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NOTEWORTHY EXTENSIONS OF KNOWN RANGES OF THREE AFRICAN FRUIT BAT SPECIES (MAMMALIA, MEGACHIROPTERA)

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ABSTRACT

True *Nanonycteris veldkampii* (Jentink, 1888) is recorded from the Central African Republic for the first time. The disputed occurrence of *Epomops buettikoferi* (Matschie, 1899) in Nigeria is confirmed. *Rousettus lanosus* Thomas, 1906, is added to the faunal list of Sudan.

1. *Nanonycteris veldkampii* (Jentink, 1888)

This species has been recorded from a number of West African countries. The westernmost locality on record is Kankasili (10°11'N, 12°29'W) in Guinea (van Orshoven & van Bree, 1968). About the known eastern limits of its distribution there has been quite some confusion. Schouteden (1944) recorded the species from Boma (5°50'S, 13°03'E), Zaire, but Hayman & Hill (1971) found this to be based on a misidentified specimen of *Epomophorus* Bennett, 1836. Frechkop (1954) took two specimens of *Plerotes anchietae* (Seabra, 1900) from Lusinga (8°53'S, 27°15'E), also in Zaire, for *Nanonycteris veldkampii*, which was corrected in Hayman, Misonne & Verheyen (1966).

Hayman & Hill (1971), in their summary of the species' distribution, mentioned Mount Cameroon (4°13'N, 9°10'E) as easternmost locality. Since then, Eisentraut (1973) reported on specimens from Victoria (4°01'N, 9°12'E) and Nyasoso (4°57'N, 9°40'E), both in Cameroon, and Vielliard (1974), in his treatise of Chad bats, en passant mentioned some fruit bat species among which *Nanonycteris veldkampii*, collected in the south of the Central African Republic. A

more exact locality was not given, but this range extension was considerable anyhow, and of zoogeographical interest as it implied that the species might occur in the Central African forest block after all. However, re-examination of the single specimen on which this was based, in the Muséum National d'Histoire Naturelle in Paris by the present author, showed that it does not represent *Nanonycteris veldkampii*, but *Micropteropus pusillus* (Peters, 1867). The specimen is without locality, but as it was collected by R. Pujol & P. Teocchi on 14.V.1966, there can be little doubt that it stems from La Maboké (3°53'N, 18°01'E).

The first apparently authentic Central African Republic specimen of *Nanonycteris veldkampii* that I came across was collected at Bangui (4°23'N, 18°37'E) and is now in the Los Angeles County Museum of Natural History collection as no. 19928. Collector and date of collecting are unknown. Originally it was part of the Loran M. Whitelock collection, as no. 341. It is a subadult of unknown sex, skin and skull, with a forearm length of 48.9 mm and a greatest skull length of 25.3 mm. Although there is no reason as yet to doubt its origin, confirmation of the occurrence of this species near Bangui by other material with full data would be welcome.

2. *Epomops buettikoferi* (Matschie, 1899)

In this account, the following abbreviations of collections have been used:

AMNH - American Museum of Natural History, New York
BMNH - British Museum (Natural History), London
FMNH - Field Museum of Natural History, Chicago
HZM - Harrison Zoological Museum, Sevenoaks
NHMI - Natural History Museum, Ife
ROM - Royal Ontario Museum, Toronto
USNM - United States National Museum, Washington
ZMA - Zoölogisch Museum, Amsterdam
ZMB - Zoologisches Museum, Berlin
ZMUI - Zoology Museum University of Ibadan, Ibadan.

In 1971 Hayman & Hill suggested that *Epomops buettikoferi*, then known with certainty from the western part of the Guinean forest block with Kumasi (6°40'N, 1°35'W) as easternmost locality, might possibly occur in Nigeria. They did not indicate on what kind of evidence this was founded, but most probably this was spirit specimen BMNH 66.1170, collected XI.1965 by D. Pye at Ibadan, and presently labelled as *E. buettikoferi*. Another specimen, HZM 2.4229, collected 24.VIII.1963 at Ilesha (7°39'N, 4°38'E) and also identified as *buettikoferi*, may also have served.

Bergmans (1975), not knowing about these specimens, construed from his data that the species' eastern limit would probably lie somewhere between the line Kumasi-Takoradi (Takoradi: 4°55'N, 1°45'W) in Ghana and the western border of Togo; in other words, that the species would probably not penetrate, let alone pass, the so-called Dahomey Gap.

