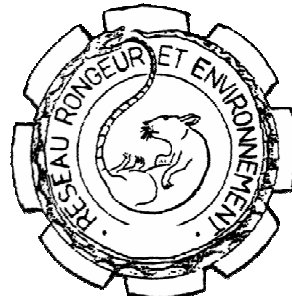


**10th International
AFRICAN SMALL MAMMAL SYMPOSIUM**



**International Institute of Tropical Agriculture
20 – 25 August 2007
Abomey-Calavi, BENIN (West Africa)**

**ABSTRACTS
OF
PRESENTATIONS**



Preface

Dear Delegates,

The Organising Team welcomes you the 10th African Small Mammal Symposium to be held in Abomey-Calavi, Benin.

We have responded to your feedback at previous symposia to bring you a stimulating scientific programme, a diverse array of field trips and social events with plenty of opportunities to network, catch up with old friends and meet new people.

Previous meetings have provided researchers studying African small mammals' a platform for discussions, interactions and exchange of ideas and have resulted in the formation of different research networks. Our goal in hosting this event is to expand and strengthen those networks and encourage more advanced researches on this fascinating group on African mammals.

Do make the most of what the conference, and Benin, has to offer.

Mikwabo

The Organising Committee

ORGANIZING COMMITTEE

Chairman: Jean T. Claude Codjia, University of Abomey-Calavi (Benin)

Co-Chairman: Herwig Leirs, University of Antwerp (Belgium)

Secretary General: Guy Apollinaire Mensah, National Institute of Agricultural Research (Benin)

Secretary General Associate: Marius R. M. Ekué, Achille Assogbadjo, Stéphane Sonon, University of Abomey-Calavi (Benin)

Members:

- ♦ Brice Sinsin, University of Abomey-Calavi (Benin)
- ♦ Daouda, Isaquou, University of Parakou (Benin)
- ♦ Jan Piet Bekker, VZZ (Netherlands)
- ♦ Eduars Linsemair, Project BIOTA (Germany)
- ♦ Elisabeth Kalko, Project BIOTA (Germany)
- ♦ Altinel Voglozin, University of Abomey-Calavi (Benin)
- ♦ Séverin Tchiboza, University of Abomey-Calavi, Benin

PARTICIPATING INSTITUTIONS

- ♦ Faculty of Agronomics Sciences, University of Abomey-Calavi,
- ♦ Faculty of Agronomics Sciences, University of Parakou,
- ♦ Network Rodents and Environment (RéRE)
- ♦ Ministry of Agriculture, Animal husbandry, and Fishing (MAEP),
- ♦ Direction of Forestry and Natural Resources (DFRN),
- ♦ Benin Centre for Scientific and Technical Research (CBRST),
- ♦ National Institute of Agricultural Research (INRAB),
- ♦ Direction of Agriculture (DAGRI),
- ♦ Project Biodiversity Transect in West and Central Africa (BIOTA),
- ♦ Vereniging voor Zoogdierkunde en Zoogdierbescherming (VZZ).

SCIENTIFIC COMMITTEE

Chairman:

Prof. Dr. Herwig Leirs: herwig.leirs@ua.ac.be, University of Antwerp (Belgium) and Danish Pest Infestation Laboratory (Denmark)

Members:

Jean T. Claude Codjia, University of Abomey-Calavi (Benin)
Guy Apollinaire Mensah, National Institute of Agricultural Research (Benin)
Brice Sinsin, University of Abomey-Calavi, (Benin)
Aimé H. Bokonon-Ganta, University of Hawaii, (USA)
Afewerk Bekele, Addis Ababa University (Ethiopia)
Steve Belmain, Natural Resources Institute (United Kingdom)
Nigel Bennett, University of Pretoria (South Africa)
Gary Bronner, University of Cape Town (South Africa)

Chris Chimimba, University of Pretoria (South Africa)
Christiane Denys, MNHN, Paris (France)
Laurent Granjon, IRD, Bamako (Mali)
David Happold, Australian National University, Canberra (Australia)
Rainer Hutterer, A. Koenig Museum, Bonn (Germany)
Boris Krasnov, Ramon Science Center (Israel)
Leonid Lavrenchenko, A.N. Severtsov Institute (Russia)
Rhodes H. Makundi, Sokoine University of Agriculture (Tanzania)
Nicholas Oguge, Kenyatta University, Nairobi (Kenya)
Bruno Sicard, IRD, Bamako (Mali)
Bill Stanley, Field Museum of Natural History (USA)
Peter Taylor, Thekwini Heritage Science Museum (South Africa)
Eduars Linsemair, Project BIOTA (Germany)
Elisabeth Kalko, Project BIOTA (Germany)

