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Notes from the Editor

After two years and eight issues African Bat Conservation News to date has only indicated one organizations logo/endorsement on the newsletters. The time to change this is overdue and I would like to encourage other organizations/ research groups, with active interests in African bats, to also endorse African Bat Conservation News and have their organizations logo appear on the newsletter. African Bat Conservation News may also be used to promote the activities and projects of your organization/ research group.

If you are interested, please send a letter indicating such an interest, together with a brief summary of your organization/ research groups interests in African bats that can be published in the newsletter, and an electronic logo you would like to appear in the newsletter. Your organization/ research groups expression of interest to endorse African Bat Conservation News will be circulated for acceptance to the current editorial board African Bat Conservation News. - E.C.J. Seamark



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Above: Subadult Wahlberg's epauletted fruit bat, (*Epomophorus wahlbergi*), Mlawula Nature Reserve, Swaziland, February 2006.

RESEARCH AND CONSERVATION

BATS AND VIRUSES: BALANCING BAT CONSERVATION AND PUBLIC HEALTH

Report back on the 8th conference of the Southern and Eastern African Rabies Group (SEARG), Heja Lodge, Namibia, 22—25 January 2006

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In 2002 a Scottish bat worker died from exposure to a bat positive for the very rare European Bat Lyssavirus, a “rabies-like virus”. In September 2005, a paper in the Proceedings of the National Academy of Sciences (by Susanna Lau and co-workers from University of Hong Kong; Vol 102: 14041-14045) reported that Chinese horseshoe bats (*Rhinolophus sinicus*) were reservoirs of Severe Acute Respiratory Syndrome (SARS), a disease which killed over 700 people in Asia since 2003. But they concluded that “The pathogenicity and host range of bat-SARS-CoV remain to be determined”. Three months later, in December 2005, a paper in Nature reported that three species of central African fruit bats were apparently symptomless carriers of the dreaded Ebola virus.

One wonders what the impact will be of these recent cases and articles on bat conservation, if they are reported irresponsibly by the popular press. In

December 1998, a sensationalised article in New Scientist entitled “Bats from hell”, reported on the death of a woman bat handler in Australia due to exposure to a yellow-bellied sheath-tailed bat which was positive for the newly discovered (and very rare) Australia Bat Lyssavirus (ABL). The article speculated the spread of diseases like Ebola to Australia, caused panic among the public (with resulting slaughtering of flying foxes in Australia), and raised the ire of bat conservationists worldwide, prompting a storm of protest, including rebuttals by Dr Merlin Tuttle in two issues of BATS (Summer 1999 and Fall 2000), the magazine of Bat Conservation International. According to Tuttle, in U.S. and Canada (since 1980), the odds of contracting rabies from a bat are less than one in 240 million, with just 1.2 human cases reported per year.

The latest reports on SARS and Ebola raise the question: Are bats merely scapegoats for these dreaded



Above: Experts on African bats and lyssaviruses were (from left) Wanda Markotter (UP), Dr Alex Wandelaar (Canada), Prof Louis Nel (UP), Dr Noel Tordo (Pasteur Institute), Dr Peter Taylor, Dr Claude Sabeta (Onderstepoort Veterinary Institute) and Dr Tony Fooks (UK Government virologist).



Above: Prof. Bob Swanepoel, coauthor of the December 2005 Nature article on Ebola in bats, and presenter on Bats and filoviruses (Ebola and Marburg) at the SEARG meeting in Namibia.



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diseases or should bat workers take these risks seriously? These were questions which motivated my willingness to attend the 8th meeting of the Southern and Eastern African Rabies Group (SEARG) in January 2006. Hosted by Professor Louis Nel and his team from University of Pretoria, the conference proved to be extremely positive and enlightening. I presented a talk on "Bats of Africa: diversity, misconceptions, truths, threats", which was well received by the 100 or so delegates, most of whom were veterinarians and virologists. I was pleasantly surprised by the sympathetic view of bats shown by most of the virologists I chatted with. Dr Tony Fooks, a UK government virologist, is working closely with UK bat conservationist, Dr Tony Hutson, in terms of understanding the epidemiology of bat lyssaviruses in the UK and reporting the results responsibly to the public. In France, virologist Dr J. Barratt, is likewise working very closely with leading bat conservationists. Canadian rabies expert, Dr Alex Wandeler, is friendly with, and works closely with leading American bat conservationists Drs Merlin Tuttle and Brock Fenton.

Several papers were presented on lyssaviruses in Africa: Duvenhage, Lagos, and Mokolo. A very useful synthesis of lyssaviruses was presented by Professor Nel (a very comprehensive synthesis is also provided within the Proceedings of the 2001 SEARG meeting in Malawi where an entire session was devoted to African bat lyssaviruses - the Proceedings are available on CD). Duvenhage and Lagos are associated with bats whilst Mokolo appears to be associated with terrestrial micromammals. Molecular sequencing of the different lyssaviruses indicates the presence of two distinct "phylogroups". Group I comprises the classical canine rabies as well as Australian and European (and a recently discovered Asian) lyssaviruses and Duvenhage virus. Conventional rabies vaccine offers protection against these viruses. On the other hand, classical rabies vaccine does not seem to offer protection against viruses of Group II, which includes Lagos and Mokolo. Doctoral research presented by Wanda Markotter from University of Pretoria, suggests that Lagos is highly pathogenetic in mice (resulting in high mortality) and should be treated as potentially pathogenetic in humans. Recently, a vaccinated dog from Richards Bay died from Lagos virus. Wanda's paper also compared DNA sequences of Lagos virus isolates obtained from four Durban fruit bats (*Epomorphorus wahlbergi*) between 2003 and 2005 with isolates from elsewhere in Africa (Nigeria, Zimbabwe, Senegal, Central African Republic, Egypt, Ethiopia). Interestingly, DNA divergence of 20% was obtained between Durban and Senegal isolates, indicating rapid mutation and evolution of the virus. Whilst Lagos was first isolated in 1956 in Nigeria in *Eidolon helvum* (the straw-coloured flying fox),

