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On a collection of bats (Mammalia: Chiroptera) from The Gambia

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A recent collection of bats from The Gambia presented in this publication comprises 17 species, four of which (*Lissonycteris angolensis*, *Pipistrellus* (*P.*) *rusticus*, *P.* (*Neoromicia*) *guineensis*, and *Scotoecus hirundo*) represent new records for The Gambia, raising the total number of known species from 27 to 31. Notes on taxonomy, distribution, ecology and biology are presented.

Key words: Gambia, Chiroptera, taxonomy, distribution, ecology, biology

INTRODUCTION

Probably the first naturalist to visit The Gambia (hereafter Gambia) was M. Adanson (1773), who stayed at Albreda, then a French trading post, from January to March 1750. However, no mammal record can be traced back to this study site. The bat fauna of Gambia was definitely sampled more than 80 years later by Dr. Percy Rendall (see Ogilby, 1835). The first review of the mammal fauna of Senegambia by Rochebrune (1883) has been proven to be rather unreliable (see Grubb and Ansell, 1996) and is here not considered any further. Thus, the first list of the bat species known from this country was given only by Jones (1992). He registered 26 species but included only few precise localities and no references to earlier records were provided; one species was omitted (*Pipistrellus africanus*, see below). *Mops congicus* J. A. Allen, 1917 was mentioned by Koopman (1993) as possibly occurring in Gambia, which is rather dubious because this species is restricted to the rain forest zone. Most likely it is a lapsus, referring instead to *Mops demonstrator* (Thomas, 1903) for which Koopman (1989) mentioned a BMNH specimen collected "at sea off Gambia". The latter record was disregarded by Grubb *et al.* (1999). Furthermore, Koopman (1993) also included Gambia in the range of *Mops brachypterus* (Peters, 1852) for which no other documentation is available. The most recent list of Gambian bats has been provided by Grubb *et al.* (1999). Based on museum collections and occasionally referring to unpublished data, these authors document 27 species as occurring in Gambia, leaving apart species recorded in flight, taken at sea off the coast, or undocumented by voucher specimens.

Grubb *et al.* (1999) do not consider the two molossid bats listed for the fauna of Gambia by Koopman (1993, see above).

Since 1999 further explorations (by LB and CE) provided observations and additional specimens which have been examined for the present study. They further document the occurrences of several species known from Gambia, allow some comments on previously published views, and add several species to the faunal list.

Material and Methods

Most bat individuals were captured with mistnets by LB and CE as members of the Department of Parks and Wildlife Management during an ongoing survey of the mammals of Gambia. Additional individuals were caught or observed at their day roosts.

Voucher specimens were preserved in the field as wet specimens from which the skulls have been extracted at the Senckenberg Museum Frankfurt (SMF). Standard body measurements (in mm) and body mass (in g) were taken by LB and CE in the field while craniodental (in mm) and additional external measurements (in mm) were taken by DK and JF. They were as follows: *body measurements*: HB: head and body length (from tip of snout to posterior margin of anus); Tl: length of tail from posterior margin of anus to tip of tail; HF c.u., HF s.u.: hindfoot length with or without claws, respectively; E: ear length from lower margin of conch to tip of ear; FA c.c., FA s.c.: forearm length with (c.c.) or without carpalia (s.c.; for comparison with skeletal material), respectively; Tb: tibia length; mtc III, mtc IV, mtc V: metacarpalia of 3rd, 4th, and 5th fingers, respectively; d4ph1, d4ph2: length of 1st and 2nd phalanx of 4th finger, respectively; bm: body mass; *craniodental measurements*: Crn: greatest length from posteriormost point to front of praemaxilla; Crn–C cr, Crn–C alv: length from posteriormost point to front of canine crown (cr), or its alveola (alv); Cbl: condylobasal length (not including incisors); Cd–C cr, Cd–C alv: length from condyles to front of canine crown (cr), or its alveola (alv); Mast: mastoid width; Bc-w: width of braincase at broadest point; Zyg: zygomatic width; C–C: breadth across crowns of upper canines; $M–M^3$: breadth across crowns of last upper molars; $C–M^3$: length of upper (maxillary) toothrow from front of canine to back of last molar; Ior: width at interorbital constriction; Mnd cd, Mnd ang: length of mandible from condyle (cd) to anteriormost point (not including incisors), or from posteriormost end of angular process (ang); $C–M_3$: length of lower toothrow from front of canine to back of last molar. To support our taxonomic views and to supplement distributional data, comparative specimens examined are listed where deemed as useful.

Co-ordinates (see Appendix I) are from nearest town or village, taken from: Gambia Official Standard Names Gazetteer (1968) prepared by the Geographic Names Division, Army Map Service, Washington. With regard to the known occurrence of bat species in Gambia, all in-flight identifications mentioned by Grubb *et al.* (1999) are here disregarded as we are not convinced of their reliability.

Species Accounts

Pteropodidae

Eidolon helvum helvum (Kerr, 1792)

Material

Abuko N.R., 14 November 2000, subad ♂ (alc), SMF 91132.

Previous records

Gambian specimens (in BMNH) without exact data were studied by Dobson (1878), Andersen (1912*b*), and Bergmans (1991), whereas Jones (1992) merely confirmed the species in this country. Based on unpublished reports, Grubb *et al.* (1999) listed this fruit bat for Banjul, Abuko N.R., and Bakau.

Biology

A large colony (estimated between 5,000 and 10,000 fruit bats) was roosting at Lamin during May and June 1999 with some suckling juveniles present (species identified from several corpses). This colony was present on 4 October 1999 (unknown number of bats in roost) and at least a few hundred bats were still using this roost on 13 November 1999. Close to Lamin, in Abuko N.R., the voucher specimen was found on 14 November 2000. During the summer months of 2000, hundreds of *E. helvum* were observed in Abuko N.R. on 20 May and 7 June, presumably coming

from the roost in Lamin. This roost was again occupied by fruit bats on 13 May 2001. Fruit bats from this roost were observed to fly at dusk in long lines towards the north-west. This area is largely urbanised but has an abundance of fruit trees, mainly mango, *Mangifera indica* (Anacardiaceae). Another large congregation of bats was discovered in the town of Brikama on 30 May 2001 where they were flying around mango trees at dusk. This may indicate the presence of another roost in this area.

A small roost of about a dozen *E. helvum* was noted in the crown of a rhun palm (*Borassus aethiopium*, Palmae) by the road at Serrekunda (Old Jeshwang) on 16 October 1999. During the later part of 1999, the presence of *E. helvum* was noted on 2–3 October at Bakau (a few individuals feeding in urban garden). One individual was found dead on a power line at Talending (Kujang) on 8 October. Fruit bats in varying numbers flying at dusk or dawn were observed at Bundung (Latra Kunda) on 14 October (a nearby roost presumed), at Fajara on 31 October, and at Banjul (Ferry Port) on 16 November. These data indicate that *E. helvum* is present in western Gambia in high numbers during May and June (with juveniles), but in fewer numbers during October and November. Rains usually begin in May/June and end in October or early November, up-river they last from May to September (Edberg, 1982; Ward, 1994).

