

B R E V I O R A

Museum of Comparative Zoology

CAMBRIDGE, MASS.

JULY 28, 1964

NUMBER 207

NOTES ON THE HORSESHOE BATS *HIPPOSIDEROS CAFFER*, *RUBER* AND *BEATUS*

BY BARBARA LAWRENCE

INTRODUCTION

Attempts to identify a small series of *Hipposideros*, collected in the Belgian Congo by Alvin Novick in 1956, have made necessary a re-examination of the distribution and specific characters of *caffer*, *ruber* and *beatus*. This has brought to light some new characters of the nasal swellings and of the nose leaves, and emphasizes the importance of the nasal region in general for showing specific differences.

HIPPOSIDEROS RUBER CENTRALIS ANDERSEN

Study of a series of six males and five females from Kivu Forest, Ituri Province, has led to a re-examination of the *caffer-ruber* group in the Museum of Comparative Zoology collections in the light of Verschuren's and Aellen's recent discussions of these small hipposiderids. The group is admittedly a confusing one. It is the more so because as competent a worker as Andersen (1906, pp. 281-282) interpreted his findings as evidence of a complicated distribution pattern which brought together in a single area different subspecies of the species *caffer*. Subsequently Hollister (1918, pp. 85-87) pointed out that two clearly distinct species, *ruber* and *caffer*, occur together in East Africa. Our material amply confirms this; we even have specimens of *ruber* and *caffer* taken in the same basement. This situation was apparently not clear to Aellen (1952, p. 76) when he followed Hollister in synonymizing *centralis* with *ruber*, although he failed to give *ruber* full specific status, considering it instead a subspecies of *caffer*. In addition he extended the range of what he called *caffer ruber* clear across the Congo to the Cameroons, whence

he recognized three other races of *caffer*. Such a distribution pattern evidently did not satisfy him and subsequently (Perret and Aellen, 1956:435; Aellen, 1957:198) he stated that the whole *caffer* complex was in need of revision, though he did not further discuss the relation of *ruber* to *centralis*.

Verschuren (1957, pp. 346-374), although he deals with a limited area, seems to have understood the situation better and it is significant that much of his work was based on field studies of the live bats. Aside from *H. beatus* which is easily distinct, he recognizes two species: *caffer centralis*, a forest form which readily adapts to life in houses, and *nanus* which is more characteristically a savannah form. According to him, the latter were far less numerous than the former and the two were only found together in one cave in heavily wooded savannah country.

Verschuren's distinction between *nanus* and *centralis* is good and on a subspecific level our material agrees well with his. On a specific level, the evidence at hand for considering *centralis* a race of *caffer* rather than of *ruber* is not convincing. Length of tooth row, width across the molars at M³, and the relation of zygomatic to mastoid width, while useful as key characters, are not good indicators of specific relationships. Careful examination of series of the *caffer-ruber* and *beatus* groups from a number of localities in a belt across central Africa suggests very strongly that modifications of the nasal structures both internal and external are the best index to specific relationships. This is perhaps not surprising. Since hipposiderids make their sounds through their noses, small variations in the relative size of the different parts of the nasal swellings and the septa which incompletely divide them should be important. Before final decision can be made on the classification of this group, the functional significance of these morphological differences needs to be much better understood.

As far as the material studied is concerned, attempts to separate *ruber* and *caffer* show that, whereas most of the differences between the two species are of size not proportion, there is a real difference of kind in the compartments of the nasal swellings. In all forms, in dorsal view (strongly illuminated from below), three pairs of compartments are visible: 1. anterior, more or less dorsal and lateral to the external nares; 2. medial, between one and the olfactory part of the brain; and 3. posterolateral to the others, and the largest. Variation in size of these is a good diagnostic character. When *caffer* is viewed from above,

the relatively very small size of compartment two and the somewhat larger size of three are sufficient to distinguish it from *ruber*. No doubt sections and other more detailed studies would show further differences in this region.

Present knowledge of the small hipposiderids, excluding *beatus*, of east and central Africa can then be summarized as follows. In the savannah country of eastern Africa two species, *ruber* and *caffer*, occur together, of similar proportions externally and cranially, but conspicuously different in size. They may be further distinguished by the proportions of the nasal compartments. Near topotypes of *ruber* from Kilosa in southern Tanganyika and specimens from Mtimbuka south of Lake Nyasa resemble each other closely, while to the north a series from Mt. Elgon is somewhat intermediate towards a more western race.

This western race has the skull as long as, but slightly narrower than, typical *ruber* and small nasals which give it the appearance of a large *caffer*. The proportions of the nasal compartments, however, are of the *ruber* type. The specimens at hand from the Ituri Forest, two from Rutshuru and one from Avakubi all belong to this western form, as does probably a specimen from Ulkerewe Island. Whether the name *centralis* is available for this western race or whether Hollister is correct in synonymizing *centralis* with *ruber*, cannot be determined until the type series is re-examined. Since the type locality of *centralis*, Entebbe, Uganda, lies west of Mt. Elgon whence we have intermediate specimens, it seems advisable for the time being to continue to use *centralis* for the Congo race.

As for the specific status of *centralis*, the structure of the nasal compartments and apparent intergrading with *ruber* are evidence of a closer relationship with this form than with *caffer*. This is in accord with Andersen's (1906, p. 281) subdivisions of *caffer*, except that his group 2, "*H. c. centralis*" (= *ruber*), is raised to specific rank and two subspecies of this, *ruber ruber* and *ruber centralis*, are recognized.