Above: Photographs of three genera of fruit bats reported to be symptomless carriers of Ebola in a recent article in Nature (from top to bottom): *Epomops*, *Hypsignathus* and *Lissonycteris*.

it has since also been found in Wahlberg's epauletted fruit bat (*Epomophorus wahlbergi*) and in the slit-faced bat (*Nycteris thebaica*).

Dr Noel Tordo from the Pasteur Institute in Paris, presented two brilliant papers on recent advances in the field of designing DNA vaccines and antivirals against the entire spectrum of lyssaviruses including Lagos. Whilst these approaches are feasible at the research level, commercial production is not feasible. A fascinating recent case reported by Tordo involved the recovery of a 15-year old American student from clinical rabies (reported by Willoughby *et al.* In *New England Journal of Medicine* in 2005: Vol. 352: 2508-14). The young woman, a future veterinarian, contracted rabies after being bitten by a rabid downed bat. Since no post-exposure prophylaxis was administered, she was admitted a month later with clinical symptoms. A dramatic search on the Internet revealed a 1992 research article by Tordo and associates demonstrating antiviral effect of ketamines which prevented replication of rabies RNA in mice. Out of desperation, ketamine was administered to the patient, who thereafter made a remarkable recovery.

One of the final papers in the conference, by Prof Bob Swanepoel of the South African National Institute for Communicable Diseases, dealt with the role of bats as carriers of filoviruses (Ebola and Marburg disease). Whilst Prof Swanepoel urged some caution in accepting the somewhat premature results of the December 2005 *Nature* paper (of which he was a coauthor) on Ebola in bats, he argued that much stronger evidence linked bats with Marburg. Outbreaks in a DRC mine over time invariably were linked with miners who worked in the mine which was occupied by large colonies of *Rousettus* fruit bats and a range of insectivorous species including *Miniopterus inflatus*. When the mine was flooded, there were no further cases reported.

I left Namibia with the firm conviction that virologists, veterinary scientists and bat workers can and must work together. We have the same simple objective: to prevent even a single human mortality in Africa due to lyssavirus exposure from a bat! Minute as the risk may seem, bat workers, and especially bat rehabbers, simple MUST take every precaution, including obligatory pre-exposure vaccination and the use of gloves when handling bats. Continuing collaborative surveillance involving Bats KZN workers and our colleagues from Allerton Laboratory (Dr Jenny Randles, Dr Keith Perrett, Dr Rob Bagnall), University of Pretoria (Wanda Markotter and Prof Louis Nel), and Onderstepoort (Dr Claude Sabeta) is absolutely essential to monitor diseases in bats and respond responsibly and immediately to possible exposures.

Postscript: A recent Batline email listing reported on the provisional results of a Centre for Disease Control (CDC) study to test for exposure to the SARS coronavirus amongst 90 North American bat researchers gathered at the October 2005 North American Bat Research Symposium. Donors had worked on bats worldwide, including the Chinese horseshoe bats which were found to harbour SARS. One serology test revealed nil exposure whilst another showed a single positive reaction which could have been due to a virus related to SARS and not SARS itself.

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.



RECORDS OF TREE ROOSTING BATS FROM WESTERN MADAGASCAR

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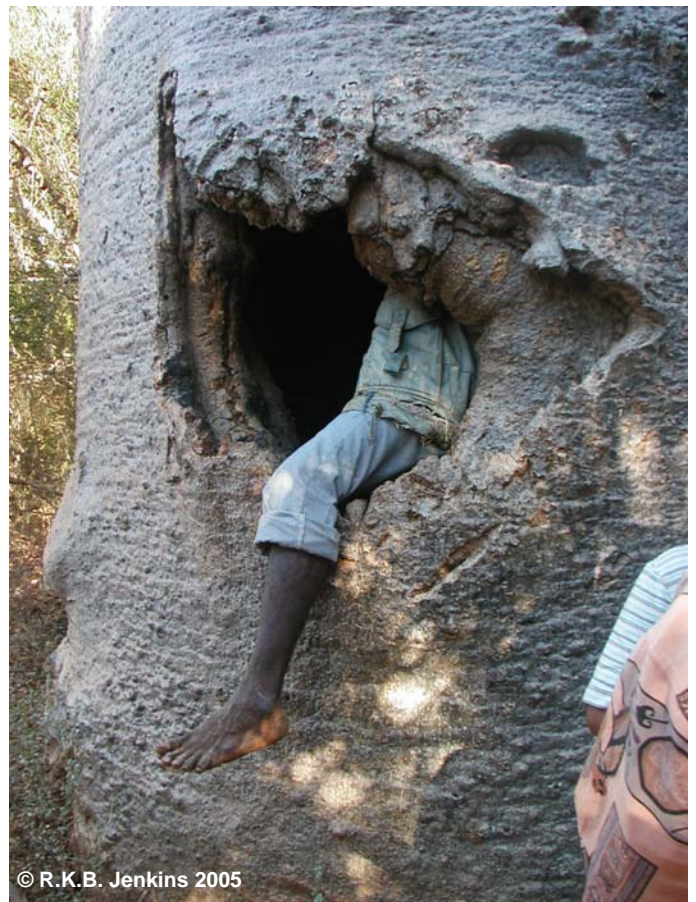
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Keywords: Madagascar, tree roosting, *Miniopterus manavi*, *Mops leucostigma*, *Mops midas miarensis*, *Rousettus madagascariensis*.

