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Inside this issue:

Above: A male Common Slit faced bat (*Nycteris thebaica*) caught at Marloth Park, Mpumalanga, South Africa in January 2007. Steven Goodman field number, SMG-15760.

Notes from the Editor:

"What does the future of African bat conservation hold?" - I recently attended the 21st Annual Meeting for the Society for Conservation Biology in Port Elizabeth, South Africa, and have had a few days to ponder the meeting, the state of conservation biology, and the possibility of achieving the 2010 objectives for reversing the rate at which biodiversity is being lost. The following questions come to mind. What are we doing about reversing the loss of bat diversity in Africa? Are we even aware if bat biodiversity is being lost? If a loss in bat biodiversity is quantifiable and identified, would it be possible to slow down the rate of loss, and what would that require? Or is a focus on loss of bats too narrow a view of biodiversity ?

Based on what I heard at the conference the pessimistic thought that came to mind was whether in conservation biology we are achieving any positive results, or is it just that we think we can achieve something. There seemed to be very little information available at the conference that indicated current, practical applications of conservation biology and its effectiveness. Professor Stuart Pimm (Duke University, USA) put it this way "Does conservation conserve? Or are we merely having conversations about it?"

The general feeling at the conference as to the most practical solution to meeting the 2010 targets was that governments need to set aside larger areas of land as Protected areas. Possible this is the best solution for the 2010 target, but is it the solution for the longer term?

What does your research/ work on bats achieve? Should more research not be focused on documenting possible losses of African bat biodiversity, and if that is indicated finding practical solutions to reverse such losses? The section on recently published papers (p 6-10) has some papers that make some contribution in this regard. Can you make a difference through your work to the future of African bat conservation in terms of moving from talk to action?

- Ernest C.J. Seamark

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SCIENTIFIC 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.

BATS RECORDED FROM TEMBE ELEPHANT PARK, KWAZULU-NATAL, SOUTH AFRICA

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In an editorial, SEAMARK (2006) called for articles documenting bats in protected areas throughout Africa. The aim was to build up a database that would allow the conservation status of African bats to be assessed, as well as to identify parks needing survey work. This article is written to this purpose for the Tembe Elephant Park in northern KwaZulu-Natal (KZN), South Africa.

Tembe Elephant Park (TEP) covers approximately 30 000 ha, straddling the border between South Africa and Mozambique. The reserve gets its name from the elephants it was set up to protect, the only original elephant population remaining in KwaZulu-Natal. The park is mostly covered by sand forest and closed woodland, but includes a limited area of swamp vegetation and grassland (MATHEWS *et al.* 2001).

TEP was visited for two nights on 24th-26th March 2006. Four nets and a single harp trap were set up at a small pan (with an area of about 30m by 10m) to the east of the park Head Quarters (27º 03.699′S; 32º 27.102′S) on the first night, and along the Muzi River (27º 57.910′S; 32º 30.946′S) on the second night. The pan was surrounded by a grassy edge and woodland beyond, and provided the only source of surface water in a radius of several kilometres. The Muzi River site was a mosaic of reed bed, open water and grassy plains. All captured bats were identified and measured. Voucher specimens were collected from each species and were deposited in the Durban Natural Science Museum (DM). All other individuals were released. In addition to the individuals captured during this survey, South African museums were checked for other specimens from this park.

A total of 38 bats, belonging to six species, was captured and processed during this two-night study, of which 31 were captured at the pan and seven at the Muzi River site (Table 1). Bats were obviously drawn from a very large area surrounding the pan, and were coming in to drink when captured. The flow of bats was so great in the early evening, that all but one of the nets had to be closed within an hour of sunset. There were also many bats flying over the Muzi River site, but open water did not appear to be limiting here and hence the capture rate was far lower than at the pan.

Bats were identified from voucher specimens using standard keys (TAYLOR 2000). In most cases, identification was equivocal. However, one specimen was identified provisionally as "*Hypsugo cf. anchietae* based on possession of a mixture of characters of *H. anchietae* (de Seabra, 1900) (posterior incisor extending well above cingulum of anterior, anterior premolar flat-crowned) and *P. hesperidus* (Temminck, 1840) (molar toothrow > 4.5mm i.e., 5.1mm). Based on preliminary craniometric assessment, T. Kearney (*in litt*.) considered the specimen is closest to *H. anchietae*. As the specimen was a female, bacular shape could not be used as a character.

