

Inside this issue:

Notice Board	1
Scientific Contributions	2 - 6
<i>Hipposideros commersoni</i> (E. Geoffroy, 1813, Hipposideridae) roosting in trees in littoral forest, south-eastern Madagascar	2 - 3
Inventory of bat species of Niaouli forest, Bénin, and its bearing on the significance of the Dahomey Gap as a zoogeographic barrier	4 - 6
Recent Literature	7 - 11
Published Papers	7 - 11



© ECJ Seamark & TC Kearney 2007

Above: A female Midas free-tailed bat (*Mops midas*) caught at Makalali Game Reserve, Limpopo province, South Africa on 9th April 2007 [ECJS-03/09/04/2007 - deposited in the Transvaal Museum].

NOTICE BOARD

Future planning

- 11th European Bat Research Symposium, Cluj-Napoca, Romania, August 2008.
- 12th European Bat Research Symposium, Lithuania, August 2011.

Call for contributions

African Bat Conservation News publishes brief notes concerning the biology of bats, new geographical distributions (preferably at least 100 km from the nearest previously published record), sparsely annotated species lists resulting from local surveys including roost counts and echolocation and sonograms of bat species occurring on the African continent and adjacent regions, including the Arabian peninsula, Madagascar, and other surrounding islands in the Indian and Atlantic oceans.

African Bat Conservation News Project Cycle

Issues will be published Quarterly (January, April, July, October).

Deadlines for scientific contributions (1 November, 1 February, 1 May, 1 August).

Deadlines for non-scientific contributions (1 December, 1 March, 1 June, 1 September).

General contributions should be sent to the editor: EditorABCN@Africanbats.org

Scientific Contributions should be sent to: ScientificEditorABCN@Africanbats.org

Download site for ABCN:

www.Africanbats.org

The views and opinions expressed in articles are not necessarily those of the editor or publisher.

Articles and news items appearing in African Bat Conservation News may be reprinted, provided the author's and newsletter reference are given.

SCIENTIFIC CONTRIBUTIONS

HIPPOSIDEROS COMMERSONI (E. GEOFFROY, 1813, HIPPOSIDERIDAE) ROOSTING IN TREES IN LITTORAL FOREST, SOUTH-EASTERN MADAGASCAR



By: Irma M. O. Raharinantenaina^{1,2}, Amyot F. Kofoky^{1,3}, Tsibara Mbohoahy⁴, Daudet Andriafidison^{1,2}, Félicien Randrianandrianina¹, Olga R. Ramilijaona² and Richard K. B. Jenkins^{1,5,6}

¹Madagasikara Voakajy, B.P. 5181, Antananarivo (101), Madagascar. Email: voakajy@moov.mg

²Département de Biologie Animale, Faculté des Sciences, Université d'Antananarivo, B.P. 906, Antananarivo (101), Madagascar.

Email: nantysse@yahoo.fr, oramilij@yahoo.fr. ³Current address: Association Vahatra, B.P. 3972, Antananarivo (101),

Madagascar. Email: amyot320@yahoo.fr. ⁴Département des Sciences Biologiques, Faculté des Sciences, Université de Toliara,

B.P. 185, Toliara (601), Madagascar. Email: tmbohoahy@yahoo.fr. ⁵School of Biological Sciences, University of Aberdeen AB24

2TZ, United Kingdom. Email: r.jenkins@abdn.ac.uk. ⁶Corresponding author. Email: jenkins@moov.mg

Key words: *Hipposideros commersoni*, tree roosts, littoral forest, Madagascar.

Bats use a variety of habitats for roosting and feeding (KUNZ, 1982). Roosting sites can include hollow tree, caves, rock crevices, mines, tombs, tree foliage, and human-built structures (KUNZ and LUMSDEN, 2003) and they play an important role in the ecology and evolution of bats. Bat use of day roost can vary on a seasonal basis (BARCLAY *et al.* 1988) and detailed investigations of roost selection and occupancy are needed to understand potentially the limiting aspects in their life history.

Hipposideros commersoni (E. Geoffroy St.-Hilaire, 1813) or Commerson's leaf-nosed bat is endemic to Madagascar (SIMMONS, 2005) and is the largest microchiropteran species on the island (PETERSON *et al.*, 1995). It is usually reported roosting in caves (e.g. CARDIFF, 2006; GOODMAN, 2006) but has also been observed roosting in trees (RAZAFIMANAHAKA, 2006). *Hipposideros commersoni* was formerly listed as "Least Concern" (HUTSON *et al.*, 2001) and it is not considered to be dependent on intact forest (GOODMAN, 2006). However, growing evidence of intensive hunting and roost disturbance resulted in a revised status of "Near threatened" during the IUCN Global Mammal Assessment workshop in Antananarivo, Madagascar, April 2005.

This preliminary study aimed to determine the roosting habits of *H. commersoni* in a forest without any known rock outcrops or associated caves. The study was conducted in the Anosy Region of southeastern Madagascar, in the S9 fragment of Sainte Luce littoral forest (fragment S9; 24°47'-24°48'S and 47°11'-47°12'E) during May 2005.

On 6 May 2005, six *H. commersoni* and one *Myzopoda aurita* Milne-Edwards and Grandidier, 1878 were captured in mist nets set inside relatively intact littoral forest. We fitted one

juvenile male *H. commersoni* with a radio tag (Holohil Systems Ltd, Canada), weighing 0.52g. As required the transmitters represented a load < 5% of the bat's body weight (ALDRIDAGE and BRIGHAM, 1988). To locate diurnal roost sites, we attempted to locate the bat each morning using a Regal 2000 receiver and a 3 element hand held Yagi antenna for the duration of the radio transmitter battery life or until the transmitter became detached from the bat. We report here on data obtained between 8 and 19 May 2005. When roosts were found we noted the vernacular and scientific names, height (m), and circumference at breast height (CBH, m) of plants the animal roosted in, as well as the roost height (m) from the ground.

Twelve-day roosts were located in mature trees within the littoral forest consisting of six plant species from four families (Table 1). One of the tree species is endemic to the littoral forest in the Anosy Region, four are exploited by local communities for construction timber and three for their medicinal properties (Table 1). The mean height of roost trees was 13.7 m ± 1.11 and the mean CBH was 0.75 m ± 0.17. The bat roosted a few meters below the top of the tree at a mean height from the ground of 9.3 m ± 0.80. No other *H. commersoni* were observed roosting in the same tree as the individual with the transmitter. The area encompassing the six roost sites occupied a surface area of 1.4 ha (Figure 1). All of the roosts were situated in relatively intact forest, 25 m north of a marsh habitat and between 203 m and 330 m east of the capture site. Two tree species (*Phylloxylon xylophyloides* and *Canthium medium*) were used for two and three consecutive nights but otherwise the roost site changed on a daily basis. Three of the trees were used on more than one occasion (Table 1), when the same branch was utilized as perch.

Table 1 A description of the trees roosts used by a single *Hipposideros commersoni* in a littoral forest of south-eastern Madagascar. Endemicity and community use are identified: regional endemic (E), used by local people for construction (B) and medicinal plant (M). CBH = circumference at breast height. Frequency and order of use are given for consecutive days between 8/5/05 and 19/5/05.