A recent survey of the bats of western Madagascar found a higher species richness in forests on karst limestone formations than at sites located on alluvial substrata (GOODMAN *et al.* 2005). An abundance of roost sites associated with rocks and caves in sedimentary rock formations was put forward as the main reason to explain the relationship between bat species richness and geology. However, a considerable proportion of recent bat survey work in western Madagascar has been conducted in areas of limestone and sandstone deposits, and this may influence conclusions about the link between roost site availability and species richness.

In this note we describe new information on roost use of three microchiropteran species on the edge of Kirindy-Mitea National Park in western Madagascar, a zone without any sedimentary rock deposits. On 28 June 2005 we located a large baobab tree (*Adansonia grandidieri*, Baill.) approximately 3 km from Marofihitsy village (20°47'S, 44°01'E) and 1.5 km outside of the park's boundary. The tree (circumference 9.9 m, height ca. 18 m) was situated in dry and scrubby degraded forest. Approximately 1.0 m from the base of the tree was a large hole, 0.6 m across and 0.6 m wide. The interior of the tree was completely hollow, smelled strongly of bat faeces and the bats were clearly audible from the tree's base (Figure 1).

We placed a 6 m mist net across the hole and the first bats, *Miniopterus manavi* (Thomas, 1906) emerged at 17h52. Between 18h00 and 18h30 we captured a total of 142 *M. manavi* emerging from the roost. At 18h55 we netted the first *Mops leucostigma* (Allen, 1918) and an additional seven individuals were netted



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Figure 1: A cavity in the lower section of a baobab tree used by emerging bats.

Table 1: Summary of specimens collected and deposited in the collections of the Département de Biologie Animale, Faculté des Sciences, Université d'Antananarivo.

Species	Field No.	Forearm Length (mm)	Weight (g)
<i>Mops leucostigma</i>	RBJ229	43.9	18.0
	RBJ231	39.8	13.0
<i>Mops midas miarensis</i>	RBJ230	63.5	41.5
	RBJ232	64.6	49.0

up until 22h00. A second, much smaller, exit was observed towards the top of the tree where the trunk and branched joined and a large number of bats were seen flying out from this hole throughout the trapping period. From 17h35 until the first bats emerged we observed a single Bat Hawk (*Macheiramphus alcinus* Bonaparte, 1850) that circled the tree and perched on the upper branches. Although known from a wide range of localities in Madagascar, this species is locally rare and there are few records of its association with bats (SINCLAIR & LANGRAND 2003).

On 13th July 2005 we netted at a colony of roosting microchiropterans (20°38'S, 44°04'E) situated in the canopy of a coconut palm (*Cocos nucifera*, L.) in Ambararata village approximately 4 km from the park's boundary (Table 1). The bats roosted together underneath the leaves at a height of approximately 8 m and we netted four *Mops midas miarensis* (Sundevall, 1843) and 25 *M. leucostigma*. Other records of molossid using trees are rare although GOODMAN & CARDIFF (2004) reported *Chaerephon leucogaster* from under loose bark of a dead standing tree in a baobab forest in the same region.

Miniopterus manavi is a common microchiropteran in Madagascar and had already been recorded from Kirindy-Mitea National Park (GOODMAN *et al.* 2005). *Mops leucostigma* and *M. midas* were not previously known from the park or its environs (GOODMAN *et al.* 2005), and although both species are quite widespread in western Madagascar this is the first description of a roosting site of the former that is not associated with synanthropic settings (GOODMAN & CARDIFF 2004).

Further, on 1 July, we mist-netted six *Rousettus madagascariensis* (Grandidier, 1928) fruit bats feeding beneath kapok trees (*Ceiba pentandra*) in Marofihitsy; this represents another new bat species for the park. This small fruit bat normally roosts in caves or rock shelters, and although there are no records of tree cavities used as roosts, such sites provide an alternative to caves. In the previously published survey results of bats from within and outside the Kirindy-Mitea National Park (GOODMAN *et al.* 2005), the site had the second lowest species richness (n = 8) of the 13 sites visited across western Madagascar. Our results indicate that the species richness of the park and surrounding habitats was incompletely described by Goodman *et al.*, (2005) and more rigorous surveys of tree cavities in Madagascar's forests will likely reveal additional information on the roosting ecology of Malagasy bats and augment protected areas species lists.

ACKNOWLEDGEMENTS

We would like to thank our partners for their support (ANGAP & Department of Animal Biology, University of Antananarivo), the Ministry of the Environment for giving us permission, and the BP Conservation Programme, the People's Trust for Endangered Species and the Darwin Initiative for funding. Thanks to Dr Steven Goodman for assistance with the identification of the molossid bats.



