strong claws; muzzle simple, without leaf-like outgrowths; lips full, forming distinct cheek pouches; second phalanx of third finger three-fourths of length of metacarpal; premaxillaries fused together anteriorly and to maxillaries posteriorly; postorbital processes undeveloped.

GENUS *NOCTILIO* LINNAEUS

GREATER BULLDOG BATS

Noctilio LINNAEUS, 1766, *Systema naturae*, ed. 12, vol. 1, p. 88. Type, *Noctilio americanus* Linnaeus (= *Vespertilio leporinus* Linnaeus).

The large size and the fact that the forearm is longer than 70 mm. separate *Noctilio* from the smaller genus *Dirias*.

RANGE: From Guerrero and Tabasco, Mexico, and Cuba, Puerto Rico and the Virgin Islands in the West Indies, south to Minas Gerais, Brazil, and northern Argentina. One species has been recorded from Trinidad and Tobago.

Noctilio leporinus leporinus (Linnaeus)

SURINAM BULLDOG BAT OR FISH-EATING BAT

Plate 10, figures 1-3; text figures 15 and 16

Vespertilio leporinus LINNAEUS, 1758, *Systema naturae*, ed. 10, p. 32.

Noctilio leporinus, D'ORBIGNY AND GÉRAIS, 1847, *Voyage dans l'Amérique Méridionale*, vol. 4, pt. 2, Mammifères, p. 12.

Noctilio leporinus leporinus, HERSHKOVITZ, 1949, *Proc. U. S. Natl. Mus.*, vol. 99, no. 3246, p. 433.

TYPE LOCALITY: "America," restricted to Surinam by Thomas (1911, p. 131).

RANGE: Trinidad; widely distributed and common. Tobago; one seen by a reliable collector.

GENERAL CHARACTERS: A large muscular bat, brownish in color, and usually with a

whitish line down middle of back; tail short, perforating interfemoral membrane and appearing on upper side; wings attached high.

DESCRIPTION: Color of upper parts ranging from Prout's Brown to Ochraceous-Tawny; under parts from Ochraceous-Buff to Zinc Orange. Skull large, broad, and massive; sagittal crest well developed in the adult, canine teeth large and strong; inner upper incisors much larger than outer; lower incisors small, closely crowded between canines, cutting edge bilobed.

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

MEASUREMENTS AND WEIGHTS: Adult male and female from Monos Island and adult male from North Manzanilla: Length of forearm, 88, 85, 85. Skull: Greatest length, 27.0, 26.9, 28.5; zygomatic breadth, 18.7, 19.5, 20.0; interorbital constriction, 7.0, —, 6.7; maxillary tooth row, C-M³, 10.5, 10.7, 10.8. Weights: Nineteen males, 39.3-81.3; 59 females, 31.4-65.3; one gravid female, 69.4.

SPECIMENS RECORDED: *Trinidad*: Monos Island, two (A.M.N.H.); North Manzanilla, six (A.M.N.H.); Mary's Bay, Gaspere Island, one (A.M.N.H.); Port-of-Spain, one (A.M.N.H.), four (L.S.U.); no exact locality, 18 (U.S.N.M.). *Tobago*: A single specimen of *Noctilio* was reported by a reliable observer in Robinson Crusoe's Cave on September, 1956, but it was not collected.

GENERAL HABITS: The Surinam Bulldog Bat roosts in colonies numbering up to about 75 individuals. The largest numbers were taken from hollow trees, such as the silk-cotton (*Ceiba pentandra*), red mangrove (*Rhizophora mangle*), immortal (*Erythrina micropteryx*), and balata or bullet-wood tree (*Manilkara bidentata*). Fewer numbers have been taken from dark land and sea caves, and occasionally specimens have been found inside buildings, towers, and gables. One was found under a freight car not far from the fish market in Port-of-Spain. On October 6, 1957, a colony of 75 was found in a silk-cotton (*Ceiba pentandra*) about a hundred feet in height. The roost extended up inside the hollow trunk for about 30 feet, with the bats occupying the topmost 15 feet. The interior of the tree was dark, humid, and smelled strongly of old fish. A musky smell was more noticeable on the males than on the females

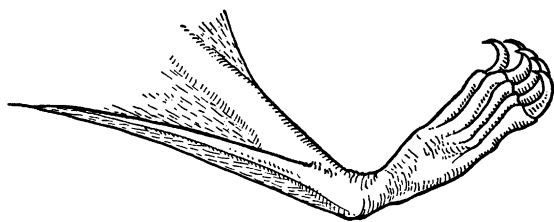


FIG. 15. Dorsal view of foot of *Noctilio leporinus leporinus* showing extremely long calcar.

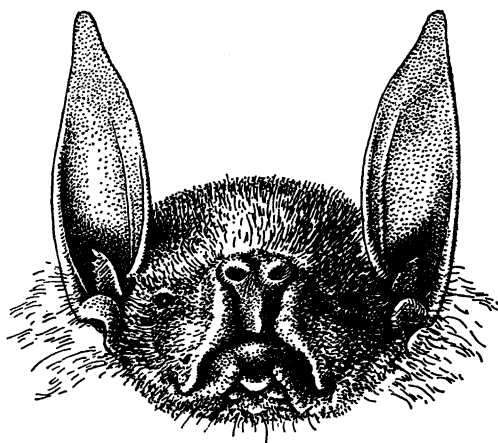


FIG. 16. Front view of head of *Noctilio leporinus leporinus*. $\times 1\frac{1}{2}$.

and seemed to issue from the pocket-like glands surrounding the testicles. On many of the specimens beads of moisture stood out on top of the wing membranes. The extremely short pelage of the specimens in this roost ranged in color from golden orange to olive in both sexes. Very few had the distinctive white line down the back.

Noctilio has a powerful, stiff-winged, but not particularly swift flight. It is an early flier and has been seen fishing in salt water off the Gulf of Paria during late afternoon sunshine in company with pelicans, although it is most commonly seen flying at dusk. In sea caves *Noctilio leporinus* has been found roosting in association with *Mormoops megalophylla*, *Glossophaga soricina*, *Carollia perspicillata*, and *Desmodus rotundus*; in buildings, with *Artibeus jamaicensis* and *Phyllostomus discolor*. No other species was found roosting with the large colonies in hollow trees except *Desmodus rotundus*. On one occasion an individual of *Noctilio* was seen to dip its hind feet in the water, but not the interfemoral membrane, and keep them submerged for about a 4-foot run. A distinct swishing sound could be heard as the feet were dragged through the water; no fish were seen caught. One bat collided with a flat stone skimmed over the water, but it swam strongly with its folded wings and was able to launch itself back into the air. A large fish about 3 feet long was seen to leap out of the water as a *Noctilio* flew over the surface, and it was apparently trying to catch the bat. Caracciolo (1895, pp.

164-170) described the fish-eating habits of this bat in Trinidad.

BREEDING: One breeding male and one non-breeding male were found on August 8, 1958, with 15 females. Twelve gravid females were found on February 4, 1958, in the same roost with eight non-gravid females, but no males were present. Lactating females were found with a few males on February 28 and March 13, 1957. Sixty-seven specimens taken alive on October 6, 1957, comprised 24 males and 43 females; 13 of the males were in a breeding state, with enlarged testicles. Wehekind (1956, p. 19) reports a captive female that gave birth to a young while hanging in a normal position in December, 1934.

FOOD: All the specimens of *Noctilio* in Trinidad that were examined appeared to have fed on small fish, probably anchovies (Engraulidae). This bat skims the surface of the water and catches small fish with the long claws on the hind feet. The fish are either eaten in flight (the chewing sound is often quite audible) or carried in the large cheek pouches back to the roost and eaten at leisure. Roosts of fish-eating *Noctilio* bats can be recognized by the powerful fishy odor that pervades the roost, and occasionally the entrance to a tree roost is plastered with old fish scales, producing a silvery glitter extending down the tree trunk for several feet. Not all the bats of this species are exclusively fish eaters. The stomach contents of seven specimens taken at Botany Bay, St. Thomas, Virgin Islands, in 1926 contained many fragments of scarabaeid beetles (two or three species, including a *Phyllophaga*), an elaterid (*Pyrophorus*), a cerambycid (*Lagochirus araneiformis*), a few fragments of a mole cricket (*Gryllotalpa*), remains of many winged ants (*Solenopsis*, two forms); a stink bug (*Thyanta*), and a cockroach (Blattidae). There was not a trace of fish in any of these specimens, and none of them had an objectionable odor. They were seen at dusk swooping down and skimming over the surface of a fresh-water pool to drink. As they flew by, they made a chewing noise that sounded like the crunching of the horny parts of beetles (Goodwin, 1928, p. 111).

PARASITES: Jobling (1949, p. 322) reports the following species of the Streblidae (bat flies) from Trinidad *Noctilio*: *Aspidoptera*

megastigma and *Paradyschiria dubia*. The Trinidad Regional Virus Laboratory (1958, pp. 89, 97, 99) lists the following parasites from Trinidad *Noctilio leporinus*: *Ornithodoros dunni* of the Ixodidae (ticks); *Teinocoptes* sp. of the Sarcoptidae (mites); *Latrocimex* sp. of the Cimicidae (bedbugs). Trematodes of unidentified species are very common in this bat.

DISEASE: Specimens examined were rabies-negative. *Histoplasma capsulatum* has been isolated from tree roosts.

SUPERFAMILY PHYLLOSTOMOIDEA WEBER

LEAF-NOSED, LEAF-CHINNED, AND VAMPIRE BATS

American bats with three bony phalanges on third finger, distal phalanx long, well ossified, and usually from one-half to three-quarters of length of second phalanx; post-orbital processes not present; premaxillaries joined anteriorly and to maxillaries.

Weber (1928, p. 153) named this superfamily Phyllostomatoidae. Simpson (1945, p. 57), in following Weber, failed to take into consideration the present International Rules of Zoological Nomenclature which make the inclusion of "at" in the ending here unwarranted.

FAMILY PHYLLOSTOMIDAE WATERHOUSE

LEAF-NOSED BATS

Text figures 17, 19

Small to very large-sized American bats with a prominent nose leaf, naked cutaneous folds of skin, which rise over tip of nostrils, or with naked, plate-like outgrowths on lower lip. Ears from moderately to well developed in size; three bony phalanges in third finger (fig. 17); tail well developed in some genera, absent in others; skull without postorbital processes; premaxillaries complete, fused with each other and with maxillaries.

Members of the family present such marked differences in structure, principally in the characters of the teeth, that they have been divided into several subfamilies.

KEY TO THE SUBFAMILIES OF THE PHYLLOSTOMIDAE OF TRINIDAD AND TOBAGO

1. Nose leaf usually well developed, plate-like outgrowths on lower lip absent 2
- Nose leaf absent, plate-like outgrowths on lower

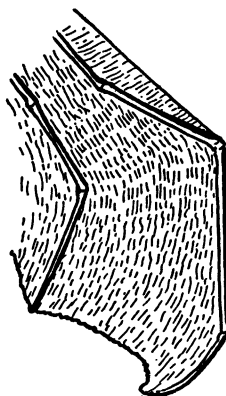


FIG. 17. Dorsal view of third finger of *Micronycteris sylvestris*, showing three phalanges.

- lip present Chilonycterinae
2. Muzzle short and broad 3
- Muzzle long and narrow 4
3. White facial stripes or median dorsal line usually present (*Centurio* and *Ametrida* excepted); feet not hairy (*Ametrida* excepted); crowns of molars with cusps rising from a broad, flattened, crushing surface Stenoderminae
- White facial stripes and median dorsal line absent; feet heavily haired; crowns of molars with distinct longitudinal groove on broad crushing surface, cusps rising from margins Sturnirinae
4. Ears fall far short of tip of nose when laid forward; tongue excessively long, with bristle-like papillae towards tip Glossophaginae
- Ears reaching near to or beyond tip of nose when laid forward; tongue normal, without bristle-like papillae towards tip 5
5. Naked pad on chin V- or Y-shaped, with or without border of small papillae Phyllostominae
- Naked pad on chin with large, O-shaped, central wart, bordered by small rounded papillae Carollinae

SUBFAMILY CHILONYCTERINAE FLOWER AND LYDEKKER

LEAF-CHINNED BATS

Small to medium-sized bats with naked, plate-like outgrowths on lower lip and no nose leaf.

KEY TO THE GENERA, SPECIES, AND SUBSPECIES OF THE CHILONYCTERINAE OF TRINIDAD AND TOBAGO

1. Wings attached along middle of back presenting a naked-backed appearance (length of

- forearm, 46.5–48.5) . *Pteronotus davyi davyi*
 Wings attached along sides of body 2
 2. Ears separate, not connected by a band across
 forehead; a tuft of stiff hairs projecting from
 each cheek 3
 Ears connected by a low band across forehead;
 tuft of hairs projecting from cheeks absent
 (length of forearm, 54.5–59.0)
 *Mormoops megalophylla tumidiceps*
 3. Length of forearm, 60.0–62.0
 *Chilonycteris rubiginosa fusca*
 Length of forearm, 44.0–46.0
 *Chilonycteris personata personata*

GENUS **CHILONYCTERIS** GRAY

MUSTACHE BATS

Chilonycteris GRAY, 1839, Ann. Mag. Hist.,
 vol. 4, p. 4. Type, *Chilonycteris macleayii* Gray.

Slender bats with extensive flying mem-
 brane; muzzle with a tuft of stiff hairs pro-
 jecting from each cheek (fig. 19); ears sepa-
 rate, pointed at tip.

* RANGE: From Sonora and Tamaulipas,
 Mexico, and Cuba, Hispaniola, and Puerto
 Rico in the West Indies, south to Mato
 Grosso, Brazil. Two species are recorded from
 Trinidad.

Chilonycteris rubiginosa fusca J. A. Allen

DUSKY OR GREATER MUSTACHE BAT

Plate 10, figures 4–6; text figures 18, 19

Chilonycteris rubiginosa fusca J. A. ALLEN, 1911,
 Bull. Amer. Mus. Nat. Hist., vol. 30, p. 262.

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

RANGE: Trinidad; common in the North-
 ern and Central ranges.



FIG. 18. Front view of head of *Chilonycteris rubiginosa fusca*. $\times 1\frac{3}{4}$.

GENERAL CHARACTERS: Moderately large,
 slender bat; no nose leaf; well-developed tail
 projecting through and appearing on upper
 surface of broad interfemoral membrane;
 lower lip with prominent, plate-like out-
 growths covered with numerous rounded
 papillae (fig. 19).

DESCRIPTION: General color of upper parts
 varying from dark brown to Warm Sepia;
 under parts paler than back. Skull: braincase
 subglobose, narrowly constricted in inter-
 orbital region; rostrum depressed above near
 base; nasal opening subcircular; inner upper
 incisors twice as large as outer, the cutting
 edges with a distinct notch; inner lower in-
 cisors trifid; outer lower incisors bifid, the four
 teeth forming a continuous row between
 canines.

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

MEASUREMENTS AND WEIGHTS: Twelve
 specimens from Trinidad: Length of forearm,
 60.5–63.0. Skull: Adult male and female:
 greatest length, 22.0, 22.2; zygomatic breadth,
 12.5, 12.4; interorbital constriction, 4.5, 4.3;
 length of maxillary tooth row, C–M³, 9.5, 9.5.
 Weights: Eleven males, 13.8–22.4; 10 females,
 13.4–20.2.

SPECIMENS RECORDED: *Trinidad*: Gua-
 charo Cave, four (M.C.Z.); Heights of
 Guanapo, 10 (A.M.N.H.); Port-of-Spain,
 two (U.S.N.M.); Tamana Hill, two
 (A.M.N.H.); no exact locality, three (L.S.U.);
 Las Cuevas, one (A.M.N.H.).

GENERAL HABITS: The Greater Mustache
 Bat is common in the larger caves of the
 Northern and the Central ranges but is
 seldom found in the smaller caves of northern
 Trinidad. It has been found roosting in asso-
 ciation with *Pteronotus davyi*, *Mormoops*
megalophylla, *Phyllostomus hastatus*, *Anoura*
geoffroyi, *Carollia perspicillata*, *Natalus tu-*
midirostris, *Desmodus rotundus*, and *Lon-*
chorhina aurita. Those bats of this species
 that are found roosting in association with
Desmodus run along the cave walls and re-
 treat into crevices and may be mistaken for
Desmodus. In the Mt. Tamana Caves, where
Desmodus has never been recorded, *Chi-*
lonycteris is easily disturbed and will leave
 the caves to fly about in the forest. The flight
 is straight and rapid.

BREEDING: Both sexes are usually found



FIG. 19. Front view of muzzle of *Chilonycteris rubiginosa fusca*, showing warty plate on lower lip and elongated tufts of hair on sides of muzzle. $\times 1\frac{1}{2}$.

roosting together, and females with young in May.

FOOD: Insects.

PARASITES: Jobling (1949, p. 322) reports the following species of the Streblidae (bat flies) from Trinidad *Chilonycteris rubiginosa*: *Trichobius caecus*, *T. parasiticus*, *T. dugesii*, *Speiseria ambigua*, *Nycterophilia coxata*, and *Euctenodes mirabilis*. The Trinidad Regional Virus Laboratory (1958, p. 99) lists the following parasite from Trinidad *Chilonycteris rubiginosa*: *Ornithodoros viguerasi* of the Ixodidae (ticks). Brennan and Jones (1960, p. 538) report the following species of the Trombiculidae (chiggers) from Trinidad *Chilonycteris rubiginosa*: *Beamerella acutascuta*, *Euschöngastia anops*, and *Trombicula tibbettsi*.

DISEASE: Specimens examined were rabies-negative. On August 11, 1959, a female made an unprovoked attack by biting a boy in the ankle at Gasparee Island, but no disease was isolated from this bat.

REMARKS: Koopman (1955, p. 112) stated that *Chilonycteris parnellii* Gray, 1843, and *Chilonycteris rubiginosa* Wagner, 1843, were conspecific and claimed that *parnellii* antedated *rubiginosa* by a few months. De la Torre (1955, p. 696) showed that such was not the case, there being no way of determining which name was published first, and recommended that the better-known and more widely used name *rubiginosa* should be retained. Koopman (1959, p. 4) claimed that *parnellii* must stand, because it was the first name published to include both species on the grounds that named forms of the big *Chilonycteris* from the mainland and the West Indian islands could be arranged in a graded series according to size. This is not quite true. Forms of the West Indian *parnellii* group can always be sepa-

rated from the mainland *rubiginosa* forms on positive cranial characters regardless of size. Because characteristic differences do exist between the two species and for other reasons, the name *rubiginosa* is retained here as the specific status for the large *Chilonycteris* found on the island of Trinidad.

Chilonycteris personata personata Wagner

LESSER MUSTACHE BAT

Plate 11, figures 1-3

Chilonycteris personata WAGNER, 1843, Arch. Naturgesch., yr. 9, vol. 1, p. 367.

TYPE LOCALITY: Mato Grosso, Brazil, probably St. Vincent, according to Goodwin (1946, p. 297).

RANGE: Trinidad; recorded from the north.

GENERAL CHARACTERS: A small, slender bat similar in general characters to *Chilonycteris rubiginosa* but much smaller; tail well developed and appearing on upper side of interfemoral membrane.

DESCRIPTION: Color of upper parts varying from Mummy Brown to Ochraceous-Tawny; under parts paler than back, Light Buff in some specimens. Skull much smaller and more delicate than that of *C. rubiginosa*, both lower incisors trifid.

MEASUREMENTS: Two females from Trinidad: Length of forearm, 45.7, 44.0. Skull: Greatest length, 15.0, 14.5; zygomatic breadth, 8.4, 7.9; interorbital constriction, 3.5, 3.3; maxillary tooth row, C-M³, 6.1, 5.7.

SPECIMENS RECORDED: *Trinidad*: Port-of-Spain, two (A.M.N.H.); St. Augustine, one (A.M.N.H.).

GENERAL HABITS: Little is known about the habits of this bat on Trinidad. One was caught in a Port-of-Spain building, another was hit by a taxi, and the third one was found dead in a drain.

DISEASE: Specimens examined were rabies-negative.

REMARKS: *Chilonycteris personata* Wagner and *Chilonycteris psilotis* Dobson have been considered as conspecific by some authors. Mexican specimens are, however, larger and definitely separable from the material now available from Trinidad, though the difference is not more than of a subspecific nature. The Mexican form should, therefore, be known as *Chilonycteris personata psilotis* Dobson.

GENUS *PTERONOTUS* GRAY

NAKED-BACKED BATS

Pteronotus GRAY, 1838, Mag. Zool. Bot., vol. 2, p. 500. Type, *Pteronotus davyi* Gray.

Slender, short-tailed bats with upper parts of body appearing to be naked behind the shoulders.

RANGE: From Tamaulipas and Sinaloa, Mexico, and the island of Dominica, Lesser Antilles, south to Mato Grosso, Brazil. One species is recorded from Trinidad.

Pteronotus davyi davyi Gray

TRINIDADIAN OR LESSER NAKED-BACKED BAT

Plate 12, figures 1-3; text figures 20, 21

Pteronotus davyi GRAY, 1838, Mag. Zool. Bot., vol. 2, p. 500.

Pteronotus davyi davyi, MILLER, 1912, Bull. U. S. Natl. Mus., vol. 79, p. 33.

TYPE LOCALITY: Island of Trinidad, West Indies.

RANGE: Trinidad; recorded from north and south Trinidad.

GENERAL CHARACTERS: In general much like *Chilonycteris*, but wings attached along middle of back instead of along sides of body, producing a barebacked appearance (fig. 21); fur of upper surface of body concealed by wings; tail well developed, perforating and appearing on upper side of interfemoral membrane.

DESCRIPTION: Color of upper parts varying from Vandyke Brown to Tawny; color of under parts ranging from Ecru-Drab to Ochraceous. One Trinidad specimen taken at Siparia is tawny, while all the rest are Ecru-Drab. Skull similar to that of *Chilonycteris personata* but larger.

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



FIG. 20. Front view of head of *Pteronotus davyi davyi*. $\times 1\frac{3}{4}$.

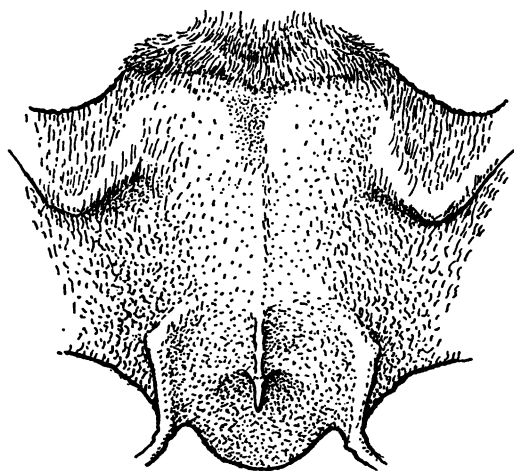


FIG. 21. Dorsal view of *Pteronotus davyi davyi*, showing attachment of wings along middle of back.

MEASUREMENTS AND WEIGHTS: Six specimens from Trinidad: Length of forearm, 46.8-48.4. Skull: Two males and two females: greatest length, 15.6, 15.7, 15.5, 15.9; zygomatic breadth, 9.0, 9.0, 9.0, 8.8; interorbital constriction, 3.7, 4.0, 4.0, 3.7; maxillary tooth row, C-M³, 6.8, 6.8, 6.8, 6.7. Weights: one female from Siparia, Trinidad, 10.0.

SPECIMENS RECORDED: *Trinidad*: Carenage, two (A.M.N.H.); Maracas Valley, one (A.M.N.H.); Heights of Aripo, one (A.M.N.H.); Port-of-Spain, two (A.M.N.H.), two (M.C.Z.); Siparia, one (A.M.N.H.).

GENERAL HABITS: *Pteronotus davyi* usually roosts in large, dark, damp caves where the air is warm and humid. It has been collected in private homes, a police station, and in a fowl pen. The Naked-backed Bat is swift in flight. It has been found roosting in association with *Chilonycteris rubiginosa*, *Mormoops megalophylla*, *Phyllostomus hastatus*, *Anoura geoffroyi*, *Carollia perspicillata*, and *Natalus tumidirostris*.

FOOD: *Pteronotus* is an insect-eating bat.

PARASITES: The Trinidad Regional Virus Laboratory (1958, p. 99) lists the following parasite from Trinidad *Pteronotus davyi*: *Ornithodoros viguerasi* of the Ixodidae (ticks).

DISEASE: One specimen of undetermined sex found dead on a Port-of-Spain street, September 29, 1955, proved to be rabies-positive.

GENUS **MORMOOPS** LEACH

LEAF-CHINNED BATS

Mormoops LEACH, 1921, Trans. Linnean Soc. London, vol. 13, pt. 1, p. 76. Type, *Mormoops blainvillii* Leach.

Slender, large-winged bats, in general similar to *Chilonycteris*, but skull greatly foreshortened and dermal outgrowths on chin highly specialized.

RANGE: From southern Texas and southern Arizona in the United States, to Cuba, Hispaniola, Puerto Rico, and south to Trinidad and Santander, Colombia. One species is recorded from Trinidad.

***Mormoops megalophylla tumidiceps* Miller**

TRINIDADIAN LEAF-CHINNED BAT

Plate 11, figures 4–6; text figures 22, 23

Mormoops tumidiceps MILLER, 1902, Proc. Acad. Nat. Sci. Philadelphia, vol. 54, p. 403.

Mormoops megalophyllum, VESEY-FITZGERALD, 1936, Trop. Agr. Jour. Imp. College Trop. Agr., Trinidad, vol. 13, no. 6, p. 161.

Mormoops megalophylla megalophylla, GREENHALL, 1956, Jour. Trinidad Field Nat. Club, p. 17.

TYPE LOCALITY: Point Gourde Caves, Trinidad, West Indies.

RANGE: Trinidad; not uncommon in the Northern and Central ranges.

GENERAL CHARACTERS: A moderately large, slender bat, with a well-developed tail, perforating and appearing on upper side of a wide interfemoral membrane; ears large and rounded, with a low connecting band across forehead (fig. 23); dermal outgrowths on chin highly developed, continuous behind angle of mouth with outer margin of ears; a small area on crown of head is often devoid of hair.

DESCRIPTION: Color of an adult male from Port-of-Spain: upper parts Mars Brown, a tuft of long stiff hairs on shoulders; back of



FIG. 22. Front view of head of *Mormoops megalophylla tumidiceps*. $\times 1\frac{3}{4}$.



FIG. 23. Front view of connecting band between ears of *Mormoops megalophylla tumidiceps*.

head Cinnamon-Brown, owing to a glandular condition; under parts between Tawny and Russet. A second specimen from this locality is uniform Mummy Brown above and below. Skull greatly foreshortened, rostrum and braincase broader than long; crown of head so greatly elevated above rostrum that the foramen magnum is above level of rostrum. Teeth essentially as in *Chilonycteris*, middle upper incisors broad, cutting edges bilobed, outer pair small; lower incisors trilobate and in a continuous row between canines.

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

MEASUREMENTS AND WEIGHTS: Twelve males and females from Mt. Tamana Caves and two males from Port-of-Spain: Length of forearm, 54.5–58.0, 59.0, 53.7. Skull: Two males and one female from Tamana Caves and one male from Port-of-Spain: greatest length, 15.0, 15.2, 15.5, 15.5; zygomatic breadth, 9.5, 9.7, 9.8, 9.7; interorbital constriction, 5.5, 5.5, 5.7, 5.6; breadth of braincase, 9.3, 9.3, 9.6, 9.6; maxillary tooth row, C–M³, 8.0, 8.1, 8.2, 8.3. Weights: Fifteen males, 12.4–19.9; one female, 14.3.

SPECIMENS RECORDED: *Trinidad:* Mt. Tamana Caves, 12 (A.M.N.H.); Point Gourde Cave, one (U.S.N.M.); Port-of-Spain, two (A.M.N.H.), one (M.C.Z.); St. Joseph, two (A.M.N.H.); Tunapuna, one (A.M.N.H.); no exact locality, one (A.M.N.H.); Las Cuevas, one (A.M.N.H.).

GENERAL HABITS: *Mormoops* is found in the larger caves at Mt. Tamana, Caura, and Point Gourde. It roosts in the dark and deep recesses of the caves where the air is warm and humid. It is easily disturbed and is very fast on the wing. Colonies of up to 20 individuals are not unusual. In the Mt. Tamana Caves it has been found roosting in association with *Chilonycteris rubiginosa*, *Pteronotis davyi*, *Phyllostomus hastatus*, *Anoura geof-*

froyi, *Carollia perspicillata*, *Natalus tumidirostris*; in the Point Gourde caves, with *Noctilio leporinus*, *Glossophaga soricina*, *Carollia perspicillata*, *Desmodus rotundus*, and *Lonchorhina aurita*.

BREEDING: Out of 20 specimens collected on October 17, 1954, in a Mt. Tamana cave, 19 were males. In the same cave on March 13, 1955, only 12 were found, and all were lactating females with no signs of young. Again on November 20, 1957, out of 16 *Mormoops* taken in the Tamana cave, 15 were males.

FOOD: *Mormoops* is an insect-eating bat.

PARASITES: The Trinidad Regional Virus Laboratory (1958, p. 99) lists the following parasite from Trinidad *Mormoops megalophylla*: *Ornithodoros viguerasi* of the Ixodidae (ticks). Brennan and Jones (1960, p. 538) report the following species of the Trombiculidae (chiggers) from Trinidad *Mormoops megalophylla*: *Euschöngastia lipoglana*, *Trombicula discors*, *T. macrozota*, *T. monops*, *T. tibbettsi*, and *Whartonia trinidadensis*.

DISEASE: Forty-eight specimens examined were rabies-negative.

REMARKS: *Mormoops m. tumidiceps* seems to have been overlooked by some authors. Trinidad specimens are larger than typical *M. megalophylla* from Oaxaca, Mexico, and have a larger skull and more swollen braincase than the latter form. As the only marked difference between the two forms seems to be in size, *tumidiceps* is here regarded as a subspecies of *megalophylla*. The Trinidad *Mormoops* is quite different from the little *Mormoops megalophylla intermedia* from Curaçao which is even smaller than the Mexican form. Colombia *Mormoops* (not previously recorded) are definitely closer in size and cranial characters to *tumidiceps* than to typical *megalophylla* and can be provisionally referred to the Trinidad form. The measurements of an adult male (A.M.N.H. No. 183316) from San Gil, Santander, Colombia, collected by Niceforo Maria, are: length of forearm, 57.5; skull: greatest length, 15.5; zygomatic breadth, 9.6; breadth of braincase, 9.6; maxillary tooth row, C-M³, 8.25.

SUBFAMILY PHYLLOSTOMINAE GILL

TYPICAL LEAF-NOSED BATS

Text figure 24

Size small to very large; nose leaf well developed (fig. 24), tail short or absent.

KEY TO THE GENERA, SPECIES, AND SUBSPECIES OF THE PHYLLOSTOMINAE OF TRINIDAD AND TOBAGO

1. Two pairs of incisors in lower jaw.2
One pair of incisors in lower jaw12
2. Ears connected by a band across forehead .4
Ears not connected by a band across forehead3
3. Length of forearm, 50.0 or over8
Length of forearm, 41.0 or less6
4. Low band across forehead joining ears unnotched; length of forearm, 39.5-45.5*Micronycteris hirsuta*
High band across forehead joining ears notched; length of forearm, less than 38.05
5. Connecting band between ears rising to a triangle in center, with shallow notch at apex; color of under parts brown; length of forearm, 31.8-36.2*Micronycteris megalotis megalotis*
Connecting band between ears with center notch deep, dividing band into two triangles; color of under parts grayish white; length of forearm, 34.5-37.5*Micronycteris minuta*
6. Fifth metacarpal longest; ears reaching tip of nose when laid forward; length of forearm, 40.0-41.0*Micronycteris sylvestris*
Third metacarpal longest; ears falling short of tip of nose when laid forward7
7. Fifth metacarpal shortest; length of forearm, 38.0-41.0; color of under parts Mars Yellow; no dorsal line on back; upper incisors vertical, in line with canines.*Micronycteris brachyotis*
Fourth metacarpal shortest; length of forearm, 35.0-38.6; color of under parts Olive-Brown; faint, light gray, dorsal line on lower back; upper incisor directed forward, not in line with canines*Micronycteris nicefori*
8. Length of forearm, over 100; no external tail (length of forearm, 106.0-110.0).*Vampyrum spectrum spectrum*
Length of forearm, less than 85.0; tail short or long9
9. Length of forearm, more than 58 ; tail short,



FIG. 24. Front view of nose leaf of *Micronycteris sylvestris*. $\times 2\frac{1}{2}$.

- less than half of the length of interfemoral membrane 10
- Length of forearm, less than 58; tail long, reaching posterior border of interfemoral membrane; nose leaf extremely long and slender, edges straight; length of forearm, 50.0–52.0 *Lonchorhina aurita*
10. Chin and lips with prominent, conical, wart-like protuberances; ear rounded at tip and reaching beyond end of nose when laid forward; calcar shorter than foot, without claws (length of forearm, 61.0–64.0) *Trachops cirrhosus*
- Chin with flat warty protuberances; ears pointed at tip and not reaching beyond end of nose when laid forward; calcar longer than foot with claws. 11
11. Length of forearm, 59.0–63.0 *Phyllostomus discolor discolor*
- Length of forearm, 79.0–82.5 *Phyllostomus hastatus hastatus*
12. Nose leaf long, fleshy, and hairy, with crenulated edges; a median white dorsal line usually present (length of forearm, 50.0–50.3) *Mimon crenulatum crenulatum*
- Nose leaf short and broad, with simple edges; median white dorsal line not present. 13
13. Ears not connected by a band across forehead; length of forearm, 54.5–56.5 *Tonatia bidens*
- Ears connected by a band across forehead; length of forearm, 34.0–36.0 *Tonatia minuta*

GENUS MICRONYCTERIS GRAY

BIG-EARED BATS

Micronycteris GRAY, 1866, Proc. Zool. Soc. London, pt. 1, p. 113. Type, *Phyllophora megalotis* Gray.

Ears small to medium in size, with or without connecting band across forehead; naked pad on lower lip V- or Y-shaped.

RANGE: From Veracruz and Jalisco, Mexico, south to Peru and Mato Grosso, Brazil. Six species are recorded from Trinidad; one is recorded from Tobago.

SUBGENUS MICRONYCTERIS GRAY

LITTLE BIG-EARED BATS

Micronycteris, SANBORN, 1949, Fieldiana, Zool., vol. 31, no. 7, p. 216. Type, *Phyllophora megalotis* Gray.

Size small to medium; tail extending to middle of interfemoral membrane; ears large, with a connecting band across forehead; naked pad on lower lip V-shaped.

Micronycteris megalotis megalotis (Gray)

LITTLE BIG-EARED BAT

Plate 12, figures 4–6; text figure 25

Phyllophora megalotis GRAY, 1842, Ann. Mag. Nat. Hist., ser. 1, vol. 10, p. 257.

Micronycteris megalotis, GRAY, 1866, Proc. Zool. Soc. London, p. 113.

Micronycteris (Micronycteris) megalotis megalotis, SANBORN, 1959, Fieldiana, Zool., vol. 31, p. 219.

TYPE LOCALITY: Brazil.

RANGE: Trinidad; common and widely distributed. Tobago; common and widely distributed.

GENERAL CHARACTERS: A small, slender bat with a prominent nose leaf, the base with flap not fused to upper lip; flying membranes thin; ears large, connected with a high band across forehead, with a shallow notch (fig. 25); tail perforating interfemoral membrane and appearing on upper side; two pairs of lower incisors present.

DESCRIPTION: General color of upper parts about Prout's Brown, bases of the hairs usually whitish; under parts darker and grayer than back, hairs unicolored to base. Skull small and slender, rostrum narrow and tapering, braincase large and elevated above rostrum; upper incisors very unequal, the inner large, cutting edges faintly divided by a notch near outer side, outer incisors very small; lower incisors small, forming a continuous row between canines, cutting edges faintly bifid; lower premolar 3 not reduced in size.

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

MEASUREMENTS AND WEIGHTS: Three from Trinidad and three from Tobago: Length of forearm, 33.5, 34.0, 34.5, 34.0, 34.3,

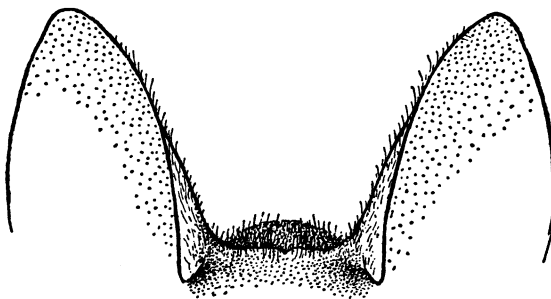


FIG. 25. Front view of connecting band between ears of *Micronycteris megalotis megalotis*, showing shallow notch in center.

35.0. Skull: Male from Trinidad: greatest length, 18.0; zygomatic breadth, 8.4; interorbital constriction, 3.8; maxillary tooth row, C-M³, 7.0. Weights: Eleven males, 3.4–6.7; three females, 4.3–8.3; one gravid female, 6.5.

SPECIMENS RECORDED: *Tobago*: Crown Point, two (A.M.N.H.); Les Coteaux, five (A.M.N.H.); Old Grange, three (A.M.N.H.); Speyside, one (A.M.N.H.). *Trinidad*: Carenage, four (A.M.N.H.); Caura Royal Road, two (A.M.N.H.); Charles Avenue, Diego Martin, one (A.M.N.H.); Cumaca, one (A.M.N.H.); Grants Trace, two (A.M.N.H.); Heights of Oropuche, two (A.M.N.H.); Mayaro, one (A.M.N.H.); Port-of-Spain, one (A.M.N.H.), two (L.S.U.); Simla Estate, one (A.M.N.H.); Ravine Sable Road, one (A.M.N.H.); no exact locality, seven (U.S.N.M.).

GENERAL HABITS: This species of *Micronycteris* usually roosts in small, well-lighted caves or near the entrance of larger and deeper caves. It has been taken from under bridges, culverts, buildings, underground drains, and cisterns; in hollow trees it prefers to roost low down near the opening. Colonies rarely exceed 12 individuals and usually include both sexes. In Trinidad it has been found roosting in association with *Saccopteryx leptura*, *Chilonycteris rubiginosa*, *Micronycteris minuta*, *Micronycteris hirsuta*, *Phyllostomus hastatus*, *Trachops cirrhosus*, *Glossophaga soricina*, *Carollia perspicillata*, *Chiroderma trinitatum*, *Desmodus rotundus*, *Diaemus youngi*, *Natalus tumidirostris*, and *Myotis nigriscans*. In Tobago it has been found roosting with *Pteropteryx macrotis* and *Glossophaga longirostris*. Its flight is not particularly rapid, and this bat has been seen to hover.

BREEDING: A lactating female was taken from a hollow tree on June 7, 1956; one gravid female, on March 19, 1958, and another, on February 26, 1959.

FOOD: *Micronycteris megalotis* is a fruit-eating bat and is apparently fond of small, ripe guavas. It plucks the fruit while hovering in the air and carries it to a nearby tree to eat. The pulp of a yellow fruit and insects had been consumed by some specimens.

PARASITES: An unidentified nematode was found in one specimen. Brennan and Jones (1960, p. 538) report the following species of the Trombiculidae (chiggers) from Trinidad

Micronycteris megalotis: *Euschöngastia desmodus* and *Trombicula vesperuginis*.

DISEASE: Specimens examined were rabies-negative.

Micronycteris minuta (Gervais)

WHITE-BELLIED BIG-EARED BAT

Plate 13, figures 4–6; text figure 26

Schizostoma minutum GERVAIS, 1855 [1856], Mammifères, in Castelnau, Expédition dans les parties centrales de l'Amérique du Sud, . . . pt. 7, Zoologie, vol. 1, p. 50, pl. 7, fig. 1.

Micronycteris minuta, THOMAS, 1901, Ann. Mag. Nat. Hist., ser. 7, vol. 8, p. 191.

TYPE LOCALITY: Capella Nova, Brazil.

RANGE: Trinidad; widely distributed but not common.

GENERAL CHARACTERS: Similar in size to *Micronycteris megalotis* but lighter in color; ears connected by a band as in *megalotis* but center notch deep, dividing the band into two triangles (fig. 26); calcar shorter than foot; tail slightly perforating upper side of inter-femoral membrane.

DESCRIPTION: General color of upper parts in one color phase Prout's Brown, bases of hairs white; under parts grayish white. In another color phase the upper parts are Hazel, the under parts lighter. Skull similar to that of *megalotis* but PM₃ reduced in size.

MEASUREMENTS AND WEIGHTS: Twelve from Trinidad: Length of forearm, 34.4–36.6. Skull: Adult male from Cumaca and females from Arena and Mayaro: greatest length, 18.2, 18.7, 19.0; zygomatic breadth, 8.3, 8.5, 8.7; interorbital constriction, 4.1, 4.2, 4.0; maxillary tooth row, C–M³, 6.7, 6.8, 6.8. Weights: One male, 6.7; four females, 5.8–6.4; one gravid female, 8.7; two lactating fe-

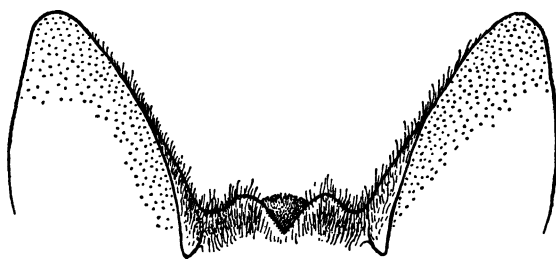


FIG. 26. Front view of connecting band between ears of *Micronycteris minuta*, showing deep notch in center.

males, 6.7, 6.9; one suckling female, 2.4; one suckling male, 1.8.

SPECIMENS RECORDED: *Trinidad*: Arena Road, Freeport, three (A.M.N.H.); Cumaca, two (A.M.N.H.); Las Lomas, one (A.M.N.H.); Leaseholds, Fyzabad, five (A.M.N.H.); Point Fortin, two (A.M.N.H.); Rochard-Douglas Road, one (A.M.N.H.); Mayaro, two (A.M.N.H.).

GENERAL HABITS: *Micronycteris minuta* has been found roosting in hollow trees with *Saccopteryx leptura*, *Micronycteris megalotis*, *Vampyrops helleri*, and *Carollia perspicillata*, and one was taken in a cave with *M. megalotis* and *Chiroderma trinitatum*.

BREEDING: A small colony of non-breeding males and non-gravid females was taken in a hollow tree on March 25, 1957. One gravid female, two non-gravid females, two lactating females, and two females nursing young were taken from one roost on May 14, 1958.

FOOD: Probably fruit or insects or both.

DISEASE: Specimens examined were rabies-negative.

REMARKS: In some individuals, especially males, there is a bare spot on top of the head surrounding a small tuft of hair.

SUBGENUS **XENOCTENES** MILLER

GREATER BIG-EARED BATS

Xenotenes, SANBORN, 1949, Fieldiana, Zool., vol. 31, no. 27, p. 22. Type, *Schizostoma hirsutum* Peters.

Ears large, connected by an unnotched band across forehead.

Micronycteris hirsuta (Peters)

PETERS' BIG-EARED BAT, HAIRY BIG-EARED BAT

Plate 13, figures 1-3; text figures 27, 28

Schizostoma hirsutum PETERS, 1869, Monatsber. Akad. Wiss. Berlin, p. 397.

Micronycteris hirsuta, ANDERSEN, 1906, Ann. Mag. Nat. Hist., ser. 7, vol. 18, p. 57.

TYPE LOCALITY: Unknown.

RANGE: Trinidad; widely distributed but not common.

GENERAL CHARACTERS: Externally like *Micronycteris megalotis* but much larger and ears connected by a low band across forehead, not notched; tail perforating upper surface of interfemoral membrane; notch on lower lip V-shaped (fig. 28).

DESCRIPTION: General color of upper parts

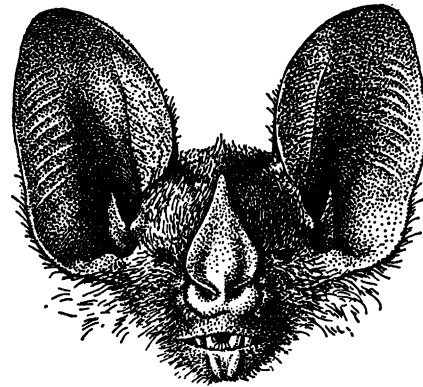


FIG. 27. Front view of head of *Micronycteris hirsuta*. $\times 1\frac{3}{4}$.

between Mummy Brown and Prout's Brown, base of hairs on shoulders and middle of back whitish; under parts Wood Brown washed with pale buff. Skull and teeth much as in *M. megalotis* except that upper inner incisors are spaced widely apart at base, in contact near tip, front face of tooth facing to the side instead of forward. Outer incisors small; canines in contact posteriorly. Lower incisors long from base to crown and wedged tightly between canines.

MEASUREMENTS AND WEIGHTS: Twelve specimens from Trinidad: Length of forearm, 42.0-45.2. Skull: Three males and two females: greatest length, 24.5, 23.5, 23.2, 24.0, 23.8; zygomatic breadth, 11.3, 11.3, 11.3, 11.0, 11.9; interorbital constriction, 5.2, 5.2, 4.8, 5.2, 5.1; maxillary tooth row, C-M³, 9.5, 9.0, 9.2, 9.5, 9.5. Weights: Four males, 10.3-14.0; three females, 10.7, 6.7, 14.3; two gravid females, 13.5, 15.4.

SPECIMENS RECORDED: *Trinidad*: Cap-de-Ville, one (A.M.N.H.); Cunupia, two (A.M.N.H.); Fort Reid, Waller Field, one (A.M.N.H.); Grants Trace, La Brea, four (A.M.N.H.); Granville, five (A.M.N.H.); Guapo, St. Patrick, four (A.M.N.H.); Leaseholds, Fyzabad, five (A.M.N.H.); Port-of-Spain, one (A.M.N.H.); St. John's, Tunapuna, one (A.M.N.H.).

GENERAL HABITS: *Micronycteris hirsuta* has been taken in hollow trees, such as the silk-cotton (*Ceiba pentandra*), hog plum (*Spondias mombin*), and wild chataigne (*Artocarpus communis*), under bridges, and from the top of an abandoned chimney stack

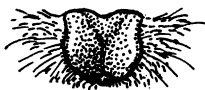


FIG. 28. Lower lip of *Micronycteris hirsuta*, showing naked V-shaped pad.

25 feet high. It has been found roosting in association with *Saccopteryx bilineata*, *Micronycteris megalotis*, *Tonatia bidens*, *Carollia perspicillata*, *Glossophaga soricina*, and *Desmodus rotundus*.

This species, as do some other Trinidad bats, changes its roosting place. Three months after a colony of *Desmodus* was removed from a hollow tree, in January, 1957, *Micronycteris hirsuta*, with all the species listed under association, were occupying this same roost.

BREEDING: An adult male and a female were taken from a hollow tree on May 14, 1956; the female had given birth to a single young, and the umbilical cord was still intact. A gravid female, with one male, was collected on March 28, 1958, and another was taken on May 7, 1959.

FOOD: This is a fruit-eating bat, but it may also consume some insects.

PARASITES: Brennan and Jones (1960, p. 538) report the following species of the Trombiculidae (chiggers) from Trinidad *Micronycteris hirsuta*: *Trombicula vesperuginis*, *Spelecola secunda*, and *Beamerella acutascuta*.

DISEASE: Specimens examined were rabies-negative.

SUBGENUS **LAMPRONYCTERIS** SANBORN

YELLOW-THROATED BATS

Lampronycteris SANBORN, 1949, Fieldiana, Zool., vol. 31, no. 27, p. 223. Type, *Micronycteris (Lampronycteris) platyceps* Sanborn = *Schizostoma brachyotis* Dobson.

Ears not connected by a band across forehead, fifth metacarpal shortest, third longest; upper incisors vertical and in line with canines.

***Micronycteris brachyotis* (Dobson)**

YELLOW-THROATED BAT

Plate 14, figures 1-6; text figures 29, 30

Schizostoma brachyotis DOBSON, 1878, Proc. Zool. Soc. London, p. 880.

Glyphonycteris brachyotis, ANDERSEN, 1906,

Ann. Mag. Nat. Hist., ser. 7, vol. 18, p. 60.

Micronycteris (Lampronycteris) platyceps SANBORN, 1949, Fieldiana, Zool., vol. 31, no. 27, p. 224.

Micronycteris (Glyphonycteris) brachyotis, SANBORN, 1949, Fieldiana, Zool., vol. 31, no. 27, p. 233.

TYPE LOCALITY: Cayenne, French Guiana.

RANGE: Trinidad; widely distributed but not common.

GENERAL CHARACTERS: Size medium for the genus; calcar about as long as or slightly longer than foot with claws; ears slightly shorter than length of head, separate, outer margin of ear conch concave in upper half; naked pad on lower lip with Y-shaped groove; pelage relatively short; tail very short, slightly perforating upper surface of inter-femoral membrane.

DESCRIPTION: Color of upper parts close to Olive-Brown, base of hairs whitish; throat, chest, and entire under parts in some close to Mars Yellow, rest of under parts Tawny-Olive; juveniles gray. Skull similar in general to that of *Micronycteris megalotis*, but braincase lower, rostrum and interorbital region more swollen, top of rostrum flattened, slightly concave; upper inner incisors chisel-shaped, outer incisors bifid, with elongated point in contact with inner teeth (fig. 30); upper canines widely spaced; PM₃ reduced as in *Micronycteris minuta*; upper premolars straight, crowns not recurved.

MEASUREMENTS AND WEIGHTS: Sixteen specimens from Trinidad: Length of forearm, 39.0-41.0. Skull: Male, female, and type (adult female): greatest length, 21.3, 21.7, 21.2; zygomatic breadth, 10.4, 10.8, 10.3; interorbital constriction, 5.0, 5.2, 4.9; maxillary tooth row, C-M³, 8.3, 8.5, 8.0. Weights: Five adult males, 9.4-15.3; juvenile male, 8.1;



FIG. 29. Front view of head of *Micronycteris brachyotis*. $\times 1\frac{1}{2}$.

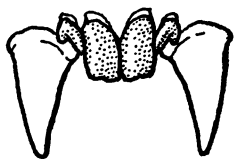


FIG. 30. Front view of upper incisor teeth of *Micronycteris brachyotis*, showing small bifid outer teeth with elongated point.

three adult females, 10.0–13.3; juvenile female, 8.7.

SPECIMENS RECORDED: *Trinidad*: Bowen Trace, one (A.M.N.H.); Guanapo, seven (C.N.H.M.); Indian Trail, Couva, one (A.M.N.H.); Motor Ranch Trace, Peñal Rock Road, 14 (A.M.N.H.); Alta Gracia Trace, Siparia, two (A.M.N.H.).

GENERAL HABITS: Up to the present time this bat has been taken only from a mine shaft and the hollow trunks of the silk-cotton tree (*Ceiba pentandra*) in colonies of up to about 10 individuals of mixed sexes. It has been found roosting in association with *Glossophaga soricina*, *Carollia perspicillata*, and *Desmodus rotundus*.

BREEDING: A breeding male was taken on June 26, 1958, and three others were taken on May 27, 1959.

FOOD: Fruit pulp, plant fibers, and insects; a white milky substance was found in the stomach of a juvenile.

PARASITES: Sanborn (1949, p. 226) reports the following species of the Streblidae (bat flies) from Trinidad *Micronycteris brachyotis*: *Trichobius dugesii*, *Speiseria ambigua*; also unidentified species of the Spinturnicidae (mites).

DISEASE: Specimens examined were rabies-negative.

REMARKS: No description of the skull of the type of *Schizostoma brachyotis* Dobson had been published when Colin Sanborn described *Micronycteris* (*Lampronnycteris*) *platyceps*. Typical specimens of *M. platyceps* from Trinidad agree so closely in detail with photographs (pl. 14, figs. 4–6) and measurements of the type of *S. brachyotis* that *platyceps* may be confidently referred to *brachyotis*.

Measurements of *S. brachyotis* furnished by Dorst and those of a large adult male *M. platyceps* from Trinidad are given here, re-

spectively, for comparison: Skin: total length; 82.0; 70.0 (82 including hind limbs); length of tail, 9.0, 9.0; length of forearm, 41.5, 41.1; ear, 15.0, 15.0; hind foot including claws, 11.0, 11.0; calcar, 12.0, 12.0. Skull: greatest length, 21.9, 21.7; condylobasal length, 19.2, 19.2; interorbital breadth, 5.8, 5.9; zygomatic breadth, 11.0, 10.8; maxillary tooth row, C–M³, 8.7, 8.5.

While the type of *S. brachyotis* averages somewhat larger than the long series of Trinidad specimens, it is an old individual with worn teeth and the skull is no larger than one from Nicaragua referred by Sanborn to *platyceps*. A specimen of *brachyotis* from Neveri, Venezuela, and one from Rio Tapajoz, Brazil, come well within the range of individual variation found in the Trinidad series. "Fur brown above and beneath" is the color given by Dobson for *brachyotis*, which about describes the color of the Venezuelan specimen. The Trinidad series are Mars Yellow on the under parts, while the specimen from Rio Tapajoz is a dark chocolate brown above, paler below, with patches of Tawny-Olive on the chest and in the inguinal region.

SUBGENUS *TRINNYCTERIS* SANBORN

WHITE-LINED FOREST BATS

Text figure 31

Trinnycteris SANBORN, 1949, Fieldiana, Zool., vol. 31, no. 27, p. 228. Type, *Micronycteris* (*Trinnycteris*) *nicefori* Sanborn.

Ears not connected by a band across forehead; fourth metacarpal shortest, third longest; notch on lower lip Y-shaped (fig. 31). Upper incisor directed forward, not in line with canines.

Micronycteris nicefori Sanborn

WHITE-LINED OR NICÉFORO FOREST BAT

Plate 15, figures 4–6; text figure 31

Micronycteris (*Trinnycteris*) *nicefori* SANBORN, 1949, Fieldiana, Zool., vol. 31, no. 27, p. 230.



FIG. 31. Naked pad on lower lip of *Micronycteris nicefori*, showing Y-shaped groove.

TYPE LOCALITY: Cúcuta, Colombia.

RANGE: Trinidad; widely distributed but not common.

GENERAL CHARACTERS: Size medium for the genus; calcar less than half of the length of the foot with claws; nose leaf with a narrow pointed tip; ears separate, medium in size, pointed, slightly concave on both margins below tip; tail short, tip slightly perforating upper side of interfemoral membrane.

DESCRIPTION: General color of upper parts varying from Olive-Brown to Walnut Brown, under parts paler than back. Hairs on back having a dark tip followed by a broad light band and a narrow dark base; most specimens with a faint light gray line on lower back. Skull with rostrum elongated; PM³ and PM⁴ reduced in size, almost flat, with a small anterior cusp; PM⁴ recurved; upper outer incisor small and not filling the space between canine and inner incisor; lower incisors small, not crowded, faintly trifid.

MEASUREMENTS AND WEIGHTS: Five specimens from Trinidad and type: Length of forearm, 37.1–39.3, 37.9. Skull: Male and female from Trinidad and type (adult male): greatest length, 20.3, 20.0, 20.5; zygomatic breadth, 9.2, 9.4, 9.6; interorbital constriction, 4.3, 4.1, 4.3; maxillary tooth row, C–M³, 7.6, 7.3, 7.3. Weights: Three males, 6.9, 8.5, 8.8; subadult female from Siparia, 8.0.

SPECIMENS RECORDED: *Trinidad*: Alta Gracia Trace, Siparia, five (A.M.N.H.); Leaseholds, Fyzabad, three (A.M.N.H.).

GENERAL HABITS: Small colonies of up to 12 individuals of both sexes have been found in hollow trees on Trinidad, roosting in association with *Carollia perspicillata*. The type was taken in a tunnel 50 meters from the entrance to the tunnel at Cúcuta, Colombia. *Lonchorhina aurita* and *Micronycteris minuta* were captured in the same tunnel.

BREEDING: Two breeding males were taken in Trinidad on October 17, 1958.

FOOD: As do other species of *Micronycteris*, *nicefori* feeds on fruit and possibly some in sects.

DISEASE: Specimens examined were rabies-negative.

SUBGENUS GLYPHONYCTERIS THOMAS

DUSKY FOREST BATS

Glyphonycteris, SANBORN, 1949, Fieldiana, Zool.,

vol. 31, no. 27, p. 231. Type, *Glyphonycteris sylvestris* Thomas.

Ears not joined by a band across forehead; fourth metacarpal shortest, fifth longest; notch on lower lip Y-shaped. Upper incisors directed forward, not in line with canines.

Micronycteris sylvestris (Thomas)

TRICOLORED FOREST BAT

Plate 15, figures 1–3; text figures 17, 24, 32–34

Glyphonycteris sylvestris Thomas, 1896, Ann. Mag. Nat. Hist., ser. 6, vol. 18, p. 302.

Micronycteris (Glyphonycteris) sylvestris, Sanborn, 1949, Fieldiana, Zool., vol. 31, p. 231.

TYPE LOCALITY: Miravalles, Guanacaste, Costa Rica.

GENERAL CHARACTERS: Size medium for the genus; ears moderately large, unconnected across the forehead; pelage tricolored; calcar shorter than length of hind foot with claws; tail short, barely perforating upper side of interfemoral membrane.

DESCRIPTION: General color of upper parts dark brown, hairs with three distinct alternating rings of dark brown and whitish; extreme base next to skin with a slight indication of white, followed by a broad band of blackish brown, a band of yellowish white, tips of the hairs Clove Brown; fur on under parts brown at base, grayish drab at tip. Skull with domed braincase but not sharply elevated above rostrum; maxillary bones swollen posteriorly. Inner upper incisors large, chisel-shaped; outer very small, scarcely reaching cingulum of canines; lower incisors trifid; PM³ and PM⁴ nearly subequal in size, with anterior cusp on both teeth slightly recurved (fig. 33).