Families	Species	Malagasy names and status/use	Frequency and order of use	Tree height (m)	CBH (m)	Perch height (m)
FABACEAE	<i>Phylloxylon xylophyloides</i>	sotro ^B	1, 3, 5, 6	15	1.50	13
LILIACEAE	<i>Casearia nigrescens</i>	tapinandro ^{B,M}	2	10	0.64	8
OLEACEAE	<i>Noronhia</i> sp.	belavenoky ^M	4, 8	14	0.36	9
FABACEAE	<i>Cynometra cloiselii</i>	mampay ^B	7	13	0.62	8
FABACEAE	<i>Eligmocarpus cynometroides</i>	hazomainty ^E	9	18	0.96	10
RUBIACEAE	<i>Canthium medium</i>	fatsikahitra ^{B,M}	10, 11, 12	12	0.40	8

As in Sainte Luce, *H. commersoni* in littoral forest in Tampolo roosted individually and frequently returned to the same part of the same tree to roost on a number of occasions (RAZAFIMANAHAKA, 2006). Mean roost (5.1 m ± 0.21) and tree (7.8 ± 0.38) height was lower in Tampolo than Sainte Luce (RAZAFIMANAHAKA, 2006). RAZAFIMANAHAKA, (2006) recorded *H. commersoni* roosting on 42 different tree species in littoral forest, including *Cynometra*, *Noronhia* and *Canthium*. BOLLEN and DONATI (2006) listed 189 tree species from Sainte Luce littoral forest and it is clearly important to increase our sampling in the future to determine if there are additional forest plants used by *H. commersoni*. It is nevertheless clear that large trees within relatively intact forest are used by roosting *H. commersoni* and, in the absence of alternative cavity roosting sites such as caves, the bats are probably dependent on the forest for roosting and foraging. The extent to which the bats and local people require the same trees also needs to be investigated further as this will have a direct impact on the conservation status of *H. commersoni* in littoral forests.

ACKNOWLEDGEMENTS

For funding this fieldwork we are grateful to the Darwin Initiative, British Ecological Society, Fauna and Flora International Rio Tinto Biodiversity Partnership and the BP Conservation Programme. For issuing permits for this research we thank the Ministère de l'Environnement, des Eaux et Forêts, the Association Nationale pour la Gestion des Aires Protégées and the Département de Biologie Animale de la Faculté des Sciences de l'Université d'Antananarivo. Thanks also to the Qit Madagascar Minerals S.A for their support and especially Jean-Baptiste Ramanamanjato, Dauphin Mbola, Givet and Rakoto. We are grateful to Paul A. Racey for comments on the manuscript.

REFERENCES

- ALDRIDGE, H. D. J. N. AND BRIGHAM, R. M., 1988. Load carrying and manoeuvrability in an insectivorous bat: a test of the 5% "rule" of radio-telemetry. *Journal of Mammalogy* **69**: 379–382.
- BARCLAY, R. M. R., FAURE, P. A. AND FARR, D. R., 1988. Roosting behaviour and roost selection by migrating silver-haired bats (*Lasionycteris noctivagans*). *Journal of Mammalogy* **69**: 821–825.
- BOLLEN, A. A AND DONATI, G., 2006. Conservation status of the littoral forest of south-eastern Madagascar: a review. *Oryx* **40**: 57–66.
- CARDIFF, S. G. 2006. Bat cave selection and conservation in Ankarana, northern Madagascar. MSc thesis. Columbia University, New York: 73 pp.
- GOODMAN, S. M. 2006. Hunting of Microchiroptera in south-eastern Madagascar. *Oryx* **40**: 1–4.
- HUTSON, A. M., MICKLEBURGH, S. P. AND RACEY, P. A., 2001. *Microchiropteran bats: Global Status Survey and Conservation Action Plan*. IUCN/SSC Chiroptera Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK: x + 258p.
- KUNZ, T. H. 1982. Roosting ecology of bats. In: Kunz, T. H (Ed.). *Ecology of bats*. Plenum Press, New York: 1–55.
- KUNZ, T. H. AND LUMSDEN, L. F., 2003. Ecology of Cavity and Foliage Roosting Bats. In Kunz, T. H. and Fenton, M. B. (Eds). *Bat Ecology*: 3–99. University of Chicago Press, Chicago.
- PETERSON, R. L., EGER, J. L., and MITCHELL, L., 1995. *Faune de Madagascar. 84. Chiropteres*. Muséum national d'Historie naturelle, Paris.
- RAZAFIMANAHAKA, J. H. 2006. Etude de l'utilisation de l'espace par *Hipposideros commersoni*, Geoffroy 1813 (Chiroptère: Hipposideridae) dans la forêt littorale de Tampolo. Mémoire de DEA. Forêt-Développement-Environnement. Ecole Supérieure des Sciences Agronomiques. Département des Eaux et Forêts. Université d'Antananarivo: 67p+XIII.
- SIMMONS, N. B. 2005. Order Chiroptera. In *Mammal Species of the World: a taxonomic and geographic reference*: 312–521. Wilson, D. E. and Reader, D. M. (Eds.). John Hopkins University Press, Baltimore.
- SIMMONS, N. B. AND VOSS, R. S., 1998. The mammals of Paracou, French Guiana: a Neotropical lowland rain forest fauna. Pt. 1. Bats. *Bulletin of the American Museum of Natural History*, n° 237: 219p.
- VAUGHAN, T. A. 1977. Foraging behaviour of giant leaf-nosed bat (*Hipposideros commersoni*). *East African of Wildlife Journal* **15**: 237–249.

Submitted: 28 May 2007

Accepted: 24 October 2007

INVENTORY OF BAT SPECIES OF NIAOULI FOREST, BÉNIN, AND ITS BEARING ON THE SIGNIFICANCE OF THE DAHOMEY GAP AS A ZOOGEOGRAPHIC BARRIER

By: Bruno A. Djossa^{1,2}; Brice A. Sinsin¹; Elisabeth K.V. Kalko^{2,3} and Jakob Fahr²

¹ Laboratoire d'Ecologie Appliquée-FSA/UAC/Bénin. ² Institute of Experimental Ecology, University of Ulm, Germany. ³ Smithsonian Tropical Research Institute, Balboa, Panama



Introduction

West African forests are usually grouped into two blocks: Upper Guinea (Guinea and Sierra Leone to Ghana; "Western Region" according to GRUBB, 1978) and Lower Guinea (Nigeria and eastward; "West Central Region" according to GRUBB, 1978). The West African rainforest region is characterized by a large number of species that are either endemic to Upper or Lower Guinea or both of them (BAKARR *et al.* 2004, KÜPER *et al.* 2004). The hiatus dividing both blocks is called Dahomey Gap (Fig. 1), i.e. a stretch of savanna reaching southward to the coast of the Gulf of Guinea (Dahomey was the former name of Bénin). However, it is still disputed whether this savanna-like vegetation exists because of a climatic anomaly or due to anthropogenic land-cover changes. DUPONT and WEINELT (1996) suggested that it was caused by both factors. ROBBINS (1978) considered human land use concentrated on the rich alluvial soils between Lomé, Togo, and Lagos, Nigeria, as the main driver of vegetation patterns (rather than climate) and therefore a relatively recent impact. AKOEGNINO (1998), who investigated isolated forest stands within the savannas of southern Bénin, assumed that the present rainfall is still sufficient to allow the establishment of a dense semi-evergreen forest, which would therefore represent the natural vegetation of this region without anthropogenic influence. On the contrary, SALZMANN and HOELZMANN (2005) reported that the palaeorecord from Lac Sélé, situated about 60 km northeast of Niaouli, suggests that the role of humans in shaping the West African savannas has been overestimated. Nowadays, this area is largely dominated by farms, fallows and grasslands intermingled with small fragments of semi-deciduous forest (ADOMOU, 2005). BOOTH (1958) also indicated that at certain periods the Dahomey Gap had been

much wider than at present.

BOOTH (1954, 1958) considered the savanna vegetation of the Dahomey Gap to be an important faunal barrier for forest-dependent species, leading over evolutionary time to endemic taxa on both sides of the Dahomey Gap. This view was challenged by ROBBINS (1978), who demonstrated that several forest-dependent mammal species can be found in forest patches within the Dahomey Gap. In the course of ongoing bat inventories throughout Bénin (BIOTA-project), we sampled one of these areas falling within the gap, the Niaouli Forest, to assess the composition of forest- vs. savanna-dependent bat species and to evaluate the importance of these forest fragments as stepping-stones connecting populations on both sides of the Dahomey Gap.