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- GOODMAN, S. M. and CARDIFF, S.G., 2004. A new species of *Chaerephon* (Molossidae) from Madagascar with notes on other members of the family. *Acta Chiropterologica* **6**: 227-248.
- SINCLAIR, I. and LANGRAND, O., 2003. *Birds of the Indian Ocean Islands*. Struik Publishers. pp. 179.



RECENT LITERATURE

CONFERENCE PRESENTATIONS

Presentations relating to bats at the 8th Southern and Eastern African Rabies Group (SEARG) Meeting

Heja Lodge, Namibia, 22-25 January 2006

THE FUTURE OF RABIES PROPHYLAXIS: THE VALUE OF RESEARCH ON NEW VACCINES AND ANTIVIRALS— *Dr. Noel Tordo (France).*

OVERVIEW OF NON-RABIES LYSSAVIRUSES FROM AFRICA— *Dr. Louis Nel (South Africa)*

MOLECULAR EPIDEMIOLOGY AND CHARACTERIZATION OF LAGOS BAT VIRUS ISOLATES FROM SOUTH AFRICA— *Wanda Markotter (South Africa).*

BATS OF AFRICA: DIVERSITY, MYTHS, MISCONCEPTIONS AND TRUTHS— *Dr Peter Taylor (South Africa).*

BATS AND FILOVIRUSES— *Prof Bob Swanepoel (South Africa).*

PUBLISHED PAPERS

ANDRIAFIDISON, D., ANDRIANAIVOARIVELO, R. A., RAMILJAONA, O. R., RAZANAHOERA, M. R., MACKINNON, J., JENKINS, R. K. B., and RACEY, P. A., 2006. Nectarivory by endemic Malagasy fruit bats during the dry season. *Biotropica* 38(1): 85-90.

Abstract: Madagascar has a distinctive fruit bat community consisting of *Pteropus rufus*, *Eidolon dupreanum*, and *Rousettus madagascariensis*. In this study, we observed fruit bat visits to flowering baobabs (*Adansonia suarezensis* and *Adansonia grandidieri*) and kapok trees (*Ceiba pentandra*) during the austral winter. *Eidolon dupreanum* was recorded feeding on nectar of baobabs and kapok, *P. rufus* was observed feeding on kapok only and no *R. madagascariensis* were seen. Three mammals species, two small lemurs (*Phaner furcifer* and *Mirza coquereli*) and *E. dupreanum*, made nondestructive visits to flowering *A. grandidieri* and are therefore all potential pollinators of this endangered baobab. This is the first evidence to show that *A. grandidieri* is bat-pollinated and further demonstrates the close link between fruit bats and some of Madagascar's endemic plants. *Eidolon dupreanum* was the only mammal species recorded visiting *A. suarezensis* and visit peaked at the reported times of maximum nectar concentration. *Pteropus rufus* visited kapok mostly before midnight when most nectar was available, but *E. dupreanum* visited later in the night. These differences in timing of foraging on kapok can be explained either by differing distances from the roost sites of each species or by resource partitioning. We advocate increased levels of protection, education, awareness, and applied research on both mammal-pollinated baobab species and fruit bats, and suggest that both baobabs and bats are candidate "flagship species" for the threatened dry forests of Madagascar.

BEKKER, J. P., and EKUÉ, M. R. M., 2004. Preliminary report on the small mammals collected during the mission RéRE-VZZ 2002 in Benin (Mammalia: Insectivora, Chiroptera, Rodentia). In: Mensah GA, Sinsin B, Thomassen E, editors. *Actes du Séminaire-Atelier sur la Mammalogie et la Biodiversité Abomey-Calavi, Bénin, 30/10-18-11/2002*. p 273-297.

DECHER, J., KADJO, B., ABEDI-LARTEY, M., TOUNKARA, E. O., and KANTE, S., 2005. A rapid survey of small mammals (shrews, rodents, and bats) from the Haute Dodo and Cavally Forests, Côte d'Ivoire. In: Alonso LE, Lauginie F, Rondeau G, editors. *A Rapid Biological Assessment of two classified forests in South-western Côte d'Ivoire*. Washington, D.C.: Conservation International; p 101-109.

DIETZ, C., 2005. Illustrated identification key to the bats of Egypt. Electronic publication. Version 1.0 (21.12.2005).

http://www.uni-tuebingen.de/tierphys/Kontakt/mitarbeiter_seiten/Identification%20key%20to%20the%20bats%20of%20Egypt.pdf

DECHER, J., OPPONG, J., and FAHR, J., 2006. Rapid Assessment of Small Mammals at Draw River, Boi-Tano, and Krokosua Hills. In: McCullough J, Decher J, Kpelle DG, editors. *A biological assessment of the terrestrial ecosystems of the Draw River, Boi-Tano, Tano Nimiri and Krokosua Hills forest reserves, southwestern Ghana*. Washington, D.C.: Conservation International; p 57-66.