FIG. 32. Front view of head of *Micronycteris sylvestris*. $\times 1\frac{1}{2}$.

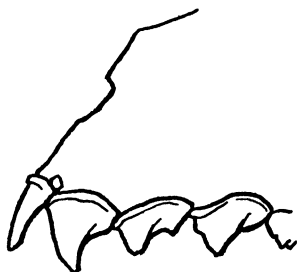


FIG. 33. Lateral view of rostrum of *Micronycteris sylvestris*, showing projecting upper incisor and recurved tip of PM⁴.

MEASUREMENTS AND WEIGHTS: Four males from Trinidad, and type in parentheses: Length of forearm, 40.0–41.8 (40.5). Skull: Greatest length, 20.2–20.6 (20.2); condylo-basal length, 18.2–18.3 (17.1); zygomatic breadth, 10.1–10.6 (9.9); interorbital constriction 4.5–5.0 (4.6); palatal length, 9.5–9.7 (8.4); greatest rostral width, 5.8–6.0 (5.5); breadth of braincase, 8.6–9.0 (8.4); maxillary tooth row, C–M³, 8.2–8.4 (7.9). Weights: 11.0, 11.0, 10.1, 10.7. Measurements of four males from Veracruz, respectively: 40.0–41.5; 20.0–20.6; 18.3–18.5; 10.0–10.0; 4.9–5.0; 9.0–9.6; 5.6–6.0; 8.3–8.5; 8.0–8.3.

SPECIMENS RECORDED: *Trinidad*: Salazar Trace, Point Fortin, four (A.M.N.H.).

GENERAL HABITS: The present series represents four of five individuals collected in a hollow, black fiddlewood tree (*Vitex divaricata*) on September 9, 1959. It was estimated that there were 75 individuals in the roost. The rest all flew off with great rapidity through an open hole at the top of the tree and apparently did not return to this roost. They were found to be roosting in association with *Saccopteryx bilineata*.

FOOD: Fruit and possibly some insects.

REMARKS: Trinidad specimens are of about the same size and are very similar to Mexican and Central American specimens of *M. sylvestris* but average considerably darker in color. The skulls of the Trinidad specimens are relatively shorter, with a more domed and larger braincase, than those of the Mexican specimens. The rostrum is also shorter and flatter in the Trinidad skulls. The skulls of the Trinidad specimens are unique in that the low sagittal crest is divided into two raised ridges behind the orbits which extend across the parietals in a sharp-angled V (fig.

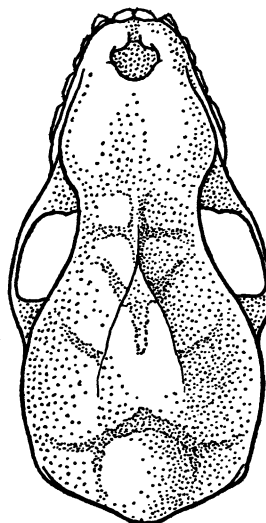


FIG. 34. Dorsal view of skull of *Micronycteris sylvestris*, showing V-shaped pattern of sagittal crest.

34), a character well defined in all four Trinidad specimens but not found in the type of *sylvestris* or in any one of the four specimens examined from Veracruz.

GENUS *Lonchorhina* TOMES

LONG-EARED BATS

Lonchorhina TOMES, 1863, Proc. Zool. Soc. London, pt. 1, p. 81. Type, *Lonchorhina aurita* Tomes.

Teeth essentially as in *Micronycteris*; nose leaf and ears highly specialized.

RANGE: Bahama Islands and from Tabasco and southern Oaxaca, Mexico, south to Ecuador and Minas Gerais, Brazil. One species is recorded from Trinidad.

Lonchorhina aurita aurita Tomes

TOMES' LONG-EARED OR LONG-NOSE-LEAFED BAT

Plate 17, figures 1–3, text figure 35

Lonchorhina aurita TOMES, 1863, Proc. Zool. Soc. London, pt. 1, p. 83.

Lonchorhina aurita aurita, HALL AND KELSON, 1959, The mammals of North America, vol. 1, p. 104.

TYPE LOCALITY: "West Indies"; island of Trinidad, according to Cabrera (1957, p. 63).

RANGE: Trinidad; recorded but not common.

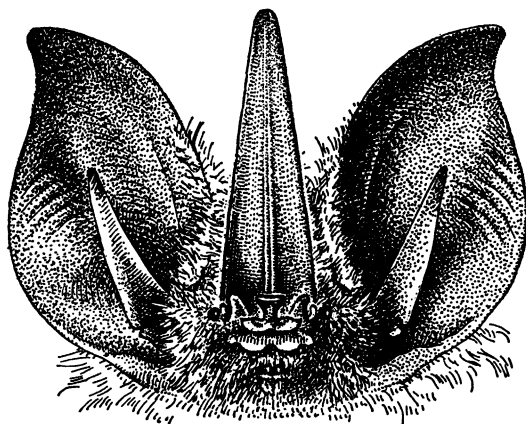


FIG. 35. Front view of head of *Lonchorhina aurita aurita*. $\times 1\frac{1}{4}$.

GENERAL CHARACTERS: A medium-sized, slender bat with an extremely long, sharply pointed nose leaf; very large, pointed ears; extremely long, slender tragus; tail reaching posterior border of a wide interfemoral membrane.

DESCRIPTION: Trinidad specimens have the upper parts uniform dark Mummy Brown; under parts Mummy Brown, slightly paler than back. Skull rather narrow; rostrum swollen; braincase sharply elevated above rostrum; interorbital region depressed, with a concavity at base of rostrum; teeth essentially as in *Micronycteris*; inner upper incisors obliquely chisel-shaped; outer incisors small; lower incisors small, subequal, and in a continuous row between canines; second lower premolar very small; anterior upper premolar scarcely larger than outer upper incisor.

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

MEASUREMENTS AND WEIGHTS: Two adult females and one juvenile male from Trinidad: Length of forearm, 51.0, 51.2, 47.0. Skull: Greatest length, 20.0, 20.3, 19.5; zygomatic breadth, 10.3, 10.6, 9.5; interorbital constriction, 4.8, 4.7, 4.2; maxillary tooth row, C-M³, 6.8, 6.8, 6.5. Weights: One female, 14.5; one gravid female, 16.6; and one juvenile male, 11.2.

SPECIMENS RECORDED: *Trinidad:* La Canoa, Santa Cruz, one (B.M.); Zagaya Cave, Montevideo, two (A.M.N.H.); Saut

d'Eau Cave, St. George County, one (A.M.N.H.).

GENERAL HABITS: Little is known about the habits of this bat on Trinidad. A colony of from 20 to 25 individuals of *Lonchorhina* was found roosting very high up in the ceiling of a cave at Montevideo, and one was taken in a sea cave at Saut d'Eau. *Lonchorhina* was found roosting in association with *Desmodus rotundus*, *Chilonycteris rubiginosa*, *Mormoops megalophylla*, *Carollia perspicillata*, *Anoura geoffroyi*, and *Natalus tumidirostris*.

BREEDING: One gravid female was taken on April 13, 1960.

FOOD: Examination of the stomach contents of two Trinidad specimens revealed the remains of insects exclusively.

GENUS TONATIA GRAY

ROUND-EARED BATS

Tonatia GRAY, 1827, in Griffith, The animal kingdom . . . by . . . Baron Cuvier, vol. 5, p. 71. Type, *Vampyrus bidens* Spix.

Ears and nose leaf not essentially different in structure from those of *Micronycteris*; skull and teeth also similar, but only one pair of lower incisors instead of two; ears with a connecting band across forehead present or absent.

RANGE: From British Honduras and western Costa Rica south to Ecuador, Bolivia, and Peru to central and eastern Brazil. Two species have been recorded from Trinidad.

Tonatia bidens (Spix)

GREATER OR SPIX'S ROUND-EARED BAT

Plate 16, figures 4-6; text figures 36, 37

Vampyrus bidens SPIX, 1823, Simiarum et vespertilionum Brasiliensium, p. 65.

[*Tonatia*] *bidens*, GRAY, 1840, in Griffith, The animal kingdom . . . by . . . Baron Cuvier, vol. 5, p. 69.

TYPE LOCALITY: Bank of Rio São Francisco, Bahia, Brazil.

RANGE: Trinidad; not uncommon.

GENERAL CHARACTERS: A rather large bat with large rounded ears, separate; proximal half of forearm well haired; base of thumb and upper sides of feet hairy; nose leaf broad at base, fusing with upper lip and sharply tapering to a point; naked pad on lower lip V-shaped and bordered by row of small,

rounded papillae (fig. 37); tail extending to middle of interfemoral membrane.

DESCRIPTION: Color of upper parts varying from Ochraceous-Tawny to blackish Mummy Brown; under parts paler and grayer than back. Skull large and massive; rostrum broad and flat, not constricted in orbital region; superior outline evenly elevated posteriorly; palate narrow; tooth rows slightly converging anteriorly, not essentially different in structure from those of *Micronycteris*. Inner upper incisors with outer border in contact with canines, outer incisors crowded forward. Second lower premolar minute and crowded between anterior and posterior premolars.

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

MEASUREMENTS AND WEIGHTS: Adult male and female from Trinidad: Length of forearm, 56.0, 55.0. Skull: Greatest length, 28.2, 26.4; zygomatic breadth, 14.3, 14.5; interorbital constriction, 5.7, 5.8; maxillary tooth row, C-M³, 9.8, 9.5. Weights: One male, 26.8; five females, 24.2-26.9; two gravid females, 31.7, 23.1.

SPECIMENS RECORDED: *Trinidad:* Cap-de-Ville, one (A.M.N.H.); Siparia, four (A.M.N.H.); La Brea, one (A.M.N.H.).

GENERAL HABITS: Little is known about the habits of this bat. It was found roosting in association with *Micronycteris hirsuta*. The Trinidad specimens and specimens of this species from Costa Rica were found roosting in

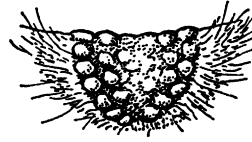


FIG. 37. Lower lip of *Tonatia bidens*, showing warty protuberances.

hollow trees.

BREEDING: Two gravid females were taken May 7, 1959.

FOOD: Fruit.

DISEASE: The specimens examined were rabies-negative.

Tonatia minuta Goodwin

LESSER OR LITTLE ROUND-EARED BAT

Plate 16, figures 1-3

Tonatia minuta GOODWIN, 1942, Jour. Mammal., vol. 23, no. 2, p. 206.

Tonatia venezuelae, SANBORN, 1941, Publ. Field Mus. Nat. Hist., zool. ser., vol. 27, p. 373.

Type Locality: Boca de Curary, Loreto, Peru.

RANGE: Trinidad; uncommon.

GENERAL CHARACTERS: Similar to that of *Tonatia bidens* but much smaller; ears connected across forehead by a low band.

DESCRIPTION: General color of upper parts Mummy Brown, becoming darker on head; the fur buffy white at base; under parts Snuff Brown, the hairs lightly tipped with pale buff. Skull small; braincase relatively narrow and high, sharply elevated above rostrum; interorbital region constricted; bony palate short and ending posteriorly at a line across front of last molars.

MEASUREMENTS AND WEIGHTS: One male and one female from Irois Forest, one juvenile from Aripo, and the type: Length of forearm, 35.5, 35.5, 34.0, 34.0+. Skull: Greatest length, 20.0, 19.5, 18.0, 18.7; zygomatic breadth, 8.2, 9.2, 6.5+, 9.0; interorbital constriction, 3.1, 3.1, 3.2, 3.0; maxillary tooth row, C-M³, 6.9, 7.1, 6.5, 6.9.

WEIGHTS: One male, 9.9; one female, 9.1.

SPECIMENS RECORDED: *Trinidad:* Aripo, one (B.M.); Guaico, four skulls (A.M.N.H.); Irois Forest, St. Patrick County, two (A.M.N.H.).

GENERAL HABITS: Four burned specimens of this little bat were taken from a termite

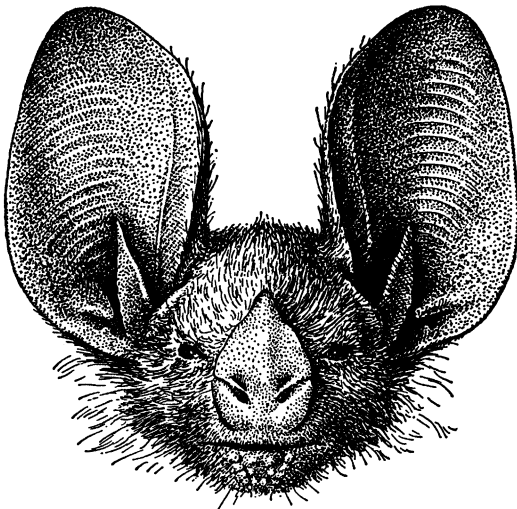


FIG. 36. Front view of head of *Tonatia bidens*. $\times 1\frac{1}{2}$.

nest, which had been set on fire to get rid of the insects. Two others were taken from another termite nest in the Irois Forest. The termite (*Microcerotermes arboreus*) is one of the several species responsible for the "dirt" nests commonly seen on tree trunks in Trinidad. Locally, these nests are called "wood ant nests." Ornithologists claim that they have seen bats in abandoned termite nests when looking for the green parakeet *Forpus passerinus vividissimus* which, it is said, lays its eggs in these nests.

REMARKS: The young individual from Aripo was listed by Sanborn (1941, p. 373) as *Tonatia venezuelae* on account of the connecting band between the ears. *Tonatia venezuelae* is a much larger bat, about the size of *T. brasiliense*, of which it is probably a synonym. The type of *brasiliense* is a poorly prepared specimen, but there are indications that it has a connecting band between the ears; unfortunately only the anterior part of the skull was saved. Measurements of the type of *brasiliense* and a paratype of *venezuelae* indicate that they are the same, but quite distinct from the Trinidad specimens: Forearm, 38.0, 38.5. Skull: Greatest length, —, 21.1; zygomatic breadth, —, 10.4; interorbital width, 3.8, 3.3; maxillary tooth row, C-M³, 7.7, 7.7; width across molars, 6.6, 6.6.

GENUS MIMON GRAY

LITTLE SPEAR-NOSED BATS

Mimon GRAY, 1847, Proc. Zool. Soc. London, pt. 15, p. 14. Type, *Phyllostoma bennettii* Gray.

Medium-sized bats with a tall, slender nose leaf; ears large, separate; tail about as long as femur, terminating near middle of a broad interfemoral membrane; skull superficially resembling that of *Tonatia*, and teeth much the same but only two pairs of lower premolars present instead of three, and inner upper incisors separated from canines by a space occupied by outer incisors.

RANGE: From Veracruz and Yucatán in Mexico south to Peru, Ecuador, and eastern Brazil in South America. One species occurs in Trinidad.

SUBGENUS ANTHORHINA LYDEKKER

HAIRY SPEAR-NOSED BATS

Anthorhina LYDEKKER, 1891, in Flower and Lydekker, Mammals living and extinct, p. 674.

Type, *Phyllostoma crenulaum* É. Geoffroy-Saint-Hilaire.

General external and cranial characters essentially as in the subgenus *Mimon*, but a white median dorsal line usually present; nose leaf hairy, crenulated instead of simple and naked; audital bullae much larger.

RANGE: From Panama south to Peru, Ecuador, and central and eastern Brazil.

REMARKS: Miller (1907, p. 129) recognized *Mimon* and *Anthorhina* as full genera. Cabrera (1957, p. 66) listed *Anthorhina* as a subgenus of *Mimon*. Handley (1960, p. 460) stated that the nominal genera *Anthorhina* and *Mimon* are not distinguishable, even as subgenera. The bats of *Anthorhina* differ from those of *Mimon* principally in having a smaller anterior upper premolar (PM¹), shorter lower incisor, larger audital bullae, stouter zygomatic arch, shorter and less woolly fur, smaller ears, and a hairy, notched nose leaf.

In *Mimon* the audital bullae are small, covering about one-half of the surface of the cochleae, whereas in *Anthorhina* the audital bullae are large and cover considerably more than half of the cochleae. A summary of the characters peculiar to *Anthorhina* seems of sufficient importance to warrant subgeneric recognition.

Mimon crenulatum crenulatum (É. Geoffroy-Saint-Hilaire)

GEOFFROY'S HAIRY, SPEAR-NOSED BAT

Plate 17, figures 4-6; text figure 38

Phyllostoma crenulatum É. GEOFFROY-SAINT-HILAIRE, 1810, Ann. Mus. d'Hist. Nat., Paris, vol. 15, p. 183.

Anthorhina crenulatum, TROUESSART, 1905, Catalogus mammalium tam viventium quam fossilium, suppl., p. 112.

Anthorhina crenulata, MILLER, 1907, Bull. U. S. Natl. Mus., vol. 57, p. 131.

Mimon (Anthorhina) crenulatum, CABRERA, 1957, Rev. Mus. Argentino Cien. Nat. "Bernardino Rivadavia," cien. zool., vol. 4, no. 1, p. 66.

Mimon crenulatum crenulatum, HANDLEY, 1960, Proc. U. S. Natl. Mus., vol. 112, p. 462.

TYPE LOCALITY: South America, possibly Trinidad, eastern Venezuela, or the Guianas.

RANGE: Trinidad; uncommon.

GENERAL CHARACTERS: A medium-sized bat with a long, slender nose leaf, hairy and

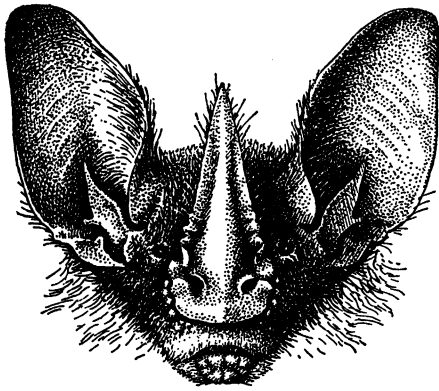


FIG. 38. Front view of head of *Mimon crenulatum crenulatum*. $\times 1\frac{1}{2}$.

with notched edges; ears large and separate; tail about as long as femur and terminating in middle of a broad interfemoral membrane.

DESCRIPTION: Color of a specimen from Trinidad: upper parts Bone Brown, base of hairs whitish; an indistinct whitish line down back; under parts blackish brown, lightly washed with Pale Pinkish Buff. Skull relatively long and narrow, with a rather broadly arched, short rostrum; audital bullae large, covering more than half of the cochleae; inner upper incisors vertical; anterior upper premolar (PM¹) scarcely larger than outer incisor; lower incisor about as wide as high, cutting edges faintly trifid; nasals shortened, leaving a wide emargination that indicates an approach towards the complete absence of nasal bones in *Chiroderma*.

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

MEASUREMENTS: Adult male from Port-of-Spain, Trinidad: Length of forearm, 50.3; third metacarpal, 45.5; first phalanx, 14.0; second phalanx, 25.2; fourth metacarpal, 43.5; fifth metacarpal, 44.0; length of head and body, 55.0; length of tail, 19.4; hind foot, 12.0; tibia, 20.5; ear from meatus, 20.0; breadth of ear, 15.5; tragus, 6.0; nose leaf, 16.5 by 67.0. Skull: Greatest length 21.4; condylobasal length, 18.3; zygomatic breadth, 11.5; interorbital constriction, 4.5; maxillary tooth row, C-M³, 7.8.

SPECIMENS RECORDED: *Trinidad*: Belmont, Port-of-Spain, one (A.M.N.H.).

GENERAL HABITS: Little is known about the habits of this bat. The Trinidad specimen

was taken in a building of Port-of-Spain. G. H. H. Tate took 15 specimens of *Mimon crenulatum keenani* from the hollow trunk of a large tree at Rio Tocuyo, Venezuela.

BREEDING: Two gravid females of *M. crenulatum keenani* were taken at Rio Tocuyo March 24, 1938, by Tate.

REMARKS: The present Trinidad specimen agrees in all essential characters with the description of the type. Other named South American forms, *Mimon longifolium* Wagner and *M. picta* Thomas, can at best be regarded only as subspecific geographical forms of *crenulatum*. *Mimon peruanum* is a synonym of *M. c. longifolium*, but *Mimon bennettii* is a full species.

GENUS PHYLLOSTOMUS LACÉPÈDE

Phyllostomus LACÉPÈDE, 1799, Tableau des divisions, sous-divisions, ordres et genres des mammifères, p. 16. Type, *Vespertilio hastatus* Pallas.

Large, robust, unicolored bats, with a well-developed fleshy nose leaf, wide interfemoral membrane, and short tail perforating upper side.

RANGE: From Veracruz and Oaxaca, Mexico, south to Ecuador, Peru, and São Paulo, Brazil. Two species are recorded from Trinidad; one comes from Tobago.

Phyllostomus discolor discolor Wagner

LONG-TONGUED OR LESSER SPEAR-NOSED BAT

Plate 19, figures 4–6; text figure 39

Phyllostoma discolor WAGNER, 1843, Arch. Naturgesch., yr. 9, vol. 1, pp. 366.

Phyllostomus discolor, MILLER, 1932, Proc. Biol. Soc. Washington, vol. 45, p. 149.

Phyllostomus discolor discolor, MILLER AND KELLOGG, 1955, Bull. U. S. Natl. Mus., no. 205, p. 67.

TYPE LOCALITY: Cuyabá, Mato Grosso, Brazil.

RANGE: Trinidad; widely distributed and common.

GENERAL CHARACTERS: A medium-sized, robust bat with a well-developed nose leaf, rather narrow pointed ears, short tail, large interfemoral membrane, and no facial stripes; lower lip with a V-shaped naked pad bordered by a row of elongate papillae.

DESCRIPTION: General color of upper parts varying from Mummy Brown to Prout's

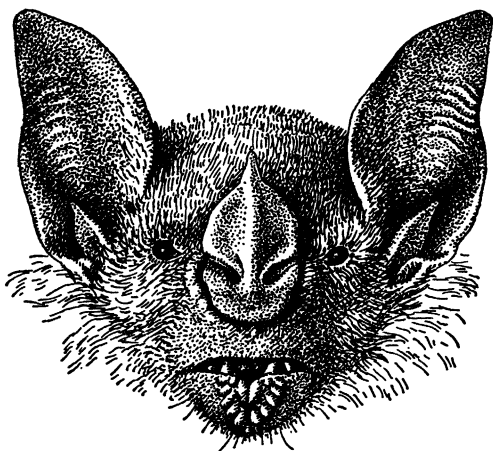


FIG. 39. Front view of head of *Phyllostomus discolor discolor*. $\times 1\frac{3}{4}$.

Brown, becoming paler on head and shoulders; under parts Cinnamon Buff. Skull massive but relatively long and slender for the genus, with a broad, low rostrum, rounded brain case, and weak sagittal crest. Inner upper incisors simple and directed slightly forward; outer incisors very short and broad; lower incisors forming a continuous row between canines, outer tooth only slightly smaller than inner, cutting edges faintly trifid.

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

MEASUREMENTS AND WEIGHTS: Two males and two females from Trinidad: Length of forearm, 59.2–63.2. Skull: One female: greatest length, 26.3; zygomatic breadth, 14.6; interorbital constriction, 6.0; maxillary tooth row, C–M³, 9.2. Weights: Twenty-one males, 22.9–40.0; 12 females, 22.2–36.9, including seven non-gravid females, 22.5–35.6, one gravid female, 29.6, and four lactating females, 31.6–36.9; one nursing young, 7.0.

SPECIMENS RECORDED: *Trinidad*: Granville, Cedros, one (A.M.N.H.); Leonville, St. Joseph, one (A.M.N.H.); Port-of-Spain, one (A.M.N.H.), one (L.S.U.); Santa Cruz, two (A.M.N.H.); Victoria Village, one (A.M.N.H.); no exact locality, two (L.S.U.).

GENERAL HABITS: The Lesser Spear-nosed Bat shows a preference for roosting in the hollow trunk of the silk-cotton tree (*Ceiba pentandra*). Colonies of about 25 individuals of both sexes have been found roosting high

up inside the trunks of trees with only one entrance, and away from the entrance. It has been found roosting in association with *Saccolpteryx bilineata*, *Noctilio leporinus*, *Micronycteris megalotis*, and *Carollia perspicillata*.

BREEDING: Gravid females have been found in February, March, June, and August; lactating females in August, September, and October; females with young in August and October; breeding males in January, August, and October. On August 2, 1957, one roost yielded 17 males, many breeding, and 13 females, one gravid.

FOOD: This is a fruit-eating bat; in captivity it prefers soft fruit such as ripe bananas, mangoes, and pawpaws to firmer fruit of the same kind. It will not eat flesh. It has a long extendible tongue, with a deep groove on the upper surface which is used to scoop out fruit pulp.

PARASITES: Jobling (1949, p. 322) reports the following species of the Streblidae (bat flies) from Trinidad specimens of *Phyllostomus discolor*: *Trichobius perspicillatus*, *T. mixtus*, and *Euctenodes mirabilis*. Unidentified trematodes were found in one specimen. The Trinidad Regional Virus Laboratory (1958, p. 94) lists the following species of the Streblidae from Trinidad *Phyllostomus discolor*: *Trichobius costalimai*. Brennan and Jones (1960, p. 538) report the following species of the Trombiculidae (chiggers) from Trinidad *Phyllostomus discolor*: *Trombicula carmenae*.

DISEASE: All specimens examined were rabies-negative.

Phyllostomus hastatus hastatus (Pallas)

PALLAS' OR GREATER SPEAR-NOSED BAT

Plate 18, figures 4–6; text figures 40, 41

Vespertilio hastatus PALLAS, 1767, *Spicilegium zoologica*, vol. 3, p. 7.

Phyllostomus hastatus, MILLER, 1907, *Bull. U. S. Natl. Mus.*, vol. 57, p. 131.

Phyllostomus hastatus hastatus, CABRERA, 1957, *Rev. Mus. Argentino Cien. Nat. "Bernardino Rivadavia," cien. zool.*, vol. 4, no. 1, p. 68.

TYPE LOCALITY: South America.

RANGE: Trinidad; widely distributed and common. Tobago, not uncommon.

GENERAL CHARACTERS: A very large, robust bat similar to *Phyllostomus discolor* but



FIG. 40. Front view of head of *Phyllostomus hastatus*
hastatus. $\times 1\frac{1}{2}$.

larger and, with the exception of the false vampire (*Vampyrus spectrum*), the largest bat in Trinidad. Tail short; interfemoral membrane large, a gland on chest conspicuous in males, inconspicuous in females; naked, V-shaped, warty pad on lower lip (fig. 41).

DESCRIPTION: General color usually varying shades of dark Mummy Brown, but some individuals reddish, while others are almost black, with gray spots. Skull large and massive, with a broad, low, and rather flattened rostrum; sagittal crest strongly developed; teeth about as in *Phyllostomus discolor* but larger.

MEASUREMENTS AND WEIGHTS: Two males and three females from Trinidad: Length of forearm, 79.3–82.2. Skull: One female: greatest length, 37.3; zygomatic breadth, 19.0; interorbital constriction, 17.3; maxillary tooth row, C–M³, 12.5. Weights: Twenty-seven males, 52.2–101.1; 31 females, 66.3–87.1; two gravid females, 64.8, 87.1; one lactating female, 82.5.

SPECIMENS RECORDED: *Tobago*: Roxborough, one (M.C.Z.); no exact locality, one (A.M.N.H.). *Trinidad*: Acona Road, Maracas, one (A.M.N.H.); Heights of Guanapo, one (A.M.N.H.); Manzanilla, two (A.M.N.H.); Waller Field, two (A.M.N.H.);

no exact locality, four (L.S.U.).

GENERAL HABITS: The Greater Spear-nosed Bat roosts in large caves, hollow trees, used and unused buildings, open attics, and occasionally under palm leaves. The largest concentrations are to be found in large dark caves where colonies of several thousand individuals are not unusual. Clusters vary in number from a few individuals up to 100 or more, packed tightly together and hanging head downward. This bat has been found in the Mt. Tamana Caves roosting in association with *Chilonycteris rubiginosa*, *Pteronotus davyi*, *Mormoops megalophylla*, *Carollia perspicillata*, and *Natalus tumidirostris*; in the Heights of Guanapo cave with all the above mentioned except *Pteronotus davyi* and in addition with *Desmodus rotundus*; in an abandoned building with *Molossus ater*, where a young male was roosting between three male *Molossus ater*; and a young male was also found under a palm leaf with 75 *Molossus ater*. In Tobago a young male was taken in a church with *Glossophaga longirostris* and *Carollia perspicillata*. It is a swift, powerful flier, in most instances, but it is not easily disturbed when roosting and shows only a little uneasiness when touched by hand. It takes a considerable amount of prodding and even shooting to make a

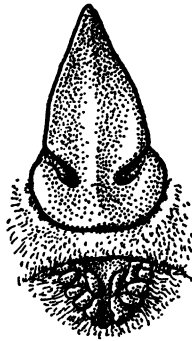


FIG. 41. Front view of nose leaf and lower lip of *Phyllostomus hastatus hastatus*, showing warty protuberances.

colony take flight. It is bold and even aggressive, and on several occasions a large individual has deliberately left a cluster of roost mates to walk down a cave wall head first and bite the gloved hand of the junior author. The roosts of this bat usually have a strong musky odor. Solitary individuals hanging alone are invariably young males. *Phyllostomus hastatus* is the only species of bat in Trinidad that appears to be truly gregarious. Most colonies of other species of bats disperse individually and travel in different directions to feed, as soon as they leave the roost, but numbers of the Greater Spear-nosed Bat usually fly together in a group from the roost to the feeding grounds. An estimated hundred individuals have been seen to fly in a flock to a grove of sapucaia nut trees (*Lecythis zabucajo*) to feed on the seeds, of which it appears to be extremely fond. When the seeds are ripe, great numbers of these bats fly together into a grove of nut trees at about dusk making loud vocal sounds, tear off the seeds to eat the fleshy attachment, and fly off again. *Phyllostomus hastatus* shows no fear of man and often flies almost into the face of an observer before swerving off to one side. Groups of 50 individuals flying together are not unusual, and, when they appear, other bats on the wing seem quickly to leave the vicinity.

BREEDING: Gravid females in an advanced stage have been taken in late March and April. Lactating females were collected in the Mt. Tamana Caves in April and June, 1956; females with a single young were taken in the same caves on September 21, 1957, while on

November 20, 1957, no young were seen with the females.

FOOD: Bases of roosts show the remains of fruit, fur, and feathers, indicating that this species has a varied diet. Examinations of its stomach contents have shown the remains of fruit and flesh. In captivity this bat thrives on a wide variety of fruit and meat. It is especially fond of raw meat, mice, and young birds. It has no hesitation in killing and eating most other species of bats put into its cage, although it appears to be uneasy in the presence of *Desmodus*.

PARASITES: Jobling (1949, p. 322) reported the following species of the Streblidae (bat flies) from Trinidad *Phyllostomus hastatus*: *Trichobius mixtus* and *Euctenodes mirabilis*. Unidentified species of cestodes and trematodes have been found in the gall bladder of one specimen. The Trinidad Regional Virus Laboratory (1958, p. 94) lists the following species of the Streblidae from Trinidad *Phyllostomus hastatus*: *Trichobius dugesii*.

DISEASE: All specimens examined were rabies-negative.

GENUS *TRACHOPS* GRAY

FRINGE-LIPPED BATS

Trachops GRAY, 1847, Proc. Zool. Soc. London, pt. 15, p. 14. Type, *Trachops fuliginosus* [= *Vampyrus cirrhosus* Spix].

Large, robust bats with large ears, woolly pelage, and highly specialized warty outgrowths on chin; middle lower premolar (PM₃) minute and crowded in from tooth row.

RANGE: From Minas Gerais, Brazil, to British Honduras and Esperanza, Chiapas, Mexico. One species is recorded from Trinidad.

Trachops cirrhosus (Spix)

LIZARD-EATING OR FRINGE-LIPPED BAT

Plate 19, figures 1-3; text figures 42, 43

Vampyrus cirrhosus SPIX, 1823, Simiarum et vespertilionum Brasiliensium, p. 64.

Trachops cirrhosus, PETERS, 1865, Monatsber. Preussischen Akad. Wiss. Berlin, p. 512.

TYPE LOCALITY: Brazil; Pernambuco, according to Cabrera (1957, p. 69).

RANGE: Trinidad; recorded from southern Trinidad and appears to be rather uncommon.

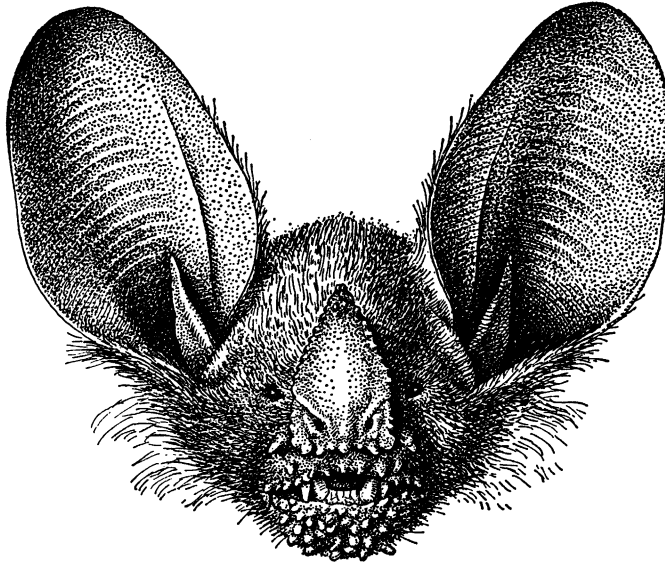


FIG. 42. Front view of head of *Trachops cirrhosus*. $\times 1\frac{1}{2}$.

GENERAL CHARACTERS: A rather large bat with relatively long and woolly pelage, fur extending down forearm for half of its length; nose leaf normal; ears large and erect; tail short and appearing on upper side of a broad interfemoral membrane; chin and lips conspicuously studded with conical or cylindrical, wart-like protuberances (fig. 43).

DESCRIPTION: General color of upper parts Cinnamon-Brown, varying to darker shades in some examples; under parts dull brownish tinged with grayish brown. Skull large and elongated; braincase large and elevated above rostrum, with a well-developed sagittal crest; teeth strong; outer upper incisors very small; lower incisors small, almost subequal in size and forming a continuous row between canines.

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

MEASUREMENTS AND WEIGHTS: Two males and one female from Trinidad: Length of forearm, 61.0–64.0. Skull: Adult male and female: greatest length, 29.3, 30.5; zygomatic breadth, 14.8, 15.5; interorbital constriction, 5.3, 5.4; maxillary tooth row, C–M³, 11.1, 11.3. Weights: Two males: 39.5, 37.2; one female, 40.1; two gravid females, 41.6, 43.0.

SPECIMENS RECORDED: *Trinidad:* Cap-de-Ville, one (A.M.N.H.); Edwards Trace, two (A.M.N.H.); Fyzabad, one (A.M.N.H.);

Parrylands Road, La Brea, one (A.M.N.H.); Peñal Rock Road, one (A.M.N.H.).

GENERAL HABITS: Small colonies of half a dozen individuals of both sexes have been taken in hollow trees in Trinidad. This bat has been found roosting in association with *Saccopteryx bilineata*, *Micronycteris megalotis*, *Carollia perspicillata*, and *Desmodus rotundus*. It is wary, easily disturbed, and readily takes flight when approached.

BREEDING: Three breeding males were taken on December 5, 1957; two gravid females, on March 13, 1959.

FOOD: The stomach contents of one specimen from Trinidad examined by the junior author showed the remains of unidentified flesh and small sharp bones. Stomach contents of a specimen from the Canal Zone,

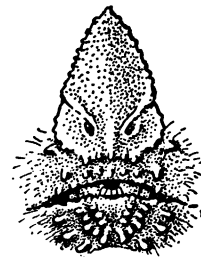


FIG. 43. Front view of chin and nose leaf of *Trachops cirrhosus*, showing conical papillae on chin and serrated edge of nose leaf.

Panama, contained numerous fragments of small bones, claws, and pieces of scaly skin of a gecko, which Charles M. Bogert, Chairman of the Department of Herpetology of the American Museum of Natural History, identified as *Thecadactylus rapicaudus*, a species that also occurs in Trinidad. In a note Bogert states that "with a small element of doubt I would say that you were safe in referring it to this species." This gecko is some 4 inches in head and body length, with an over-all length of about 6 inches. A further examination of the intestinal tract of the Trinidad specimen revealed fragments of tiny, round, hollow bones and a tail vertebra that closely resemble the remains of the gecko found in the Panama specimen.

DISEASE: Specimens examined were rabies-negative.

GENUS *VAMPYRUM* RAFINESQUE

GIANT SPEAR-NOSED BATS

Vampyrum RAFINESQUE, 1815, *Analyse de la nature*, p. 54. Type, *Vespertilio spectrum* Linnaeus.

Very large bats with tall narrow ears, sharply pointed at the tip, and no external tail; muzzle elongated; chin smooth.

RANGE: Tropical America from Bahia, Brazil, north to Veracruz, Mexico. One species is recorded from Trinidad.

Vampyrum spectrum spectrum (Linnaeus)

LINNAEUS' FALSE VAMPIRE, SPECTRAL,
OR GIANT SPEAR-NOSED BAT

Plate 18, figures 1-3; text figure 44

Vespertilio spectrum LINNAEUS, 1758, *Systema naturae*, ed. 10, p. 31.

Vampyrus spectrum, LEACH, 1822, *Trans. Linnean Soc.*, London, vol. 13, p. 80.

Vampyrum spectrum, SANBORN, 1949, *Jour. Mammal.*, vol. 30, p. 280.

Vampyrum spectrum spectrum, CABRERA, 1957, *Rev. Mus. Argentino Cien. Nat.* "Bernardino Rivadavia," cien. zool., vol. 4, no. 1, p. 70.

TYPE LOCALITY: South America; restricted to Surinam by Thomas (1911, p. 130).

RANGE: Trinidad; widely distributed but nowhere common.

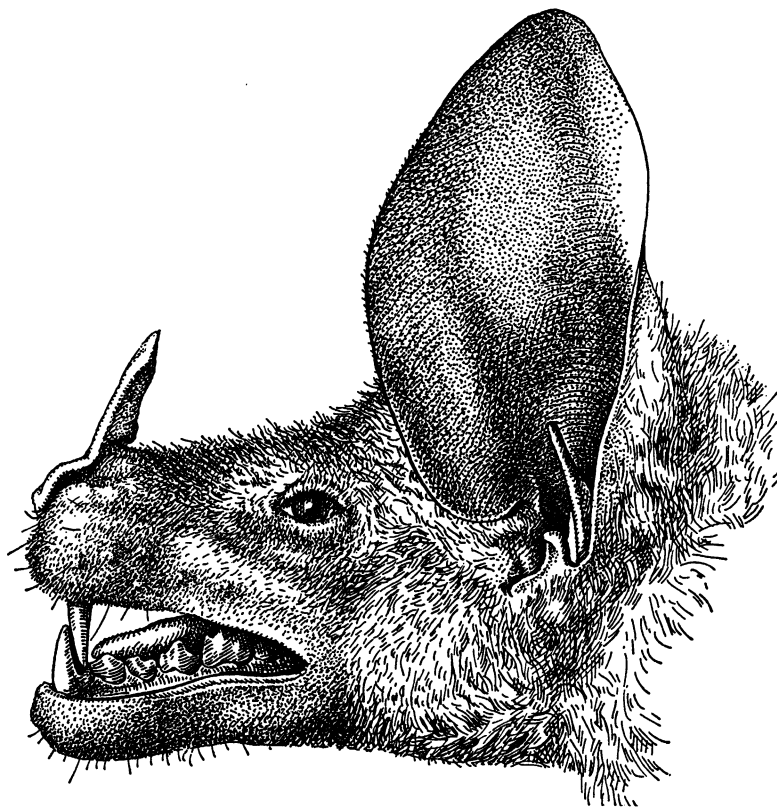


FIG. 44. Lateral view of head of *Vampyrum spectrum spectrum*. $\times 1\frac{1}{2}$.

GENERAL CHARACTERS: The largest bat found in Trinidad, with a wing spread of about 30 inches; muzzle elongated; nose leaf moderate, depressed at nostrils; ears large, separate, and relatively narrow; tail absent.

DESCRIPTION: General color of upper parts Bister, base of hairs buffy; under parts thinly covered with pale brownish hairs. Skull massive, elongate; sagittal crest well developed; teeth strong; inner upper incisors low and wide; outer incisors small and pushed slightly forward out of line of tooth row; lower incisors small and forming a continuous row between canines.

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

MEASUREMENTS AND WEIGHTS: Adult male and female from Trinidad: Length of forearm, 106.7, 109.2. Skull: Adult male: greatest length, 53.3; zygomatic breadth, 24.5; interorbital constriction, 7.9; maxillary tooth row, C-M³, 21.5. Weights: Four males, 147.0–174.1; three females, 150.8–184.9; one immature female, 155.2; one lactating female, 157.2.

SPECIMENS RECORDED: *Trinidad:* Cedros, two (A.M.N.H.); Maracas Valley, one (A.M.N.H.); Whiteland, Victoria, one (A.M.N.H.).

GENERAL HABITS: In Trinidad this bat has been found, in groups not exceeding five individuals of both sexes, roosting in the hollow trunks of the silk-cotton tree (*Ceiba pentandra*), the mora (*Mora excelsa*), and hog plum (*Spondias mombin*). Usually no other bat is found in a *Vampyrum* roost; however, a pair was found roosting in association with *Desmodus* in the Moruga area of south Trinidad.

BREEDING: On September 6, 1955, a non-breeding male flew into a house and was captured under a bed; a lactating female was taken May 9, 1959.

FOOD: This big false vampire is largely, if not entirely, carnivorous. Fur of mammals and feathers of birds have been found in the stomach of this bat, and the long bones of a bat have been found at the base of one roost. Wehekind (1956, p. 20) reports: "... on 12th July 1934 one was shot in a silk cotton tree at St. John's, Tunapuna ... the stomach was examined and only animal matter found; fur, feathers and bone ... at the foot of the tree

were feathers of blue birds and doves and a rodent's tail. On 20th of July two more were in the same tree. Their stomachs were opened and it was found they had fed on birds; the intestines were full of feathers and small bones." In captivity this bat thrives on raw meat, mice, and small chickens. It drinks water and soon becomes tame and gentle. A pair kept in captivity since May 19, 1958, have been fed four mice each, daily. The mouse is seized and held by the claw on the thumb and carried to the top of the cage to be eaten, the head being devoured first and the tail discarded.

PARASITES: Brennan and Jones (1960, p. 538) report the following species of the Trombiculidae (chiggers) from *Vampyrum spectrum*: *Trombicula vesperuginis*.

DISEASE: Specimens examined were rabies-negative.

FOLKLORE: In Trinidad the silk-cotton tree figures extensively in the supernatural beliefs of the natives. As this tree is pollinated by bats, and bats make their home in its hollow trunk or hang in the foliage, it is not surprising that bats are associated with a number of Trinidadian apparitions and ghosts. Perhaps best known in the folklore are the *douens* that flit about among the branches of the silk-cotton trees. They are believed to be little children who have died before they were baptized. They have no sex and no faces, their feet turn backward, and they are either naked or wear long white robes and large hats.

SUBFAMILY GLOSSOPHAGINAE GILL

NECTAR-FEEDING BATS

Text figure 45

Bats in this subfamily are rather small, with an elongate muzzle; small nose leaf; short, rounded ears; tail short or absent; long, highly extendible tongue, its surface having conspicuous, bristle-like papillae (fig. 45); and narrow and elongate cheek teeth.

KEY TO THE GENERA, SPECIES, AND SUBSPECIES OF THE GLOSSOPHAGINAE OF TRINIDAD AND TOBAGO

1. Two pairs of incisors in lower jaw 2
Incisors in lower jaw absent 3
2. Length of forearm, 33.0–39.0; length of upper tooth row, C-M³, 7.3 or less.
. *Glossophaga soricina soricina*

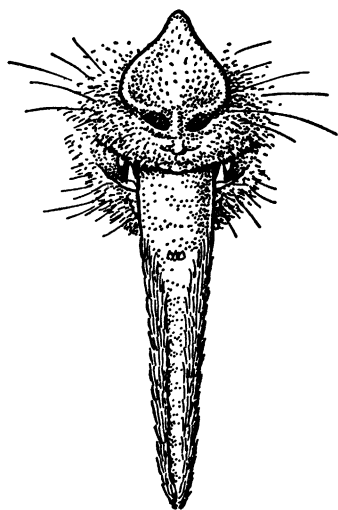


FIG. 45. Dorsal view of tongue of *Anoura geoffroyi geoffroyi*, showing bristle-like papillae on surface.

- Length of forearm, 39.0–41.0; length of upper tooth row, C–M³, 7.8 or over
 *Glossophaga longirostris major*
 3. External tail absent or rudimentary; length of forearm, 44.0–45.0
 *Anoura geoffroyi geoffroyi*
 Tail half of length of interfemoral membrane; length of forearm, 33.5–35.2
 *Choeroniscus intermedius*

GENUS *GLOSSOPHAGA* É. GEOFFROY-SAINT-HILAIRE

LONG-TONGUED BATS

Glossophaga É. GEOFFROY-SAINT-HILAIRE, 1818, Mém. Mus. d'Hist. Nat., Paris, vol. 4, p. 418. Type, *Vespertilio soricinus* Pallas.

Small, blackish or reddish brown, long-nosed bats with small triangular nose leaf, short ears, and two pairs of lower incisors.

RANGE: From Sonora, Mexico, the Bahama Islands and Jamaica, West Indies, south to Paraguay, northern Argentina, and São Paulo, Brazil. Two species are recorded from Trinidad; one is known from Tobago.

Glossophaga soricina soricina (Pallas)

COMMON OR LESSER LONG-TONGUED BAT

Plate 20, figures 1–3

Vespertilio soricinus PALLAS, 1766, Miscellanea zoologica, p. 48.

Glossophaga soricina, É. GEOFFROY-SAINT-HILAIRE, 1818, Mém. Mus. d'Hist. Nat., Paris, vol. 4, p. 418.

Glossophaga soricina soricina, MILLER, 1913, Proc. U. S. Natl. Mus. vol. 46, p. 418.

TYPE LOCALITY: Surinam.

RANGE: Trinidad; widely distributed and common.

GENERAL CHARACTERS: A small, long-nosed bat with short pelage; short tail that barely extends to the middle of a broad interfemoral membrane; notched lower lip.

DESCRIPTION: General color of upper parts dark brown varying in shades from Snuff Brown to Mummy Brown, base of hairs soiled whitish; under parts paler and duller in color than back. Skull with braincase large and elongate; rostrum low and weak and somewhat shorter than braincase; upper incisors well developed and projecting forward; crowns of inner incisors longer than high, cutting edges straight; outer upper incisors smaller than inner; lower incisors small, completely filling space between canines; molariform teeth small, elongate, with low crowns.

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

MEASUREMENTS AND WEIGHTS: Twenty specimens from Trinidad: Length of forearm, 33.1–39.1. Skull: Three females: greatest length, 21.0, 20.9, 20.5; zygomatic breadth, 9.2, 9.2, 9.3; interorbital width, 4.0, 4.0, 4.1; breadth of braincase, 8.5, 8.3, 8.3; maxillary tooth row, C–M³, 7.0, 7.3, 7.2. Weights: Twenty-eight males, 5.4–10.4; 53 females, 5.7–12.7, including 37 non-gravid females, 5.7–11.4, 12 gravid females, 9.9–12.7, four lactating females, 8.0–11.2.

SPECIMENS RECORDED: *Trinidad*: Cumuto Main Road, four (A.M.N.H.); Granville, one (A.M.N.H.); Green Hill, three (A.M.N.H.); Mainfield, Guayaguayare, four (A.M.N.H.); Moruga, one (A.M.N.H.); North Road, Tableland, one (A.M.N.H.); Peñal Rock Road, one (A.M.N.H.); Port-of-Spain, one (A.M.N.H.); Tabaquite-Rio Claro Road, three (A.M.N.H.); Sedass Road, Caroni, two (A.M.N.H.); Siparia, one (A.M.N.H.); Tous-saint Road, Las Lomas, one (A.M.N.H.); no exact locality, 43 (U.S.N.M.).

GENERAL HABITS: *Glossophaga soricina* is usually found in colonies of from 12 to 16 individuals of both sexes. It roosts in well-lighted caves, hollow trees, and under bridges, culverts, and tunnels. It has been taken inside buildings, under houses, and in sheds used for

drying cocoa and tonka beans. It has been found roosting in association with *Saccopteryx bilineata*, *Noctilio leporinus*, *Micronycteris megalotis*, *Micronycteris hirsuta*, *Carollia perspicillata*, *Desmodus rotundus*, *Diaemus youngi*, and *Myotis nigricans*. This bat is wary and a rapid flier, and it can hover to some extent.

BREEDING: Breeding males have been taken in February, March, and August; gravid females in January, April, May, June, and December; lactating females in January, February, March, and June; females with young, in January, March, and June.

FOOD: Stomach contents of this bat have shown fruit juices mixed with some very small insects which had probably been trapped in nectar. This species has been seen to settle on calabash flowers (*Crescentia cujete*). It does not appear to be strictly a nectar-feeder, as specimens are frequently found with broken incisor teeth which perhaps had been broken off as the bat attempted to chew on a hard seed. Occasionally specimens are found with a yellowish stain, probably from the juice of fruit such as the mango. In captivity it feeds on soft bananas, mangoes, and pawpaw.

PARASITES: Jobling (1949, p. 322) reports the following species of the Streblidae (bat flies) from Trinidad *Glossophaga soricina*: *Euctenodes mirabilis*. The Trinidad Regional Virus Laboratory (1958, p. 94) lists the following species of the Streblidae (bat flies) from Trinidad *Glossophaga soricina*: *Speiseria ambigua* and *Trichobius dugesii*. Brennan and Jones (1960, p. 538) report the following species of the Trombiculidae (chiggers) from Trinidad *Glossophaga soricina*: *Euschöngastia colombiae*.

DISEASE: Specimens examined were rabies-negative.

***Glossophaga longirostris major* Goodwin**

TRINIDADIAN OR GREATER LONG-TONGUED BAT

Plate 20, figures 4–6; text figure 46

Glossophaga major GOODWIN, 1958, Amer. Mus. Novitates, no. 1877, p. 5.

TYPE LOCALITY: Woodbrook, Port-of-Spain, Trinidad, West Indies.

RANGE: Tobago; not uncommon. Trinidad; not uncommon.

GENERAL CHARACTERS: A medium-sized long-nosed bat similar to *Glossophaga soricina* but larger, with a longer rostrum and longer skull.

DESCRIPTION: General color of upper parts Prout's Brown, this color lightened by paling tips of hairs; under parts Cinnamon Brown, overlain with sooty black on chin, throat, and chest. Skull long and narrow, with an elongate braincase and slender rostrum.

MEASUREMENTS AND WEIGHTS: Ten females from Tobago: Length of forearm, 38.8–41.0. Skull: Four females from Tobago: greatest length, 22.3–23.3; zygomatic breadth, 9.4–9.6; interorbital constriction, 4.5–5.0; breadth of braincase, 8.4, 8.5; maxillary tooth row, C–M³, 7.6–7.9. Fourteen females from Trinidad: length of forearm, 38.4–41.8. Skull: Ten females: greatest length, 22.0, 24.0; zygomatic breadth, 9.5, 10.0; interorbital constriction, 4.7–5.0; breadth of braincase, 8.7–8.8; maxillary tooth row, C–M³, 7.8–8.4. Weights: Four males from Trinidad, 9.7–13.4; two immature males, 10.5, 12.2; five females, 9.7–13.0; seven gravid females, 12.4–18.9; four gravid females from Patos Island, Venezuela: 9.8–15.2.

SPECIMENS RECORDED: *Tobago:* Government House, Scarborough, eight (A.M.N.H.); Orange Hill Road, two (A.M.N.H.); Little Tobago, three (A.M.N.H.). *Trinidad:* Port-of-Spain, 14 (A.M.N.H.); two (M.C.Z.); Point Fortin, one (A.M.N.H.).

GENERAL HABITS: The behavior of this bat is very similar to that of *Glossophaga soricina*. It roosts in small colonies in well-lighted caves and buildings, such as schools, churches, sugar mills, and drying sheds. On Tobago it has been found roosting in associa-

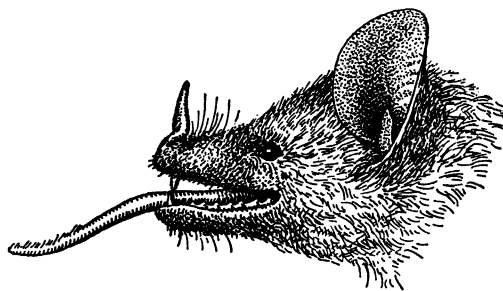


FIG. 46. Lateral view of head of *Glossophaga longirostris major*. $\times 1\frac{3}{4}$.

tion with *Peropteryx macrotis*, *Micronycteris megalotis*, *Phyllostomus hastatus*, and *Carollia perspicillata*. It does not seem to be easily disturbed, as numbers have been seen hanging from the rafters of a schoolroom when class was in session.

BREEDING: A female with a single young was taken on September 3, 1956. One breeding male and four gravid females were taken on March 10, 1956, three of the fetuses measuring in total length: 14.2, 18.9, 23.0. Six gravid females were taken in February, March, April, and August; four gravid females, on March 5, 1958, on Patos Island, Venezuela.

FOOD: This bat feeds on fruit pulp and fruit juices mixed occasionally with some small insects and some nectar.

DISEASE: Specimens examined were rabies-negative.

REMARKS: *Glossophaga major* was based on an individual with a skull that had the braincase depressed. The material now available from Trinidad and Tobago indicates that the island specimens average considerably larger than the typical form from the mainland. Seven specimens out of 14 from Trinidad have the length of the forearm 40.4 mm. or over, and five out of 10 from Tobago, 40.0 or over. The present series is darker in color than specimens from the mainland and has the chin, throat, and chest overlain with sooty black. The skulls of the Trinidad and Tobago specimens have a larger and more rounded braincase than those from the mainland, giving the impression of a longer rostrum. The Trinidad and Tobago specimens seem to be sufficiently characterized to justify their recognition as a subspecific form of *G. longirostris*.

GENUS ANOURA GRAY

LONG-NOSED, TAILLESS BATS

Anoura GRAY, 1838, Mag. Zool. Bot., vol. 2, p. 490. Type, *Anoura geoffroyi* Gray.

Resembling *Glossophaga* in external appearance but larger, with no external tail and no lower incisors.

RANGE: From Nayarit and Veracruz, Mexico, south to Peru and São Paulo, Brazil. One species is recorded from Trinidad.

Anoura geoffroyi geoffroyi Gray

TAILLESS, LONG-TONGUED, OR GEOFFROY'S LONG-NOSED BAT

Plate 21, figures 1-3; text figures 45, 47, 48

Anoura geoffroyi GRAY, 1938, Mag. Zool. Bot., vol. 2, p. 490.

Anoura geoffroyi geoffroyi, SANBORN, 1933, Publ. Field Mus. Nat. Hist., zool. ser. vol. 30, p. 26.

TYPE LOCALITY: Brazil, probably Rio de Janeiro (Sanborn, 1933, p. 26).

RANGE: Trinidad; common in Northern and Central ranges.

GENERAL CHARACTERS: A medium-sized, dark-colored bat with notched lower lip; a long nose; small, rounded ears; no external tail; short calcar; very narrow and well-haired interfemoral membrane (fig. 48); fur of the body extending down forearm for about half of its length.

DESCRIPTION: General color of upper parts Mummy Brown, base of hairs soiled whitish, under parts about color of back. Skull with a large, low, smooth braincase; rostrum shorter than braincase, low and weak; zygomatic arches incomplete; upper incisors minute, in pairs close together; outer larger than inner; inner incisors widely separated from each other; lower incisors absent.

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

MEASUREMENTS AND WEIGHTS: Fifteen males from Trinidad: Length of forearm, 40.0-44.0. Skull: One male: greatest length, 24.8; zygomatic breadth, 11.2; interorbital constriction, 5.0; maxillary tooth row, C-M³, 9.5. Weight: Thirty-two males: 12.6-17.7; 20 females, 11.3-16.2; 30 gravid females (well advanced), 14.7-22.9; 16 male fetuses, 1.5-



FIG. 47. Lateral view of head of *Anoura geoffroyi geoffroyi*. $\times 1\frac{1}{4}$.

4.8; 15 female fetuses, 3.1–5.2; at birth (weights and total lengths, respectively), one male, 5.7, 40.9; three females, 5.3, 40.0; 4.5, 41.9; 50.0, 41.0.

SPECIMENS RECORDED: *Trinidad:* Arima Valley, three (A.M.N.H.); Caves of Aripo, eight (A.M.N.H.). Mt. Tamana Caves, three (A.M.N.H.); Port-of-Spain, one (U.S.N.M.).

GENERAL HABITS: This species appears to be strictly a cave bat. Males and females hang together in tight clusters, usually in a scooped-out depression of the cave ceiling, in numbers of up to about 15 individuals. It usually prefers the well-lighted portions of the cave but does not hang so close to the entrance as *Carollia*. In the Mt. Tamana Caves it was found roosting in association with *Chilonycteris rubiginosa*, *Pteronotus davyi*, *Mormoops megalophylla*, *Phyllostomus hastatus*, *Carollia perspicillata*, and *Natalus tumidirostris*, and with *Lonchorhina aurita* and *Desmodus rotundus* elsewhere. In the Heights of Aripo Caves it is found with the guacharo or oil bird (*Steatornis caripensis*). On March 20, 1955, an estimated 500 birds occupied the caves, and *Anoura* was found 100 feet farther in than the last of the birds, about 50 feet below them where the cave sloped downward, in total darkness and where sections of the cave constantly dripped moisture. The elevation of this cave is about 2500 feet, and the temperature is 60° F. The Aripo Caves are located in the heart of the Montane Rain Forest, the haunt of the howling monkey and the bushmaster.