Material and Methods

Niaouli Forest (6°44'N, 2°08'E) is located about 50 km north of Cotonou and covers ca. 220 ha. Nowadays, only 65.5 ha of remnant dense forest remains that represent relatively undisturbed forest. Part of this forest is classified as "forêt du bas fond" and comprises 24.2 ha, which is intersected by the Ava River (Fig. 2). The majority of this forest type is permanently flooded. A second portion (41.3 ha) is located on a plateau ("forêt du plateau"), which is surrounded by savanna.

We sampled bats in Niaouli Forest for 3 nights (5th, 6th and 7th of August) in 2003 with 2 mist nets (26 mist net-hours) and 1 night (1st of Jun) in 2007 with 5 mist nets (32.5 mist net-hours). Mist nets employed measured 12 x 2.8 m (16 mm mesh; 2 x 70 d netting), with 5 shelves. Nets were erected between poles near ground level or slightly elevated above the surrounding vegetation (herb layer). Mist nets were open

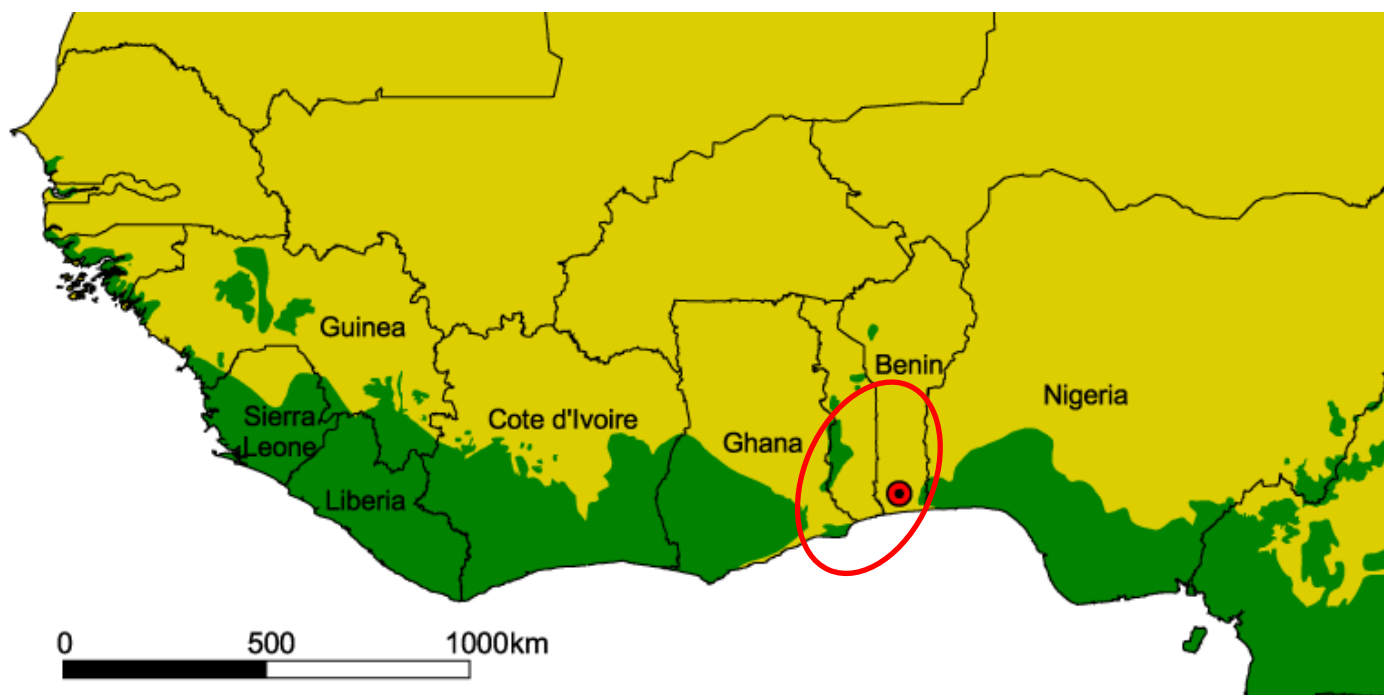


Figure 1: Potential extent of the forest biome in West Africa (OLSON *et al.* 2001), showing the Dahomey Gap (encircled), which separates Upper and Lower Guinea. The point indicates the location of Niaouli Forest.

Table 1: Bat species recorded during this study from Niaouli Forest, southern Bénin. Measurements include only adult specimens (n=39) except for two subadult specimens as indicated.

Species	Sex, (sample size), age	Forearm (mm) x ± SD (min-max)	Body mass (g) x ± SD (min-max)
<i>Epomophorus gambianus</i>	♂♂ (n=3)	88.3±1.2 (87.0-89.2)	117.3±16.4 (105-136)
	♀♀ (n=10)	81.6±3.5 (75.2-86.0)	83.4±9.3 (74-103)
<i>Epomops franqueti</i>	♂♂ (n=3)	89.7±3.4 (86.8-93.5)	111.0±9.6 (100-118)
	♀♀ (n=4)	80.3±3.5 (75.2-82.7)	83.5±11.3 (73-99)
<i>Hypsignathus monstrosus</i>	♂ (n=1) subadult	109.7	161
	♀♀ (n=2)	111.1 (110.5-111.7)	212.5 (201-224)
<i>Megaloglossus woermanni</i>	♂♂ (n=9)	40.5±0.8 (38.6-41.5)	13.0±0.7 (12-14)
	♀♀ (n=4)	40.2±0.6 (39.7-41.0)	12.8±1.5 (11-14)
<i>Eidolon helvum</i>	♂♂ (n=3)	116.8±1.4 (116.0-118.5)	218.0±14.1 (205-233)
	♀ (n=1) subadult	100.7	107
<i>Hipposideros cyclops</i>	♂ (n=1)	68.2	34

between 19:15 and 20:00 until 00:00 hrs during the first half of the night and re-opened in the early morning from 4:00 to 6:30 hrs. Sites were selected in both “forêt du plateau” and “forêt du bas fond”. Species were identified with keys of HAYMAN and HILL (1971) and BERGMANS (2002) as well as the reference collection recently established at the University of Abomey-Calavi. To identify *Epomops* spp., we mainly relied on forearm length, body mass, and the pattern of the third palatal ridge to distinguish between *E. buettikoferi* (Matschie, 1899) and *E. franqueti* (Tomes, 1860). Two specimens of *Hypsignathus monstrosus* H. Allen, 1862 (1 ♂, field number [F-N°] 1850; 1 ♀, F-N° 11b) and one specimen of *Hipposideros cyclops* (Temminck, 1855) (♂, F-N° 1867) were collected and deposited in the reference collection at the University of Abomey-Calavi, all other bats were released.

Results

We captured 55 bats in total (34 in 2003 and 21 in 2007) comprising six species (Table 1). Records of *Hypsignathus monstrosus* and *Megaloglossus woermanni* Pagenstecher, 1885 constitute the first published records for Bénin. Based on their general distribution patterns, habitat preferences of species recorded during the present survey can be characterized as follows. *Epomophorus gambianus* (Ogilby, 1835) is a savanna species that invades the forest zone where rainforest has been converted to farmbrush (BERGMANS, 1988; FAHR and EBIGBO, 2003). In West Africa, *Epomops franqueti* is mostly confined to rainforest (BERGMANS, 1989). *Hypsignathus monstrosus* is mainly found in the forest zone, but extends into savannas along gallery forests and forest islands (BERGMANS, 1989; FAHR *et al.* 2006). *Megaloglossus woermanni* is mostly confined to rainforest (BERGMANS, 1997; FAHR and EBIGBO, 2003). *Eidolon helvum* is a migratory species, which, depending on season, is found both in rainforest and savanna habitats (BERGMANS, 1991). *Hipposideros cyclops* (Fig. 3) is mostly found in the rainforest zone but extends into the forest-savanna mosaic along gallery forests and forest islands (DECHER and FAHR, 2005). Overall, four species (*H. monstrosus*, *E. franqueti*, *M. woermanni* and *H. cyclops*) or 67% of the species total are those that are mainly found within the forest zone.