A total of six species are now known for the Tembe Elephant Park (Table 2). A 7th species, *Eidolon helvum* (Kerr, 1792), is suspected based on several sightings (W. Mathews), but its presence requires confirmation. Notwithstanding apparent frequent sightings of this species at Ndumu Game

Table 1: Species and numbers of bats captured at two sites in Tembe Elephant Park, March 2006.

Species	Pan	Muzi River	Total
Molossidae			
Chaerephon pumilus	8	-	8
Mops condylurus	8	5	13
Vespertilionidae			
Neoromicia nanus	2	2	4
Hypsugo cf. anchietae	1	-	1
Scotophilus dinganii	2	-	2
Scotophilus viridis	10	-	10
Total individuals	31	7	38
Total species	6	2	6

Table 2: Species list for Tembe Elephant Park based on voucher specimens. DM = Durban Natural Science Museum, Durban; TM = Transvaal Museum, Pretoria.

Species	Vouchers
Molossidae	
Chaerephon pumilus	DM4800-2*; DM8497; TM45327*
Mops condylurus	DM8502
Vespertilionidae	
Neoromicia nanus	DM8498-DM8499
Hypsugo cf. anchietae	DM8500
Scotophilus dinganii	DM8501
Scotophilus viridis	DM8488

*Indicates specimens collected during previous surveys.

Reserve (DIXON, 1966), this would represent only the second site at which this species has been recorded in KwaZulu-Natal (the first specimen was collected by Collin Sapsford at Mtunzini in the 1980s and was deposited in the Durban Natural Science Museum, DM7356). The absence of other fruit bats (in particular *Epomophorus* species) was surprising and may have been an artefact of the short length of the study. However, no fruit bats were heard during the two nights and appropriate fruiting trees appeared to be very rare in most of the park. Perhaps these bats are restricted spatially and/or temporally in TEP.

The list presented in Table 2 for TEP is almost certainly incomplete. In addition to fruit bats, a number of insectivorous bats may have also been overlooked. At the very minimum we expect the following species to occur in TEP due to availability of appropriate habitat and occurrence at neighbouring sites: *Hipposideros caffer* (Sundevall, 1846)*, Rhinolophus simulator* K. Andersen, 1904*, Nycteris thebaica* E. Geoffroy St.-Hilaire, 1818*, Nycticeinops schlieffeni* (Peters, 1859)*, Neoromicia zuluensis* (Roberts, 1924) *and Miniopterus natalensis* (A. Smith, 1833). Austin Roberts, in 1933, collected three of these species (*H. caffer, N. thebaica* and *M. natalensis*) as well as *Kerivoula lanosa* (A. Smith, 1847) from a locality labelled variably as “Ingwavuma” or “Ingwavuma Bush” which is probably close to the location of the current TEP.

When compared with species lists from other nature reserves from KwaZulu-Natal, nine bat species were recorded from Ndumu (including apparent frequent sightings of *Eidolon helvum*; DIXON 1966), 13 from Hluhluwe-Umfolozi Park (BOURQUIN *et al.* 1971) and Ithala (SEAMARK and KEARNEY 2004), six from Oribi Gorge in the south of KZN (BOURQUIN and MATHIAS 1984) and only two from Weenen (BOURQUIN and MATHIAS 1995). These data reflect the degree of sampling effort as well as the general northwards and eastwards increase in bat species diversity recorded for the province (ROWE-ROWE and TAYLOR, 1996). Recent bat collecting efforts at Mkhuze Game Reserve has increased the number of bat species from seven in 1964 to at least 15 (DIXON 1964, KEARNEY and TAYLOR 1997, TAYLOR 1998, TAYLOR *et al.* 2004), and this list includes such rare and endangered species as *Cloeotis percivali* (IUCN: Critically Endangered for SA) and *Myotis bocagei* (IUCN: Data Deficient for SA) (KEARNEY and TAYLOR 1997, TAYLOR *et al.* 1994, 2004).

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FIELD NOTES (FEBRUARY 2005): KLIPHUIS CAMP SITE, CEDERBERG, WESTERN CAPE PROVINCE SOUTH AFRICA

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On 7 December 1937 Captain Guy Chester Shortridge and Mr Donald Carter collected a single chiropteran specimen from "Kliphuis, northern spur of the Cederberg" (SHORTRIDGE and CARTER, 1938), also described on the specimen labels as "Kliphuis, Pakhuis Pass, 11 miles N.E. of Clanwilliam, N.W. Cape Province", South Africa, which they described as *Platymops* (*Sauromys*) *haagneri umbratus* Shortridge and Carter 1938. *Platymops* (*Sauromys*) *haagneri umbratus,* the holotype of which, KM 2827 (an adult male), is in the Amathole Museum (syn. Kaffrarian Museum = KM), in King Williams Town, is currently referred to as *Sauromys petrophilus* (Roberts, 1917) (SIMMONS, 2005).