South-eastwards of Gambia, *E. helvum* is present during the dry season in January (Maa, 1968: Ziguinchor, lower Casamance), whereas in Guinea Bissau its presence has been recorded from February to May (Bergmans, 1991: Bolama Island, 2 February; Rainho and Franco, 1999: S. Domingos, 6 March; Lopes and Crawford-Cabral, 1992: Canchungo, 8 April; Bolama, 10–14 April; Veiga-Ferreira, 1948: Bolama in April; Lopes and Crawford-Cabral, 1992: Contubo-el (Bafatá), 18–19 May). *Eidolon helvum* was found in Senegal during the dry season close to the Gambian border in Sine-Saloum (Sanborn, 1936: Fatick, 19 February), further north at Bignona (Morel, 1961: in May), during the rainy season near St. Louis (Schmutterer, 1992: Diourbel, 2nd half of July), and after the rains at Rufisque (Morel, 1961; Bourlière and Tran, 1955: 21 December). The furthest north that *E. helvum* was observed is Nouakchott (18°05'N, 15°59'W), Mauretania (Cosson *et al.*, 1996). Here the fruit bats formed a small colony of up to hundred individuals residing in the roost from May-June to September–October. The available data suggest that *E. helvum* migrates north with the rains, although part of the population remains resident during the dry season, perhaps migrating only locally.

Lissonycteris angolensis smithii (Thomas, 1908)

Material

500 m S Solifor Point, 14 May 2000, juv ♂ (skull, alc), SMF 91006.

Taxonomy

Peterson *et al.* (1995) and Cotterill (2001) treated the taxon *smithii* as a species different from *L. angolensis* Bocage, 1898. We do not follow this arrangement because Peterson *et al.* (1995) compared widely separated populations of *L. a. smithii* from Sierra Leone, Ivory Coast, Ghana and Nigeria with those of *L. a. angolensis* (Bocage, 1898) from Cameroon, Zaïre, Sudan and Kenya, thereby not noticing the clinal differentiation as discussed by Eisentraut (1965) and Bergmans (1997). Our own unpublished data show a rather continuous increase in body size from west to east. We therefore think that this action is premature. Further study of specimens is needed, especially from Nigeria where these taxa

supposedly meet (see also Bergmans, 1997).

Distribution

This specimen represents the first record for Gambia, though Grubb *et al.* (1999) assumed this fruit bat to be absent from the country due to lack of suitable habitat and caves as roosting sites. The Gambian locality links the presently westernmost occurrences in Senegal (Adam and Hubert, 1972: Bandia region near Dakar; Sylla *et al.*, 1997: Ebarak, 12°38'N - 12°52'W; Salémata, 12°35'N - 12°50'W) with records from more forested localities to the east.

Biology

Adults flying in the top part of an old dry well were observed since 20 June 1999 and later the present juvenile (32.5 g, erupted teeth of specific morphology) was collected from the same roost. This documents a breeding colony and excludes occasional immigration from more forested region. The dry well is located on top of a coastal cliff approximately 30 m a.s.l. The surrounding area was once covered with coastal forest. Over the past 10 years it has been heavily deforested to provide fuelwood for the local population. The area now consists of low shrubs and vegetable gardens and is heavily grazed by Ndama cattle. The nearest forested habitat is located at Tanji River (Karinti) Bird Reserve about 5 km to the north-east along the coastline.

Epomophorus gambianus gambianus
(Ogilby, 1835)

Material

Banjul, December 1998, ad ♀ (skull, skeleton), SMF 91038, mummified beneath roost; ibid., 6 June 1999, ♂ neonate (alc); SMF 91039, found dead below roost. — Lamin, June 1999, sex ? (skull, all teeth lost), SMF 91065, found dead. — between Tanji and Brufut, 16 September 2000, ♂ (alc), SMF 91131.

Measurements

SMF 91131 (♂) and SMF 91038 (ad ♀), respectively: FA c.c. 88.5, 81.8; FA s.c. 86.3, 79.5; mtc III 63.9, 59.4; mtc IV 60.8, 57.3; mtc V 62.1, 58.8; tb 37.9, 34.8; HF s.u. 22.9, 21.3. — Skull: Cbl –, 48.9.

Previous records

Ogilby (1835): 'Gambia' (type locality of *Pteropus gambianus* and *P. macrocephalus*). — Bennett (1836): 'Gambia' (type locality of *P. epomophorus*). — Bennett (1841): 'Gambia' (type locality of *P. whitei*). — Tomes (1860), Dobson (1878), Andersen (1912*b*), Jones (1992): 'Gambia'. — Rosevear (1965): River Gambia (on flowers of *Adansonia digitata*). — Edberg (1982): Bakau - Banjul - Serrekunda area. — Bray (1984): between Kuntaur and Georgetown; Fajara. — Bergmans (1988): Basse; 13 km W Bathurst; Brikama Bar; Keneba; 16 km SE Kuntaur; Kudang; Toniataba; Wali-Kunda. — Ward (1994): Kombo Beach Hotel, SW of Fajara. — Grubb *et al.* (1999): Banjul; Kombo St. Mary; Bakau; Georgetown; Abuko N.R.

Restriction of type locality

Dr. P. Rendall resided with his brother, the then Lieut.-Gov. of Fort St. Mary (presently Banjul) and the other British possessions in that neighbourhood, and both collected the specimens which later became the types of *E. gambianus* and of the several synonyms listed above. With regard to the commonness of the species in the area of extreme western Gambia, the type locality may be safely restricted to Banjul.

Biology

Several individuals were mist-netted and released after examination of their reproductive status: Abuko N.R., 16 April 2000, 2 ad ♀♀, juv ♀; 14 May 2000, 2 juv

♀♀; 20 May 2000, 8 ♂♂ad, 12 lact. ♀♀; 3 July 2000, lact. ♀, ad ♂ — Makasutu Culture Forest (near Bafuloto), 17 May 2000, 4 ad ♂♂, 10 lact. ♀♀, non-lact. ad ♀, 3 unsexed juv. — Juffureh, 18 June 2000, juv ♂. At Banjul a neonate was found on 6 June and in the Makasutu Culture Forest one half-grown juvenile suckling from its mother on 23 January. Lactating females were mist-netted during May, June and July. In the Delta du Saloum N.P. across the north-western border of Gambia, Verschuren (1982) observed pregnancies and lactation in *E. gambianus* from the end of April until early May.

The commonness of *E. gambianus* is further documented by numerous observations. During the last week of April 1995, *E. gambianus* roosted singly in neem trees, *Azadirachta indica* (Meliaceae), and in pairs or singly in thick, spiny bushes of *Bougainvillea spectabilis* (Nyctaginaceae) in the gardens of the Senegambia Hotel west of Kololi (DK) amongst nests of a breeding colony of weaver birds, *Ploceus cucullatus* (Ploceidae). The bats used the same roosting places permanently and apparently remained unmolested when sun rays were shining on them. Feeding *E. gambianus* were observed on trees of two *Ficus* spp., one of them bearing cauliflorous fruits (*F. capensis*, Moraceae; see Wildlife Conservation Department, 1978), and immediately after dusk they regularly visited flowers of the African locust bean (*Parkia biglobosa*, Mimosaceae). A roost was seen in Banjul (May 1999) and two more in Kartung village (March 1999). These fruit bats were heard calling and seen by torchlight in Abuko N.R. (April to July 1999) where they were observed to feed regularly on the fruits of strangler figs (*Ficus vogelii*, Moraceae). Five bats appeared to be drinking at dusk from a pool in Abuko N.R. (9 November 1999). A day roost of this species was observed at Makasutu Culture Forest (near Bafuloto) on 9 May 1999 (10 bats in roost), on 9 July 1999 (45 bats), 10 September 1999 (69 bats), 23 January 2000 (11 bats, including one half-grown juvenile suckling), 17 June 2000 (137 bats) and 7 April 2001 (103 bats). Single or several bats were seen flying at Yundum (4 October 1999), Bundung (Latra Kunda, 14 October 1999), Fajara (31 October 1999), Farafenni (19 November 1999), Old Jeshwang (Serrekunda, 23 December 1999), and at Brikama (Methodist Mission, 16 December 1999), Bijilo Forest Park (16 July 2000), and Tanji River (Karinti) Bird Reserve (1 May 2001).