Discussion

Epomops, *Hypsignathus* and *Megaloglossus* were listed by BOOTH (1954) as genera occurring in rainforest east and west of the Dahomey Gap, and BERGMANS (1997) mapped the Dahomey Gap as a barrier for *Hypsignathus* and *Megaloglossus*. These conclusions are not supported by our data as they were found to occur within the Dahomey Gap.



Figure 2: Two different views of the flooded part (“forêt du bas fond”) of Niaouli Forest and Ava River.

BEKKER and EKOUE (2004), who also reported *Epomophorus gambianus* from Niaouli Forest, additionally found *Nanonycteris veldkampii* (Jentink, 1888) (a migratory species occurring in both forest and savanna habitats) as well as *Hipposideros caffer* (Sundevall, 1846) (a species found both in forest and savanna habitats). Both *E. franqueti* and *H. cyclops* were previously recorded from Kpodave (ROBBINS, 1980), which is located about 40 km west of Niaouli. *Epomops franqueti*, *M. woermanni* and *H. cyclops* were also captured in Lama Forest (VOGLOZIN, 2005; WEBER, 2005), another fragment situated about 25 km north of Niaouli. These different collections from several forest remnants within the Dahomey Gap confirm the presence of forest-dependent bat species in the Dahomey Gap as already reported by



Figure 3: *Hipposideros cyclops* (F-N° 1867) from Niaouli Forest.

ROBBINS (1978). We therefore agree with ROBBINS (1978) that the presence of forest-dependent mammals within the Dahomey Gap necessitates a re-evaluation of its importance as a zoogeographic barrier, and in particular for mobile mammals like bats.

Acknowledgements

We appreciate funding by the German Ministry of Education and Science through the BIOLOG-program (BMBF; project W09 BIOTA-West, 01 LC 0411). We thank the authorities of Niaouli Forest for granting the permit to conduct this survey.

References

- ADOMOU, A. C., 2005. *Vegetation Patterns and Environmental Gradients in Bénin: Implications for Biogeography and Conservation*. PhD-Thesis, University of Wageningen. 136 pp.
- AKOEGNINO A., 1998: Les forêts denses humides semi-décidues du Sud-Bénin. *Journal de la Recherche Scientifique de l'Université du Bénin* **2**(1), 125-131.
- BAKARR, M., OATES, J. F., FAHR, J., PARREN, M. P. E., RÖDEL, M.-O. and DEMEY, R., 2004. Guinean forests of West Africa, in: *Hotspots Revisited: Earth's Biologically Richest and Most Endangered Terrestrial Ecoregions*, (eds. MITTERMEIER, R. A., GIL, P. R., HOFFMAN, M., PILGRIM, J., BROOKS, T., MITTERMEIER, C. G., LAMOREUX, J. and DA FONSECA, G. A. B.), 123-130. CEMEX and Conservation International, Mexico City & Washington, D.C. 392 pp.
- BEKKER, J. P. and EKUÉ, M. R. M., 2004. Preliminary report on the small mammals collected during the mission RéRE-VZZ 2002 in Bénin (Mammalia: Insectivora, Chiroptera, Rodentia), in: *Actes du Séminaire-Atelier sur la Mammalogie et la Biodiversité Abomey-Calavi, Bénin, 30/10-18-11/2002*, (eds. MENSAH, G. A., SINSIN, B. and THOMASSEN, E.), 273-297. Mededeling van de Vereniging voor Zoogdierkunde en Zoogdierbescherming, Vol. 70. 305 pp.
- BERGMANS, W., 1988. Taxonomy and biogeography of African fruit bats (Mammalia, Megachiroptera). 1. General introduction; material and methods; results: The genus *Epomophorus* Bennet, 1836. *Beaufortia* **38**(5): 75-146.
- BERGMANS, W., 1989. Taxonomy and biogeography of African fruit bats (Mammalia, Megachiroptera). 2. The genera *Micropteropus* Matschie, 1899, *Epomops* Gray, 1870, *Hypsignathus* H. Allen, 1861, *Nanonycteris* Matschie, 1899, and *Plerotes* Andersen, 1910. *Beaufortia* **39**(4): 89-153.
- BERGMANS, W., 1991 [for 1990]. Taxonomy and biogeography of African fruit bats (Mammalia, Megachiroptera). 3. The genera *Scotonycteris* Matschie, 1894, *Casinycteris* Thomas, 1910, *Pteropus* Brisson, 1762, and *Eidolon* Rafinesque, 1815. *Beaufortia* **40**(7): 111-176.
- BERGMANS, W., 1997. Taxonomy and biogeography of African fruit bats (Mammalia, Megachiroptera). 5. The genera *Lissonycteris* Andersen, 1912, *Myonycteris* Matschie, 1899 and *Megaloglossus* Pagenstecher, 1885; general remarks and conclusions; annex: Key to all species. *Beaufortia* **47**(2): 11-90.
- BERGMANS, W., 2002. Les chauves-souris (Mammalia, Chiroptera) de Bénin. *Compte rendu préliminaire*. IUCN. Amsterdam. 41 pp.
- BOOTH, A. H., 1954. The Dahomey Gap and the mammalian fauna of the West African Forest. *Rev. Zool. Bot. Afr.* **50**(3-4): 305-314.
- BOOTH, A. H., 1958. The Niger, the Volta and the Dahomey Gap as geographic barriers. *Evolution* **12**(1): 48-62.
- DECHER, J. and FAHR, J., 2005. *Hipposideros cyclops*. *Mammalian Species* (**763**): 1-7.
- DUPONT, L. M. and WEINELT, M., 1996. Vegetation history of the savanna corridor between the Guinean and the Congolian rain forest during the last 150,000 years. *Vegetation History and Archaeobotany* **5**(4): 273-292.
- FAHR, J. and EBIGBO, N. M., 2003. A conservation assessment of the bats of the Simandou Range, Guinea, with the first record of *Myotis welwitschii* (Gray, 1866) from West Africa. *Acta Chiropterologica* **5**(1): 125-141.
- FAHR, J., DJOSSA, B. A. and VIERHAUS, H., 2006. Rapid assessment of bats (Chiroptera) in Déré, Diécké and Mt. Béro classified forests, southeastern Guinea; including a review of the distribution of bats in Guinée Forestière, in: *A Rapid Biological Assessment of Three Classified Forests in Southeastern Guinea*, (eds. WRIGHT, H. E., McCULLOUGH, J., ALONSO, L. E. and DIALLO, M. S.), 168-180, 245-247. RAP Bulletin of Biological Assessment, Vol. 40. Conservation International, Washington, D.C. 248 pp.
- GRUBB, P., 1978. Patterns of speciation in African mammals. *Bull. Carnegie Mus. nat. Hist.* **6**: 152-167.
- HAYMAN, R. W. and HILL, J. E., 1971. Order Chiroptera, in: *The Mammals of Africa, an Identification Manual*, (eds. MEESTER, J. and SETZER, H. W.), 1-73. Smithsonian Institution, Washington, D.C.
- KÜPER, W., SOMMER, H., LOVETT, J. C., MUTKE, J., LINDER, H. P., BEETJE, H. J., VAN ROMPAEY, R. S. A. R., CHATELAIN, C., SOSEF, M. and BARTHLOTT, W., 2004. Africa's hotspots of biodiversity redefined. *Ann. Missouri Bot. Gard.* **91**(4): 525-535.
- OLSON, D. M., DINERSTEIN, E., WIKRAMANAYAKE, E. D., BURGESS, N. D., POWELL, G. V. N., UNDERWOOD, E. C., D'AMICO, J. A., ITOUA, I., STRAND, H. E., MORRISON, J. C., LOUCKS, C. J., ALLNUTT, T. F., RICKETTS, T. H., KURA, Y., LAMOREUX, J. F., WETTENGEL, W. W., KURA, Y., HEDAO, P. and KASSEM, K. R., 2001. Terrestrial ecoregions of the world: A new map of life on Earth. *BioScience* **51**(11): 933-938.
- ROBBINS, C. B., 1978. The Dahomey gap – a reevaluation of its significance as a faunal barrier to West African forest mammals. *Bull. Carnegie Mus. nat. Hist.* **6**: 168-174.
- ROBBINS, C. B., 1980. Small mammals of Togo and Bénin. I. Chiroptera. *Mammalia* **44**(1): 83-88.
- SALZMANN, U. and HOELZMANN, P., 2005. The Dahomey Gap: An abrupt climatically induced rain forest fragmentation in West Africa during the late Holocene. *The Holocene* **15**(2): 190-199.
- VOGLOZIN, N. C. A., 2005. *Influences des systèmes agro-forestiers sur la diversité des communautés de chauves-souris dans la forêt classée de la Lama*. DEA-Thesis, Faculté des Sciences Agronomiques, Université d'Abomey-Calavi, Bénin.
- WEBER, N., 2005. *Raumnutzung und Fouragierverhalten des afrikanischen Langzungenflughundes Megaloglossus woermanni (Chiroptera: Pteropodidae) im Lama-Wald, Bénin, Westafrika*. Diploma-Thesis, Friedrich-Alexander-Universität Erlangen-Nürnberg. 84 pp.

