

GEOGRAPHIC VARIATION IN THE LESSER NOCTILIO,
NOCTILIO ALBIVENTRIS (CHIROPTERA)

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ABSTRACT.—Based on the study of 537 specimens of the lesser noctilio, *Noctilio albiventris* Desmarest, from throughout the geographic range of the species, four geographical areas of differentiation are here recognized. One comprises the region from Honduras southward to central Colombia and western Venezuela. There the bats are medium in size for the species and normally the brightest in color. For this taxon the appropriate name is *Noctilio albiventris minor* Osgood. The second area comprises the Upper Amazon Basin, the eastern versant of the Cordillera Oriental northward to the vicinity of Caracas, Venezuela, thence southward along the coast at least to Suriname. In this region the bats are the largest and darkest for the species. The valid name for this taxon appears to be *Noctilio albiventris affinis* D'Orbigny. The third area comprises the southern parts of Venezuela, Guyana and Suriname, the Lower Amazon Basin and the coastal areas of eastern Brazil as far as the Rio São Francisco. There the bats are the smallest of the species and usually dark in color, but in some individuals the venter is pale buff. For this taxon the earliest available name is *Noctilio albiventris albiventris* Desmarest. The fourth area comprises the drainage basin of the Río Paraná in southern Brazil, Paraguay, and Argentina. There the bats are again medium in size for the species and normally greyish brown above and buff to orange-buff below. This taxon appears to be without a name and herein is described as a new subspecies and named in honor of the late South American mammalogist Dr. Angel Cabrera LaTorre.

The two species of bats comprising the family Noctilionidae differ mainly in size as is brought out in the key below. The larger bats were the subject of an earlier review (Davis, 1973); the smaller ones are the subject of this report.

Wing span about 400 millimeters (mm); length of foot 20 mm or less;
length of forearm less than 70 mm; weight less than 40 grams; length
of maxillary tooththrow 8.5 mm or less

..... *Noctilio albiventris* Desmarest

Wing span about 500 mm; length of foot 25 mm or more; length of fore-
arm more than 75 mm; weight more than 50 grams; length of maxillary
tooththrow more than 10 mm

..... *Noctilio leporinus* (Linnaeus)

In an attempt to determine the nature and extent of individual, sexual, and geographic variation, and to stabilize the taxonomy and nomenclature of the smaller of the two recognized species of *Noctilio*, I have assembled 537 specimens from throughout its geographic range, which extends from Honduras southward, mainly east of the Andes in South America, to Argentina. These bats are most often found in association with tropical freshwater streams over and along which they forage for insects, their principal food,

and small fish. Most locality records are at elevations below 500 meters (m); the highest elevation of which I have record is 1100 m on the Río Aponguaio in southeastern Venezuela. They normally use hollow trees as daytime roosts, but they have also been found in the attics of buildings.

Listed below are the institutions from which I examined specimens, together with their respective designations as used in the lists of specimens examined and the names of individuals who provided me with specimens and data. To these individuals I express my sincere appreciation for their assistance and cooperation. AMNH—American Museum of Natural History, New York City (K. F. Koopman); CHNU—Colección de Historia Natural Uniandes, Bogotá, Colombia (C. J. Marinkelle); CM—Carnegie Museum, Pittsburgh, Pennsylvania (C. A. Heppenstall); FMNH—Field Museum of Natural History, Chicago (J. C. Moore, Philip Hershkovitz, and Luis de la Torre); KU—University of Kansas Museum of Natural History, Lawrence (J. K. Jones, Jr. and Robert Hoffmann); LASALLE—Museo de Historia Natural La Salle, Caracas, Venezuela (C. J. Joly T.); LACM—Los Angeles County Museum of Natural History, Los Angeles (D. R. Patten); LSU—Louisiana State University Museum of Zoology, Baton Rouge (G. H. Lowery, Jr.); MCZ—Museum of Comparative Zoology, Harvard College, Cambridge (C. W. Mack and Barbara Lawrence); MNHU—Museo Nacional de Historia Natural, Montevideo, Uruguay (Alfredo Ximénez); MSU—Michigan State University Museum, East Lansing (R. H. Baker); MVZ—Museum of Vertebrate Zoology, University of California, Berkeley (O. P. Pearson and W. Z. Lidicker); PUWL—Purdue University Wildlife Laboratory, Lafayette, Indiana (R. E. Mumford); ROM—Royal Ontario Museum, Toronto, Canada (R. L. Peterson); SNM—"Senckenberg" Natur Museum und Forschungs Institut, Frankfurt, Germany (Heinz Felten); TCWC—Texas Cooperative Wildlife Collections, Texas A&M University, College Station; TTU—Texas Tech University, Lubbock (R. J. Baker and H. H. Genoways); UA—University of Arizona, Tucson (E. L. Cockrum); UMMZ—University of Michigan Museum of Zoology, Ann Arbor (W. H. Burt and E. T. Hooper); USNM—U.S. National Museum, Washington, D.C. (C. O. Handley, Jr.); ZVUU—Departamento de Zoología Vertebrados, Universidad de Uruguay, Montevideo (Alfredo Langguth).

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TAXONOMIC AND NOMENCLATURE HISTORY

The taxonomic and nomenclature history of this species begins with Desmarest's recognition of *Noctilio albiventris* in 1818. In the original description no type locality was designated, but Cabrera (1957) fixed it as the Rio São Francisco, Bahia, Brazil, the first exact locality from which the species was recorded (by Spix, 1823). In 1820 Desmarest emended the original spelling of *albiventris* to *albiventer*, which spelling was used by Spix (1823) when he figured the animal, and by subsequent authors who credited Spix as authority for the name until Hershkovitz (1949) called attention to Desmarest's earlier name *albiventris*.

In 1830 Rengger assigned the name *Noctilio ruber* to some specimens from Paraguay which he mistakenly thought were *Noctilio*; in 1836, D'Orbigny applied the name *Noctilio affinis* to the lesser noctilio in Bolivia; in 1907 Cabrera described *Noctilio zaparo* from the upper reaches of the Amazon River in eastern Ecuador; in 1910, Osgood described *Noctilio minor* on the basis of one female from western Venezuela and questioned Miller's separation in 1904 of the lesser noctilio from *Noctilio* as a distinct genus under the name *Dirias* with *Noctilio albiventer* Spix the type species; in 1920, Thomas described *Noctilio irex* on the basis of two specimens from Santa Júlia on the Río Xingu, Pará, Brazil. No further changes occurred until 1949.

Herskovitz (1949) added to the nomenclatural history of the species when he reported that "the earliest published specific name for the small *Noctilio* is *Vespertilio labialis* Kerr (Animal Kingdom, 1792:93). Kerr's description of *labialis* is based on Pennant's Peruvian bat variety β (Syn. Quad., 1771: 365). Pennant concluded his description with the remarks that it "inhabits Peru and the Mosquito shore . . . length from nose to the end of the membrane, *above* [italics mine] 5 inches; extent of wings, *twenty* [italics mine]." Herskovitz concluded that *labialis* was the valid specific epithet for all forms of the lesser noctilio, restricted the type locality to the Río Ucayali, Department of Loreto, Perú, and placed *Noctilio zaparo* Cabrera as a junior synonym of *Noctilio labialis* (Kerr).

Cabrera (1957) disagreed with Herskovitz's interpretation of Pennant's account and maintained that the name *labialis* should be assigned to the Mosquito coast (northern Honduras and adjacent Nicaragua) population of the lesser noctilio, but he agreed that the valid specific epithet is *labialis*. Thus Cabrera treated *N. minor* Osgood as a junior synonym of *Noctilio labialis labialis* (Kerr) and resurrected *N. zaparo* Cabrera to subspecific status. Workers followed this arrangement until Herskovitz (1975) questioned the identity of Pennant's varieties B and β of the "Peruvian Bat," which Pennant stated that Linnaeus placed "under the name *Noctilio Americanus*." So the reader can better understand the basis for the controversy, Pennant's descriptions follow:

"B. With a head like a pug dog: large strait-pointed ears: two canine teeth, and two small cutting teeth between each, in each jaw: tail enclosed in the membrane, which joins to each hind leg, and is also supported by two long cartilaginous ligaments involved in the membrane: color of the fur iron grey: body equal to that of a middle-sized Rat: extent of wings two feet, five inches.

