Reprinted from BULLETIN OF THE SOUTHERN CALIFORNIA ACADEMY OF SCIENCES
Vol. 72, No. 2, August 1973
pp. 106–107
Made in the United States of America

NONGEOGRAPHIC VARIATION IN THE LONG-NOSED BAT, *CHOERONISCUS INTERMEDIUS*

The genus *Choeroniscus* (Mammalia; Phyllostomatidae) presently contains five species all of which are rare in collections. Four (*inca, intermedius, minor,* and *periosus*) occur only in northern South America, whereas *Choeroniscus godmani,* the commonest species of the genus, occurs in Mexico, Central America, and northern South America. Owing to the apparent rarity of *Choeroniscus,* no comprehensive systematic work has been undertaken on the genus (Handley, 1966); before detailed studies of geographic variation and interspecific variation are attempted, however, a better understanding of nongeographic variation in member species is needed. Therefore, when a large series of *Choeroniscus intermedius* from Trinidad became available for study, we undertook analysis of nongeographic variation within this species, the results of which are discussed below.

All statistical analyses were performed on the IBM 360–50 computer at Texas Tech University. The univariate statistical program that was used yielded standard statistics (mean, range, standard deviation, standard error of the mean, variance, and coefficient of variation) and employed single-classification analysis of variance (*F*-test, significance level .05) to test for significant differences between the means for males and females (Sokal and Rohlf, 1969). Similar analyses have been used by Genoways and Jones (1971) and Jones, Genoways, and Baker (1971) in studies of other mammalian groups. Standard external measurements that were used were those recorded on the specimen label by the preparator; cranial measurements and length of forearm were taken in the laboratory by means of dial calipers. All measurements are recorded in millimeters. All specimens available to us were adults (phalangeal epiphyses fused). They were obtained by Baker in the course of a study of karyotypic variation in bats supported by a grant (GN 29132X1) from the National Science Foundation. Laboratory phases of the study were supported by the Institute of Museum Research, Texas Tech University.

Individual variation.—For the five external measurements studied (Table 1), the range of coefficients of variation were from 2.5 (total length for males) to 25.4 (length of tail vertebrae for females). Values for females were higher than those for males for all five external measurements. Coefficients of variation were unusually high (Long 1968, 1969; Smith 1972) for length of hind foot for females and length of tail vertebrae for both sexes. The high value for the former probably resulted from differences in the method of taking this measurement by individual preparators. Variation in tail length could be related to this also, but possibly resulted from individual variation in this structure. The tail of *Choeroniscus* is relatively short, not reaching the posterior border of the interfemoral membrane, and probably is of little structural value.

Mastoid breadth of females had the lowest coefficient of variation (1.9) for the seven cranial measurements analyzed, whereas postorbital breadth for males had the highest value (6.8). Coefficients of variation were lower for females than for males in all seven cranial measurements. Postorbital constriction was the most variable measurement in both sexes. This measurement proved to be extremely dif-

TABLE 1. External and cranial measurements for *Choeroniscus intermedius* (10 males and 26 females) from Trinidad. 1, Total length; 2, length of tail vertebrae; 3, length of hind foot; 4, length of ear; 5, length of forearm; 6, greatest length of skull; 7, condylobasal length; 8, mastoid breadth; 9, breadth of braincase; 10, postorbital constriction; 11, length of maxillary toothrow; 12, breadth across upper molars. An asterisk indicates that the sexes are significantly different at the .05 level.

	Sex	Mean	(Range)	± SE	CV
1.	♂	63.1	(61.0–66.0)	± 0.50	2.5
	♀	64.3	(56.0–71.0)	± 0.68	5.4
2.	♂	7.8	(6.0– 9.0)	± 0.32	12.8
	♀	7.6	(4.0–11.0)	± 0.38	25.4
3.	♂	8.5	(7.5– 9.0)	± 0.18	6.8
	♀	8.8	(7.0–11.0)	± 0.18	10.3
4.	♂	12.8	(11.0–14.0)	± 0.31	7.8
	♀	12.1	(10.0–14.0)	± 0.22	9.3
5.	♂	34.1	(32.5–35.7)	± 0.34	3.2
	♀	34.7	(26.5–38.4)	± 0.39	5.8
6.	♂*	21.8	(21.2–22.9)	± 0.19	2.7
	♀	23.1	(22.3–24.1)	± 0.10	2.1
7.	♂*	21.2	(20.5–22.0)	± 0.17	2.5
	♀	22.5	(21.6–23.4)	± 0.10	2.3
8.	♂*	8.3	(8.0– 8.6)	± 0.07	2.6
	♀	8.6	(8.4– 9.0)	± 0.03	1.9
9.	♂*	8.3	(8.1– 8.8)	± 0.07	2.5
	♀	8.5	(8.1– 8.9)	± 0.04	2.1
10.	♂	3.6	(3.3– 4.1)	± 0.08	6.8
	♀	3.7	(3.3– 4.1)	± 0.05	6.4
11.	♂*	7.5	(7.0– 7.9)	± 0.09	3.6
	♀	8.1	(7.5– 8.7)	± 0.05	3.0
12.	♂	4.3	(4.0– 4.7)	± 0.07	5.2
	♀	4.3	(4.2– 4.7)	± 0.03	3.5