Submitted: 30 August 2007

Accepted: 16 November 2007

RECENT LITERATURE

PUBLISHED PAPERS

VERY, D. M., 2007. Pleistocene micromammals from Wonderwerk Cave, South Africa: practical issues. *Journal of Archaeological Science* 34(4): 613-625.

Abstract: The combination of large samples and broken material raises practical issues and potential problems that may be undetectable in smaller samples. Informal identification keys are provided to indicate the types of non-dental features that may be usefully employed when standard features are not present. This process has so far been taken to the generic level. The ratio of minimum numbers of individuals based on mandibles alone (MD) to those obtained using mandibles and maxillae (MNI) varies from 0.59 in Gerbillinae to 0.97 in Macroscelididae, thereby demonstrating that counting only mandibles will skew sample structure. Differential difficulty of identification at lower taxonomic levels, combined with differential susceptibility to breakage, also influences the likelihood that the proportional representation of taxa will be correct.

BENDA, P., ANDREAS, M., KOCK, D., LUCAN, R. K., MUNCLINGER, P., NOVÁ, P., OBUCH, J., OCHMAN, K., REITER, A., UHRIN, M., and WEINFURTOVÁ, D., 2006. Bats (Mammalia: Chiroptera) of the Eastern Mediterranean. Part 4. Bat fauna of Syria: Distribution, systematics, ecology. *Acta Soc. Zool. Bohem.* 70((1-4)): 1-329.

Abstract: A complete list of bat records available from Syria was compiled from literature and from new records, based on field studies and examination of museum specimens. The record review is complemented by distribution maps, summaries of the distributional statuses of particular species, files of field observations, reviews of taxonomy, and data on feeding ecology. To some species sheets, also the echolocation data are added. From the territory of the modern Syrian Arab Republic, 290 records of 27 bat species belonging to eight families are reported; viz. *Rousettus aegyptiacus* (Geoffroy, 1810) (5 record localities), *Rhinopoma microphyllum* (Brünnich, 1782) (2), *Rhinopoma hardwickii* Gray, 1831 (4), *Taphozous nudiventris* Cretzschmar, 1830 (9), *Rhinolophus ferrumequinum* (Schreber, 1774) (25), *R. hipposideros* (Bechstein, 1800) (10), *R. euryale* Blasius, 1853 (2), *R. mehelyi* Matschie, 1901 (6), *R. blasii* Peters, 1866 (3), *Asellia tridens* (Geoffroy, 1813) (10), *Myotis myotis* (Borkhausen, 1797) (6), *M. blythii* (Tomes, 1857) (10), *M. nattereri* (Kuhl, 1817) (6), *M. emarginatus* (Geoffroy, 1806) (5), *M. aurascens* Kuszajkin, 1935 (4), *M. capaccinii* (Bonaparte, 1837) (13), *Eptesicus serotinus* (Schreber, 1774) (13), *E. bottae* (Peters, 1869) (10), *E. anatolicus* Felten, 1971 (4), *Hypsugo savii* (Bonaparte, 1837) (11), *Pipistrellus pipistrellus* (Schreber, 1774) (16), *P. kuhlii* (Kuhl, 1817) (69), *Nyctalus noctula* (Schreber, 1774) (4), *Otonycteris hemprichii* Peters, 1859 (13), *Plecotus macrobullaris* Kuszajkin, 1965 (5), *Miniopterus schreibersii* (Kuhl, 1817) (9), and *Tadarida teniotis* (Rafinesque, 1814) (16). The records labelled from Syria in the historical broader sense (which included also the modern Lebanon, Jordan, Palestine, and parts of southern Turkey) and thus of undefined origin, were also added and discussed. *Eptesicus anatolicus*, which is here considered a separate species according to results of profound morphological analysis, is in Syria recorded for the first time. From the territory currently ruled by the Syrian Arab Republic (i.e., without the Golan Heights), *R. hipposideros*, *M. nattereri*, *H. savii*, *N. noctula*, and *T. teniotis* are reported for the first time. The reviews of taxonomic opinions concerning particular species, supplemented in some cases by original analyses, present discussions and revisions of taxonomy of Syrian populations, namely in *Taphozous nudiventris*, *Rhinolophus ferrumequinum*, *R. euryale*, *R. mehelyi*, *Myotis myotis*, *M. nattereri*, *M. emarginatus*, *Eptesicus serotinus*, *E. bottae*, *Hypsugo savii*, *Otonycteris hemprichii*, and *Miniopterus schreibersii*. The name *Rhinolophus (Euryalus) judaicus* Andersen et Matschie, 1904 is found to be a synonym of the name *R. mehelyi* Matschie, 1901 instead of *R. euryale* Blasius, 1853. New interpretations on the type localities are discussed and/or suggested (*Vespertilio Microphyllum* Brünnich, 1782, *Taphozous kachhensis babylonicus* Thomas, 1915, *Rhinolophus blasii* Peters, 1866, and *Myotis Escalerae* Cabrera, 1904).

EICK, G. N., JACOBS, D. S., YANG, F., and VOLLETH, M., 2007. Karyotypic differences in two sibling species of *Scotophilus* from South Africa (Vespertilionidae, Chiroptera, Mammalia). *Cytogenetic and Genome Research* 118(1): 72-77.

Abstract: Karyotype descriptions are given for *Scotophilus dinganii* ($2n = 36$, $FNa = 50$) and a recently discovered sister-species, *Scotophilus* sp. nov. ($2n = 36$, $FNa = 52$). These two sibling species occur sympatrically and are distinguished by body size, echolocation frequency and cytochrome b sequence. Cytogenetically, both species differ from other *Scotophilus* species in the subtelocentric morphology of chromosome 2 and a terminal heterochromatic segment on the X chromosome. Further, *Scotophilus* sp. nov. is characterized by a subtelocentric chromosome 4 not found in any other *Scotophilus* species. Comparing the *Scotophilus* karyotype with that of the vespertilionid genus *Myotis*, extensive conservation of whole chromosome arms has been found recently. However, out of 25 chromosomal arms six could not be identified in *Scotophilus*. Therefore, in the present study fluorescence in situ hybridization with whole chromosome painting probes from *Myotis myotis* was carried out on metaphase preparations from *Scotophilus dinganii* and *Scotophilus* sp. nov. These experiments revealed that three previously unidentified *Scotophilus* chromosomes (A, B, C) contain homologous sequences to *Myotis* chromosomes 18 plus 22, 19 plus 25, and 16/17, respectively.