A comparative geometric morphometric analysis of non-geographic variation in two geographically disparate species of murid rodents (Rodentia: Muridae), *Aethomys ineptus* from Southern Africa and *Arvicanthis niloticus* from Sudan

Abdel-Rahman E.H.¹, Taylor P. J.²,¹,
Contrafatto G.³, Lamb J.M.³, Bloomer, P.⁴ &
Chimimba C.T.^{1,5}

1. Mammal Research Institute (MRI),
Department of Zoology & Entomology,
University of Pretoria, Pretoria, 0002 South
Africa. Email: eitimadh@yahoo.com,

2. Durban Natural Science Museum, P.O. Box
4085, Durban, 4000 South Africa.

3. School of Biological and Conservation
Sciences, University of KwaZulu-Natal, P.O.
Box 18091, Dalbridge, 4014 South Africa.

4. Department of Genetics, University of
Pretoria, Pretoria, 0002 South Africa

5. DST-NRF Centre of Excellence for Invasion
Biology (CIB), Department of Zoology &
Entomology, University of Pretoria, Pretoria,
0002 South Africa.

Abstract

Non-geographic morphometric variation particularly at the level of sexual dimorphism and age variation has been extensively documented in many organisms including rodents, and is useful for establishing whether to analyse sexes separately or together and for selecting adult specimens to consider for subsequent data recording and analysis. However, such studies have largely been based on linear measurement-based traditional morphometric analyses that mainly focus on the partitioning of overall size, rather than shape-related morphological variation. Nevertheless, recent advances in unit-free, landmark/outline-based geometric morphometric analyses are arguably considered to offer a new, superior tool to assess shape-related morphological variation than the linear measurement-based traditional morphometric analysis. In the present study, we used geometric morphometric analysis to assess the nature and extent of non-geographic variation in the Tete veld rat, *Aethomys ineptus* from southern Africa and, *Arvicanthis niloticus* from Sudan at the level of sexual dimorphism and age variation, the results of which are compared with previously published results based on traditional morphometric data. In addition, our comparative analysis allowed an insight into

factors that may influence adaptive phenotypic variation in these two murid rodent species that occupy a wide range of geographically and climatically disparate habitats. Our results show that while the results of the traditional morphometric analyses of both species were congruent, they were not sensitive enough to detect some signals of non-geographic morphometric variation. For example, while one series of analyses detected the presence of sexual dimorphism, the others could not. These results highlight the importance of a careful evaluation of size- and shape-related non-geographic morphometric variation prior to subsequent analyses of geographic variation and the delineation of species. Erroneous analyses of non-geographic variation may have implications in the interpretation of evolutionary and geographic processes that may be responsible for morphological differences at both the inter- and intra-specific levels.

Key words: *Aethomys ineptus*, *Arvicanthis niloticus*, non-geographic variation, traditional/geometric morphometrics, sexual dimorphism, age variation, southern Africa, Sudan

Phylogeny and historical demography of economically-important rodents of the genus *Arvicanthis* (Mammalia: Muridae) from the Nile Valley: of mice and men.

Abdel Rahman Ahmed E.H.¹, Ducroz, J-F.², Mitchell, A.³, Lamb, J.⁴, Contrafatto, G.⁴, Denys, C.², Lecompte, E.² & Taylor, P.J.⁵

1. Mammal Research Institute (MRI), Department of Zoology & Entomology, University of Pretoria, Pretoria, 0002 South Africa. Email: eitimadh@yahoo.com.

2. Muséum National d'Histoire Naturelle, Department Systematics & Evolution, UMR CNRS 5202, Paris, France

3. Genetics Department, University of KwaZulu-Natal, Pietermaritzburg Campus, Private Bag X01, Scottsville, 3209, South Africa

4. School of Biological and Conservation Sciences, University of KwaZulu-Natal, P. O. Box 18091, Dalbridge, 4014, South Africa.