The only other species of the genus known to inhabit West Africa is *Epomops franqueti* (Tomes, 1860). This close relative is partly sympatric with *buettikoferi* (see De Vree, 1971; Bergmans et al., 1974; Bergmans, 1975). West African *franqueti* are generally smaller than *buettikoferi* and have a different palatal ridge configuration (De Vree, 1971; Bergmans et al., 1974; Bergmans, 1975).

In 1976 I collected 21 specimens of *Epomops* in various localities in Nigeria (now all in the ZMA collection), which apparently represent two different forms. Eight specimens agree with typical *franqueti* and the other mostly, although not completely, with *buettikoferi*, and are here considered to represent that species. The data I gathered from Nigerian *Epomops* specimens in other collections are not detailed enough to reconsider their identities without the actual specimens before me. The conclusions in this paper are therefore restricted to the ZMA specimens and one recently studied specimen in the HZM collection. Other Nigerian *Epomops* specimens which have come to my knowledge are listed as such, collections indicated. The ROM specimens and those recorded by Happold & Happold (1978) - now in the BMNH collection - have not been studied by me.

Epomops buettikoferi:

Arusua (in Pandam Wildlife Park, near 9°15'N, 7°50'E): 1 adult ♂, 2 adult ♀♀, 8-9.VII.1976 (ZMA 19.084-86). Pandam Wildlife

Park, near Pandam (9°15'N, 7°50'E): 1 adult ♀, 1 immature ♀, 1 subadult ♂, 2-4.VII.1976 (ZMA 19.081-83). Ife (7°28'N, 4°34'E): 1 adult ♂, 1 subadult ♂, 1 immature ♂, 2 adult ♀♀, 2 subadult ♀♀, 14-17.VIII.1976 (ZMA 19.090-96). Ilesha (7°39'N, 4°38'E): 1 adult ♂, 24.VIII. 1963 (HZM 2.4229).

Epomops franqueti:
Agege (6°38'N, 3°19'E): 1 immature ♂, 28-29. VIII.1976 (ZMA 19.098). Calabar (4°56'N, 8°22'E): 1 adult ♂, 23.VII.1976 (ZMA 19.031). Ibadan (7°23'N, 3°56'E): 1 adult ♂, 1 adult ♀, 2 subadult ♀♀, 4-5.VIII.1976 (ZMA 19.032-33, 19.088-89). Ife (7°28'N, 4°34'E): 1 adult ♀, 21-22.VIII.1976 (ZMA 19.097). Odukpani (5°07'N, 8°20'E): 1 immature ♀, 24-25.VII.1976 (ZMA 19.087).

Epomops spec.:
Akpaka Forest Reserve, Onitscha Province (not traced): NHMI. Abonema (4°41'N, 6°49'E): BMNH. Asaba (6°11'N, 6°43'E): BMNH. Calabar (4°56'N, 8°22'E): BMNH. Ibadan (7°23'N, 3°56'E): AMNH, BMNH, FMNH, HZM, NHMI, ROM, USNM, ZMUI. Ife (7°28'N, 4°34'E): NHMI. Igbo-Ora (7°29'N, 3°19'E): USNM. Igbo-Oloyin (7°33'N, 3°58'E): BMNH. Lagos (6°27'N, 3°28'E): ZMB. Nikrowa (6°14'N, 5°21'E): BMNH. Oban (5°17'N, 8°33'E): BMNH. Okolomeji Forest Reserve (7°25'N, 3°32'E): BMNH, ROM. Omo Forest Reserve (7°15'N, 4°15'E): BMNH, ROM. Sapoba (6°08'N, 5°50'E): ROM. Sapoba Forest Reserve (6°06'N, 5°53'E): BMNH. Umuahia (5°32'N, 7°29'E): BMNH.

Some measurements of 13 adult Nigerian *Epomops* specimens are shown in table 1. Although the numbers per sex per species are far too low to establish size variation ranges it is nevertheless clear from this table that two taxa are involved. The two female skull length ranges are especially noteworthy. On the other hand it is quite likely that the complete ranges, once established, will show confusing overlaps.

The specimens assigned to *buettikoferi* appear to be quite small in size and weight if compared to ranges in Ivory Coast populations (Bergmans, 1975). This may mark a difference between populations at either side of the Dahomey Gap, although this supposed barrier for forest animals appears to be less effective than has often been assumed (Robbins, 1978), and *buettikoferi* is probably less restricted to the high forest block than Bergmans (1975) concluded from the localities on record (D.W. Thomas, pers. comm., VII.1981), so that its distribution may be continuous and its size variation clinal. Both sexes of *franqueti* appear to attain relatively large sizes and weights in Nigeria, if compared to known ranges in the more western populations from Ivory Coast (Bergmans, 1975). They fit in quite well with those given for 21 Western Nigerian specimens (sexes combined), identified as *franqueti* by Happold & Happold (1978).