In flight *Anoura* is swift and can hover. As most cave-dwelling bats, it can do a quick back-flip when alighting, grasping the cave

roof with the claws of the hind feet. It has been seen to hover in a cage 8 inches by 8 inches by 10 inches for from 10 to 15 seconds. *Anoura* has a strong musky odor and an extraordinarily long tongue which when fully extended measures from 44 mm. to 65 mm., actually longer than the head and body length.

BREEDING: On October 17, 1954, at Mt. Tamana Caves 30 individuals of *Anoura* were collected; 29 were males. There were other females in the cave, but no young were seen. On June 12, 1956, in the same caves, 45 were collected, of which 20 were males and 25 were females; no young were seen. On November 20, 1957, 88 were collected, of which 32 were males and 56 were gravid females with the fetuses in advanced stages of development. Because of the disturbance made by the collectors, there were a number of premature deliveries of young which should have been born about a week later. Four of the deliveries were apparently normal.

FOOD: *Anoura* feeds on nectar and the soft pulp of ripe fruit. It has survived for two months in captivity on the soft parts of the pawpaw.

PARASITES: Jobling (1949, p. 322) reports the following species of the Streblidae (bat flies) from Trinidad *Anoura geoffroyi*: *Trichobius mixtus* and *Aspidoptera clovisi*. The Trinidad Regional Virus Laboratory (1958, pp. 94, 99) lists the following streblids and ticks from Trinidad *Anoura geoffroyi*: *Speiseria ambigua*, *Trichobius dugesii*, and *Ixodes downsi*.

DISEASE: Specimens examined were rabies-negative.

GENUS CHOERONISCUS THOMAS

LONG-NOSED, TAILED BATS

Choeroniscus THOMAS, 1928, Ann. Mag. Nat. Hist., ser. 10, vol. 1, p. 122. Type, *Choeronycteris minor* Peters.

Muzzle long, very slender; tail short; in general like *Glossophaga* but without incisors in lower jaw.

RANGE: From Oaxaca, Mexico, south to Peru, Ecuador, Amazonas, Brazil, and Surinam. One species is recorded from Trinidad.

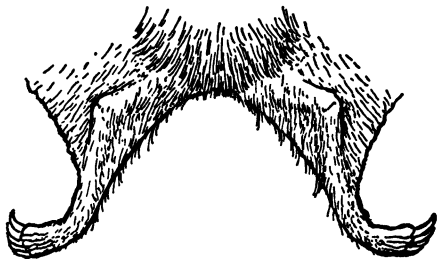


FIG. 48. Dorsal view of hind limbs of *Anoura geoffroyi geoffroyi*, showing narrow interfemoral membrane.

Choeroniscus intermedius (J. A. Allen
and Chapman)

TRINIDADIAN LONG-NOSED, TAILED BAT

Plate 21, figures 4-6; text figures 49, 50

Choeronycteris intermedia J. A. ALLEN AND
CHAPMAN, 1893, Bull. Amer. Mus. Nat. Hist.,
vol. 5, art. 13, p. 207.

[*Choeroniscus*] *intermedia*, THOMAS, 1928, Ann.
Mag. Nat. Hist., ser. 10, vol. 1, p. 122.

TYPE LOCALITY: Princetown (= Princes
Town), Trinidad, West Indies.

RANGE: Trinidad; very scarce.

GENERAL CHARACTERS: A small, dark-
colored bat with an exceptionally long
muzzle, notched lower lip, very small tri-
angular nose leaf, and short tail. The female
of this species is larger than the male.

DESCRIPTION: General color of upper parts
rather darker than Mummy Brown, the hairs
Light Drab from base for three-quarters of
their length and tipped with Mummy Brown;
under parts scarcely paler than back, the
hairs unicolored. Skull very long and slender,
rostrum narrow and delicate but less than
half of the length of the skull; hamular
processes of pterygoids inflated and in con-
tact with audital bullae (fig. 50); teeth small,
delicate, and uniformly spaced; upper in-
cisors minute, inner incisors widely separated
from each other; lower incisors absent; upper
and lower premolars low, long, narrow, and
widely separated from one another.

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

MEASUREMENTS AND WEIGHTS: Skin and
skull of the type (a female), an adult female,
and a male from Trinidad: Length of forearm,
34.5, 35.2, 33.5. Skull: Greatest length, 22.4,
22.7, 21.4; breadth of braincase, 8.3, 8.2, 8.4;
interorbital breadth, 3.8, 3.5, 3.4; maxillary
tooth row, C-M³, 7.8, 7.9, 7.5. Weights: One

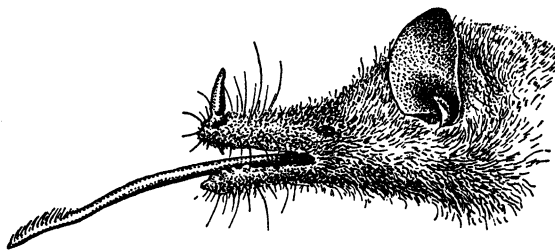


FIG. 49. Lateral view of head of *Choeroniscus intermedius*. $\times 1\frac{1}{2}$.

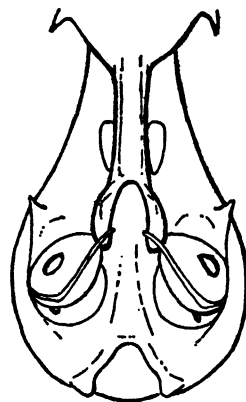


FIG. 50. Palate of *Choeroniscus intermedius*, showing hamular processes of pterygoids inflated and in contact with bullae.

gravid female, 7.8; one male, 4.6.

SPECIMENS RECORDED: *Trinidad*: Princes
Town, one (A.M.N.H.); Sangre Grande, one
(A.M.N.H.); Irois Forest, St. Patrick
County, one (A.M.N.H.).

GENERAL HABITS: Colin Sanborn (1954, p.
290) states that, in a colony of eight speci-
mens of *Choeroniscus* (probably *inca*), two
males and six females were found roosting on
the under side of a fallen tree that lay over a
stream through a deep gully, at Chimanta-
tepuí, Venezuela.

BREEDING: A gravid female from Trinidad
was taken August 16, 1958. On February 5,
1923, a gravid female of *Choeroniscus inca*
was taken by Herbert Lang at Kamakusa,
British Guiana.

FOOD: This bat is probably to some extent
a nectar feeder, its long muzzle and long ex-
tensible tongue being especially suitable to
lap up the liquid at the bottom of large, night-
blooming flowers. Microscopical examina-
tion of the stomach contents of one specimen,
however, revealed some minute particles that
are possibly pollen, some that may be crystal-
lized honey or fruit juice, many fragments of
a coleopterous insect, and numerous brown
and white, hair-like strands, probably either
from insects or from fruit. This specimen, at
least, had fed to a large extent on insects.

REMARKS: J. A. Allen, when he and Chap-
man described *Choeroniscus intermedia*, had
three specimens from Princes Town, Trini-
dad: the type, which is a somewhat faded fe-
male and possibly was prepared from a

pickled specimen, and two in spirits, both males. The last-named two cannot be located at the present time.

Allen gave the forearm lengths of the Trinidad specimens as male, 33.5, and female, 34.5, but apparently he measured the radius. The exact status of *Choeroniscus minor* (Peters) from Surinam cannot be determined, as the type was destroyed during the second World War. The sex of the type is not known, and cranial measurements have not been published. If the type of *C. minor* was a female, then it could be closely allied to *C. intermedia*, but if a male, it could be close to or the same as the specimens we now know as *Choeroniscus inca* (Thomas), because males of that species are considerably smaller than females. The forearm length in male specimens of *C. inca* is about the same as in females of *intermedia*. A large female *Choeroniscus inca* (forearm, 36.8) has been taken in British Guiana.

SUBFAMILY CAROLLINAE MILLER

TRICOLORED SHORT-TAILED FRUIT BATS

Medium-sized, robust bats with a short tail; pelage distinctly tricolored; calcar shorter than foot without claws; ears falling short of tip of nose when laid forward, a naked warty pad on lower lip; two pairs of lower incisors.

GENUS CAROLLIA GRAY

LESSER SHORT-TAILED FRUIT BATS

Carollia GRAY, 1838, Mag. Zool. Bot., vol. 2, p. 488. Type, *Carollia braziliensis* Gray [= *Vespertilio perspicillatus* Linnaeus].

Dusky or reddish brown muscular bats with upper incisors strongly contrasting in size, the outer minute; canines low, strong, and simple in form; premolars rather narrow, with well-developed main cusps and cutting edges.

RANGE: From San Luis Potosi and Colima, Mexico, Jamaica, West Indies, south to Ecuador, Peru, and Mato Grosso, Brazil. One species is recorded from Trinidad and Tobago.

Carollia perspicillata perspicillata (Linnaeus)

LINNAEUS' SHORT-TAILED FRUIT BAT

Plate 23, figures 1-3; text figures 51, 52

Vespertilio perspicillatus LINNAEUS, 1758, Systema naturae, ed. 10, vol. 1, p. 31.

Hemiderma perspicillatum, THOMAS, 1901, Ann. Mag. Nat. Hist., ser. 7, vol. 8, p. 192.

Carollia perspicillata perspicillata, MILLER, 1924, Bull. U. S. Natl. Mus., vol. 128, p. 53.

TYPE LOCALITY: Surinam (see Thomas, 1911, p. 130).

RANGE: Tobago; common and widely distributed. Trinidad; common and widely distributed.

GENERAL CHARACTERS: A medium-sized bat with rather short ears; small, pointed nose leaf; tail reaching to about the middle of a naked, moderately developed, interfemoral membrane; forearm furred along outer side near base; naked pad on lower lip V-shaped, with a large central wart bordered by a row of small, rounded warts (fig. 52).

DESCRIPTION: General color varying from grayish to brown, with some specimens chestnut; the fur tricolored, dark brown at base, followed by a wide band of whitish or bright Ochraceous-Buff and broadly tipped by the prevailing color of the individual; under parts slightly paler than back, the fur more or less unicolored to roots. Skull strongly built, with a short rostrum; upper incisors completely filling space between canines; inner upper incisors relatively large; outer incisors minute; lower incisors small, notched, and forming a slightly convex row between canines; premolars rather narrow, with well-developed main cusps.

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

MEASUREMENTS AND WEIGHTS: Thirty specimens from Trinidad: Length of forearm, 40.0-44.5. Skull: Adult male and female: greatest length, 22.9, 22.6; zygomatic breadth, 11.5, 11.4; interorbital constriction,



FIG. 51. Front view of head of *Carollia perspicillata perspicillata*. $\times 1\frac{1}{2}$.



FIG. 52. Lower lip of *Carollia perspicillata* *perspicillata*, showing pattern of warts.

6.0, 5.5; maxillary tooth row, C-M³, 7.5, 7.6. Weights: Fifty-nine males, 12.5–19.9; 83 females, 11.3–23.1, including 53 non-gravid females, 11.3–21.2, 16 gravid females, 14.5–23.1, 14 lactating females, 13.5–19.9.

SPECIMENS RECORDED: *Tobago*: Fort George, Scarborough, three (A.M.N.H.); Milford Bay, two (M.C.Z.); Mt. Pleasant, St. Patrick School, one (A.M.N.H.); Orange Hill Estate, two (A.M.N.H.); Little Tobago, one (A.M.N.H.). *Trinidad*: Arima Valley, 20 (A.M.N.H.); Blue Basin village, Diego Martin, one (A.M.N.H.); Brazil Arena, east of Talparo Estate, four (A.M.N.H.); Caparo Valley Road, one (A.M.N.H.); Siparia, one (A.M.N.H.); Douglas Road, Moruga, one (A.M.N.H.); Gasparillo, Santa Cruz, four (A.M.N.H.); Heights of Guanapo, one (A.M.N.H.); John's Road, Nariva, six (A.M.N.H.); Port-of-Spain, 26 (U.S.N.M.); Santa Cruz, 10 (A.M.N.H.); Ravine Sable, Extension Road, one (A.M.N.H.).

GENERAL HABITS: This bat roosts in colonies of more than 100 individuals of both sexes in a wide variety of places. It has been found in caves, hollow trees, tunnels, in wells, mine shafts, old machinery, drying sheds, and on the under side of leaves. It has been found roosting in association with *Saccopteryx bilineata*, *S. leptura*, *Noctilio leporinus*, *Chilonycteris rubiginosa*, *Pteronotus davyi*, *Mormoops megalophylla*, *Lonchorhina aurita*, *Micronycteris megalotis*, *M. hirsuta*, *M. brachyotis*, *M. nicefori*, *Phyllostomus discolor*, *P. hastatus*, *Trachops cirrhosus*, *Glossophaga soricina*, *G. longirostris*, *Anoura geoffroyi*, *Artibeus jamaicensis*, *A. lituratus*, *Natalus tumidirostris*, *Desmodus rotundus*, *Diaemus youngi*, and *Myotis nigricans*. In dark caves *Carollia* is not easily disturbed. Colonies may roost closely packed together, or individuals may hang separately. The bat is a rapid flier and flies in a straight line from the roost to feeding grounds, and when avoiding intervening objects it swerves suddenly and defecates in flight as it turns. The result is that

walls and houses are frequently spattered with feces.

BREEDING: Gravid females have been taken in February, March, April, May, June, July, August, and October; breeding males, in February, April, May, June, July, and September; lactating females, in all the months from May to October; single young in January, May, June, July, and August; males only, in some roosts, in January, February, and June; females only with young, in some roosts in January, April, and October. In Tobago a female with a single young was taken on September 3, 1956.

FOOD: *Carollia perspicillata* probably feeds twice during each night. This bat leaves the daytime roost shortly after dusk to forage for food. It eats a variety of fruits from the following trees: sapodillo (*Achras zapota*), mamee sapote (*Calocarpum mammosum*), papaya (*Carica papaya*), bois canot (*Cecropia peltata*), fustic (*Chlorophora tinctoria*), star apple (*Chrysophyllum cainito*), sea grapes (*Coccoloba uvifera*), coffee (*Coffea* spp.), tonka bean (*Dipteryx odorata*), primrose (*Eugenia jambos*), pomeac (*Eugenia malaccensis*), Ceylon willow (*Ficus benjamina comosa*), mango (*Mangifera indica*), balata (*Manilkara bidentata*), chenet (*Melicocca bijuga*), banana (*Musa* spp.) bay tree (*Pimenta racemosa*), jumbie candle (*Piper* spp.), penny piece (*Pouteria multiflora*), guava (*Psidium guajava*), soap berry (*Sapindus saponaria*), hog plum (*Spondias mombin*), and almond (*Terminalia catappa*). If the fruit is large, the bat eats it while hanging on the tree; if small, the fruit is plucked and carried by the bat to a temporary roost, called a "digesting place," to be eaten. The choice of these feeding stations varies. One favored spot appears to be mosquito nets, and the bats drop debris down the sides of people's beds. Some fruit is carried to the regular daytime roost. In captivity the bat thrives on a wide variety of fruit. It is a wasteful feeder but is important in the natural dissemination of a great many fruits and seeds.

PARASITES: Jobling (1949, p. 322) reports the following species of the Streblidae (bat flies) from Trinidad *Carollia perspicillata*: *Trichobius dugesii*, *Speiseria ambigua*, and *Euctenodes mirabilis*. The Trinidad Regional Virus Laboratory (1958, p. 94) lists the fol-

lowing species of the Streblidae (bat flies) from Trinidad *Carollia perspicillata*: *Trichobius parasiticus*. Brennan and Jones (1960, p. 538) report the following species of the Trombiculidae (chiggers) from Trinidad *Carollia perspicillata*: *Beamerella acutascuta*, *Euschöngastia anops*, *E. colombiae*, *E. desmodus*, and *Trombicula vesperuginis*.

DISEASE: *Carollia perspicillata* is one of the bats that is frequently found to be infected with rabies on Trinidad and one of the species most commonly found in roosts with rabies-positive *Desmodus*. No rabies-positive specimens have been recorded from Tobago. *Histoplasma capsulatum* was isolated from tree roosts occupied by *Saccopteryx bilineata* and *Desmodus*.

REMARKS: A specimen from the Heights of Guanapo is a partially albino subadult female, with white wings and under parts extensively white. An off-color specimen from Arima is Tawny-Olive, with light-colored ears and flying membrane. A captive *Carollia* was bitten by a *Desmodus* on the back, leaving a small wound that scarified. Four days later, the hair dropped from the area, leaving a bare spot 40 mm. by 25 mm.

SUBFAMILY STURNIRINAE MILLER

HAIRY-LEGGED TAILLESS BATS

Medium-sized, robust bats with no external tail, calcar rudimentary; interfemoral membrane very narrow and well haired.

KEY TO THE SPECIES AND SUBSPECIES OF THE STURNIRINAE OF TRINIDAD AND TOBAGO

- Pelage bicolored, hair buffy from base and tipped with dark brown; crowns of upper molars occupied by a deep, longitudinal groove; length of forearm, 40.5–43.6 . . . *Sturnira lilium lilium*
 Pelage tricolored, dusky at base, followed by a pale buffy band and tipped with dark brown; crowns and upper molars occupied by a shallow, longitudinal groove; length of forearm, 45.1–46.0 *Sturnira tildae*

GENUS STURNIRA GRAY

EPAULET BATS

Sturnira GRAY, 1842, Ann. Mag. Nat. Hist., vol. 10, p. 257. Type, *Sturnira spectrum* Gray [= *Phyllostoma lilium* É. Geoffroy-Saint-Hilaire].

Patch of stiff yellowish or reddish hairs on shoulders marking glandular openings.

RANGE: Tamaulipas and Jalisco, Mexico,

Jamaica and island of Dominica in the West Indies, south to the Guianas, Ecuador, Peru, Argentina, and possibly Chile. Two species are recorded from Trinidad.

SUBGENUS STURNIRA GRAY

SHORT-FACED EPAULET BATS

Sturnira GRAY, 1842, Ann. Mag. Nat. Hist., vol. 10, p. 257. Type, *Sturnira spectrum* Gray [= *Phyllostoma lilium* É. Geoffroy-Saint-Hilaire].

Differing from the subgenus *Sturnirops* Goodwin in having a shorter and broader skull, with the interorbital region not elongated.

Sturnira lilium lilium (É. Geoffroy-Saint-Hilaire)

PARAGUAYAN YELLOW-SHOULDERED BAT

Plate 22, figures 1–3; text figures 53–55

Phyllostoma lilium É. GEOFFROY-SAINT-HILAIRE, 1810, Ann. Mus. d'Hist. Nat. Paris, vol. 15, p. 181.

Sturnira lilium, GERVAIS, 1855 [1856], Mammifères, in Castelnau, Expédition dans les parties centrales d l'Amerique du Sud, . . . pt. 7, Zoologie, vol. 1, p. 39.

Sturnira lilium lilium, GOLDMAN, 1917, Proc. Biol. Soc. Washington, vol. 30, p. 116.

TYPE LOCALITY: Paraguay.

RANGE: Trinidad; Northern Range, but the distribution may be wider.

GENERAL CHARACTERS: A medium-sized bat with short ears, normal nose leaf, no external tail, interfemoral membrane very narrow and well furred; hind limbs and feet haired to base of toes (fig. 54); forearm lightly furred; pelage relatively short, soft, and full.

DESCRIPTION: Color of an adult male from Trinidad: upper parts Mummy Brown, the

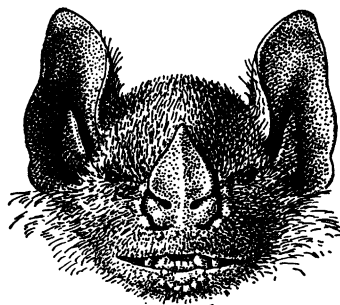


FIG. 53. Front view of head of *Sturnira lilium lilium*. $\times 1\frac{1}{2}$.

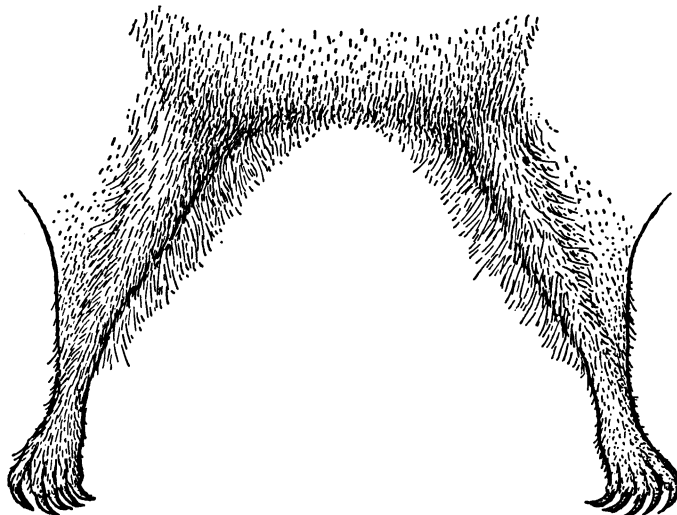


FIG. 54. Dorsal view of hind limbs of *Sturnira lilium lilium*, showing hairy limbs and feet.

hairs Pinkish Buff from base and broadly tipped with Mummy Brown; shoulder patches Russet; under parts Saccardo's Umber. Skull short and rounded; rostrum short and broad; sagittal crest finely developed; inner upper incisors large, with crowns higher than long; outer upper incisors low and barely extending above cingulum of canines, longer than high; lower incisors small, closely crowded between canines, their cutting edges trilobate; upper premolars with a triangular outer cusp, styles slightly developed, and a small posterior cusp; upper molars quadrate in outline and slightly broader than long, the main portion of the crowns occupied by a deep longitudinal groove (fig. 55), second molar smaller than first, third molar about one-third of the size of second.

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

MEASUREMENTS AND WEIGHTS: Adult male and female from Trinidad, and two adult males from Sapacay, Paraguay (in parentheses): Length of forearm, 43.6, 40.5, (42.5,

43.3). Skull: Greatest length, 22.5, 21.8 (22.1, 22.6); zygomatic breadth, 13.5, 13.2 (13.7, 14.0); breadth of braincase, 10.35, 10.1 (10.4, 10.4); interorbital constriction, 6.0, 5.8 (6.0, 6.1); maxillary tooth row, C-M³, 6.7, 6.5 (6.7, 6.9). Weights: One male, 19.3; one female, 16.1.

SPECIMENS RECORDED: *Trinidad*: Water Fall Road, Maracas, one (A.M.N.H.); Guayaguayare, Mayaro County, two (U.F.); 15 $\frac{3}{4}$ -mile mark on Churchill-Roosevelt Highway, one (A.M.N.H.).

GENERAL HABITS: *Sturnira* normally roost in hollow trees, but one specimen was found in a cave, and others have been taken in houses. The two American Museum of Natural History specimens were trapped in mist nets.

BREEDING: The shoulder glands on a male taken on March 21, 1958, discharged a strong, sweetish, musky odor.

FOOD: Fruit; the Trinidad specimens had some unidentified fruit seeds in the stomach.

REMARKS: *Sturnira lilium* is a wide-ranging species represented by several geographical forms. The subspecific status of the Trinidad specimens is provisional, pending a review of the genus by Luis de la Torre.



FIG. 55. Upper teeth of *Sturnira lilium lilium*, showing deep groove on crowns of molars and front view of incisors.

Sturnira tildae De la Torre

TRINIDADIAN YELLOW-SHOULDERED BAT

Plate 22, figures 4-6; text figure 56

Sturnira tildae DE LA TORRE, 1959, Nat. Hist. Misc., Chicago Acad. Sci., no. 166, p. 1.

TYPE LOCALITY: Arima Valley, Trinidad, West Indies.

RANGE: Trinidad; widely distributed but not common.

GENERAL CHARACTERS: Similar to *Sturnira lilium* but larger, smaller than *S. ludovici*, and differing from both species in cranial and dental characters.

DESCRIPTION: Upper parts of type Chestnut-Brown, the hairs long and silky, with a very narrow whitish band at base followed by a broader dark grayish band, then a band of Pale Pinkish Buff, and finally tipped with Chestnut-Brown; under parts pale olive brown to roots of hair; shoulder patches Pale Tawny. Color and pelage of an adult female from Maracas River strikingly different from those of type, bases of hairs darker than in type, light band broader and whiter, and tips of hairs Mummy Brown, giving pelage a strongly tricolored effect. Skull larger than that of *S. lilium*, inner upper incisors bilobed, with lobes of equal size. Lingual cusps of upper molars indistinct from one another and low in height, forming a low lingual ridge, resulting in a broad, shallow, U-shaped, occlusal surface (fig. 56), or shallow, longitudinal groove contrasting with the relatively deep groove in *lilium*. Second upper molar in *lilium* and *ludovici* possessing a small cusp located posteriomediaally from larger posterior and labial cusp of tooth; in *tildae* this small cusp further reduced to a small tubercle connected by a low ridge with apex of anterior-most labial cusp. Lower incisors faintly trilobed, median lobe equal in height to lateral lobes of tooth. Third upper and lower molars proportionately larger in *tildae* than in *lilium* or *ludovici*.

MEASUREMENTS AND WEIGHTS: Two adult males and two adult females from Trinidad: Length of forearm, 45.8, 46.0, 45.1, 46.0. Skull: Greatest length, 23.5, 24.4, 23.3, 23.2; zygomatic breadth, 14.1, 14.5, 13.9, 14.1;

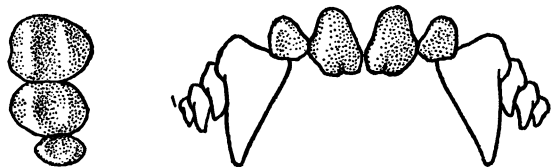


FIG. 56. Upper teeth of *Sturnira tildae*, showing shallow groove on crowns of molars and front view of incisors.

interorbital constriction, 6.2, 6.4, —, 6.3; interorbital breadth 6.6, 6.7, 6.3, 6.4; maxillary tooth row, C-M³, 7.1, 7.1, 7.1, 7.1. Weights: Adult female (including a large fetus, 2.2), 25.6.

SPECIMENS RECORDED: *Trinidad*: Arima Valley, one (A.M.N.H.); Maracas River near Water Fall Road, Maracas, one (A.M.N.H.); Plaisance, Mayaro Bay, one (C.N.H.M.); Rio Claro, one (A.M.N.H.).

FOOD: The Maracas River specimen taken March 12, 1958, had purplish fruit juice in its stomach.

BREEDING: A female taken March 12, 1958, contained a large fetus.

DISEASE: Specimens examined were rabies-negative.

SUBFAMILY STENODERMINAE GILL

BROAD-FACED, WHITE-LINED BATS

Small to large-sized, robust bats with a short, broad muzzle, narrow interfemoral membrane, no external tail, white facial or median dorsal lines usually present, absent in *Centurio* and *Ametrida*, molar teeth with broad crushing surfaces and well-developed cusps rising from flattened crowns.

KEY TO THE GENERA, SPECIES, AND SUBSPECIES OF THE STENODERMINAE OF TRINIDAD AND TOBAGO

1. Face naked and covered with fleshy dermal outgrowths, nose leaf rudimentary (length of forearm, 43.5–44.5) . . . *Centurio senex*
Face not naked or covered with fleshy dermal outgrowths, nose leaf normal. 2
2. Nasal bones absent 3
Nasal bones present. 4
3. Inner upper incisors long, placed vertically in tooth row (length of forearm, 46.5–48.0) *Chiroderma villosum*
Inner upper incisors short, placed obliquely in tooth row; length of forearm, 40.5. *Chiroderma trinitatum*
4. Inner upper incisors with cutting edges notched 5
Inner upper incisors with cutting edges entire 9
5. Upper incisors with cutting edges trilobate (length of forearm, 38.0–40.0).
Upper incisors with cutting edges bilobate. 6
Upper incisors crowded between canines (length of forearm, 40.0–43.0).
Upper incisors separate from each other and from canines 7

7. Length of forearm, more than 60 (64.5–74.5) *Artibeus lituratus palmarum*
 Length of forearm, 60 or less 8
 8. Length of forearm, 55.0–60.0
 *Artibeus jamaicensis trinitatus*
 Length of forearm, 40.0–42.0
 *Artibeus cinereus cinereus*
 9. Upper incisors separated by a space from each other and from canines 10
 Upper incisors not separated by a space from each other or from canines (length of forearm, 38.0–43.0) *Enchisthenes harti*
 10. Facial and dorsal stripes present; feet not hairy (length of forearm, 38.0–51.0)
 *Vampyroides caraccioloii*
 No facial or dorsal stripes present; feet hairy (length of forearm, 31.5–32.5)
 *Ametrida centurio*

GENUS *URODERMA* PETERS

TENT BATS

Uroderma PETERS, 1865, Monatsber. Preussischen Akad. Wiss. Berlin, p. 588. Type, *Phyllostoma personatum* Peters [= *Uroderma bilobatum* Peters].

Yellow-eared bats with sharply defined facial stripes, a median dorsal line, and bilobate upper incisors.

RANGE: From the Isthmus of Tehuantepec, Mexico, south to Peru, Bolivia, and São Paulo, Brazil. One species is recorded from Trinidad.

Uroderma bilobatum bilobatum Peters

YELLOW-EARED BAT

Plate 23, figures 4–6; text figures 57, 58

Uroderma bilobatum PETERS, 1866, Monatsber. Preussischen Akad. Wiss. Berlin, p. 394.

Uroderma bilobatum bilobatum CABRERA, 1957, Rev. Mus. Argentino Cien. Nat. "Bernardino Rivadavia," cien zool., vol. 4, no. 1, p. 79.



FIG. 57. Front view of head of *Uroderma bilobatum bilobatum*. $\times 1\frac{3}{4}$.

TYPE LOCALITY: Ipanema, São Paulo, Brazil.

RANGE: Trinidad; not uncommon.

GENERAL CHARACTERS: A medium-sized, robust bat with white facial stripes an indistinct dorsal line, normal nose leaf, short ears, narrow, V-shaped, interfemoral membrane, and no external tail.

DESCRIPTION: General color of upper parts grayish brown, the hairs light drab from base and tipped with Bister; a pair of white facial stripes extending from sides of nose leaf to between ears, another pair from corners of mouth to base of ears; a narrow, indistinct, whitish, dorsal stripe on lower back; under parts paler and more whitish than back; margin of ears yellowish white. Skull long and rather narrow, with a short, broad, deep rostrum; inner upper incisors much larger than outer, the outer small and scarcely reaching the cingulum of inner, all four teeth separate and deeply bilobed (fig. 58); lower incisors small and filling space between canines; posterior molars small, both above and below.

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

MEASUREMENTS AND WEIGHTS: Subadult male and four females from Trinidad: Length of forearm, 40.0, 42.2–43.0. Skull: Subadult male and two adult females: greatest length, 23.1 —, 23.4; zygomatic breadth, 11.5, —, 13.4; interorbital constriction, 5.9, 5.9, 5.5; maxillary tooth row, C–M³, 8.1, 8.2, 8.1. Weights: One male and three females from Trinidad: 13.7, 18.5, 17.1, 18.3; seven males, young or subadult, 5.6–14.3; nine females, 13.1–19.4, including one immature, 13.1, one non-gravid, 16.7, three gravid, 18.6–19.0, four lactating, 17.1–19.4.

SPECIMENS RECORDED: *Trinidad*: Granville, four (A.M.N.H.); Guayaguayare, Rio Claro, two (A.M.N.H.).

GENERAL HABITS: In Trinidad this bat is known to roost in small clusters of 10 or more individuals. It has been found on the under side of the fan-shaped leaves of certain palm trees, especially the carat palm (*Sabal glaucescens*), a tall palm native to Trinidad which reaches 50 feet in height. The bat makes a series of cuts across the pleated surface of a leaf, causing half of the leaf to bend at an angle to form a protected retreat. One adult

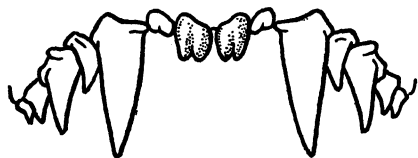


FIG. 58. Front view of upper incisors of *Uroderma bilobatum bilobatum*, showing bilobate cutting edges.

male was taken August 27, 1958, roosting in association with *Saccopteryx bilineata*, *S. leptura*, *Artibeus jamaicensis*, and *A. lituratus*.

BREEDING: One of two females taken February 29, 1956, in the high woods of southeastern Trinidad was lactating, and three gravid and three lactating females, four non-breeding males, and two non-gravid females were taken May 30, 1958, from under the fronds of a coconut palm tree.

FOOD: Examination of the stomach contents of two specimens indicated that they had been feeding on the fruit of a wild guava (*Psidium guajava*).

PARASITES: Brennan and Jones (1960, p. 538) report the following species of the Trombiculidae (chiggers) from Trinidad *Uroderma bilobatum*: *Eutrombicula batatas*.

DISEASE: Specimens examined were rabies-negative.

GENUS *VAMPHYROPS* PETERS

BROAD-NOSED BATS

Vampyrops PETERS, 1865, Monatsber. Preussischen Akad. Wiss. Berlin, p. 356. Type, *Phyllostoma lineatum* E. Geoffroy-Saint-Hilaire.

Tailless, broad-nosed bats with facial and dorsal lines present; inner upper incisors with cutting edge trilobate or entire.

RANGE: From Oaxaca, Mexico, south to Peru and Minas Gerais, Brazil. One species is recorded from Trinidad.

REMARKS: Hershkovitz (1958, p. 613) replaced the generic name *Vampyrops* Peters, 1865, with *Platyrrhinus* Saussure, 1860, on the grounds that the latter name has priority. De la Torre and Starrett (1959, pp. 1-2) showed that facts do not support the validity of this change, because *Platyrrhinus* Saussure, 1860, is a junior homonym of *Platyrrhinus* Fabricius, 1801. *Vampyrops* is therefore used here as the generic name for the species found on Trinidad.

Vampyrops helleri Peters

HELLER'S BROAD-NOSED OR WHITE-LINED BAT

Plate 24, figures 1-3; text figures 59-61

Vampyrops helleri PETERS, 1866, Monatsber. Preussischen Akad. Wiss. Berlin, p. 392.

TYPE LOCALITY: Mexico.

RANGE: Trinidad; not uncommon.

GENERAL CHARACTERS: A medium-sized, robust bat with white facial and dorsal stripes, similar in external appearance to *Uroderma* but interfemoral membrane very narrow, V-shaped, and densely furred; forearm well furred for most of its length; hind limbs and feet more or less furred to claws; no external tail.

DESCRIPTION: General color of upper parts Snuff Brown; under parts paler in color than back; margins of ears yellowish, metacarpal of second digit also yellowish in life but fading in dry skin; a pair of broad white facial stripes extending from nostrils to between ears; a second pair of narrower white lines from corners of mouth to base of ears; a narrow white stripe extending from top of head down middle of back. Skull much like that of *Uroderma*; upper incisors very unequal, the inner more than twice as high as outer, the crowns obliquely set, in contact at tip, the cutting edges trifid (fig. 61), but the cusps may be lost through wear. Lower incisors small, subequal, forming a complete straight line between canines, cutting edges faintly bifid; third upper and third lower molars present but small.

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

MEASUREMENTS AND WEIGHTS: Three females and one male from Trinidad: Length of



FIG. 59. Front view of head of *Vampyrops helleri*. $\times 1\frac{1}{4}$.



FIG. 60. Lateral view of head of *Vampyrops helleri*. $\times 1\frac{1}{4}$.

forearm, 38.3, 38.9, 38.0, 39.9. Skull: Greatest length, 23.0, —, 22.2, 22.7; zygomatic breadth, 12.6, 12.5, 12.0, 12.3; interorbital constriction, 5.6, 5.6, 5.5, 5.3; condylobasal length, 21.3, 20.5, 20.4, 20.5; maxillary tooth row, C-M³, 8.5, 8.0, 7.7, 8.3. Weights: Four adult males, 10.0, 10.7, 12.0, 14.7; an immature female, 11.4.

SPECIMENS RECORDED: *Trinidad*: Maracas Valley, three (A.M.N.H.); Point Fortin, two (A.M.N.H.); Port-of-Spain, one (M.C.Z.); Spring Hill, one (A.M.N.H.).

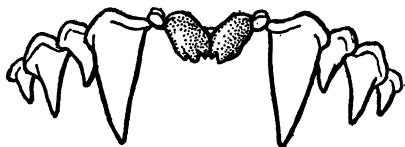


FIG. 61. Front view of upper incisors of *Vampyrops helleri*, showing trilobate cutting edges.

GENERAL HABITS: Little is known about the habits of *Vampyrops*, but they are probably much the same as those of *Uroderma*. Three of the Trinidad specimens were taken inside dwelling houses; two, under the leaves of a carat palm (*Sabal glaucescens*). One came from a hollow olivier tree (*Chuncoa obovata*), roosting in association with *Saccopteryx leptura*, *Micronycteris megalotis*, *M. minuta*, and *Carollia perspicillata*.

FOOD: The stomach contents of one Trinidad specimen contained fruit pulp and unidentified fruit seeds.

DISEASE: Specimens examined were rabies-negative.

GENUS *VAMPYRODES* THOMAS

WHITE-LINED TAILLESS BATS

Vampyroides THOMAS, 1900, Ann. Mag. Nat. Hist., ser. 7, vol. 5, p. 270. Type, *Vampyrops caracciola* Thomas.

Large, broad-nosed bats very similar to *Vampyrops* but with two upper molars instead of three.

RANGE: From Izabal, southeastern Guatemala, south to Peru and northern Brazil. One species is recorded from Trinidad and Tobago.

Vampyroides caraccioli caraccioli (Thomas)

TRINIDADIAN WHITE-LINED TAILLESS BAT

Plate 24, figures 4-6, text figures 62, 63

Vampyrops caracciola THOMAS, 1889, Ann. Mag. Nat. Hist., ser. 6, vol. 4, p. 167.

Vampyroides caraccioli, CABRERA, 1957, Rev. Mus. Argentino Cien. Nat. "Bernardino Rivadavia," cien. zool., vol. 4, no. 1, p. 82.

TYPE LOCALITY: Trinidad, West Indies.

RANGE: Trinidad; not common. Tobago; known from five specimens.

GENERAL CHARACTERS: A rather large, robust bat with whitish facial stripes and a median, white, dorsal line; narrow V-shaped interfemoral membrane; forearm and hind limbs and feet hairy; nose leaf strongly developed; no external tail.

DESCRIPTION: General color of upper parts dull grayish brown, rather lighter on head and shoulders; under parts scarcely paler than back; a pair of broad white lines extending from nose leaf to between ears, nearly touching each other anteriorly; a narrow, white, dorsal stripe extending from top of head down middle of back to base of interfemoral membrane. Skull rather large and strong; inner upper incisors much larger than outer incisors, all four teeth separated by a space from one another, with cutting edges entire (fig. 63); lower incisors in a straight row, completely filling space between canines,



FIG. 62. Front view of head of *Vampyroides caraccioli caraccioli*. $\times 1\frac{3}{4}$.

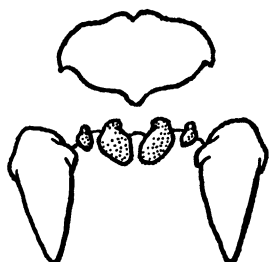


FIG. 63. Front view of upper incisors of *Vampyroides caraccioloii caraccioloii*, showing simple cutting edges.

the cutting edges bifid; third upper molar absent.

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

MEASUREMENTS: Type (sex?), a female from Port-of-Spain, and a female from Tobago: Length of forearm, 50.0, 51.2, 48.5. Skull: Greatest length, —, 24.7, 25.2; zygomatic breadth, 16.8, 15.2, 16.0; interorbital constriction, 6.2, 5.5, 6.0; maxillary tooth row, C-M³, 9.8, 8.5, 9.2.

SPECIMENS RECORDED: *Tobago*: Scarborough Botanic Garden, one (A.M.N.H.); Pigeon Peak, four (R.N.H.L.). *Trinidad*: Port-of-Spain, one (M.C.Z.); no exact locality, two (B.M.); Mt. Aripo, two (B.M.).

GENERAL HABITS: Little is known about the habits of this bat. A cluster of four was found hanging from the spreading branches of a shrub at Pigeon Peak, Tobago, with a single individual a short distance from the cluster. Two were found roosting under a palm frond at Mt. Aripo, Trinidad.

BREEDING: A female from Tobago taken on September 9, 1956, was non-gravid.

FOOD: The stomach contents of the Tobago specimen revealed unidentified fruit.

DISEASE: No specimens have been tested for rabies.

REMARKS: Oldfield Thomas obviously named *Vampyroides caraccioloae* after the collector, though he did not specifically state that he named the species for Caracciolo. Thomas (1893) changed the specific name to *caraccioli* after he learned that the collector's name was Caracciolo. In amending the name, Thomas should have changed it to *caraccioloii* and not *caraccioli*, which was probably a typographical error.

The Trinidadian form is closely allied to

the brighter-colored Amazonian *Vampyroides ornata*, and the differences between the two forms are of subspecific rank.

GENUS *CHIRODERMA* PETERS

BATS WITHOUT NASAL BONES

Chiroderma PETERS, 1860, Monatsber. Preussischen Akad. Wiss. Berlin, p. 747. Type, *Chiroderma villosum* Peters.

Large, broad-nosed bats similar to *Vampyrops* and *Vampyroides*, but skull without nasal bones and with only two upper and two lower molars.

RANGE: From Veracruz, Mexico, south to Minas Gerais, Brazil; also Colombia and Ecuador. Two species are recorded from Trinidad, and one is from Tobago.

Chiroderma villosum villosum Peters

GREATER OR PETERS' WHITE-LINED BAT

Plate 25, figs 4-6; text figures 64-66

Chiroderma villosum PETERS, 1860, Monatsber. Preussischen Akad. Wiss. Berlin, p. 748.

TYPE LOCALITY: San Esteban, Venezuela.

RANGE: Trinidad; not common. Tobago; not common.

GENERAL CHARACTERS: A rather large, robust bat with indistinct facial shapes and median dorsal line; interfemoral membrane narrow, V-shaped, and well haired; forearm well haired; no external tail; nose leaf broad.

DESCRIPTION: General color of a female from Trinidad: upper parts light grayish brown; under parts a darker gray than back; an indistinct pair of narrow white lines from base of nose leaf to between ears; median dorsal line indistinct. Skull large and broad, with a low sagittal crest; the most outstanding cranial character the apparent absence of



FIG. 64. Front view of head of *Chiroderma villosum villosum*. $\times 1\frac{1}{2}$.

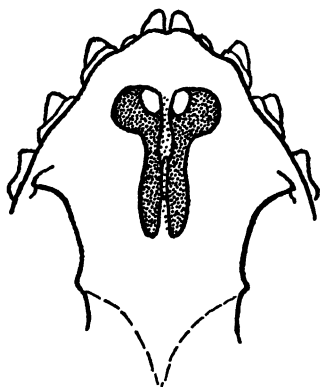


FIG. 65. Dorsal view of rostrum of *Chiroderma villosum villosum*, showing absence of nasal bones.

any nasal bones (fig. 65), their place occupied by an emargination extending backward from nares to between orbits; inner upper incisors long, slender, vertical, and not approaching one another terminally (fig. 66); outer upper incisors small, scarcely reaching cingulum of inner incisors; lower incisors small and subequal; first lower premolar nearly flat crowned.

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

MEASUREMENTS: Two adult females, one from Diego Martin and one from Maracas Valley, and a subadult male and a female from Port-of-Spain, Trinidad: Length of forearm, 48.2, 48.0, 46.5, 46.6. Skull: Greatest length, 26.2, 26.2, 25.5, 24.8; zygomatic breadth, 16.5, 16.0, —, —; interorbital width, 6.0, 6.3, 6.0, —; postorbital constriction, 5.7, 5.6, 6.0, 5.9; maxillary tooth row, C-M², 9.5, 9.2, 8.8, 8.8.

SPECIMENS RECORDED: *Tobago*: No exact locality, number of specimens unknown (B.M.). *Trinidad*: Diego Martin, one (A.M.N.H.); Maracas Valley, one (A.M.N.H.);

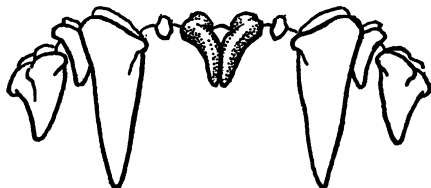


FIG. 66. Front view of upper incisors of *Chiroderma villosum villosum*, showing slender vertical shafts of inner teeth.

Port-of-Spain, two (M.C.Z.).

GENERAL HABITS: This is probably a tree and cave bat, though nothing is known about its habits on Trinidad.

BREEDING: A female taken alive in a house in Maracas Valley on September 12, 1954, gave birth to a single young the same afternoon. A female taken August 14, 1959, contained a half-grown fetus.

FOOD: So far as is known this bat is fruit eating.

DISEASE: One specimen examined was rabies-negative.

REMARKS: Two large larvae 18 mm. long found in the abdominal cavity of a female picked up at Diego Martin were identified by C. W. Sabrosky of the United States Department of Agriculture as a species of the flesh fly (*Sarcophaga*, family Sarcophagidae). The larvae were in too advanced a state of development to have been from eggs laid by the flesh fly after the bat had died.

Chiroderma trinitatum Goodwin

LESSER OR TRINIDADIAN WHITE-LINED BAT

Plate 25, figures 1-3; text figure 67

Chiroderma trinitatus GOODWIN, 1958, Amer. Mus. Novitates, no. 1877, p. 1.

TYPE LOCALITY: Cumaca, Trinidad, West Indies.

RANGE: Trinidad; known from one specimen.

GENERAL CHARACTERS: Similar to *C. villosum* but smaller and differing in cranial details.

DESCRIPTION: Color and pelage not determinable, as the type has lost most of its fur. General cranial characters about as in *C. villosum*, but inner upper incisors relatively short and placed obliquely in tooth row, widely separated at base and approaching one another at tips (fig. 67); anterior lower premolar relatively large, with a strong, well-developed, anterior cusp that reaches half of the height of the canine.

MEASUREMENTS: Type (an adult female): Length of forearm, 40.5. Skull: Greatest length, 22.5; zygomatic breadth, 13.7; interorbital constriction, 5.6; maxillary tooth row, C-M², 7.7.

SPECIMEN RECORDED: *Trinidad*: Cumaca, one (A.M.N.H.).



FIG. 67. Front view of upper incisors of *Chiroderma trinitatum*, showing inner teeth placed obliquely in tooth row.

GENERAL HABITS: The type and only known specimen was taken in a well-lighted cave occupied by *Micronycteris megalotis*.

BREEDING: The present specimen was a gravid female collected on March 22, 1956, containing a large fetus, showing a distinct, white, median, dorsal line.

FOOD: Probably fruit.

DISEASE: The one specimen examined was rabies-negative.

GENUS *ARTIBEUS* LEACH

AMERICAN FRUIT BATS

Artibeus LEACH, 1821, Trans. Linnean Soc. London, vol. 13, p. 75. Type, *Artibeus jamaicensis* Leach.

Small to large, robust, broad-nosed bats; paired facial stripes usually present; median dorsal line absent; no external tail; upper incisors not crowded between canines, the inner larger than the outer and deeply bilobed.

RANGE: From Sonora and Tamaulipas, Mexico, Bahama Islands, Cuba, and Haiti, south to Peru, Bolivia, northern Argentina, Paraguay, and Rio de Janeiro, Brazil. Three species are recorded from Trinidad and Tobago.

Artibeus jamaicensis trinitatis Andersen

LESSER TRINIDADIAN FRUIT BAT

Plate 26, figures 1-3; text figures 68, 69

Artibeus planirostris trinitatis ANDERSEN, 1906, Ann. Mag. Nat. Hist., ser. 7, vol. 18, p. 420.

Artibeus j[amaicensis] trinitatis, HERSHKOVITZ, 1949, Proc. U. S. Natl. Mus., vol. 99, no. 3246, p. 447.

TYPE LOCALITY: Trinidad, West Indies.

RANGE: Trinidad; common and widely distributed. Tobago; common and widely distributed.

GENERAL CHARACTERS: A large, robust bat with or without white facial stripes; no external tail; interfemoral membrane narrow,

V-shaped; upper sides of limbs, feet, and outside basal half of forearm thinly haired.

DESCRIPTION: General color of upper parts varying from Mummy Brown to Prout's Brown; under parts dull brownish; a pair of white facial stripes, when present, extending from nose leaf to between ears; a second pair from corner of mouth to base of ear; tip of wings yellowish white. Skull short, broad, and strongly built, with a short, wide rostrum; inner upper incisor small, with a distinctly bilobed cutting edge, outer pair simple and smaller than inner; lower incisors smaller than upper, subequal in size, with slightly bilobed cutting edges; molar teeth strong, with large crushing surfaces. A small posterior molar usually present on each side of upper jaw (fig. 69).

DENTAL FORMULA: Incisors, $\frac{2-2}{1-1}$; canines, $\frac{2-2}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{2-2}{3-3}$ or $\frac{3-3}{3-3} = 30$ or 32.

MEASUREMENTS AND WEIGHTS: Twelve males and 18 females from Trinidad: Length of forearm, 54.9-55.5, 56.2-60.6. Adult male and female from Tobago: 58.5, 58.5. Skull: Adult male and female from Trinidad: Greatest length, 28.8, 27.8; zygomatic breadth, 17.4, 17.3; interorbital constriction, 17.0, 6.8; maxillary tooth row, C-M³, 10.3, 10.2. Weights: Forty-three males, 26.0-44.6; 104 females, 24.5-55.1, including 61 non-gravid females, 24.5-48.4, 21 gravid females, 32.2-55.1, and 22 lactating females, 30.1-40.5.

SPECIMENS RECORDED: *Tobago:* Charlotteville, six (B.M.); two (A.M.N.H.); Plymouth, two (A.M.N.H.); Little Tobago, seven (A.M.N.H.). *Trinidad:* Port-of-Spain, 32 (A.M.N.H.); New Yalta, one (A.M.N.H.);

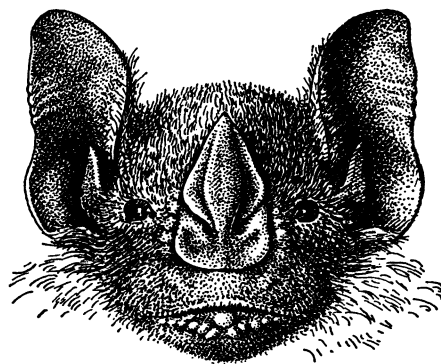


FIG. 68. Front view of head of *Artibeus jamaicensis trinitatis*. $\times 1\frac{1}{2}$.



FIG. 69. Upper molar teeth of *Artibeus jamaicensis trinitatis*, showing presence of small posterior molar.

Petit Valley, one (A.M.N.H.).

GENERAL HABITS: Colonies of up to 25 individuals of mixed sexes have been found roosting under palm leaves and in the dark foliage of shade trees, such as mango and bread fruit. Frequently the bats hang together in a cluster like a swarm of bees. The species is also found under the eaves of buildings; less frequently, in hollow trees and occasionally in well-lighted caves. It has been found roosting in association with *Saccoteryx leptura*, *Noctilio leporinus*, *Uroderma bilobatum*, *Carollia perspicillata*, *Artibeus lituratus*, and *A. cinereus*. *Artibeus* leaves its roost shortly before dark. It is a strong flier, though not particularly swift. The movement of the wings in flight can be seen easily.

BREEDING: On February 26, 1945, six gravid females were taken at Charlotteville, Tobago; a female with a single young was collected in September. On Trinidad breeding males have been found in March, April, June, July, September, October, November, and December; gravid females, in February, March, April, May, and July; females with single young, in February, March, April, May, June, and July; and lactating females, in April, June, July, and September. Males have been taken together with gravid females and females with young in one roost.

FOOD: Fruit of the following trees and shrubs is eaten by *Artibeus jamaicensis* and *A. lituratus*: mango (*Mangifera indica*), golden apple (*Spondias cytherea*), hog plum (*Spondias mombin*), soursop (*Annona muricata*), sugar apple (*Annona squamosa*), bois lay lay (*Cordia bicolor*), manjack (*Cordia collococca*), six-angled cactus (*Cereus hexagonus*), manicou fig (*Epiphyllum hookeri*), night-blooming cactus (*Hylocereus lemairei*), papaw (*Carica papaya*), almond (*Terminalia ca-*

tappa), mabolo (*Diospyros mabola*), a species of the spurge family (*Putranjiva roxburghii*), governor plum (*Flacourtia indica*), mamee apple (*Mammea americana*), avocado (*Persea americana*), serrette (*Byrsonima spicata*), Barbados cherry (*Malpighia glabra*), bois canot, or trumpet tree (*Cecropia peltata*), fustic, or bois d'orange (*Chlorophora tinctoria*), Ceylon willow (*Ficus benjamina*), sacred fig (*Ficus religiosa*), plantain, or banana (*Musa* sp.), Monos plum (*Ananias umbellulifera*), rose apple (*Eugenia jambos*), pomerac (*Eugenia malaccensis*), bay tree (*Pimenta racemosa*), guava (*Psidium guajava*), gru gru palm (*Acrocomia aculeata*), gri gri palm (*Bactris* sp.), broom palm (*Coccothrinax* sp.), cabbage palm (*Roystonea oleracea*), angelin (*Andira inermis*), tonka bean (*Dipteryx odorata*), granadilla (*Passiflora quadrangularis*), jumbie candle (*Piper* sp.), sea grapes (*Coccoloba uvifera*), coco plum (*Chrysobalanus icaco*), coffee (*Coffea* sp.), chenet (*Melicocca bijuga*), soapseed (*Sapindus saponaria*), sapodilla (*Achras zapota*), mamee sapote (*Calocarpum mammosum*), star apple (*Chrysophyllum cainito*), mahwa (*Madhuca latifolia*), balata (*Manilkara bidentata*), tie tongue (*Mimusops elengi*), penny piece (*Pouteria multiflora*), acoma (*Sideroxylon quadrioculare*), and European grape (*Vitis vinifera*).

Artibeus often stains its fur with the juices of the fruit on which it is feeding by actually eating its way inside large *julie* mangos; four yellowish green females, each with a yellowish green young, were collected from the eaves of a Port-of-Spain building. The yellowish green color, apparently from the juice of the mango, penetrated the fur to the skin of the entire animal. On occasions bats have dropped mangoes on the roofs of houses. Sometimes the incessant bombardment of fruit on the roofs of dwellings has made sleep for human beings impossible, making the cutting down of mango trees in the vicinity a necessity. Fruit is either eaten on the tree or carried to a temporary feeding station or back to the home roost.

PARASITES: Jobling (1949, p. 322) reports the following species of the Streblidae (bat flies) from Trinidad specimens of *Artibeus jamaicensis*: *Pterellipsis aranea*. The Trinidad Regional Virus Laboratory (1958, p. 97) lists the following species of the Sarcoptidae

(mites) from Trinidad *Artibeus jamaicensis*: *Teinocoptes* sp. Brennan and Jones (1960, p. 538) report the following species of the Trombiculidae (chiggers) from Trinidad *Artibeus jamaicensis*: *Trombicula vesperuginis*.

DISEASE: This species has been reported to be rabies-positive in Trinidad but not in Tobago. Pawan (1948, pp. 175–176) reported it as asymptomatic for rabies up to six months. An unidentified virus was isolated from Trinidad specimens by the Trinidad Regional Virus Laboratory (1958, p. 122). It is immunologically distinct from rabies, and no Negri bodies are produced. However, the incubation period in inoculated mice is approximately the same as that for rabies.

***Artibeus lituratus palmarum* J. A. Allen
and Chapman**

GREATER TRINIDADIAN FRUIT BAT

Plate 26, figures 4–6; text figure 70

Artibeus palmarum J. A. ALLEN AND CHAPMAN, 1897, Bull. Amer. Mus. Nat. Hist., vol. 9, art. 2, p. 16.

Artibeus jamaicensis palmarum, VESEY-FITZGERALD, 1936, Trop. Agr. Jour. Imp. College Trop. Agr. Trinidad, vol. 13, no. 6, p. 161.

A[rtibeus] l[ituratus] palmarum, HERSHKOVITZ, 1949, Proc. U. S. Natl. Mus., vol. 99, p. 447.

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

RANGE: Trinidad; common and widely distributed. Tobago; common and widely distributed.

GENERAL CHARACTERS: A large, fruit-eating bat very similar to *Artibeus j. trinitatis* but considerably larger and fur extending well down on base of V-shaped interfemoral membrane; no external tail.

DESCRIPTION: General color about as in *trinitatis*; skull similar but larger and lacking the small last upper molar usually present in *trinitatis*; inner upper incisors small but larger than outer, the cutting edges deeply bilobed, all four teeth usually separated by a space (fig. 70).

MEASUREMENTS AND WEIGHTS: Fourteen males and 18 females from Trinidad: Length of forearm, 64.6–72.4, 68.9–74.3. Skull: Adult male from Trinidad: greatest length, 30.5; zygomatic breadth, 18.5; interorbital constriction, 18.4; maxillary tooth row, C–M³,

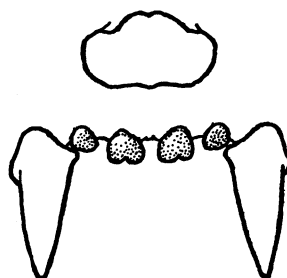


FIG. 70. Front view of upper incisors of *Artibeus lituratus palmarum*, showing spacing between teeth and bilobate cutting edge on inner pair.