" β . With a large head and hanging lips, like the chops of a mastiff: nose bilobated: upper lip divided: strait, long and narrow ears, sharp-pointed: teeth like the former: tail short; a few joints of it stand out of the membrane, which extends far beyond it; is angular and ends in a point: claws on the hind feet large, hooked, and compressed sideways: membranes

of the wings dusky, very thin: fur on the head and back brown: on the belly cinereous: length from the nose to the end of the membrane, above five inches; extent of wings, twenty.

"Inhabits *Peru* and the Mosquito shore: the last was given me by John Ellis, Esq; F. R. S. It differs from the former in size, being less; in all other respects agreed."

Hershkovitz (1975) directed attention to the measurements given by Pennant—a wingspread of two feet, five inches [= 29 inches] in variety B and 20 inches in variety β —and concluded that Pennant's variety B cannot be identified with any known New World bat and that his variety β is a representative of the species currently known as *Noctilio leporinus*. The wingspread in the lesser noctilio seldom exceeds 15 inches and that of *Noctilio leporinus* is about 20 inches and never as much as "two feet, five inches." Hershkovitz concluded that with *Noctilio labialis* (Kerr) removed from consideration, the earliest valid name for the small species appears to be *Noctilio albiventris* Desmarest, 1818. Thus, the name *Noctilio labialis* (Kerr) falls as a subjective synonym of *Noctilio leporinus* (Linnaeus); *Noctilio albiventris* Desmarest becomes the valid specific epithet for the lesser noctilio, and the names proposed by D'Orbigny, Cabrera, Osgood, and Thomas become synonyms of the specific trivial name *albiventris*.

NONGEOGRAPHIC VARIATION

Samples from three restricted geographic areas (near Pucallpa in eastern Perú, Ilha do Marajó at the mouth of the Rio Amazonas, and the Río Coco where it separates Honduras and Nicaragua) were selected to ascertain the nature and extent of individual and sexual variation in this species. Only individuals with ossified epiphyses of the wing bones (therefore assumed to be adult) were used and data from males were separated from those for females.

Within samples, the amount of variation from the mean value of each variate is slight. Perusal of Table 1 reveals that the coefficient of variation (CV) is less than 4.0 in all instances and less than 3.0 in all but two. The least variable character is length of maxillary toothrow (with CV's of 2.07, 1.39, and 1.30 in the three subsamples of males and 1.74, 2.07, and 0.58 in the three subsamples of females), followed by condylobasal length and width across M3-M3. Consequently, it would seem that any or all of the characters listed in the table can be used with assurance in assessing geographic variation, but usually the most reliable evaluations result from the use of the least variable characters.

Color variation within each subsample of the two samples (from eastern Perú and the Río Coco in Central America) for which dried skins were available is considerable. Dorsal coloration of males from the Río Coco varies from dull brown to rich reddish mahogany; ventral coloration, from yellow-

TABLE 1.—Selected measurements of adult males and females of *Noctilio albiventris* to show the extent of individual and sexual variation of nine variates in three geographically restricted samples.

Variates	Males				Females				F value
	Mean	SD	Extremes	CV	Mean	SD	Extremes	CV	
Condylobasal length	20.72	N = 11 0.37	20.0-21.2	1.82	Leticia, Amazonas, Colombia N = 11 19.86	0.27	19.5-20.3	1.39	36.82*
Zygomatic breadth	16.86	0.22	16.5-17.2	1.28	15.71	0.40	14.7-16.1	2.57	70.00*
Cranial breadth	11.90	0.30	11.3-12.3	2.52	11.35	0.38	10.4-11.8	3.30	14.18*
Maxillary toothrow	8.19	0.17	8.0- 8.5	2.07	7.89	0.14	7.7- 8.0	1.74	20.70*
Width across M3-M3	10.52	0.21	10.2-10.9	2.03	10.06	0.19	9.8-10.4	1.90	27.65*
Mandibular length	15.22	0.34	14.8-15.8	2.22	15.02	0.40	14.4-15.7	2.69	1.59
Lower toothrow	9.01	0.13	8.8- 9.2	1.44	8.56	0.19	8.2- 8.8	2.23	40.83*
Forearm	65.95	1.13	63.2-67.0	1.71	66.24	1.51	64.2-68.4	2.28	0.25
Metacarpal III	59.28	1.62	57.5-62.0	2.74	58.90	1.07	57.2-60.7	1.82	0.42
Condylobasal length	18.76	N = 10 0.41	Ilha do Marajó, Pará, Brazil 18.1-19.3	2.19	18.07	0.19	17.8-18.3	1.08	22.97*
Zygomatic breadth	14.92	0.54	14.1-15.7	3.63	14.20	0.32	13.9-14.8	2.25	13.12*
Cranial breadth	10.84	0.18	10.5-11.1	1.64	10.64	0.25	10.3-11.1	2.31	4.35
Maxillary toothrow	7.60	0.11	7.5- 7.8	1.39	7.26	0.15	7.1- 7.6	2.07	34.22*
Width across M3-M3	9.55	0.18	9.3- 9.9	1.86	9.25	0.21	9.0- 9.6	2.29	11.74*
Mandibular length	14.34	0.34	13.9-14.8	2.40	13.60	0.20	13.5-14.1	1.47	34.61*
Lower toothrow	8.52	0.20	8.2- 8.9	2.40	7.93	0.16	7.7- 8.2	1.98	52.48*
Forearm	58.66	1.01	57.0-60.3	1.73	57.84	1.11	56.2-59.9	1.92	2.98
Metacarpal III	53.45	1.17	51.0-55.0	2.18	52.82	1.31	51.3-55.3	2.48	1.29
Condylobasal length	19.08	N = 13 0.29	Río Cocco, Honduras 18.5-19.5	1.53	18.32	0.23	18.0-18.8	1.24	56.17*
Zygomatic breadth	15.66	0.29	15.2-16.1	1.85	14.85	0.27	14.4-15.3	1.82	54.04*
Cranial breadth	11.10	0.16	10.9-11.4	1.42	11.05	0.19	10.8-11.4	1.76	0.60
Maxillary toothrow	7.78	0.10	7.6- 8.0	1.30	7.52	0.04	7.5- 7.6	0.58	68.78*
Width across M3-M3	9.72	0.16	9.5-10.0	1.69	9.42	0.10	9.2- 9.5	1.05	33.57*
Mandibular length	14.35	0.28	14.0-14.8	1.98	13.81	0.18	13.5-14.2	1.30	33.56*
Lower toothrow	8.47	0.08	8.4- 8.7	0.98	8.11	0.11	8.0- 8.4	1.38	91.55*
Forearm	60.39	1.30	58.2-63.2	2.15	59.55	1.15	57.2-61.1	1.92	3.11
Metacarpal III	55.85	0.91	54.5-57.7	1.62	54.57	1.02	52.3-56.0	1.88	11.34*

* Significant at the 0.05 level.

ish through buff to bright rufous. In the subsample of females, the dorsum varies from dull brown to reddish brown; the venter from buff to yellowish, tinged with rusty red. In the subsample of males from near Pucallpa, Perú, the dorsum varies from chocolate to dark umber as does the venter. In females, the dorsum varies from chocolate to brownish orange; the venter, from umber to orange. A pale mid-dorsal stripe is present, at least on the rump, in all specimens examined from the two sample areas.

The statistically treated data in Table 1 reveal that males are significantly larger than females in six of the nine variates measured. In all three sample areas there is little or no overlap in observed values in males and females of (1) length of maxillary tooththrow, (2) length of mandibular tooththrow, and (3) condylobasal length. In cranial breadth, length of forearm, and length of metacarpal III, however, the overlap in values of males and females is nearly complete.