Abstract: This RAP provided a unique opportunity to increase our knowledge of the small mammal diversity of southwestern Ghana. 105 terrestrial small mammal captures, composed of 6 species of shrews and 10 species of rodents, and 82 bat captures composed of 15 species were made. The shrew *Crocidura obscurior* is the first record for Ghana. *Crocidura buettikoferi* and *C. foxi* are first records for southwestern Ghana. At Krokosua Hills we documented the rare microbat *Scotophilus nucella* (IUCN Red List: Vulnerable), which was described in 1984 and hitherto known from only ten specimens from Ghana, Côte d'Ivoire and Uganda. Overall the small mammal species composition clearly reflects a forest fauna. Especially among the bats sampled, not a single savanna species was present despite partially degraded forest conditions.



Above: Krokosua Forest Reserve; edge of farming plot of the village of Mim in the reserve— **Jan Decher**

Below: *Myonycteris torquata* at Draw River Forest Reserve "hanging around" camp after release— **Jan Decher**.



EMMS, C., and BARNETT, L.K., 2005. Gambian biodiversity: A provisional checklist of all species recorded within The Gambia, West Africa. Part two: Vertebrates. 3rd version. University of Warwick, U.K.: 52 pp.
<http://www.darwingambia.gm/checklist2.pdf>.

GOODMAN, S. M., JENKINS, R. K. B., and RATRIMOMANARIVO, F. H., 2005. A review of the genus *Scotophilus* (Mammalia, Chiroptera, Vespertilionidae) on Madagascar, with the description of a new species. *Zoosystema* 27(4): 867-882.

Abstract: The bat genus *Scotophilus* Leach, 1821 is poorly known from islands in the western Indian Ocean. *S. borbonicus* (É. Geoffroy, 1803) was originally described in the early 19th century from La Réunion on the basis of two specimens. Its presence on that island has not been subsequently documented. The holotype specimen has been lost and the lectotype is in a very poor state of preservation, further complicating a proper diagnosis of this taxon. *S. borbonicus* has also been reported from Madagascar, but these records are without clear documentation. Little information is available on *S. robustus* A. Milne-Edwards, 1881, a Malagasy endemic. On the basis of recently discovered old specimens and newly collected material from Madagascar we reevaluate the species limits of members of this genus. Three species of *Scotophilus* are documented on Madagascar, one of which is new to science and described herein. This new species, *S. tandreana* n. sp., is distinguished from the other species occurring on Madagascar and elsewhere in the world by pelage coloration and cranial and dental measurements.

Keywords: Chiroptera, La Reunion, Madagascar, Mammalia, new species, *Scotophilus*, Vespertilionidae.

GUNNELL, G. F., and SIMMONS, N. B., 2005. Fossil evidence and origin of bats. *Journal of Mammalogy* 12(1/2): 209-246.

Abstract: The phylogenetic and geographic origins of bats (Chiroptera) remain unknown. The earliest confirmed records of bats date from the early Eocene (approximately 51 Ma) in North America with other early Eocene bat taxa also being represented from Europe, Africa, and Australia. Where known, skeletons of these early taxa indicate that many of the anatomical specializations characteristic of bats had already been achieved by the early Eocene, including forelimb and manus elongation in conjunction with structural changes in the pectoral skeleton, hind limb reorientation, and the presence of rudimentary echolocating abilities. By the middle Eocene, the diversification of bats was well underway with many modern families being represented among fossil forms. A new phylogenetic analysis indicates that several early fossil bats are consecutive sister taxa to the extant crown group (including megabats), and suggests a single origin for the order, at least by the late Paleocene. Although morphological studies have long placed bats in the Grandorder Archonta, (along with primates, dermopterans, and tree shrews), recent molecular studies have refuted this hypothesis, instead strongly supporting placement of bats in Laurasiatheria. Primitively, proto-bats were likely insectivorous, under-branch hangers and elementary gliders that exploited terminal branch habitats. Recent work has indicated that a number of other mammalian groups began to exploit similar arboreal, terminal branch habitats in the Paleocene, including multituberculates, eulipotyphlans, dermopterans, and plesiadapiforms. This may offer an ecological explanation for morphological convergence that led to the erroneous inclusion of bats within Archonta: ancestral archontan groups as well as proto-bats apparently were exploiting similar arboreal habitats, which may have led to concurrent development of homoplastic morphological attributes.

HULVA, P., HORÁČEK, I., STRELKOV, P. P., and BENDA, P., 2004. Molecular architecture of *Pipistrellus pipistrellus*/*Pipistrellus pygmaeus* complex (Chiroptera: Vespertilionidae): further cryptic species and Mediterranean origin of the divergence. *Mol. Phylogent. Evol.* 32(3): 1023-1035.

Abstract: Previous genetic analyses have demonstrated that two phonic types of one of the most common European bats, the Common pipistrelle, belong to distinct species, although they are almost identical morphologically (45 kHz *Pipistrellus pipistrellus* and 55 kHz *Pipistrellus pygmaeus*). To reconstruct the history of the species complex and explain the codistribution of both forms in Europe and the Mediterranean, we performed phylogenetic analysis based on a 402-bp portion of the cytochrome b gene. Particular attention was paid to the eastern and southern parts of the range where no data were available. We found further distinctive allopatric haplotypes from Libya and Morocco. The difference of about 6–7% described in the Libyan population suggests the occurrence of a new species in the southern Mediterranean. The species status of Moroccan population is also discussed. The phylogeographic patterns obtained and analysis of fossil records support the hypothesis of expansion of both species into Europe from the Mediterranean region during the Holocene. The allopatric speciation model fits our data best. The paleobiographic scenario envisaged is corroborated also by molecular clock estimations and correlations with Late Neogene environmental changes in the Mediterranean region which ended with the Messinian salinity crisis.