10.7. Weights: Thirty-six males, 44.4–74.0; 54 females, 45.0–86.3, including 37 non-gravid females, 46.2–79.2, six gravid females, 45.0–81.7, and 11 lactating females, 57.1–86.3.

SPECIMENS RECORDED: *Tobago*: Charlotteville, one (B.M.). *Trinidad*: Granville, Cedros, three (A.M.N.H.); Icacos, Gran Chemin, three (A.M.N.H.); Port-of-Spain, 28 (A.M.N.H.); Royal Botanic Gardens, eight (A.M.N.H.).

GENERAL HABITS: This species frequents roosting places similar to those of *Artibeus j. trinitatis*, and its habits are much the same. It has been found roosting in association with *Artibeus jamaicensis* and *Desmodus rotundus*, with the latter in a hollow silk-cotton tree, and also has been found with *Saccopterxy bilineata*, *S. leptura*, and *Uroderma bilobatum*.

BREEDING: In Trinidad breeding males have been taken in January, February, May, June, August, September, November, and December; gravid females, in March, April, May, June, and July; females with a single young, in April, May, June, July, August, September, and October; and lactating females, in April, May, and October. In Tobago a lactating female was taken in September and a gravid female in February.

FOOD: The many kinds of fruit listed under *Artibeus jamaicensis*.

PARASITES: Jobling (1949, p. 322) reports the following species of the Streblidae (bat flies) from Trinidad *Artibeus l. palmarum*: *Paratrachobius longicrus*. The Trinidad Regional Virus Laboratory (1958, p. 94) lists the following species of the Streblidae from Trinidad *Artibeus l. palmarum*: *Pterellipsis aranea*.

DISEASE: This species of *Artibeus* has been reported rabies-positive in Trinidad but not

in Tobago. It is probably an asymptomatic carrier of rabies. An unidentified virus was isolated from Trinidad specimens by the Trinidad Regional Virus Laboratory (1958, p. 122). (See under *Artibeus jamaicensis trinitatis*.)

***Artibeus cinereus cinereus* (Gervais)**

LITTLE BRAZILIAN FRUIT BAT OR
PYGMY FRUIT BAT

Plate 27, figures 1-3; text figure 71

Dermanura cinereum GERVAIS, 1855 [1856], Mammifères, in Castelnau Expédition dans les parties centrales de l'Amérique du Sud, . . . pt. 7, Zoologie, vol. 1, p. 36.

Artibeus hartii, J. A. ALLEN AND CHAPMAN, 1897, Bull. Amer. Mus. Nat. Hist., vol. 9, art 2, p. 15.

Artibeus cinereus, THOMAS, 1901, Ann. Mag. Nat. Hist., vol. 7, no. 8, p. 143.

Artibeus cinereus cinereus, ANDERSEN, 1908, Proc. Zool. Soc. London, p. 292.

Artibeus quadrivittatus, VESEY-FITZGERALD, 1936, Trop. Agr. Jour. Imp. College Trop. Agr. Trinidad, vol. 13, no. 6, p. 161.

TYPE LOCALITY: Brazil; Pará, according to Cabrera (1957, p. 87).

RANGE: Trinidad; not uncommon and widely distributed. Tobago; recorded.

GENERAL CHARACTERS: A small, robust bat with white facial stripes and no external tail, similar to the larger species of *Artibeus* of Trinidad but much smaller.

DESCRIPTION: General color of upper parts Mummy Brown, a pair of white lines extending from base of nose leaf to between ears; under parts scarcely any paler than back. Skull similar to that of the larger species of *Artibeus* except that the formula for the

molars is $\frac{2}{2}$, the small posterior molar being absent both above and below.

MEASUREMENTS AND WEIGHTS: Three adult males and one female from Trinidad: Length of forearm, 40.0, 41.8, 38.0, 41.5. Skull: Greatest length, 20.0, 20.0, 20.0, 20.5; zygomatic breadth, 12.0, 11.0, 11.2, 11.9; interorbital constriction, 4.8, 5.0, 4.7, 5.2; maxillary tooth row, C-M², 7.0, 6.9, 6.5, 6.9. Weights: Five males, 9.1-13.8.

SPECIMENS RECORDED: *Tobago*: Store Bay, Crown Point, one (R.N.H.L.). *Trinidad*: Aripo, two (A.M.N.H.); Caparo, two (A.M.N.H.); Granville, one (A.M.N.H.); Sangre Grande, one (A.M.N.H.).

GENERAL HABITS: The habits of this little bat are much the same as those of *Uroderma*. It roosts in small colonies of a few individuals under the cut leaves of palm trees and on the under side of banana leaves.

BREEDING: Non-gravid females have been taken in September and October; non-breeding males, in January and April; a breeding male was collected on March 28, 1958.

FOOD: Various kinds of fruit.

PARASITES: The Trinidad Regional Virus Laboratory (1958, p. 94) lists the following species of the Streblidae (bat flies) from Trinidad *Artibeus cinereus*: *Pterellipsis* sp. Brennan and Jones (1960, p. 538) report the following species of the Trombiculidae (chiggers) from Trinidad *Artibeus cinereus*: *Eutrombicula goldii*.

DISEASE: Specimens examined were rabies-negative.

REMARKS: A male was caught by a *tigre* snake (*Spilotes pullatus*) at Sangre Grande on July 25, 1958.

GENUS **ENCHISTHENES** ANDERSEN

THOMAS' LITTLE FRUIT BATS

Enchisthenes ANDERSEN, 1906, Ann. Mag. Nat. Hist., ser. 7, vol. 18, p. 419. Type, *Artibeus hartii* Thomas.

Small, short-faced fruit bats, similar to *Artibeus cinereus* but with cutting edges of upper incisors simple.

RANGE: From Tamaulipas and Jalisco, Mexico, south to Ecuador and Venezuela. The genus is monotypic; it is recorded from Trinidad.



FIG. 71. Front view of head of *Artibeus cinereus cinereus*. $\times 1\frac{3}{4}$.

***Enchisthenes hartii* (Thomas)**

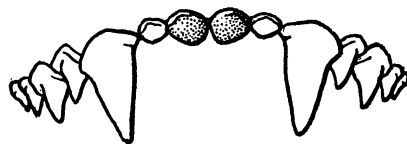
TRINIDADIAN OR LITTLE FRUIT BAT

Plate 27, figures 4-6; text figures 72, 73

Artibeus hartii THOMAS, 1892, Ann. Mag. Nat. Hist., ser. 6, vol. 10, p. 408.*Enchisthenes hartii*, ANDERSEN, 1908, Proc. Zool. Soc. London, p. 224.

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

RANGE: Trinidad; known only from the type and apparently not common.

GENERAL CHARACTERS: Similar in size and general external characters to *Artibeus cinereus* but differing in some cranial details; no external tail.DESCRIPTION: Color of upper parts dark Mummy Brown, becoming almost black on head and shoulders; a pair of narrow buffy brown lines extending from base of nose leaf to between ears, and an indistinct pair from corners of mouth to base of ears; under parts paler than back. Skull short and broad; palate short; cutting edges of upper median incisors simple, obtusely pointed in middle, outer upper incisors narrower and shorter than inner, all four teeth in contact with one another and with canines (fig. 73); lower incisors small, subequal, and filling space between canines; a small third molar present both above and below but relatively larger than in *Artibeus*.DENTAL FORMULA: Incisors, $\frac{2-2}{2-2}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3}$ = 32.MEASUREMENTS: The type, a subadult male: Length of forearm, 38.0. Skull: Greatest length to front of canines, 20.8; zygomatic breadth, 12.5; width of braincase, 9.7; maxillary tooth row, C-M³, 7.2.FIG. 72. Front view of head of *Enchisthenes hartii*. $\times 1\frac{3}{4}$.FIG. 73. Front view of upper incisors of *Enchisthenes hartii*, showing simple cutting edges of inner pair.SPECIMENS RECORDED: *Trinidad*: Royal Botanic Gardens, Port-of-Spain, one (B.M.).

HABITS: Nothing is known about the habits of this little bat.

FOOD: Fruit.

PARASITES: Jobling (1949, p. 322) reports the following species of the Streblidae (bat flies) from a Trinidad *Enchisthenes hartii*: *Trichobius dugesii*.REMARKS: The two specimens recorded by J. A. Allen and Chapman (1897, p. 15) prove to be *Artibeus cinereus*.GENUS **CENTURIO** GRAY

GREATER WRINKLE-FACED BATS

Centurio GRAY, 1842, Ann. Mag. Nat. Hist., vol. 10, p. 259. Type, *Centurio senex* Gray.

Medium-sized, broad-nosed bats with rudimentary nose leaf, foreshortened naked face, and the flying membrane between fourth and fifth finger striated with contrasting narrow, light and dark, transverse bands.

RANGE: From Tamaulipas and Yucatan, Mexico, south to Panama and Trinidad. The genus is monotypic. It is recorded from Trinidad and Tobago.

***Centurio senex* Gray**

CENTRAL AMERICAN WRINKLED-FACED BAT

Plate 29, figures 1-3; text figures 74, 75

Centurio senex GRAY, 1842, Ann. Mag. Nat. Hist., vol. 10, p. 259.

TYPE LOCALITY: Unknown; restricted to Realejo, Chinandego, Nicaragua, by Goodwin (1946, p. 327).

RANGE: Trinidad; not uncommon. Tobago; recorded.

GENERAL CHARACTERS: A medium-sized bat with a very short, broad, naked face completely covered with wrinkled dermal outgrowths; no external tail; interfemoral membrane moderately developed and V-shaped.



FIG. 74. Front view of head of *Centurio senex*. $\times 1\frac{1}{2}$.

DESCRIPTION: General color of upper parts between Drab and Saccardo's Brown, a white spot on shoulders; under parts slightly paler than back; an off-color specimen is Tawny Olive. Skull short and broad, with a high, rather narrow braincase, moderately well-developed sagittal crest, virtually no rostrum, palate short and very wide (fig. 75); upper incisors small and forming a discontinuous row between canines; the inner incisors larger than outer, cutting edges rising to a point in the middle; lower incisor small, low, closely crowded, and with a deep notch in the middle.

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

MEASUREMENTS AND WEIGHTS: Four males and one female from Trinidad: Length of forearm, 44.4, 44.3, 44.0, 43.5, 44.0. Skulls: Three males and one female: greatest length, 19.0, 18.2, 18.3, 18.0; zygomatic breadth, 14.9, 15.0, 15.3, 14.5; interorbital constriction, 5.0, 5.1, 5.2, —; condylobasal length, 15.5, 15.6, 15.4, 15.5; width of palate across M^2-M^2 , 10.8, 11.0, 11.2, —; maxillary tooth row, $C-M^2$, 5.4, 5.5, 5.5, 5.5. Weights: Twelve males, 17.9–27.5; one female, 17.6.



FIG. 75. Palate of *Centurio senex*, showing foreshortened rostrum.

SPECIMENS RECORDED: *Tobago*: No exact locality, one (B.M.); *Trinidad*: Port-of-Spain, five (A.M.N.H.).

GENERAL HABITS: This bat has been found roosting under the leaves of a mango tree and *rayo* (*Dracaena* sp.), as well as *Putranjiva*, a small tree with dense foliage and no local name. In November, 1958, two males were collected from a *Putranjiva* tree in Memorial Park, Port-of-Spain; nine males were taken from the same tree in November, 1959, and 12 more males during 1960. A thorough search of the area revealed no females. *Centurio* was always found by ones and twos in the same tree but never more than three were found together. Specimens netted alive issued a powerful odor. Roosting in trees, this bat covers its face with a flap of skin from the chin. Specimens in captivity slept with the skin of the chin pulled up over the face where it covered the top of the head and extended over the flaps of the ears which lie flat across the top of the head. A little bump on the crown of the head acts as a sort of "doorstop," and the wrinkled chin skin is stretched taut at this point. In some specimens there are two translucent areas in the middle of the stretched facial mask, devoid of hair, which cover the bat's eyes and presumably enable it to see light, and perhaps objects, even when the face is covered. It was possible to pull this skin mask away from the bat's face and to see light and moving objects such as a waved finger or a pencil through these translucent windows. When aroused, the bat unshrouds itself, and the skin mask covering the head and face slips back in wrinkled folds to the normal position under the chin, with the two windows appearing as bumps. The large lap-pets of loose skin on the chin of the males, not part of the mask, probably contain scent glands, as there is a distinct, musky, skunk-like odor about the head. *Centurio* flies with a somewhat wobbly, jerky motion and has a tendency, at least in close quarters, to fly with its body vertical to the ground. Collectors say that, in flight, this bat resembles a large butterfly.

BREEDING: Two breeding males were taken in November, 1958, while in November, 1959, six breeding and three non-breeding males were taken—all from the same tree

in Port-of-Spain. A female from this same tree gave birth to a single young in January, 1961. A non-gravid female was taken at Siparia in October, 1958.

FOOD: Yellow fruit pulp was found in the stomachs of this bat. The skin between the lips and the gum line is covered with many small papillae, which may serve as strainers when the bat feeds on soft fruit.

DISEASE: Specimens examined were rabies-negative.

REMARKS: Live specimens of *Centurio* kept under observation, except for eating and drinking the first night, refused food but drank on the second night. Very ripe bananas and pawpaw, diced and mashed, were offered as food, but the soft mushy mixture was preferred. The bat appeared to suck up the mixture. When the bat's mouth was opened, the throat orifice was seen to be only a tiny circular hole. The diameter of the opening measured 1.4 mm. in four specimens and 1.3 mm. in one specimen. A very rough dissection of the throat revealed that directly behind the first opening there was a second opening joined to the first and approximately of the same dimension. This second opening leads into a globular sac which constricted towards what was thought to be the tube-like esophagus.

GENUS *AMETRIDA* GRAY

LESSER WRINKLED-FACED BATS

Ametrida GRAY, 1847, Proc. Zool. Soc. London, p. 15. Type, *Ametrida centurio* Gray.

Small, broad-faced bats with a small but normally formed nose leaf, no external tail, face hairy, interfemoral membrane and feet hairy. Skull with rostrum so greatly shortened that the flat space in front of the nares is wider than the distance between the canines; braincase highly domed and rising steeply above rostrum; zygomatic arches expanded and bent outward at middle; upper incisors very unequal; the inner conical and fully one-third as long as canines; outer incisors minute, flat crowned, or faintly notched; all four incisors usually separated from one another and from canines by a small space; lower incisors small, subequal in size, with a distinct median notch and crowded between canines; a minute third molar present on each side of upper and lower jaws. Two

species are known: *Ametrida centurio* Gray and *Ametrida minor* H. Allen.

RANGE: Tropical regions of northern South America, from the Amazon region in Brazil north to the Guianas, Venezuela, and Trinidad.

Ametrida centurio Gray

GRAY'S LESSER WRINKLED-FACED BAT

Plate 29, figures 4-6; text figures 76, 77

Ametrida centurio GRAY, 1847, Proc. Zool. Soc. London, p. 15.

TYPE LOCALITY: Paria, Brazil.

RANGE: Trinidad: Gulf of Paria.

GENERAL CHARACTERS: A small, dusky-colored bat with a short, broad, hairy face, moderately large, rounded ears, deeply notched tragus, elevated forehead, no external tail, narrow, V-shaped, hairy, interfemoral membrane, hind feet well haired. Resembling *Centurio* in some external characters but much smaller and the development of dermal outgrowths on the face much less extensive, nose leaf short and broad, rising to a point at tip.

DESCRIPTION: Color of upper parts dull brownish, darkest on rump, becoming much paler on head and shoulders; the hair Mummy Brown at base, followed by a broad band of Light Buff and tipped with Dresden Brown; under parts uniform Olive-Brown; a prominent white spot on shoulders at the origin of antebrachial membrane; lips margined with small, rounded, wart-like outgrowths, similar outgrowths occurring between lips and nose leaf and a V-shaped group of warts at lower lip surrounding a small central wart. Skull with greatly shortened ros-



FIG. 76. Front view of head of *Ametrida centurio*. $\times 1\frac{3}{4}$.

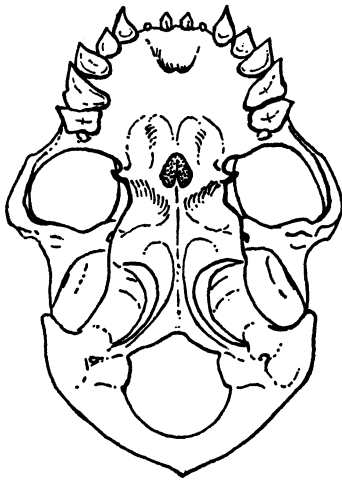


FIG. 77. Palate of *Ametrida centurio*, showing extreme reduction of pterygoids.

trum, very short nasals, highly domed but narrow braincase; the skull further characterized by the practical absence of any interpterygoid space, the pterygoids being directed almost perpendicularly outward and the choanae opening between them a rounded vertical aperture facing backward, characters unique in American bats (fig. 77).

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

MEASUREMENTS AND WEIGHTS: A subadult female from the Gulf of Paria, Trinidad; an adult female from Caripito, Venezuela; and an adult male of *Ametrida minor* from Kartabo, British Guiana (in parentheses): Length of forearm, 31.7, 32.3 (24.8). Skull: Greatest length, —, 16.2 (14.5); condylobasal length, —, 13.6 (11.9); interorbital width, 4.2, 4.3 (3.3); mastoid width, —, 9.5 (8.9); width of braincase, —, 8.3 (8.2); zygomatic width, 11.3, 11.5 (10.3); width of rostrum, —, 8.0 (7.1); width of palate across M^1-M^1 , 8.0, 8.3 (7.2); maxillary tooth row, $C-M^3$, 4.6, 4.6 (4.3); mandibular tooth row, $C-M^3$, 5.0, 5.1 (4.5); height of cranium, —, 10.5 (8.6).

SPECIMEN RECORDED: *Trinidad*: Gulf of Paria, one (A.M.N.H.).

REMARKS: Nothing has been published on the habits of this bat. The present specimen was found on a marine oil-drilling barge operating at a location 15 to 18 miles from land and midway between Chacachacare

Island, Trinidad, and Point Cedros, Trinidad. It was said to have been taken from a pipe on the barge. It is not fully grown, as the epiphyseal sutures of the metacarpals and phalanges are open. The skull is badly crushed, but all the teeth are fully developed. Two individuals of *Artibeus lituratus palmarum* were caught on the same structure at about the same time. While this specimen of *Ametrida centurio* was not actually taken on the island, it was collected well within Trinidad waters and is therefore a valid record to be included in the fauna of Trinidad.

Ametrida centurio Gray is very similar in external and cranial characters to *Ametrida minor* (pl. 29, figs. 7–9) from Surinam, and the ranges of the two species overlap, but it can always be distinguished from the latter by its longer forearm and larger skull.

FAMILY DESMODONTIDAE GILL

VAMPIRE BATS

This family includes the true vampire bats which subsist on the blood of animals to the exclusion of other food. The front teeth are highly specialized for cutting, all trace of crushing surfaces on molar teeth being absent; long bones of wings and legs grooved for accommodation of muscles; nostrils surrounded by dermal outgrowths forming a rudimentary nose leaf; no external tail; three bony phalanges on third finger; interfemoral membrane reduced to a narrow fringe, and calcar rudimentary or absent.

KEY TO THE GENERA AND SPECIES OF THE DESMODONTIDAE OF TRINIDAD AND TOBAGO

- Thumb greatly elongated, wings unicolored, cutting edges of lower incisors bilobate (length of forearm, 52.1–59.6) *Desmodus rotundus*
Thumb moderately elongated, tips of wings conspicuously white, cutting edges of lower incisors entire (length of forearm, 50.0–52.0)
. *Diademus youngi*

GENUS DESMODUS WIED-NEUWIED

COMMON VAMPIRE BATS

Desmodus, 1826, WIED-NEUWIED, Beiträge zur Naturgeschichte von Brasilien, vol. 2, p. 231. Type, *Desmodus rufus* Wied-Neuwied [= *Phyllostoma rotundum* É. Geoffroy-Saint-Hilaire].

Desmodus can be distinguished from the other vampire bats by its greatly elongated thumb and bilobate lower incisor.

RANGE: From Sonora and Tamaulipas, Mexico, south to Valparaiso, Chile, and Uruguay. One species is recorded from Trinidad.

Desmodus rotundus rotundus (É.
Geoffroy-Saint-Hilaire)

GEOFFROY'S VAMPIRE BAT OR SOUTH AMERICAN
VAMPIRE BAT

Plate 28, figures 1-3; text figures 78-80

Phyllostoma rotundum É. GEOFFROY-SAINT-HILAIRE, 1810, Ann. Mus. d'Hist. Nat., Paris, vol. 15, p. 181.

Desmodus rotundus, THOMAS, 1901, Ann. Mag. Nat. Hist. ser. 7, vol. 8, p. 193.

Desmodus rufus, VESEY-FITZGERALD, 1936, Trop. Agr. Jour. Imp. College Trop. Agr., Trinidad, vol. 13, no. 6, p. 161.

Desmodus rotundus rotundus, HERSHKOVITZ, 1949, Proc. U. S. Natl. Mus., vol. 99, no. 3246, p. 449.

TYPE LOCALITY: Paraguay.

RANGE: Trinidad; widely distributed and common.

GENERAL CHARACTERS: A medium-sized, close-furred bat with rather small, separate, pointed ears; thumb greatly elongated (fig. 79), about one-fifth as long as third digit, its metacarpal with a short, rounded pad at base and a more elongated pad under outer half; fur short and close; forearms and limbs sparsely haired; calcar reduced to a wart-like excrescence; no external tail; lower lip deeply grooved. Females usually larger than males.

DESCRIPTION: General color of most Trinidad specimens dark Drab, the under parts slightly paler than back, but there are red, gold, and orange color phases. Skull with a large, smoothly rounded braincase, very wide

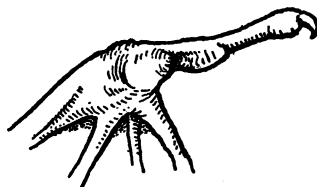


FIG. 79. Greatly elongated thumb of *Desmodus rotundus rotundus*.

posteriorly; rostrum reduced to a mere support of the greatly enlarged incisors and canines; upper incisors large, almost completely filling space between canines, these teeth with a triangular point and long, sharp, cutting edges (fig. 80); lower incisors small and deeply bilobed; canines large, long, and acutely pointed; upper cheek teeth small, scarcely larger than lower incisors; lower cheek teeth also small.

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

MEASUREMENTS AND WEIGHTS: Fifteen males and 16 females from Trinidad: Length of forearm, 52.4-56.7, 56.7-59.6. Skull: Adult male and female: greatest length, 23.4, 24.1; zygomatic breadth, 11.2, 12.2; inter-orbital constriction, 5.5, 5.4; maxillary tooth row, C-M¹, 3.4, 3.5. Weights: Ninety-six males: 14.1-37.7; 104 females, 17.4-46.6, including 35 non-gravid females, 17.4-39.6, 39 gravid females, 24.2-46.6, and 30 lactating females, 24.4-40.4; suckling young: seven males, 6.7-9.9; five females, 7.1-13.0.

SPECIMENS RECORDED: *Trinidad*: Apex, Fyzabad, one (A.M.N.H.); Ben Lomond, one (A.M.N.H.); Buenos Ayres, two (A.M.N.H.); Cedros, nine (A.M.N.H.); Granville, one (A.M.N.H.); Petit Valley, one (A.M.N.H.); Grants Trace, three (A.M.N.H.); Mandingo, three (A.M.N.H.); Moruga, two (A.M.N.H.); Oropuche, two (A.M.N.H.); St. John's, four (A.M.N.H.); Santa Cruz, one (A.M.N.H.).

GENERAL HABITS: This vampire bat is most frequently found roosting in well-lighted small caves but occurs in large caves and in hollow trees. It has also been found roosting in old sugar mills, disused wells, abandoned machinery, and places under bridges, culverts, drains, and buildings. On two different occasions 500 vampire bats of mixed sexes were taken in an abandoned World War II ammunition dump.

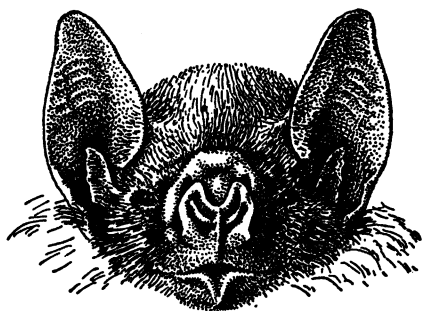


FIG. 78. Front view of head of *Desmodus rotundus rotundus*. $\times 1\frac{1}{4}$.

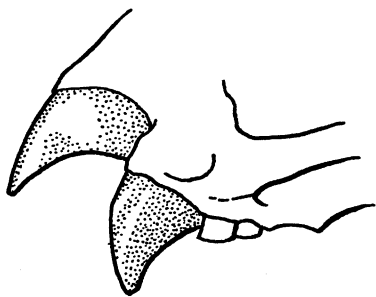


FIG. 80. Lateral view of upper dentition of *Desmodus rotundus rotundus*, showing greatly enlarged incisor and canine.

It has been found roosting in association with *Saccopteryx bilineata*, *Noctilio leporinus*, *Chilonycteris rubiginosa*, *Mormoops megalophylla*, *Micronycteris megalotis*, *M. brachyotis*, *M. hirsuta*, *Phyllostomus hastatus*, *Vampyrum spectrum*, *Trachops cirrhosus*, *Glossophaga soricina*, *Carollia perspicillata*, *Artibeus lituratus*, *Natalus tumidirostris*, *Lonchorhina aurita*, *Anoura geoffroyi*, and *Desmodus rotundus*.

BREEDING: Trinidad specimens of *Desmodus* breed throughout the year. Gravid and lactating females and females with young have been taken during every month of the year. The highest incidence of young appears during April, May, October, and November. A sample of sexes taken from an average-sized roost at Erin, Trinidad, on February 2, 1957, showed: seven adult males, 13 non-gravid females, one gravid female, and 12 lactating females with five nursing males and seven nursing females. A female caught on April 10, 1957, inoculated with a virus and kept in captivity, gave birth to a single young on July 2 after a period of 84 days. Both sexes have been found together while young are present, but there is evidence that the males are apt to roost separately when the young are born.

FOOD: The natural food of the vampire bat is the blood of wild animals and birds. With the arrival of man and the introduction of domestic stock on Trinidad, the vampire bat has been provided with a more accessible and palatable diet. It is most partial to the blood of cattle and horses, with other livestock, such as goats, pigs, poultry, sheep, and dogs, in order of preference; man is at the bottom

of the list. When birds, such as chickens, turkeys, and pigeons, and sometimes goats, are molested in one particular area, netting operations frequently show that a bat of the genus *Diaemus* rather than one of *Desmodus* is the culprit.

Individual animals, such as a single horse or a cow, may be repeatedly attacked, while numbers of similar stock, either in the same group or in the same vicinity, are not bitten. In early 1957, one lone horse of about 50 stabled at the Police Barracks in Port-of-Spain was repeatedly singled out and bitten, even though this horse was moved to a different stall every night for weeks. Some stalls had electric illumination, but that did not deter the bat. Two cows pastured in the Cocorite district on the western edge of Port-of-Spain were bitten night after night for weeks, yet less than a city block away not a single animal in a herd of 14 dairy cows was troubled during the same period. It seems that certain human beings may be singled out and bitten, while others that have slept unprotected in the same room at the same time are not molested. Animals housed in open stalls and stables are frequently attacked along with those animals that are tethered under bushes and trees, while animals in open pasture usually seem to enjoy some degree of freedom.

The wound made by a vampire is an elliptical or not quite circular, scoop-like incision made by the razor-sharp upper incisor teeth and is usually painlessly inflicted. Large animals are most frequently bitten on the neck, shoulders, or flanks, but cattle have been bitten at the base of the horns, the base and tip of the ears, the anal region, and between the hooves. The Asiatic Water Buffalo (*Bubalus*), locally called "bison," is often bitten inside the nostrils. Swine are attacked on the nose and ears, and sows suffer severely from being repeatedly bitten on the teats which may become so scarified that their milk cannot flow and the young pigs cannot nurse. Sleeping dogs have been bitten on the nose and ears. Individual fowl and pigeons have been exsanguinated in a single night, and bites have been observed on the comb, the base of the neck, the under surface of the toes, the legs, and the anus. Humans have been bitten on the tips of the fingers, the

toes, the nose, the ears, the elbows, just above the eyebrows, and on the lips.

The habits of the vampire bat have been described by Villa (1957, pp. 341-342). After the wound is made, the bat applies its tongue to the blood as it flows. The lateral edges of the tongue turn downward to produce a concave under surface, which, in conjunction with the deep groove in the middle of the lower lip, forms a tube through which the blood moves. While feeding, the tongue is extended and is usually stationary, and the upper surface remains completely free of blood. The bat's chest and throat movements clearly indicate that the blood is flowing to the digestive tract. From time to time, the tongue may be seen to make in-and-out lapping motions which are thought to produce a partial vacuum in the buccal cavity and further assist the blood flow. The junior author has observed that, when the blood flow lessens, the tongue tip may agitate the wound surface to stimulate the flow.

A vampire may consume such large quantities of blood that it is incapable of flight and falls from the side of its victim to the ground. Several have been caught after a chase on the ground in this apparently flightless condition. After feeding, a vampire usually retreats to a temporary shelter or "digesting place," usually at a low level such as under steps or bridges, on a door frame, in tunnels, or on trees. During the day, these temporary roosts are never occupied, but evidence of fresh blood droppings indicate that bats have fed in the vicinity. Permanent roosts can be recognized by the much larger quantities of droppings, which are tarry in substance, stain the skin and clothes as does tar, and are always accompanied by a strong odor of ammonia.

Individuals of *Desmodus* will live for many years in captivity if fed upon defibrinated blood, and Trapido (1946, pp. 218-219) reported one that lived for 12 years and nine months. A vampire can consume in a single night approximately two ounces of blood. It is entirely possible that a cow would yield this quantity per bite to one bat in a night, including the quantity that generally continues to flow from the wound after the bat has completed its meal. Single cows have been observed in Trinidad which have had as

many as 12 different bites inflicted during one night, plus 49 recent wounds, while on the border between British Guiana and Brazil the junior author observed one steer that had been bitten more than 30 times in a single night.

It has been estimated that one captive vampire consumes about five and three-quarter gallons of blood in a year. During 1959, approximately 1800 vampire bats were collected in Trinidad. Therefore, the assumption is made that these bats, while free, could under favorable conditions be responsible for a maximum loss of 10,350 gallons of blood during the year!

PARASITES: Jobling (1949, p. 322) reports the following species of the Streblidae (bat flies) from Trinidad *Desmodus rotundus*: *Trichobius parasiticus*, *Euctenodes mirabilis*, and *Strebla vespertilionis*. The Trinidad Regional Virus Laboratory (1958, p. 94) lists the following species of the Streblidae (bat flies) from Trinidad *Desmodus rotundus*: *Trichobius dugesii* and *Trichobius perspicillatus*; and of the Ixodidae (ticks): *Ornithodoros azteci*. Brennan and Jones (1960, p. 538) report the following species of the Trombiculidae (chiggers) from Trinidad *Desmodus rotundus*: *Euschöngastia colombiae*, *E. megastyrax*, *Trombicula longicalcar*, *T. pecari*, *T. saccopteryx*, *T. vesperuginis*, and *Whartonia nudosetosa*.

DISEASE: In Trinidad the vampire bat is the principal carrier and transmitter of rabies. Pawan (1936b, p. 402) reported that vampire bats, either with or without the external symptoms of rabies after natural or artificial infection, are capable of transmitting rabies up to five and one-half months, and they can also recover from the furious form of the disease to spread infection for prolonged periods. Recently one rabies-positive *Desmodus* under observation survived for 10 months in captivity.

In Trinidad, rabies outbreaks seem to start towards the end of the rainy season, when the precipitation is prolonged and intense (September to December). A period of subsidence follows during the beginning of the dry season (January to March). At the onset of the next rainy season, around June and July, outbreaks recur, generally intensify as the rains become heavier, and may con-

tinue into the following year.

From a careful analysis of past outbreak patterns and a close study of bat behavior, especially among the vampire bat population, it has been possible to predict, with a fair degree of accuracy, when and where rabies outbreaks will occur among the non-immunized portion of the cattle population. A prediction was made in late 1958 that 1959 would be a major epidemic year.

The appearance of rabies in October and November, 1953, among the cattle of Siparia paralleled the appearance of rabies among the cattle of Siparia in October and November, 1958. The last heavy epidemic of rabies in Trinidad occurred during 1954. In 1955 there were 22 confirmed cases in cattle; three confirmed cases in 1956; and three confirmed cases in 1957. During October and November, 1958, there were five confirmed cases and three unconfirmed cases (clinical symptoms) in the Siparia district. A true picture of a rabies outbreak cannot be based on the number of confirmed laboratory cases for a number of reasons. For example, livestock owners either do not, or are reluctant to, report their livestock losses to the authorities, or the animals may die in some remote or isolated area and cannot be located. In addition, itinerant butchers readily purchase sick, dying, or dead animals and sell the meat in districts where there is no proper meat inspection. At the start of the rabies epidemic in Point Fortin in 1959, one confirmed case was reported on September 17, while traceable but unconfirmed cases numbered 73. The actual count would probably have been approximately 100 or more.

Exclusive of the cases in Siparia and Point Fortin, other deaths, all confirmed, occurred among cattle, donkeys, goats, and pigs, in about a dozen different districts over Trinidad, the most important occurring in Toco and the Fishing Pond area of Manzanilla, both in the northeastern portion of the island.

Many country people or peasants in Trinidad, when questioned about wounds that had obviously been inflicted on them by vampire bats, frequently and resolutely state that they had been bitten by a *soucouyant*, a blood-sucking supernatural *jumbie*, or evil spirit, well known in Trinidad folklore. The *soucouyant* is usually an old woman, who at

night sheds her skin, generally hiding it under a mortar, and flies off through the air as a ball of fire. She can only pass through a keyhole or a crack in the house and, as does the vampire bat, attacks some person for her nightly meal of blood. There are several methods of trapping this *jumbie*. One is to locate the shed skin and sprinkle hot pepper on it which may burn the *soucouyant* to death when she returns and replaces her skin. A less drastic method is to scatter several pounds of rice outside her house which she must count, grain by grain, before she can re-enter. If the *jumbie* is caught without her skin, the villagers may decide to dispose of the *soucouyant* by placing her in a nail-spiked barrel full of tar and then roll the barrel into the ocean. Complete household protection may be afforded by the elimination of keyholes and the filling in of all cracks in the house.

Histoplasma capsulatum has been isolated from tree roosts of *Desmodus rotundus* in association with *Carollia perspicillata* and *Saccopteryx bilineata*.

GENUS *DIAEMUS* MILLER

AVIAN VAMPIRE BATS

Diaemus MILLER, 1906, Proc. Biol. Soc. Washington, vol. 19, p. 84. Type, *Desmodus youngi* Jentink.

Vampire bats similar to *Desmodus*, but thumb shorter, tips of wings white, and cutting edges of lower incisors entire.

RANGE: From Venezuela, the Guianas, and Trinidad to Peru; Parana and São Paulo, Brazil. The genus is probably monotypic. It is recorded from Trinidad.

Diaemus youngi (Jentink)

SPOTTED OR WHITE-WINGED VAMPIRE BAT

Plate 28, figures 4-6; text figures 81, 82

Desmodus youngi JENTINK, 1893, Notes Leyden Mus., vol. 15, p. 282.

Diaemus youngi, MILLER, 1906, Proc. Biol. Soc. Washington, vol. 19, p. 84.

TYPE LOCALITY: Berbice, British Guiana.

RANGE: Trinidad; not uncommon.

GENERAL CHARACTERS: A medium-sized, robust bat, with short ears; thumb enlarged (fig. 82); no external tail; interfemoral membrane narrow and haired; hind feet hairy to base of claws; calcar absent. *Diaemus* is



FIG. 81. Front view of head of *Diaemus youngi*. $\times 1\frac{3}{4}$.

similar to *Desmodus* in general external characters, but the thumb is much less elongated, the eyes are larger, and the tips of the wings are white.

DESCRIPTION: General color of upper parts Prout's Brown, becoming lighter on shoulders and sides of head; under parts about color of back; tips and outer edges of wings creamy white. Skull similar to that of *Desmodus* but larger and with a larger braincase. Teeth as in *Desmodus* except lower incisors less distinctly paired, their tips curving slightly inward, cutting edges of the outer entire; inner tooth trilobate during early stages of development; posterior upper molar minute, often absent.

DENTAL FORMULA: Incisors, $\frac{1-1}{1-1}$; canines, $\frac{1-1}{1-1}$; premolars, $\frac{1-1}{2-2}$; molars, $\frac{2-2}{1-1}$ or $\frac{1-1}{1-1} = 22$ or 20.

MEASUREMENTS AND WEIGHTS: Two adult females and one adult male from Trinidad: Length of forearm, 50.5, 51.9, 50.0. Skull: Adult female and male: greatest length, 24.0, 23.3; zygomatic breadth, 13.9, 13.4; inter-orbital constriction, 5.9, 6.0; breadth of braincase, 12.8, 12.6; maxillary tooth row, C-M², 3.6, 3.4. Weights: Ten males, 31.7-41.3; five females, 37.5-48.1, including two gravid females, 46.2, 48.1.

SPECIMENS RECORDED: *Trinidad*: Siparia, three (A.M.N.H.).

GENERAL HABITS: *Diaemus* roosts in colonies of up to 30 individuals. This bat has been found in a hollow immortal tree (*Erythrina micropteryx*), and a single specimen was taken in a well-lighted cave. It has been found roosting in association with *Saccolpteryx bilineata* and *Desmodus rotundus*. Bats of the genus *Diaemus* are swift and de-

liberate in flight, and during flight the white tips and margins of the wings can be clearly seen. When disturbed, this bat opens its mouth and can, at will, bring to the commissures of the mouth two cup-shaped glands. The glands seem to fill the bat's mouth, and, when further disturbed, the stoma of the glands can be directed forward and, with the accompaniment of a noisy "psst," emit a powerful and peculiar odor which is offensive and nauseating to many people. Victor C. Quesnel of the Colonial Microbiological Research Institute, Trinidad, who made extraction tests, found several common amino-acids and an unidentified sulphur-containing compound. A butanol extraction test suggested that the odor of the secretion may be pleasant in itself but that it may be masked by unpleasant odors produced in the "cup" of the glands.

BREEDING: A breeding colony of mixed sexes of an estimated 30 individuals was found in a hollow tree. An immature male, four breeding males, one lactating female, one non-gravid female, and one non-lactating female were taken together on October 28, 1958. Two lactating females each with a single young male were taken on August 23, 1954; one of the young was estimated to be about two weeks of age, the other about two months.

FOOD: *Diaemus* feeds on the blood of mammals and birds. Observations indicate that it prefers avian blood to mammalian blood. The first specimen taken in Trinidad was killed while attacking a fowl in a tree. When a colony of *Diaemus* was reduced in south Trinidad, the attacks on poultry by vampire bats in the same area were reduced at the same time. A dead specimen was found beside a goat that had been repeatedly bitten by a bat and had had strychnine syrup applied to the most recent wound. On several occasions,



FIG. 82. Elongated thumb of *Diaemus youngi*.

when pigeons had been reported to be heavily attacked, mist nets set up around the pigeon lofts invariably captured *Diaemus*. Usually, when poultry and goats are attacked in an area, to the obvious exclusion of cattle and equines, *Diaemus* have been collected.

PARASITES: The Trinidad Regional Virus Laboratory (1958, p. 94) lists the following species of the Streblidae (bat flies) from Trinidad *Diaemus youngi*: *Euctenodes* sp. and *Trichobius dugesii*.

DISEASE: Specimens examined were rabies-positive.

REMARKS: In captivity *Diaemus* refused to feed on defibrinated cattle blood, even when mixed with chicken blood. It feeds readily on pure chicken blood. A live guinea pig offered to one specimen, after it had refused cattle blood, was ravenously set upon until it was exsanguinated. The method of feeding is the same as is described for *Desmodus*. *Diaemus* is extremely vocal, in that it has a variety of hisses, screams, and chirps. Mated pairs appear to be quite devoted to each other and have been observed to clean and preen each other as well as be quite disturbed when one is separated from the other. A mirror causes excitement when a bat sees its own reflection; one licked the glass.

SUPERFAMILY VESPERTILIONOIDEA WEBER

LONG-TAILED INSECT-EATING BATS

Small to moderately large-sized bats without a nose leaf or prominent dermal outgrowth on chin, tail usually as long as or longer than the wide interfemoral membrane.

FAMILY NATALIDAE MILLER

NATALID BATS

Small, delicately formed bats with low, somewhat funnel-shaped ears, long slender limbs, large, naked interfemoral membrane, no nose leaf, thumb well-developed, with a normal claw, tail long, thread-like, and extending the length of interfemoral membrane, third finger with two phalanges.

GENUS NATALUS GRAY

FUNNEL-EARED BATS

Natalus GRAY, 1838, Mag. Zool. Bot., vol. 2, p. 496. Type, *Natalus stramineus* Gray.

Natalid organ a thin, floating, glandular

disk covering the frontal region of the head, lying between skin underlying muscles.

RANGE: From Baja California and Tamaulipas, Mexico, south to Panama; Bahama Islands, Cuba, Dominican Republic, Haiti, Jamaica, Lesser Antilles, Trinidad, and Curaçao in the West Indies; Natal and Lagoa Santa in eastern Brazil; San Esteban, Venezuela; and Santander, Colombia. One species is recorded from Trinidad.

SUBGENUS NATALUS GRAY

GREATER FUNNEL-EARED BATS

Natalus, DALQUEST, 1950, Jour. Mammal., vol. 31, no. 4, p. 442. Type, *Natalus stramineus* Gray.

Ears large, with superior margin rounded, lower lip with a shallow emargination, natalid organ large.

Natalus tumidirostris haymani Goodwin

TRINIDADIAN FUNNEL-EARED OR LONG-LEGGED BAT

Plate 31, figures 7-9; text figures 83-85

Natalus stramineus, SANBORN, 1941, Publ. Field Mus. Nat. Hist., zool. ser., vol. 27, p. 380.

Natalus tumidirostris haymani GOODWIN, 1959, Amer. Mus. Novitates, no. 1977, p. 12.

TYPE LOCALITY: Mt. Tamana, altitude between 600 and 700 feet, Trinidad, West Indies.

RANGE: Trinidad; not uncommon in the Central and Northern ranges.

GENERAL CHARACTERS: A small, slender, yellowish bat with thin flying membranes; no nose leaf; very long, slender limbs; a very long, thin, thread-like tail extending the full length of a very wide, thin, interfemoral membrane (fig. 84); fur moderately long and lax.

DESCRIPTION: Color of upper parts vary-



FIG. 83. Front view of head of *Natalus tumidirostris haymani*. $\times 1\frac{1}{2}$.

ing from bright rich Cinnamon-Buff to dull Cinnamon-Buff; under parts slightly paler in color than back. Skull long and narrow, with a high, globular braincase, rising abruptly above level of rostrum; rostrum elongate, the maxillary bones conspicuously inflated so that the tooth rows cannot be seen when the skull is viewed from above; bony palate short, a posterior emargination extending to the middle molar (fig. 85); upper incisors in pairs, small, low, and subequal, the four teeth in a straight line, broken in the middle by a shallow palatal emargination; lower incisors small, trifid, the middle lobe the largest.

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

MEASUREMENTS AND WEIGHTS: Eight males and three females from Tamana Caves: Length of forearm, 39.0–41.5. Skull: Greatest length, 16.1–17.3; condylobasal length, 15.0–16.5; zygomatic breadth, 8.3–8.6; breadth of braincase, 7.8–8.3; interorbital constriction, 3.2–3.6; width across canines, 3.6–4.0, width across molars, 5.3–6.0; maxillary tooth row, C–M³, 7.0–9.2. Weights: Thirty-five males, 4.8–9.9; 16 females, 4.6–6.3.

SPECIMENS RECORDED: *Trinidad*: Guacharo Cave, two (M.C.Z.); Heights of Guanapo, one (A.M.N.H.); Platanal, two (A.M.N.H.); Tamana Caves, 18 (A.M.N.H.); two (B.M.); Las Cuevas, two (A.M.N.H.).

GENERAL HABITS: This bat has been found in colonies of up to 65 individuals roosting in large, dark caves. It seems to pre-

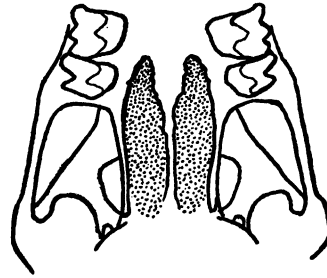


FIG. 85. Ventral view of skull of *Natalus tumidirostris haymani*, showing posterior emargination of palate.

fer the driest and darkest portions of a cave, particularly the flues and chimneys. A male and female were found in a hollow rubber tree (*Hevea brasiliensis*). In the Mt. Tamana Caves it was found roosting in association with *Chilonycteris rubiginosa*, *Pteronotus davyi*, *Mormoops megalophylla*, *Phyllostomus hastatus*, *Anoura geoffroyi*, and *Carollia perspicillata*; in the Heights of Guanapo caves, with *Desmodus rotundus*; and in Zagaya Cave, with *Lonchorhina aurita*. *Natalus* is a swift flier but delicate, as the concussion of a gun fired in a cave drops specimens even though they have been untouched by pellets.

BREEDING: On November 20, 1957, 40 males and 25 females were taken in the Tamana Caves, all non-breeding.

FOOD: This is a strictly insect-eating bat.

DISEASE: Specimens examined were rabies-negative.

REMARKS: Sanborn (1941, p. 380) listed two specimens in the British Museum from Trinidad as *Natalus stramineus*. The skulls of these specimens have been removed and cleaned, and the specimens prove to be *Natalus tumidirostris haymani*.

FAMILY FURIPTERIDAE MILLER

THUMBLESS OR SMOKY BATS

Small, dusky-colored, slender bats, superficially resembling *Natalus* but with pelage much darker in color, tail short, and thumb rudimentary.

GENUS FURIPTERUS BONAPARTE

LITTLE SMOKY BATS

Furipterus BONAPARTE, 1837, Iconografia fauna Italia, vol. 1, fasc. 21. Type, *Furia horrens* F. Cuvier.

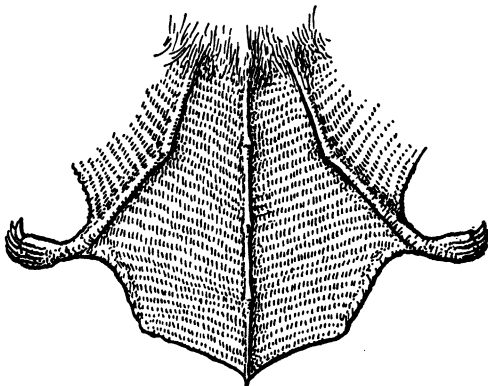


FIG. 84. Dorsal view of interfemoral membrane of *Natalus tumidirostris haymani*, showing long, thread-like tail.

RANGE: Northern South America, from Colombia to the Guianas and Santa Catarina, Brazil. The genus is monotypic. It is recorded from Trinidad.

***Furipterus horrens* (F. Cuvier)**

CUVIER'S SMOKY, THUMBLESS, OR PIG BAT

Plate 30, figures 1-3; text figures 86, 87

Furia horrens F. CUVIER, 1828, Mém. Mus. d'Hist. Nat., Paris, vol. 16, p. 150.

Furipterus horrens, TOMES, 1856, Proc. Zool. Soc. London, p. 176.

TYPE LOCALITY: Mana River, French Guiana.

RANGE: Trinidad; not common.

GENERAL CHARACTERS: A small, slender, dusky-colored bat with funnel-shaped ears; rudimentary thumb (fig. 87); short tail ending in interfemoral membrane a little beyond middle; muzzle and lips without warty processes other than an angular projection on upper lip; third finger with two phalanges.

DESCRIPTION: General color of upper parts bluish gray, chin and just above nose reddish brown, under parts slightly paler in color than back. Skull very small and slender, with relatively large, globular braincase, sharply elevated above a narrow tapered rostrum; teeth about as in *Natalus* except that canines reduced to about height of premolars.

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

MEASUREMENTS: Specimen from Trinidad: Length of forearm, 31.2. Skull: Greatest length, 11.5; zygomatic breadth, 6.3; inter-orbital constriction, 3.0; maxillary tooth row, C-M³, 5.0.

SPECIMEN RECORDED: *Trinidad*: Princes Town, one (A.M.N.H.).

GENERAL HABITS: *Furipterus* probably frequents dark caves, but no specimens have



FIG. 86. Front view of head of *Furipterus horrens*. $\times 2\frac{1}{2}$.

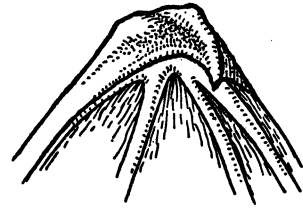


FIG. 87. Rudimentary thumb of *Furipterus horrens*.

been collected on Trinidad during recent years.

FOOD: Insects.

FAMILY THYROPTERIDAE MILLER

AMERICAN DISK-WINGED BAT

Text figure 88

Small, slender, delicately formed bats with conspicuous, hollow, suctorial disks at the base of the thumb and on the soles of the feet (fig. 88); no nose leaf; tail extending slightly beyond the posterior border of a broad interfemoral membrane.

GENUS THYROPTERA SPIX

DISK-WINGED, SUCKER-FOOTED BATS

Thyroptera SPIX, 1823, Simiarum et vespertilionum Brasiliensium, p. 61. Type, *Thyroptera tricolor* Spix.

Third finger with three bony phalanges; toes with two phalanges each; third and fourth toes ankylosed; skull without post-orbital processes; anterior border of palate emarginate.

RANGE: From British Honduras south into South America and from Ecuador and Peru to São Paulo, Brazil. One species is recorded from Trinidad.

***Thyroptera tricolor tricolor* Spix**

BRAZILIAN DISK-WINGED OR SUCKER-FOOTED BAT

Plate 30, figures 4-6; text figure 89

Thyroptera tricolor SPIX, 1823, Simiarum et vespertilionum Brasiliensium, p. 61.

Thyroptera tricolor albigula, GREENHALL, 1956, Jour. Trinidad Field Nat. Club, p. 18.

Thyroptera tricolor tricolor, CABRERA, 1957, Rev. Mus. Argentino Cien. Nat. "Bernardino Rivadavia," cien. zool., vol. 4, no. 1, p. 98.

TYPE LOCALITY: Banks of the Amazon, Brazil.

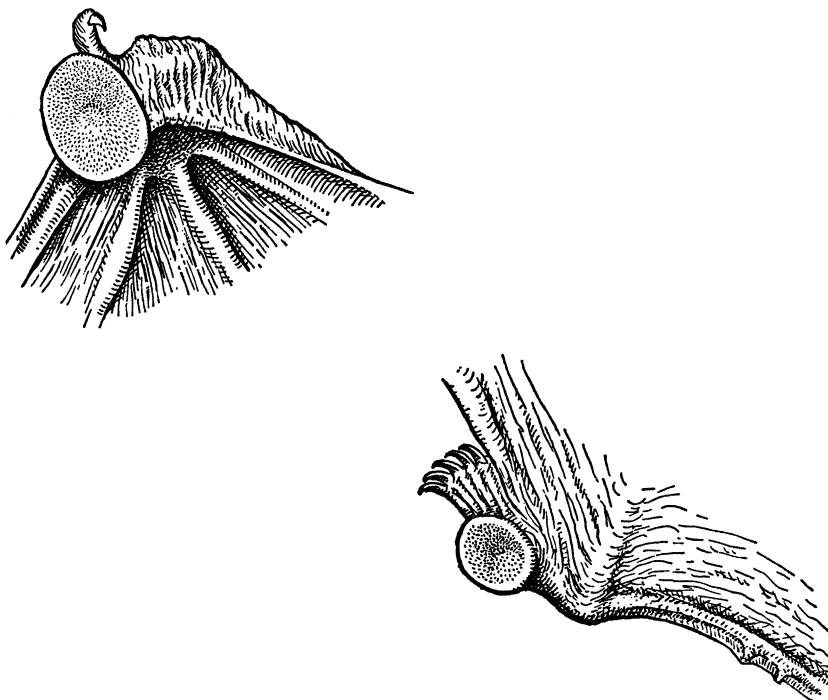


FIG. 88. Under side of thumb and foot of *Thyroptera tricolor tricolor*, showing suctorial disks and cartilaginous spurs on calcar.

RANGE: Trinidad; not common.

GENERAL CHARACTERS: A small, delicately formed, brownish bat with moderately long, thick pelage; very thin flying membranes; short, funnel-shaped ears; extreme tip of tail free; feet very small; calcar well developed, with two cartilaginous projections on posterior border (only one in *Thyroptera discifera*).

DESCRIPTION: General color of upper parts reddish brown near dark Cinnamon-Brown, base of hairs slightly paler than tips; under parts usually white or yellowish white to roots of hairs except for a narrow margin on sides of body and neck which is dusky; chin and throat yellowish white. Skull with a large, rounded braincase, abruptly elevated behind rostrum, its surface smooth and globular; rostrum narrow, weak, and low, the upper surface nearly flat; inner upper incisors larger than outer, both teeth well developed, with a small outer cusp; lower incisors three in number, small and trilobed.

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

MEASUREMENTS: One adult male, three

adult females, and one subadult female from Trinidad: Length of forearm, 37.5, 37.3, 37.2, 36.2, 34.0. Skull: Adult male and three females: greatest length, 14.1, 14.7, 14.5, 13.5; zygomatic breadth, 7.2, 7.4, 7.0, 6.8; inter-orbital constriction, 2.5, 2.8, 2.6, 2.5; width of braincase, 6.9, 7.2, 6.8, 6.5; maxillary tooth row, C-M³, 5.6, 5.7, 5.7, 5.5.

SPECIMENS RECORDED: *Trinidad*: Heights of Aripo, one (A.M.N.H.); no exact locality, two (M.C.Z.); Port-of-Spain, one (A.M.N.H.); Sangre Grande, one (A.M.N.H.).

HABITS: This bat has been found roosting in the newly curled, trumpet-shaped leaves of the banana (*Musa*) and the balisier



FIG. 89. Front view of head of *Thyroptera tricolor tricolor*. $\times 1\frac{3}{4}$.

FIG. 90. Front view of head of *Myotis nigricans nigricans*. $\times 1\frac{3}{4}$.



FIG. 91. Front view of upper incisors of *Myotis nigricans nigricans*, showing subequal size of incisors 2 and 3.

trum; palate deeply emarginate in front. Upper incisors well developed, subequal, the crowns higher than long, subterete, the inner with a posterior secondary cusp (fig. 91); lower incisors forming a continuous row between canines, cutting edges trilobate, the third lower incisor much wider than first or second.

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

MEASUREMENTS AND WEIGHTS: Five specimens from Trinidad: Length of forearm, 32.1–35.5. Skull: Adult male and female: greatest length, 13.1, 12.5; zygomatic breadth, 7.7, 7.4; interorbital constriction, 3.5, 3.1; maxillary tooth row, C–M³, 5.0, 4.5. Weights: Adult male and female from Trinidad: 3.3, 3.1.

SPECIMENS RECORDED: *Tobago*: No exact locality, number of specimens unknown (B.M.). *Trinidad*: North Branch Road, Cap-de-Ville, four (A.M.N.H.); Point Fortin, one (A.M.N.H.); Siparia, two (A.M.N.H.).

GENERAL HABITS: *Myotis* may be found in any kind of dark safe retreat, such as caves, hollow trees, and in the cornice or between the walls of buildings. It has been found roosting in association with *Saccopteryx bilineata*, *Micronycteris megalotis*, *Glossophaga soricina*, and *Carollia perspicillata*.

BREEDING: One male and eight non-gravid females were taken on September 18, 1956, and a non-breeding male was taken on February 14, 1957.

FOOD: Insects.

DISEASE: Specimens examined were rabies-negative.

GENUS *EPTESICUS* RAFINESQUE

BIG BROWN BATS

Eptesicus RAFINESQUE, 1820, Annals of nature, p. 2. Type, *Eptesicus melanops* Rafinesque [= *Vespertilio fuscus* Palisot de Beauvois].

Medium-sized, robust bats with thick,

leathery flying membrane; two pairs of upper incisors, the outer minute.

RANGE: Nearly all the mainland of Western and Eastern Hemispheres, probably to the limit of tree growth. One species is recorded from Tobago.

Eptesicus melanopterus (Jentink)

SURINAM OR JENTINK'S BROWN BAT

Plate 31, figures 1–3; text figures 92, 93

Vesperus melanopterus JENTINK, 1904, Notes Leyden Mus., vol. 24, p. 176.

Eptesicus melanopterus, THOMAS, 1920, Ann. Mag. Nat. Hist., ser. 9, vol. 5, p. 361.

TYPE LOCALITY: Paramaribo, Surinam.

RANGE: Tobago; recorded.

GENERAL CHARACTERS: A medium-sized, dark brownish bat with rather thick leathery flying membranes; ears rounded and separate; tail extending to posterior border of a broad, naked, interfemoral membrane; nose and lips simple.

DESCRIPTION: General color of upper parts dark brownish; under parts slightly paler than back. Skull relatively strong and massive; braincase elevated posteriorly; sagittal crest low; palate emarginate in front; outer upper incisor minute (fig. 93); lower incisors trilobate and crowded between canines.