5. Durban Natural Science Museum, P. O. Box 4085, Durban, 4000, South Africa.

Abstract

Our investigation clarified the taxonomy, phylogeny and historical demography of semi-commensal Nile rats (*Arvicanthis*) from the Nile Valley in Sudan. Nile rats are important crop pests and zoonotic disease reservoirs; whilst not occupying human dwellings they are closely associated with agricultural settlements in the Nile Valley. Phylogenetic analysis of the complete cytochrome-*b* gene (1140 bp) of 23 individuals from six localities in Sudan (from two previously recognized species, *A. niloticus* and *A. testicularis*), together with available Genbank sequences, supported the monophyly of the genus *Arvicanthis* and its sister-group relationship with *Lemniscomys*. The data supported the existence of only a single species, *A. niloticus*, from the Nile Valley. Historical demography and population genetics of the Sudanese Nile Valley population indicated a very recent exponential population expansion event (ca 300 years ago), which corresponds with the most recent period of exponential human population expansion in the Nile Valley inferred from archaeological evidence. Two African *Arvicanthis* clades were supported (with 100% bootstrap support) by the broader phylogenetic analysis: 1) *A. niloticus*, *A. abyssinicus* and *A. neumanni*, and 2) *A. rufinus* and *A. ansorgei* from Western Africa. Within the first clade, divergence between lineages of *A. niloticus* s. s. from West and North-East Africa (8.9%) suggests specific recognition, but sampling of

geographically intermediate localities is required. Based on hypothesized palaeodrainage and palaeoclimatic patterns, we propose a simple model for speciation of *Arvicanthis* in Africa.

Key Words: molecular systematics – cytochrome-*b* – taxonomy – coalescence – population genetics – geomorphology – palaeoclimates – haplotype network.

Geometric morphometrics and taxonomy of the genus *Arvicanthis* (Rodentia: Muridae) from Sudan

Arvicanthis niloticus, *Arvicanthis testicularis*, Sudan.

Abdel-Rahman, E.H.¹, Taylor, P.J.², Contrafatto, G.³ and Lamb, J.M.³

1. Mammal Research Institute (MRI), Department of Zoology & Entomology, University of Pretoria, Pretoria, 0002 South Africa;

2. Durban Natural Science Museum, P.O. Box 4085, Durban, South Africa, 4000 (Email: taylorpeter@durban.gov.za);

3. School of Biology and Conservation Sciences, George Campbell, Building, University of KwaZulu-Natal, 4041, Durban, South Africa

Abstract

The genus *Arvicanthis* Lesson, 1842 (Rodentia; Muridae; Murinae) comprises herbivorous unstriped grass rats widespread in the Nile Valley, west, central and east Africa. Two species (*Arvicanthis niloticus* Demarset, 1842 and *A. testicularis* Sundevall, 1843) have previously been reported to occur in the Nile valley (Egypt and Sudan) but with many taxonomic uncertainties. The amount of phenotypic variation (shape and size) in *Arvicanthis niloticus* and *A. testicularis* from Sudan was assessed from a geometric morphometric approach (GM) by applying univariate and multivariate statistical techniques at different taxonomic levels. Shape and centroid size differences between *A. niloticus* and *A. testicularis* for dorsal and ventral views, revealed the existence of one species, *A. niloticus*. Our results are in consistent with the linear morphometric analysis, cytogenetic and molecular data (PCR-RAPDs and mtDNA sequencing). However, a significant skull-shape difference (dorsal and ventral views) between five populations from Sudan was evident ($p < 0.05$). Inter-population variability was due to adaptation to local climatic conditions (Altitude, Mean annual temperature, Absolute maximum temperature, Absolute minimum temperature, Mean annual precipitation, Monthly maximum precipitation) and geographical variables (coordinates for latitude and longitude). These results suggest that this widely-distributed species exhibits a local pattern of morphological differentiation related to commensalism and climatic variables that may induce some ecological, functional and behavioural adaptations.