Kliphuis camp site (693 m asl.; 32°08'10.248"S, 19°00'10.332"E) is located 12 km ENE of Clanwilliam, at the base of the Pakhuis Pass, in the northern Cederberg Mountains, Western Cape Province (Figure 1). In February 1999 SEAMARK and BRAND (2005) mist netted specimens of five species of bats at the Kliphuis camp site (Table 1), one of which was *S. petrophilus umbratus*. Six years later, another single night survey at Kliphuis campsite on 5 February 2005 again recorded five species, including *S. petrophilus umbratus* (Table 1).

The mist net arrangement in 2005 was four single 2.6 high x 12 m mist nets with 4 panels, 36 mm mesh size, one set across a man-made dam (2.5 hrs) and three (2 hrs) set perpendicular to the vegetation alongside the dam and the river flowing into the dam. The nets were opened at 20h03 and the first bat was sighted at 20h08. A two bank harp trap measuring 1.6 m high x 1.4 m wide (2.24 m^2 capture surface) was also installed within the vegetation alongside the river flowing into the dam. Only the net set over the water caught bats. In 1999, the capture set-up was three nets stacked above one another reaching a height of 6 m (top and bottom panels of the nets being overlapped), set across the man-made dam. Several changes were observed by the authors to the site over the intervening six years. The water level in the man-made dam was lower in 2005. With the lowering of the

Table 1: Number of individuals of different bat species captured at Kliphuis campsite in February 1999 (SEAMARK and BRAND, 2005), February 2005, and the combined figures for both years, as well as the calculated species richness. NMH = net-meter-hours, Capture rate = number of bats caught per net-meter-hour x 100.

	Feb 1999	Feb 2005	Combined
NMH	**120**	**102**	**222**
Sauromys petrophilus	13	7	20
Tadarida aegyptiaca	-	1	1
Cistugo leuseuri	2	-	2
Neoromicia capensis	1	1	2
Eptesicus hottentotus	1	3	4
Miniopterus natalensis	1	1	2
Species richness	5	5	6
Total number captured	18	14	32
Capture rate	15.0 %	13.7 %	14.4 %

Figure 1: View in February 2005 looking east towards the Pakhuis Pass. Kliphuis camp site is situated within the large clump of trees on the right of the road.

Figure 2: View at Kliphuis camp site in February 2005, looking west over the man-made dam in the Kliphuis river, over which bats were caught in 1999 and 2005.

Table 2: Field measurements (mm) of forearm length (Fa), head length (HL) [from junction with neck to nose tip see CHURCHILL (1998)], tibia (Tib), and mass (g) for five species of bats caught at Kliphuis campsite on 5 February 2005.

Species		Mass	Fa	HL	Tib
		X (n) Range	X (n) Range	X (n) Range	X (n) Range
Sauromys petrophilus	♂	11.00 (6) 10.50-13.00	38.3 (6) 37.2-39.9	21.0 (1)	-
	♀	10.00 (1)	40.2 (1)	-	-
Tadarida aegyptiaca	♂	14.00 (1)	44.5 (1)	23.0 (1)	12.8 (1)
Neoromicia capensis	♂	6.45 (1)	33.2 (1)	16.9 (1)	12.9 (1)
Eptesicus hottentotus	♂	18.70 (2) 18.50-19.00	49.5 (2) 49.4-49.7	21.6 (2) 21.3-22.9	21.9 (2) 21.9
	♀	19.50 (1)	50.5 (1)	23.7 (1)	22.2 (1)
Miniopterus natalensis	♂	11.00 (1)	47.4 (1)	17.5 (1)	20.6 (1)

Figure 3: *Sauromys petrophilus umbratus* caught at Kliphuis camp site.

Figure 4: *Tadarida aegyptiaca* (TM47569) caught at Kliphuis camp site. The angle of the ears can be modified to lie forward over the face (left) or at right angle to the face (right).

Figure 5: *Eptesicus hottentotus* (TM47702) caught at Kliphuis camp site.

water and thick vegetation had encroached on the river just upstream of the dam. A large tree that was on the side of the dam in 1999 had been cut down; the stump can be seen on the far side of the dam in Figure 2.