The sagittal crest is well developed in old males, but low or barely discernible in adult females and in juveniles of either sex. The weight of adult males tends to be greater than that of females, but there is considerable overlap in the values. For example, the means and extremes of 15 adult males from the Río Coco sample area are 31.2 (22.2 to 40.3) grams (g); those of 12 females, 24.5 (18.1 to 30.8) g. In the sample from eastern Perú, the mean weight of 12 males is 37.1 g with extremes of 30.5 and 44.0. The corresponding values of 16 females are 31.4 (27.0 to 36.3).

In brief, there are statistically significant differences between males and females insofar as most cranial measurements are concerned. In length of forearm and of metacarpal III, however, there is little sexual dimorphism. Consequently, in studies of geographic variation in this species, it is essential that males and females be treated separately.

GEOGRAPHIC VARIATION

Although CV values in Table 1 indicate that individuals of either sex can be used to measure geographic variation in this species, I selected females because they outnumbered males in most of the samples and vary less with age in development of the sagittal crest, other cranial ridges, and the mastoid processes. To facilitate the handling of data, I pooled the specimens from each of 11 geographic areas (see map, Fig. 1) selected because of availability of specimens and, more importantly, because results of previous studies (Davis, 1966, 1968, 1973) revealed that most of them are areas of geographic differentiation in other species of bats.

If one uses a single measurement such as condylobasal length or length of forearm as a measure of geographic variation, this species segregates roughly into two distinct groups (Fig. 2). One group includes populations in sample areas 1 through 8 in a relatively narrow coastal belt from Honduras southward along the Atlantic seaboard of South America to the drainage basin

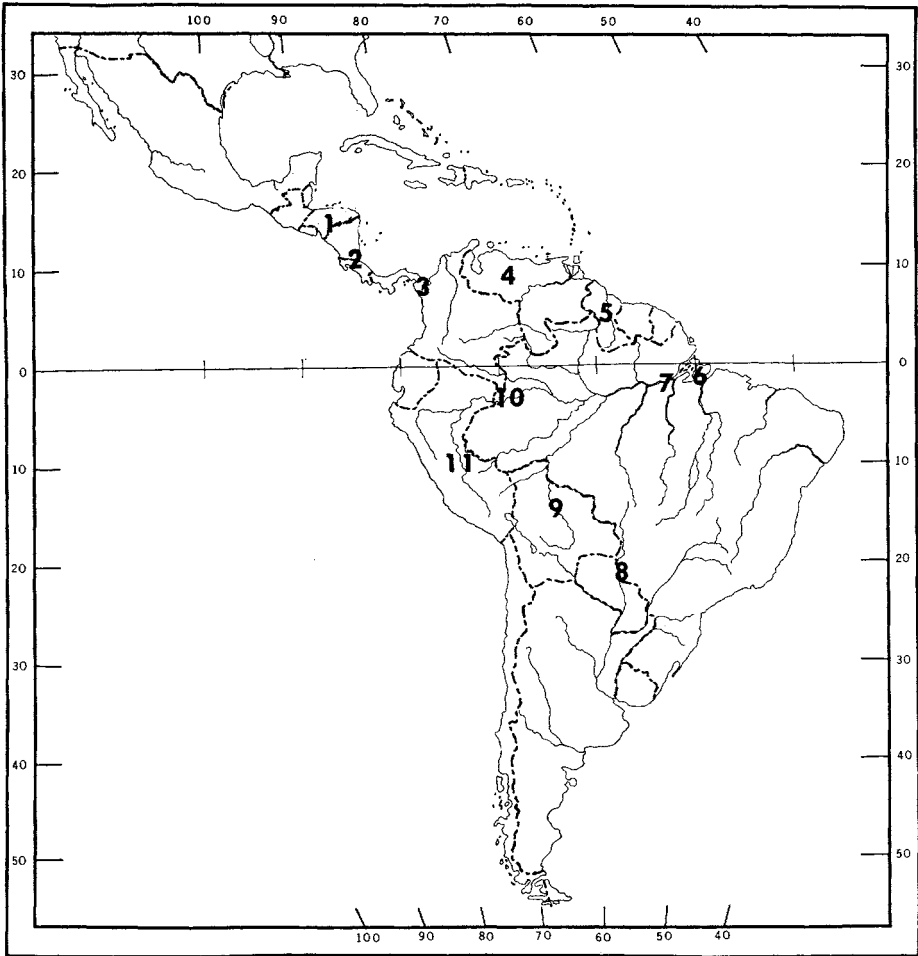


FIG. 1.—Map showing the areas from which data were pooled to provide information on which the scatter diagrams in Fig. 3 are based. Sample Area 1 comprises Honduras and the contiguous Río Coco region of Nicaragua ($N = 24$); Area 2, the balance of Nicaragua and Costa Rica ($N = 13$); Area 3, Panamá and northwestern Colombia ($N = 12$); Area 4, Venezuela ($N = 23$); Area 5, Guyana ($N = 12$); Area 6, mouth of the Río Amazonas and the Río Xingu ($N = 11$); Area 7, the Lower Amazon Basin from the mouth of the Río Negro to, and including several sites on, the Río Tapajós ($N = 27$); Area 8, several sites on the Río Paraguay and the Río Paraná in Brazil, Paraguay and Argentina ($N = 12$); Area 9, several sites in Bolivia ($N = 22$); Area 10, from the vicinity of Leticia, Colombia, to the mouth of the Río Negro in Brazil ($N = 16$); Area 11, several sites in eastern Perú ($N = 47$).

of the Río Paraná. Bats in sample area 4, however, average larger than those in the other seven areas in this belt. The other major group includes populations in sample areas 9, 10, and 11 in the upper reaches of the Amazon Basin in Colombia, Ecuador, Perú, and Bolivia.

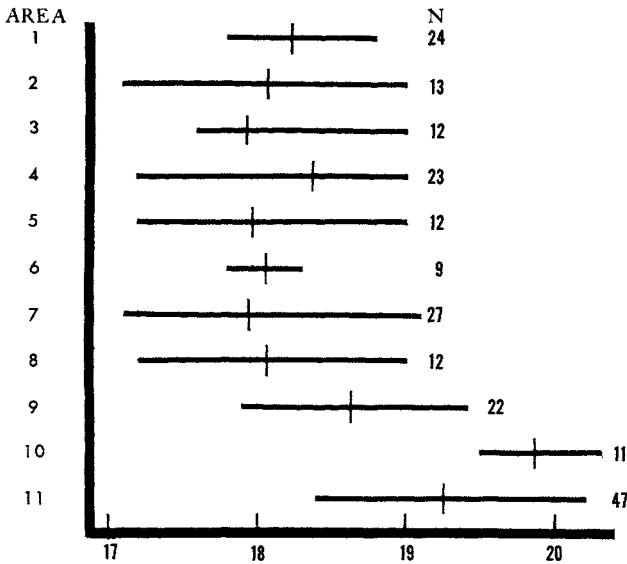


FIG. 2.—Comparisons of the condylobasal length (means and extremes) in pooled samples of *Noctilio albiventris* from the 11 areas designated in Fig. 1.

However, if one uses scatter diagrams correlating length of maxillary tooth-row with width across M3-M3, two of the least variable characters within samples, a somewhat different relationship is evident (see Fig. 3). Populations in sample areas 9, 10, and 11 again segregate as a rather homogeneous assemblage of individuals that are larger than those in the other sample areas. In addition, individuals from this geographic region are in general the darkest and they either lack a mid-dorsal stripe or have one that is barely discernible. This is the assemblage to which D'Orbigny gave the name *affinis* in 1836 and which Cabrera (1907) named *Noctilio zaparo*.