GOODMAN, S. M., RYAN, K. E., MAMINIRINA, C. P., FAHR, J., CHRISTIDIS, L., and APPLETON, B., 2007. The specific status of populations on Madagascar referred to *Miniopterus fraterculus* (Chiroptera: Vespertilionidae), with the description of a new species. *Journal of Mammalogy* 88(5): 1216-1229.

Abstract: A new species of bat of the genus *Miniopterus* is described from Madagascar based on a series of specimens taken in the Central Highlands of the island. This new species previously was identified as *M. fraterculus*, which is widespread in portions of eastern and southern Africa. Comparisons between these 2 taxa were further complicated because *M. fraterculus* occurs in portions of its range in sympatry with a morphologically similar species, *M. natalensis*. Based on specimen material and associated tissue samples from near the type localities of *M. natalensis* and *M. fraterculus*, as well as access to some of the critical type specimens, morphological and genetic molecular analyses were used to determine that Malagasy specimens previously assigned to *M. fraterculus* represent a previously unrecognized species of *Miniopterus* endemic to the island. Given that the habitat used by *Miniopterus* sp. nov. is not necessarily associated with native forest, that it has a broad distribution across the Central Highlands, and that it has been found in synanthropic situations, this species is not considered a conservation concern.

GROSETH, A., FELDMANN, H., and STRONG, J. E., 2007. The ecology of Ebola virus. *Trends in Microbiology* 15(9): 408-416.

Abstract: Since Ebola virus was first identified more than 30 years ago, tremendous progress has been made in understanding the molecular biology and pathogenesis of this virus. However, the means by which Ebola virus is maintained and transmitted in nature remains unclear despite dedicated efforts to answer these questions. Recent work has provided new evidence that fruit bats might have a role as a reservoir species, but it is not clear whether other species are also involved or how transmission to humans or apes takes place. Two opposing hypotheses for Ebola emergence have surfaced; one of long-term local persistence in a cryptic and infrequently contacted reservoir, versus another of a more recent introduction of the virus and directional spread through susceptible populations. Nevertheless, with the increasing frequency of human filovirus outbreaks and the tremendous impact of infection on the already threatened great ape populations, there is an urgent need to better understand the ecology of Ebola virus in nature.

JACOBS, D. S., KELLY, E. J. M. M., and STOFFBERG, S., 2007. Thermoregulation in two free-ranging subtropical insectivorous bat species: *Scotophilus* species (Vespertilionidae). *Canadian Journal of Zoology* 85(8): 883-890.

Abstract: Little is known about the thermal regulatory behaviour of free-ranging subtropical bats. We studied torpor use in two free-ranging subtropical sibling species of insectivorous bat, *Scotophilus dinganii* (A. Smith, 1833) and *Scotophilus mhlanganii*, during the austral autumn. All *S. dinganii* (mass 28.9 ± 2.6 g (mean \pm SD)) roosted in buildings, whereas all *S. mhlanganii* (28.0 ± 0.4 g) roosted in the foliage of trees or in a tree cavity. Contrary to what has been seen in other subtropical species, both *Scotophilus* species used only one bout of torpor per day. Bats entered torpor 2 h after returning from foraging and aroused passively as the roost was heated by the sun the following day. There was a negative correlation between duration of foraging and duration of torpor, probably because bats that foraged longer had less time for torpor. Despite physical differences between roosts, foliage and building roosts appeared equally thermally labile, resulting in torpor bouts of similar depth and duration between individuals of the two species that used such roosts. Cavity-roosting female *S. mhlanganii*, on the other hand, used torpor bouts that were longer and shallower than those used by its female conspecifics in foliage roosts and female *S. dinganii* in buildings. Thus, thermal regulatory behaviour was determined more by the type of roost used than by interspecific differences in physiology.

LIM, B. K., 2007. Divergence times and origin of neotropical sheath-tailed bats (Tribe Diclidurini) in South America. *Mol. Phylog. Evol.* 45(3): 777-791.

Abstract: Times of divergence and origin of sheath-tailed bats (family Emballonuridae) in the New World were approximated with a relaxed molecular clock approach using Bayesian analysis of introns from the three nuclear genetic transmission systems in mammals (autosomal, X and Y sex chromosomes). An upper constraint of 30 mya for the oldest known Neotropical emballonurid fossil and a lower constraint of 13 mya for the only pre-Pleistocene fossil of an extant genus were used as calibration points. Differentiation began in the Late Oligocene with the appearance of two subtribes as independently corroborated by each gene. Following an explosive model of evolution, the genera diversified relatively suddenly in the Early Miocene with seven of the eight genera radiating within 1.4 myr and most intrageneric speciation occurring before the Pliocene. Optimization of ancestral areas onto the phylogeny suggests that the ancestor of New World emballonurid bats has its origin in Africa and this is the third report of placental mammals colonizing South America by trans-Atlantic dispersal and subsequent speciation in allopatry.

MASEKO, B. C., BOURNE, J. A., and MANGER, P. R., 2007. Distribution and morphology of cholinergic, putative catecholaminergic and serotonergic neurons in the brain of the Egyptian rousette flying fox, *Rousettus aegyptiacus*. *Journal of Chemical Neuroanatomy* 34(3-4): 108-127.

Abstract: Over the past decade much controversy has surrounded the hypothesis that the megachiroptera, or megabats, share unique neural characteristics with the primates. These observations, which include similarities in visual pathways, have suggested that the megabats are more closely related to the primates than to the other group of the Chiropteran order, the microbats, and suggests a diphyletic origin of the Chiroptera. To contribute data relevant to this debate, we used immunohistochemical techniques to reveal the architecture of the neuromodulatory systems of the Egyptian rousette (*Rousettus aegyptiacus*), an echolocating megabat. Our findings revealed many similarities in the nuclear parcellation of the cholinergic, putative catecholaminergic and serotonergic systems with that seen in other mammals including the microbat. However, there were 11 discrete nuclei forming part of these systems in the brain of the megabat studied that were not evident in an earlier study of a microbat. The occurrence of these nuclei align the megabat studied more closely with primates than any other mammalian group and clearly distinguishes them from the microbat, which aligns with the insectivores. The neural systems investigated are not related to such Chiropteran specializations as echolocation, flight, vision or olfaction. If neural characteristics are considered strong indicators of phylogenetic relationships, then the data of the current study strongly supports the diphyletic origin of Chiroptera and aligns the megabat most closely with primates in agreement with studies of other neural characters.

MASEKO, B. C., and MANGER, P. R., 2007. Distribution and morphology of cholinergic, catecholaminergic and serotonergic neurons in the brain of Schreiber's long-fingered bat, *Miniopterus schreibersii*. *Journal of Chemical Neuroanatomy* 34(3-4): 80-94.

Abstract: The current study describes the nuclear parcellation and neuronal morphology of the cholinergic, catecholaminergic and serotonergic systems within the brain of a representative species of microbat. While these systems have been investigated in detail in the laboratory rat, and examined in several other mammalian species, no chiropterans, to the author's knowledge, have been examined. Using immunohistochemical stains for choline-acetyltransferase, tyrosine hydroxylase and serotonin, we were able to observe and document these systems in relation to the cytoarchitecture. The majority of cholinergic nuclei typically found in mammals were evident in the microbat, however we could not find evidence for choline-acetyltransferase immunopositive neurons in the Edinger-Westphal nucleus, parabigeminal nucleus, and the medullary tegmental field, as seen in several other mammalian species. A typically mammalian appearance of the catecholaminergic nuclei was observed, however, the anterior hypothalamic groups (A15 dorsal and ventral), the dorsal and dorsal caudal subdivisions of the ventral tegmental area (A10d and A10dc), and the ventral (pars reticulata) substantia nigra (A9v) were not present. The serotonergic nuclei were similar to that reported in all eutherian mammalian species studied to date. The overall complement of nuclei of these systems in the microbat, while different to the species examined in other orders of mammals, resembles most closely the complement seen in earlier studies of insectivore species, and is clearly distinguished from that seen in rodents, carnivores and primates. This data is discussed in terms of the phylogenetic relationships of the chiropterans.