Anyway, whereas *buettikoferi* and *franqueti* are rather easily distinguished by size and weight alone in the western part of their shared range, in Nigeria the generally larger *buettikoferi* is not so large and the smaller *franqueti* not so small, which partly obscures the specific difference.

Apart from size, the other important morphological difference between the two species, as found in their palatal ridge configurations (De Vree, 1971; Bergmans et al., 1974; Bergmans, 1975) also poses new problems when applied to Nigerian specimens. As far as we know, in specimens west of the Dahomey Gap the third ridge is always, be it sometimes narrowly, divided in the middle in *buettikoferi*, but in 6 of the 13 Nigerian specimens which could be checked it is not, in 3 narrowly, and in 4 about typically. Moreover, most specimens in which the third ridge is not divided also possess atypical postdental ridges. De Vree (1971) and Bergmans et al. (1974) described how in *franqueti* these ridges are quite evenly denticulated, whereas in *buettikoferi* each ridge half (that is: of ridges 4, 5, 6, 7 and sometimes 8) has a subcentral tooth larger than the others in its row. In several Nigerian *buettikoferi* this character is much less distinct than in Ivory Coast specimens, which just as the diminished size difference tends to mask the specific distinctness from *franqueti*.

The Nigerian *buettikoferi* specimens treated here have in common that they were all caught in or near forest either far from the original high forest zone (Arusua, Pandam) or only just inside this zone (Ife, Ilesha). All *franqueti* specimens listed above were taken at more southern localities well inside this zone (Agege, Calabar, Odukpani) or approaching its northern limit (Ibadan, Ife). Only at Ife the two species were found to be sympatric.

The new overall picture of *buettikoferi* distribution and intraspecific variation call for a critical re-evaluation of *Epomops* specimens

Table I. Selected measurements in mm and some other data of adult Nigerian *Epomops buettikoferi* (Matschie, 1899) and *Epomops franqueti* (Tomes, 1860). The *E. buettikoferi* male from Ilesha is in the Harrison Zoological Museum, Sevenoaks; all others are in the Zoölogish Museum, Amsterdam.

	Epomops buettikoferi								*Epomops franqueti*				
	♂♂			♀♀					♂♂		♀♀		
	Arusua	Ilesha	Ife	Pandam	Arusua	Arusua	Ife	Ife	Calabar	Ibadan	Ife	Ibadan	Ibadan
forearm length	97.4	92.7	92.4	85.5	85.6	88.3	90.9	92.7	91.8	89.4	81.0	82.6	83.9
greatest skull length	54.6	53.9	53.9	48.8	48.3	48.4	48.2	49.1	50.6	47.7	43.2	42.0	42.9
condylobasal length	54.4	53.5	52.7	47.9	48.1	48.0	47.0	48.6	49.9	47.2	42.1	41.0	42.0
C^1-C^1 externally	10.2		10.6	9.2	9.0	9.1	8.8	9.1	9.6	9.5	8.3	8.2	8.3
C^1-M^1	17.9	17.7	17.7	15.8	15.5	15.9	15.4	16.3	15.8	15.4	14.4	13.4	13.6
M^1-M^1	15.9		16.0		13.8	13.4	13.2	14.0	13.7	14.0	13.8	12.6	12.8
C_1-M_2	19.8	20.0	20.0	17.4	17.3	18.0	16.7	17.6	17.2	16.5	16.0	15.2	15.3
length M^1	3.2		3.4	3.4	3.0	3.1	3.2	3.1	2.8	2.7	3.0	2.5	2.6
weight in grams	148		162	125[1]	110[1]	113	107[2]	123[1]	142	131	95[1]	91.5[1]	97[1]
3rd palatal ridge divided	no	yes	no	yes	yes	yes	no	no	no	no	no	no	no

[1]) with embryo (1 Arusua specimen not checked)
[2]) with juvenile of 15.5 g

from West Africa and adjoining regions. The Nigerian population of *buettikoferi* may well be isolated from the more western ones. De Vree et al. (1969; 1970; 1971) assigned all their 155 *Epomops* specimens from up to 20 localities in Togo to *franqueti*. Unfortunately no taxonomic account of this collection has been published, nor are the specimens available for study. Collected data on *buettikoferi*-like *Epomops* from Ghana (easternmost locality: Legon, 5°40'N, 0°12'W), in various collections suggest that here they may average smaller than in Ivory Coast (Bergmans, unpublished notes), from which it seems likely that specific identification of *Epomops* specimens from Togo is quite complicated.

