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New locality record of the variegated butterfly bat, *Glauconycteris variegata* (Tomes, 1861) from the Sudan.

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Introduction

Bats of Africa have been studied by many authors. Rosevear (1965) studied the bats fauna of West Africa and he gave an efficient and simple identification keys. Jones (1971) presented a list for the bats of West Africa. Hayman and Hill (1971) studied the systematic status and the distribution of African bats. Happold (1967) studied the mammalian fauna of Khartoum Province, previous Sudan. He described 10 bat species but *Glauconycteris variegata* was not one of them. Koch (1969) studied the bat fauna of the previous Sudan with reference to their systematic status and distribution. Koopman (1975) revised the bats species of the previous Sudan and he grouped them in nine ecogeographical categories. He recognized 66 species as occurring within the boundaries of the country in addition to 38 species known from nearby areas which may cross the boundaries of the Sudan. Koopman (1975) categorized *G. variegata* in the forest savanna. Recently Reeder et al. (2013) proposed a new genus to a vespertilionid bat *G. superba* (Hayman, 1939) collected from Southern Sudan to be *Niumbaha superba*

Materials and Methods

Two adult male specimens of *Glauconycteris variegata* were collected from Khartoum and two males from the Dinder National Park (DNP) by mist nets (Fig. 1). The morphometric characters chosen for the description were done following Rosevear (1965), Happold (1967), Peterson (1972), Koopman (1975) and El-Rayah (1980). Soft characters (body, tail, ear and tragus) were measured by a ruler while other characters were measured by a vernier caliber in millimeters. Characters studied are the length of soft characters (body, tail, ear and tragus) and tibia, and the length of wing characters (forearm, third, fourth and fifth metacarpal and their first and second phalanx).

Fig 1 Map of the Sudan showing the locations of the variegated butterfly bat, *Glauconycteris variegate* (modified after Google maps).

● = The location of *G. variegata*

DNP = Dinder National Park

Results

The collected specimens are very small vespertilionid bats which have white skin. The pelage is silky, silver grey in colour dorsally and creamy ventrally. The wings and the large interfemoral membrane are transparent and reticulated with black or dark brown veinations. The interfemoral membrane encloses almost the whole tail. The base of the wings and the interfemoral membrane are orange in colour for the specimens collected from Khartoum. Specimens collected from DNP lack this orange colouration. The lower lip bears a flap of flesh on its inner side. The muzzle is small and the dental formula is $\frac{2.1.1.3}{3.1.2.3}$. The ears are small and widely separated like in other vespertilionid bats (Fig. 2 and Table 1). Males of *Glauconycteris variegata* collected from Khartoum are found to be larger than males collected from the DNP in six measured morphometric characters (Table 1)

Glauconycteris variegata was found roosting in the riverine area in Khartoum and DNP. One specimen was found roosting with a colony of *Scotophilus nigrita*, *G. argentata* and *Rhinolophus landeri* in a well in the DNP.

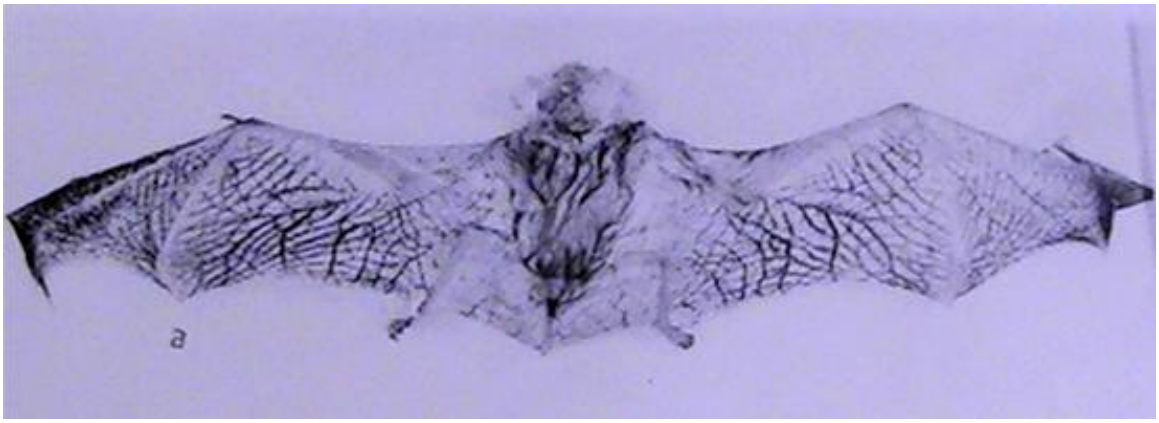

Fig 2 The variegated butterfly bat, *Glauconycteris variegata*

Table 1 Comparison between the measurements of different morphometric characters of males *Glauconycteris variegata* collected from Khartoum and Dinder National Park