Roost sites were located mainly in mango trees, which are usually growing in villages or other noisy and populated places such as the grounds of a hotel garden. On one occasion a roost was found under the fronds of a rhun palm in a coastal forest.

Micropteropus pusillus (Peters, 1868)

Material

Abuko N.R., 15–16 April 2000, ad ♂, ad ♀, 2 juv ♀♀ (4 skulls, 4 alc), SMF 91040–43.

Measurements

SMF 91040 (ad ♂) and SMF 91041 (ad ♀), respectively: FA c.c. 55.2, 57.1; bm 26.5, 33. — Skull: Crn 29.85, 29.17; Cbl 28.93, 28.22; Zyg 18.56, 18.04.

Previous records

Tomes (1860, as *Epomophorus schoensis* (Rüppell, 1842)), Peters (1868), Dobson (1878, as *Epomophorus pusillus*): ‘Gambia’. — Andersen (1912*b*), Bergmans (1989): Bathurst. — Hirst (1923), Rudnick (1960), Jones (1992): ‘Gambia’. — Bergmans (1989): 13 km W Bathurst; Wali-Kunda. — Grubb *et al.* (1999): Abuko N.R.; doubtfully Tendaba; Bakau.

Biology

Several individuals were mist-netted and released after examination of their reproductive status: Abuko N.R., 14 May 2000, 3 lact. ♀♀, non-lact. ad ♀, ad ♀ carrying 1 young, 4 ad ♂♂; 18 May 2000, ad ♂; 19 May 2000, lact. ♀; 20 May 2000, lact. ♀; 3 July 2000, ad ♂; 5 September 2000, ad ♀ — Makasutu Culture Forest, 17 June 2000, 3 ad ♀♀, 7 ad ♂♂ — Juffureh, 18 June 2000, juv ♂.

One bat roosting beneath fronds of rhun palm in Bijilo Forest Park (16 May 2000). *Micropteropus pusillus* were observed feeding on the flowers of the African locust bean and the fruits of a strangler fig. Habitats include gallery forest, Guinea and Sudan savanna and coastal forest.

Note

Grubb *et al.* (1999) followed Andersen (1912*b*) and considered Gambia to be the terra typica of *M. pusillus*, as "Peters in effect renamed *Epomophorus schoensis* Tomes 1860 and therefore Tomes' type locality must stand, even though his syntypes are evidently no longer in existence". This is in contradiction to Bergmans (1989), who considers Yoruba, Nigeria, to be the locus typicus, whence originated the specimens examined by Peters (1868). Recognising Tomes' (1860) misidentification, Peters named his specimens as a new species, without having seen Tomes' specimens from Gambia. Thus, Yoruba is the type locality. Peters (1868) read his paper at the meeting of the Academy on 19 December 1867, and it appeared in print only in 1868.

Megadermatidae

Lavia frons frons (E. Geoffroy, 1810)

Material

Madiyana Camp, Niumi N.P., Sine Saloum Delta, 29 January 2000, ♂, ♀ (2 skulls, 2 alc), SMF 91044–45.

Measurements

SMF 91044 (♂) and SMF 91045 (♀), respectively: FA c.c. 61.1, 64.7; Tb 32.5, 36.2; bm 21, 24. — Skull: Crn–C alv 24.7, 25.7; Cd–C alv 22.1, 22.8; Zyg 14.9, 15.5.

Previous records

Ogilby (1835), Dobson (1878), Andersen and Wroughton (1907), Jones (1992): 'Gambia'. — Grubb *et al.* (1999): Basse; Kunkilling Forest; Mungo Park Memorial; Wali-Kunda; possibly Tendaba. Remarkably few records of this striking and easily identified species are known from Gambia. The listing of the related eastern African endemic megadermatid species *Cardioderma cor* (Peters, 1872) for Gambia by Palacky (1901) is erroneous, being confounded with *L. frons*.

Biology

The above measurements document the sexual dimorphism in body and skull size of this species, with males averaging smaller, as discussed by Kock (1969). Further individuals were mist-netted and released after examination: Makasutu Culture Forest, 17 June 2000, ad ♀ carrying one young, mist-netted in transition zone between mangroves and Guinea savanna woodland dominated by the African oil palm, *Elais guineensis* (Palmae). Two bats were foraging in Farafenni (15 January 2001) and one adult bat was roosting in foliage adjacent to River Gambia on MacCarthy Island (19 January 2001).

Nycteridae

Nycteris hispida (Schreber, 1774)

Material

Madiyana Camp, Niumi N.P., Sine Saloum Delta, 29 January and 4 February 2000, 2 ♀♀ (2 skulls, 2 alc), SMF 91046–47.

Taxonomy

Apart from the well known specific character (trifid upper incisors, size) the present specimens of *N. hispida* have the basioccipital broader and the auditory bulla visibly smaller than the skulls of *N. gambiensis*. Van Cakenberghe and De Vree (1993) did not find any indication to recognise subspecies.

Previous records

Andersen (1912*a*), Jones (1992): 'Gambia'. — The Gambian record by Van Cakenberghe and De Vree (1993) actually concerns individuals from Senegal (Dialocote in the then 'French Gambia'), already examined by Andersen (1912*a*) and considered to be *N. gambiensis* but actually being partly *N. hispida* (see Rosevear, 1965).

Biology

The two individuals were captured in coastal scrub consisting of seasonally flooded tamarix, *Tamarix senegalensis* (Tamaricaceae).

Nycteris macrotis Dobson, 1876

Material

Near Jappeni, October 1998, ♂ (skull, skeleton), SMF 91050. — Madianna, near Brufut, 20 April 1999, ♀ (skull, alc), SMF 91051. — Lamin Bridge, 15 September 1999, ad ♀ (skull, alc), SMF 91052. — Jiboroh Kuta, 31 October 1999, ad ♂, juv ♂, ad ♀ (3 skulls, 3 alc), SMF 91053–55. — near Jambur, 14 May 2000, ♀, juv ♀ (skull, 2 alc), SMF 91067–68. — near Jiroff, 8 September 2000, ad ♂ (skull, alc), SMF 91085.

Measurements

Adults, bm 15–16.5.

Taxonomy

Van Cakenberghe and De Vree (1985) found no size character to recognise subspecies in *N. macrotis*.

Previous records

Andersen (1912*a*), Rosevear (1965), Thomas *et al.* (1994); 'Gambia'. — Van Cakenberghe and De Vree (1985): Banjul; 13 km W Banjul; Kudang; 8 km N Kuntaur; Makka; Toniataba. — Jones (1992): MacCarthy Island. — Grubb *et al.,* 1999: Fula Bantang; Georgetown; Tendaba; Tubakuta; Sankuley Kunda.

Biology

Individuals or small groups were found in road culverts and under a bridge; the latter roost was shared with a colony of about 30 *Rhinolophus landeri* (observed 15 September and 25 November). The roosts appear to be relatively stable; a small colony of 5 individuals in a road culvert near Jambur was present 12 November, 16 December and 14 May of the following year. Surrounding habitats varied but in the main consisted of agricultural land (often seasonally flooded rice fields) in former Guinea savanna.

Near Jambur one female roosting in a road culvert had a young on 14 May, whereas at Madianna another female was suckling a nearly full grown juvenile on 20 June. At Jiboroh Kuta (31 October) both sexes roosted in a road culverts forming a group of 10 adults plus an unknown number of juveniles still being nursed (female with juvenile sampled). — In the Senegalese Delta du Saloum N.P. adjoining north-western Gambia, Verschuren (1982) also observed juveniles during May.