ficult to take with dial calipers, undoubtedly resulting in the high values.

Secondary sexual variation.—Analysis of variance revealed that males were significantly different from females in five (greatest length of skull, condylobasal length, mastoid breadth, breadth of braincase, and length of maxillary toothrow) of the 12 measurements tested (Table 1). Females were larger than the males in all of these measurements. In the remaining seven, males averaged larger in two (length of tail vertebrae and length of ear) and females were larger in five (total length, length of hind foot, length of forearm, postorbital constriction, and breadth across upper molars).

Conclusions.—Of the 12 measurements analyzed, only length of tail exhibited enough individual variation to warrant its deletion in analysis of geographic or interspecific variation in the genus *Choeroniscus*. Also, because of the difficulty in consistently taking the measurement, we also suggest elimination of postorbital constriction.

Specimens of *Choeroniscus intermedius* were found to exhibit significant secondary sexual variation in five of the 12 measurements studied. Therefore, it is clear that males and females should be separated in analyses of variation within members of the genus. Females were found to be the larger in 10 of the 12 measurements—similar to the situation found in several other groups of bats (see for example, Jones and Schwartz, 1967; Jones *et al.*, 1971; Peterson, 1965).

Specimens examined. — TRINIDAD: Blanchisseuse, 5; Guayaguayare, 12; Las Cueves, 14; Maracas Valley, 1; San Rafael, 4.

LITERATURE CITED

Genoways, H. H., and J. K. Jones, Jr. 1971. Systematics of southern banner-tailed kangaroo rats of the *Dipodomys phillipsii* group. J. Mamm., 52:265–287.

Handley, C. O., Jr. 1966. Descriptions of new bats (*Choeroniscus* and *Rhinophylla*) from Colombia. Proc. Biol. Soc. Washington, 79:83–88.

Jones, J. K., Jr., H. H. Genoways, and R. J. Baker. 1971. Morphological variation in *Stenoderma rufum*. J. Mamm., 52:244–247.

Jones, J. K., Jr., and A. Schwartz. 1967. Bredin-Archbold-Smithsonian biological survey of Dominica. 6. Synopsis of bats of the Antillean genus *Ardops*. Proc. U. S. Nat. Mus., 124(3634):1–13.

Long, C. A. 1968. An analysis of patterns of variation in some representative Mammalia. Part I. A review of estimates of variability in selected measurements. Trans. Kansas Acad. Sci., 71: 201–227.

———. 1969. An analysis of patterns of variation in some representative Mammalia. Part II. Studies on the nature and correlation of measures of variation. Pp. 289–302, *in* Contributions in Mammalogy. (J. K. Jones, Jr., ed), Misc. Publ. Mus. Nat. Hist., Univ. Kansas, 51:1–428.

Peterson, R. L. 1965. A review of the bats of the genus Ametrida, family Phyllostomidae. Contrib. Life Sci., Royal Ontario Mus., 65:1–13.

Smith, J. D. 1972. Systematics of the chiropteran family Mormoopidae. Misc. Publ. Mus. Nat. Hist., Univ. Kansas, 56:1–132.

Sokal, R. R., and F. J. Rohlf. 1969. Biometry . . . W. H. Freeman and Co., San Francisco, xxi + 1–776.

HUGH H. GENOWAYS, *The Museum, Texas Tech University, Lubbock, 79409;* ROBERT J. BAKER, and W. BERNARD WYATT, *Department of Biology and The Museum, Texas Tech University, Lubbock 79409.*

Accepted for publication June 1, 1973.