Morphometric character	Khartoum	Dinder National Park
	Measurements (mm)	Measurements (mm)
Body length	55 , 55.5	52.6, 52.65
Tail length	41.9, 45.5	47, 47
Ear length	13.5, 13.9	13.6, 13.7
Tragus length	5.45, 5.6	4.85, 4.9
Tibia length	19.35, 19.35	18.9, 18.95
Forearm length	40.6, 43	40.6, 40.7
Third metacarbal length	38.85, 40.5	39.8, 39.85
First phalanax of the third metacarpal length	14.6, 15.25	14.7, 14.8
Second phalanax of the third metacarpal length	21.25, 22,45	21, 21.1
Fourth metacarpal length	38.3, 38.8	37.9, 38
First phalanax of the fourth metacarpal length	11.1, 12,5	11.6, 11.65
Second phalanax of the fourth metacarpal length	11.3, 11.85	11.45, 11.5
Fifth metacarpal length	36.7, 36.7	36.5, 36.5
First phalanax of the fifth metacarpal length	9.3, 9.8	9.6, 9.65
Second phalanax of the fifth metacarpal length	8, 8	7.2, 7.3

Discussion

Glauconyctris was erected by Dobson (1875) for certain vespertilionid African bats merely as a subgenus of *Chalinolobus* (Peters, 1866) but it was raised to generic status by de Winton (1901) and Miller (1907). Ellerman et al. (1953), Rosevear (1965), Hayman and Hill (1971), Peterson and Smith (1973), Peterson (1982) and Hill and Harison (1987) dealt with it as a genus following de Winton (1901) and Miller (1907). On the other hand Simpson (1945), Koopman (1971, 1975, 1993, 1994) and smithers (1983) considered it as a subgenus of the Australian *Chlinolobus*. The molecular evidence supports the generic status of *Glauconycteris* and places it in the tribe Nycticeiini while placing *Chalinolobus* in the tribe Vespertilionini (Hoofer and Van Den Bussche, 2003). However, Simmon (2005) place them both in the tribe Vespertilionini. Koopman (1971) considered the number of species as seven. Peterson (1973) described another species. On the other hand Simmons (2005) recognized twelve species and Fahr and Kalko (2011) added another species.

Glauconyctris variegata is a widespread savanna species, however, too few specimens are available to assess their taxonomic status (Koopman, 1975). Jacobs et al. (2008) gave the distribution of *G. variegata* in a narrow band running from Senegal to southern Ethiopia and Somalia, and in much of southern and eastern Africa outside the tropical rainforest, as far as northern Namibia, Zimbabwe, and South Africa. A single specimen from Somalia (De Beaux, 1934), which was allocated to the subspecies *phalaena* is a male with a forearm length of 38 and a condylobasal length of 12.9 (quoted from Koopman, 1975). Another Somali specimen is an unsexed adult with a forearm length of 40 and a condylobasal length of 12.8 (Koopman, 1975). On the other hand, Hill and Morris (1971) allocated a single specimen from northeastern Ethiopia to *Scotophyllus. v. variegata*. Hayman and Hill (1971), Koopman (1975), Simmon (2005) and Wilson and Reeder (2005) recognized two subspecies of *G. variegata* (*G. v. phalaena* the northern parts of the range including the Sudan and Somalia and *G. v. variegata* in the southern part of the range including North East Ethiopia). Koopman (1975) concluded that the distribution of *G. variegata* and the subspecies *phalaena* (if valid) in the region of the Sudan is still imperfectly known.

The description and morphometric characters of the collected specimens are similar to *Glauconycteries variegata* described by Rosevear (1965) except that they have a shorter tibia. They are also similar to *G. variegata* described by Hayman and Hill (1971), Koopman (1975) and Happold (2013).

Koopman (1975) recorded it as a subspecies (*C. Glauconycteris variegatus*) from White Nile near Fashoda, Upper Nile Province, previous Sudan. He identified it from one adult female specimen in alcohol with extracted skull in the British Museum, type of *phalaena* (forearm = 43 mm, condylobasal length = 13 mm). Kock (1969) recorded it from two localities in Southeastern Kordofan (Kadugli and Jebel Otoro). Rambaldini (2010) described them as relatively small bats averaging 10 cm in total length, 4.7 cm tail length and weighing around 11 grams with females slightly larger than males. Fenton, et al (1977) and Rambaldini (2010) found *G. variegata* roosting in trees. In the present study *G. variegata* was found roosting in trees in the riverine area in Khartoum and in a well in the reverine area in the DNP.

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