Nycteris gambiensis (Andersen, 1912)

Material

Tanji River (Karinti) Bird Reserve, coast near Bald Cape, 13 September

1999, 2 ♂♂ (2 skulls, 2 alc), SMF 91048–49.

Measurements

FA c.c. 41.7–42.2; bm 6–6.5. — Skull (SMF 91048 and 91049, respectively): Crn–C cr 18.10, 18.22; Cd–C cr 15.98, 16.07; Zyg 8.21, 10.24; M–M^3 6.67, 6.45; C–M^3 6.12, 6.13; Mnd cd 11.54, 11.65; C–M/3 6.52, 6.50.

Comparative material

Guinea: Near Tahiré, foot of Mt. Kelesi, 500 m, 27 October 1956, ♂ (skull, skin), SMF 43670, H. Knorr leg. — Near Nyembaro, 10 km W Kolenté, 24 November 1956, ♂ and ♀ (2 skulls, 2 skins), SMF 43668–69, H. Knorr leg. — Burkina Faso: Diebougou, SMF 60944; Bourzanga, SMF 60945 (for details see Koch-Weser, 1984).

Nycteris thebaica thebaica Geoffroy, 1813: Egypt: Cairo, ♂ (skull, alc), SMF 5425, E. Bennwarth leg.; 20 km S Cairo, SMF 25839–41, E. Kulzer leg.; Saqqara, SMF 22662–3, 22665–6, 22669–70, NAMRU-3 ded.; Upper Egypt, sex ? (skull, skin), SMF 1321, E. Rüppell ded. 1823; Valley of the Kings, Al-Karnak, March 1983, ♀ (skull, alc), SMF 63526, Röder leg. — Sudan: Nubia, sex ? (skull, skin) SMF 12351, E. Rüppell leg. (*N. thebaica albiventris*); Kordofan, 1824, 3 sex ? (3 skulls, 3 skins), SMF 12294, 12358, 12362, E. Rüppell leg.; Jebel Toro, Nuba Mts., Kordofan, ♂ (skull, skin), SMF 32668, D. Kock leg.

Taxonomy

Nycteris gambiensis was considered to be merely a subspecies of *N. thebaica* (see Kock, 1969; Koopman, 1975), but the analyses by Adam and Hubert (1976) as well as by Van Cakenberghe and De Vree (1998) documented its specific rank, though the latter authors admitted that similar small-sized populations of *N. thebaica* are not uncommon in north-eastern Africa, with considerable overlap in the range of measurements. — Within *N. gambiensis* no subspecies are discernible (Van Cakenberghe and De Vree, 1998).

Previous records

Rosevear (1965): Kuntaur. — Van Cakenberghe and De Vree (1998): 13 km W Banjul; Kudang; 16 km SE Kuntaur; Makka; Toniataba. — Jones (1992): MacCarthy Island. — Grubb *et al*. (1999): Tendaba.

Biology

In mid September 10–12 *N. gambiensis* roosted in a room with access to the roofspace and to a hole in a wall. This roost was used by 27 bats on 2 December 1999, by 11 bats on 29 July 2000, and by 40–50 bats on 28 August 2000. In January 2001 the roost was abandoned by the bats when it became the site for a large hive of wild honey bees (Apidae). The surrounding habitat consists of a mixture of coastal forest and scrub.

Rhinolophidae

Rhinolophus landeri landeri Martin, 1838

Material

Lamin Bridge, 15 September 1999, ad ♂, subad ♀, ad ♀ (3 skulls, 3 alc), SMF 91056–8; ibid., 15 October 1999, ♂, subad ♀, ad ♀ (3 skulls, 3 alc), SMF 91059–61. – 500 m S Solifor Point, 12 May 2000, ♀ (skull, alc), SMF 91075.

Measurements

[selected, including subadults; those of *R. guineensis* follow in square brackets]: FA c.c. 41.3 (adolescent)–43.9 [46]; Tb 16.8–20.4; mtc III 28.0 (adolescent)–29.8; mtc IV 31.3–31.8; d4ph1 5.4–7.1; d4ph2 12.1–14.8; mtc V 28.2–31.0; bm 7–8.5. — Skull: Cd–C cr 14.92–15.7 [18.3]; Zyg 8.96–9.50 [10.4]; M–M^3 6.56–6.96 [8.1]; C–M^3 cr 6.15–6.67 [7.9].

Comparative material

Burkina Faso: Diebougou, SMF 60946–51 (for details see Koch-Weser, 1984). — Nigeria: Maiduguri, Bornu State, January 1973, 2 ♀♀ (2 skulls, 2 alc), SMF 44773–4, H. P. Feddersen leg. — Ramin'yarburbura, Gwarzo Kano, Kaduna State, 20 September 1990, ♂ (skull, alc) SMF 77325, A. Storch leg.

Rhinolophus denti denti Thomas, 1904: Namibia: Farm Sissekab, Otavi District, July 1964, ♀ (skull, alc), SMF 28252, R. E. Rau leg. — Botswana: Drotsky Cave, S of Kai Kai, 18 October 1977, sex ? (skull), SMF 54254, J. Boessneck leg.

Rhinolophus guineensis Eisentraut, 1960: Senegal: Diattacounda, Casamance, 25 December 1975, ♂ (skull, skin), ZFMK 76.26, W. Böhme leg.

Taxonomy

All present Gambian *R. landeri* show the specific characters: processus on sella triangular or bluntly pointed; axillary hair tufts in males (white); skull size larger than *R. d. denti* (which in turn is larger than *R. denti knorri* Eisentraut, 1960); nasal inflations broader than *R. d. denti*; basioccipital between cochleae broader than in *R. d. denti*; talon of M^1 posteriorly larger; glenoid surface area larger than *R. d. denti*; PM_3 slightly extruded (versus completely extruded in *R. denti*); PM_2 high, 2/3 to 3/4 height of PM_4 (versus low, 1/2 height of PM_4 in *R. denti*).

From Gambia, more specifically from Lamin Bridge, the similar *R. denti* was reported by Jones (1992) and Grubb *et al.* (1999). The latter accepted this species for Gambia based on sketches of the noseleaf and field measurement of specimens released after examination. The forearm lengths (< 42 mm at Lamin Bridge, 40.9 and 41.8 mm at Tendaba) fall between those of the nominate *denti* and the subspecies *knorri*. No measurements of digit 4 were supplied, which are assumed to discriminate *R. denti* from *R. landeri* (the latter has the length of the first phalanx of the 4th finger 50% or less than the 2nd phalanx versus 50% or more in *R. denti knorri*; see Eisentraut, 1960: tables 1–2). Additionally, Hayman and Hill (1971) considered the 'notably shortened' 1st phalanx of the 4th finger in relation to the metacarpal in *R. landeri* to serve as a differentiating character (versus unshortened in *R. denti*). According to our (partly unpublished) data for specimens from West Africa this proportion averages 20.9% in *R. landeri* versus 22.2% in *R. denti*. Therefore we question the usefulness of this rather subtle character. Instead, we found the forearm length of *R. denti knorri* as given by Eisentraut (1960) to be shorter (37.5–40.5) than in *R. l. landeri* (39.9–45.1, $n = 36$), i.e., with very little overlap between both species in West Africa. This confirms our impression that *R.* '*denti*' reported from Gambia with forearm length = 40.9 are probably *R. landeri*. Additionally, we found no overlap between *R. l. landeri* and *R. denti knorri* in the length of head and body, tibia, hindfoot (s.u.), and 5th metacarpal.

We therefore consider the records of *R. denti* from Gambia as doubtful because of lack of character specifications and voucher specimens. The forearm length suggests that the released individuals represented possibly adolescent *R. landeri*. This view is supported by the small forearm measurements of two females from the same roost listed above, with pectoral and pubic nipples undeveloped in September and October.