Table 2 gives field measurements of the 14 individuals of five species from two families caught in February 2005 and associated voucher specimens were deposited in the mammal collection of the Transvaal Museum (TM). Two species of Molossidae were caught: six male and one post-lactating female of *Sauromys petrophilus umbratus* (Figure 3) (males – TM 47570, TM 47571, TM 47573; female – TM 47572), and one male *Tadarida aegyptiaca* E. Geoffroy, 1818 (Figure 4) (TM 47569), this recorded for the first time from this site. Three species of Vespertilionidae were obtained: one male *Neoromicia capensis* (A. Smith, 1829) and two male and one female *Eptesicus hottentotus* (A. Smith, 1833) (Figure 5) (male – TM 47702). A single male *Miniopterus natalensis* (A. Smith, 1833) (TM 47703) was caught.

Acknowledgements

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RECENT LITERATURE

PUBLISHED PAPERS

CORDEIRO, N. J., LOVETT, J. C., MULUNGU, E., MAINA, G. G., and GERSTLE, J. H., 2006. Initial trends of bird assemblages before and after river diversion in an endemic-rich African forest. *Biodiversity Conservation* 15(3): 971-983.

Abstract: The Lower Kihansi Hydropower Project in southern Tanzania caused the diversion of the Kihansi River from the Kihansi Gorge in the year 2000. By sampling the understorey avifauna prior to diversion, we examined (i) whether the adjacent Udagaje Gorge was an adequate control for observations in the Kihansi Gorge; (ii) which species of conservation interest occurred; and, (iii) which season best suited annual monitoring. Species composition and capture rates at three and two elevational transects in the Kihansi Gorge and Udagaje Gorge, respectively, confirmed that Udagaje had a comparable avifaunal assemblage to Kihansi. The cold season was most appropriate for population monitoring because >2 times more individuals were captured in the cold than hot season at both gorges, and at least four altitudinal migrants were present in the cold but not hot season. Post-diversion sampling revealed that only the Upper Kihansi transect suffered a significant decrease in number of individuals, a result that was driven largely by a decline in the Little Greenbul, Andropadus virens. This transect is closest to the Kihansi waterfall and associated spray zone which were lost after river diversion. Lack of differences in bird communities at other transects after diversion illustrates that early post-diversion effects on birds are probably concentrated near the base of the main falls. Together with studies of other biota in Kihansi, we propose that long-term monitoring is necessary to understand the factors that regulate changes in species composition of this threatened forest site.

DALLIMER, M., KING, T., COPE, D., and JIANA, M. B., 2006. Estimation of population density of *Eidolon helvum* on the island of Príncipe, Gulf of Guinea. *Mammalia* 70(1/2): 48-51.

Abstract: *Eidolon helvum* is a widespread African fruit bat. It is migratory and can form colonies of millions of individuals. On Príncipe, in the Gulf of Guinea, there are seemingly large numbers of *E. helvum*. Here, they have lost their migratory behaviour and rely on the availability of the year-round food resources on the island, which is small (128 km2) but is dominated by both primary rainforest and fruit-tree plantations. We visited the major roost for *E. helvum* on the island. Exit counts carried out on two consecutive nights showed the roost was used by between 10,539 (SE±67) and 14,160 (SE±324) individuals. Compared to mainland Africa, the colony was small, no doubt constrained by the size of the island. Nonetheless, Príncipe still supports a considerable density of *E. helvum* of between 82 and 111 bats/km2, which is comparable with densities found on mainland Africa.

GRANJON, L., and TRAORÉ, M., 2007. Prey selection by barn owls in relation to small-mammal community and population structure in a Sahelian agro-ecosystem. *Journal of Tropical Ecology* 23(2): 199-208.

Abstract: Barn owl pellet content was studied on seven occasions over a 2-y period during which terrestrial small-mammal populations were assessed via a capture-mark-recapture (CMR) programme in a Sahelian agro-ecosystem of the Inner Delta of Niger River in Mali. Rodents (especially *Mastomys huberti* representing 78.5% of the total number of prey) were the major prey of the barn owl on all but one occasion, when bats were dominant. This exception coincided with the period of lowest abundance of *M. huberti* at the study site. Distribution of *M. huberti* prey into four age classes was assessed through analysis of tooth wear in remains from the seasonal pellet samples. Comparisons with age structure of the CMR population indicate that the barn owl tended to prey on smaller-than-average (thus younger) individuals, especially when these are rare in the population (non-reproductive period between June and October). The spectrum of prey consumed is compared with data previously reported in Sahelian Africa, showing for the first time in this region a major shift in prey choice by the barn owl when its preferred prey becomes rare. At the rodent population level, the apparent choice of younger *M. huberti* prey at some periods is interpreted in the light of our knowledge on population dynamics of the species in this habitat.