There are only very few specimens from Togo in other collections: 2 ♀♀ from Ezimé (7°29'N, 0°56'E) identified as *franqueti* by Robbins, 1980 (USNM); 1 adult ♂ skin from Kadjamba (9°53'N, 0°32'E) (ZMB; originally identified as *"Epomophorus zechi"* (Matschie, 1899), which would be *Epomophorus gambianus* (Ogilby, 1835), but because of its well-defined whitish belly patch much more likely *Epomops*); 1 adult *franqueti* ♀ from Kete Kradji (7°48'N, 0°03'E) (ZMB 8945); 1 immature ♀ from Misahöhe (6°57'N, 0°35'E) (ZMB 50003). From Benin, the single specimen from Kpodave (6°49'N, 1°46'E) identified as *franqueti* by Robbins, 1980 (USNM), and a neonatus from Grand Popo (6°19'N, 1°57'E) - the correct identity of which is hard to establish - (ZMB 10011) seem to be all there is. Hence, the question of the possible occurrence of *buettikoferi* in the Dahomey Gap can not yet be answered.

As in Nigeria *buettikoferi* is known as far as 7°50'E, it should be kept in mind as a possible inhabitant of northern central Cameroon.

3. *Rousettus lanosus* Thomas, 1906

Kock (1969) and Koopman (1975), in their accounts of the Sudan bat fauna, did not list *Rousettus lanosus*. From its known distribution in other countries the latter author reckoned that it might be expected in southern Sudan mountains. Only a few years later, in 1978, G. Nikolaus collected the first Sudan specimens at Gilo, Imatong Mountains (± 4°10'N, 32°45'E). The 11 specimens are now in the Staatliches Museum für Naturkunde in Stuttgart (29801, -03, -04, -07, -09-15). Measurements of the 6 adults among these are given in table 2. The forearm lengths of specimens 29807 and 29809 suggest a relatively low overall size average in this population. Cheek teeth sizes agree more or less with those in a series from Mount Menengai in Kenya, in the collection of the Zoölogisch Museum, Amsterdam; P^4 and M^1 are somewhat shorter in some cases, while canines and first upper and lower molars may be slightly more robust. If subspecies are to be recognized, the Sudan specimens would agree mostly with *R. l. kempi* Thomas, 1909.

Adult ♀♀ were caught in January (3 specimens) and April (1), adult ♂♂ in April (1) and October (1); subadults in January and April; 2 juveniles (one with M^2 and M_3 not yet erupted, the other with all teeth erupted) on 4 April. From specimen 29801, captured 7 January, a flea *Thaumapsylla dina* Jordan, 1937 - probably the first record of this flea for Sudan: Hutson, in lit., 18.III.1981 - and a fly, *Stylidia scissa* Speiser, 1901, were collected; the fly is known from some Microchiropterans only (Theodor, 1967) and its find on *Rousettus* may be due to straggling between spirit specimens.

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The following curators of mammals gave me access to fruit bat collections in which I studied, over a number of years, West African *Epomops* specimens: Dr. P.J.H. van Bree, Amsterdam; Mrs. Dr. A.B. Durotype, Ife; Dr. H. Hackethal, Berlin; Dr. D.L. Harrison, Sevenoaks; Dr.

Table 2. Measurements in mm and weights of adult *Rousettus lanosus* Thomas, 1906 from Gilo, Imatong Mountains, Sudan, in the Staatliches Museum für Naturkunde, Stuttgart.

	♂♂		♀♀			
Collection number	29814	29807	29801	29809	29811	29812
forearm length	88.3	84.4	90.0	82	88[1]	86[1]
greatest skull length	42.0			39.4	40.6	39.5
condylobasal length	39.4			37.2	38.2	37.1
rostrum length	16.1			15.3	15.9	15.5
palatal length	20.9			20.0	20.8	20.5
mandible length	31.5			30.3	30.7	30.0
mandible height	12.1			10.8	10.8	11.6
cranium width	17.6			16.7	16.8	17.3
interorbital width	7.5			7.5	7.7	7.9
postorbital width	9.2			8.9	8.1	10.1
zygomatic width	24.0			22.9	23.4	22.7
width C^1-C^1 cingula	8.9			7.9	8.3	8.2
length C^1-M^2 cingula	14.1			14.0	14.1	14.3
width M^2-M^2 cingula	11.8			12.3	12.7	--
length C_1-M_3 cingula	16.3			15.6	15.5	16.0
weight in grams	112[1]	94[1]	115[1]	96[1]	96[1]	94[1]

[1]) field measurements

J.E. Hill, London; Dr. K.F. Koopman, New York; Mr. R. Parker, Ibadan; Dr. R.L. Peterson, Toronto; Dr. H.W. Setzer, Washington; Dr. R. Turner, Chicago.