Keywords: Allopatry, Chiroptera, Cryptic diversity, Cytochrome b, mtDNA, Phylogeny, Phylogeography, *Pipistrellus pipistrellus*, *Pipistrellus pygmaeus*.

JACOBS, D. S., EICK, G. N., SCHOEMAN, M. C., and MATTHEE, C. A., 2006. Cryptic species in an insectivorous bat, *Scotophilus dinganii*. *Journal of Mammalogy* 87(1): 161-170.

Abstract: In recent years many cryptic bat species have been unmasked by differences in their echolocation calls. The yellow house bat (*Scotophilus dinganii*) is 1 of 3 species of *Scotophilus* currently described in southern Africa and is distinguished from the other 2 species by its size and yellow venter. Here we use genetic, morphological, and echolocation call data to show the existence of a cryptic species. We found that *S. dinganii* consists of 2 forms, one that uses a peak echolocation frequency of 44 kHz and the other a peak frequency of 33 kHz. Both forms have yellow venters. The 44-kHz phonic type is up to 15% smaller than the 33-kHz phonic type and differed genetically by an average cytochrome-b (Cytb) sequence divergence of 3.3%. Furthermore, combined phylogenetic analyses of Cytb and control region sequences indicate that the 2 phonic types are reciprocally monophyletic, suggesting that they are sibling species.

Keywords: bats, cryptic species, echolocation, mitochondrial DNA, morphology, *Scotophilus dinganii*, *Scotophilus viridis*.

KEARNEY, T. C., and SEAMARK, E. C. J., 2005. Morphometric analysis of cranial and external characters of *Laephotis* Thomas, 1901 (Mammalia: Chiroptera: Vespertilionidae) from southern Africa. *Annals of the Transvaal Museum* 42: 71-87.

Abstract: Morphometric analysis, which included palatal and post-palatal measurements, allow the distinction of *Laephotis botswanae* and *L. cf. angolensis* from other *Laephotis* species, and suggest the assignment of specimens from KwaZulu-Natal in South Africa previously identified as *L. cf. wintoni* to *L. botswanae*. The distinction between *L. wintoni* and *L. namibensis*, however, was not confirmed and still remains to be clarified. It is suggested that until the species distinction is further clarified by additional characters or other systematic techniques, the current species assignments be retained. Morphometric analysis based on cranial characters, which excluded palatal and post-palatal measurements, show some separation of the *Laephotis* species in the principal component analysis, but not in the cluster analysis. Analyses based on external characters only were not useful for the separation of the *Laephotis* species.

Keywords: Cranial and external measurements, *Laephotis*, multivariate morphometrics, species identification.

KEITH, M., CHIMIMBA, C. T., REYERS, B., and VAN JAARVELD, A. S., 2005. Taxonomic and phylogenetic distinctiveness in regional conservation assessments: A case study based on extant South African Chiroptera and Carnivora. *Animal Conservation* 8(3): 279-288.

Abstract: The current study investigates whether a simple measure of taxonomic diversity (Taxonomic Distinctiveness (TD)) can be used as a proxy for different measures of phylogenetic diversity (Phylogenetic Distinctiveness (PD)) in determining species of regional conservation priority, and uses extant South African Chiroptera and Carnivora as a case study. Published phylogenies for the two mammalian Orders allowed the quantification of a node-based measure that was considered to represent phylogenetic diversity (PDNODE), as well as a branch length-based measure that was considered to represent the amount of evolutionary change over time (PDBRANCH). Both the PDNODE and PDBRANCH, together with TD were included in our regional conservation priority assessment. Although no statistically significant differences were detected between the PDNODE, PDBRANCH and the TD for both the Chiroptera and Carnivora, these measures were also shown to be correlated with each other. More importantly, inclusion of either the PDNODE, PDBRANCH, or TD in our analysis did not significantly alter the species that were identified as being of regional conservation priority. Both regional priority scores for the South African Chiroptera and Carnivora and their respective rankings were broadly consistent across the three potential indicators of conservation status utilised. These results suggest that the inclusion of either the PDNODE and/or PDBRANCH in conservation prioritisation exercises may not add value to that currently provided by the TD. Consequently, this implies that the absence of relevant PD data, the utilisation of the TD in regional conservation priority settings may provide the appropriate information on evolutionary diversity.

LAUSEN, C. L., and BARCLAY, R. M. R., 2005. *Pipistrellus nanus*. *Mammalian Species* 784(1): 7.

LEROY, E. M., KUMULUNGUI, B., POURRUT, X., ROUQUET, P., HASSANIN, A., YABA, P., DÉLICAT, A., PAWESKA, J. T., GONZALEZ, J.-P., and SWANEPOEL, R., 2005. Fruit bats as reservoirs of Ebola virus. *Nature* 438(7068): 575-576.

Abstract: The first recorded human outbreak of Ebola virus was in 1976, but the wild reservoir of this virus is unknown. Here we test for Ebola in more than a thousand small vertebrates that were collected during Ebola outbreaks in humans and great apes between 2001 and 2003 in Gabon and the Republic of the Congo. We find evidence of asymptomatic infection by Ebola virus in three species of fruit bat, indicating that these animals may be acting as reservoir for this deadly virus.