KEITH, M., CHIMIMBA, C. T., REYERS, B., and VAN JAARSVELD, A. S., 2007. A comparative analysis of components incorporated in conservation priority assessments; a case study based on South African species of terrestrial mammals. *African Zoology* 42(1): 97-111.

Abstract: Assessing the risk of extinction to species forms an essential part of regional conservation initiatives that facilitate the allacation of limited resources for conservation. The present study conducted conservation priority assessments for 221 South African terrestrial mammal species using existing data sources. These data sources included regional IUCN Red List assessments, regional geographic distributions, relative endemism, taxonomic distinctiveness, relative body mass and human density. These components were in turn subjected to two quantitative conservation priority assessment techniques in an attempt to determine regional conservation priorities for South African terrestrial mammals. The top 22 mammal species (i.e. the top 10% of assessed species) identified by both regional conservation priority assessment techniques to be of conservation priority, consistently identified 13 South African terrestrial mammal species to be of high conservation priority. Seven of the 13 species were from the order Afrosoricida, two species from the order Eulipotyphla, with one species each from the orders Chiroptera, Lagomorpha, Pholidota, and Rodentia. More importantly; 12 of the 13 mammal species were also listed as threatened in the 2004 Red *Data Book of South African Mammals.* These results suggest that the two conservation priority assessment techniques used in the present study may represent a practical and quantitative method for determining regional conservation priorities, and include measures that represent *vulnerability, conservation value,* and *threat.*
Keywords: Chiroptera; conservation; conservation value; regional conservation priorities; species; technique; terrestrial mammals; threat assessment; vulnerability.

JENKINS, R. K. B., ANDRIAFIDISON, D., RAZAFIMANAHAKA, H. J., RABEARIVELO, A., RAZAFINDRAKOTO, N., RATSIMANDRESY, Z., ANDRIANANDRASANA, R. H., RAZAFIMAHATRATRA, E., and RACEY, P. A., 2007. Not rare, but threatened: the endemic Madagascar flying fox *Pteropus rufus* in a fragmented landscape. *Oryx* 41(2): 263-271.

Above: Roosts of *Pteropus rufus* in the Alaotra-Mangoro Region are conserved by two Malagasy NGOs (Madagasikara Voakajy & ACCE) in a project currently supported by the Lubee Bat Conservancy and Fauna and Flora International.

Abstract: The endemic Madagascar flying fox *Pteropus rufus* is threatened by habitat loss at roost sites and hunting for bushmeat. There is no conservation plan for this species, even though it is categorized on the IUCN Red List as Vulnerable and plays an important role as a seed disperser. In the Mangoro valley of central eastern Madagascar we monitored roost occupancy and abundance of *P. rufus* on 15 occasions at six sites over a 12-month period and conducted a detailed assessment of eight roosts during July 2004. There was considerable monthly variation in bat abundance and only two sites contained bats during every visit. Three sites were occupied only between September and March and may act as maternity or nursery roosts. Evidence of hunting was found at three roosts, and fire and forest clearance are ubiquitous threats. Two roosts were in *Eucalyptus* plantations and six were in small (2.2 - 28.7 ha) isolated fragments of degraded, mid elevation dense humid forest. All roosts were outside protected areas but were within 20 km of relatively intact forest. Faecal analysis revealed a diet of native forest tree species, cultivated fruits and *Eucalyptus* flowers. *P. rufus* in the Mangoro valley, and elsewhere in Madagascar, appears to survive in human-impacted environments by the inclusion of exotic plants in its diet and the ability to move between roosts. We provide conservation recommendations for *P. rufus* at both local and national levels.

Keywords: Diet; flying fox; fragmentation; hunting; Madagascar; plantations; *Pteropus rufus*; habitat; roost; conservation; species; abundance

Left: *Pteropus rufus,* the Madagascar flying fox, is the largest of the island's three endemic fruit bat species. It is usually found roosting in small areas of forest where it is threatened by the demand for bushmeat and the loss of forest to agricultural expansion and wildfires.

KOFOKY, A., ANDRIAFIDISON, D., RATRIMOMANARIVO, F., RAZAFIMANAHAKA, H. J., RAKOTOTONDRAVONY, D., RACEY, P. A., and JENKINS, R. K. B., 2007. Habitat use, roost selection and conservation of bats in Tsingy de Bemaraha National Park, Madagascar. *Biodiversity and Conservation* 16: 1039-1053.