Dr. F. Dieterlen, Stuttgart, kindly sent me a collection of fruit bats from southern Sudan to study, among which the series of *Rousettus lanosus*.

Dr. A.M. Hutson, London, identified the flea, and Dr. P. Oosterbroek, Amsterdam, the fly collected from *Rousettus lanosus*.

REFERENCES

BERGMANS, W., 1975. On the differences between sympatric Epomops franqueti (Tomes, 1860) and Epomops buettikoferi (Matchie, 1899), with additional notes on the latter species (Mammalia, Megachiroptera).- Beaufortia, 23 (304): 141-152.

------, L. BELLIER & J. VISSAULT, 1974. A taxonomical report on a collection of Megachiroptera (Mammalia) from the Ivory Coast.- Rev. Zool. afr., 88 (1): 18-48.

DE VREE, F., 1971. Notes sur une collection de Chiroptères ouest africains, principalement de la Côte d'Ivoire.- Rev. Zool. Bot. afr., 83 (1-2): 31-49.

------, J. HULSELMANS & W. VERHEYEN, 1970. Contribution à l'étude des Chiroptères de la République du Togo. 2. Liste préliminaire des Chiroptères récoltés par la deuxième Mission zoologique belge au Togo.- Rev. Zool. Bot. afr., 82 (1-2): 41-46.

------, A. DE ROO & W.N. VERHEYEN, 1969. Contribution à l'étude des Chiroptères de la République du Togo.- Rev. Zool. Bot. afr., 80 (1-2): 200-207.

------ & E VAN DER STRAETEN, 1971. Contribution à l'étude des Chiroptères de la République du Togo. 3. Liste préliminaire des Chiroptères récoltés par la troisième Mission zoologique belge au Togo.- Rev. Zool. Bot. afr., 83 (1-2): 159-164.

EISENTRAUT, M., 1973. Die Wirbeltierfauna von Fernando Poo und Westkamerun.- Bonn. zool. Mon., 3: 1-428, pls. 1-5.

FRECHKOP, S., 1954. Exploration du Parc National de l'Upemba. Mission G.F. de Witte en collaboration avec W. Adam, A. Janssens, L. van Meel et R. Verheyen (1940-1949). Fasc. 14, Mammifères. Inst. Parcs Nat. Congo Belge, Bruxelles: 1-83, pl. I-III.

HAPPOLD, D.C.D. & M. HAPPOLD, 1978. The fruit-bats of Western Nigeria.- Niger. Fld, 43 (1): 30-37; (2): 72-77; (3): 121-127.

HAYMAN, R.W. & J.E. HILL, 1971. Order Chiroptera: 1-73. In: J. Meester & H.W. Setzer (eds.), The mammals of Africa, an identification manual, part 2 (Smithsonian Institution Press, Washington).

------, X. MISONNE & W. VERHEYEN, 1966. The bats of the Congo and of Rwanda and Burundi.- Annls Mus. r. Afr. centr., (Sér. 8vo, Sci. zool.), 154: 1-105, 114 maps.

KOCK, D., 1969. Die Fledermaus-Fauna des Sudan.- Abh. senckenb. naturforsch. Ges., 521: 1-238.

KOOPMAN, K.F., 1975. Bats of the Sudan.- Bull. Amer. Mus. nat. Hist., 154 (4): 353-444.

ORSHOVEN, J. van & P.J.H. van BREE, 1968. Quelques données sur six espèces de Mégachiroptères de la République de Guinée.- Beaufortia, 14 (176): 177-192.

ROBBINS, C.B., 1978. The Dahomey Gap - a reevaluation of its significance as a faunal barrier to West African High Forest mammals.- Bull. Carnegie Mus. nat. Hist., 6: 168-174.

------, 1980. Small mammals of Togo and Benin. I. Chiroptera.- Mammalia, 44 (1): 83-88.

SCHOUTEDEN, H., 1944. De zoogdieren van Belgisch Congo en van Ruanda-Urundi, I. Primates, Chiroptera, Insectivora, Pholidota.- Annls Mus. Congo Belge (C. Sér. II) 3 (1): 1-168.

THEODOR, O., 1967. An illustrated catalogue of the Rothschild collection of Nycteribiidae (Diptera) in the British Museum (Natural History): i-viii + 1-506, pls. 1-5 (Trust Brit. Mus. (Nat. Hist.), London).

VIELLIARD, J., 1974. Les Chiroptères du Tchad.- Revue suisse Zool., 81 (4): 975-991.

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