Previous records

Rosevear 1965: Kuntaur.

Biology

Under the Lamin Bridge a group of 30 *R. landeri* (associated with a single *Nycteris macrotis*) was observed on 15 September,

32 on 15 October, and 13 on 25 November (again associated with a single *N. macrotis*). From a dry well near Solifor Point, used as a roost by *Lissonycteris angolensis* and *Hipposideros ruber* in April 1999, *R. landeri* was captured on 12 May. Surrounding habitat consists of agricultural land located in former coastal forest or Guinea savanna. The bats from the roost under Lamin Bridge have so far not been captured in the nearby gallery forest.

Hipposideridae

Hipposideros ruber guineensis Andersen, 1906

Material

Madiyana Camp, Niumi N.P., 29 January 2000, ♂ (skull, alc), SMF 91062. – 500 m S Solifor Point, 12 May 2000, 2 ♂♂, 4 ♀♀ (6 skulls, 6 alc), SMF 91069–74.

Measurements

Body — range in 3 ♂♂: Tl 24.5– 31.4; HF c.u. 8.9–10.3; HF s.u. 8.0–9.2; E 13.9–15.2; FA c.c. 47.9–49.5; FA s.c. 47.5–48.4; Tb 20.5–21.0; mtc III 35.7–36.4; mtc IV 34.8–35.8; mtc V 30.6–31.2; bm 7.5–8.0. — 4 ♀♀: Tl 29.5–30.1; HF c.u. 9.1–9.6; HF s.u. 8.4–8.9; E 14.1–15.2; FA c.c. 49.0–49.75; FA s.c. 48.5–49.35; Tb 19.9–21.9; mtc III 36.2–37.5; mtc IV 36.1–36.8; mtc V 31.8–32.3; bm 8.8. — Skull — range in 3 ♂♂: Crn 18.1–18.4; Cd–C cr 15.55–16.05; Mast 9.7–9.9; Bc-w 8.8–9.15; Zyg 9.9–10.4; C–C 4.4–4.7; M–M^3 6.57–6.86; C–M^3 6.44–6.55; Ior 2.97–3.1; Mnd ang 11.1–12.1; Mnd cd 11.72–12.13; C–M_3 7.06–7.18. — 4 ♀♀: Crn 17.91–18.71; Cd–C cr 15.63–15.98; Mast 9.52–9.77; Bc-w 8.45–8.87; Zyg 9.92–10.20; C–C 4.35–4.64; M–M^3 6.57–6.91; C–M^3 6.42–6.54; Ior 2.88–3.12; Mnd ang 11.40–11.90; Mnd cd 11.74–12.07; C–M_3 6.93–7.09.

Taxonomy

The present specimens are larger in all body, wing and skull measurements compared to the West African sympatric *H. caffer* (Sundevall, 1846), represented by the subspecies *H. c. tephrus* Cabrera, 1906 (see Andersen, 1907).

Previous records

Jones (1992): MacCarthy Island. — Jones *et al.* (1993), Grubb *et al.* (1999): Abuko N.R; Hela Kunda; near Georgetown.

Biology

Near Solifor Point *H. ruber* was captured leaving an old dry well in April 1998 (identified in the hand and released) and its presence confirmed in May 2000. This roost was shared with *R. landeri* and *L. angolensis*. The surrounding habitat was once coastal forest but is now degraded and has become agricultural land. The habitat on Jinack Island is seasonally flooded coastal scrub dominated by *Tamarix*.

Asellia tridens murraiana (Anderson, 1881)

Material

Georgetown (= Janjangbureh), MacCarthy Island, 20 April 1995, ♂ (skull, skeleton), SMF 82480, D. Kock leg.

Measurements

SMF 82480 (♂): FA c.c 52.0; Tb 19.5 — Skull: Crn 19.79; Crn–C 19.22; Cbl 17.87; Cd–C 17.42; Zyg 11.28; C–C 5.72; M–M^3 8.04; C–M^3 7.20; Ior 2.66; Mnd ang 14.49; Mnd cd 13.75; C–M_3 7.97.

Taxonomy

In size the present specimen is within the range of variation of large-sized *A. tridens* (E. Geoffroy, 1813) populations in Lower Egypt, Iraq and Yemen, called *A. t. murraiana* by Kock (1969: table 25). Owen

and Qumsiyeh (1987) confirmed that western African *A. tridens* are large-sized and indistinguishable from *A. t. murraiana*, but pose a systematic problem because of the wide geographical separation between the Near East populations and those of similar size in western Africa.

Previous records

Hayman and Hill (1971): Kuntaur. — Jones (1992): MacCarthy Ild. — Jones *et al.* (1993); near Georgetown. — Grubb *et al.* (1999): Georgetown; Sapu. The presence of this Saharo-Sindian species on the Gambia River with remnant riverine forest is remarkable.

Vespertilionidae

Pipistrellus (*Pipistrellus*) *rusticus marrensis* Thomas and Hinton, 1923

Material

Madiyana Camp, Niumi N.P., Sine Saloum Delta, 29 January 2000, ♀ (skull, alc), SMF 91063.

Comparative material

Pipistrellus r. marrensis: Ethiopia: Aware Melca, 09°08'N - 39°54'E, Hawash Plains, Shewa Province, 17 April 1971, ad ♀ (skull, alc), MZUF M.1971–2 C.6563, B. Lanza leg. [Lanza (1972) as *P. nanus* (Peters, 1852)] — Gambela, Ilu Babor, 1972, 2 ad ♂♂ (2 skulls, 1 skin, 1 alc), SMF 44830–31, G. Nikolaus leg. — Sudan, Kordofan, Nuba Mts.: Kadugli, SMF 33283; Tadoro, SMF 33283 (for details see Kock, 1969). — Central African Republic: Ndélé, 08°25'N - 20°38'E, June 1946, juv ♀ (skull, alc), MNHN (uncatalogued). — Burkina Faso: Ouagadougou, SMF 60993–94 (for details see Koch-Weser, 1984).

Pipistrellus r. rusticus Tomes, 1861: Tanzania: Kisiju Forest, 07°24'S - 39°20'E, 5 km N Kisiju village, Kisarawe Distr., 10 December 1992, ad ♂, ad ♀ (2 skulls, 2 alc) SMF 81203–4, L. Stubblefield (Frontier Tanzania) leg. (see Burgess *et al.*, 2000: Appendix 5, erroneously listed as from Vikindu).

Measurements

SMF 91063 (♀): E 9.7; Tb 10.6; FA c.c. 28.73; bm 3.75. — Skull: Crn 11.60; Cbl 11.27; Mast 7.06; Bc-w 6.42; Zyg 7.74; C–C 3.96; M–M^3 5.32; C–M^3 4.18; Ior 3.45; Mnd cd 8.49; Mnd ang 8.66; C–M_3 4.29.

Taxonomy

This species, with a narrow white margin along the posterior wing membranes, inner upper I^1 unicuspid, and intruded upper PM^2 not visible externally, might be mistaken for small *P. kuhlii* (Kuhl, 1817) or *P. deserti* (Thomas, 1902). Skull and body size agree with published data for specimens from Burkina Faso (Koch-Weser, 1984) and Kordofan, Sudan (Kock, 1969; Koopman, 1975), representing *P. r. marrensis*.