MATTHEWS, T., DENYS, C., and PARKINGTON, J. E., 2005. The palaeoecology of the micromammals from the late middle Pleistocene site of Hoedjiespunt 1 (Cape Province, South Africa). *Journal of Human Evolution* 49(4): 432-451.

Abstract: The palaeontological site of Hoedjiespunt I (HDPI) represents a fossilized hyaena lair. A rich mammalian fauna, including four hominid teeth, has been recovered from the site. Micromammals were recovered from the same sediments as the larger fauna. Taphonomic analysis suggests that the micromammal assemblages from HDPI were accumulated by a barn owl. The barn owl produces micromammal assemblages that provide a broad sample of micromammals, within a certain size range, living in the hunting area of the owl. There are size-related and other biases inherent in the prey selection of this predator, and owls may roost in one area and hunt in another however, the barn owl has frequently been found to provide a better indication of micromammals living within an area than trapping. The micromammals from HDPI were used to reconstruct the microhabitats in the vicinity of the site. Two taxonomic habitat indexes were used to assess the environment and dominant habitat types at Hoedjiespunt 1. The variability and adaptability of many of the southern African micromammals complicates interpretation of the results, however, it appears that the micromammals from the HDPI fossil assemblages utilized habitats of open, scrub vegetation, and rocky and sandy areas. It is suggested that the environment was not markedly different from today, but it may have been relatively more arid. A comparison between HDPI and other fossil sites in the area dating from the terminal Pleistocene to the Holocene indicates that HDPI is lacking certain species that are common to all the other west coast fossil sites. There is some discrepancy in the environment indicated by the large mammals as compared that indicated by to the micromammals at the site. It is suggested that this discrepancy may reflect the fact that an owl is likely to have hunted in the vicinity of the hyaena den, probably in the more open areas around the roost site, whereas the macrofauna, accumulated by the further-ranging brown hyaena (*Hyaena brunnea*), represents environments from further afield.

Keywords: Chiroptera, Rhinolophidae, *Rhinolophus clivosus*, *Tyto alba*, Aves, predation.

MILLER-BUTTERWORTH, C. M., EICK, G., JACOBS, D. S., SCHOEMAN, M. C., and HARLEY, E. H., 2005. Genetic and phenotypic differences between South African long-fingered bats, with a global miniopterine phylogeny. *Journal of Mammalogy* 86(6): 1121-1135.

Abstract: The Natal long-fingered bat (*Miniopterus natalensis*) and lesser long-fingered bat (*M. fraterculus*) are morphologically almost indistinguishable and occur sympatrically over much of their southern African range. This raises the possibility that they are sister taxa. We employed a multidisciplinary approach to examine their taxonomic relationship to one another and to other *Miniopterus* species, whose global phylogeny requires review. We examined echolocation, morphological, and dietary differences between *M. natalensis* and *M. fraterculus*, as well as both nuclear and mitochondrial DNA variation between them in the context of a phylogeny incorporating 13 *Miniopterus* species and subspecies. Despite similarities in their morphology and distribution, *M. natalensis* and *M. fraterculus* echolocation at peak frequencies separated by 12 kHz, and both nuclear and mitochondrial DNA markers confirm they are distinct species. Analysis of cytochrome-b (*Cytb*) sequences further indicates that *M. fraterculus* and *M. natalensis* are not sister taxa; *M. fraterculus* appears to be more closely related to the greater long-fingered bat (*M. inflatus*). Examination of the global taxonomy of *Miniopterus* confirms that Schreibers's long-fingered bat (*M. schreibersii*) forms a paraphyletic species complex. Furthermore, the miniopterine bats are divided into 2 geographically isolated monophyletic groups, one containing African and European species, and the other taxa from Australasia and Asia. *Cytb* sequence divergence also suggests that *M. natalensis* is distinct from the European *M. schreibersii*. These results support the elevation of *M. natalensis* to full species rank.

Keywords: Chiroptera, cytochrome b, evolution, microsatellite, *Miniopterus*, morphology, phylogeny.

PAGEL, TH., 2005. Eine Reise in das Land der Berggorillas: Uganda. *Zeitschrift des Kölner Zoo* 48(3): 107-130.

Notes: The Nile fruit bat, *Rousettus aegyptiacus*, roosts by the thousands in a cave in Maramagambo Forest, Queen Elizabeth National Park. The cave is also inhabited by two rock pythons, *Python sebae*, predated on the fruit bats.

RAZAKARIVONY, V., RAJEMISON, B., and GOODMAN, S. M., 2005. The diet of Malagasy Microchiroptera based on stomach contents. *Mammalian Biology* 70(5): 312-316.

Keywords: *Emballonura nov.sp.*, *Hipposideros commersoni*, *Miniopterus manavi*, *Myotis goudoti*, *Triaenops rufus*.

RICHTER, H. V., and CUMMING, G. S., 2006. Food availability and annual migration of the straw-colored fruit bat (*Eidolon helvum*). *Journal of Zoology (London)* 268(1): 35-44.