Perusal of Fig. 3 reveals that individuals from sample areas 1 through 8 can be separated into four groups—(1) those from sample areas 6 and 7 in the lower Amazon Basin, (2) those from sample area 8 in the drainage basin of the Río Paraná, (3) those from sample area 4, and (4) those from sample areas 1, 2, 3, and 5. Individuals from sample areas 6 and 7 are the smallest and their mean values of length of maxillary toothrow and width across the upper molars fall noticeably below the 2 standard deviation parameters established for sample area 1. Note that only six (15 percent) of the 19 plotted points in the combined samples 6 and 7 fall *within* the parameters set for sample area 1. In addition, the bats are also dark in color like those from the headwaters of the Rio Amazonas. This is the assemblage to which Desmarest (1818) applied the name *albiventris* and Thomas (1920) the name *irex*.

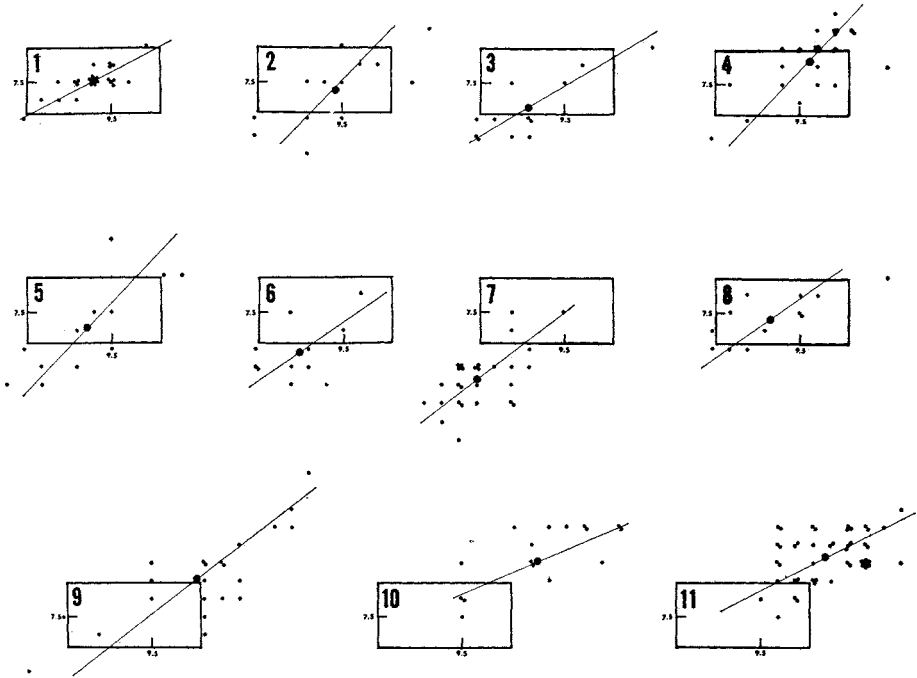


FIG. 3.—Scatter diagrams correlating length of maxillary tooththrow (vertical axis) with width across the third upper molars (horizontal axis) in samples of adult female *Noctilio albiventris* from the 11 areas designated in Fig. 1. Parameters of the horizontal lines of the rectangles represent two standard deviations (SD, 0.19) above and below the mean width across M3–M3 (9.40) in the sample from Honduras (Sample Area 1); those of the vertical lines, two standard deviations (SD, 0.09) above and below the mean length of the maxillary tooththrow (7.51) in the same sample. Regression lines were not calculated, but rather were drawn through points of intersect of the first and third quartiles of the two variates. Means are represented by the large dots. Values from all other samples are plotted against parameters established for the Honduran sample (Sample Area 1).

In the drainage basin of the Río Paraná (sample area 8) the population consists of individuals larger than those in the lower Amazon Basin, noticeably smaller than those found in areas 10 and 11 in the upper reaches of the Río Amazonas, and inseparable, on the basis of measurements, from the bats occupying the region from western Venezuela to Honduras. They do differ from the last group, however, in that their color is in general paler; that is, the brighter-colored individuals are more nearly yellow than orange or orange-rusty; the somber-colored ones, grayish brown rather than rusty brown or chocolate. To me, it is reasonable to assume that the lesser noctilios living in the drainage basin of the Río Paraná are more or less isolated from those inhabiting the drainage basin of the Río Amazonas and that there is no gene interchange at all with the similar-sized elements of the species in northern

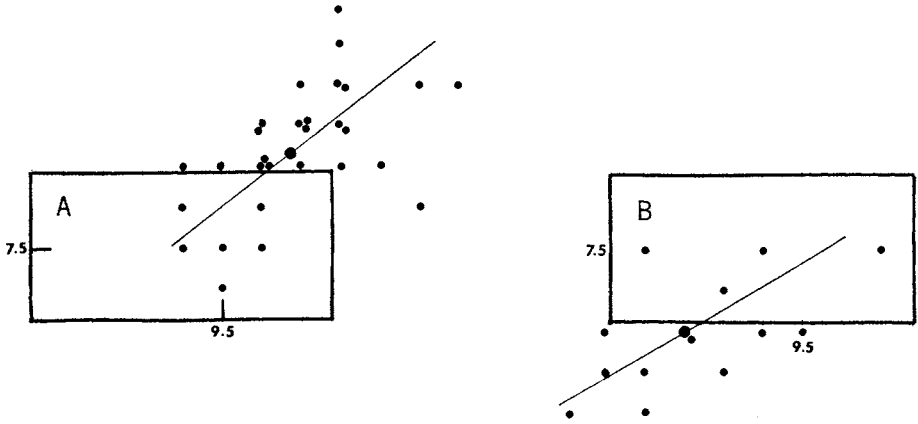


FIG. 4.—Scatter diagrams comparing length of maxillary tooththrow (vertical axis) plotted against width across M3–M3 (horizontal axis) in (A) bats from coastal localities in sample areas 4 and 5 (Venezuela and Guyana) with (B) those from inland localities in the same sample areas. In both, the data are plotted against the 2 SD-parameters established for Sample Area 1.

South America and Central America. But there likely is some gene flow between the Paranán and the Bolivian populations. Note in Fig. 3 that the range of variation in the two correlated variates from sample area 9 is much greater than that in any of the adjacent sample areas. I interpret this as an indication of intergradation between the large bats of eastern Perú and the smaller *Noctilio* inhabiting the drainage system of the Río Paranán.

Populations of the lesser noctilio in sample areas 1 through 3 consist of individuals that are intermediate in size as measured by length of maxillary tooththrow (see Fig. 3) and width across M3–M3. Their general color tones are also intermediate between the dark-colored inhabitants of the Amazon Basin and the paler ones found along the Río Paranán. Note that the mean values of those samples (1 to 3) have a clinal relationship with the largest values in sample area 1 and the smallest, in sample area 3. Also note that there is a rather sharp break between the means of samples 3 and 4. Examination of the raw data revealed that this break occurs in Venezuela between Lake Maracaibo and the vicinity of Caracas. Osgood (1910) proposed the name *Noctilio minor* for a representative of this assemblage of populations.

Results obtained from plotting length of maxillary tooththrow against width across M3–M3 in specimens from sample areas 4 and 5 suggested that my method of pooling data needed refinement. When re-examined, the raw data revealed that those bats from sites in the coastal areas of Venezuela, Guyana, and Suriname are nearly as large as those from the Upper Amazon Basin and that those from inland sites are more nearly like those found in the lower regions of the Amazon. Thus, it appears that the large *Noctilio affinis* ranges along the eastern versant of the Cordillera Oriental to the

vicinity of Caracas; thence southward along the coast in a relatively narrow belt at least to Suriname. The large size of these bats is evident in Fig. 4. An alternative is to treat the coastal population from Caracas to Suriname as a separate taxonomic unit, a choice I discarded because I have found no morphological means of separating them from *affinis*, and because some other species of bats, *Eptesicus andinus* and *Eptesicus montosus*, for example, also range northward along the Andes into the Sierra Nevada de Mérida of Venezuela (Davis, 1966).

To summarize, I recognize four areas in which geographic differentiation has occurred in this species and in which the populations merit subspecific recognition. The most easily recognized geographic taxon occurs in the upper reaches of the Amazon drainage system, thence northward along the eastern foothills of the Andes to the coastal areas of Venezuela, Guyana, and Suriname. There the individuals are the largest and darkest of the species. For this taxon the valid name seems to be *Noctilio albiventris affinis* D'Orbigny, with *Noctilio zaparo* Cabrera a subjective synonym.