Distribution

This species was not previously known from Gambia. *Pipistrellus rusticus* may be more common than suggested by the relatively few records available. A distribution map given by Koch-Weser (1984: figure 8) needs up-dating. The species was collected in the Bandia Forest, Senegal (Hubert, 1973), the nearest collecting site to the present one. A record from the forested Nimba Mts., Liberia, by Hill (1982) and by Wolton *et al.* (1982) has been shown by Koopman *et al.* (1995) to be referable to *P. kuhlii* (Kuhl, 1817). The species has been found on the Oli River, Borgu G.R., Nigeria (Hill and Harrison, 1987). A specimens from Ndélé, Central African Republic, has been examined (see comparative material above). The northern smaller-sized *P. r. marrensis*, ranging from West Africa to Ethiopia

(Largen *et al.*, 1974) and NW-Kenya (Hill, 1976) is disjunct from the nominate subspecies in south-eastern Africa from Malawi and Zambia to NE-Namibia, Botswana and Northern Province, South Africa. The occurrence of the species was established near Zomba, and on the Zomba Plateau, possibly also on the Viphya Plateau (Happold *et al.*, 1988; Happold and Happold, 1990; but see cautioning by Happold and Happold, 1997). Recently the species was first recorded from Vikundu Forest, Tanzania (Burgess *et al.*, 2000: Appendix 5); however, the correct locality being Kisuju Forest (see above: comparative material). Several additional unidentified localities in Zimbabwe have been mapped by Hutton (1986) and mentioned by Cotterill (1996: Bubiana River). Within the known range in the Northern Province of South Africa, further localities were reported by Herholdt (1989: Waterberg District), Rautenbach *et al.* (1993: northern Kruger National Park), and Taylor (1999: Messina).

Biology

The Gambian individual was mist-netted early in the morning in seasonally-flooded coastal scrub dominated by *Tamarix*.

Pipistrellus (*Hypsugo*) *africanus stampflii* (Jentink, 1888)

Material

Abuko N.R., 20 May and 7 June 2000, ♂, 6 ♀♀ (7 skulls, 7 alc), SMF 91077–82, 91088.

Measurements

HB, ♀♀ 34.7–37, ♂ 37.9; Tl, ♀♀ 28.4–4–30.0, ♂ 27.1; HF c.u. ♀♀ 5.0–6.0, ♂ 6.0, HF s.u. ♀♀ 4.2–5.6, ♂ 5.4; E ♀♀ 8.8–9.7, ♂ 9.0; FA c.c. ♀♀ 26.0–28.7, ♂ 26.5; Tb ♀♀ 9.6–10.8, ♂ 10.15; mtc III ♀♀ 24.6–27.1, ♂ 24.3; mtc IV ♀♀ 24.4–25.7, ♂ 24.0; mtc V ♀♀ 24.3–25.3, ♂ 23.3; bm ♀♀ 2.25–2.75, ♂ 2.6. — Skull (♀, SMF 91088): Crn 10.75; Cbl 10.27; Mast 6.42; Bc-w 5.65; Zyg 6.64; C–C 3.23; M–M^3 4.39; C–M^3 3.61; Ior 3.20; Mnd ang 7.23; Mnd cd 7.38; C–M_3 3.86.

Taxonomy

The tragus (hatched-shaped), antitragus (quadrangular), and upper incisors (I^1 and I^2 bifid; I^2 = 1/2 height of I^1) assign these small bats to *P. africanus* (Rüppell, 1842), formerly named *P. nanus* (Peters, 1852). None of the specimens has paired glands at the basal quarter of the tail (O'Shea 1980). The subspecific classification is based on the small skull size of this series, and *stampflii* is given preference over *pusillulus* Peters, 1870, described from Loango, Congo (B), but mislocated as in Angola by Monticelli (1887) and Allen (1939). The tragus shape of *pusillulus* [broadened on top, similar to *Nyctalus noctula* (Schreber, 1774)] would exclude it from *P. africanus*.

Previous records

Hill and Harrison (1987, as *P. nanus*) examined a specimen from Kuntaur, a record omitted by Jones (1992) and Grubb *et al.* (1999).

Biology

This series, mist-netted during the same night, confirms the observation of authors that females are more common than males. The series was captured over permanent freshwater pools in gallery forest.

Pipistrellus (*Neoromicia*) *guineensis* (Bocage, 1889)

Material

Abuko N.R., 18 May 2000, ♀ (skull, alc), SMF 91076.

Measurements

SMF 91076 (♀): HB 41; Tl 32.5; HF c.u. 7.0; HF s.u. 6.7; E 10.1; FA c.c.28.1; Tb 10.8; mtc III 27.2; mtc IV 26.7; mtc V 26.5; bm 3.5. — Skull: Crn 11.44; Cbl 11.07; Mast 6.90; Bc-w 6.06; Zyg 7.56; C–C 3.33; M–M^3 4.61; C–M^3 3.87; Ior 3.37; Mnd ang 8.31; Mnd cd 8.23; C–M_3 4.08.

The long skull of the present specimen is due to an abnormal bony anterior extension of the premaxilla.

Comparative material

Burkina Faso: Nouna, SMF 26404 (for details see Kock 1969); Diomga and Nouna, SMF 60995–6097 (for details see Koch-Weser 1984). — Chad: Fort Archambault [= Sarh], March 1911, 2 ♂♂ (2 skulls, 2 alc), SMF 63901–2; Expedition Herzog A. F. zu Mecklenburg leg.

Distribution

This species has not been found in Gambia previously; its nearest known localities are Bissau, Guinea Bissau (Bocage, 1889), and Badi, Senegal (Aellen, 1956). In size it falls well into the known variation [Kock, 1969: table 34, except SMF 33277 = *Eptesicus somalicus* (Thomas, 1901) fide Koopman, 1975].

Biology

The Gambian specimen was mist-netted in Guinea savanna.

Pipistrellus (*Neoromicia*) *rendalli rendalli* (Thomas, 1889)

Material

Abuko N.R., 7 June 2000, ♂, ♀ (2 skulls, 2 alc), SMF 91086–87.

Measurements

SMF 91086 (♂) and SMF 91087 (♀), respectively: HB 48, 49.7; Tl 41.5, 37.1; HF s.u. 7.1, 7.5; E 13.3, 12.5; FA c.c. 34.5, 37.0; Tb 12.3, 12.5; mtc III 31.7, 33.0; mtc IV 32.2, 33.0; mtc V 30.4, 31.5; bm 5.5, 6.5. — Skull: Crn 12.98, 13.61; Cbl 12.57, 12.97; Mast 7.98, 8.05; Bc-w 7.18, 6.93; Zyg 9.20, 9.90; C–C 4.35, 4.28; M–M^3 5.85, 6.13; C–M^3 4.65, 4.79; Ior 3.90, 3.94; Mnd ang 10.19, 10.17; Mnd cd 10.01, 10.02; C–M_3 5.03, 5.26.

Comparative material

Pipistrellus r. phasma G. M. Allen, 1911: Tanzania: Mtai F.R., 04°58’S - 38°46’E, 190 m, N Amani, E-Usambara Mts., Maramba District, Tanga Region, 21 January 1997, lact. ad ♀ (skull, alc), SMF 86690, Frontier Tanzania leg. — Mkwaja Ranch Forests, 05°52’S - 38°47’E, Pangani Distr., 4 September 1991, ad ♀ (skull, alc), SMF 79581, C. Ansell (Frontier Tanzania) leg. — Litipo Forest Reserve, 39°29’E - 10°02’S, 25 km W Lindi, Lindi Distr., 6 August 1993, ♂ (skull, alc), SMF 82539, Frontier Tanzania leg. — Kenya: Aruba Lodge, Tsavo East N.P., 12 April 1970, 2 ♀♀ (2 skulls, 2 alc), SMF 37547, 37552, D. Kock leg. — Sudan: Abu Doleib, 09°20’N - 31°35’E, White Nile, Malakal District, 31 March 1910, ♂ (skull, alc), ZFMK 1910.1 [= *Eptesicus floweri* (de Winton, 1901) of Lehmann, 1964]. — Congo (K): Duma, N of Libenge, Oubangui, SMF 6393 (see Kock, 1969).