Abstract: Animal migrations offer a unique opportunity for developing and testing hypotheses about the ecological requirements of different species and the tradeoffs that they make between conflicting life-history demands. There has been relatively little research into the causes and consequences of migrations by fruit bats, despite their potential significance for pollination and seed dispersal. We assessed the causes of one of the most spectacular migrations of fruit bats known: the annual influx of an estimated 5-10 million *E. helvum* into Kasanka National Park in Zambia. We tested several predictions based on the hypothesis that *E. helvum* migrates to exploit seasonal variations in food supply opportunistically. Phenological data, feeding observations and monitoring of fruit bat movements provided the first quantitative evidence in support of the hypothesis that the migration of *E. helvum* in Zambia is driven by food supply. The *E. helvum* colony exhibited several surprising behaviors, including a tendency for migratory satellite colonies to aggregate, rather than to disperse, during the time of peak food production, and a tendency to fly

well beyond the most immediate food sources when foraging. Alternative hypotheses to explain the *E. helvum* migration were not supported, but further research is needed to clarify the results of this preliminary study. Both the size of the colony and its potential for large-scale movements suggest that this bat may play an important economic and ecological role over a significant portion of sub-Saharan Africa. Information is still lacking about migration routes, food sources, habitat requirements and the role of migration in disease transmission between colonies of *E. helvum*.

SALGUEIRO, P., COELHO, M. M., PALMEIRIM, J. M., and RUEDI, M., 2004. Mitochondrial DNA variation and population structure of the island endemic Azorean bat (*Nyctalus azoreum*). *Mol Ecology* 13(11): 3357-3366.

Abstract: The Azorean bat *Nyctalus azoreum* is the only endemic mammal native to the remote archipelago of the Azores. It evolved from a continental ancestor related to the Leisler's bat *Nyctalus leisleri* and is considered threatened because of its restricted and highly fragmented distribution. We studied the genetic variability in 159 individuals from 14 colonies sampled throughout the archipelago. Sequences of the D-loop region revealed moderate but highly structured genetic variability. Half of the 15 distinct haplotypes were restricted to a single island, but the most common was found throughout the archipelago, suggesting a single colonization event followed by limited interisland female gene flow. All *N. azoreum* haplotypes were closely related and formed a star-like structure typical of expanded populations. The inferred age of demographic expansions was consistent with the arrival of founder animals during the Holocene, well before the first humans inhabited the Azores. Comparisons with a population of *N. leisleri* from continental Portugal confirmed not only that all *N. azoreum* lineages were unique to the archipelago, but also that the current levels of genetic diversity were surprisingly high for an insular species. Our data imply that the Azorean bat has a high conservation value. We argue that geographical patterns of genetic structuring indicate the existence of two management units.

SEDLÁČEK, O., HORÁK, D., RIEGERT, J., REIF, J., and HORÁČEK, I., 2006. Comments on Welwitsch's mouse-eared bat (*Myotis welwitschii*) with the first record from Cameroon. *Mammalian Biology* 71(2): 120-123.

Keywords: Cameroon, distribution, *Myotis welwitschii*, new record.

VOLLETH, M., HELLER, K.-G., and FAHR, J., 2006. Phylogenetic relationships of three "Nycticeiini" genera (Vespertilionidae, Chiroptera, Mammalia) as revealed by karyological analysis. *Mammalian Biology* 71(1): 1-12.

Abstract: GTG-banded karyotypes are presented for *Scotoecus hirundo* ($2n = 30$; FN = 50), *Rhogeessa alleni* ($2n = 30$; FN = 50), *Scotophilus kuhlii* ($2n = 36$; FN = 48) and *Scotophilus leucogaster* ($2n = 36$; FN = 50). These three genera belong to the family Vespertilionidae and have previously been placed into the tribe "Nycticeiini" (Tate 1942). Karyological analysis, however, points to a close relationship of *Scotoecus hirundo* to the tribes Pipistrellini and Vespertilionini (sensu Volleth and Heller 1994). *Rhogeessa (Baeodon) alleni*, a member of the karyologically diverse genus *Rhogeessa*, has two fusion chromosomes in common with the genus *Plecotus*. Together with morphological (Hill and Harrison 1987) and molecular-genetic results (Hofer and Van Den Bussche 2003), chromosome analysis suggests a closer relationship of Plecotini and *Rhogeessa*. The two species examined of the genus *Scotophilus* show differences only in two small autosomal pairs and the Y chromosome. Chromosomal data did not reveal closer relationships of this genus to any other vespertilionid tribe.

Keywords: Chromosomal evolution, Phylogenetic relationships, Vespertilionidae.

NOTICE BOARD

Conferences

6th Conference of the Southern African Society for Systematic Biology

To be held at: Kruger National Park, South Africa, 14 - 17 July 2006

Further information: <http://swarm.co.za/SASSB2006/SASSB1.htm>

36th Annual North American Symposium on Bat Research

To be held at: Wrightsville Beach, NC, USA, 18-21 October 2006.

Further information: <http://www.nasbr.org>

Future planning

- 21st Annual Conference of the Society for Conservation Biology, Port Elizabeth, South Africa, 1-5 July 2007.
- 37th Annual North American Symposium on Bat Research, tentatively scheduled for Mexico in 2007. [<http://www.nasbr.org>]
- 14th International Bat Research Conference, Oaxaca, Mexico, 5 -11 August 2007.
- 11th European Bat Research Symposium, Cluj-Napoca, Romania, August 2008.
- 12th European Bat Research Symposium, Lithuania, August 2011.

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