Abstract: Although the land mammals of Madagascar have been the subject of many studies, the island's bats have yet to feature prominently on the research or conservation agenda. In this study we used mist nets, acoustic sampling and cave surveys to assess habitat use, seasonality and roost selection. Four microchiropteran species (*Triaenops rufus*, *T. furculus*, *Miniopterus manavi* and *Myotis goudoti*) appeared to be strongly associated with the forest interior based on trapping, but analysis of time-expanded echolocation recordings revealed that *T. rufus* and *M. manavi* were frequently recorded in forest edges and clearings. Bat activity was significantly lower inside the forest than at the interface between agricultural land and forest. The caves visited most often by tourists were low in bat abundance and species richness. Anjohikinakina Cave, which was visited infrequently by people, was used by five species and contained between 54% (winter) and 99% (summer) of bats counted in 16 caves and is a site of national importance for bat conservation. *Hipposideros commersoni* was only netted in our study area during October and may be a migrant to the site or present but inactive during the austral winter. The forest surrounding the caves is therefore important because it provides cover for emerging bats and a potential source of invertebrate prey whilst the forest edge is important to foraging bats.

Keywords: abundance; Acoustic sampling; bat conservation; caves; Chiroptera; foraging; Forest dependency; habitat use; Karst; Madagascar; mist nets; richness; roost; sampling; seasonality; selection; species; species richness; surveys.

Top right: This is the second specimen of *Scotophilus tandrefana* known to science, and was collected during a survey of Parc National Tsingy de Bemaraha 135 years after the first specimen.

Bottom right: Tsingy limestone pinnacle in the deciduous forest of Parc National Tsingy de Bemaraha.

KRUSKOP, S. V., and LAVRENCHENKO, L. A., 2006. First bat records in the Simien Mountains (Northern Ethiopia). *Russian Journal of Theriology* 5(2): 59-62.

Above: Female *Laephotis wintoni* caught in the Simien Mountains of Northern Ethiopia.

Abstract: No any bat records were known previously from the Simien Mountains National Park (Northern Ethiopia) while two bat species were reported from the Simien foothills. During the work of Ethiopian-Russian Biological Expedition two bat species were captured at the elevation of ca. 3250 m. Males of *Pipistrellus* from the *"kuhlii"* species group were captured or observed several times in anthropo-genous landscapes. According to multivariate analysis these pipistrelles are similar to *P.* cf. *kuhlii* from southern part of the country and to *P. hesperidus.* One captured female of *Laephotis wintoni* represents most northern and highest elevation record of the genus.

Keywords: Ethiopia; *Laephotis*; *Laephotis wintoni*; landscape; multivariate analysis; new records; *Pipistrellus kuhlii*; Simien Mountains.

Left: Biotope in which *Laephotis wintoni* was captured in the Simien Mountains.

MATTHEE, C. A., EICK, G., WILLOWS-MUNRO, S., MONTGELARD, C., PARDINI, A. T., and ROBINSON, T. J., 2007. Indel evolution of mammalian introns and the utility of non-coding nuclear markers in eutherian phylogenetics. *Molecular Phylogenetic Evolution* 42(3): 827-837.

Abstract: Nuclear DNA intron sequences are increasingly used to investigate evolutionary relationships among closely related organisms. The phylogenetic usefulness of intron sequences at higher taxonomic levels has, however, not been firmly established and very few studies have used these markers to address evolutionary questions above the family level. In addition, the mechanisms driving intron evolution are not well understood. We compared DNA sequence data derived from three presumably independently segregating introns (THY, PRKC I and MGF) across 158 mammalian species. All currently recognized extant eutherian mammalian orders were included with the exception of Cingulata, Dermoptera and Scandentia. The total aligned length of the data was 6366 base pairs (bp); after the exclusion of autapomorphic insertions, 1511bp were analyzed. In many instances the Bayesian and parsimony analyses were complementary and gave significant posterior probability and bootstrap support (>80) for the monophyly of Afrotheria, Euarchontoglires, Laurasiatheria and Boreoeutheria. Apart from finding congruent support when using these methods, the intron data also provided several indels longer than 3bp that support, among others, the monophyly of Afrotheria, Paenungulata, Ferae and Boreoeutheria. A quantitative analysis of insertions and deletions suggested that there was a 75% bias towards deletions. The average insertion size in the mammalian data set was 16.49bp±57.70 while the average deletion was much smaller (4.47bp±14.17). The tendency towards large insertions and small deletions is highlighted by the observation that out of a total of 17 indels larger than 100bp, 15 were insertions. The majority of indels (>60% of all events) were 1 or 2bp changes. Although the average overall indel substitution rate of 0.00559 per site is comparable to that previously reported for rodents and primates, individual analyses among different evolutionary lineages provide evidence for differences in the formation rate of indels among the different mammalian groups.