The second taxon is composed of populations in the Lower Amazon Basin from the mouth of the Rio Negro to the mouth of the Amazon; thence southward along the Atlantic coast at least as far as the Rio São Francisco in the state of Bahia and quite likely as far south as Rio de Janeiro; northward, this subspecies occurs in southern Guyana and the lowlands of Venezuela. Individuals in the geographic center of this area are the smallest of the species. For this taxon the valid name is *Noctilio albiventris albiventris* Desmarest, with *Noctilio irex* Thomas a subjective synonym.

The third subspecies occupies the drainage basin of the Río Paraná where the individuals are medium in size and pale in color. Hershkovitz (1975) suggested that the name *Noctilio albiventris ruber* Rengger applies to this population, but, as pointed out later, I hold the view that *Noctilio ruber* Rengger was applied to specimens of *Myotis ruber* (E. Geoffroy) and that this taxon of *Noctilio* is without a name.

The fourth taxon includes the populations in the area extending from Honduras southward along the Pacific versant of South America to central Colombia and along the Caribbean versant as far as Lake Maracaibo, Venezuela. For this taxon the valid name is *Noctilio albiventris minor* Osgood. Each taxon is discussed in some detail in the following accounts.

ACCOUNTS OF SUBSPECIES

Noctilio albiventris minor Osgood

1910. *Noctilio minor* Osgood, Field Mus. Nat. Hist., Zool. Ser., 10(4):30.
1912. *Noctilio albiventer minor*, Osgood, Field Mus. Nat. Hist., Zool. Ser., 10(5):62.
1920. *Dirias albiventer minor*, Goldman, Smithsonian Misc. Coll., 69:117.
1942. *Dirias minor*, Goodwin, Bull. Amer. Mus. Nat. Hist., 79(2):121.

TABLE 2.—Comparative measurements of five selected variates in pooled samples of adult female *Noctilio albigentris* from 11 geographic regions. Given for each variate are the mean, the extremes, and one standard deviation from the mean.

Area	Condylor-basal length	Zygo-matic breadth	Max-illary toothrow	Width across M3-M3	Length of forearm	N
1. Honduras and Río Coco region of Nicaragua	18.24 (17.8-18.8) ±0.24	14.76 (14.2-15.3) ±0.31	7.51 (7.3-7.8) ±0.09	9.40 (9.0-10.0) ±0.19	59.41 (57.2-61.5) ±1.12	24
2. Remainder of Nicaragua and Costa Rica	18.08 (17.1-19.0) ±0.51	14.63 (14.1-15.1) ±0.27	7.45 (7.1-7.8) ±0.20	9.46 (9.0-10.0) ±0.30	58.81 (56.5-61.8) ±1.70	13
3. Panamá and NW Colombia	17.93 (17.6-19.0) ±0.37	14.54 (14.2-15.0) ±0.27	7.36 (7.2-7.7) ±0.17	9.29 (9.0-10.0) ±0.29	58.35 (56.5-63.8) ±1.90	12
4. Venezuela	18.38 (17.2-19.0) ±0.46	14.72 (13.6-15.6) ±0.51	7.63 (7.2-7.9) ±0.18	9.56 (9.0-10.0) ±0.23	59.62 (56.5-62.7) ±1.56	23
5. Guyana	17.97 (17.2-19.0) ±0.75	14.61 (14.1-15.5) ±0.52	7.41 (7.1-7.9) ±0.26	9.36 (8.9-9.9) ±0.31	58.91 (55.8-62.9) ±2.37	12
6. Mouth of Río Amazonas and Río Xingu	18.06 (17.8-18.3) ±0.20	14.20 (13.9-14.8) ±0.34	7.22 (7.1-7.4) ±0.10	9.21 (9.0-9.5) ±0.18	57.99 (56.2-59.9) ±1.07	9
7. Amazon Basin from Río Negro to Río Tapajós	17.94 (17.1-19.1) ±0.65	14.07 (13.5-14.9) ±0.35	7.13 (6.8-7.5) ±0.15	9.00 (8.7-9.3) ±0.17	58.50 (54.3-62.0) ±2.01	27

TABLE 2.—Continued.

Area	Condylo- basal length	Zygo- matic breadth	Max- illary toothrow	Width across M3-M3	Length of forearm	N
8. Río Paraguay from Brazil, Paraguay and Argentina	18.06 (17.2-19.0) ±0.50	14.58 (14.0-15.6) ±0.51	7.48 (7.3-7.7) ±0.14	9.33 (9.0-10.0) ±0.33	59.86 (57.0-61.2) ±1.22	12
9. Bolivia	18.63 (17.9-19.4) ±0.44	15.17 (14.3-16.0) ±0.47	7.72 (7.2-8.3) ±0.25	9.76 (8.8-10.4) ±0.42	62.39* (59.0-67.5) ±3.52	22
10. Río Amazonas from Leticia, Colombia to Río Negro	19.86 (19.5-20.3) ±0.28	15.71 (14.7-16.1) ±0.40	7.89 (7.7-8.0) ±0.14	10.06 (9.8-10.4) ±0.19	66.24 (64.2-68.4) ±1.52	11
11. Eastern Perú	19.25 (18.4-20.2) ±0.37	15.60 (14.8-16.1) ±0.26	7.84 (7.5-8.1) ±0.13	9.87 (9.5-10.3) ±0.20	65.96 (63.0-69.4) ±1.60	47

* N = 11.

1949. *Noctilio labialis minor*, Hershkovitz, Proc. U.S. Nat. Mus., 99:433.
 1957. *Noctilio labialis labialis*, Cabrera, Rev. Mus. Argentino Cienc. Nat., 4:56.
 1975. *Noctilio albiventris minor*, Hershkovitz, J. Mamm., 56(1):244.

Holotype.—Adult female, preserved in alcohol with skull removed; no. 18,044 Field Museum of Natural History; collected 15 February 1908 by Ned Dearborn at Encontrados, Zulia, Venezuela. Measurements: forearm, 58.4; condylobasal length, 17.2; zygomatic breadth, 14.5; length of maxillary toothrow, 7.3; width across M3–M3, 9.4.

Diagnosis.—Medium in size for the species; length of maxillary toothrow in females averaging 7.5 mm, with extremes of 7.1 and 7.8, and in males, 7.8 (7.6–8.0); length of forearm in females averaging about 59 mm (56.5–63.8) and in males, 60.7 (58.2–63.2). Weight of non-gravid females, 24 (18–30) g; of males, 31 (22–36). For other measurements see Tables 1 and 2.

Distribution.—From San Pedro Sula, Honduras, southward through Central America to central Colombia and western Venezuela (Encontrados) west of the Cordillera Oriental and the Sierra Nevada de Mérida (Fig. 5, A).