MÜLLER, M. A., PAWESKA, J. T., LEMAN, P. A., DROSTEN, C., GRYWNA, K., KEMP, A., BRAACK, L. E. O., SONNENBERG, K., NIEDRIG, M., and SWANEPOEL, R., 2007. Coronavirus antibodies in African bat species. *Emerging Infectious Diseases* 13(9): 1367-1370.

Abstract: Asian bats have been identified as potential reservoir hosts of coronaviruses associated with severe acute respiratory syndrome (SARS-CoV). We detected antibody reactive with SARS-CoV antigen in 47 (6.7%) of 705 bat serum specimens comprising 26 species collected in Africa; thus, African bats may harbor agents related to putative group 4 CoV.

O'BRIEN, J., MCCRACKEN, G. F., SAY, L., and HAYDEN, T. J., 2007. Rodrigues fruit bats (*Pteropus rodricensis*, Megachiroptera: Pteropodidae) retain genetic diversity despite population declines and founder events. *Conservation Genetics* 8(5): 1073-1082.

Abstract: Fruit bats of the genus *Pteropus* are important contributors to ecosystem maintenance on islands through their roles as pollinators and seed dispersers. However, island faunas are the most prone to extinction and there is a real need to assess the possible genetic implications of population reductions in terms of extinction risk. An effective method of ameliorating extinction risk in endangered species is the establishment of captive populations ex situ. The effectiveness of captive breeding programmes may be assessed by comparing the genetic variability of captive colonies to that of wild counterparts. Here, we use polymorphic microsatellite loci to assess genetic variability in wild, critically endangered Rodrigues fruit bats (*Pteropus rodricensis*, Dobson 1878) and we compare this variability to that in a captive colony. We document remarkable conservation of genetic variability in both the wild and captive populations, despite population declines and founder events. Our results demonstrate that the wild population has withstood the negative effects of population reductions and that captive breeding programmes can fulfil the goals of retaining genetic diversity and limiting inbreeding.

OLAYEMI, F. O., FAGBOHUN, O. A., AIKI-RAJI, C. O., OLUWAYELU, D. O., ROBERTS, O. O., and EMIKPE, B. O., 2006. Haematology of the African fruit bat (*Eidolon helvum*). *Tropical Veterinarian* 24(4): 81-84.

Abstract: The effect of sex on the haematological values of apparently healthy African fruit bat (*Eidolon helvum*) was determined. There were no significant sex differences ($P > 0.05$) in the red blood cell count, packed cell volume, haemoglobin concentration, mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration. The total white blood cell, lymphocyte, neutrophil, eosinophil, monocyte counts were also similar in the male and female African fruit bat. The lack of sexual dimorphism of the haematological values observed for the African fruit bats means that the normal blood values of healthy males could largely be employed in the assessment of health status in females and vice-versa.

PICOT, M., JENKINS, R. K. B., RAMILJAONA, O., RACEY, P. A., and CARRIERE, S. M., 2007. The feeding ecology of *Eidolon dupreanum* (Pteropodidae) in eastern Madagascar. *African Journal of Ecology* 45(4): 645-650.

Abstract: We investigated the diet of the endemic fruit bat *Eidolon dupreanum* (Chiroptera: Pteropodidae) in eastern Madagascar. We collected faecal and ejecta samples under day roosts and at nocturnal feeding trees. *Eidolon dupreanum* ate mainly fruit, although *Eucalyptus* spp. flowers were also consumed. In total, 30 plant species (fourteen identified and sixteen unidentified) were recorded in the diet, including six introduced taxa. *Polyscias* spp. trees, which occurred in humid forest at least 5 km from the roost, were the most frequently recorded plant in the diet. Fruits of *Psidium* spp. were abundant near to the roost but relatively uncommon in the faeces. Passage through the alimentary canal was limited to seeds <7 mm and there was some evidence for a positive effect on germination after passage through bats' stomachs. The role of fruit bats as seed dispersers in forest ecosystems in Madagascar should be used as an additional leverage for their conservation.

POURRUT, X., DÉLICAT, A., ROLLIN, P. E., KSIAZEK, T. G., GONZALEZ, J.-P., and LEROY, E. M., 2007. Spatial and temporal patterns of Zaire ebolavirus antibody prevalence in the possible reservoir bat species. *Journal of Infectious Diseases* 196(S2): S176-S183.

Abstract: To characterize the distribution of Zaire ebolavirus (ZEBOV) infection within the 3 bat species (*Epomops franqueti*, *Hypsignathus monstrosus*, and *Myonycteris torquata*) that are possible reservoirs, we collected 1390 bats during 2003-2006 in Gabon and the Republic of the Congo. Detection of ZEBOV immunoglobulin G (IgG) in 40 specimens supports the role of these bat species as the ZEBOV reservoirs. ZEBOV IgG prevalence rates (5%) were homogeneous across epidemic and nonepidemic regions during outbreaks, indicating that infected bats may well be present in nonepidemic regions of central Africa. ZEBOV IgG prevalence decreased, significantly, to 1% after the outbreaks, suggesting that the percentage of IgG-positive bats is associated with virus transmission to other animal species and outbreak appearance. The large number of ZEBOV IgG-positive adult bats and pregnant *H. monstrosus* females suggests virus transmission within bat populations through fighting and sexual contact. Our study, thus, helps to describe Ebola virus circulation in bats and offers some insight into the appearance of outbreaks.

RAJEMISON, B., and GOODMAN, S. M., 2007. The diet of *Myzopoda schliemanni*, a recently described Malagasy endemic, based on scat analysis. *Acta Chiropterologica* 9(1): 311-313.

REINHARDT, K., NAYLOR, R. A., and SIVA-JOTHY, M. T., 2007. Estimating the mean abundance and feeding rate of a temporal ectoparasite in the wild: *Afrocimex constrictus* (Heteroptera: Cimicidae). *International Journal for Parasitology* 37(8-9): 937-942.

Abstract: The feeding frequency of blood-feeding invertebrates in the wild is largely unknown but is an important predictor for the potential of disease transmission and for estimating the effects blood feeding may have on the host population. We present a method to estimate the mean feeding frequency per individual parasite from the frequency distribution of fed and unfed individuals in the wild. We used three populations of the cimicid species, *Afrocimex constrictus*, that parasitises the fruit bat *Rousettus aegyptiacus*. We found that the area occupied by a bug refugium was a good predictor of the number of bugs in that refugia. The estimated parasite population sizes ranged from ca. 25,000 to 3 million bugs. Their mean abundance was 1-15 bugs per host individual. Preventing feeding by bugs in their natural habitat showed that bugs took approximately 20 days to return to an unfed stage. A formula is presented by which the distribution of digestion stages in the samples was used to calculate that *A. constrictus* feeds approximately every 7-10 days. The dry weight of a full blood meal was approximated as 13.3 mg. Therefore *A. constrictus* is estimated to draw an average of 1-28 μ L blood per host per day. We suggest that any of our methods can be adjusted to be used in other haematophagous insects to estimate host and parasite population size, mean parasite abundance and blood meal

size as well as mean feeding frequency in the wild, including the bed bug species that parasitise humans.

ROSSITER, S. J., BENDA, P., DIETZ, C., ZHANG, S., and JONES, G., 2007. Rangewide phylogeography in the greater horseshoe bat inferred from microsatellites: Implications for population history, taxonomy and conservation. *Molecular Ecology* 16(22): 4699-4714.