MATTHEWS, T., DENYS, C., and PARKINGTON, J. E., 2007. Community evolution of Neogene micromammals from Langebaanweg 'E' Quarry and other west coast fossil sites, south-western Cape, South Africa. *Palaeogeography Palaeoclimatology Palaeoecology* 245(3-4): 332-352.

Abstract: This paper provides an overview of the micromammalian palaeocommunities found in fossil bearing palaeontological and archaeological west coast sites dating from the Mio-Pliocene, as represented by the site of Langebaanweg 'E' Quarry, and other sites dating from the late Middle Pleistocene, until the late Holocene. Recent excavations at Langebaanweg have resulted in the addition of more murid genera to previously compiled faunal lists. An updated faunal list is presented, and a comparison is made on a generic level between the micromammals from Langebaanweg, and the considerably younger west coast fossil sites of Elands Bay Cave, Steenbokfontein Cave, the Saldanha Bay Yacht Club site and Hoedjiespunt 1, and some modem owl pellet collections. The palaeobiogeographical and palaeoenvironmental significance of the different west coast micromammal communities, and the evolution of the west coast rodent community is examined. Nine of the micromammal genera found at LBW are present in some, or all, of the west coast fossil sites dating from the late Middle Pleistocene until the Holocene. This indicates the endurance of many of the genera present at LBW, and in the Kalahari South West Arid and Namib Regions, from the Mio-Pliocene, up until the present.

MAYER, F., DIETZ, C., and KIEFER, A., 2007. Molecular species identification boosts bat diversity. *Frontiers in Zoology* 4(1): 4.

Abstract: The lack of obvious morphological differences between species impedes the identification of species in many groups of organisms. Meanwhile, DNA-based approaches are increasingly used to survey biological diversity. In this study we show that sequencing the mitochondrial protein-coding gene NADH dehydrogenase, subunit 1 (nd1) from 534 bats of the Western Palaearctic region corroborates the promise of DNA barcodes in two major respects. First, species described with classical taxonomic tools can be genetically identified with only a few exceptions. Second, substantial sequence divergence suggests an unexpected high number of undiscovered species.

MONADJEM, A., RESIDE, A., and LUMSDEN, L., 2007. Echolocation calls of rhinolophid and hipposiderid bats in Swaziland. *South African Journal of Wildlife Research* 37(1): 9-15.

Abstract: Echolocation call parameters of six species of rhinolophid and hipposiderid bat species occurring in Swaziland are presented. All calls were obtained with the frequency-division ANABAT bat detector, and mostly from hand-held individuals. There did not appear to be any differences in calls between hand-held and free-flying bats. However, there were significant inter-specific differences with respect to the constant frequency component of the call (equivalent to maximum frequency) and call duration. Minimum frequency was found to be highly variable, and considered not useful for species identification of free-flying individuals. Call parameters obtained in this study are very similar to those obtained with the time-expansion Pettersson detector, suggesting that for this group, choice of detector makes little difference. It is suggested that bat detectors provide an important method to inventory southern African bats, and supplement traditional, capture-based techniques, notably mist nets and harp traps.
Keywords: Anabat; bat detector; constant frequency; echolocation calls; frequency division; harp; identification; inventories; mist nets; species identification; technique.

MONADJEM, A., and FAHR, J. 2007. Rapid survey of bats of North Lorma, Gola and Grebo National Forests, with notes on shrews and rodents. Pages 47-58, 101-106 *in* Hoke,P., Demey,R., Peal,A. editors. *A Rapid Biological Assessment of North Lorma, Gola and Grebo National Forests, Liberia*. Conservation International, Arlington, Virginia.

Above: *Rhinolophus hillorum*

Above: *Scotonycteris zenkeri*

Abstract: Bats were sampled in three forest reserves in Liberia using mist nets, a harp trap, and roost searches. Terrestrial small mammals were captured opportunistically and were not used in the final assessment of the forests. A total of 182 bats of 22 species were captured, representing 37 % of the bat species known to occur in Liberia. Species richness was highest at Gola and Grebo, possibly because secondary forest and forest edge was sampled there. North Lorma, where only forest interior was surveyed, had both the lowest capture success and the lowest species richness. Three IUCN Red List species were recorded: *Rhinolophus hillorum* (Vulnerable) in Gola, *Scotonycteris zenkeri* (Near Threatened) in Grebo, and *Hipposideros fuliginosus* (Near Threatened) in North Lorma. Bat assemblages in each of the surveyed areas were characterized by forest-dependent species. Not a single species typical of savanna habitats was recorded, indicating high habitat integrity of the reserves. Three species are reported for the first time from Liberia (*Rhinolophus landeri*, *Neoromicia guineensis*, *Neoromicia* aff. *grandidieri*), raising the species total for the country to 59. An updated checklist with corrected species identifications is presented for the bats of Liberia. Two species of shrews, one murid rodent, five squirrels and one anomalure (scaly-tailed squirrel) were also recorded, including the rarely reported Western Palm Squirrel *Epixerus ebii* and the Lesser Anomalure *Anomalurus* cf. *pusillus*.