Specimens examined (total number, 102).—HONDURAS. *Atlántida*: 3 mi. E Tela, sea level, 2 ♀ ♀ (TCWC). *Cortes*: 6 mi. E San Pedro Sula, 100 ft., 3 ♂ ♂ (TCWC), 1 ♂ (MSU). *El Paraíso*: Río Coco, ca. 78 km. ENE Danlí, 900 ft., 10 ♂ ♂, 18 ♀ ♀ (TCWC), 1 ♂, 1 ♀ (KU). *Gracias A Dios*: Brus Laguna, sea level, 2 ♂ ♂, 1 ♀ (TCWC). NICA-RAGUA. *Boaco*: 4 km. W Teustepe, 140 m., 2 ♂ ♂, 2 ♀ ♀ (KU). *Chontales*: Hato Grande, 60 m., 3 ♂ ♂, 3 ♀ ♀ (KU). *Jinotega*: Río Coco, 55 mi. NNE Jinotega, 1100 ft., 1 ♂, 1 ♀ (TCWC); Río Coco, 80 mi. NNE Jinotega, 1000 ft., 1 ♂, 1 ♀ (TCWC); Río Coco, 78 mi. ENE Danlí [Honduras], 900 ft., 1 ♂, 1 ♀ (TCWC). *Rivas*: Finca Amayo, 13 km. S, 14 km. E Rivas, 40 m., 3 ♂ ♂, 1 ♀ (KU). *Zelaya*: Cara de Mono, 50 m., 1 ♂, 1 ♀ (KU); El Recreo, 25 m., 1 ♀ jv. (KU); 2 mi. W Rama, 50 ft., 1 ♂ (TCWC); 6 mi. W Rama, 50 ft., 1 ♀ (TCWC). COSTA RICA. *Heredia*: 4 mi. W Pto. Viejo, 300 ft., 1 ♀ (TCWC). *Limón*: Cariari, 3 ♂ ♂, 1 ♀ (LSU); Fortuna, 2 mi. W Pandora, 2 ♂ ♂, 1 ♀ (USNM). *Puntarenas*: 9 mi. ENE Puerto Golfito, 100 ft., 1 ♂, 2 ♀ ♀ (TCWC). PANAMA. *Canal Zone*: Juan Mina, 5 mi. NE Gamboa, 4 ♂ ♂, 3 ♀ ♀ (MVZ); Summit, 3 ♂ ♂, 2 ♀ ♀ (USNM). *Chiriquí*: 11 mi. W Concepción, 200 ft., 2 ♂ ♂ (TCWC). *Panamá*: 18 km. WSW Chepo, 200 ft., 2 ♀ ♀ (TCWC); Pacora, 6 ♀ ♀ (2 skel. only) (MVZ). VENEZUELA. *Zulia*: Encontrados, 1 ♀ (holotype of *N. minor*) (FMNH). COLOMBIA. *Córdoba*: Turipana, 10 km. NE Montería, 3 ♂ ♂ (TCWC). *Magdalena*: La Gloria, Río Magdalena, 45 m., 1 ♀ (USNM).

Plotted records, no specimens examined: COLOMBIA. *Chocó*: Unguía; *Magdalena*: Río Guaimaral (Allen, 1970).

Noctilio albiventris affinis D'Orbigny

1836. *Noctilio affinis* D'Orbigny, Voyage dans L'Amérique Méridionale, Atlas Zool., Mammifères, lam. 10, fig. 1.
 1907. *Noctilio zaparo* Cabrera, Proc. Biol. Soc. Washington, 20:57.
 1914. *Noctilio albiventer*, Osgood, Field Mus. Nat. Hist., Zool. Ser., 10(12): 177.
 1949. *Noctilio (Dirias) albiventer*, Sanborn, J. Mamm., 30(3):279.

1949. *Noctilio labialis labialis*, Hershkovitz, Proc. U.S. Nat. Mus., 99:434.
 1957. *Noctilio labialis zaparo*, Cabrera, Rev. Mus. Argentino Cien. Nat. "Bernardino Rivadavia," Cien. Zool., 4(1):56.
 1968. *Noctilio labialis labialis*, Ceballos Bendezú, Rev. Facultad Ciencias (Univ. Nac. San Antonio Abad del Cuzco), 2:18.
 1975. *Noctilio albiventris zaparo*, Hershkovitz, J. Mamm., 56(1):244.

Holotype.—None appears to be extant. The name is based on material from Concepción, Departamento de Bení, Bolivia.

Diagnosis.—This subspecies comprises the largest and darkest individuals of the species; length of maxillary toothrow in females averages about 7.8 mm, with extremes of 7.2 and 8.4, and in males, 8.1 (7.5–8.5); length of forearm in females averages about 64 mm (59.0–69.4) and in males about 65 mm (61.5–70.0). Weight of non-gravid females averages 31.5 (27–40) g; that of males, 37 (21–44). For other measurements see Tables 1 and 2.

Distribution.—Occurs from the upper reaches of the Amazon drainage system northward along the eastern base of the Andes to northwestern Venezuela, thence eastward along the coast to Suriname (Fig. 5, B).

Remarks.—It is clear that D'Orbigny associated his name *affinis* with a small *Noctilio*. In a later publication, D'Orbigny (1847) described the color of *affinis* as cinnamon-brown (brun-cannelle), paler below than above, and its size as a little smaller than that of "*Vespertilio leporinus* ou *ruficeps*," both of which names refer to the larger *Noctilio leporinus*. He gave two forearm measurements—58 mm and 62 mm. He reported that in the province of Moxos [= Mojos] (Bolivia), *affinis* lived in the attics of buildings and that at Concepción [Bení, Bolivia] the bats were very abundant and permeated the air with a strong musky odor.

Cabrera (1907) described his *Noctilio zaparo* as being closely allied to *N. albiventer* [= *albiventris*], but larger and stouter, the ridges on the skin of the lower jaw much reduced, the ear hardly reaching the nostrils when laid forward, and the carpus not reaching the muzzle when the wings are folded close to the body. I have examined numerous fluid-preserved specimens of the lesser noctilio from eastern Colombia, eastern Ecuador, eastern Perú, Bolivia, and the lower reaches of the Rio Amazonas and, other than in size and color, I found no differences among them that cannot be attributed directly to method of preservation. In other words, I believe the differences Cabrera noted in length of ear, position of the carpus, and the number of ridges on the chin are artificial and resulted from differences in preparation and preservation of the specimens.

Specimens examined (total number, 255).—VENEZUELA. *Apure*: 6 km. W San Fernando de Apure, 100 m., 1♀ (TCWC). *Aragua*: Rancho Grande, 1♂, 1♀ (alc.) (UMMZ); El Limón-Maracay, 6♂♂, 1♀ (LASALLE). *Distrito Federal*: Caracas, 970 m., 1♀ (LASALLE). *Sucre*: Río Grande, nr. Santa María, 150 m., 2♂♂, 9♀♀ (LASALLE); Tacal, 11 km. SSW Cumaná, 1♂ (KU); Tataracual, 31 km. SE Cumaná, 1♂, 4♀♀ (KU); 5 km. E San Antonio del Golfo, 2♂♂, 1♀ (KU). *Monagas*: 42 km. SE