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

MEASUREMENTS: Adult male from Tobago, and the type (a female) and a topotype male in parentheses: Length of forearm, 40.4 (40.0, 39.2). Skull: Greatest length, 15.2 (—, 15.5); condylobasal length, 14.25 (—, 14.6); zygomatic breadth, 10.1 (—, 10.9); breadth of braincase, 7.3 (—, 7.3); interorbital constriction, 4.0 (—, 4.0); width across molars, 6.75 (7.1, 6.6); maxillary tooth row, C–M³, 5.9 (6.0, 5.6).



FIG. 92. Front view of head of *Eptesicus melanopterus*. $\times 1\frac{1}{4}$.

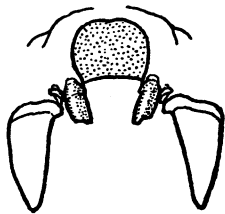


FIG. 93. Front view of upper incisors of *Eptesicus melanopterus*, showing comparative size of large inner and small outer incisors.

SPECIMENS RECORDED: *Tobago*: Roxborough, one (M.C.Z.).

REMARKS: The Tobago specimen of *Eptesicus* agrees in all essential characters with the type description and measurements of *Eptesicus melanopterus* (Jentink). Koopman (1958) listed the Tobago specimen as *Eptesicus brasiliensis* (Desmarest). *Eptesicus brasiliensis* is a large species and is much larger than and quite distinct from *E. melanopterus*. In his original description Desmarest gave only one measurement of *brasiliensis*: wing-spread, 11 "pouces" (305 mm.). Geoffroy's measurements of *Eptesicus hilari*, a synonym of *brasiliensis* that apparently came from the same locality, are: length of head and body, 67 mm.; tail, 49, forearm, 44; wing spread, 324. The Tobago specimen has a wing spread of 270.

GENUS LASIURUS GRAY

RED AND HOARY BATS

Lasiurus GRAY, 1831, Zoological miscellany, no. 1, p. 38. Type, *Vespertilio borealis* Müller.

Medium-sized bats with the interfemoral membrane, hind limbs, and feet hairy; ears low and rounded; one pair of incisors in upper jaw.

RANGE: Western Hemisphere to limit of tree growth, including Bermuda, Bahamas, Greater Antilles, Galápagos, and Hawaiian Islands. One species is recorded from Trinidad.

Lasiurus borealis frantzii (Peters)

COSTA RICAN RED BAT

Plate 32, figures 1-3; text figures 94, 95

Atalapha frantzii PETERS, 1871, Monatsber. Preussischen Akad. Wiss. Berlin, p. 908.

Lasiurus borealis frantzii, GOLDMAN, 1932, Proc. Biol. Soc. Washington, vol. 45, p. 148.

TYPE LOCALITY: Costa Rica.

RANGE: Trinidad; not common.

GENERAL CHARACTERS: A medium-sized, bright reddish bat with the fur of the body extending well down on a broad interfemoral membrane (fig. 95) and along forearms; ears low and rounded; metacarpals evenly graduated in length; tail extending full length of interfemoral membrane.

DESCRIPTION: General color of upper parts bright Chestnut, the hairs blackish at base followed by a band of Light Buff, and broadly tipped with Chestnut; under parts lighter colored than back. Skull short and broad; braincase high and rounded; rostrum very short and broad; palate emarginate anteriorly; upper incisors short, in contact with canines, slightly triangular in outline; lower incisors small, closely imbricated, trifid; a minute upper premolar on inner side of tooth row at base of canines; anterior palatal emargination wide.

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

MEASUREMENTS: Adult male from Trinidad: Length of forearm, 38.1. Skull: Greatest length, 11.6; zygomatic breadth, 8.7; inter-orbital constriction, 4.2; maxillary tooth row, C-M³, 3.95; width of braincase, 7.4; width across M³-M³, 5.6; condylobasal length, 11.4.

SPECIMENS RECORDED: *Trinidad*: Caroni, one (A.M.N.H.).

GENERAL HABITS: The red bat roosts individually, hanging among the leaves of trees, trusting to the camouflage of its pelage for concealment rather than hiding itself from view. It is an early flier and does not usually use the same roosting place twice. In northern regions the red bat migrates in the spring and fall.

BREEDING: The red bat is one of the few species in which the female usually has more than one young in a litter and occasionally as

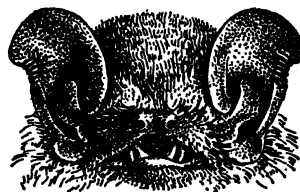


FIG. 94. Front view of head of *Lasiurus borealis frantzii*. $\times 1\frac{1}{2}$.

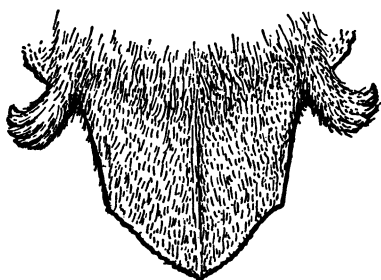


FIG. 95. Dorsal view of interfemoral membrane of *Lasiurus borealis frantzii*, showing hairy covering.

many as four. The young are carried by the parent until they are almost ready to fly.

FOOD: Insects.

GENUS *DASYPTERUS* PETERS

BIG YELLOW BATS

Dasypterus PETERS, 1871, Monatsber. Preussischen Akad. Wiss. Berlin, p. 912. Type, *Lasiurus intermedius* H. Allen.

Large yellow bats similar to *Lasiurus* but larger, interfemoral membrane less hairy, length of forearm about 47 mm. or over.

RANGE: From Willoughby Beach, Virginia, and Texas in the United States south to Chile and Uruguay in South America. One species is recorded from Trinidad.

REMARKS: Handley (1960, p. 473) considers *Dasypterus* Peters and *Lasiurus* Gray as congeneric and states that there is no valid reason for separating *Dasypterus* from *Lasiurus* even on a subgeneric basis. *Dasypterus* does resemble *Lasiurus* in most structural details, but the two genera are so distinct in general external appearance that the generic name *Dasypterus* is retained here for this large yellow bat from Trinidad.

Dasypterus ega panamensis Thomas

PANAMANIAN SHORT-EARED OR LARGE YELLOW BAT

Plate 31, figures 4-6; text figures 96-98

Dasypterus ega panamensis THOMAS, 1901, Ann. Mag. Nat. Hist., ser. 7, vol. 8, p. 246.

Dasypterus ega ega, GREENHALL, 1956, Jour. Trinidad Field Nat. Club, p. 18.

TYPE LOCALITY: Bogava [= Bugaba], foot of Volcan Chiriquí, Chiriquí, Panama.

RANGE: Trinidad; not uncommon.



FIG. 96. Front view of head of *Dasypterus ega panamensis*. $\times 1\frac{1}{2}$.

GENERAL CHARACTERS: A moderately large, dark brownish bat, with short, rounded ears; tragus large (fig. 97); tail long and supporting a gradually narrowing interfemoral membrane to a point well beyond the feet; interfemoral membrane well haired on upper side from base for about half of its length.

DESCRIPTION: General color uniform dark Clay Color, fur black basally, followed by broad band of brownish buff, and tipped in unworn pelage with dark brown, cheeks darker in color than rest of face. Skull similar to that of *Lasiurus* but larger, more robust, and lacking the minute upper premolar; palate emarginate in front (fig. 98).

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

MEASUREMENTS: Two females from Trinidad: Length of forearm, 49.4, 47.7. Skull: Adult female: greatest length, 17.0; zygomatic breadth, 11.1; interorbital constriction, 4.7; width across M^2-M^3 , 7.5; maxillary tooth row, $C-M^3$, 5.5.

SPECIMENS RECORDED: *Trinidad*: Cunapo, Sangre Grande, two (A.M.N.H.); Mafekin, Mayaro, one (A.M.N.H.).

GENERAL HABITS: The habits of this bat are probably much the same as those of the red bat, *Lasiurus*.

BREEDING: Females have four mammae. Three females found under a thatched roof at

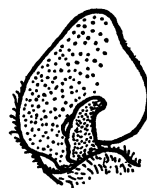


FIG. 97. Lateral view of ear of *Dasypterus ega panamensis*, showing large, hook-shaped tragus.

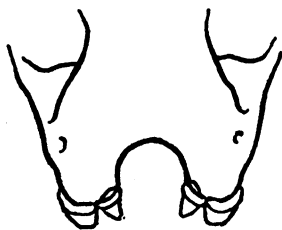


FIG. 98. Dorsal view of rostrum of *Dasypterus ega panamensis*, showing anterior palatal emargination.

Mafekin, Mayaro, Trinidad, on June 1, 1959, had a total of nine young among them.

DISEASE: Specimens examined were rabies-negative.

REMARKS: The Trinidad specimens are much darker in color than typical specimens of *D. ega* from Brazil and agree in all essential characters with specimens of *D. e. panamensis* from Central America. A series from Serra de Parintins, Brazil, representing typical *Dasypterus ega*, are dull brownish white in color; the hairs on the upper parts are blackish at the extreme base and are followed by a broad band of Light Buff and are tipped with Dresden Brown. The length of the forearm of two adult males from Serra de Parintins, Brazil, is 46.7, 47.1. The measurements of the skull of an adult female from Barba, Rio Madeiro, Brazil, are: greatest length, 16.2; zygomatic breadth, 10.8; internal constriction, 4.7; width across M^2-M^3 , 7.3; maxillary tooth row, $C-M^3$, 5.7.

GENUS **RHOGEËSSA** H. ALLEN

LITTLE YELLOW BATS

Text figures 99, 100

Rhogeëssa H. ALLEN, 1866, Proc. Acad. Nat. Sci. Philadelphia, vol. 18, p. 285. Type, *Rhogeëssa tumida* H. Allen.

Tiny to small bats, with flying membrane

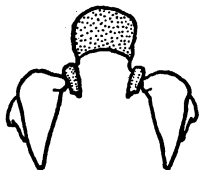


FIG. 99. Front view of upper incisors of *Rhogeëssa tumida riparia*, showing notch on outer edge of teeth.

naked and leathery; one pair of upper incisors with a small outer cusp near tip (fig. 99).

RANGE: From Tamaulipas and Sonora, Mexico, south to Bogotá, Colombia, Puna Island, Ecuador, Venezuela, and Alto Parnahyba, Brazil. Two species are recorded from Trinidad.

***Rhogeëssa parvula minutilla* Miller**

MARGARITA LITTLE YELLOW BAT

Plate 32, figures 4-6

Rhogeëssa minutilla MILLER, 1897, Proc. Biol. Soc. Washington, vol. 11, p. 139.

Rhogeëssa io, GREENHALL, 1956, Jour. Trinidad Field Nat. Club, p. 8.

Rhogeëssa parvula minutilla, CABRERA, 1957, Rev. Mus. Argentino Cien. Nat. "Bernardino Rivadavia," cien. zool., vol. 4, no. 1, p. 111.

TYPE LOCALITY: Margarita Island, Venezuela.

RANGE: Trinidad; widely distributed.

GENERAL CHARACTERS: A very small, pale yellowish bat with no external specializations; ears small and rounded; flying membrane relatively thick and strong; tail long and extending the full length of a broad, naked interfemoral membrane.

DESCRIPTION: General color of typical specimens pale Tawny-Olive, the hairs lightly tipped with dusky. Skull small and slender; braincase small, rounded anteriorly, and elevated posteriorly to an angular peak; zygomatic arches slender and widely spreading; interorbital region relatively narrow; upper incisors simple, less than half as high as canines; lower incisors bifid, the outer lobe on all three teeth being obsolete and the inner lobe virtually absent on outer teeth.

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

MEASUREMENTS: One male and two females from Trinidad: Length of forearm, 27.4, 29.0, 28.0. Skull: Greatest length, 11.5, 11.0, 12.0; zygomatic breadth, 6.8, 6.6, 7.0; breadth of braincase, 5.2, 5.5, 5.7; maxillary tooth row, $C-M^3$, 4.1, 4.4, 4.3.

SPECIMENS RECORDED: *Trinidad*: Port-of-Spain, one (C.N.H.M.); no exact locality, one (U.S.N.M.), one (B.M.).

REMARKS: *Rhogeëssa p. minutilla* is here regarded only as a probable member of the

Trinidad fauna. The three specimens listed here have the small size and the pale Tawny-Olive color of *minutilla*. All three, however, have been in spirits for a considerable length of time, which could have bleached the pelage and caused distortion and shrinkage of the skulls.

***Rhogeessa tumida riparia* Goodwin**

TRINIDADIAN LITTLE YELLOW BAT

Plate 32, figures 7-9; text figure 100

Rhogeessa tumida, GREENHALL, 1956, Jour. Trinidad Field Nat. Club, p. 8.

Rhogeessa tumida riparia GOODWIN, 1958, Amer. Mus. Novitates, no. 1923, p. 5.

TYPE LOCALITY: Cuchivano, Province of Sucre, Venezuela, altitude 700 feet.

RANGE: Trinidad; not uncommon.

GENERAL CHARACTERS: A small, dark reddish brown bat, similar in external appearance to *R. p. minutilla* but darker and more reddish in color and averaging larger.

DESCRIPTION: General color of the type, upper parts Raw Umber, the hairs Cinnamon-Buff from base for two-thirds of their length; under parts Tawny-Olive. Skull short and broad, with a broad, flattened rostrum; broad, low braincase, not elevated posteriorly; molariform teeth relatively broad and heavy; palate broad. Compared with the skull of *R. p. minutilla*, that of *R. t. riparia* is relatively shorter and broader, with the braincase flatter posteriorly, the palate shorter, and the molariform teeth larger and broader.

MEASUREMENTS AND WEIGHTS: The type, three males, and two females from Trinidad: Length of forearm, 28.2, 29.1, 29.5, 29.5, 28.0, 28.5. Skull: Greatest length, 12.2, 12.4, 12.4, 12.0, 12.7, 12.4; zygomatic breadth, 8.1, 8.1, 8.2, 8.2, 8.1, —; breadth of braincase, 6.0, 6.0, 6.1, 5.9, 6.0, 5.9; maxillary tooth row, C-M³, 4.6, 4.5, 4.6, 4.5, 4.5, 4.5. Weights: Four males ranging from immature to adult, 3.3-5.0; two females (one immature and one semi-adult), 3.0, 3.4.

SPECIMENS RECORDED: *Trinidad*: Maracas Valley, three juveniles, two semi-adult (A.M.N.H.); Petit Valley, three juveniles (A.M.N.H.); St. Augustine, three (B.M.); Port-of-Spain, two semi-adult (A.M.N.H.); Siparia, four, of which three are mutilated (A.M.N.H.).

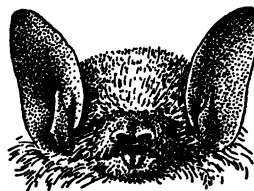


FIG. 100. Front view of head of *Rhogeessa tumida riparia*. $\times 1\frac{1}{2}$.

GENERAL HABITS: *Rhogeessa* is known to roost in fairly large colonies. It has been found roosting in the thatched roof of native houses, between boards, and in hollow trees, and one was found under a palm frond.

BREEDING: Little is known about the breeding habits of this bat except that twins are not unusual.

FOOD: Insects.

DISEASE: Specimens examined were rabies-negative.

REMARKS: Most of the Trinidad specimens are here provisionally referred to *R. t. riparia*. Most of them are either immature or have mutilated skulls, and some have been in spirits for some time, causing the forearm and often the skulls to soften to a jelly. All these specimens are very dark in color, with the tips of the hairs broadly blackish brown. The skulls are short and broad as in the type. The upper incisors in the Trinidad specimens have a distinct secondary cusp near the tip on the outer side (fig. 99). In the type these teeth are worn down to a broad point with only a slight indication of an accessory cusp.

FAMILY MOLOSSIDAE GILL

FREE-TAILED BATS OR MASTIFF BATS

Text figures 101, 102

Small to rather large-sized, muscular bats with short, thick, leathery ears, broader than long, and projecting forward over the eyes; short, thick muzzle, not provided with a nose leaf, and usually with modified, spoon-shaped hairs; tail long and projecting well beyond posterior border of interfemoral membrane (fig. 101); wings long, narrow, and leathery; feet short and broad; pelage thick and rather close; third finger with three phalanges, the second phalanx reflexed (fig. 102), the third phalanx cartilaginous except at base. Skull strong, without postorbital

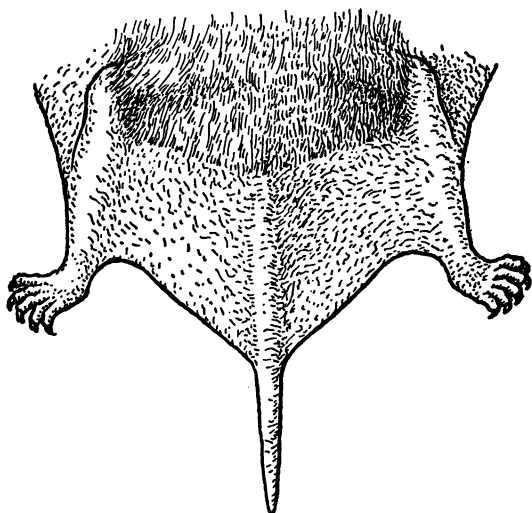


FIG. 101. Dorsal view of tail of *Molossus trinitatus*, showing its length in relation to that of the interfemoral membrane.

processes; premaxillaries with nasal branches present or absent.

KEY TO THE GENERA, SPECIES, AND SUBSPECIES
OF THE MOLOSSIDAE OF TRINIDAD AND
TOBAGO

1. Two pairs of incisors in lower jaw2
One pair of incisors in lower jaw5
2. Ears separate, inner margins of ears not rising
from same point on forehead (length of fore-
arm, 30–36.8) *Molossops greenhalli*
Ears not separate, inner margins of ears rising
from same point on forehead3
3. Deep vertical grooves on upper lip4
Vertical grooves on upper lip absent (length of
forearm, 53.5–54.5) *Promops centralis*
4. Ears not extending beyond tip of nose when
laid forward, rostrum broader than interor-

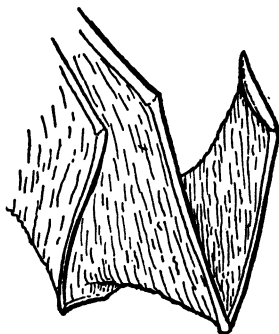


FIG. 102. Dorsal view of third finger of *Molossus ater ater*, showing reflexed second phalanx.

- bital region (length of forearm, 36.0–37.5)
. *Tadarida brasiliensis antillarum*
Ears extending well beyond tip of nose when
laid forward, rostrum not broader than
interorbital region (length of forearm, 40.0–
43.5) *Tadarida europaea*
5. Pelage unicolored, base of hair not paler than
tip (length of forearm, 47.5–51.0)
. *Molossus ater ater*
Pelage bicolored, base of hair white6
 6. Fur not extending onto interfemoral mem-
brane (length of forearm, 37.0–39.5)
. *Molossus major major*
Fur extending well down on interfemoral mem-
brane (length of forearm, 46.9–50.6)
. *Molossus trinitatus*

GENUS **MOLOSSOPS** PETERS

DOG-FACED BATS

Molossops PETERS, 1865, Monatsber. Preus-
sischen Akad. Wiss. Berlin, p. 575. Type, *Dysops*
temminckii Burmeister.

Small to medium-sized, free-tailed bats;
ears separate and not rising from the same
point on forehead; nasal branches of pre-
maxillaries joined anteriorly; one or two
pairs of lower incisors present.

RANGE: From Veracruz, Mexico, south to
Ecuador, Peru, Corrientes, Argentina, Para-
guay, Mato Grosso, and Minas Gerais,
Brazil. One species is recorded from Trinidad.

SUBGENUS **CYNOMOPS** THOMAS

GREATER DOG-FACED BATS

Cynomops, CABRERA, 1957, Rev. Mus. Argen-
tino Cien. Nat. "Bernardino Rivadavia," cien.
zool., vol. 4, no. 1. p. 118. Type, *Molossus cerastes*
Thomas.

Molossops greenhalli (Goodwin)

TRINIDADIAN DOG-FACED OR FREE-TAILED BAT

Plate 34, figures 1–3; text figures 103, 104

Cynomops planirostris planirostris, GREENHALL,
1956, Jour. Trinidad Field Nat. Club, p. 18.

Cynomops greenhalli GOODWIN, 1958, Amer.
Mus. Novitates, no. 1877, p. 3.

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

RANGE: Trinidad; known only from Port-
of-Spain.

GENERAL CHARACTERS: A medium-sized,
dark reddish brown, free-tailed bat with
under parts considerably lighter in color than
back.

DESCRIPTION: Color of upper parts uniform Russet, with the base of hairs white; fur short, velvety, and glossy; under parts dull Avellaneous. Nose, membranes, ears, feet, and tail blackish; a narrow strip of fur extending along outer side of forearm to base of metacarpals. Skull short, broad, and low, with a relatively high, flattened rostrum; conspicuous, laterally projecting lacrimal ridges (fig. 104); braincase relatively smooth and flattened on top, with a very low sagittal crest; upper incisors rather long, simple, in contact with each other and projecting forward; inner lower incisors crowded forward from tooth row, cutting edges deeply bifid; outer lower incisors when present smaller than inner, faintly trifid, and crowded against canines; first lower premolar smaller than second premolar; upper canines with a broad groove on front surface of shaft.

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

MEASUREMENTS AND WEIGHTS: The type (an adult male) and three adult female topotypes: Length of forearm, 36.8, 34.3, 34.5, 33.3. Skull: Greatest length, 18.5, 17.5, 17.6, 17.2; zygomatic width, 12.4, 10.5, 11.6, 10.7; interorbital constriction, 4.5, 4.3, 4.5, 4.5; maxillary tooth row, C-M³, 6.8, 6.5, 6.6, 6.2. Weights: Two female topotypes: 10.8, 12.8.

SPECIMENS RECORDED: *Trinidad:* Royal Botanic Gardens, Port-of-Spain, four (A.M.N.H.); two (U.N.A.M.).

GENERAL HABITS: This bat is known to roost in the hollow branches of fair-sized trees in colonies of from 50 to 75 individuals. Six specimens were taken from the hollow branches of a yellow poui tree (*Tecoma ser-ratifolia*), the lowest hollow branch being 30 feet from the ground. This colony occupied

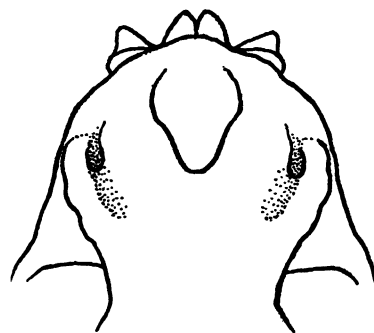


FIG. 104. Dorsal view of rostrum of *Molossops greenhalli*, showing projecting lacrimal ridges.

the tree for at least six months before it was cut down. The bats emerged from the roost regularly each evening about 15 minutes before dark. They flew from the roost at a fast rate, downward, then upward, one bat following the other at intervals of about one second, until six of eight were in flight. After a pause of five or 10 seconds six or eight more emerged from the roost. About 15 or 20 minutes later a number of the bats returned to the roost. When the tree was cut down, the bats collected were seen clinging to the fallen branches. They were cold and clammy to the touch and extremely torpid. Males have the usual musky odor of molossine bats; the females have no odor.

BREEDING: On June 6, 1955, one male and six females were collected. Four of the females were gravid, and each gave birth to a single young sometime before June 20.

FOOD: In captivity *Molossops* ate flying termites, though a variety of other insects were refused as food. It was kept alive on a diet of Irish pork sausage. The feeding time seemed to be about 6:30 p.m., and it took about half an hour for each bat to warm up from the cold torpid state.

GENUS *TADARIDA* RAFINESQUE

WRINKLED-LIPPED, FREE-TAILED BATS

Tadarida RAFINESQUE, 1814, Précis des découvertes et travaux somnologiques, p. 55. Type, *Cephalotes teniotis* Rafinesque.

Medium-sized, free-tailed bats, with large ears joined together by a low band across forehead; two or three pairs of lower incisors present; nasal branches of premaxillaries approaching each other anteriorly but not joined together.



FIG. 103. Front view of head of *Molossops greenhalli*. $\times 1\frac{1}{4}$.

RANGE: Widely distributed in tropical regions of the Eastern and Western Hemispheres. In America from southern British Columbia and Iowa south, including the West Indies, to central Chile and Argentina, Paraguay, and southern Brazil. Two species are recorded, one from Trinidad and one from Tobago.

***Tadarida europs* (H. Allen)**

ALLEN'S LITTLE WRINKLED-LIPPED,
FREE-TAILED BAT

Plate 33, figures 1-3; text figures 105, 106

Nyctinomus europs H. ALLEN, 1889, Proc Amer. Phil. Soc., vol. 26, p. 558.

Tadarida europs, SHAMEL, 1931, Proc. U. S. Natl., Mus., vol. 78, p. 14.

Tadarida brasiliensis brasiliensis, GREENHALL, 1956, Jour. Trinidad Field Nat. Club, p. 8.

TYPE LOCALITY: Brazil.

RANGE: Trinidad; known from two specimens.

GENERAL CHARACTERS: A small, free-tailed bat, with deep vertical grooves or wrinkles on the upper lip; ears large, rounded; inner margin of both ears arising from same point on forehead and when laid forward ears reaching beyond end of muzzle. Most noticeable external character in this species is bare spot on lower sides of back.

DESCRIPTION: General color of Trinidad specimens, upper parts Snuff Brown; hair on under parts tipped with Light Buff. Skull with relatively long narrow rostrum scarcely wider anteriorly than at point of least interorbital width (fig. 106); sagittal crest rather well developed; anterior border of palate emarginate; premaxillaries separated by a space equal to base of canines; upper incisors about half as high as canines, set wide apart at base and strongly converging towards tip and separated from canines by a space; lower



FIG. 105. Front view of head of *Tadarida europs*. $\times 1\frac{1}{2}$.

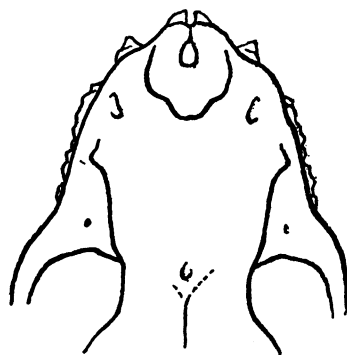


FIG. 106. Dorsal view of cranium of *Tadarida europs*, showing long, narrow rostrum.

incisors four.

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

MEASUREMENTS AND WEIGHTS: Type (a female), an adult male, and a female from Trinidad: Length of forearm, 43.2, 40.5, 40.2. Skull: Greatest length, 16.6, —, 16.0; zygomatic breadth, 9.2, —, 9.0; interorbital constriction, 3.4, —, 3.3; maxillary tooth row, C-M³, 6.4, 6.6, 6.2. WEIGHTS: One female from Trinidad, 8.0.

SPECIMENS RECORDED: *Trinidad*: Port-of-Spain, two (A.M.N.H.).

GENERAL HABITS: In Venezuela this bat was found roosting in the crevices of large rocks, where colonies of more than 50 individuals were not uncommon.

FOOD: Insects.

REMARKS: The skull of one Trinidad specimen, a male, is too fragmentary for satisfactory identification, but its size and the restriction of the fur to the lower sides of the body indicate that it can be referred to *T. europs*. The second specimen is a female with a shorter forearm and a skull smaller than that of any individual in a large series of *T. europs* from Venezuela, but most of the fur has gone from the body. It appears to be adult but may not be fully grown, and except for noticeably smaller size it is very similar to typical specimens of *T. europs* from the mainland.

***Tadarida brasiliensis antillarum* (Miller)**

DOMINICAN LITTLE WRINKLED-LIPPED BAT

Plate 33, figures 4-6; text figures 107, 108

Nyctinomus antillarum MILLER, 1902, Proc. Acad. Nat. Sci. Philadelphia, vol. 54, p. 398.



FIG. 107. Dorsal view of cranium of *Tadarida brasiliensis antillularum*, showing broad rostrum.

Tadarida brasiliensis antillularum, SCHWARTZ, 1955, Jour. Mammal., vol. 36, p. 108.

TYPE LOCALITY: Roseau, Dominica, Lesser Antilles.

RANGE: Tobago; known from one specimen.

GENERAL CHARACTERS: A small, free-tailed bat similar to *T. europis* but ears shorter, palatal emargination wider, and differing in other cranial and dental details.

DESCRIPTION: General color of upper parts varying from Mummy Brown to Russet; under parts very little paler than back; ears small and when laid forward not extending beyond end of muzzle. Skull small, with a broad, flat rostrum, considerably wider than at the point of least interorbital width (fig. 107); outer lower incisor very small and first upper premolar minute; nasal branches of premaxillaries distinctly separated anteriorly (fig. 108).

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

MEASUREMENTS: Adult male from Tobago and type: Length of forearm, 36.0, 37.4.

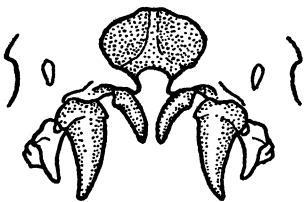


FIG. 108. Front view of rostrum of *Tadarida brasiliensis antillularum*, showing emargination of anterior branches of premaxillaries.

Skull: Greatest length, 15.5, 16.0; zygomatic breadth, 8.7, 8.8; interorbital breadth, 3.7, 3.6; breadth of braincase, 7.5, 7.6; maxillary tooth row, C-M³, 5.6, 5.5.

SPECIMENS RECORDED: *Tobago*: Exact locality unknown, one (U.S.N.M.).

GENUS *PROMOPS* GÉRAIS

DOME-PALATED BATS

Promops GÉRAIS, 1855 [1856], Mammifères, in Castelnau, Expédition dans les parties centrales de l'Amérique du Sud, . . . pt. 7, Zoologie, vol. 1, p. 58. Type, *Promops ursinus* Gervais [= *Molossus nasutus* Spix].

Medium-sized, free-tailed bats with ears rising from the same point on forehead; pelage whitish at base; two pairs of lower incisors present; nasal branch of premaxillaries joined anteriorly.

RANGE: From Jalisco and northern Yucatan, Mexico, south to Peru, northern Argentina, Paraguay, and Bahia and Amazonas, Brazil. One species is recorded from Trinidad.

Promops centralis Thomas

MEXICAN DOME-PALATED OR RIDGE-NOSED MASTIFF BAT

Plate 34, figures 4-6; text figures 109-111

Promops centralis THOMAS, 1915, Ann. Mag. Nat. Hist., ser. 8, vol. 16, p. 62.

TYPE LOCALITY: Northern Yucatan, Mexico.

RANGE: Trinidad; widely distributed but not common.

GENERAL CHARACTERS: A medium-sized, reddish, free-tailed bat, with lines of fur diverging from angle in bend of wing along forearm and fourth finger; ears short, arising from same point on forehead; a median raised ridge down upper side of muzzle (fig. 110); a

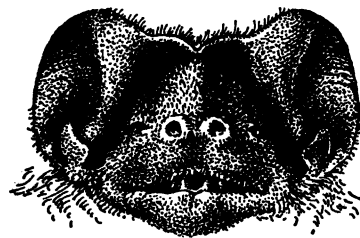


FIG. 109. Front view of head of *Promops centralis*. $\times 1\frac{1}{2}$.



FIG. 110. Front view of muzzle of *Promops centralis*, showing median ridge.

small dense bush of stiff hairs below nostrils; fur moderately long.

DESCRIPTION: Color of one specimen from Trinidad: upper parts between Russet and Cinnamon-Brown, base of hairs Light Buff; under parts snuff brown, base of hairs whitish; another specimen is Mummy Brown. Skull short and broad, with a high, domed palate (fig. 111); upper incisors large, slender, and projecting forward; anterior upper premolar rudimentary; lower incisors small and bifid.

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

MEASUREMENTS AND WEIGHTS: Three females from Trinidad: Length of forearm, 54.2, 53.7, 54.6. Skull of an adult female: Greatest length, 20.5; front of canines to condyles, 18.9; zygomatic breadth, 12.3; interorbital constriction, 4.2; maxillary tooth row, C-M³, 7.8. Weights: One male, 14.4; two females, 17.2, 14.4.

SPECIMENS RECORDED: *Trinidad:* Cocorite, Port-of-Spain, one (L.S.U.); George Village, two (A.M.N.H.); Port-of-Spain, one (L.S.U.); San Fernando, one (A.M.N.H.); no exact locality, three (L.S.U.).

GENERAL HABITS: Small colonies of up to six individuals have been found roosting on the under side of palm leaves, especially

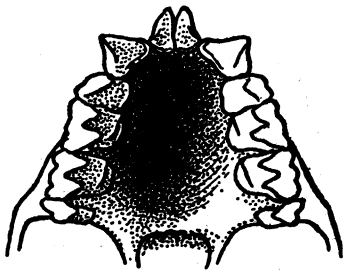


FIG. 111. Ventral view of skull of *Promops centralis*, showing domed palate.

where the frond angles downward, affording the greatest amount of shade.

BREEDING: Two of six females taken under a palm leaf on April 12, 1956, were lactating.

FOOD: Insects.

DISEASE: Specimens examined were rabies-negative.

GENUS *MOLOSSUS* É. GEOFFROY-SAINT-HILAIRE

MASTIFF BATS

Molossus É. GEOFFROY-SAINT-HILAIRE, 1805, Ann. Mus. d'Hist. Nat. Paris, vol. 6, p. 151. Type, *Vespertilio molossus* Schreber [= *Vespertilio molossus major* Kerr].

Small to medium-sized, muscular, free-tailed bats; ears low and rising from same point on forehead; nasal branches of premaxillaries joined anteriorly; one pair of incisors in lower jaws.

RANGE: From Tamaulipas and Nayarit, Mexico, south to Paraguay, including the West Indies south of Cuba. Three species are recorded from Trinidad; one is known from Tobago.

Molossus ater ater É. Geoffroy-Saint-Hilaire

GREATER HOUSE OR GUIANAN MASTIFF BAT

Plate 35, figures 1-3; text figures 112, 113

Molossus ater É. GEOFFROY-SAINT-HILAIRE, 1805, Ann. Mus. d'Hist., Nat., Paris, vol. 6, p. 155.

Molossus rufus, MILLER, 1913, Proc. U. S. Natl. Mus., vol. 46, p. 88.

Molossus rufus nigricans, GREENHALL, 1956, Jour. Trinidad Field Nat. Club, p. 8.

Molossus ater, GOODWIN, 1960, Amer. Mus. Novitates, no. 1994, pp. 1-6.

TYPE LOCALITY: Cayenne, French Guiana.

RANGE: Trinidad; widely distributed and common.

GENERAL CHARACTERS: A rather large, muscular, free-tailed bat, occurring in red and black color phases; ears short, rounded, and arising from a point on forehead, when laid forward, barely extending to end of muzzle; a small pad of stiff hairs below nostrils; wing membranes with a narrow border of fur along forearm; fur short and close; wings long and narrow.

DESCRIPTION: General color in the red phase uniform Russet; in the dark phase uniform glossy black. Skull with large braincase, flattened on top and with a greatly developed,

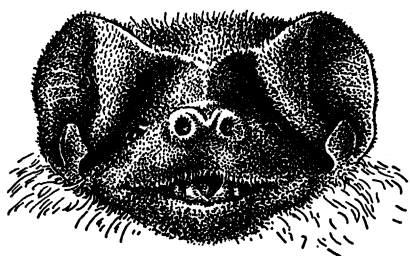


FIG. 112. Front view of head of *Molossus ater ater*. $\times 1\frac{1}{2}$.

knife-like, sagittal crest (fig. 113); palate arched; rostrum short and broad; no anterior palatal emargination; upper incisors short and placed close together; lower incisors small, crowded forward, and deeply bifid; lower canines strongly in contact with one another.

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

MEASUREMENTS AND WEIGHTS: Three males and three females from Trinidad: Length of forearm, 48.9, 50.0, 50.1, 47.9, 48.7, 50.8. Skull: One female and three males: Greatest length, 21.0, 22.5, 22.5, 21.8; zygomatic breadth, 12.5, 13.8, 13.5, 13.4; inter-orbital constriction, 4.7, 4.5, 4.3, 4.2; maxillary tooth row, C-M³, 7.4, 8.0, 7.6, 8.0. Weights: Thirty-six males, 17.6–39.9; 54 females, 14.2–32.3, including 41 non-gravid, 14.2–32.3, one gravid, 26.2, and 12 lactating, 18.1–29.2.

SPECIMENS RECORDED: *Trinidad:* Caparo Valley Road, eight (A.M.N.H.); Centeno, 10 (A.M.N.H.); Douglas Road, Moruga, one (A.M.N.H.); Fyzabad, five (A.M.N.H.); Los Bajos, one (A.M.N.H.); Princes Town, two (A.M.N.H.); Port-of-Spain, nine (A.M.N.H.); St. Joseph, one (A.M.N.H.); Waller Field, one (A.M.N.H.); no exact locality, five (U.S.N.M.).

GENERAL HABITS: Most frequently found in dwelling houses, this bat lives directly under galvanized roofing where the temperature may reach 130° F. It has also been found in large colonies roosting under palm leaves and in hollow trees. Colonies of 50 individuals are not unusual. Both sexes have large glands inside the mouth over the canines. The mouth of these glands is open when the bat feeds.

This bat is most frequently found roosting

in association with *Molossus major* and on two occasions has been found with *Phyllostomus hastatus*. It becomes very active in the roost a short time before dusk and again about an hour later after the first flight; there is more activity before dawn. It scuttles over the roost walls and floor, mouse-like, with the tips of the folded wings tucked up under the armpits, and sleeps in a horizontal rather than a vertical position. It is a fast and erratic flier, sometimes flying low and sometimes high in the air.

BREEDING: One gravid female was taken in March; lactating females were taken from July to September. On September 7, 1956, a lactating female with a single young was found in a hollow tree. On October 2, 1957, 15 non-breeding males, eight non-gravid females, and one lactating female were found under a palm leaf. On December 20, 1957, three non-breeding males, 10 breeding males, and 14 non-gravid females were found together around the louvers of an abandoned building. Breeding males have been taken from March to August. When disturbed, males discharge a musky substance from their chest gland. The sex ratio of 239 specimens between March and October, 1958, was: 121 were males and 118 females.

FOOD: Insects. Both sexes have large cheek pouches, and when they are stuffed and crammed to capacity, the bat returns to the roost to chew and swallow its food.

PARASITES: The Trinidad Regional Virus Laboratory (1958, pp. 89, 94, 99) lists the following species of parasites from Trinidadian *Molossus ater*: Streblidae (bat flies), *Euctenodes* sp.; Polycetenidae (blood-sucking

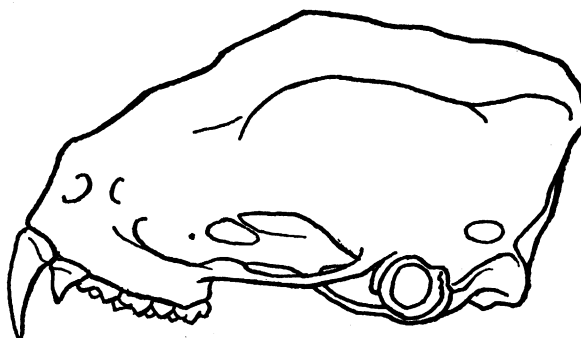


FIG. 113. Lateral view of skull of *Molossus ater ater*, showing high, knife-like, sagittal crest.

bugs), *Hesperoctenes fumarius*; Ixodidae (ticks), *Ornithodoros dunni*.

DISEASE: Specimens examined were rabies-negative.

REMARKS: Angel Cabrera, in his catalogue of South American mammals (1957, p. 132), put *Molossus pretiosus* Miller from Venezuela in synonymy under *Molossus ater* which appears to be a valid species and may eventually be found on Trinidad. Specimens of *M. pretiosus* from the type locality, La Guaira, Venezuela, are represented in both red and black color phases and average considerably smaller than typical *M. ater* and have a shorter and broader skull. The measurements of a male and two adult female topotypes of *Molossus pretiosus* are: length of forearm, 46.8, 46.5, 45.5; skull, greatest length, 21.3, 20.5, 19.5; zygomatic breadth, 13.1, 12.8, 12.5; interorbital constriction, 4.2, 4.2, 4.1; maxillary tooth row, C-M³, 7.4, 7.4, 7.3.

***Molossus major major* (Kerr)**

MARTINIQUE LITTLE MASTIFF OR
LITTLE FREE-TAILED HOUSE BAT

Plate 34, figures 7-9

V[espertilio mol]lossus major KERR, 1792, The animal kingdom, p. 97.

Molossus major, MILLER, 1913, Proc. U. S. Natl. Mus., vol. 99, p. 453.

Molossus obscurus, VESEY-FITZGERALD, 1936, Trop. Agr. Jour. Imp. College Trop. Agr. Trinidad, vol. 13, no. 6, p. 161.

Molossus major major, HERSHKOVITZ, 1949, Proc. U. S. Natl. Mus., vol. 99, p. 453.

TYPE LOCALITY: Martinique, Lesser Antilles.

RANGE: Trinidad; widely distributed and common. Tobago; widely distributed and common.

GENERAL CHARACTERS: Very similar to *Molossus ater* but about half of the size.

DESCRIPTION: Fur short and close, whitish from base for about half of its length and tipped with blackish brown or reddish brown. Skull, except for being smaller, very similar to that of *Molossus ater*.

MEASUREMENTS AND HEIGHTS: One male and three females from Tobago: Length of forearm, 38.5, 38.0, 38.0, 38.1. Eleven males and 13 females from Tobago: forearm, 37.1-39.7, 36.7-39.5. Three females from Bar-

bados: forearm, 38.1, 37.9, 37.2. Skull: Eight males and eight females from Trinidad, one male and two females from Tobago, and three females from Barbados: greatest length, 16.6-17.2, 15.8-16.3, 16.7, 16.2, 16.0, 16.0, 16.0, 15.8; zygomatic breadth, 10.2-10.5, 9.2-10.2, 10.5, 10.2, 10.0, 9.8, 9.8, 9.8; interorbital constriction, 3.5-3.6, 3.2-3.5, 3.6, 3.5, 3.5, 3.2, 3.1, 3.1; breadth of braincase, 8.2-8.9, 7.8-8.4, 8.7, 8.5, 8.4, 8.2, 8.3, 8.0; maxillary tooth row, C-M³, 6.0-6.2, 5.9-6.0, 6.1, 5.9, 5.9, 5.9, 5.8, 5.9. Weights: One hundred and ten males, 6.5-15.0; 115 females, 5.1-14.2, including 107 non-gravid females, 5.1-12.7, and eight gravid females, 9.8-14.2; two sucklings, 3.3, 3.3.

SPECIMENS RECORDED: *Tobago*: Charlotteville, five (B.M.), 14 (A.M.N.H.); Scarborough, four (A.M.N.H.); Little Tobago, five (A.M.N.H.). *Trinidad*: Centeno, five (A.M.N.H.); Maracas Valley, one (A.M.N.H.); Moruga, two (A.M.N.H.); Port-of-Spain, 12 (A.M.N.H.); San Fernando, three (A.M.N.H.); Siparia, one (A.M.N.H.).

GENERAL HABITS: In 1895 Caracciolo reported that this bat was not very common, but at Port-of-Spain colonies of more than 300 individuals are now found between the eaves of buildings and the galvanized roofing where the bats tolerate and seem to enjoy temperatures as high as 130° F. This bat has also been found under palm leaves and in cocoa-drying sheds. *Molossus major* has been found roosting in association with *Molossus ater*. It is an early flier and leaves the roost 30 or 40 minutes before dark, while the short-tailed swift (*Chaetura brachyura*) is still on the wing.

In August *M. major* made its first appearance in the evening at Port-of-Spain at 6:20 p.m., while in December it was seen flying at about 5:40 p.m. General Electric light-meter reading at both times registered 3.5, which equals about 24 foot candles.

BREEDING: Breeding males have been taken from March to August. On September 17, 1957, five non-breeding males and 10 lactating females with single young were taken in an attic. Single young have been found in October and lactating females without young in December. The sex ratio is approximately 1:1; of 596 collected between

March and October, 1958, 291 were males and 305 were females.

FOOD: Insects.

PARASITES: The Trinidad Regional Virus Laboratory (1958, p. 97) lists the following species of mites from Trinidadian *Molossus major*: Dermanyssidae, *Ichoronyssus* sp.; Myobiidae, *Myobia* sp.

DISEASE: One specimen taken from an attic at Port-of-Spain was found to be rabies-positive. Numerous other specimens examined were rabies-negative.

REMARKS: The mandible and wing bones of a specimen of *Molossus m. major* were found in the nest of a Spix Scop Owl (*Otus choliba*) in Trinidad, after the young had flown.

***Molossus trinitatus* Goodwin**

TRINIDADIAN MASTIFF OR FREE-TAILED BAT

Plate 35, figures 4-6; text figure 101

Molossus trinitatus GOODWIN, 1959, Amer. Mus. Novitates, no. 1967, p. 1.

TYPE LOCALITY: Belmont, Port-of-Spain, Trinidad, West Indies.

RANGE: Trinidad; known only from type locality.

GENERAL CHARACTERS: A medium-sized, blackish, free-tailed bat with base of fur whitish.

DESCRIPTION: Fur relatively long, soft, and lax, reaching a length of 6.5 mm. on shoulders and extending on upper side of interfemoral

membrane from base for one-third of its length (fig. 101); color of upper parts a dull dark Mummy Brown, the fur grayish white from base for about two-thirds of its length; under parts Mummy Brown, base of hairs whitish. Skull relatively long and slender for *Molossus*, with a relatively narrow braincase and long narrow rostrum; sagittal and occipital crests low and weakly developed; molariform tooth rows nearly parallel, only slightly divergent posteriorly; basisphenoid pits large and deep; posterior border of bony palate without median projection; anterior upper premolar relatively large.

MEASUREMENTS AND WEIGHTS: The type (a semi-adult male): Length of forearm, 49.3. Skull: Greatest length, 22.0; zygomatic breadth, 12.7; breadth of braincase, 9.7; maxillary tooth row, C-M³, 7.9. Weights: The type and an immature male: 19.3, 16.0.

SPECIMENS RECORDED: *Trinidad*: Port-of-Spain, two (A.M.N.H.). San Fernando, one (A.M.N.H.).

GENERAL HABITS: Probably much the same as those of *Molossus ater*.

FOOD: Insects.

DISEASE: Specimens examined were rabies-negative.

REMARKS: The three known specimens, which were taken in houses, include the type, one topotype, a fully adult male with a fragmentary skull, and one immature male from San Fernando.

GAZETTEER OF PRINCIPAL LOCALITIES AND COLLECTING STATIONS

TRINIDAD

AS THERE IS no suitable gazetteer of Trinidad and Tobago localities available and no recent maps of these islands have been published, the position of the following localities is based largely on a list prepared by the Acting Post-Master General of Trinidad, dated September 14, 1957. Geographic names in Trinidad may have a variety of spellings, and in some instances there are duplications. Place names have changed from time to time, and future changes may be expected. Some of the places and many roads and traces are not to be found on generally available maps. The elevations given must be considered as only approximate, because, with few exceptions, they were read by aneroid barometer. Trinidad is a relatively small area, so coördinates to the nearest minute of north latitude and west longitude are given for the counties and wards, while principal place names are followed by the ward and by the county names. Other places, villages, estates, roads, and traces are located by their relation to the main roads and the approximate distances from the principal localities.

Acona Road, Maracas: Three miles north of Curepe on Maracas Royal Road.

Adam Smith Square, Woodbrook: Southwest district, Port-of-Spain.

Alexander Street, St. Clair: West Central district, Port-of-Spain.

Alta Garcia Trace, De Gannes Village, Siparia: See De Gannes.

Alta Gracia Trace, Siparia: See De Gannes.

Anglican Church, Siparia: See Siparia village.

Apex, Fyzabad: See Fyzabad (Apex is an oilfield).

Arena Road, Freeport: See Freeport.

Ariapita Avenue, Woodbrook: Southwest district, Port-of-Spain.

Arima: Town in Arima Ward, St. George County, 16 miles east of Port-of-Spain on Eastern Main Road, elevation 100 feet.

Arima: Ward in St. George County at latitude 10° 39' N., longitude 61° 16' W.

Arima Valley: Extending north from Arima town into the Northern Range.

Aripo: Valley about 4 miles east of Arima, extending north into Northern Range.

Aripo Caves: See Heights of Aripo.

Aripo Road: Highway running parallel with eastern boundary of Arima Ward, St. George County.

Basse Terre: Village in Moruga Ward, Victoria County, 4 miles north of Moruga on Moruga Road, elevation 150 feet.

Belmont: Northeast district, Port-of-Spain.

Ben Lomond, Buenos Ayres: See Buenos Ayres.

Blanchisseuse: Ward in St. George County at latitude 10° 46' N., longitude 61° 19' W.

Blue Basin: Village in Diego Martin Ward, St. George County, 5 miles northeast of Diego Martin village.

Boca de Monos: Straits separating Monos Island from the northwest peninsula of Trinidad.

Boissiere Lane, Belmont: Northeast district, Port-of-Spain.

Bonasse: Village in Cedros Ward, St. Patrick County, 20 miles southwest of Point Fortin on Southern Main Road, elevation at sea level.

Botanic Garden: See Royal Botanic Gardens.

Bournes Road, St. James: West district, Port-of-Spain.

Bowen Trace: Vicinity of Coromandel in Cedros Ward, St. Patrick County, at 66-mile post of Southern Main Road.

Brasso: Town in eastern Montserrat Ward, Caroni County.

Brasso Road: Main road between Brasso and Todd's Road.

Brazil Arena: Village in San Raphael Ward, St. George County, 1½ miles south of San Raphael village on Talparo Road.

Buenos Ayres: Village in Erin Ward, St. Patrick County, 3 miles northwest of Erin village on Erin Road, elevation 150 feet.

Cadiz Road, Belmont: Northeast district, Port-of-Spain.

Cantaro: Village in St. Ann's Ward, St. George County, on Saddle Road, 5 miles north of San Juan village, elevation 500 feet.

Caparo: Village in Montserrat Ward, Caroni County, 2 miles southeast of Todd's Road Station on Caparo Valley to Brasso Road, elevation 150 feet.

Caparo Valley-Brasso Road: Caroni County, main highway in eastern Trinidad between Longdenville and Brasso.

Caparo Valley Road: Enters Caparo.