Abstract: The distribution of genetic variability across a species' range can provide valuable insights into colonization history. To assess the relative importance of European and Asian refugia in shaping current levels of genetic variation in the greater horseshoe bats, we applied a microsatellite-based approach to data collected from 56 localities ranging from the UK to Japan. A decline in allelic richness from west Asia to the UK and analyses of FST both imply a northwestward colonization across Europe. However, sharp discontinuities in gene frequencies within Europe and between the Balkans and west Asia (Syria/Russia) are consistent with suture zones following expansion from multiple refugia, and a lack of recent gene flow from Asia Minor. Together, these results suggest European populations originated from west Asia in the ancient past, and experienced a more recent range expansion since the Last Glacial Maximum. Current populations in central Europe appear to originate from the Balkans and those from west Europe from either Iberia and/or Italy. Comparisons of RST and FST suggest that stepwise mutation has contributed to differentiation between island and continental populations (France/UK and China/Japan) and also among distant samples. However, pairwise RST values between distant populations appear to be unreliable, probably due to size homoplasy. Our findings also highlight two priorities for conservation. First, stronger genetic subdivision within the UK than across 4000 km of continental Eurasia is most likely the result of population fragmentation and highlights the need to maintain gene flow in this species. Second, deep splits within China and between Europe and China are indicative of cryptic taxonomic divisions which need further investigation.

STANLEY, W. T., ROGERS, M. A., SENZOTA, R. B. M., MTURI, F. A., KHAULE, P. M., MOEHLMAN, P. D., and O'CONNOR, B. M., 2007. Surveys of small mammals in Tarangire National Park, Tanzania. *Journal of East African Natural History* 96(1): 47-71.

Abstract: Small mammals were sampled in Tarangire National Park between 1994 and 1996. Twenty-six species of small mammals, including four species of Soricomorpha, seven species of Chiroptera and 15 species of Rodentia were documented, with some records being the first for the park. Identifications and natural history data (including a list of associated arthropods) are presented for each of the 26 species.

THORN, E., KOCK, D., and CUISIN, J., 2007. Status of the African bats *Vesperugo grandidieri* Dobson 1876 and *Vesperugo flavescens* Seabra 1900 (Chiroptera, Vespertilionidae), with description of a new subgenus. *Mammalia* 71(1/2): 70-79.

Abstract: The taxonomy of some African vespertilionid bats of uncertain status is studied. Analysis of the original description of *Vesperugo flavescens* Seabra 1900 and subsequent examination and discussion of a syntype specimen of *V. flavescens* disclose discrepancies leading to the conclusion that it is a nomen dubium. *V. flavescens* is furthermore preoccupied by *Nannugo pipistrellus* var. *flavescens* Koch 1865. The holotype of *Vesperugo grandidieri* Dobson 1876 is examined, its species characters, especially of its skull and dentition, clearly established, and the taxon is removed from the synonymy of *Neoromicia capensis* (Smith 1829) as a well-defined species, *Pipistrellus* (sensu lato) *grandidieri*, that differs from any subgenus recently associated with that genus. *Eptesicus capensis angolensis* Hill 1937 is considered to be conspecific with *P. grandidieri*, the former representing a subspecies in south-central and west-central Africa.

WEBER, N., and FAHR, J. 2007. A rapid survey of small mammals from Atewa Range Forest Reserve, Eastern Region, Ghana. Pages -90-98, 178-180 in McCullough, J., Alonso, L.E., Naskrecki, P., Wright, H.E., Osei-Owusu, Y. editors. *A Rapid Biological Assessment of the Atewa Range Forest Reserve, Eastern Ghana*. RAP Bulletin of Biological Assessment, Vol. 47. Conservation International, Arlington, Virginia.

Abstract: We report on the results of a small mammal survey in the Atewa Range Forest Reserve. A total of 12 bat species were recorded. Composition of bat species clearly reflects a forest assemblage, with no savanna species being observed. Two rarely recorded bat species (*Hypsugo [crassulus] bellieri* and *Pipistrellus* aff. *grandidieri*) are reported for the first time for Ghana, raising the total number of species for this country to 86. Together with specimens from five localities in West Africa, *Pipistrellus* aff. *grandidieri* from Atewa might represent an undescribed species. *Hypsugo (crassulus) bellieri* is endemic to the Upper Guinean forests. Zenker's fruit bat *Scotonycteris zenkeri* is ranked on the Red List as Near Threatened (IUCN 2006). The three terrestrial small mammal species recorded during the survey are likewise forest-dependent and include two West African endemics: Edward's swamp rat *Malacomys edwardsi* and the shrew *Crocidura grandiceps*. The latter is ranked as Near Threatened on the IUCN Red List and had not been recorded from Ghana since its description. The overall species composition of small mammals indicates high habitat integrity of the Atewa Range Forest Reserve, which constitutes the most significant block of Upland Evergreen Forest in Ghana. The integral protection of Atewa is an outstanding priority for the preservation of (sub-) montane forests in West Africa, both for the conservation of small mammals and of biodiversity in general. In accordance with international conservation principles on mining and biodiversity, we recommend that mining concessions for Atewa are cancelled, that its legal protection status is upgraded, that no development is allowed within the forest reserve, and that effective management measures are implemented.

WYANT, K. A., and ADAMS, R. A., 2007. Prenatal growth and development in the Angolan free-tailed bat, *Mops condylurus* (Chiroptera: Molossidae). *Journal of Mammalogy* 88(5): 1248-1251.

Abstract: We present data on prenatal growth, development, and skeletal ossification for the Angolan free-tailed bat (*Mops condylurus*), a species distributed throughout sub-Saharan Africa. Specimens were measured for crown-rump length (CRL), greatest length of the skull (GLS), forearm length, mass, and wing area. We cleared and differentially stained specimens for cartilage and bone to quantify pattern of skeletogenesis. Significant regressions for general growth trajectories were generated by plotting CRL and fetal mass against GLS. We quantified growth of the forearm, which showed a positive relationship with growth of the skull. Curiously, wing area was highly positively related to fetal mass, suggesting an ecomorphological relationship of wing loading and flight ability being established early in development in this species. Patterns of ossification in this species were more similar to those of phyllostomid and pteropodid bats than they were to vespertilionid bats, to which *M. condylurus* is apparently more closely related.

ZAVA, B., and MASSETI, M., 2007. First record of four species of bats from the national park of El Feidja (NW Tunisia) with a note on the non-flying mammals of the Khroumiria region. *Hystrix (n.s.)* 18(1): 83-90.

Abstract: During a field study carried out in the Tunisian National Park of El Feidja (Khroumiria region, NW Tunisia) in May 2000, we captured four species of bats never previously recorded in this area: the Mediterranean horseshoe bat *Rhinolophus euryale*, the greater horseshoe bat *R. ferrumequinum*, the Mehely's horseshoe bat *R. mehelyi* and the Geoffroy's bat *Myotis emarginatus*. Considering the already well-known diffusion of the Schreibers' bat *Miniopterus schreibersi*, the common pipistrelle, *Pipistrellus pipistrellus*, the lesser mouse-eared bat *Myotis blythi* and the greater mouse-eared bat *Myotis myotis*, these new records raise to 8 the species of bats known for the region. The mammalians' checklist of the Khroumiria region includes 27 species.

Editorial Board:

Robert Barclay (University of Calgary, Canada); **Woody Cotterill** (University of Stellenbosch, South Africa); **Jakob Fahr** (University of Ulm, Germany); **Steve Goodman** (Chicago Field Museum of Natural History, United States of America); **David Jacobs** (University of Cape Town, South Africa); **Teresa Kearney** (Transvaal Museum, South Africa); **Dieter Kock** (Senckenberg Museum, Germany); **Ara Monadjem** (University of Swaziland, Swaziland); **Peter Taylor** (Durban Natural Science Museum, South Africa); **Victor Van Cakenberghe** (University of Antwerp, Belgium).

Articles and news items appearing in African Bat Conservation News may be reprinted, provided the author's and newsletter reference are given. Copyright of photographs are held by the photographers.