There also occurs in central Africa a bat with *caffer*-like nasal compartments but of nearly the same size as *centralis*. We have one specimen from Beni of this apparent race of *caffer* which we take to be *nanus* and probably the same as the series so identified by Verschuren. The sympatric occurrence of representatives of two rather similar species of small *Hipposideros* recognized by Hollister in East Africa seems to be typical of the Congo region as well.

Verschuren's habitat notes for *caffer centralis* (= *ruber centralis*) and *nanus* (= *caffer nanus*) suggest that *caffer* may be typically a savannah form which has spread west where suitable country is to be found, while *ruber*, a forest form, has moved into dry country fairly extensively, possibly because of its adaptability to roosting in buildings.

HIPPOSIDEROS BEATUS MAXIMUS VERSCHUREN

Two males, collected at Mabali, agree with Verschuren's (1957, p. 364) description in being larger than *beatus* from the Cameroons, and extend the range of *b. maximus* considerably to the southwest. Until Verschuren published his account of the bats of Garamba, it had generally been accepted that *nanus* was a small relative of *beatus* and represented this species in the northeastern Belgian Congo. Actually, as Verschuren has said (1957, pp. 370-72), the eastern relative of *beatus* is a larger not a smaller race and *nanus* is quite a different animal. As stated above, it is very likely a form of *caffer*.

With the discovery of this larger race, Andersen's (1906, p. 275) characters of tooth row and zygomatic arch no longer hold for the species. One of the specimens of *beatus maximus* from Mabali is almost identical in zygomatic-mastoid proportions with a similar-sized *guineensis*, a member of the *caffer-ruber* group, from Metet, while length of upper cheek teeth and width across the tooth rows taken outside M³ are exactly the same in both. As for the supposedly shorter tibia of *beatus*, the typical race is smaller than *guineensis* and so has a conspicuously shorter tibia. In the larger *b. maximus*, the tibia is only slightly shorter and the ratio of length of tibia to length of forearm while usually less than in *guineensis* occasionally shows no difference.

A search for better diagnostic characters to separate the *caffer-ruber* races from *beatus* again has shown the importance of the nasal region. Cranially, these differences are hard to measure though they are apparent enough to the eye. In *beatus* the rostrum bulks larger in proportion to the cranium with the width across the nasal swellings relatively greater in proportion to their total length. In spite of this, the inflation of the nasal region is less than in the *caffer-ruber* group. In particular, compartment three is relatively small as seen both in dorsal and in side view.

Externally, width of nasals is usually reflected in width of nose leaf. While this character is often of subspecific value, specific relationships are better shown by differences in details of structure of nose leaves than by absolute size. Here again

we find *beatus* sharply distinct from the *ruber-caffer* group. In *beatus*, the center of the horseshoe is shallower, and associated with this general difference are a number of particular characteristics. The septum slopes rather evenly inward to a point between the nostrils, whereas in *caffer* and *ruber* it has a very marked lumpy projection midway of its length, internal to which it makes a sharp angle where it meets the face between the nostrils. The nostrils themselves are less deep set and the pits ventral to them are shallower in *beatus* than in *caffer* and *ruber*. Further, in *beatus*, the two lateral accessory leaflets are of nearly equal length with a small warty growth dorsal to the end of the inner one, while in *caffer* and *ruber* the inner accessory leaflet is longer than the outer and the wart lies posterior rather than dorsal to its end. Verschuren's figures (1957, figs. 137, 141, and 146) show well the differences in septum between the two groups, while the pale rim around the nostrils seems to be associated with their shallowness in *beatus*. The difference which he figures in surface of the sella is harder to see in alcoholic specimens and the development of the medial thickening is not a character which separates all the *caffer-ruber* group from *beatus*. Other external characters which help to confirm the distinct position of *beatus* are the average more distal attachment of the wing membrane and less funnel-shaped ears.

LITERATURE CITED

AELLEN, V.

1952. Contribution à l'étude des chiroptères du Cameroun. Mém. Soc. Neuchâteloise Sci. Nat., **8**, fasc. 1:1-121, figs. 1-26.
1957. Les chiroptères africains du Musée Zoologique de Strasbourg. Rev. Suisse Zool., **64**, fasc. 1, no. 6:189-214.

ANDERSEN, K.

1906. On *Hipposideros caffer*, Sund. and its closest allies; with some notes on *H. fuliginosus*, Temm. Ann. Mag. Nat. Hist., (7) **17**:269-282.

HOLLISTER, N.

1918. East African mammals in the United States National Museum. Part I. Insectivora, Chiroptera and Carnivora. Bull. U. S. Nat. Mus., **99**:1-194, pls. 1-55, figs. 1-3.

PERRET, J. L. and V. AELLEN

1956. Mammifères du Cameroun de la collection J. L. Perret. Rev. Suisse Zool., **63**, no. 26:365-450.

VERSCHUREN, J.

1957. Écologie, biologie et systématique des cheiroptères. Institut des Parcs Nationaux du Congo Belge, Exploration du Parc National de la Garamba, Mission H. de Saeger, fasc. 7:1-473, 1 pl., 1 map, figs. 1-178.



Lawrence, Barbara. 1964. "Notes on the horseshore bats *Hipposideros caffer*, *ruber* and *beatus*." *Breviora* 207, 1–5.

View This Item Online: <https://www.biodiversitylibrary.org/item/25428>

Permalink: <https://www.biodiversitylibrary.org/partpdf/31351>

Holding Institution

Harvard University, Museum of Comparative Zoology, Ernst Mayr Library

Sponsored by

Harvard University, Museum of Comparative Zoology, Ernst Mayr Library

Copyright & Reuse

Copyright Status: In copyright. Digitized with the permission of the rights holder.

License: <http://creativecommons.org/licenses/by-nc-sa/3.0/>

Rights: <https://biodiversitylibrary.org/permissions>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.