Cap-de-Ville: Village in La Brea Ward, St. Patrick County, 1½ miles southwest of Point Fortin on

- Guapo to Cap-de-Ville Road, elevation about sea level.
- Carapichaima: Village in Montserrat Ward, Caroni County, 7 miles north of Couva on Waterloo Road, elevation 50 feet.
- Carenage: Village in Diego Martin Ward, St. George County, 7 miles west of Port-of-Spain on Western Main Road, elevation from sea level to 100 feet.
- Carlos Street, Woodbrook: Southwest district, Port-of-Spain.
- Caroni: County at latitude $10^{\circ} 30' N.$, longitude $61^{\circ} 22' W.$
- Caroni: Village in Cunupia Ward, Caroni County, 4 miles southeast of Curepe on Southern Main Road, elevation 75 feet.
- Caroni River: Flows westward through Caroni County into the Gulf of Paria; length, about 25 miles.
- Caroni=Savannah Road: See Princess Margaret Highway.
- Caura: Village in Tacarigua Ward, St. George County, 7 miles north of Tacarigua village on Caura Royal Road, elevation 600 feet. Caura or *Jumbe* Cave nearby.
- Caura Royal Road: Extends north into Caura Valley about 8 miles along Tacarigua River.
- Caura Valley: Extending north into the Northern Range from Tacarigua village.
- Caves of Aripo: See Heights of Aripo.
- Cedros: Peninsula in southwest Trinidad.
- Cedros: Small village in Cedros Ward, near Gulf of Paria.
- Cedros: Ward in St. Patrick County, latitude $10^{\circ} 06' N.$, longitude $61^{\circ} 48' W.$
- Centeno: Central Experiment Station of the Department of Agriculture in Arima Ward, St. George County, 2 miles east of Piarco airport, 6 miles south of Arima and 26 miles east of Port-of-Spain, elevation 50 feet.
- Chaguanas: Village in Chaguanas Ward, Caroni County, 8 miles south of Churchill-Roosevelt Highway on Princess Margaret Highway at 8-mile post.
- Chaguanas: Ward in Caroni County, latitude $10^{\circ} 30' N.$, longitude $61^{\circ} 23' W.$
- Charles Avenue: See Diego Martin village.
- Charuma: Ward in Nariva County, latitude $10^{\circ} 32' N.$, longitude $61^{\circ} 12' W.$
- Chatham: Small village in Cedros Ward, St. Patrick County, near southern coast of Trinidad.
- Chatham Road: Cedros Ward, St. Patrick County, leading from Chatham to Cedros, crossing Southern Main Road at $62\frac{1}{2}$ -mile post.
- Chin Chin Road: Caroni County, connecting Cunupia village with Las Lomas.
- Churchill-Roosevelt Highway: Paved highway running parallel to and slightly south of the Eastern Main Road, coming off that road at the 3-mile post and reëntering that road at Aripo Road junction at about the 20-mile post.
- Coblentz Avenue: Suburb of Port-of-Spain in St. Ann's Ward.
- Cocal: Ward in Nariva County, latitude $10^{\circ} 22' N.$, longitude $61^{\circ} 05' W.$
- Coco Road, Granville Point: In Cedros Ward, St. Patrick County, on the Gulf of Paria.
- Cocorite: East district, Arima.
- Cocorite: Suburb west of Port-of-Spain on Western Main Road.
- Cocorite Terrace: Suburb west of Port-of-Spain, on Western Main Road.
- Cocos Bay: On the east coast of Trinidad bordering the Nariva Swamp.
- Columbus Road: Cedros Ward, St. Patrick County, running southwest from Bonasse to Icacos village.
- Coora Road, Siparia: Leading southeast from Siparia village.
- Coromandel: Village in Cedros Ward, St. Patrick County, 7 miles east of Bonasse on Southern Main Road, elevation 50 feet.
- Coryal: Village in Tamana Ward, St. Andrew County, 7 miles south of Cumuto on Cumuto Main Road, elevation 200 feet.
- Cotton Hill, St. Clair: West central district, Port-of-Spain.
- Couva: Village in Couva Ward, Caroni County, 9 miles south of Chaguanas village on South Main Road at 21-mile post, elevation 50 feet.
- Couva: Ward in Caroni County, latitude $10^{\circ} 25' N.$, longitude $61^{\circ} 27' W.$
- Cumaca: Village in Valencia Ward, St. Andrew County, 10 miles north of Valencia village on Valencia to Cumaca Road, elevation 1200 feet. The Oropuche Guacharo Caves are located about 2 miles northwest.
- Cumuto: Village in Tamana Ward, St. Andrew County, 5 miles east of San Raphael on Cumuto-Tumpuna Road, elevation 100 feet.
- Cumuto Main Road: Leading south from Cumuto village to Coryal village.
- Cumuto-Tumpuna Road: Leading east from San Raphael village to Cumuto village.
- Cunapo, Sangre Grande: Village in Manzanilla Ward, St. Andrew County, 1 mile north of Sangre Grande on Cunapo-Southern Road, elevation 100 feet.
- Cunapo-Southern Road: Leading south from Sangre Grande to Rio Claro through St. Andrew County and Nariva County.
- Cunupia: Village in Cunupia Ward, Caroni County, 4 miles south of Caroni village on Southern Main Road, elevation 50 feet.
- Cunupia: Ward in Caroni County, latitude $10^{\circ} 33' N.$, longitude $61^{\circ} 20' W.$

- Curepe: Village in Tacarigua Ward, St. George County, $6\frac{1}{2}$ miles east of Port-of-Spain on Eastern Main Road, elevation 100 feet.
- De Gannes: Village in Siparia Ward, St. Patrick County, 1 mile east of Siparia village on the San Fernando-Siparia-Erin Road.
- Delhi Road: One-half mile north of Fyzabad, leading west off Fyzabad Road.
- Diego Martin: Village in Diego Martin Ward, St. George County, 4 miles north from Western Main Road on Diego Martin Valley Road, elevation 100 feet.
- Diego Martin: Ward in St. George County, latitude $10^{\circ} 42' N.$, longitude $61^{\circ} 35' W.$
- Diego Martin Valley Road: Leading north from Western Main Road at 4-mile post into low-lying valley through the Northern Range.
- Douglas Road, Moruga: Leading west about 12 miles north of Moruga village or 1 mile north of Preau.
- Dundonald Street: Central district, Port-of-Spain.
- Eastern Main Road: Main paved highway leading from Port-of-Spain, running eastward to Sangre Grande for 29 miles, then southeast to the Atlantic Ocean, terminating at 39-mile post.
- Edwards Trace: Small unpaved road in Moruga Ward, Victoria County, between Moruga village and Basse Terre.
- El Cerro del Aripo: See Heights of Aripo; the highest mountain in Trinidad.
- El Tucuche: Mountain in Tacarigua Ward, St. George County, latitude $10^{\circ} 44' N.$, longitude $61^{\circ} 25' W.$, elevation 3072 feet, the second highest mountain in Trinidad.
- Erin: Village (also called San Francique), in Erin Ward, St. Patrick County, $12\frac{1}{2}$ miles southwest of Siparia village on the San Fernando-Siparia-Erin Road, elevation 50 feet.
- Erin: Ward in St. Patrick County, latitude $10^{\circ} 05' N.$, longitude $61^{\circ} 38' W.$
- Fifth Company: Village in Ortoire Ward, Victoria County, $2\frac{1}{2}$ miles north of Preau on the Moruga Road.
- Fisher Avenue, St. Ann's: Suburb northeast of Port-of-Spain.
- Flament Street, Woodbrook: Southwest district, Port-of-Spain.
- Fort Reid, Waller Field: United States leased area, roughly bounded by Arima village on the northwest, Guanapo on the southwest, Valencia village on the northeast, and Sangre Grande on the southeast; elevation 50 to 100 feet.
- Four Roads: Village in Diego Martin Ward, St. George County, $\frac{1}{2}$ mile north of Western Main Road on Diego Martin Valley Road, elevation 75 to 100 feet.
- Four Roads: Village in Tamana Ward, St. Andrew County, $3\frac{1}{2}$ miles southwest of Coryal on the Cumuto Main Road, elevation 200 feet.
- Freeport: Village in Montserrat Ward, Caroni County, 2 miles southeast of Carapichaima, elevation 75 feet.
- Fullerton: Village in Cedros Ward, St. Patrick County, 2 miles west of Bonasse on Perseverance Road, elevation sea level to 50 feet.
- Fyzabad: Village in Siparia Ward, St. Patrick County, 4 miles south of Oropuche on Fyzabad Road, elevation 50 feet.
- Fyzabad Road: Leading off Siparia Road to Fyzabad village.
- Gaspar Grande: Island in Diego Martin Ward, St. George County, due south off the tip of the northwest peninsula of Trinidad in the Gulf of Paria, latitude $10^{\circ} 40' N.$, longitude $61^{\circ} 39' W.$, elevation sea level to 338 feet. Covers area of 319 acres. Locally called Gasparee Island or Centipede Island because of the centipedes, 14 inches long, that are found there as well as on the other islands of the Bocas.
- Gasparee Island: See Gaspar Grande.
- Gasparillo: Village in St. Ann's Ward, St. George County, in the Santa Cruz Valley, 2 miles northeast of Cantaro on the Gasparillo Road, elevation 350 feet.
- Gasparillo Road: St. Ann's Ward, St. George County, branches off Saddle Road 5 miles north of San Juan in Santa Cruz village.
- George Village: In Ortoire Ward, Victoria County, near Tableland, $9\frac{1}{2}$ miles east of Princes Town on the Naparima-Mayaro Road.
- Gonzales: Village in La Brea Ward, St. Patrick County, $\frac{1}{2}$ mile southwest of Guapo on the Southern Main Road, elevation 50 feet.
- Government Farm, St. Joseph: Government Stock Farm. See St. Joseph.
- Grand Chemin: Also called Moruga. See Moruga village.
- Grants Trace: In La Brea Ward, St. Patrick County, 3 miles east of La Brea on the Southern Main Road at the 46-mile post from San Fernando.
- Granville: Village in Cedros Ward, St. Patrick County, 2 miles north on Granville Road from 68 $\frac{1}{2}$ -mile post on the Southern Main Road from San Fernando, elevation sea level to 50 feet.
- Granville Road: Leading to Granville in Cedros Ward, St. Patrick County, from 68 $\frac{1}{2}$ -mile post on Southern Main Road from San Fernando.
- Green Hill: In Cedros Ward, St. Patrick County 2 to 3 miles southwest of Bonasse, elevation 189 feet.
- Grell Street, Siparia: See Siparia village.
- Guacharo: See Guacharo Caves.
- Guacharo Cave: May refer to any of several caves mainly located in the Northern Range in which

- the *guacharo*, or oil-bird (*Steatornis caripensis*), is found. See Heights of Aripo, Cumaca, Oropuche Guacharo Caves, Platanal, and Monos Island.
- Guaioco: Village in Tamana Ward, St. Andrew County, 1 mile west of Sangre Grande on Eastern Main Road, elevation 50 feet.
- Guanapo: Village in San Raphael Ward, St. George County, $3\frac{1}{2}$ miles south of Arima on Tumpuna Road, elevation 50 feet.
- Guanapo Valley: Extending north into the Northern Range about 1 mile east of Arima.
- Guapo: Village in La Brea Ward, St. Patrick County, 4 miles southwest of La Brea on the Southern Main Road at 54-mile post and 1 mile north on La Retrante Road, elevation sea level.
- Guaracara-Tabaquite Road: In Savana Grande Ward, Victoria County, winding northeast of San Fernando to Tabaquite village.
- Guayaguayare: Ward in Mayaro County, latitude $10^{\circ} 12' N.$, longitude $61^{\circ} 03' W.$
- Guayaguayare, Rio Claro: Village in Guayaguayare Ward, Mayaro County, 12 miles south of Mayaro on the Mayaro-Guayaguayare Road, the road known as Rio Claro-Guayaguayare Road leading from Guayaguayare to Rio Claro, elevation sea level to 50 feet.
- Gulf of Paria: Separates Venezuela and Trinidad, latitude $10^{\circ} 20' N.$, longitude $62^{\circ} 00' W.$
- Heights of Aripo (including El Cerro del Aripo): Junction of Arima and Blanchisseuse wards in St. George County and Valencia Ward, St. Andrew County, elevation 3085 feet; Aripo Caves or Guacharo Cave about 3 miles from the Aripo Valley Road, elevation 2700 feet.
- Heights of Guanapo: In Arima Ward, St. George County, 5 miles northeast of Arima on the Heights of Guanapo Road, elevations up to 2000 feet.
- Heights of Guanapo Road: Leading north into the Guanapo Valley from the Eastern Main Road at the $17\frac{1}{2}$ -mile post.
- Heights of Oropuche: Valencia Ward, St. Andrew County, 1 mile east of Cumaca, elevations up to 1200 feet.
- Icacos: Village in Cedros Ward, St. Patrick County, 7 miles southwest of Bonasse on Columbus Road, elevation sea level to 50 feet.
- Icacos, Gran Chemin: See Icacos. Gran Chemin refers to the main road, i.e., Southern Main Road, which at this point, the 79-mile post, may be the Perseverance Road.
- Indian Trail: Road leading southeast from Couva to Tortuga.
- Irois Forest: Village in Cedros Ward, St. Patrick County, $10\frac{1}{2}$ miles east of Bonasse on the Southern Main Road at the $62\frac{1}{2}$ -mile post and 1 mile north on the Chatham Road, elevation 50 feet.
- Johns Road, Nariva: See St. Johns Road, Nariva.
- Killdeer Trace: In Cocal Ward, Nariva County, approximately 4 miles northwest of Rio Claro on the Cunapo-Southern Road at about the 27-mile post, elevation 50 to 100 feet.
- La Brea: Village in La Brea Ward, St. Patrick County, $16\frac{1}{2}$ miles southwest of San Fernando on the Southern Main Road at the $48\frac{1}{2}$ -mile post, elevation sea level to 100 feet. The famous Pitch Lake is 1 mile southwest of this point.
- La Brea: Ward in St. Patrick County, latitude $10^{\circ} 10' N.$, longitude $61^{\circ} 39' W.$
- La Canoa, Santa Cruz: Village in St. Ann's Ward, St. George County, 1 mile northeast on La Canoa Road $2\frac{1}{2}$ miles north of San Juan, elevation 500 feet.
- La Canoa Road: St. Ann's Ward, St. George County, branches off Saddle Road $1\frac{1}{2}$ miles north of San Juan.
- La Fontaine Cave, Petit Valley: Cave in Diego Martin Ward, St. George County, $1\frac{1}{4}$ miles east of Diego Martin village on La Fontaine Estate, elevation 500 feet.
- La Fontaine Estate; Diego Martin Ward, St. George County, 1 mile east of Diego Martin village north of the Western Main Road.
- La Retrante Road: In La Brea Ward, St. Patrick County, leading from the Southern Main Road at the 54-mile post northwest 1 mile to Guapo.
- La Sagesse Road, Santa Cruz: In St. Ann's Ward, St. George County, branches off Gasparillo Road.
- Lady Young Road: St. Ann's Ward, St. George County, suburban road $\frac{1}{2}$ to $1\frac{1}{2}$ miles east of Port-of-Spain.
- Las Cuevas: Village in Blanchisseuse Ward, St. George County, located on Las Cuevas Bay. An extension of the North Coast Road from Maracas Bay to Las Cuevas is under construction.
- Las Cuevas Bay: On north coast, latitude $10^{\circ} 47' N.$, longitude $61^{\circ} 24' W.$
- Las Lomas: Village in Cunupia Ward, Caroni County, $4\frac{1}{2}$ miles southeast of Cunupia on the Chin Chin Road, elevation 200 feet.
- Leaseholds, Fyzabad: Oil field south and southwest of Fyzabad.
- Leonville, St. Joseph: District in Tacarigua Ward, St. George County, $\frac{1}{2}$ mile west of St. Joseph on the Eastern Main Road.
- Longdenville: Village in Chaguanas Ward, Caroni County, 4 miles south of Cunupia on Caparo Valley-Brasso Road, elevation 50 feet.
- Los Bajos: Village in Erin Ward, St. Patrick County, 6 miles southwest of Siparia village on the San Fernando-Siparia-Erin Road, elevation 150 feet.
- Lukput Street, St. James: West district, Port-of-Spain.

- Mafekin, Mayaro Road:** Cocal Ward, Nariva County, leading north from Mayaro village to Manzanilla-Mayaro Road.
- Mainfield, Guayaguayare:** Oil field in Guayaguayare Ward, Mayaro County, about 10½ miles west then northeast on private oil field road from Guayaguayare, elevation 200 to 300 feet.
- Majuba Road, Petit Valley:** In Diego Martin Ward, St. George County, leading off east of Diego Martin Valley Road at 2½-mile post in Petit Valley.
- Mandingo and Taylor Road:** Crossroads in Savana Grande Ward, Victoria County, 3 to 4 miles southeast of Princes Town, elevation 100 feet.
- Manzanilla:** Village in Manzanilla Ward, St. Andrew County, 6 miles southeast of Sangre Grande on the Eastern Main Road, elevation 100 to 200 feet.
- Manzanilla:** Ward in St. Andrew County, latitude 10° 37' N., longitude 61° 08' W.
- Manzanilla-Mayaro Road:** Cocal Ward, Nariva County, and Ture Ward, St. Andrew County, leading south from Manzanilla village to Mayaro village about 20 miles along the east coast of Cocas Bay but known in this district as "The Cocal."
- Maracas:** Village in Tacarigua Ward, St. George County, 3 miles north of Curepe and St. Joseph on the Maracas Royal Road, elevation 500 feet.
- Maracas Bay:** On north coast, latitude 10° 45' N., longitude 61° 26' W.
- Maracas River:** In Tacarigua Ward, St. George County, flowing from the Northern Range through Maracas Valley and entering the Caroni River.
- Maracas Royal Road:** Tacarigua Ward, St. George County, leading north into the Maracas Valley about 7 to 8 miles from Curepe or St. Joseph.
- Maracas Valley:** Tacarigua Ward, St. George County, extending north into the Northern Range from Curepe or St. Joseph.
- Maracas Waterfalls:** In Maracas Valley, Tacarigua Ward, St. George County, about 1 mile from end of Maracas Waterfalls Road on the mountain El Tucuche, elevation 1100 feet.
- Maracas Waterfalls Road:** Tacarigua Ward, St. George County, leading northeast off the Maracas Royal Road at the 4½-mile post.
- Maraval:** Village in Diego Martin Ward, St. George County, 3 miles north of Port-of-Spain on the Maraval or Saddle Road, elevation 300 feet.
- Maraval Road:** Diego Martin Ward, St. George County, leading north into Maraval Valley from Port-of-Spain. Outside of Port-of-Spain it is usually called Saddle Road.
- Maraval Valley:** Diego Martin Ward, St. George County, extending north into the Northern Range from the northwest district of Port-of-Spain.
- Marli Street, New Town:** West central district, Port-of-Spain. See New Town.
- Mary Street, St. Clair:** West central district, Port-of-Spain.
- Mary's Bay:** See St. Mary's Bay.
- Masson Hospital, Long Circular Road:** West central district of St. James, Port-of-Spain.
- Matron's Quarters, Charlotte Street:** Central district, Port-of-Spain.
- Matura:** Village in Matura Ward, St. Andrew County, 10½ miles northeast of Sangre Grande on the Toco Main Road, elevation 150 feet.
- Matura:** Ward in St. Andrew County, latitude 10° 42' N., longitude 61° 04' W.
- Maxwell Philipp Street, St. Clair:** West central district, Port-of-Spain.
- Mayaro:** County at latitude 10° 10' N., longitude 61° 05' W.
- Mayaro:** Village in Guayaguayare Ward, Mayaro County, 14 miles east of Rio Claro on the Naparima-Mayaro Road at the 39-mile post, elevation 50 feet.
- Mayaro Bay:** On east coast, latitude 10° 15' N., longitude 60° 58' W.
- Mayaro-Guayaguayare Road:** Guayaguayare Ward, Mayaro County, leading south from Mayaro to Guayaguayare village for a distance of about 12 miles.
- Mitan:** Village in Ture Ward, St. Andrew County, 13½ miles south of Sangre Grande on the Cunapo-Southern Road, elevation 100 feet.
- Moka Estate, Maraval:** Diego Martin Ward, St. George County, near Maraval village.
- Monos Island:** Due west off the northwest peninsula of Trinidad in the Gulf of Paria, latitude 10° 41' N., longitude 61° 41' W., elevation 942 feet; covers area of 973 acres. A Guacharo Cave is found here.
- Montevideo:** Toco Ward, St. David County, village 1 mile south of Sans Souci.
- Montserrat:** Ward in Caroni County, latitude 10° 25' N., longitude 61° 21' W.
- Moruga:** Village in Moruga Ward, Victoria County, 19 miles southeast of Princes Town on the Moruga Road, elevation sea level to 50 feet. Also called Grand Chemin.
- Moruga:** Ward in Victoria County, latitude 10° 08' N., longitude 61° 18' W.
- Moruga Road:** Moruga Ward, Victoria County, leading southeast from Princes Town to Moruga village for a distance of about 19 miles.
- Motor Ranch Trace, Peñal Rock Road:** Siparia

- Ward, St. Patrick County, 8 miles east of Peñal on the Peñal Rock Road.
- Mt. Harris, Manzanilla: Ture Ward, St. Andrew County, 3 miles north of Mitán on Cunapo-Southern Road between 10-mile post to 12-mile post and southwest of Manzanilla village 8 to 10 miles, elevation 884 feet.
- Mt. Aripo: See Heights of Aripo.
- Mt. Tamana: Tamana Ward, St. Andrew County, 2 miles east of Four Roads, elevation 1009 feet.
- Mt. Tamana Caves: Tamana Ward, St. Andrew County, bat caves on northwest side of Mt. Tamana, elevation 600 to 700 feet.
- Mt. Tucuche: See El Tucuche.
- Murray Street, Woodbrook: Southwest district, Port-of-Spain.
- Naparima: Ward in Victoria County, latitude 10° 14' N., longitude 61° 27' W.
- Naparima-Mayaro Road: A main road running the entire width of Trinidad from San Fernando eastward to Mayaro for a distance of approximately 40 miles.
- Nariva: County at latitude 10° 22' N., longitude 61° 10' W.
- New Town: North central district, Port-of-Spain.
- New Yalta: See Diego Martin.
- North Branch Road, Cap-de-Ville: La Brea Ward, St. Patrick County.
- North Coast Road: St. Ann's Ward, St. George County, leading northeast off Saddle Road at the 7-mile post over the Northern Range and down to the north coast to Maracas Bay to the 7-mile post. It is being extended to Las Cuevas.
- North Manzanilla: Village in Manzanilla Ward, St. Andrew County, 3 miles east of Manzanilla village on North Manzanilla Road, elevation 50 feet.
- North Manzanilla Road: Manzanilla Ward, St. Andrew, leading eastward off Eastern Main Road at 36½-mile post about ¾ mile southeast of Upper Manzanilla.
- North Road, Tableland: In Ortoire Ward, Victoria County, 3 miles west of Tableland, leading northeast off Naparima-Mayaro Road at the 14-mile post.
- Northern Range: Mountain chain extending across the entire width of northern Trinidad.
- Olton Road, Belmont: Northeast district, Port-of-Spain.
- Oropuche: Village in Siparia Ward, St. Patrick County, 7 miles southwest of San Fernando on the Southern Main Road at the 41-mile post, elevation 50 feet. Also called St. Mary's.
- Oropuche Caves: See Cumaca and Platanal.
- Oropuche Guacharo Caves: See Cumaca and Platanal.
- Ortoire: Ward in Victoria County, latitude 10° 16' N., longitude 61° 19' W.
- Paria: See Gulf of Paria.
- Parrylands: Village in La Brea Ward, St. Patrick County, 1 mile east of Gonzales on Parrylands Road, elevation 100 feet.
- Parrylands Road: La Brea Ward, St. Patrick County, leading to Parrylands from Gonzales on Southern Main Road at the 54½-mile post.
- Parry Lands: See Parrylands.
- Peñal: Village in Siparia Ward, St. Patrick County, 9 miles south of San Fernando on the San Fernando-Siparia-Erin Road, elevation 50 to 100 feet.
- Peñal Rock Road: Siparia Ward, St. Patrick County, leading south and then east from Peñal to Basse Terre for about 16 miles.
- Peñal Rock Road: Village in Siparia Ward, St. Patrick County, 5 miles south and east of Peñal on the Peñal Rock Road at the 5-mile post, elevation 50 to 100 feet. Also called Sadhoowa.
- Perseverance Road: Cedros Ward, St. Patrick County, leading from Fullerton east to Bonasse, a distance of 2 miles.
- Petit Valley: Village in Diego Martin Ward, St. George County, 1½ miles northeast from Four Roads, elevation 100 feet. See La Fontaine Cave.
- Petra Street, Woodbrook: Southwest district, Port-of-Spain.
- Piarco Airport: Six miles southeast of Arima, Arima Ward, St. George County.
- Plaisance, Mayaro Bay: Village in Guayaguayare Ward, Mayaro County, 1 mile east of Mayaro village on Mayaro Bay, elevation sea level.
- Platanal: Remote village in Valencia Ward, St. Andrew County, latitude 10° 44' N., longitude 61° 09' W., elevation 700 feet, about 3 miles northeast of Cumaca on the Valencia-Cumaca Road (at this point not passable by car).
- Oropuche Guacharo Caves in vicinity.
- Point Fortin: La Brea Ward, St. Patrick County, latitude 10° 11' N., longitude 61° 41' W. A point located on the Gulf of Paria on the north side of Cedros Peninsula.
- Point Fortin: Village in La Brea Ward, St. Patrick County, 9 miles south of La Brea village at the junction of the Cap-de-Ville Road and a private oil field road, elevation sea level.
- Point Gourde: In Diego Martin Ward, St. George County, latitude 10° 40' N., longitude 61° 38' W. A point located on the south of the Gulf of Paria side of the northern peninsula of Trinidad, elevation 462 feet.
- Point Gourde Caves: Diego Martin Ward, St. George County, limestone caves on south side of Point Gourde at sea level. At high tide it is almost impossible to enter; when tide is low, a small craft can enter mouth of caves.

- Point-a-Pierre: Ward in Victoria County, latitude 10° 20' N., longitude 61° 24' W.
- Police Headquarters, St. Vincent Street: Central district, Port-of-Spain.
- Port-of-Spain: City in St. George County at latitude 10° 38' N., longitude 61° 31' W., elevation from sea level to 500 feet. The capital of Trinidad and Tobago, and also of the newly federated West Indies, area about 3.7 square miles (1946).
- Port-of-Spain Matron's Quarters, Charlotte Street: Central district, Port-of-Spain.
- Preau: Village in Ortoire Ward, Victoria County, 11 miles north of Moruga on the Moruga Road, elevation 100 feet.
- Princes Town: Village in Savana Grande Ward, Victoria County, 8 miles east of San Fernando on the Naparima-Mayaro Road, elevation 100 to 150 feet.
- Princess Margaret Highway: A major paved highway leading south off the Churchill-Roosevelt Highway between the 3-mile post and the 4-mile post to Chaguanas, approximately 8 miles. May be called Caroni-Savannah Road.
- Princetown: See Princes Town.
- Ravine Sable: Village in Chaguanas Ward, Caroni County, 2 miles southeast of Longdenville on the Ravine Sable Road off the Caparo Valley-Brasso Road, elevation 100 to 200 feet.
- Ravine Sable Road: Chaguanas Ward, Caroni County, leading southeast from the Caparo Valley-Brasso Road at the 2-mile post.
- Ravine Sable, Extension Road: See Ravine Sable Road.
- Regis Road: In vicinity of Cunupia. See Cunupia.
- Rio Claro: Village in Cocal Ward, Nariva County, 26 miles east of San Fernando on the Naparima-Mayaro Road, or 15 miles southeast of Tabaquite on the Tabaquite-Rio Claro Road, elevation 100 feet.
- Rio Claro, Tabaquite Road: See Tabaquite-Rio Claro Road.
- Rio Grande Forest, Sangre Grande: In Matura Ward, St. Andrew County, forest area about 10 air miles northeast of Sangre Grande between Vega-de-Oropuche and Matura village, elevation 200 feet.
- Rochard Road: Siparia Ward, St. Patrick County, leading northeast from Sadhoowa.
- Rochard-Douglas Road: Siparia Ward, St. Patrick County, road leading east 5 miles northeast of Sadhoowa off Rochard Road.
- Rochard-Douglas Road, Moruga: See Rochard-Douglas Road. Road extends as trace into Moruga Ward, Victoria County.
- Rosary Church, Henry Street: Central district, Port-of-Spain.
- Royal Botanic Gardens: North district, Port-of-Spain.
- Rust Street, St. Clair: West central district, Port-of-Spain.
- Saddle Road: Bordering Diego Martin and St. Ann's wards in St. George County. See Maraval Road. Road leads north of Port-of-Spain through Maraval Valley into the Northern Range, turning eastward over a high point called "The Saddle" (about 600 feet in elevation) and running southward through the Santa Cruz Valley to San Juan on the Eastern Main Road.
- Sadhoowa: Village in Siparia Ward, St. Patrick County, 5 miles south and east of Peñal on the Peñal Rock Road, elevation 100 feet. See Peñal Rock Road village.
- St. Andrew: County at latitude 10° 35' N., longitude 61° 10' W.
- St. Ann's: District in St. Ann's Ward, St. George County, suburb northeast of Port-of-Spain.
- St. Ann's: Ward in St. George County, latitude 10° 41' N., longitude 61° 28' W.
- St. Augustine: Village in Tacarigua Ward, St. George County, 7 miles east of Port-of-Spain on the Eastern Main Road, elevation 50 feet.
- St. Clair Avenue: West central district of St. Clair, Port-of-Spain.
- St. David: County at latitude 10° 47' N., longitude 61° 25' W.
- St. Francois Valley Road: Northeast district of Belmont, Port-of-Spain.
- St. George: County at latitude 10° 40' N., longitude 61° 25' W.
- St. George's Circular: A road in northeast district of Belmont, Port-of-Spain.
- St. James: West district, Port-of-Spain.
- St. John Road, Oropuche: Small road in Siparia Ward, St. Patrick County, at edge of the town of Oropuche.
- St. John's Road, Nariva: Charuma Ward, Nariva County, coming off the Tabaquite-Rio Claro Road about 5 miles southeast of Tabaquite at the 22-mile post and running westward.
- St. John's, Tunapuna: See Tunapuna.
- St. Joseph: Village in Tacarigua Ward, St. George County, 6 miles east of Port-of-Spain on the Eastern Main Road, elevation 50 to 500 feet.
- St. Mary's: Village in Siparia Ward, St. Patrick County, elevation 50 feet. Also called Oropuche.
- St. Mary's Bay: On north coast of Gaspar Grande.
- St. Patrick: County at latitude 10° 10' N., longitude 61° 35' W.
- St. Pernice: Estate near Gasparillo, Santa Cruz Valley.
- Salazar Trace: La Brea Ward, St. Patrick County, in the vicinity of Point Fortin.

- Samuel Cooper Road, Moruga: Savana Grande Ward, Victoria County, leading north off the Moruga Road 4 miles southeast of Princes Town at the 4-mile post.
- San Fernando: City of Naparima Ward, Victoria County, latitude $10^{\circ} 17' N.$, longitude $61^{\circ} 28' W.$, the second largest city in Trinidad, 40 miles south of Port-of-Spain on the Southern Main Road, elevation from sea level to 586 feet.
- San Fernando-Siparia-Erin Road: In Naparima Ward, Victoria County, bordering Siparia and Erin wards in St. Patrick County, leading south and southwest from San Fernando through Siparia to Erin, a distance of approximately 25 miles.
- San Francique: Village in Erin Ward, St. Patrick County; also called Erin. See Erin.
- San Juan: Village in St. Ann's Ward, St. George County, 4 miles east of Port-of-Spain on the Eastern Main Road, elevation 100 to 200 feet.
- San Raphael: Village in San Raphael Ward, St. George County, 5 miles south of Arima on the Tumpuna Road, elevation 100 feet.
- San Raphael: Ward in St. George County, latitude $10^{\circ} 32' N.$, longitude $61^{\circ} 16' W.$
- Sangre Grande: Village in Manzanilla Ward, St. Andrew County, 29 miles east of Port-of-Spain on the Eastern Main Road, elevation 100 feet.
- Sangre Grande, Rio Grande Forest: See Rio Grande Forest, Sangre Grande.
- Sans Souci: Toco Ward, St. David County, village on northeast coast of Trinidad, 12 miles west of Toco village on Toco Main Road.
- Santa Cruz: Village in St. Ann's Ward, St. George County, 2 miles north of San Juan on Saddle Road, elevation 400 feet.
- Santa Cruz Valley: St. Ann's Ward, St. George County, extending north into the Northern Range from San Juan.
- Saut d'Eau Cave: Diego Martin Ward, St. George county, on seacoast directly north of Port-of-Spain.
- Savana Grande: Ward in Victoria County, latitude $10^{\circ} 18' N.$, longitude $61^{\circ} 22' W.$
- Sedass Road, Caroni: Indefinite locality in Caroni County.
- Siebert Square, Woodbrook: Southwest district, Port-of-Spain.
- Simla: See Simla Estate.
- Simla Estate: In Arima Ward, St. George County, a research station of the New York Zoological Society, 4 miles north of Arima, Arima Valley, on the Blanchisseuse Road, part of the old Verdant Vale Estate, elevation 800 feet.
- Siparia: Village in Siparia Ward, St. Patrick County, 19 miles south of San Fernando on the San Fernando-Siparia-Erin Road, elevation 200 feet.
- Siparia: Ward in St. Patrick County at latitude $10^{\circ} 09' N.$, longitude $61^{\circ} 28' W.$
- Siparia Road: Highway between Siparia and Peñal, St. Patrick County.
- Sisters Flat, Charlotte Street: Central district, Port-of-Spain.
- Southern Main Road: A paved main road commencing at Caroni village in Cunupia Ward, Caroni County, leading south through San Fernando and terminating at Bonasse in Cedros Ward, St. Patrick County, a distance of approximately 73 miles.
- Spring Hill: Arima Ward, St. George County, in Arima Valley north of Arima town.
- Spring Hill Estate: In Arima Ward, St. George County, 6 miles north of Arima, Arima Valley, on the Blanchisseuse Road, elevation 1500 feet. A Guacharo Cave is found here.
- Tabaquite: Village in Montserrat Ward, Caroni County, 15 miles northwest of Rio Claro on the Tabaquite-Rio Claro Road, elevation 250 feet.
- Tabaquite-Rio Claro Road: Leading southeast from Tabaquite in Montserrat Ward, Caroni County, to Rio Claro in Cocal Ward, Nariva County, a distance of about 15 miles.
- Tableland: Village in Ortoire Ward, Victoria County, $9\frac{1}{2}$ miles east of Princes Town on the Naparima-Mayaro Road at the 17-mile post, elevation 250 feet.
- Tacarigua: Village in Tacarigua Ward, St. George County, 10 miles east of Port-of-Spain on the Eastern Main Road, elevation 50 feet.
- Tacarigua: Ward in St. George County at latitude $10^{\circ} 40' N.$, longitude $61^{\circ} 23' W.$
- Tacarigua River: Tributary of the Caroni River, Tacarigua Ward, St. George County.
- Talparo Road: Main road between San Raphael and Talparo in western San Raphael Ward, St. George County.
- Tamana: Ward in St. Andrew County at latitude $10^{\circ} 32' N.$, longitude $61^{\circ} 11' W.$
- Tamana Caves: See Mt. Tamana Caves.
- Tamana Hill: See Mt. Tamana.
- Toco: Village in Toco Ward, St. David County, $28\frac{1}{2}$ miles northeast of Sangre Grande on Toco Main Road, elevation 300 feet.
- Toco: Ward in St. David County at latitude $10^{\circ} 47' N.$, longitude $61^{\circ} 03' W.$
- Toco Main Road: Leading northeast of Sangre Grande to Toco village, a distance of $28\frac{1}{2}$ miles.
- Todd's Road Station, Caroni: Chaguanas Ward, Caroni County, $4\frac{1}{2}$ miles southeast of Longdenville on the Caparo Valley-Brasso Road, elevation 200 feet.
- Tortuga: Village in Montserrat Ward, Caroni

- County, 9 miles southeast of Couva on Indian Trail Road, elevation 200 feet.
- Toussaint Road, Las Lomas: Indefinite location near Las Lomas.
- Trinidad: Second largest island of the West Indies and the most southern of the Lesser Antilles, at latitude $10^{\circ} 03' N.$ to $10^{\circ} 50' N.$, longitude $60^{\circ} 55' W.$ to $61^{\circ} 15' W.$
- Trinity: Ward in Mayaro County at latitude $10^{\circ} 10' N.$, longitude $61^{\circ} 09' W.$
- Tumpuna: Village in Arima Ward, St. George County, 11 miles south of Arima on the Tumpuna Road, elevation 200 feet.
- Tumpuna Road: In Arima Ward, St. George County, leading south from Arima to Tumpuna, a distance of about 11 miles.
- Tunapuna: Village in Tacarigua Ward, St. George County, 8 miles east of Port-of-Spain on the Eastern Main Road, elevation 50 to 500 feet.
- Turure: Ward in St. Andrew County at latitude $10^{\circ} 32' N.$, longitude $61^{\circ} 07' W.$
- Union Hill, Victoria Village: See Victoria village.
- Upper Manzanilla: See Manzanilla.
- Valencia: Village in Valencia Ward, St. Andrew County, 5 miles east of Arima on the Eastern Main Road, elevation 200 feet.
- Valencia: Ward in St. Andrew County at latitude $10^{\circ} 41' N.$, longitude $61^{\circ} 10' W.$
- Valencia-Cumaca Road: In Valencia Ward, St. Andrew County, leading to Cumaca northeast from Valencia.
- Vega-de-Oropuche: Village in Manzanilla Ward, St. Andrew County, $2\frac{1}{4}$ miles northeast of Sangre Grande on the Toco Main Road, elevation 50 feet.
- Verdant Vale Estate: In Arima Ward, St. George County, 4 miles north of Arima on the Blanchisseuse Road, elevation 800 feet. See Simla Estate.
- Victoria: County at latitude $10^{\circ} 15' N.$, longitude $61^{\circ} 20' W.$
- Victoria: Village in Naparima Ward, Victoria County, $1\frac{1}{2}$ miles southeast of San Fernando, district of San Fernando, elevation 100 feet.
- Victoria Square North: Central district, Port-of-Spain.
- Waller Field: See Fort Reid, Waller Field.
- Water Fall Road, Maracas: See Maracas Waterfalls Road.
- Waterloo: Village in Chaguanas Ward, Caroni County, 2 miles west of Carapichaima on the Waterloo Road, elevation sea level.
- Waterloo Road: Chaguanas Ward, Caroni County, leading south from Carapichaima to Couva, a distance of about 7 miles.
- Western Main Road: Diego Martin Ward, St. George County, main paved road leading west from Port-of-Spain along the gulf side of the northwest peninsula to the United States leased area.
- Western Trace, Moruga: Ortoire Ward, Victoria County, in the vicinity of Fifth Company village, off the Moruga Road.
- Whiteland, Victoria: Savana Grande Ward, Victoria County, road junction in vicinity of Williamsville.
- Williamsville: Village in Savana Grande Ward, Victoria County, 9 miles northeast of San Fernando on the Guaracara-Tabaquite Road.
- Woodbrook: Southwest district, Port-of-Spain.
- Woodford Square: Central district, Port-of-Spain.
- Zagaya Cave: In Toco Ward, St. David County, southeast of village of Montevideo and south of Sans Souci, elevation 1226 feet.

TOBAGO

Tobago is a Ward of Trinidad and is divided into seven parishes, viz.: (1) St. Patrick; (2) St. Andrew; (3) St. David; (4) St. George; (5) St. Mary; (6) St. John; and (7) St. Paul.

As is the case with Trinidad, geographical information for Tobago is incomplete and in many instances inaccurate. Coordinates for latitude and longitude are given for certain localities. Elevations are for the most part approximate.

Arnos Vale Road: Principal motor road in northwestern Tobago.

Charlotteville: Village in St. John Parish, 28 miles northeast of Scarborough on the Wind-

ward Road, latitude $11^{\circ} 19' N.$, longitude $60^{\circ} 33' W.$, elevation sea level to 300 feet.

Crown Point: St. Patrick Parish, 8 miles southwest of Scarborough, the extreme western point of Tobago, latitude $11^{\circ} 08' N.$, longitude $60^{\circ} 50' W.$, elevation 25 to 50 feet.

Crown Point Cave or Robinson Crusoe's Cave: St. Patrick Parish, limestone cave directly on side of cliff overlooking ocean at Crown Point, elevation 25 feet.

Fort George, Scarborough: St. Andrew Parish, latitude $11^{\circ} 10' N.$, longitude $60^{\circ} 44' W.$, elevation 452 feet.

Government House, Scarborough: St. Andrew Parish, $1\frac{1}{2}$ miles northeast of Scarborough, elevation 300 feet.

Les Coteaux, Arnos Vale: Village in St. David Parish, 5 miles northwest of Scarborough on Arnos Vale Road, latitude $11^{\circ} 13' N.$, longitude $61^{\circ} 45' W.$, elevation 250 to 300 feet.

Little Tobago: An island 2 miles east of Tobago, latitude $11^{\circ} 18' N.$, longitude $60^{\circ} 30' W.$

Milford Bay: Borders extreme western tip of island, latitude $11^{\circ} 09' N.$, longitude $60^{\circ} 50' W.$ Locally called Store Bay, at Crown Point.

Mt. Pleasant, St. Patrick School: St. Patrick Parish, 4 miles northeast of Crown Point, latitude $11^{\circ} 09' N.$, longitude $60^{\circ} 48' W.$, elevation 158 feet.

Old Grange: District in St. Patrick Parish, about 1 mile north of Mt. Pleasant, elevation 250 to 300 feet.

Orange Hill Estate: St. Patrick Parish, 2 to 3 miles northwest of Scarborough, elevation 250 to 300 feet.

Orange Hill Road: Leaves Scarborough about $\frac{3}{4}$ mile west of town.

Pigeon Peak: Mountain in St. John Parish, latitude $11^{\circ} 18' N.$, longitude $60^{\circ} 33' W.$, elevation 1800 feet.

Plymouth: Village in St. David Parish, $1\frac{1}{2}$ miles west of Les Coteaux, latitude $11^{\circ} 13' N.$, longitude $60^{\circ} 47' W.$, elevation 100 to 200 feet.

Robinson Crusoe's Cave: St. Patrick Parish, limestone cave at Crown Point, on side of cliff overlooking the ocean.

Roxborough: Village in St. Paul Parish, 17 miles northeast of Scarborough on the Windward Road, latitude $11^{\circ} 15' N.$, longitude $60^{\circ} 35' W.$, elevation sea level to 300 feet.

Scarborough: Principal village of Tobago, in St. Andrew Parish at latitude $11^{\circ} 11' N.$, longitude $60^{\circ} 44' W.$, elevation sea level to 452 feet.

Scarborough, Old Government Rest House: St. Andrew Parish, $\frac{3}{4}$ mile north of wharf and above Scarborough Botanic Garden, elevation 200 feet.

Scarborough Botanic Garden: St. Andrew Parish, $\frac{1}{2}$ mile north of Scarborough from wharf, elevation 100 to 200 feet.

Speyside: A village in St. John Parish about 20 miles northeast of Scarborough on the Windward Road, latitude $11^{\circ} 18' N.$, longitude $60^{\circ} 30' W.$, elevation from sea level to 300 feet.

Store Bay: See Milford Bay.

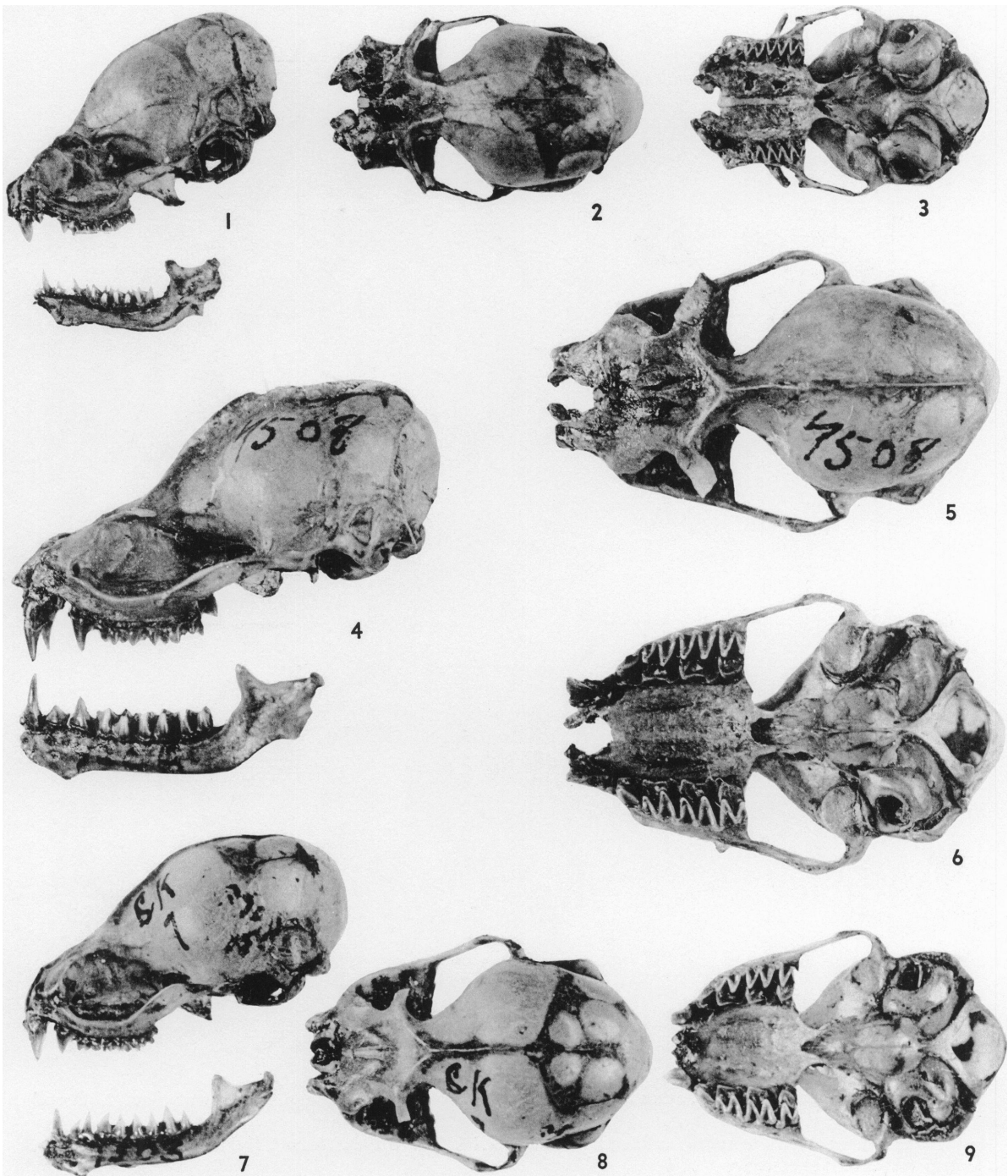
Tobago: Ward of Trinidad, latitude $11^{\circ} 09' N.$, longitude $60^{\circ} 12' W.$

Windward Road: Principal road commencing at Scarborough and leading northeast to Charlotteville. It is being extended.

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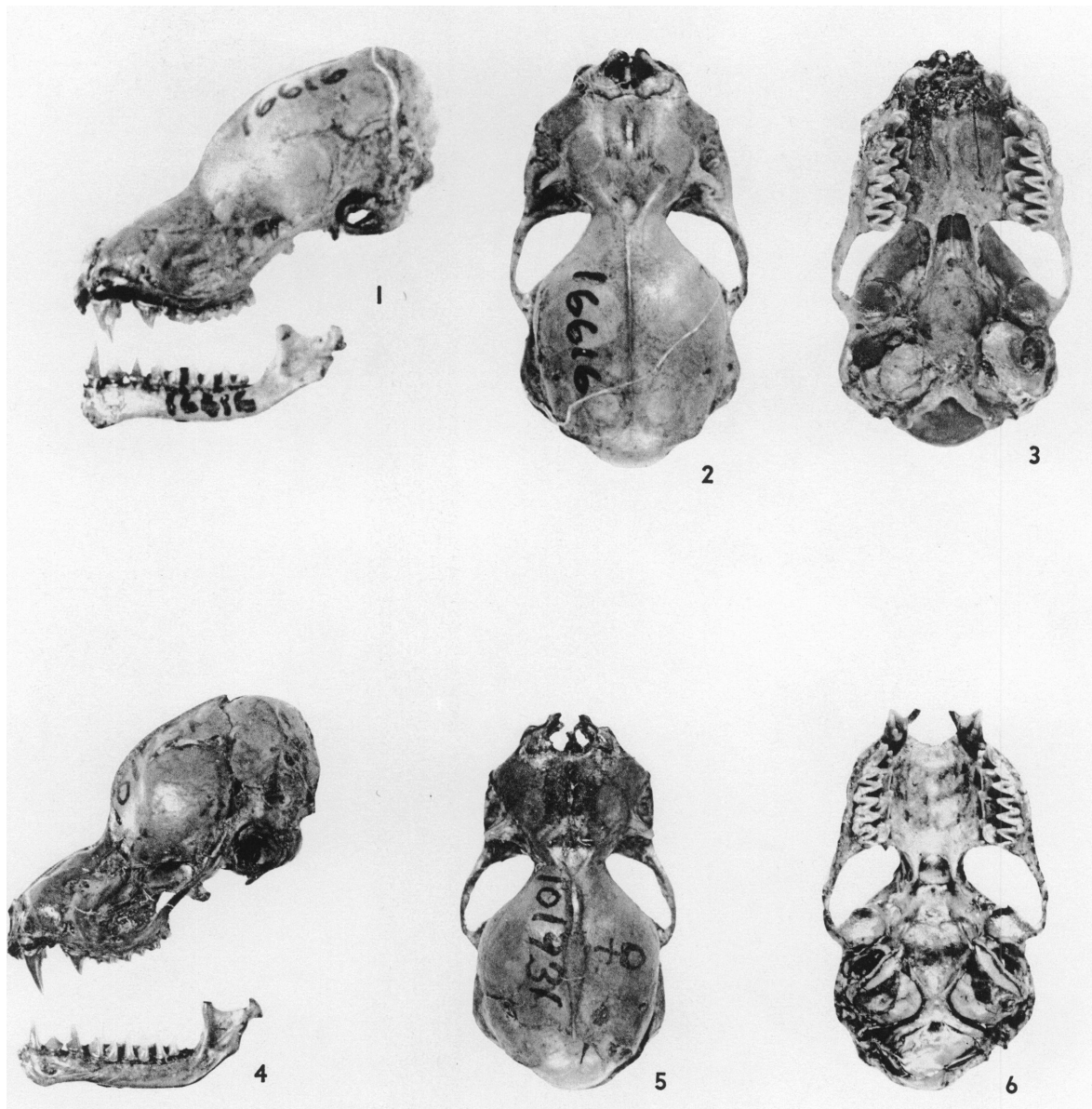
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1-3. *Rhynchiscus naso*, adult female, A.M.N.H. No. 7439, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 4$

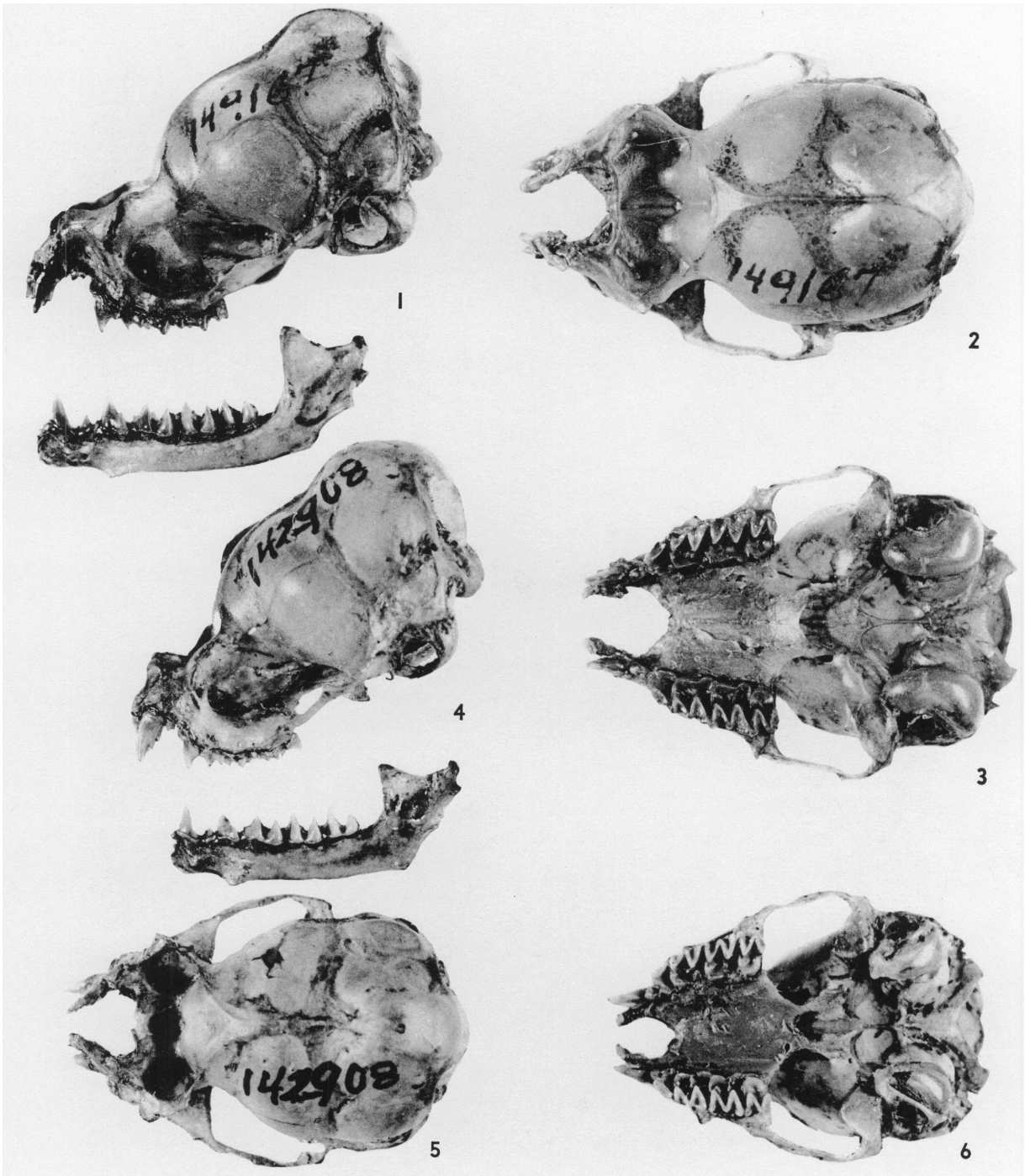
4-6. *Saccopteryx bilineata perspicilifer*, adult female, A.M.N.H. No. 7508, type, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 4$

7-9. *Saccopteryx leptura*, adult male, A.M.N.H. No. 7499, from Trinidad. 7. Lateral view. 8. Dorsal view. 9. Ventral view. $\times 4$



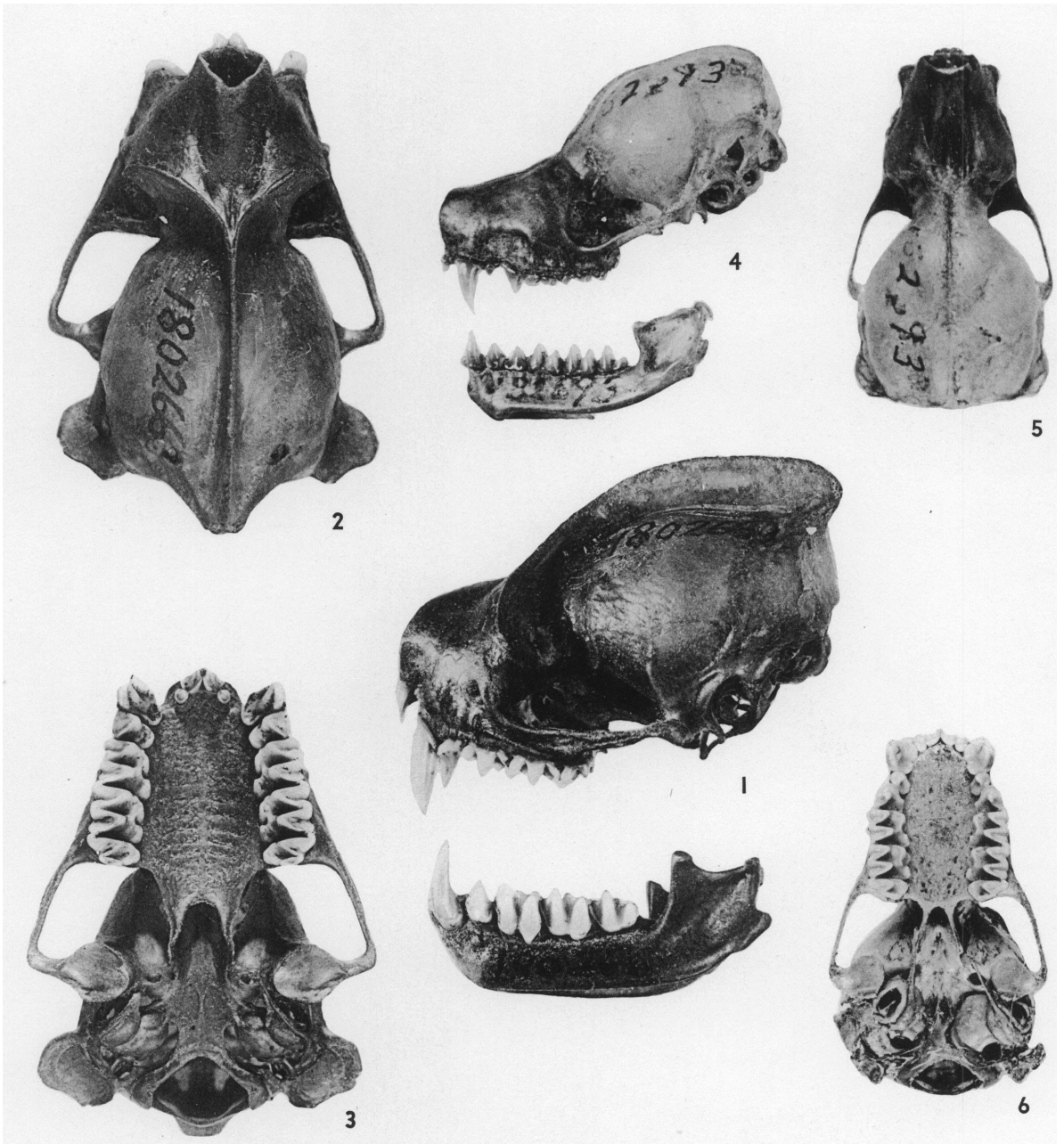
1-3. *Peropteryx macrotis macrotis*, adult female, M.C.Z. No. 16616, from Tobago. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 4$

4-6. *Peropteryx macrotis trinitatis*, adult female, U.S.N.M. No. 101931, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 4$

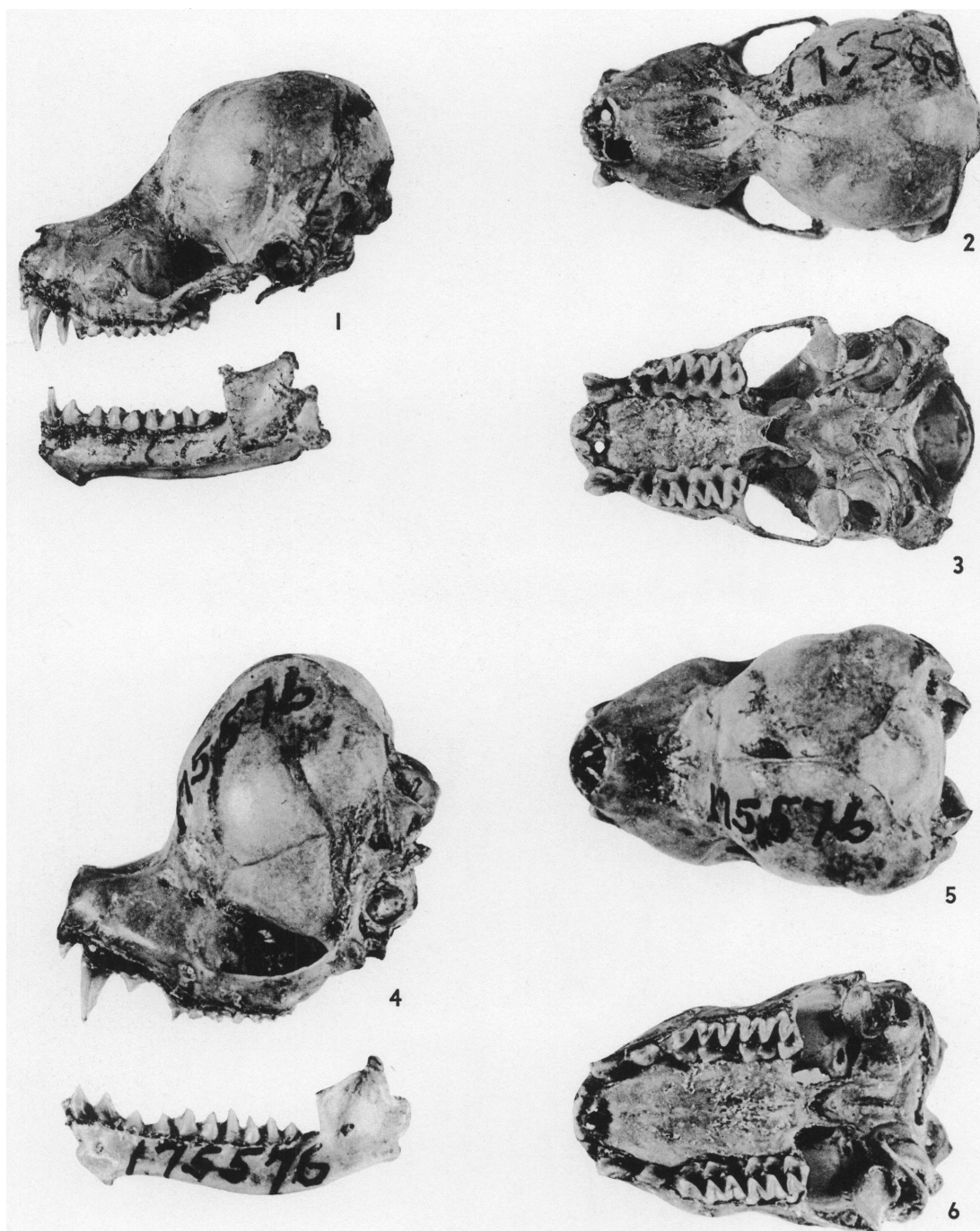


1-3. *Diclidurus albus*, adult female, A.M.N.H. No. 149167, from Colombia. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 4$

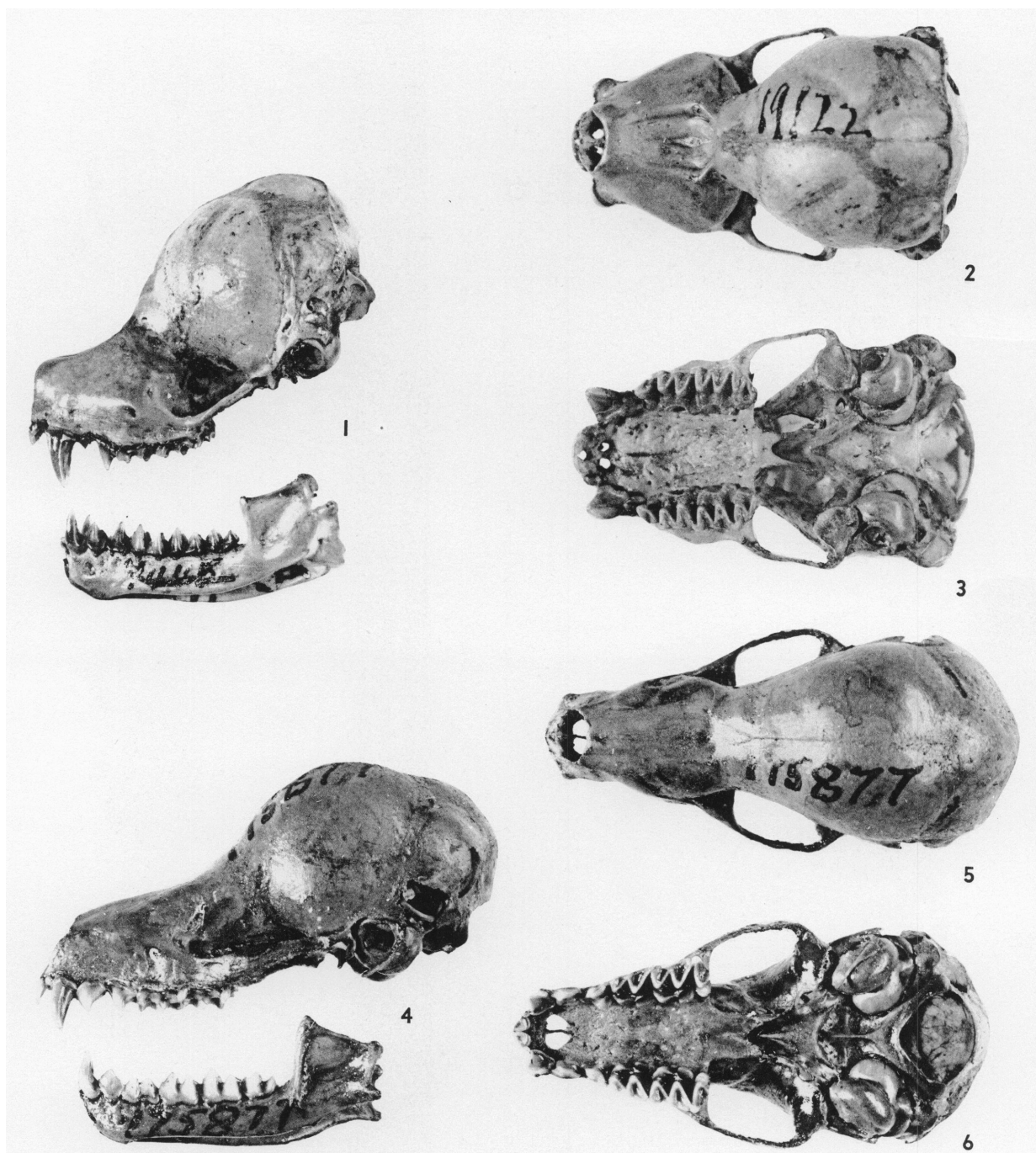
4-6. *Diclidurus scutatus*, adult female, A.M.N.H. No. 142908, from British Guiana. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 4$