Taxonomy

The measurements given above supplement the few data published by Thomas (1899) for the West African nominate subspecies. The wings are all whitish; the fingers weakly pigmented; the dorsal and ventral fur is bi-coloured; only one upper PM present; I^1 unicuspid, its basal ‘hook’ (Rosevear, 1965: figure 70b) only weakly developed; I^2 unicuspid, but with an external cingulum cusp, and the tooth 2/3 the height of I^1.

It is not clear whether *P. rendalli* is monotypic. Hayman (in Fain, 1953) considered

Eptesicus faradjius J. A. Allen, 1917 (Faradje and Niangara, Congo (K)) as synonymous with *P. rendalli*, followed by Verschuren (1957: Garamba N.P., NE-Congo (K)) and Rosevear (1965). Koopman (1965) could not differentiate *faradjius* from *Eptesicus phasma* G. M. Allen, 1911 (Meru River, NW of Mt. Kenya), which itself probably is a subspecies of *P. rendalli*, but not having seen *P. rendalli* from western Africa, preferred to leave it the status of subspecies, *P. rendalli faradjius*. Funaioli and Lanza (1968) classified their Somali record as *P. rendalli phasma*. Ansell (1969, 1978) and Ansell and Dowsett (1988) compared Zambian specimens and others from Botswana and Malawi with the data provided by Rosevear (1965) and noticed this southern population to have shorter tails (39–45, versus 36–40 in Rosevear, 1965, sic!) and longer ears (12–14, versus 11–12 in Rosevear, 1965) than those in other parts of the range. They did not notice, however, that Rosevear's (1965) data include all specimens available at that time in the British Museum collection, i.e., not only of West African specimens, but also including Malawian ones (see Thomas, 1896; Kershaw, 1922). Furthermore, short tails (35 and less) were recorded by Meinig (2000: Mali), Poché (1975: National Park W, Niger; Panyam, Nigeria), Allen (1917: NE-Congo (K)), and True (1893: E-Kenya), not forming a definite geographic pattern as assumed by Ansell (1969). Similarly, outside such a 'southern' population, long ears were measured by Aellen (1956; Senegal, 14.5 mm), Meinig (2000; Mali, 11.5–13.0 mm) and in the present Gambian material (see above, 12.5–13.3). Koopman (1975) included *phasma* (with *faradjius* as a synonym) as a probably valid subspecies of *P. rendalli* in Kenya, Somalia, Sudan, Uganda, and NE-Congo (K), and later (Koopman, 1994) recognised two subspecies, *P. r. rendalli* (Gambia to Chad) and *P. r. phasma* (Sudan and Somalia south of Botswana and Mozambique), without that typifying characters were ever specified.

The species is sexually dimorphic, as stated by Allen (1917) and confirmed by measurements published by Vielliard (1974) for Chad and Koopman (1975) for Sudan. However, while this seems to be obvious in forearm length (other wing size measurements are not available for comparison), skull length and upper toothrow length are less sexually dimorphic. Until further material from the range of the species becomes available for critical comparison, we use the above trinominal.

Previous records

Thomas (1889), Hill and Harrison (1987): Bathurst [type locality of *Vesperugo* (*Vesperus*) *rendalli*]. — Theodor (1956), Rosevear (1965): 'Gambia' [most likely based on the type material of this species]. Since its discovery at the end of the 19th century this is the first confirmation of the species in Gambia.

Biology

The individuals were mist-netted in Abuko N.R. over permanent freshwater pools within gallery forest. The senile male has the teeth so much worn down that an identification based on its skull alone would have been difficult; the flattened crowns of the molars remind of those of fruit bats and one is left wondering about the kind of insect prey captured and chewed by this individual.

Scotoecus hirundo (de Winton, 1899)

Material

Abuko N.R., 16 April 2000, ♂ (skull, alc), SMF 91064.

Measurements

SMF 91064 (♂): FA c.c. 34.2; FA s.c. 33.1; mtc III 32.2; mtc IV 30.9; mtc V 31.7;

Tb 13.0; bm 8.25. — Skull: Crn 13.68; Cbl 13.36; Cd–C cr 13.65; Mast 9.56; Bc-w 7.78; height of braincase 5.03; breadth across foramen infraorbitale 5.39; lacrymal breadth 7.38; Zyg 10.59; C–C 5.13; M–M^3 6.95; C–M^3 5.50; Ior 4.54; Mnd ang 11.14; Mnd cd 10.81; C–M_3 5.85.

Comparative material

[infraspecific allocation in brackets] Ethiopia: Chano, W-shore Lake Abaya, 11 km N Arba Minch, Gamu Gofa, 20 July 1974, ♀ (skull, alc), SMF 49136 (*hindei*), H. Rupp leg. — Gambela, Ilu Babor, 1972, 2 ♂♂, ♀ (3 skulls, 3 alc), SMF 41834, 44834–5 (*hirundo*), J. S. Ash leg., G. Nikolaus leg. — Uganda: Tororo, 1 October 1974, ♀ (skull, alc), Coll. East African Virus Research Institute (intermediate *hirundo*/*hindei*), A. B. C. Killango leg. — Kenya: Kapsania, Sigor, West-Pokot, 24 March 1971, ♀ (skull, skin) SMF 39443 (*hindei*), J. G. Williams leg. — Kisiaunet, 1675 m, West Pokot, 19 September 1970, ♀ (skull, skin), N.M. Nairobi 7572 (*hindei*), I. R. Aggundey leg. — Buffalo Springs Camp, 855 m, Isiolo Game Reserve, 29 September 1975, ♂ (skull, skin), SMF 48671 (*hindei*), D. Kock and R. Mumford leg. — Othaya, Nyeri Distr., June 1968, ♂ (skin), SMF 48670 (*hirundo*), J. G. Williams leg. — Governor's Camp, 1370 m, E-bank Mara River, Masai Mara Game Reseve, Narok Distr., 6 February 1967, ♂, 2 ♀♀ (3 skulls, 3 skins), SMF 48672–4 (*hindei*), J. G. Williams leg.

Taxonomy

Hill (1974) recognised two dark-winged African species by size within the genus *Scotoecus* Thomas, 1901. Based on two populations from Ghana and Benin, respectively, Robbins (1980) documented sexual dimorphism for the dark-winged *Scotoecus* (females averaging smaller, males larger) and concluded that *S. hindei* Thomas, 1901 should be considered as synonymous with *S. hirundo*. The size of the present specimen is within the variation limits of *falabae* Thomas, 1915, previously thought to be a subspecies of *S. hindei*. Until the sexual dimorphism and size variation over larger parts of the species range are known in more detail, we conservatively treat the dark-winged *Scotoecus* here as monotypic. — The specimen SMF 91064 has the PM^2 present on both sides.

This species has not been reported from Gambia previously. The individual was mist-netted in Guinea savanna.

Scotophilus leucogaster leucogaster (Cretzschmar, 1826)

Material

Abuko N.R., 20 May 2000, ♂, ♀ (2 skulls, 2 alc), SMF 91083–84; ibid., 7 June 2000, 2 ♀♀ (2 skulls, 2 alc), SMF 91089–90.