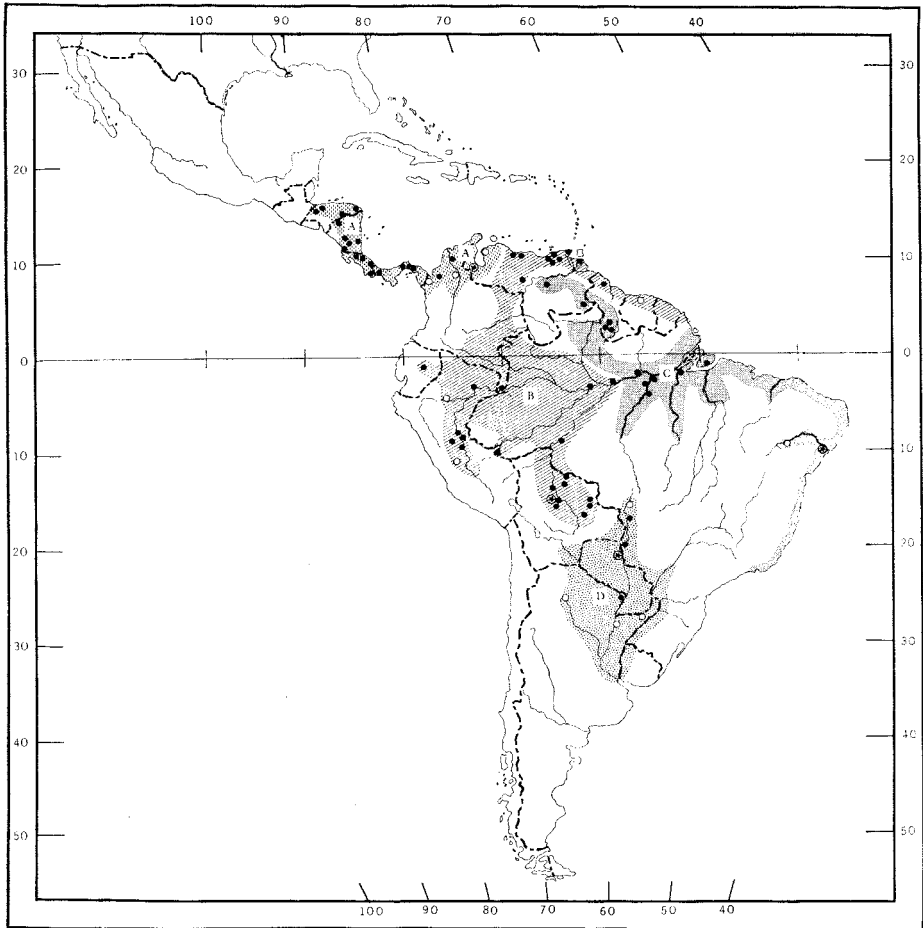


FIG. 5.—Map showing the distribution of the four subspecies of *Noctilio albiventris* herein recognized. Solid circles (dots) indicate localities from which specimens were examined in this study; open circles, published locality records from which no specimens were examined by me; large circle enclosing a star, type locality. A = *Noctilio albiventris minor*; B = *Noctilio albiventris affinis*; C = *Noctilio albiventris albiventris*; D = *Noctilio albiventris cabrerai*.

Maturín, 1♂ (LACM). *Territorio Delta Amacuro*: 140 km. NE Barrancas, 1♂, 3♀♀ (LACM). GUYANA. Georgetown, 2♂♂, 8♀♀ (TCWC). COLOMBIA. Amazonas: 3 mi. W Leticia, Isla Santa Sofía, 2♂♂, 1♀ (alc.) (TTU); Loreto, 11♂♂, 1♀ (TTU), 21♂♂, 39♀♀ (alc.) (CHNU). ECUADOR. *Napo Pastaza*: Limón Cocha, 1♀ (MSU). PERÚ. *Huanaco*: 2 mi. N Tingo María, 2000 ft., 4♂♂, 1♀ (TCWC); 4 km. NE Tingo María, 4♂♂ (LSU). *Loreto*: Balta, Río Curanja, 1♀ (UA), 16♂♂, 31♀♀ (LSU); Pucallpa, 1♂ (alc.) (TCWC); 27 mi. ESE Pucallpa, 1♀ jv. (TCWC); 38 mi. SE Pucallpa, 300 ft., 2♀♀ (TCWC); 61 mi. SE Pucallpa, 500 ft., 5♂♂, 17♀♀ (TCWC). BRAZIL. *Territorio Rondônia*, 1♂ (AMNH). BOLIVIA. *Bení*: Mouth of Río Ibare, 1♀ (AMNH); Río Iténez, opposite Costa Marques, Brazil, 1♂, 1♀ (AMNH); Río Iténez, Remanso,

5♂♂, 4♀♀ (AMNH); 22 km. S Puerto Siles, 1♂ (AMNH); San Joaquín, 3♂♂, 10♀♀ (FMNH); 23 km. W San Javier, 5♂♂, 5♀♀ (AMNH). *Santa Cruz*: Buena Vista, 350 m., 4♂♂, 8♀♀ (FMNH). Localities plotted but no specimens examined: SURINAME. Paramaribo (Husson, 1962). PERÚ. *Ayacucho*: Luisiana, Río Apurímac (Tuttle, 1970). *Loreto*: Yurimaguas, 600 ft. (Osgood, 1914).

Noctilio albiventris albiventris Desmarest

1818. *Noctilio albiventris* Desmarest, Nouv. Dict. d'Hist. Nat., 23:15.
 1823. *Noctilio albiventer*, Spix, Simiarum et Vespertilionum Brasil, p. 58, pl. 36, figs. 2 and 3.
 1906. *Dirias albiventer*, Miller, Proc. Biol. Soc. Washington, 19:84.
 1920. *Dirias irex* Thomas, Ann. and Mag. Nat. Hist., ser. 9, 6:273.
 1930. *Dirias albiventer albiventer*, Cabrera, Rev. Centro. Estud. Agron. y Veter., Buenos Aires, 23:426.
 1949. *Noctilio labialis albiventer*, Hershkovitz, Proc. U.S. Nat. Mus., 99:434.
 1957. *Noctilio labialis albiventris*, Cabrera, Rev. Mus. Argentino Cien. Nat. "Bernardino Rivadavis," 4(1):55.
 1975. *Noctilio albiventris albiventris*, Hershkovitz, J. Mamm., 56(1):244.

Holotype.—None appears to be extant. Provenance of Desmarest's material is unknown, but Cabrera (1957) fixed the type locality as the Rio São Francisco, Bahia, Brazil, the locality from which the specimens described and figured by Spix (1823) came.

Diagnosis.—Individuals of this taxon are the smallest of the species. Length of maxillary toothrow in females averages 7.2 mm, with extremes of 6.8 and 7.5; that in males, 7.5 (7.1–7.8); length of forearm in females averages about 58 mm (54.3–62.0), that in males, 58 (56.3–60.3). For other measurements see Table 2, sample areas 6 and 7.

Distribution.—Southern Venezuela, southern Guyana, the Lower Amazon Basin, and the coastal area of eastern Brazil (Fig. 5, C).

Remarks.—The small size of *albiventris*, as compared with the other subspecies herein recognized, is clearly evident in Fig. 3, sample areas 6 and 7. Note that all but six of the 39 plotted points fall below the parameters set for sample area 1.

Thomas (1920) described *Dirias irex* (= *Noctilio albiventris*) on the basis of two unusually small specimens from Santa Júlia (ca. 4°S, 55°W) on the Rio Iriri, a left affluent of the Rio Xingu, in the state of Pará, Brazil. His measurements of the holotype, a male, are: forearm, 53; greatest length of skull, 18; condylobasal length, 16; maxillary toothrow, 7. Cabrera (1957:56) considered *irex* to be inseparable from *N. a. albiventris* largely because Vieira (1942) reported a similarly small specimen from the Rio São Francisco, the type locality of *albiventris*. Vieira's data are from a female; Thomas', from a male. Consequently, the measurements are not comparable.

In my review I have examined no specimens of *Noctilio* that are as small in all measurements as the two Thomas had. Among males, the shortest

maxillary tooththrow (7.1) I found was in an individual from Tauary, a locality on the Rio Tapajóz about 200 kilometers northwest of Santa Júlia. The one with the shortest forearm (56.3) is from Aramanay, a locality also on the Rio Tapajóz. In the six males available from Tauary length of forearm varies from 57.3 to 60.1 (carpals included); condylobasal length, 17.6 to 19.2; length of maxillary tooththrow, 7.1 to 7.6. The minimal measurements in this sample are only slightly greater than the corresponding 55.9, 16.5, and 6.9 recorded by D. C. Carter (manuscript) when he examined and measured the holotype of *irex* in 1966. Using Carter's measurements, which were taken by methods comparable to those I have used, the differences between the measurements of *irex* and the smallest values found in the Tauary sample are 55.9 as opposed to 56.3 for the forearm; 16.5 as opposed to 17.6 for condylobasal length; 6.9 as opposed to 7.1 for length of maxillary tooththrow. Consequently, I concur with Cabrera's assignment of *Dirias irex* Thomas to the synonymy of *Noctilio albiventris albiventris* Desmarest.