1-3. *Noctilio leporinus leporinus*, adult male, A.M.N.H. No. 180266, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 2\frac{1}{2}$
 4-6. *Chilonycteris rubiginosa fusca*, adult female, A.M.N.H. No. 182693, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 2\frac{1}{2}$

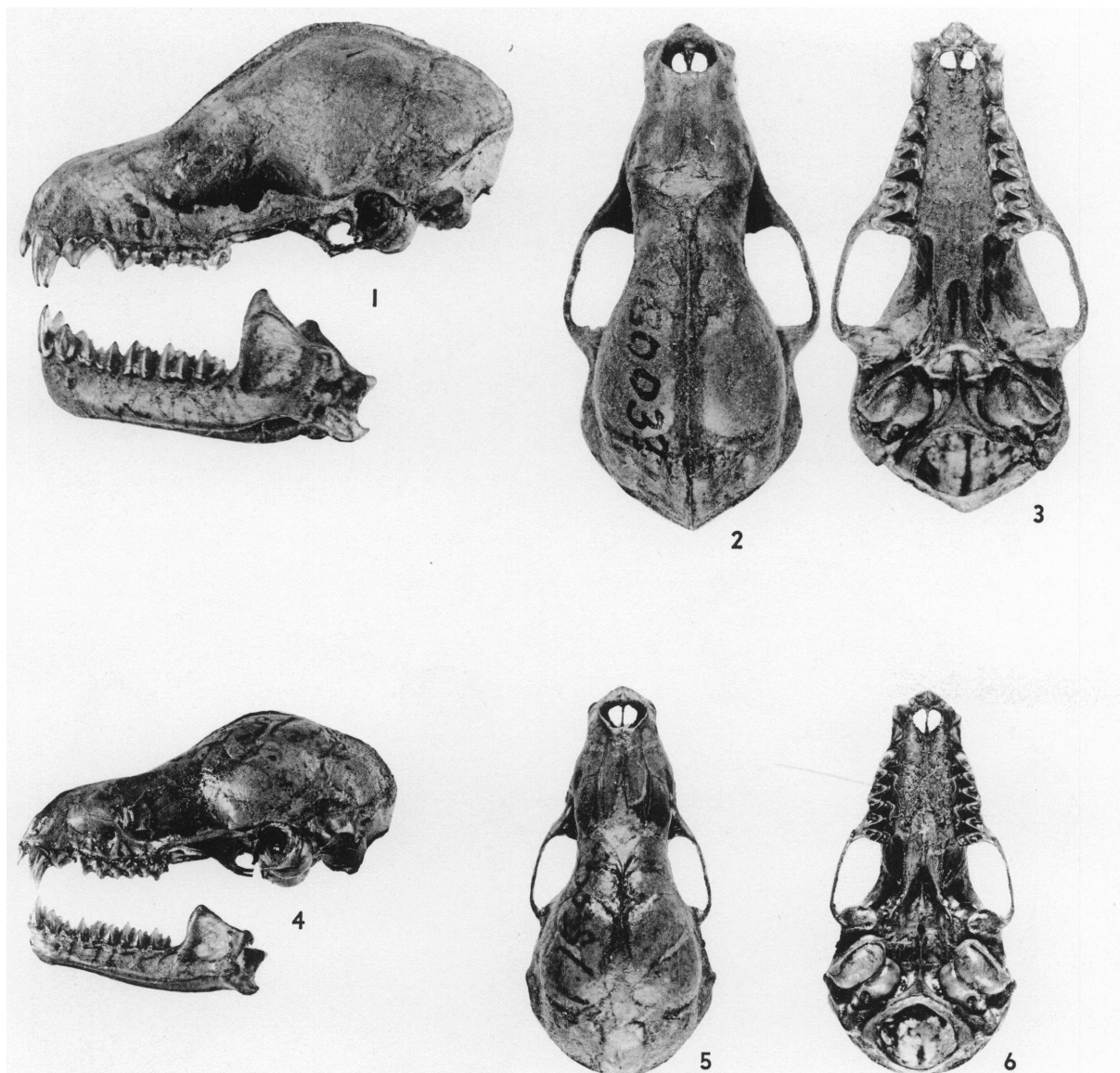


1-3. *Chilonycteris personata personata*, adult female, A.M.N.H. No. 175560, from Trinidad.
 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 4$
 4-6. *Mormoops megalophylla tumidiceps*, adult female, A.M.N.H. No. 175576, from Trinidad.
 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 4$



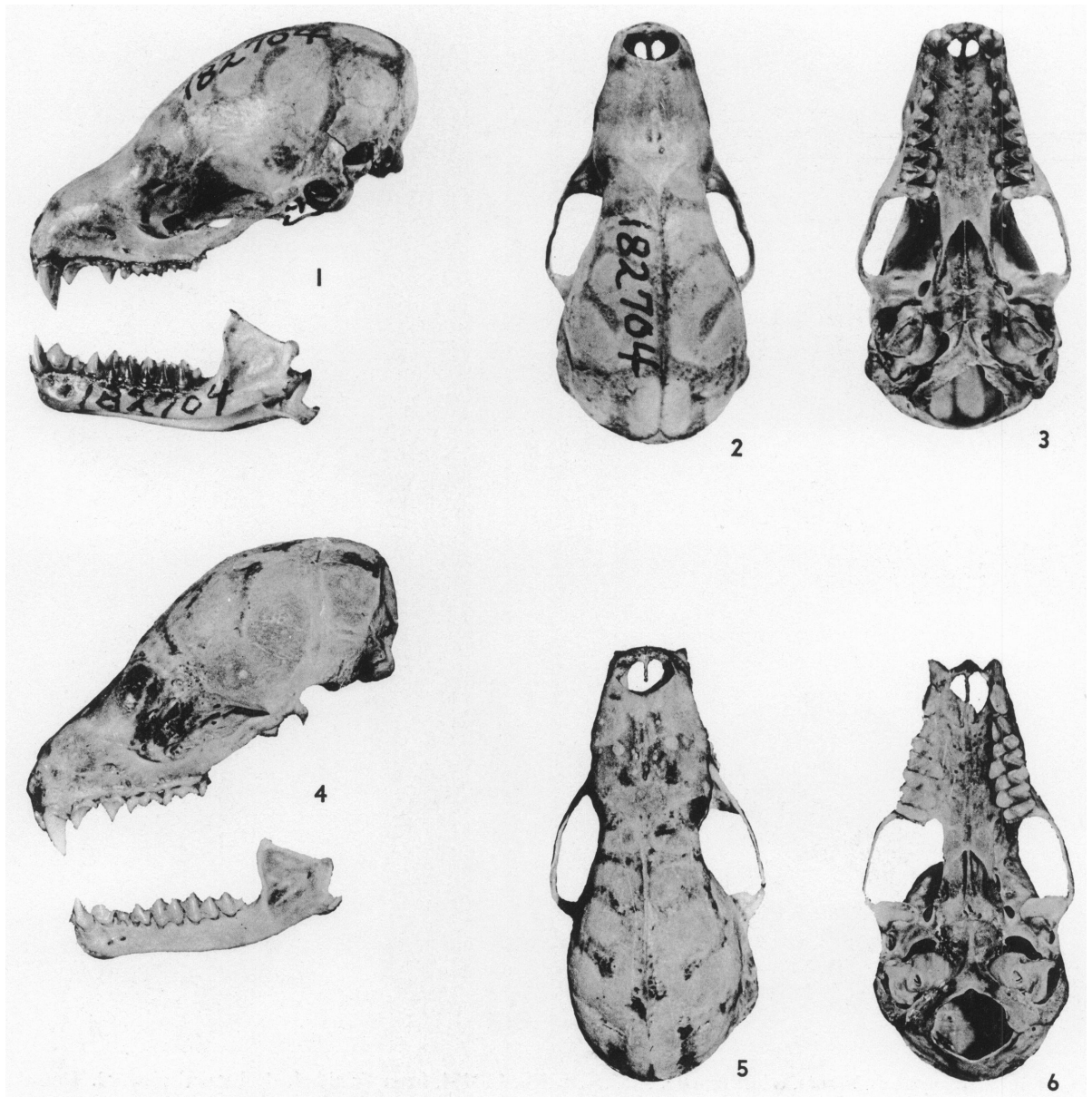
1-3. *Pteronotus davyi davyi*, adult male. A.M.N.H. No. 19122, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 4$

4-6. *Micronycteris megalotis megalotis*, adult male, A.M.N.H. No. 175877, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 4$



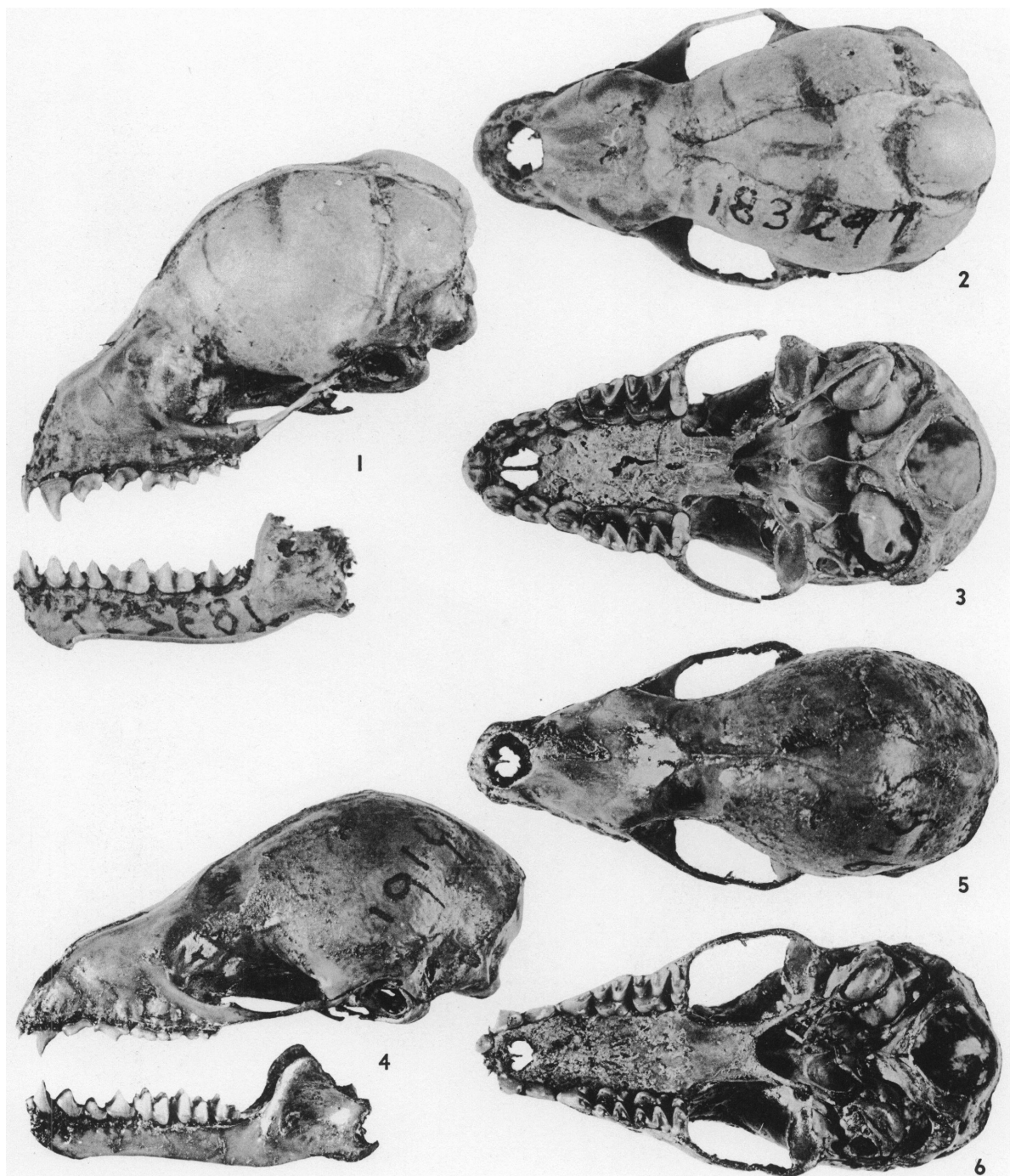
1-3. *Micronycteris hirsuta*, adult female, A.M.N.H. No. 180033, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 3$

4-6. *Micronycteris minuta*, adult male, A.M.N.H. No. 175592, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 3$



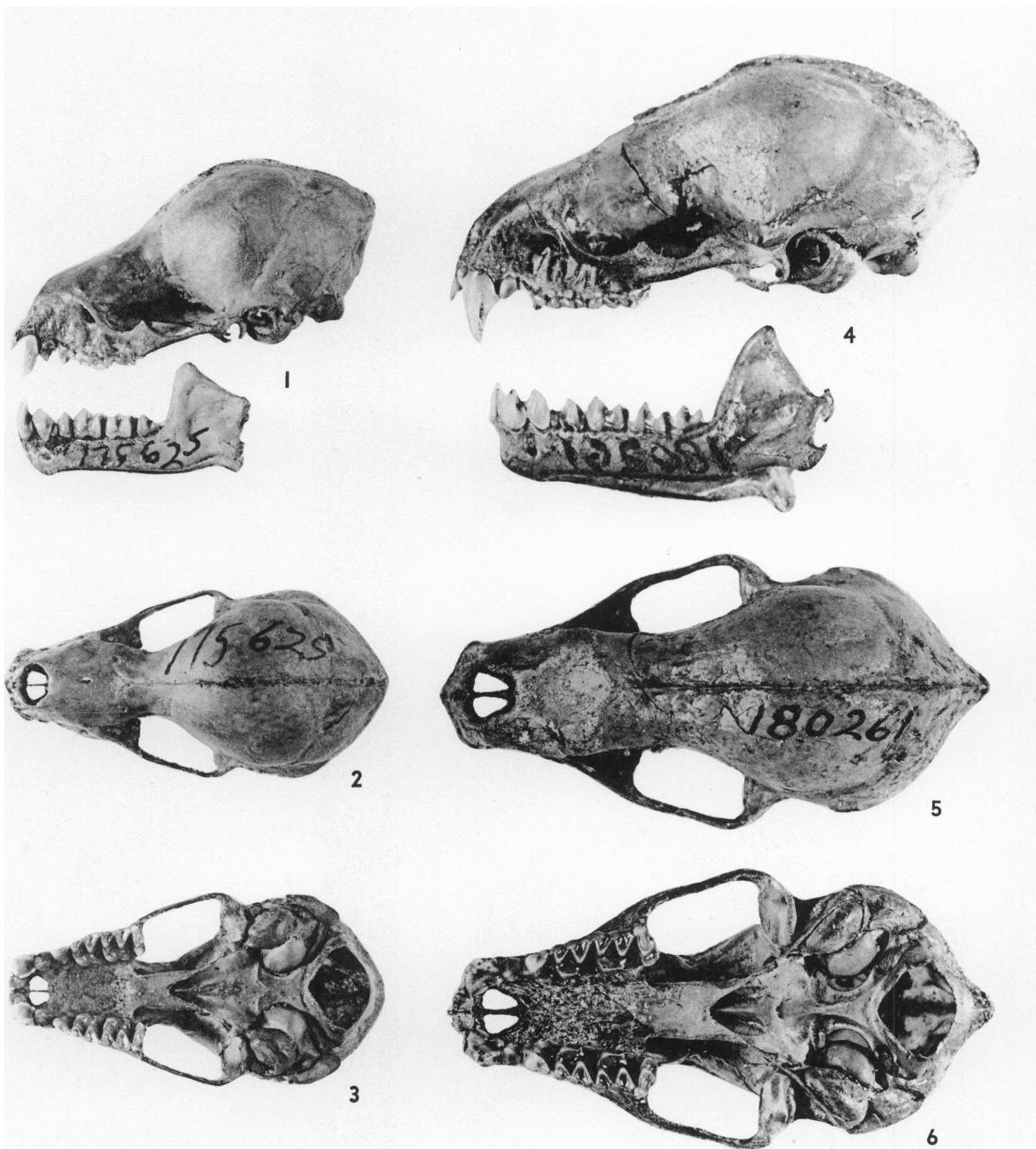
1-3. *Micronycteris platyceps*, adult male, A.M.N.H. No. 182704, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 3$

4-6. *Micronycteris brachyotis*, adult, sex?, P.M. No. 1876-1074, type, from French Guiana. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 3$

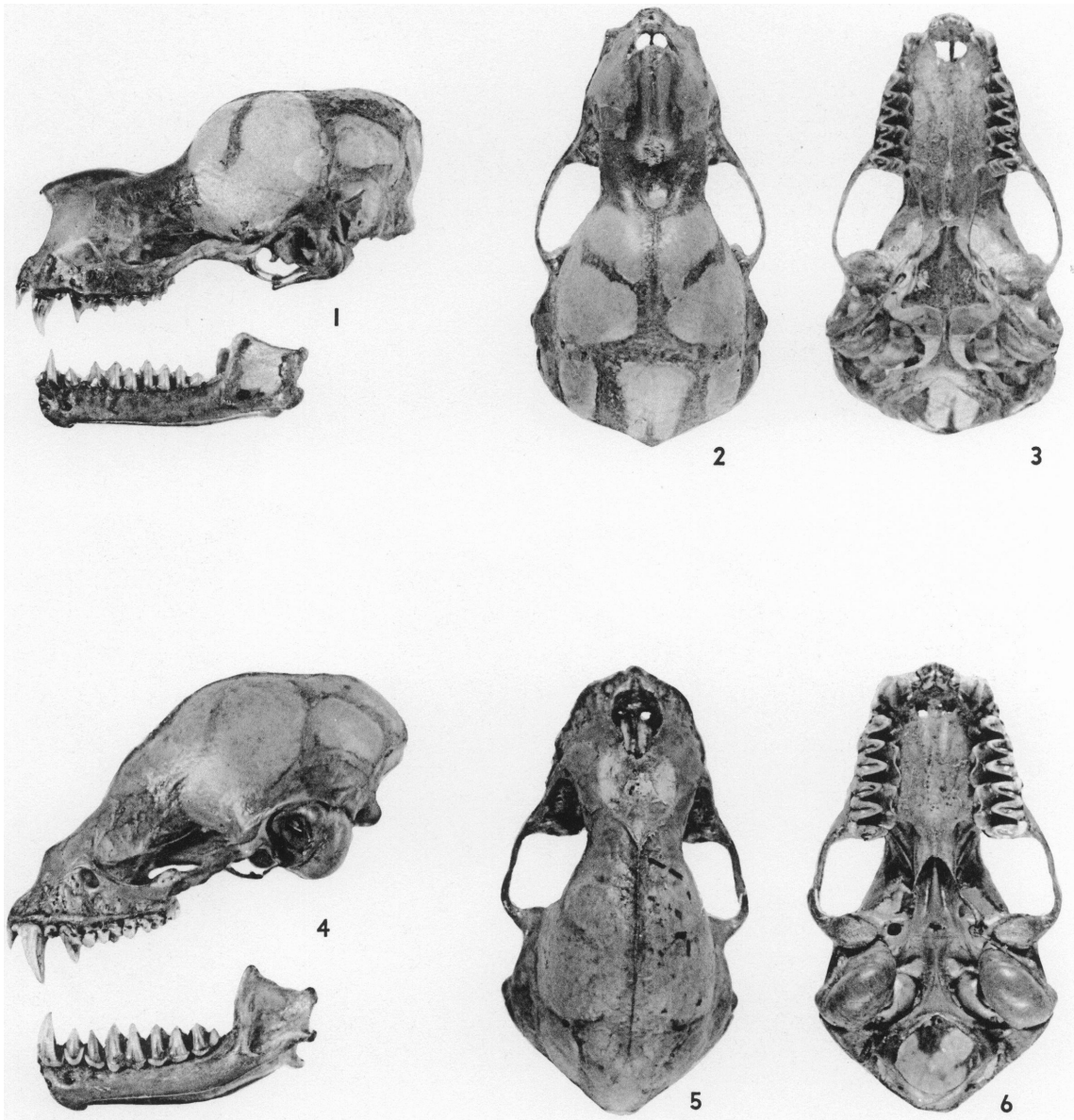


1-3. *Micronycteris sylvestris*, adult male, A.M.N.H. No. 183297, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 4$

4-6. *Micronycteris nicefori*, adult female, A.M.N.H. No. 175644, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 4$



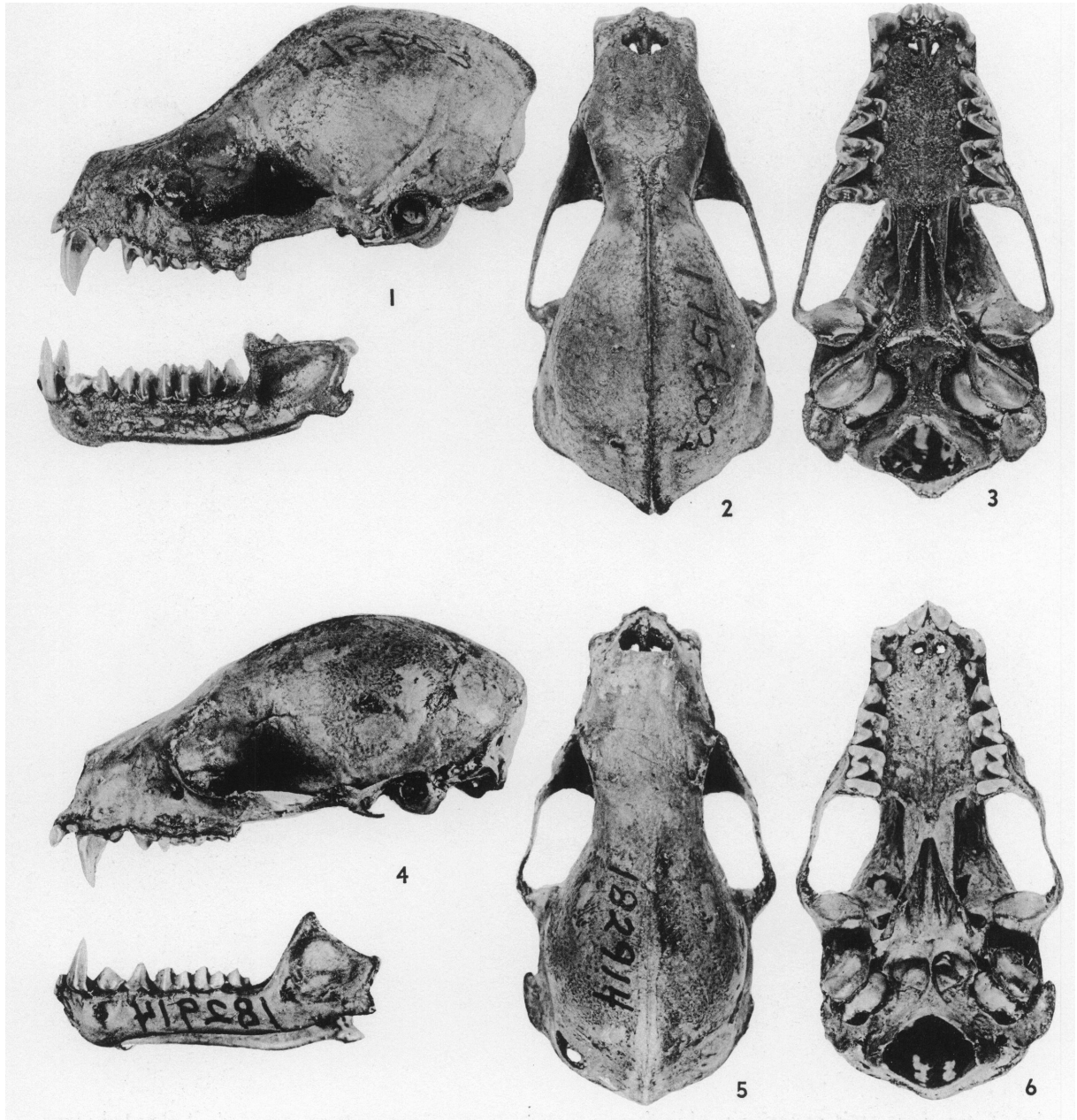
1-3. *Tonatia minuta*, adult, sex?, A.M.N.H. No. 175625, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 3$
 4-6. *Tonatia bidens*, adult male, A.M.N.H. No. 180261, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 3$



1-3. *Lonchorhina aurita aurita*, adult female, A.M.N.H. No. 184701, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 3$
 4-6. *Mimon crenulatum crenulatum*, adult female, A.M.N.H. No. 175586, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 3$

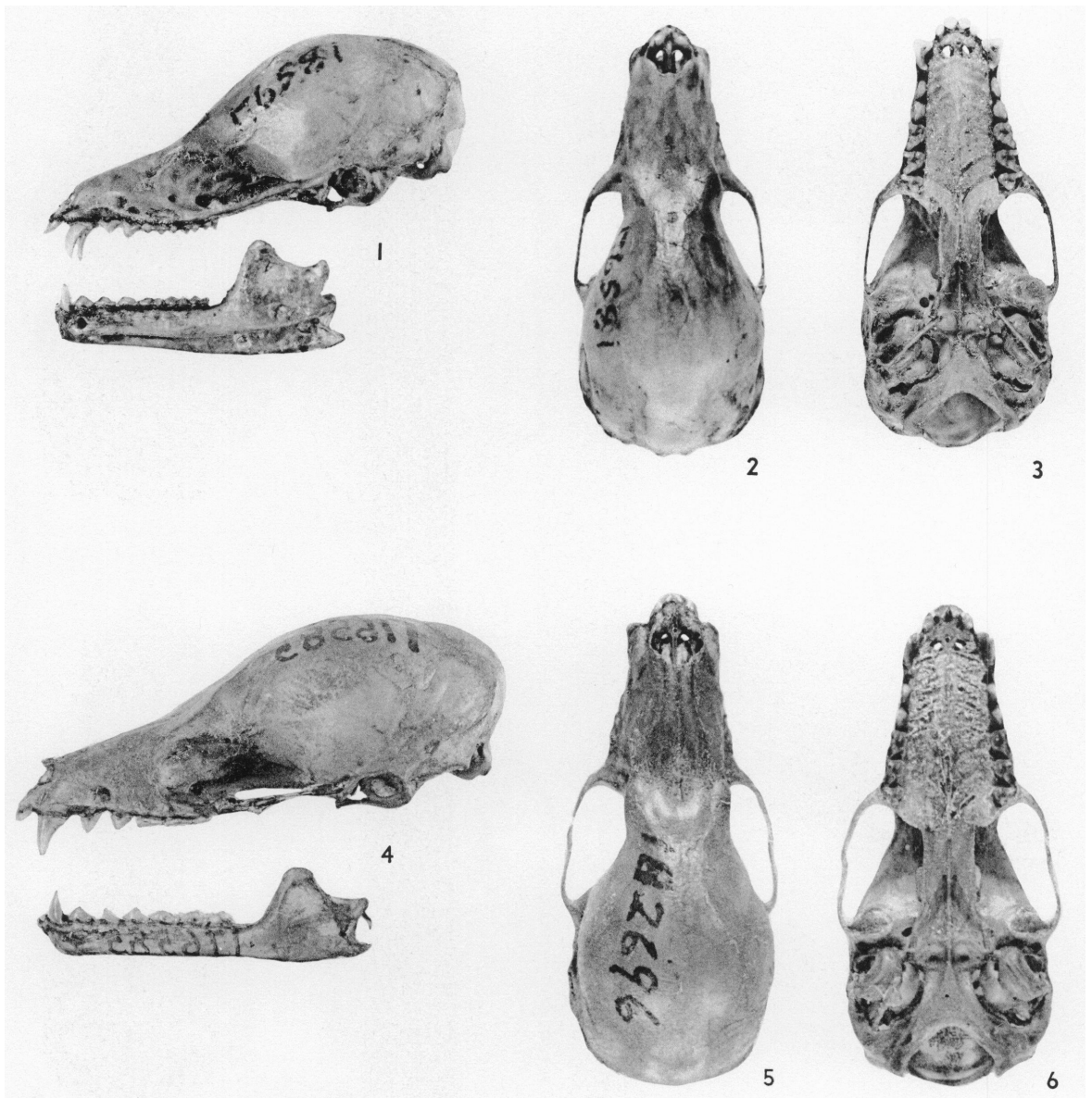


1-3. *Vampyrum spectrum spectrum*, adult male, A.M.N.H. No. 17517, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 2$
 4-6. *Phyllostomus hastatus hastatus*, adult female, A.M.N.H. No. 24140, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 2$



1-3. *Trachops cirrhosus*, adult female, A.M.N.H. No. 175603, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 2\frac{1}{2}$

4-6. *Phyllostomus discolor discolor*, adult male, A.M.N.H. No. 182914, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 2\frac{1}{2}$

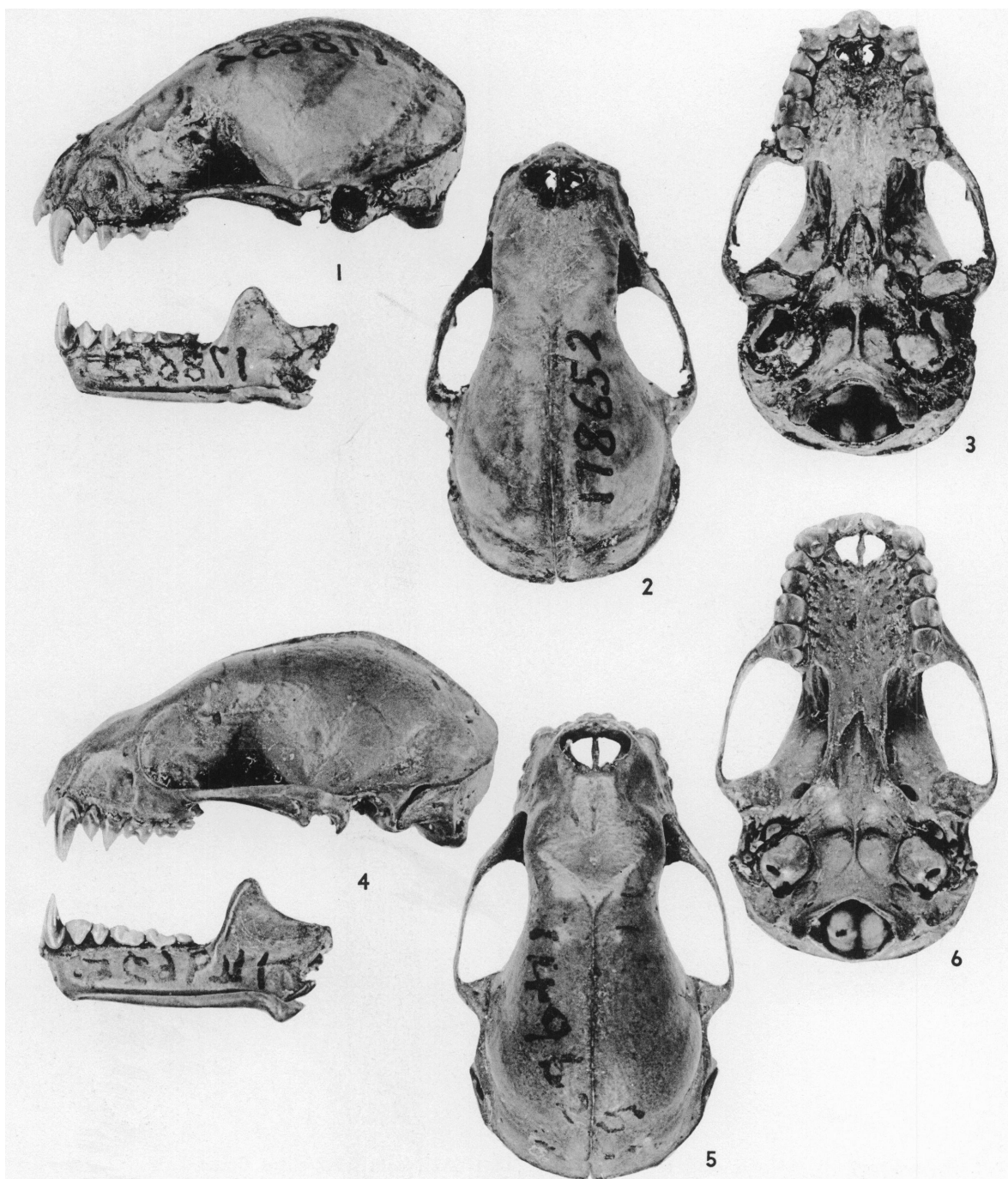


1-3. *Glossophaga soricina soricina*, adult female, A.M.N.H. No. 176581, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 3$
4-6. *Glossophaga longirostris major*, adult female, A.M.N.H. No. 182696, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 3$



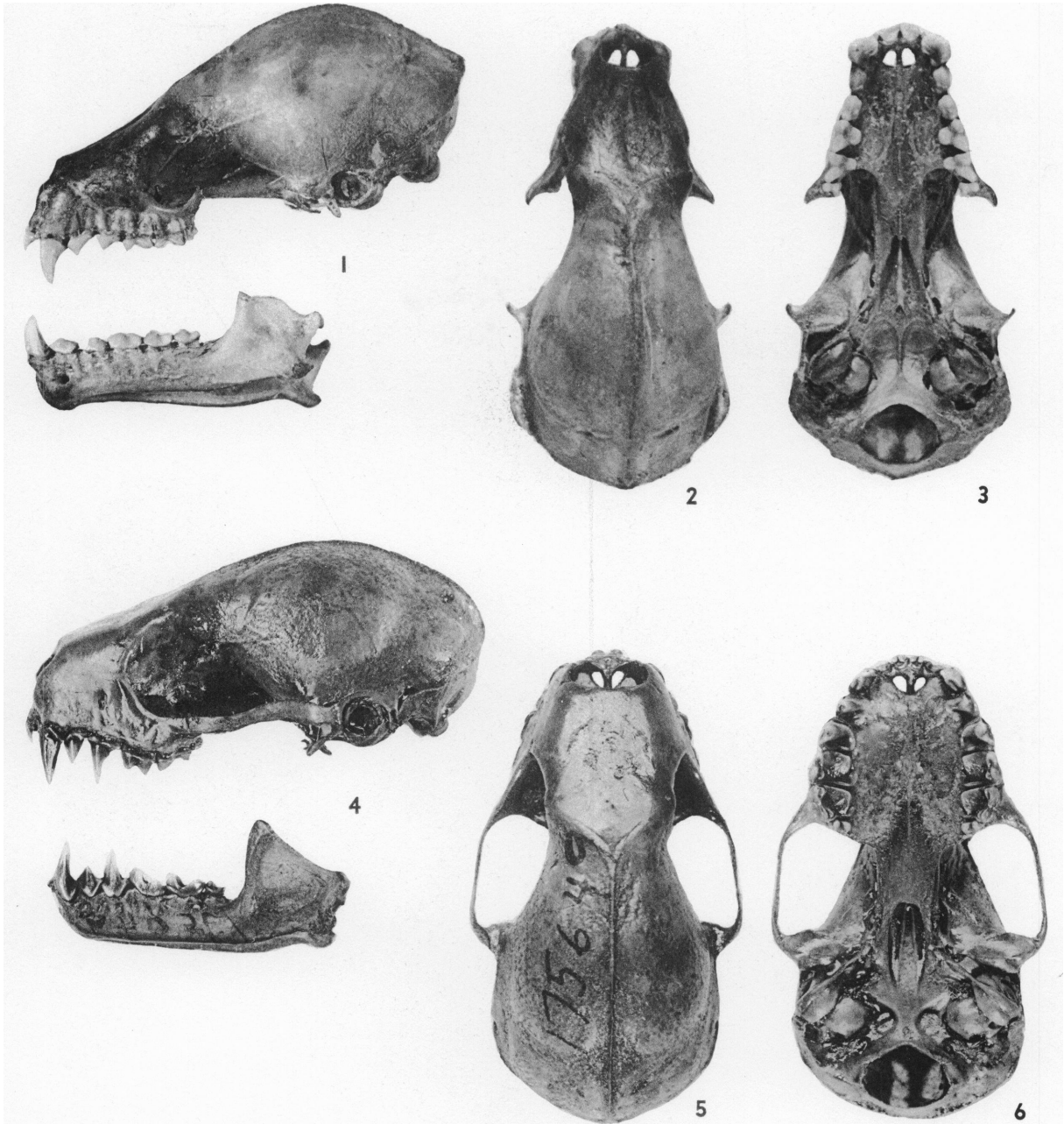
1-3. *Anoura geoffroyi geoffroyi*, adult male, A.M.N.H. No. 175827, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. × 3

4-6. *Choeroniscus intermedius*, adult female, A.M.N.H. No. 6072, type, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. × 3

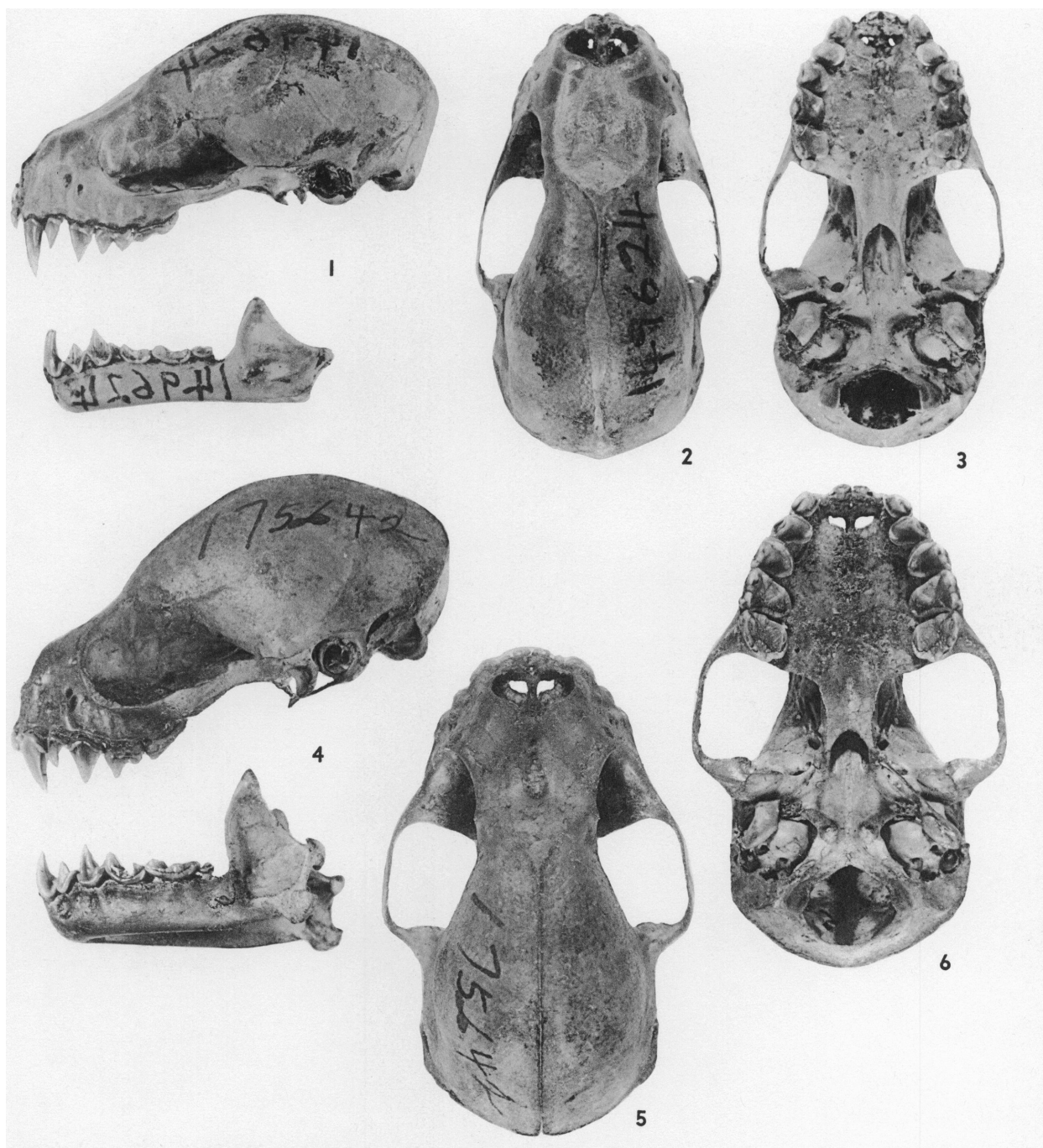


1-3. *Sturnira lilium lilium*, adult male, A.M.N.H. No. 178652, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 3$

4-6. *Sturnira tildae*, adult male, A.M.N.H. No. 149625, type, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 3$

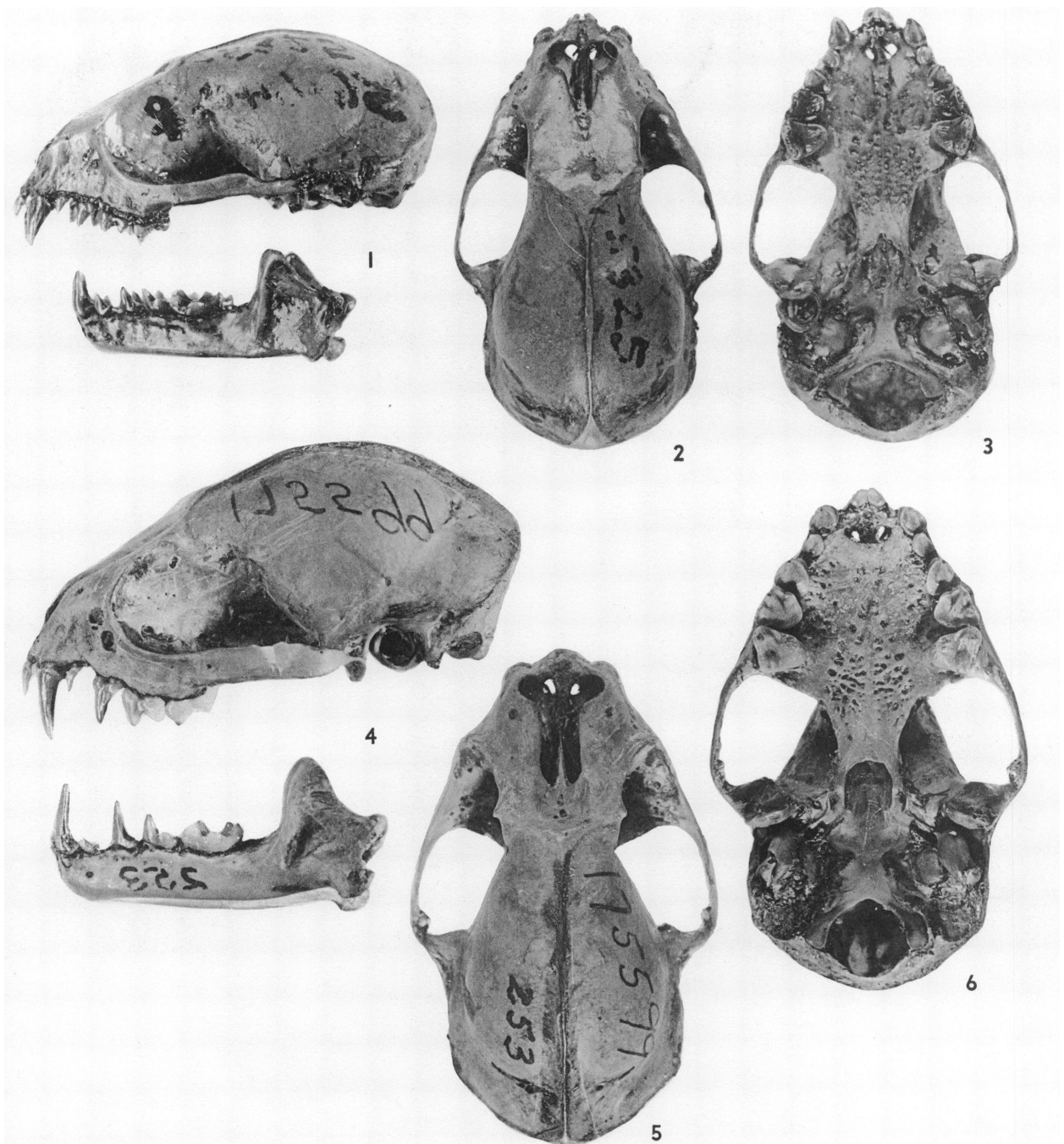


1-3. *Carollia perspicillata perspicillata*, adult male, A.M.N.H. No. 184730, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 3$
 4-6. *Uroderma bilobatum bilobatum*, adult female, A.M.N.H. No. 175649, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 3$

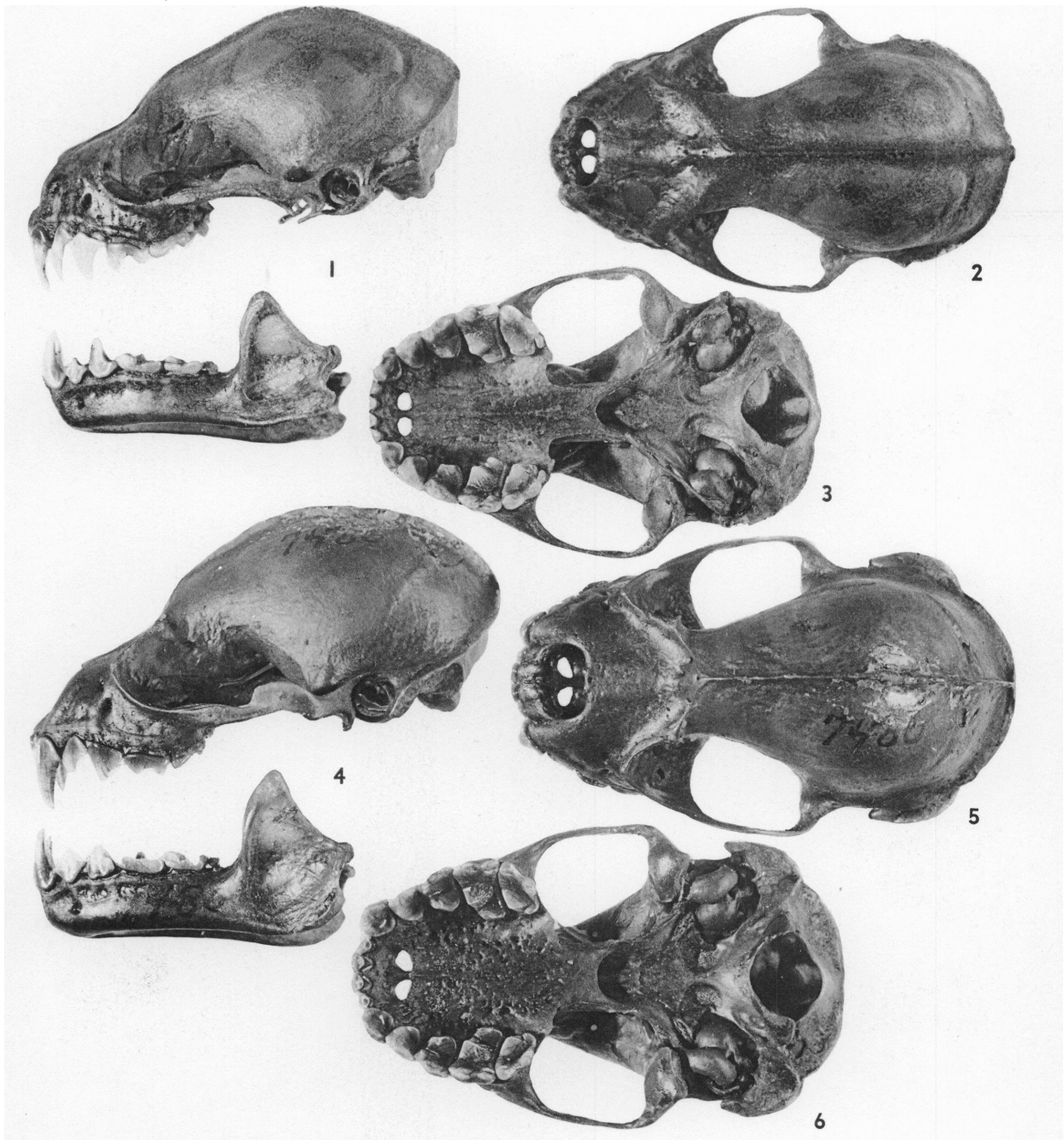


1-3. *Vampyrops helleri*, adult female, A.M.N.H. No. 149624, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 3$

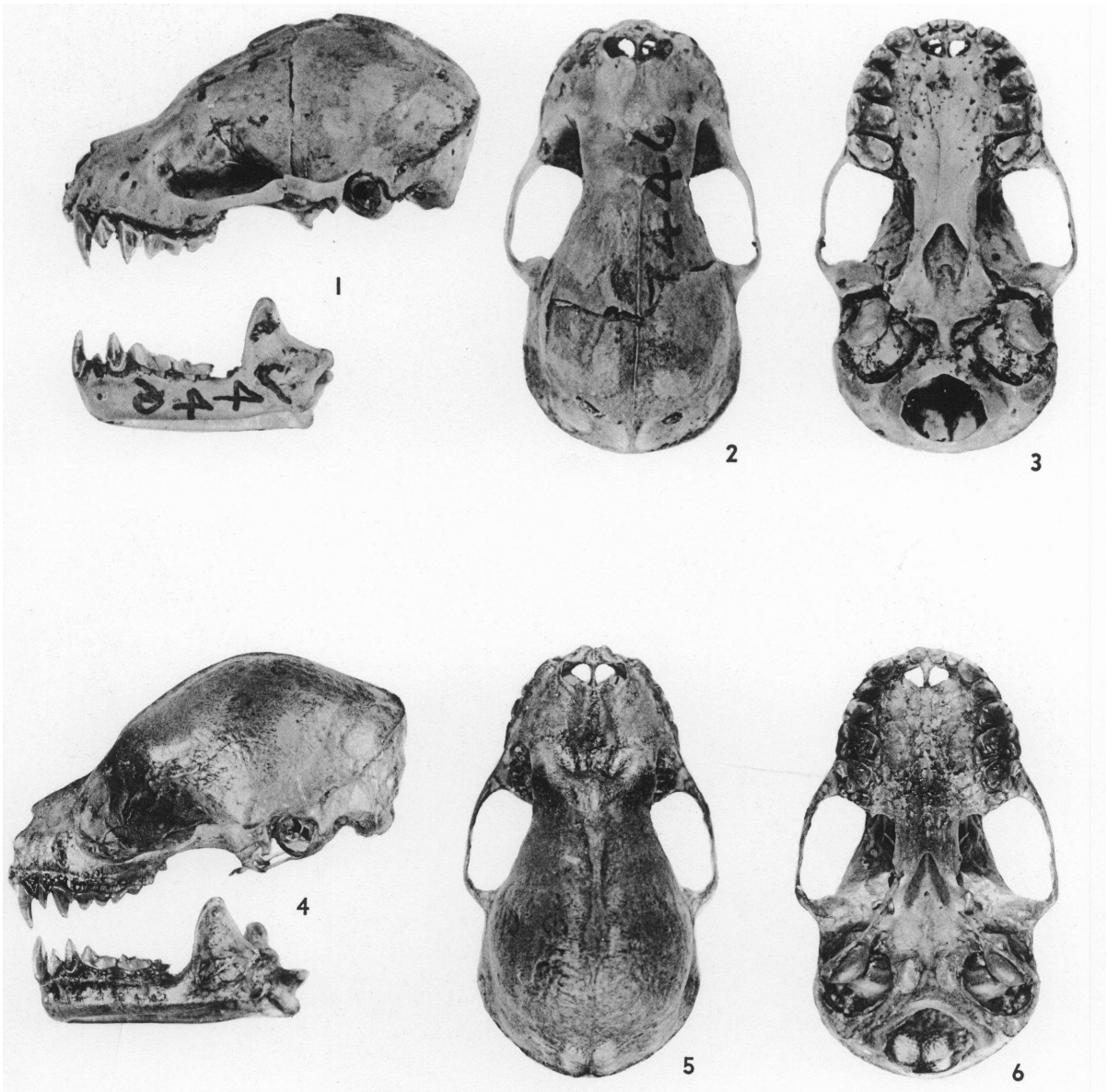
4-6. *Vampyrodes caraccioloii caraccioloii*, adult female, A.M.N.H. No. 175642, from Tobago. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 3$



1-3. *Chiroderma trinitatum*, adult female, A.M.N.H. No. 175325, type, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 3$
 4-6. *Chiroderma villosus villosus*, adult female, A.M.N.H. No. 175599, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 3$

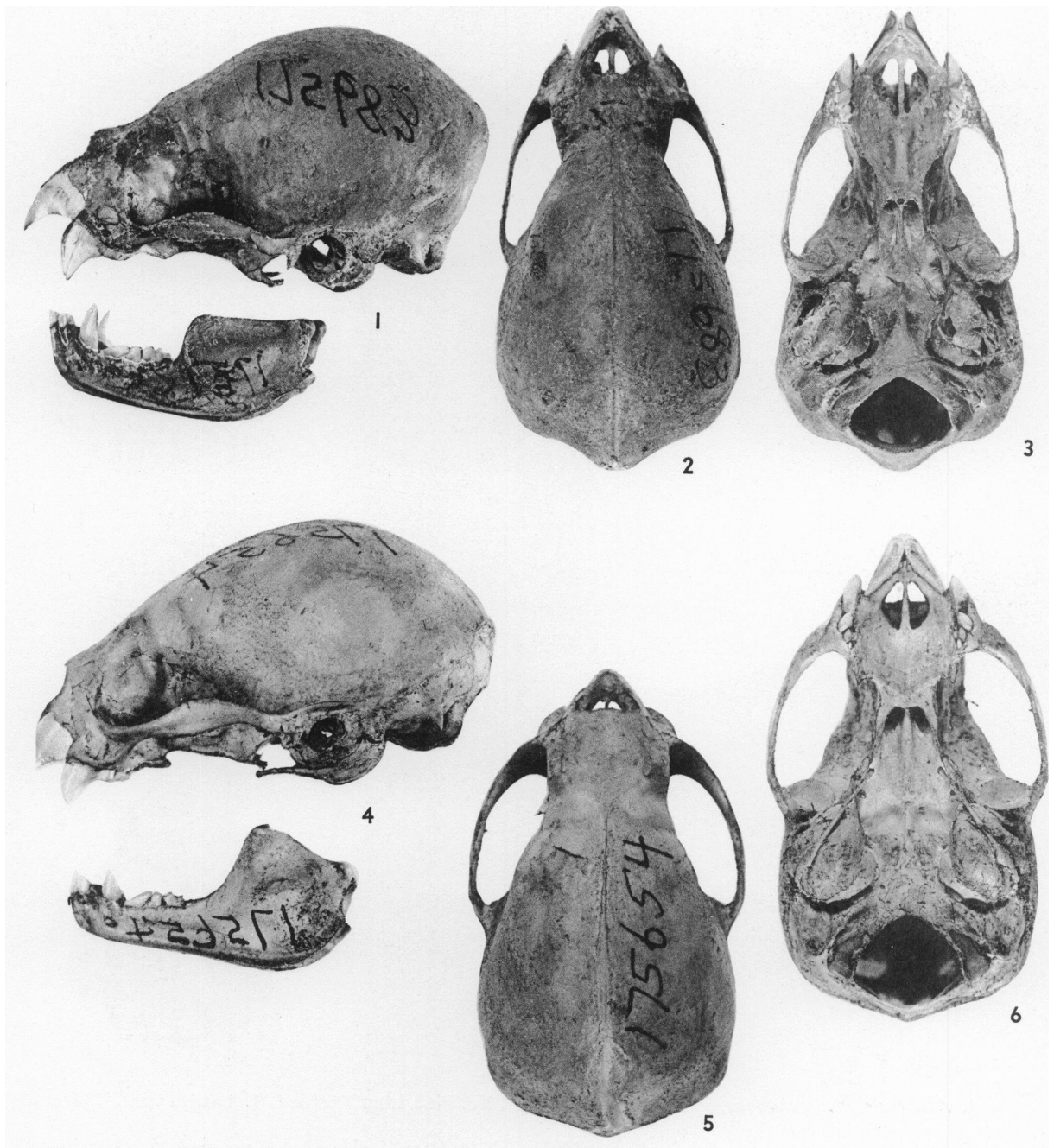


1-3. *Artibeus jamaicensis trinitatus*, adult female, A.M.N.H. No. 184697 from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 2\frac{1}{2}$
4-6. *Artibeus lituratus palmarum*, adult male, A.M.N.H. No. 7480, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 2\frac{1}{2}$