Measurements

♂, 3 ♀♀: HB 67–75; Tl 48.5–52.6; HF s.u. 9.0–10.1; E 15.5–16.3; FA c.c. 47.6–54.3; Tb 19.0–21.4; mtc III 47.1–50.3; mtc IV 45.8– 49.7; mtc V 43.4–46.9; bm 16–28.5. — Skull: Crn 17.95–19.1; Cbl 16.60–17.93; Mast 11.53–12.12: Bc-w 8.77–9.40; Zyg 13.28–13.40; C–C 6.45–6.73; M–M^3 8.16–8.52; C–M^3 6.34–6.71; Ior 4.75–4.95; Mnd ang 13.63–14.07; Mnd cd 13.43–13.91; C–M_3 7.43–7.55.

Comparative material

Sudan: Nuba Mts., Kordofan (for details see Kock, 1969).

Scotophilus viridis (Peters, 1852): Nigeria: Yankari Game Reserve, Bauchi, 30 August 1990, ♂ (damaged skull, alc), SMF 77328, A. Storch leg. — Ethiopia: Gambela, Ilu Babor, 539 m, 29 December 1969

and 10 February 1970, ♀, ♂ (2 skulls, 2 alc), SMF 41837–38, J. S. Ash leg.

Scotophilus dinganii (A. Smith, 1833): Ethiopia: Arba Minch, Lake Abaya, Gamu Gofa, 7 August 1973, ♀ (skull, alc), SMF 45007, H. Rupp leg. — Kenya: Kabete, NW Nairobi, 24 June 1956, 5 skulls and 5 alc, SMF 25843–47, E. Kulzer leg. — Congo (K): Kinkole-Pêcheur, Zone de la N'sele, Kinshasa Region, 17 May 1980, 2 ♀♀ (2 skulls, 2 alc), SMF 58065–66; Mutashia leg. — Kipopo, Shaba, 30 November 1955, ♀ (skull, alc), SMF 16866, P. Anciaux de Faveaux leg.

Taxonomy

The skull size of SMF 91084 falls into the range of variation of *S. viridis* as given by Robbins *et al.* (1985), but the specimen is actually larger than other *S. viridis* and agrees well with *S. l. leucogaster* from Burkina Faso and Kordofan, Sudan. In West Africa, *S. leucogaster* is represented by its nominate subspecies.

Previous records

Robbins *et al.* (1985: Toniataba); this specimen has also been listed by Grubb *et al.* (1999) as *S. leucogaster nucella* Robbins, 1983. However, *nucella* is considered to be a darker coloured forest species, being somewhat smaller in external measurements but slightly larger in craniodental measurements than *leucogaster* (see Robbins *et al.*, 1985). — For the Abuko N.R. Grubb *et al.* (1999); listed *S. dinganii nux* Thomas, 1904, or '?*colias*' Thomas, 1904. However, also *S. nux* is regarded as a separate forest-living species by Robbins *et al.* (1985). We therefore question the occurrence of *nucella*, *nux* or *dinganii colias* in Gambia, which needs to be substantiated.

Biology

The individuals were mist-netted in Abuko N.R. over permanent freshwater pools in gallery forest. Twin embryos and a probably lactating female were found on 7 June. While twins in *Scotophilus* are not uncommon, those reported for *S. nigrita* auctorum, nec *V. nigrita* Schreber, 1774, cannot be definitely referred to any presently recognized species. However, in *S. leucogaster* twin embryos were observed by Ansell (1963) in November at Lake Rukwa, Tanzania. One of the females was parasitised, besides by several argasid ticks and few spinturnicid mites, by a single bat fly (Diptera: Nycteribiidae), a male *Paracyclopodia bouvieri* (Falcoz, 1924), a new record for Gambia.

Discussion

The recent list of bats from The Gambia by Grubb *et al.* (1999), leaving apart in flight identifications and undocumented records (see Introduction), amounts to only 27 species for Gambia. The present investigation adds four species hitherto not documented for Gambia, i.e., *Lissonycteris angolensis*, *Pipistrellus* (*P.*) *rusticus*, *P.* (*Neoromicia*) *guineensis*, and *Scotoecus hirundo*, raising the total number of known species to 31. This represents a rather small number of bat species considering the latitude of Gambia und its position within the Sudano-Guinean woodland zone. With regard to the different habitat types still available for bats in this country, it indicates that the chiropteran fauna is still inadequately known. Surprisingly, even bats often found in human settlements occupying a variety of artificial structures, like bats of the families Emballonuridae, Molossidae or Vespertilionidae, are underrepresented by their number of records. This is likewise valid for Emballonuridae, Rhinolophidae and Vespertilionidae in natural habitats. With regard to the known set of species present in Gambia, ranging from forest inhabitants like *L. angolensis* to desert dwelling species like

Asellia tridens, it can be expected that several more species will be discovered by further field work, finally resulting in a species list comparable to those of neighbouring Senegal and Guinea-Bissau. We expect that the total species number of Gambia is in the range of about 50. The discrepancy between our estimation and the actual species number highlights the need for continued field work.

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APPENDIX I

Gazetteer of localities reported in this paper from The Gambia:

Abuko Nature Reserve — 13°24'N, 16°39'W
Bakau — 13°29'N, 16°41'W
Banjul (Atlantic Hotel Bird Garden) — 13°27'N, 16°35'W
Banjul (Ferry Port) — 13°27'N, 16°35'W
Banjul — 13°28'N, 16°39'W
Basse — 13°19'N, 14°13'W
Bijilo Forest Park — 13°26'N, 16°44'W
Brikama — 13°16'N, 16°39'W
Bundung (Latra Kunda) — 13°27'N, 16°41'W
Fajara (Mama's Restaurant) — 13°28'N, 16°41'W
Farafenni — 13°34'N, 15°36'W
Fula Bantang — 13°29'N, 14°50'W
Georgetown (Janjangbureh) — 13°33'N, 14°45'W
Janjangbureh = Georgetown
Jappeni, near — 13°25'N, 15°25'W
Jambur, near — 13°19'N, 16°43'W
Jiboroh Kuta, near Gambia/Senegal-Casamance border — 13°11'N, 16°34'W
Jiroff, near — 13°25'N, 15°42'W
Juffureh — 13°20'N, 16°23'W
Kartung — 13°06'N, 16°46'W
Hela Kunda — 13°17'N, 15°22'W
Kololi — 13°26'N, 16°43'W
Kombo St. Mary — 13°26'N, 16°41'W

Kunkilling Forest — 13°32’N, 14°43’W
Kuntaur — 13°40’N, 14°52’W
Lamin — 13°23’N, 16°39’W
Lamin Bridge — 13°24’N, 16°39’W
MacCarthy Island — 13°32’N, 14°46’W
Madianna — 13°21’N, 16°46’W
Madiyana Camp, Jinack Island, Sine Saloum Delta, Niumi N.P. — 13°35’N, 16°32’W
Maka — 13°44’N, 15°17’W
Makasutu Culture Forest (near Bafuloto) — 13°19’N, 16°37’W
Mungo Park Memorial — 13°33’N, 14°34’W
Old Jeswang (Serrekunda) — 13°26’N, 16°41’W
Sankuley Kunda — 13°31’N, 14°46’W
Sapu — 13°33’N, 14°54’W
Senegambia Hotel — W of Kololi
Serrekunda (opposite post office) (Old Jeswang) — 13°26’N, 16°41’W
Solifor Point, 500 m S of — 13°20’N, 16°49’W
Talending (Kujang) — 13°26’N, 16°41’W
Tanji River (Karinti) Bird Reserve (Head Quarter buildings), near Bald Cape, W of Brufut — 13°23’N, 16°48’W
Tendaba — 13°26’N, 15°48’W
Toniataba — 13°24’N, 15°35’W
Wali-Kunda — 13°34’N, 14°55’W
Yundum — 13°22’N, 16°41’W