Specimens examined (total number, 144).—GUYANA. Dadanawa Ranch Headquarters, 2 ♂♂, 6 ♀♀ (ROM); Kuitaro, Rupununi District, 2 ♀♀ (ROM); Quash Wan, Werri More area, 8 ♂♂, 1 ♀ (ROM). VENEZUELA. *Bolívar*: K 125 on road between El Dorado and Santa Elena, 1,100 m., 1 ♂ (LASALLE); Lago Paramito, 40 km. NE Maripa, 80 m., 1 ♂, 3 ♀♀ (LASALLE); Maripa, 80 m., 1 ♂, 3 ♀♀ (KU). BRAZIL. *Amazonas*: Itacoatiara, Rio Amazonas, 1 ♂ (USNM), 3 ♂♂ 2 ♀♀ (FMNH); Manacapurú, Rio Solinões, 1 ♂, 2 ♀♀ (SNM). *Pará*: Aramany, Rio Tapajóz, 9 ♂♂, 3 ♀♀ (AMNH); Boca de Igarapé Piaba, Rio Amazonas [= 12 mi. W Obidos], 2 ♀♀ (MCZ); Faro, 6 ♂♂, 4 ♀♀ (AMNH); Granipapo, Ilha do Marajó, Rio Aparo, 10 ♂♂, 10 ♀♀ (LACM); Igarapé Amarin, Rio Tapajóz, 3 ♂♂, 4 ♀♀ (AMNH); Igarapé Brabo, Rio Tapajóz, 8 ♂♂, 2 ♀♀ (AMNH); Pinhy [= Pinhell], Rio Tapajóz, 8 ♂♂, 14 ♀♀ (MCZ); Porto de Moz, Rio Xingu, 1 ♂, 1 ♀ (AMNH); Santarém, 1 ♂ (CM); Tauary, Rio Tapajóz, 8 ♂♂, 14 ♀♀ (MCZ). Locality plotted but no specimens examined: *Bahia*: Joazeiro (Vieira, 1942).

Noctilio albiventris cabrerai, new subspecies

1942. *Dirias albiventer*, Vieira, Arquivos de Zoologia, 3:263.

1957. *Noctilio labialis albiventris*, Cabrera, Catalogo de los mamíferos de America del Sur, 1:55.

1975. *Noctilio albiventris ruber*, Hershkovitz, J. Mamm., 56(1):244.

Holotype.—Adult female, skin and skeleton, no. 234,239 American Museum of Natural History, collected 30 May 1967, at Fuerte Olimpo, Depto. de Olimpo, Paraguay, by Alfredo Ximénes; original no. 4113.

Diagnosis.—Medium size for the species. Mean length of maxillary tooththrow in females, 7.5 (in males, 7.7); of width across M3–M3, 9.3 (9.7); length of forearm, 59.7 (60.8); weight, 30.3 (39.4) g; color variable, 18 of 21 individuals are greyish brown above and buff to orange-buff below; the others are brownish-orange both above and below.

Measurements (means followed by extremes in parentheses).—Of seven females: forearm, 59.7 (57.0–61.0); condylobasal length, 18.1 (17.5–18.5); zygomatic breadth, 14.5 (14.0–15.1); length of maxillary tooththrow, 7.5 (7.3–

7.6); width across M3-M3, 9.3 (9.1-9.5); length of mandibular toothrow, 8.1 (8.0-8.3). Of 13 males: forearm, 60.8 (59.0-62.5); condylobasal length, 18.9 (18.5-19.5); zygomatic breadth, 15.6 (15.0-16.2); length of maxillary toothrow, 7.7 (7.5-7.9); width across M3-M3, 9.7 (9.4-10.0); length of mandibular toothrow, 8.6 (8.3-8.8).

Comparisons.—Larger and paler than *N. a. albiventris*; smaller and paler than *N. a. affinis*; about the same size as *N. a. minor* but paler. See Table 2 for comparative measurements.

Distribution.—Drainage basin of the Río Paraná in southern Brazil, Paraguay, and Argentina (Fig. 5, D).

Remarks.—Hershkovitz (1975:244) suggested that the name *Noctilio ruber* Rengger (1830) applies to the small *Noctilio* of Paraguay and northern Argentina, but perusal of Rengger's description of his *ruber*, which he equates with Azara's "chauve-souris onzieme," convinces me that this allocation is invalid. My translation of Rengger's account (pp. 95-96) follows:

"Azara's eleventh bat up to now has been placed in the systematics system under the name *Vespertilio ruber*. But I am convinced that it belongs to the genus *Noctilio* which has definite characteristics which I have determined through my examination of several individuals of different ages. They are similar to *Noctilio leporinus* and *rufus* Spix, but neither in color nor in dimensions do they agree.

"At first, because of their smaller size, I mistook these bats for young individuals of *Noctilio dorsatus* [= *Noctilio leporinus* with mid-dorsal stripe] which they resemble in form and pelage. However, they are differentiated from them by the following characters:

"Color of head and back wood-brown (zimmerbraun), of the belly, yellowish brown (braunlichgelb), the yellowish white spots (flechen) lacking on the back. The flying membrane arises from the ankle and the tail reaches nearly to the border of the interfemoral membrane, both of which characters are not found in the previously mentioned species.

"Dimensions: Snout to base to tail, 2" 2" [= 57 mm.]; length of tail, 1" 2" [= 31 mm.]; wingspread, 9" 11" [= 259 mm.]; length of ear, 6" [= 13 mm.].

"These bats live in colonies of 20 to 100 individuals on the shores of lakes and streams."

Critical examination of Rengger's description reveals that he was describing something other than a small *Noctilio* as that genus is understood today. This is evident in the comparisons given in Table 3.

In 1806 E. Geoffroy Saint-Hilaire described *Vesp[ertilio] ruber*, based also on Azara's "chauve-souris onzieme," and Thomas (1902) allocated that name to a large rufous-brown *Myotis* with short, velvety fur and medium size ears found in Paraguay with the comment that "on grounds of locality and the exactitude of its agreement with Azara's description" he (Thomas) had no

TABLE 3.—Comparison of the characteristics of *Noctilio ruber* of Rengger (1830) and *Noctilio albiventris*.

Characters	Rengger's <i>N. ruber</i>	Small <i>Noctilio</i>
Length of head and body	57 mm	65–80 mm
Length of tail	31 mm	13–16 mm
Wing spread	259 mm	285–380 mm
Length of ear	13 mm	22–24 mm
Tail	Extends nearly to edge of inter-femoral membrane	Extends less than half the length of interfemoral membrane
Flying membrane	Arises from ankle	Arises about 10 mm above ankle

hesitation in identifying his specimens of *Myotis* with Azara's "chauve-souris onzieme." Thus, it appears that Rengger's *Noctilio ruber* is a misidentification of specimens probably referable to *Myotis ruber* (E. Geoffroy).

Noctilio intermedius Natterer is a manuscript name which became a *nomen nudum* when listed as a synonym of *Noctilio leporinus* by Pelzen in 1833 (Hershkovitz, *in litt.*). D. C. Carter (manuscript) found a male specimen of *N. albiventris* at the Zoologische Staatssammlung (München) in 1966 that was collected 26 May 1824 at Cuyaba, Brazil, bearing a label indicating that it is the type of Natterer's *N. intermedius*. On geographic grounds this specimen should be assigned to *N. a. cabrerai*.

I name this subspecies in honor of the late Dr. Angel Cabrera LaTorre of Argentina who did so much to advance the knowledge of South American mammals and who had a special interest in the noctilionid bats.

Specimens examined (total number, 36).—BRAZIL. *Mato Grosso*: Carandhsinho, Rio Paraguay, 3 ♂♂, 2 ♀♀ (MNHU), 1 ♂, 2 ♀♀ (ZVUU), 1 ♀ (PUWL); Fazenda João Borges, 240 km SSW Cuiaba [= Cuyaba]. 1 ♀, 1 ♂ (TCWC), 1 ♀ (PUWL) (not plotted); Fazenda Santa Isabel, 200 km SSW Cuiaba, 1 ♂ (PUWL) (not plotted); Puga, Rio Paraguay, 2 ♂♂ (SNM). PARAGUAY. *Olimpo*: Fuerte Olimpo, Río Paraguay, 13 ♂♂, 7 ♀♀ (AMNH). ARGENTINA. *Formosa*: Clorinda, 1 ♀ (TCWC). Localities plotted but no specimens examined: ARGENTINA. Provinces of Corrientes, Misiones and Salta (Cabrera, 1957). BRAZIL. *Mato Grosso*: Caceres (Vieira, 1942).

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