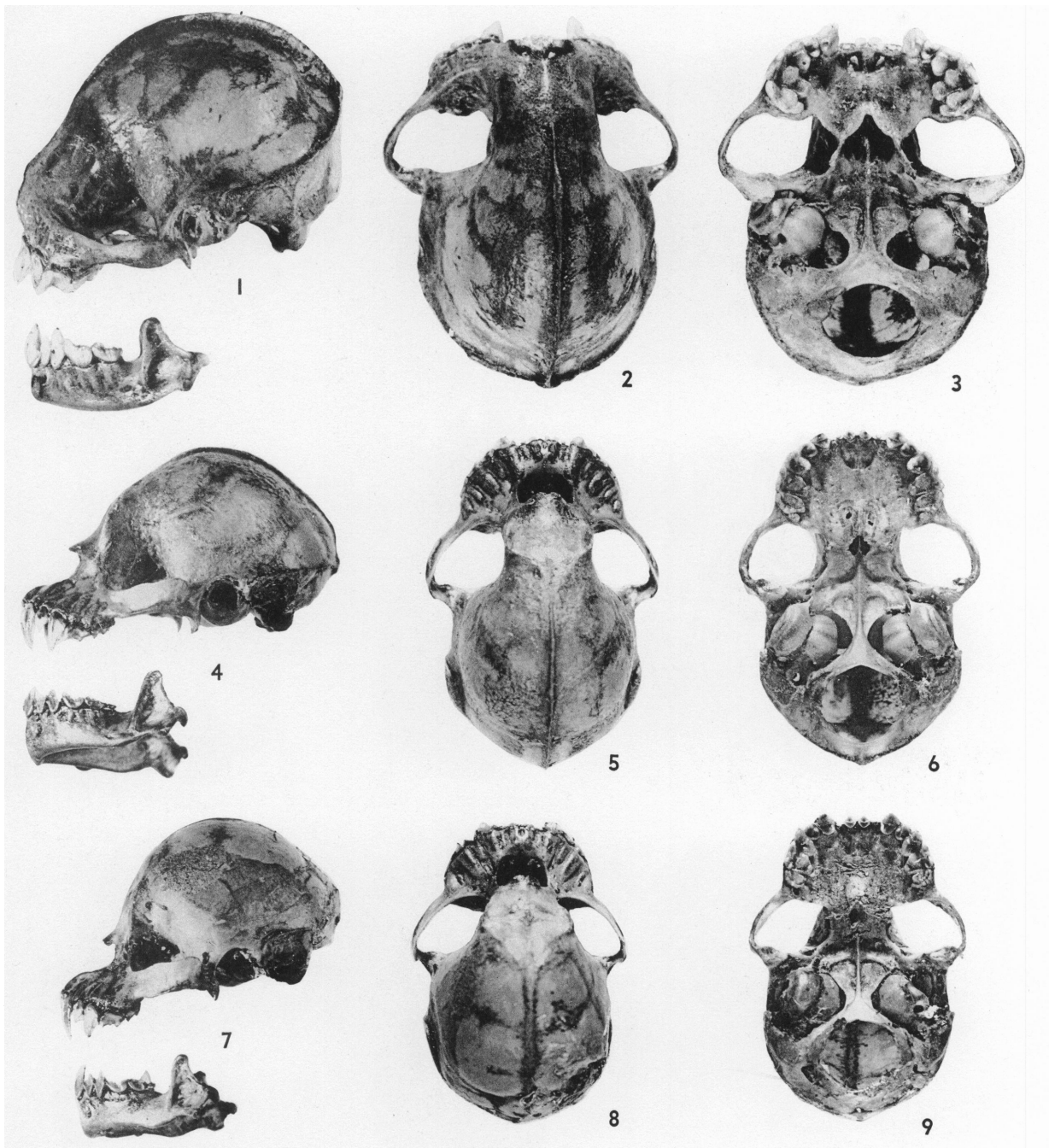


1-3. *Artibeus cinereus cinereus*, adult female, A.M.N.H. No. 7446, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 3$

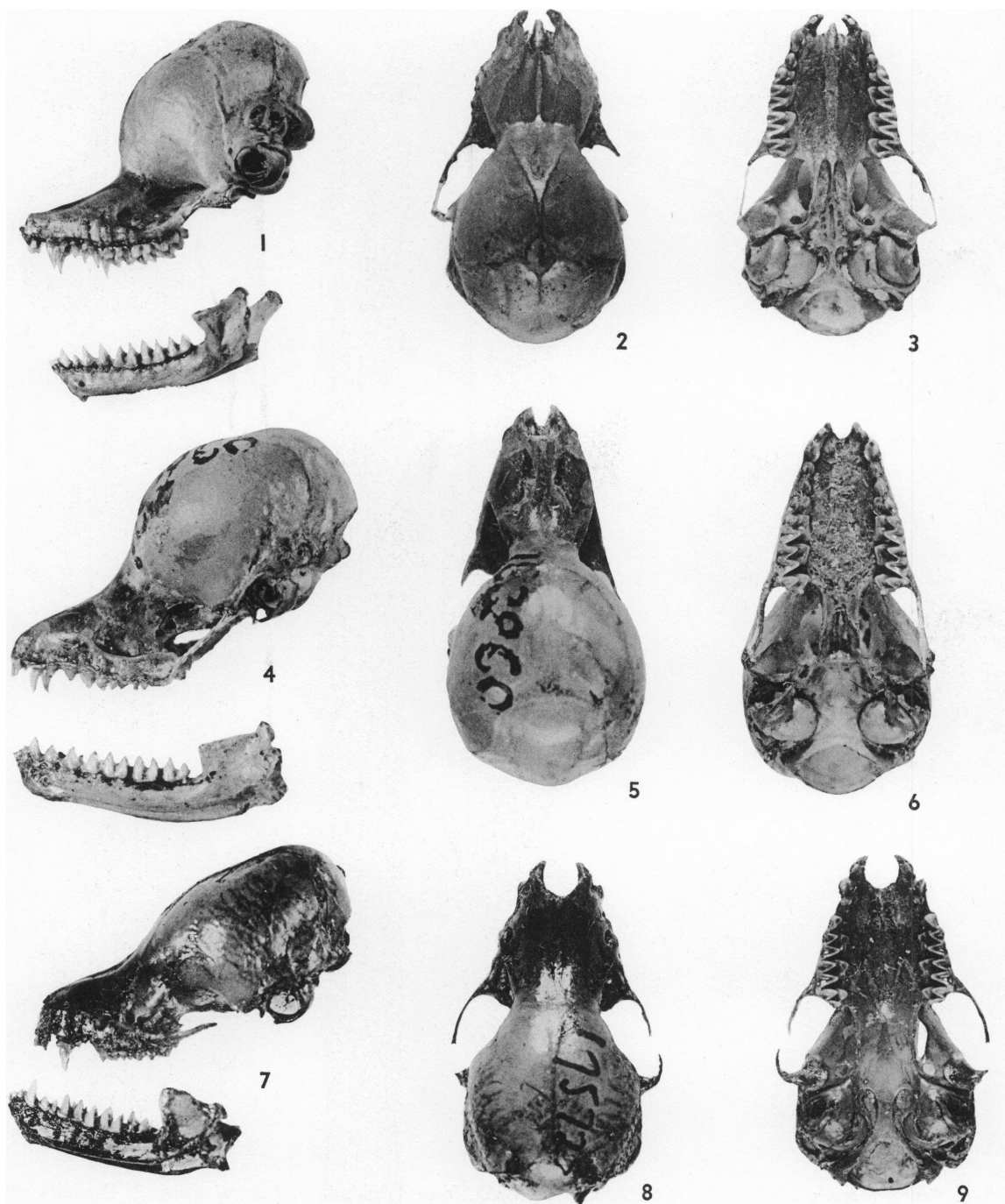
4-6. *Enchisthenes hartii*, adult female, C.N.H.M. No. 83318, from Mexico. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 3$



1-3. *Desmodus rotundus rotundus*, adult female, A.M.N.H. No. 179991, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 3$
 4-6. *Diaemus youngi*, adult female, A.M.N.H. No. 175654, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 3$



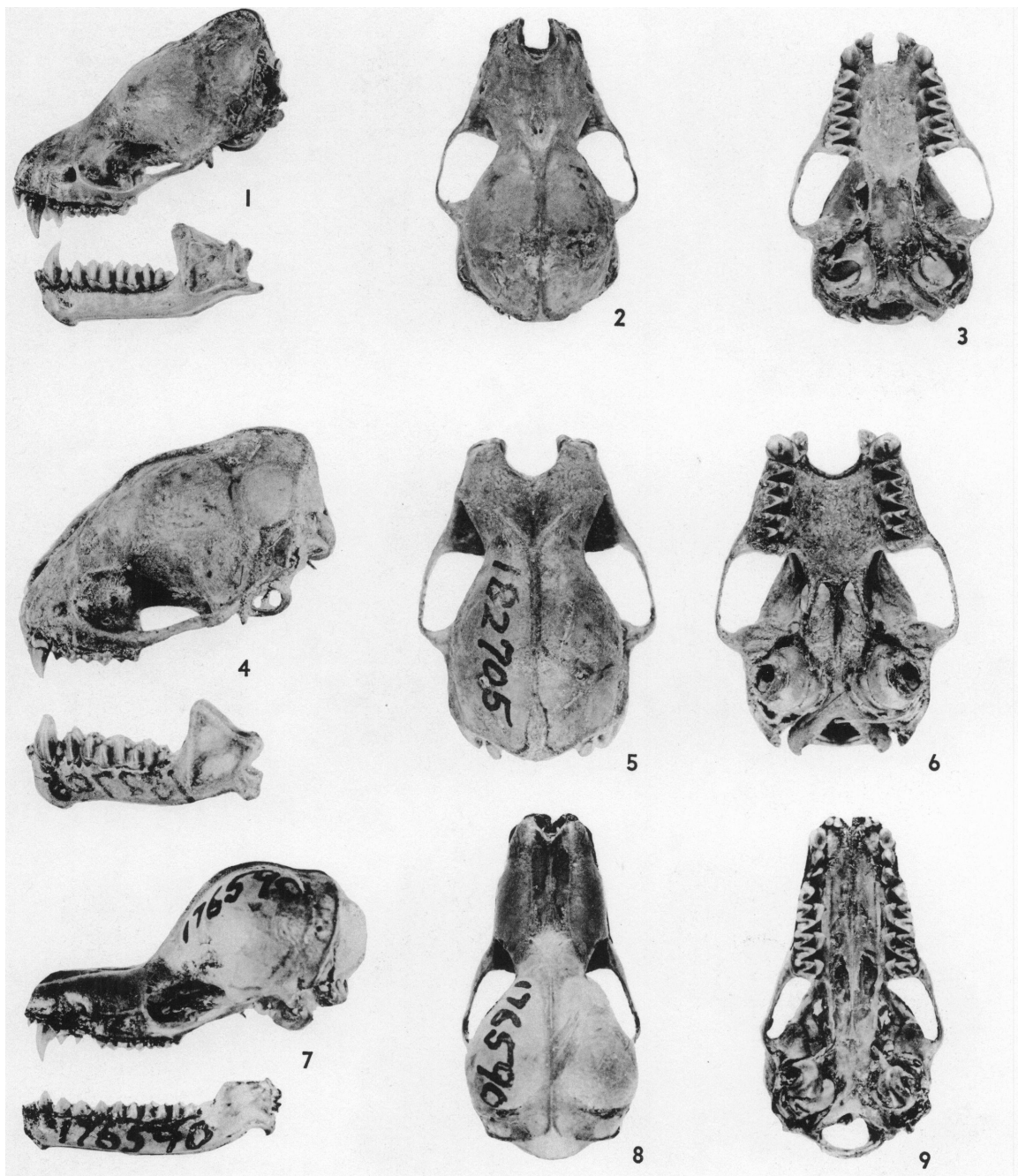
1-3. *Centurio senex*, adult male, A.M.N.H. No. 183862, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 3$
 4-6. *Ametrida centurio*, adult female, A.M.N.H. No. 142613, from Caripito, Venezuela. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 3$
 7-9. *Ametrida minor*, adult male, A.M.N.H. No. 142909, from Kartabo, British Guiana. 7. Lateral view. 8. Dorsal view. 9. Ventral view. $\times 3$



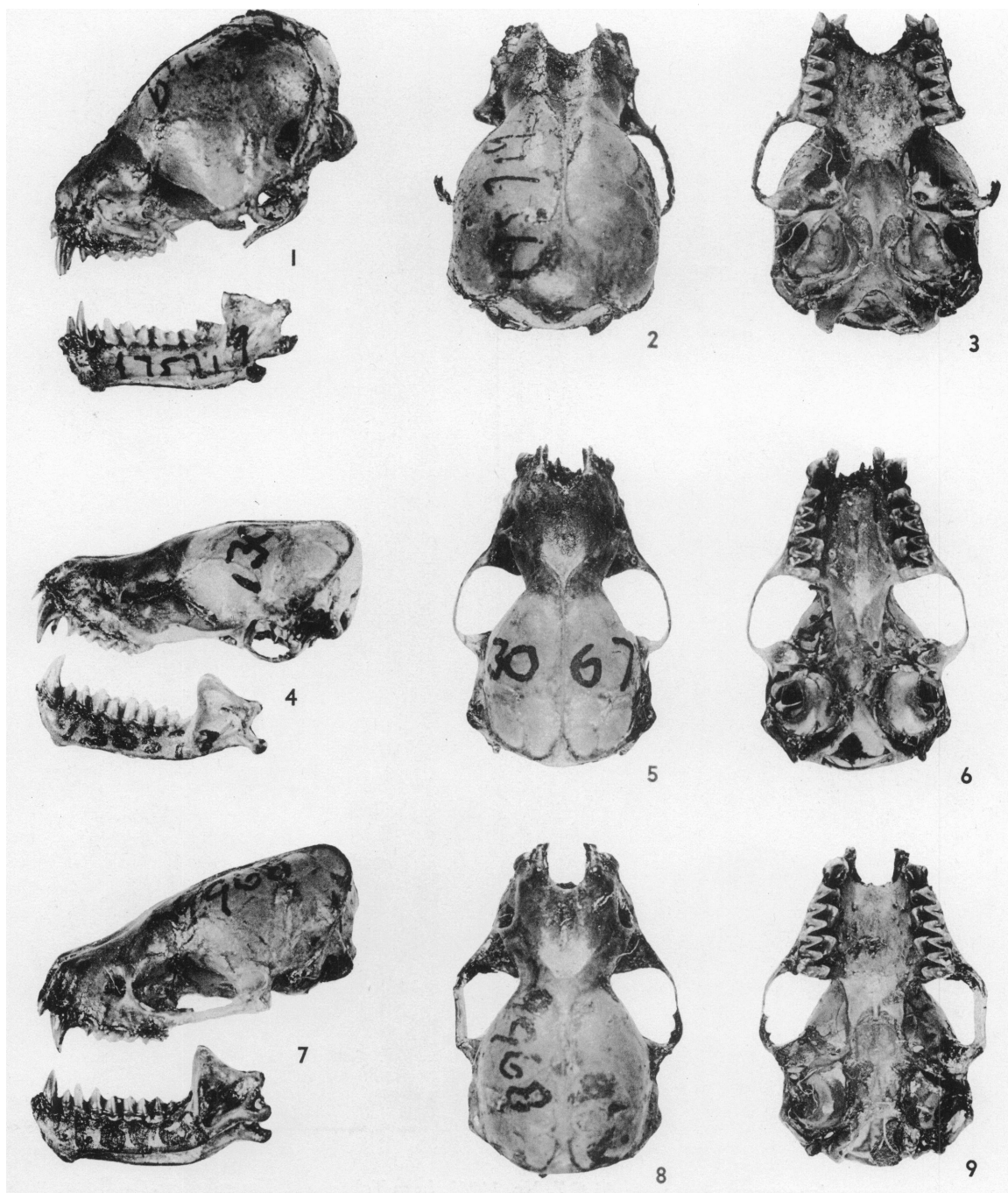
1-3. *Furipterus horrens*, adult male, A.M.N.H. No. 142903, from British Guiana. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 4$

4-6. *Thyroptera tricolor tricolor*, adult male, A.M.N.H. No. 183860, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 4$

7-9. *Myotis nigricans nigricans*, adult female, A.M.N.H. No. 175725, from Trinidad. 7. Lateral view. 8. Dorsal view. 9. Ventral view. $\times 4$



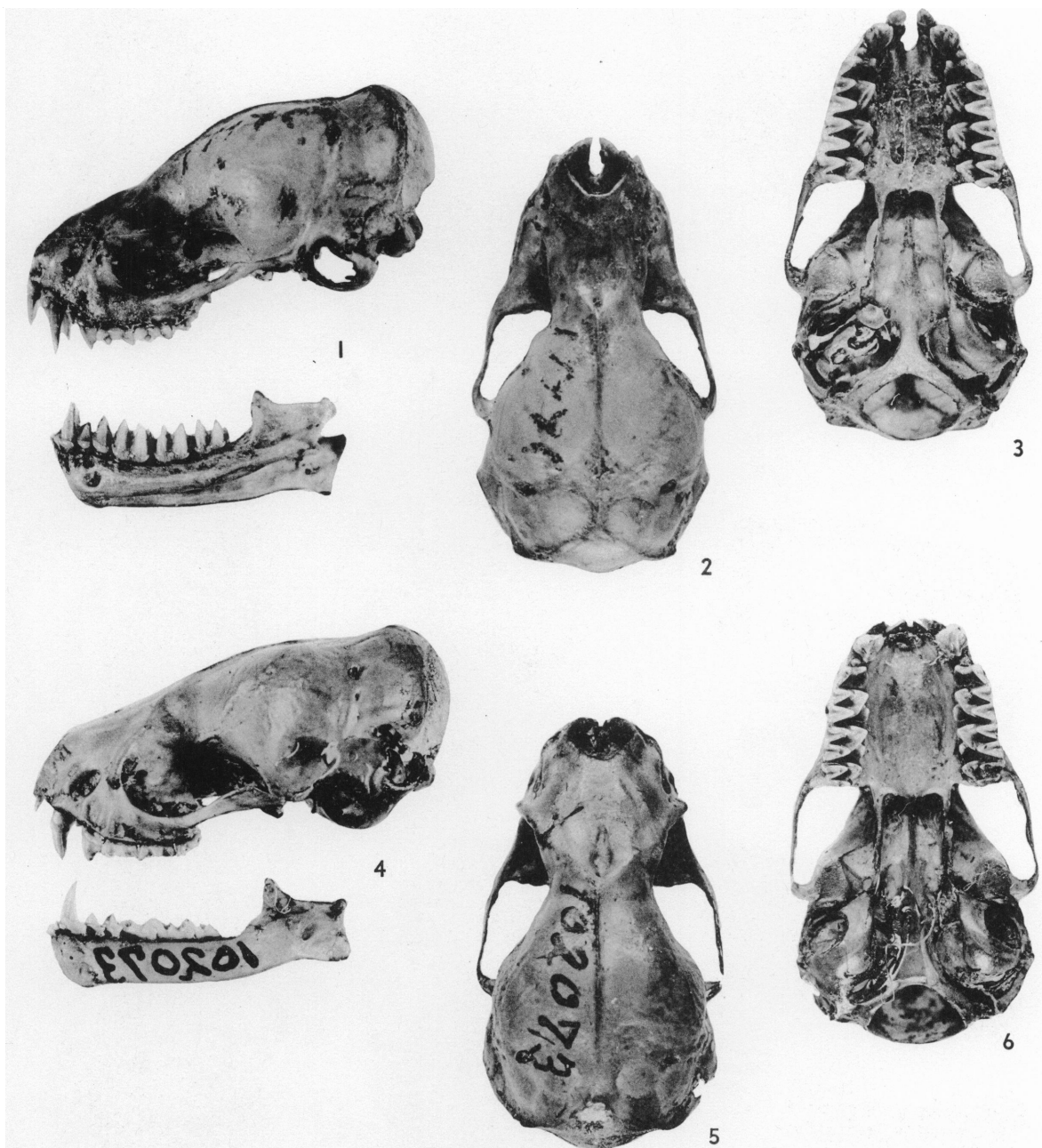
- 1-3. *Eptesicus melanopterus*, adult male, M.C.Z. No. 11267, from Tobago. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 3$
 4-6. *Dasypterus ega panamensis*, adult female, A.M.N.H. No. 182705, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 3$
 7-9. *Natalus tumidirostris haymani*, adult male, A.M.N.H. No. 176590, from Trinidad. 7. Lateral view. 8. Dorsal view. 9. Ventral view. $\times 3$



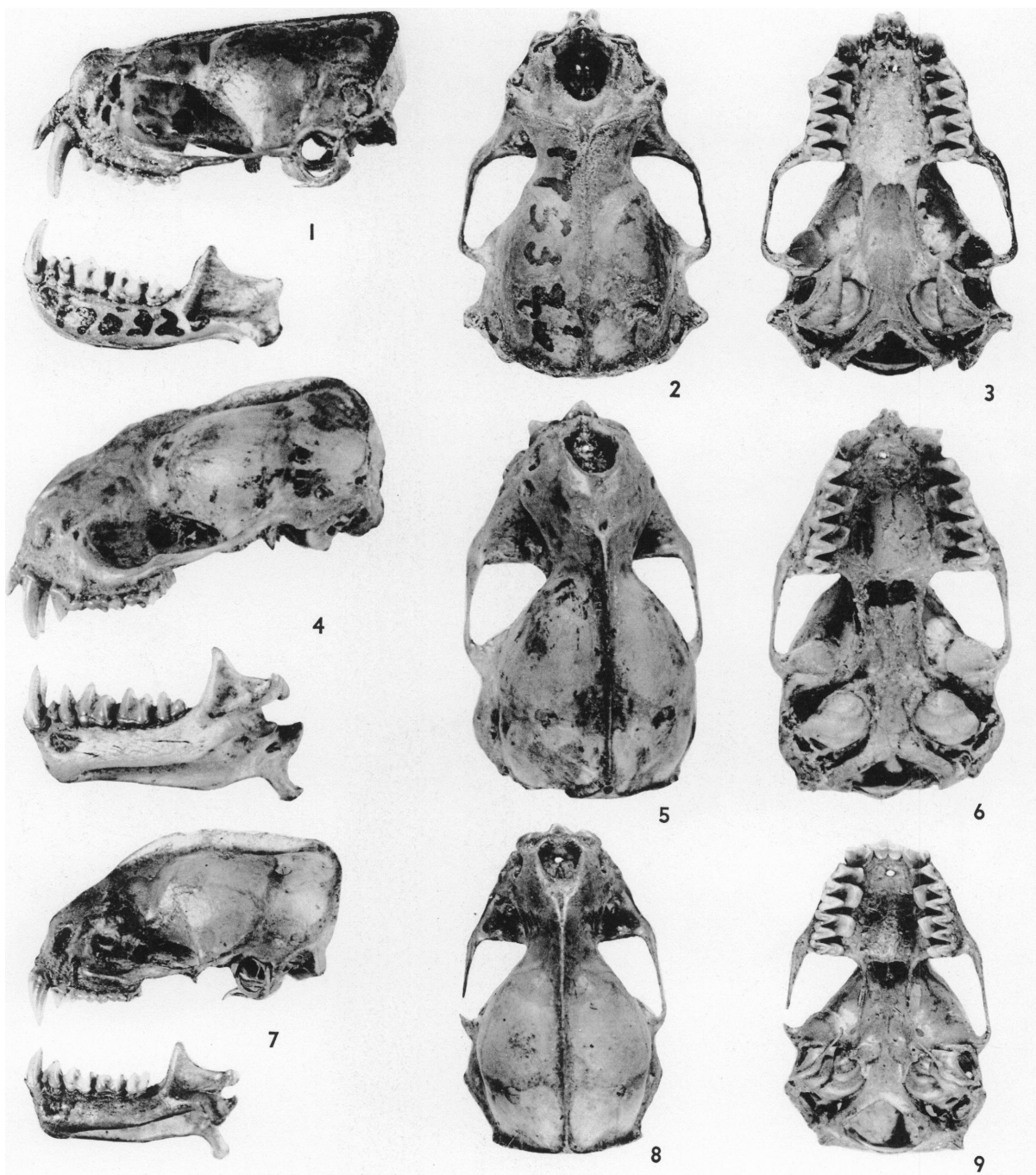
1-3. *Lasiurus borealis frantzii*, adult male, A.M.N.H. No. 175719, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 4$

4-6. *Rhogeessa parvula minutilla*, adult male, A.M.N.H. No. 130677, from Venezuela. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 4$

7-9. *Rhogeessa tumida riparia*, adult male, A.M.N.H. No. 69968, type, from Venezuela. 7. Lateral view. 8. Dorsal view. 9. Ventral view. $\times 4$



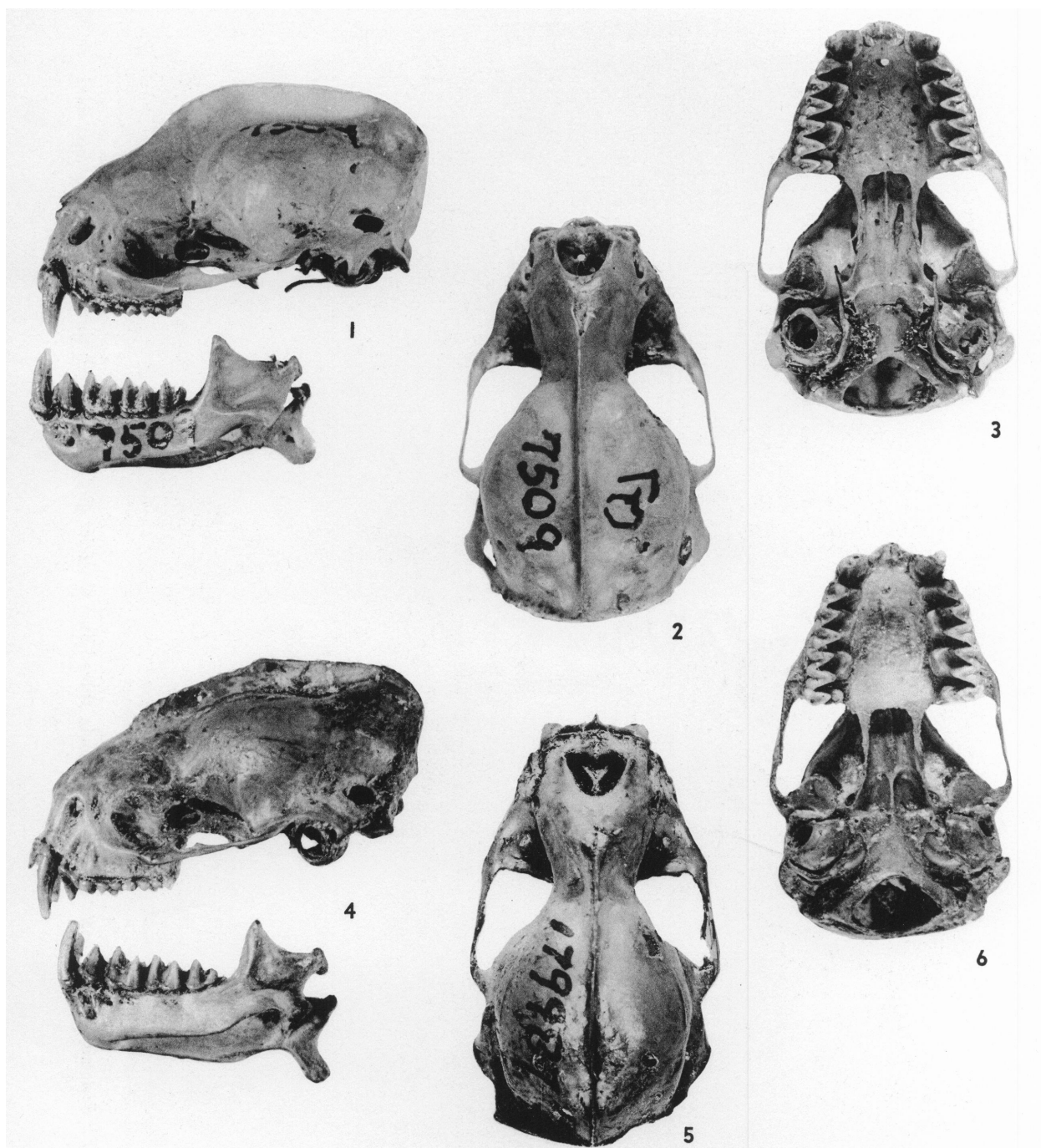
1-3. *Tadarida europis*, adult female, A.M.N.H. No. 179963, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 4$
 4-6. *Tadarida brasiliensis antillarum*, adult male, U.S.N.M. No. 102073, from Tobago. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 4$



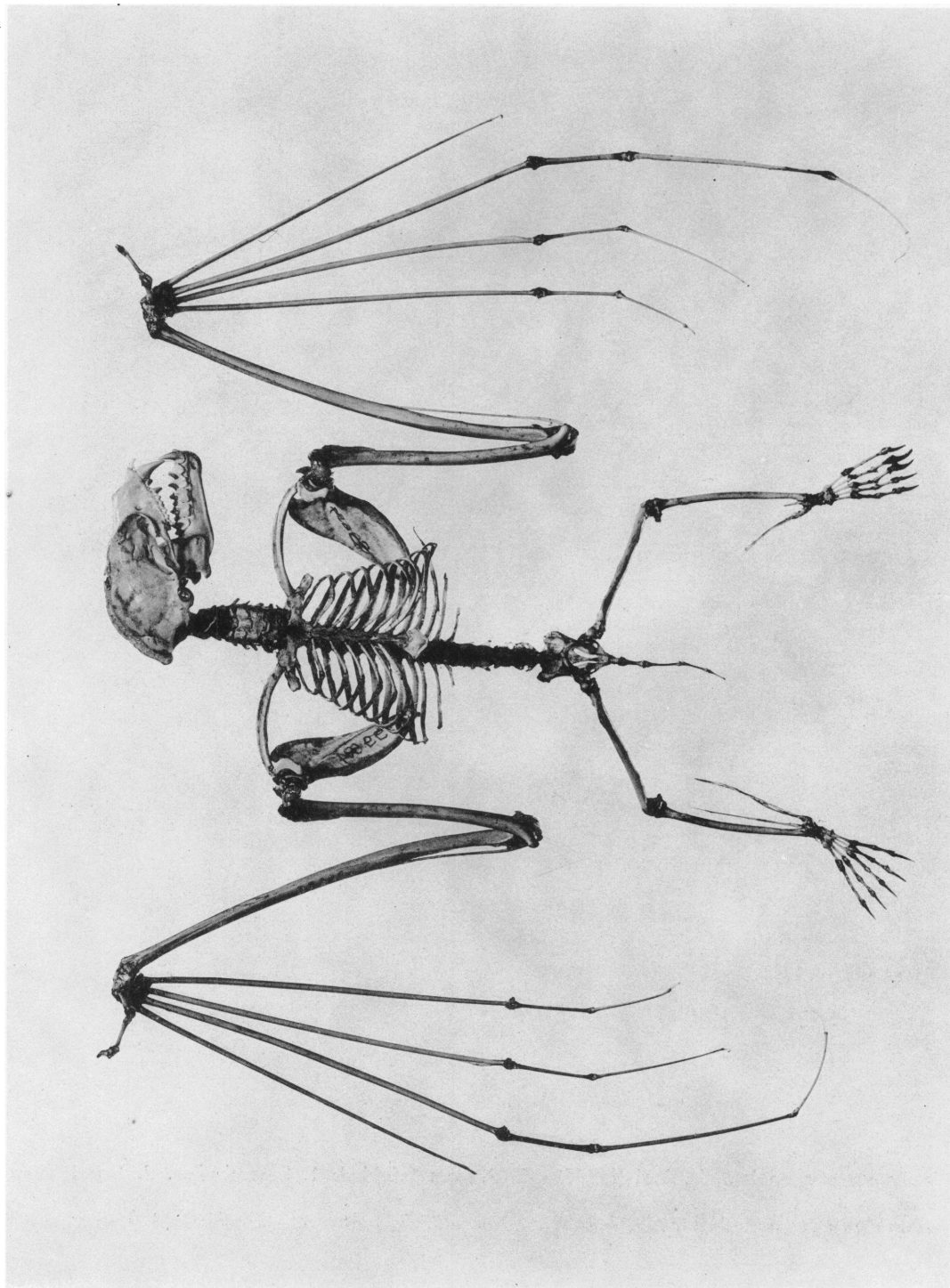
1-3. *Molossops greenhalli*, adult male, A.M.N.H. No. 175326, type, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 3$

4-6. *Promops centralis*, adult female, A.M.N.H. No. 175652, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 3$

7-9. *Molossus major major*, adult male, A.M.N.H. No. 178668, from Trinidad. 7. Lateral view. 8. Dorsal view. 9. Ventral view. $\times 3$



1-3. *Molossus ater ater*, adult male, A.M.N.H. No. 7509, from Trinidad. 1. Lateral view. 2. Dorsal view. 3. Ventral view. $\times 3$
 4-6. *Molossus trinitatus*, subadult male, A.M.N.H. No. 179987, type, from Trinidad. 4. Lateral view. 5. Dorsal view. 6. Ventral view. $\times 3$



Skeleton of *Phyllostomus hastatus hastatus*. Ulna and fibula thread-like; shoulder girdle specialized; three bony phalanges on third finger. $\times \frac{3}{4}$



1



2

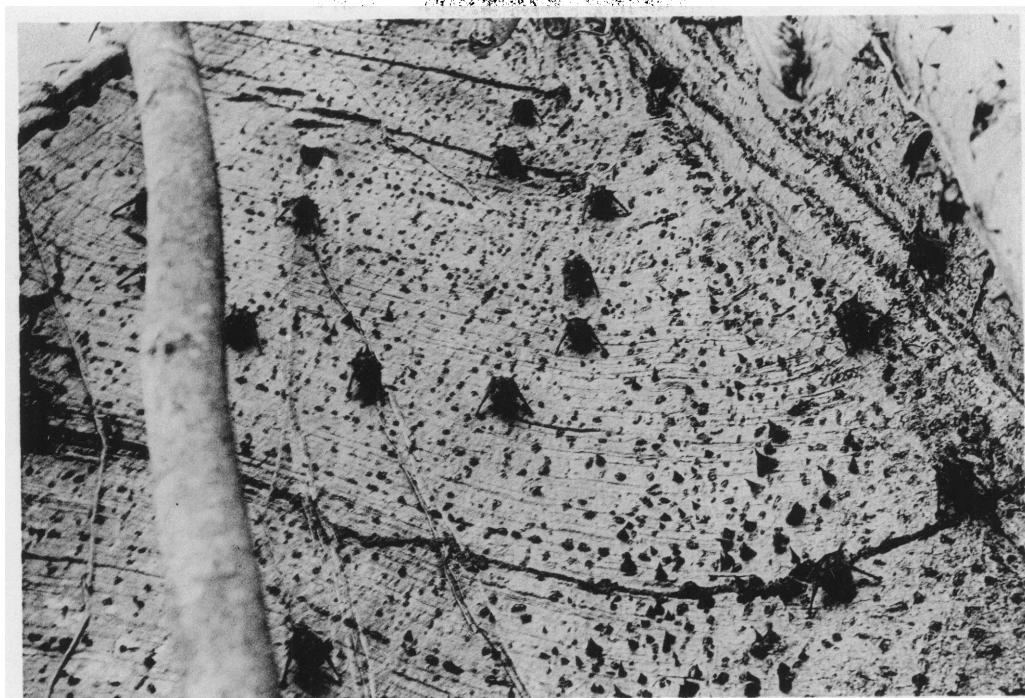
1. Head of *Centurio senex*. Translucent eye "windows" mentioned in text are shown in skin drawn over chin

2. Head of *Vampyrops helleri*, showing details in structure of nose leaf, warts on lips, and white facial stripes

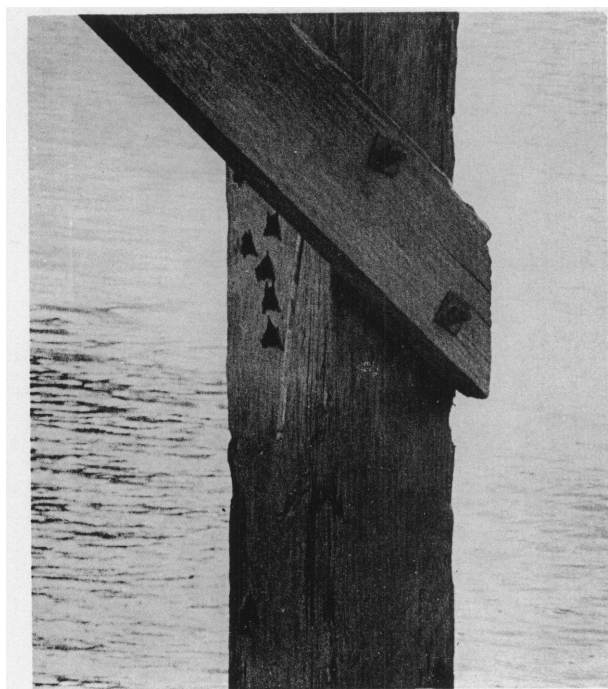
Photographs by Trinidad Regional Virus Laboratory



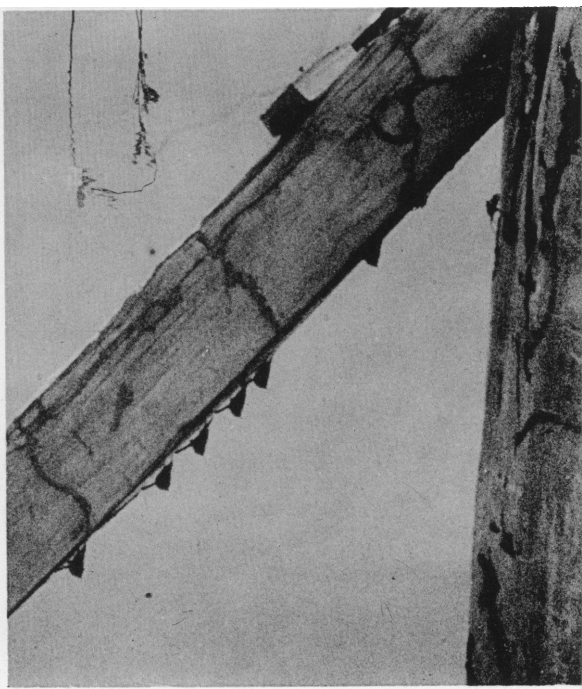
Anous geoffroyi geoffroyi, *Phyllostomus hastatus hastatus*, *Carollia perspicillata perspicillata*, and *Chilonychteris rubiginosa fusca* roosting in association at Tamana Cave, Trinidad. Photograph by Julien S. Kenny



1



2



3

1. *Saccopteryx bilineata perspicilifer* roosting in spaced formation on trunk of silk-cotton tree, Trinidad
2. *Rhynchiscus naso*, roosting in evenly spaced formation on pilings under a Caroni River bridge
3. *Rhynchiscus naso* roosting in evenly spaced line on dock pilings at Nariva River

Photographs by A. M. Greenhall

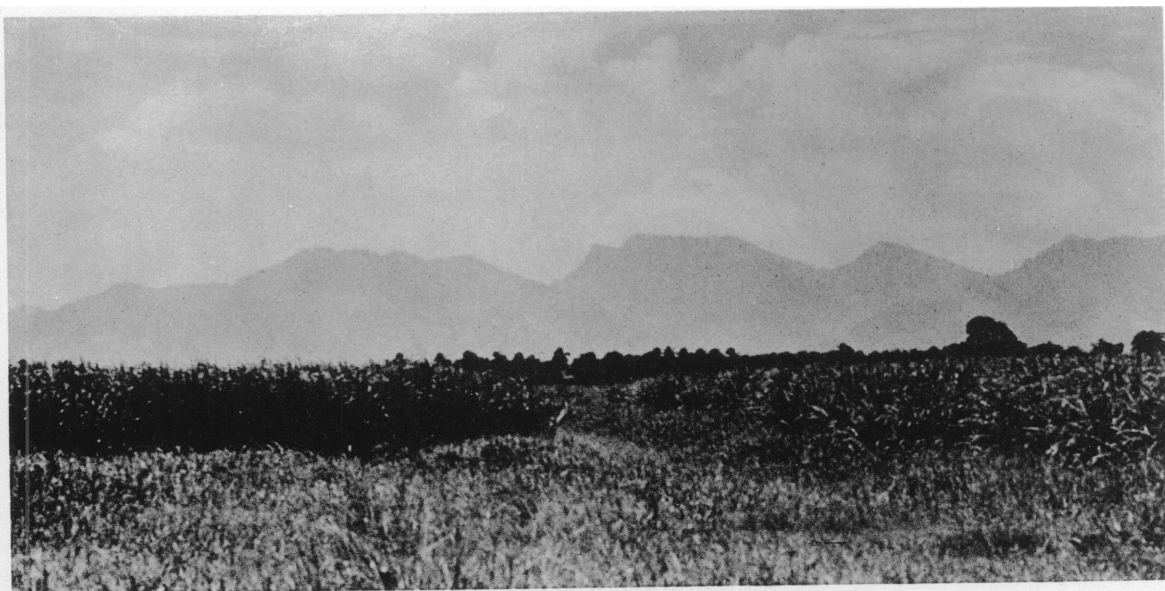


1



2

Artibeus lituratus palmarum. 1. Roosting under a clump of bouganvillea vines at Mary Street, Port-of-Spain.
2. Roosting in a shade tree at Port-of-Spain. Photographs by A. M. Greenhall

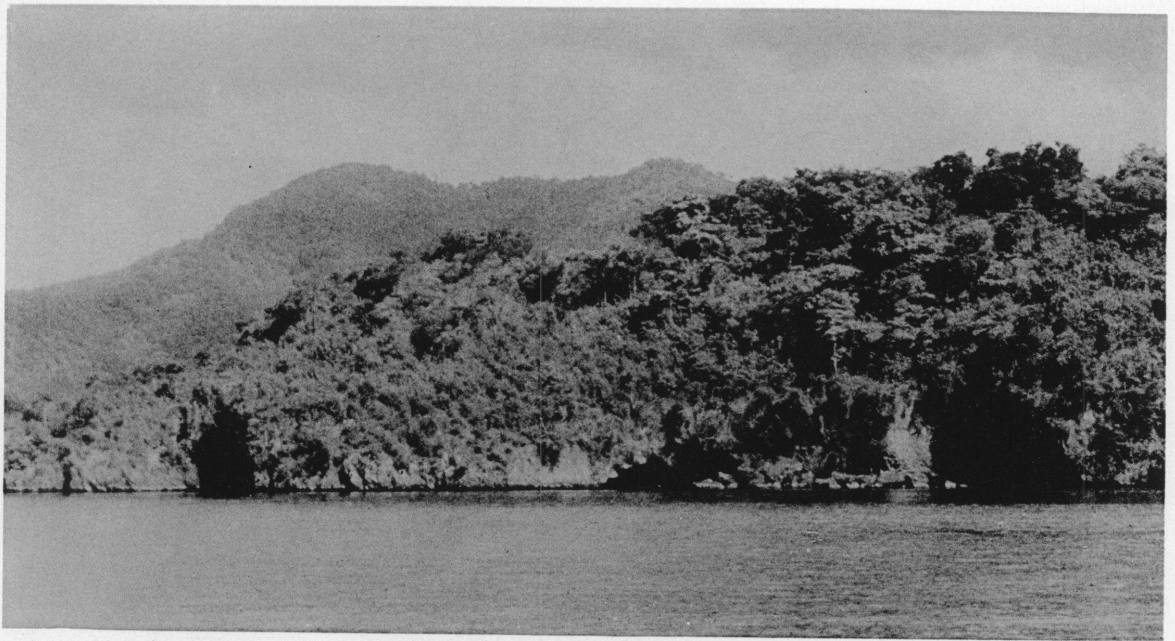


1

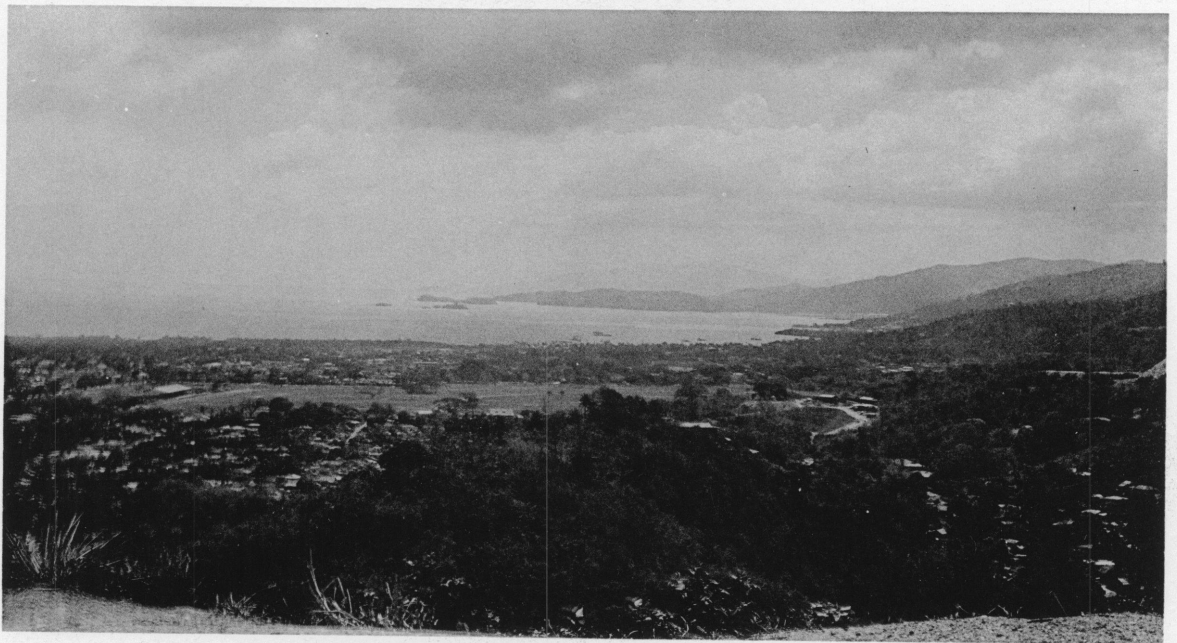


2

1. The Northern Range, El Tucuche in the center
 2. Maracas Valley, St. George County, Trinidad, extending northward into the Northern Range from Curepe
- Photographs by A. M. Greenhall

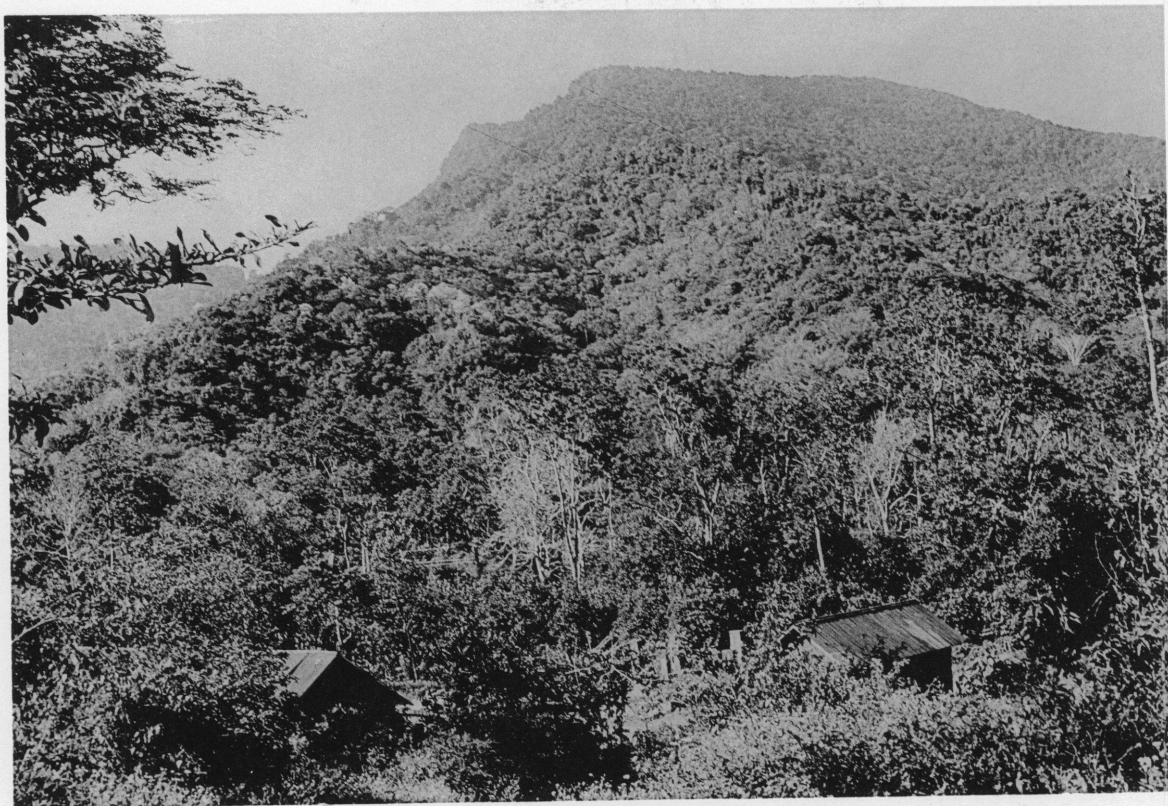


1



2

1. Entrances to Point Gourde Caves
 2. Looking westward from Lady Young Road towards Venezuela. Mountains in distance are on the Paria Peninsula. Cluster of islands in center is known as Five Islands. Point of land extending from right to left is Point Gourde. Gasparee is to left of point; Port-of-Spain, in foreground
- Photographs by A. M. Greenhall



1



2

1. El Tucuche, 3072 feet, second highest mountain in Trinidad
 2. Extreme northwestern tip of Trinidad proper, looking east over the Caribbean Sea. This is the entrance to Boca de Monos
- Photographs by A. M. Greenhall



1

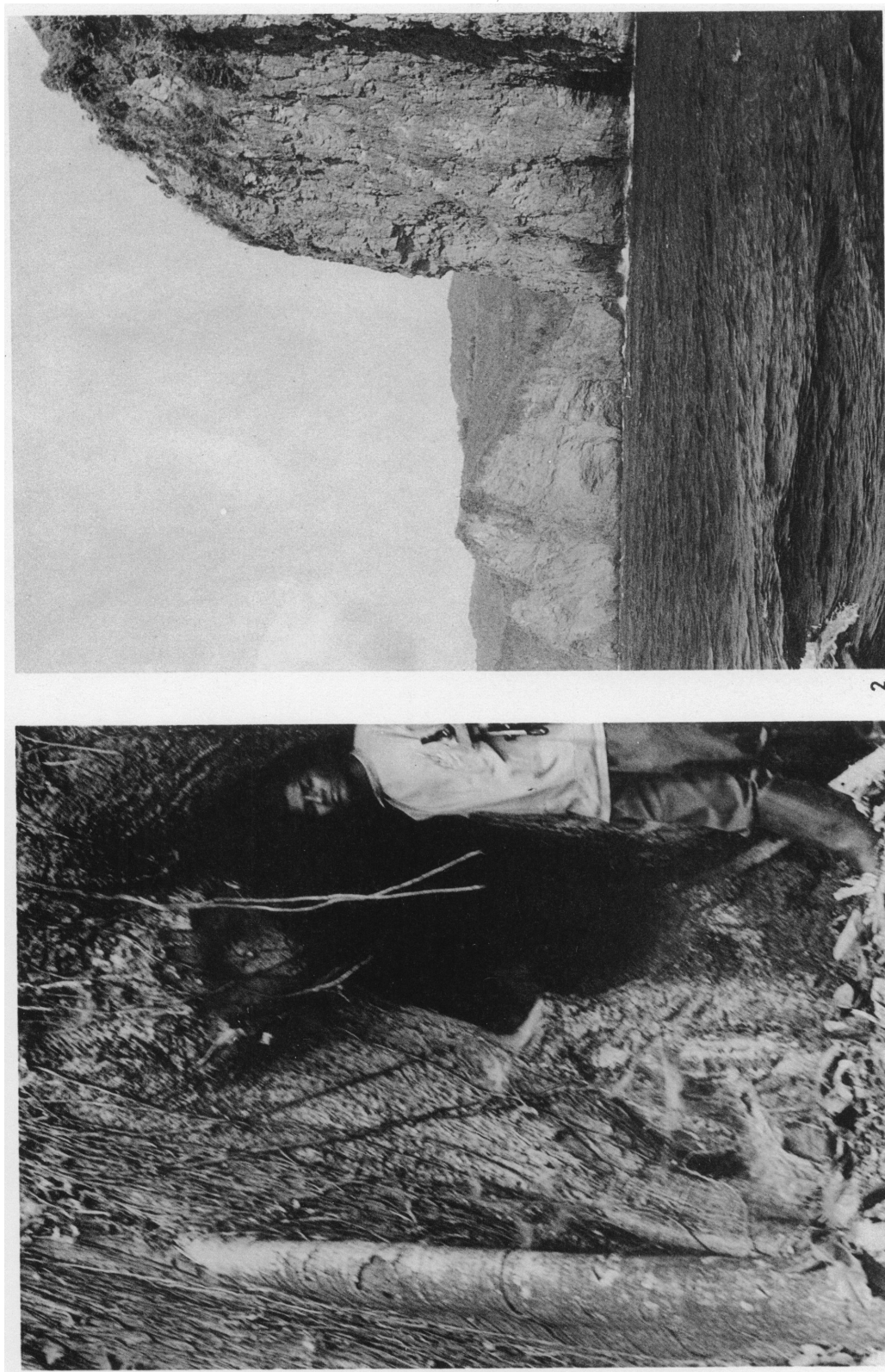


2

1. Roost of *Noctilio leporinus leporinus* in red mangrove tree. The entrance to the roost was coated with fish scales

2. Silk-cotton tree near Caroni River. A cavity in this tree is the roost of *Noctilio leporinus leporinus* and sometimes of *Desmodus rotundus rotundus*

Photographs by A. M. Greenhall

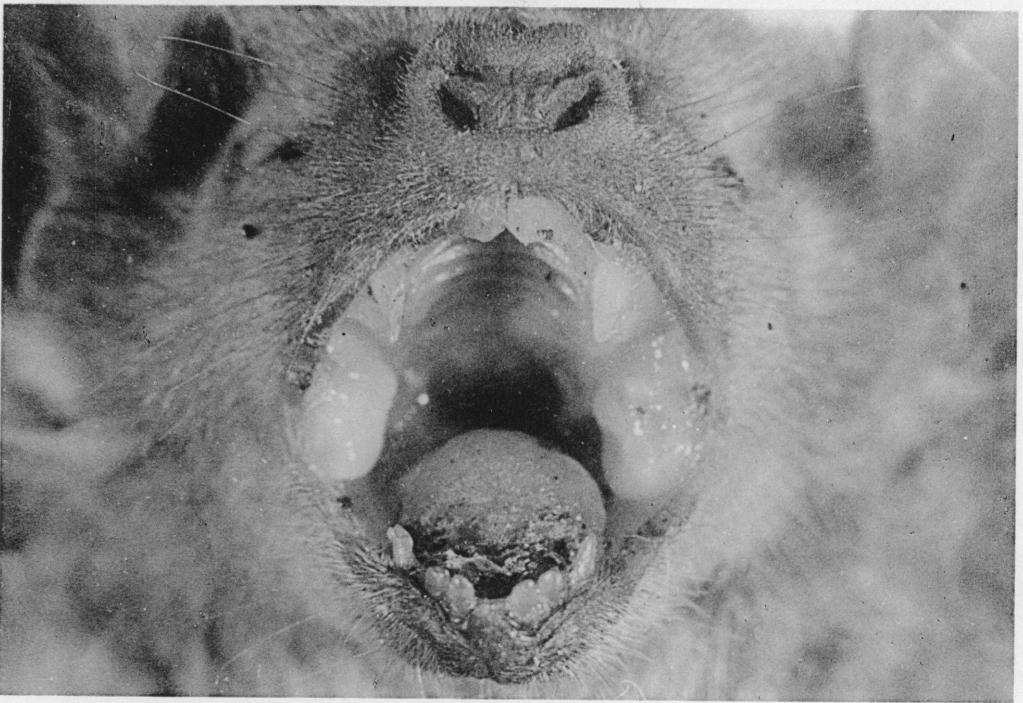


1. Franklin Thurab, laboratory assistant in the Department of Agriculture of Trinidad and Tobago, at entrance of *Desmodius* roost in silk-cotton tree. The individuals of *Saccolpteryx bilineata perspicillifer* shown in figure 1 of plate 39 were roosting on the trunk of this tree
2. Cliffs of Monos Island facing the Caribbean Sea. In the waters around this island Charles Kingsley and his brother G. H. Kingsley watched *Noctilio* catching fish

Photographs by A. M. Greenhall



1



2

1. Leaf of cabbage fan palm, with ribs cut by either *Uroderma bilobatum bilobatum* or *Artibeus cinereus cinereus* to form a sheltered roost. Photograph by A. M. Greenhall
2. Open mouth of *Diaemus youngi*, showing large scent glands in mouth and incisor teeth. Photograph by Trinidad Regional Virus Laboratory