Left: *Hypsignathus monstrosus*

MÜLLER, B., GOODMAN, S. M., and PEICHL, L., 2007. Cone photoreceptor diversity in the retinas of fruit bats (Megachiroptera). *Brain, Behaviour and Evolution* 70: 90-104.

Abstract: Older studies have claimed that bats including the Megachiroptera (fruit bats or flying foxes) have pure-rod retinas and possess no cone photoreceptors. We have determined the presence and the population densities of spectral cone types in six megachiropteran species belonging to four genera: *Pteropus rufus* , *P. niger* , *P. rodricensis* , *Rousettus madagascariensis*, *Eidolon dupreanum* , and *Epomophorus gambianus.* Spectral cone types and rods were assessed immunocytochemically with opsin-specific antibodies. All six species have rod-dominated retinas but possess significant cone populations. The high rod densities (range 350,000-800,000/mm 2 , depending on species and retinal location) provide good scotopic sensitivity in these predominantly nocturnal animals. With the cones (density range 1,300-11,000/mm 2 , corresponding to 0.25-0.6% of the photoreceptors, depending on species and retinal location) the retinas also possess the prerequisite for vision at photopic light levels. The three *Pteropus* species have two spectral cone types, a majority of middle-to-long-wave sensitive (L-) cones, and a minority of short-wave sensitive (S-) cones, indicating the potential for dichromatic color vision. This conforms to the pattern found in most mammals. In contrast, *Rousettus* , *Eidolon* and *Epomophorus* have L-cones but completely lack S-cones, indicating cone monochromacy and color blindness. The discussion relates these findings to the visual behavior of fruit bats.

Keywords: Color vision; Cone osins; diversity; flying foxes; Fruit bats; Megachiroptera; Photoreceptors; population density; *Pteropus rufus*; Retina; Visual pigments.

SÁNCHEZ, F., 2006. Harvest rates and patch-use strategy of Egyptian fruit bats in artificial food patches. *Journal of Mammalogy* 87(6): 1140-1144.

Abstract: The amount of food left by a forager after feeding in a depletable patch of known volume, the giving-up density (GUD), estimates the quitting harvest rate. I constructed a feeder for measuring GUD in Egyptian fruit bats (*Rousettus aegyptiacus*). The feeder contained liquid food mixed with pieces of hose that interfered with the drinking behavior of the bats and forced them to work progressively harder to obtain more food as the depth of the liquid in the feeder decreased. Harvest rates in bats using these feeders declined with time. When presented with feeders containing different initial food densities, the bats equalized GUD and consumed proportionately more food from rich patches than from poor ones. Thus, the bats recognized patches of different quality and foraged following a fixed quitting harvest rate patch-use strategy.

VIVIER, L., and VAN DER MERWE, M., 2007. The incidence of torpor in winter and summer in the Angolan free-tailed bat, *Mops condylurus* (Microchiroptera: Molossidae), in a subtropical environment, Mpumulanga, South Africa. *African Zoology* 42(1): 50-58.

Abstract: The incidence of torpor during summer and winter in response to cold exposure in Mops *condylurus* was studied in a subtropical environment. Body temperature changes under natural roosting conditions during winter and summer were monitored using bats fitted with temperature-sensitive radio transmitters. Rectal temperatures of free-roosting bats were also measured during winter. During summer, the effect of clustering on the incidence of torpor under different climatic conditions was investigated. *Mops condylurus* were thermolabile and displayed daily bouts of torpor during winter and summer, with body temperatures closely conforming to ambient temperatures. Body temperatures as low as 12.0°C were recorded during winter. Regression analysis showed a positive correlation between body and ambient temperatures in winter and summer. There was no difference in the incidence of torpor between single and clustering bats, although single bats maintained slightly higher body temperatures. Results indicate that M. *condylurus* maintained an optimally small Tb-T. differential by readily becoming torpid under roosting conditions, thereby minimizing energy expenditure.

Keywords: body temperature; free-roosting; Molossidae; Mops; subtropical; thermoregulation; torpor.

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