Key words: Inter-specific variability, skull shape variation, geometric morphometrics,

Circulation of arenaviruses in rodents captured from 2003 to 2005 in Ivory Coast

Akoua-Koffi C.¹, Coulibaly GD, Allali B.¹, Kouassi Kan S.¹, Akran V.¹, Kouakou B.¹, H. Dosso², Denys C.³, M. Dosso¹, ter Meulen J.⁴ & Gunther S.⁴

1. *Department of epidemic viruses – Pasteur Institute of Côte d'Ivoire. dve.ipci@yahoo.fr / akouame@yahoo.fr*

2. *Ecology Research Centre – University of Abobo Adjame – Côte d'Ivoire.*

3. *National museum of Natural History – Paris –France.*

4. *Tropical Medicine Institute of Hamburg – Germany.*

Abstract

Rodents are known to cause damages to agriculture and also to be reservoirs of bacterial, parasitic and viral diseases. Chronically infected rodents are vector hosts of Arenaviruses, family of Arenaviridae. Some of them are pathogenic for men and can be the causes of serious diseases like Lassa hemorrhagic fever whose natural reservoir is a rodent of the *Mastomys* genus. In order to contribute to a better knowledge of rodents which are reservoirs of Arenaviruses including the Lassa fever virus, the little rodents captured during a multicentric research project of type INCO-DEV have been the subject of virology research. The sampling was carried out in a standardized way with a system of trapping in line consisting of the same number of traps of type Sherman and following the protocol of the survey. Each captured rodent is identified and submitted to an autopsy in order to remove organs, to take blood in search of Arenaviruses by RT-PCR and genomic sequencing in the virology laboratory of the Institute of Tropical Medicine of Hamburg. The molecular and cytogenetic techniques allowing the complete identification of the rodent were carried out at the National Museum of Natural History (NMNH) of Paris. Six investigation missions of one month's time each from December 2003 to November 2005 allowed the capture of 1503 rodents including 896 *Mastomys* (59.6%) reservoirs of potential vectors of Lassa viruses and 16 *Hylomyscus*. Out of 2758 analysed specimens, no virus was detected in the *Mastomys*, only 03 upon 16 *Hylomyscus* and 03 / 109 *Nannomys* were found positive. The characterization of these Arenaviruses is under way. The precise identification of the *Hylomyscus* and *Nannomys* species is made through morphological and cyt.b molecular analyses. While waiting for the conclusions of virology

analyses, the *Hylomyscus* and *Nannomys* seem to be the reservoirs of some Arenaviruses in Ivory Coast. Therefore the local population and health officers must be informed about the eventual risks related to the manipulation, consumption of these small rodents.

Key words: Hemorrhagic Fever – Arenaviruses – *Hylomyscus* – Ivory Coast.

Distribution status of Cape Clawless Otters (*Aonyx capensis*) In Niger Valley, Benin

Akpona A.H

Laboratoire d'Ecologie Appliquée, Faculté des Sciences Agronomiques/Université d'Abomey –Calavi: 01 BP 526 Cotonou, Bénin ; Tél/Fax (229) 30 30 84 ; E-mail : akpona@gmail.com /loutreotter@yahoo.fr

Abstract

Data were collected on cape clawless distribution in order to identify key habitats for its conservation through a combination of in situ surveys, literature reviews and community interviews. The old and present distribution of cape clawless otter was determined during 2 months of surveys in Niger valley especially in Benin parts (districts of Malanville and Karimama). We interviewed 78 local people, especially fishermen, farmers, hunters and tradipraticians of two ethnic group (Haoussa, Dendi) distributed in 31 villages. A poster featuring good quality images of the two species of otters was used to ensure that the interviewee really know the species and to limit confusion risk. These interviews were later be confirmed by local population who present skins or others organs conserved for different purposes and by research of presence indices or living observations. As a result of these interviews, observations of cape clawless populations have been reduced since the last thirty (30) years. A categorization of cape clawless otters' habitat was done according to its presence/absence. Local people recongnize that cape clawless otters have disappeared on Tlawa, Aladjikoara, Amanikoara, Aladjitounga and Amatounga sites and could be probably observed on Kompa, Tassitounga, Money, Monsey (Haoussa ad Dendi), Birni lafia, Soumékoara, Sagarana, Karimama, Garou, Madékali, Zibabango, Haoussatounga, Bellotounga, Dangazori and Karigui sites. However three sites (Gouania, Pétinga and Tandatéjji) were classified as potential for the effectiveness presence of the species. The reduction of Cape clawless otters habitat was investigated and showed that local populations attributed this situation to extinction (38%) and migration (62%).

A monitoring program of cape clawless otter and its habitat have to been established to assess the focal landscape for the conservation of the species in Niger valley.

Keys words: Distribution status, cape clawless otter, conservation, Niger valley.

Ecologie et conservation du pangolin arboricole *Manis tricuspis* dans la forêt classée de la Lama (Sud – Bénin)

Akpona A.H. et Sinsin, B.

Laboratoire d'Ecologie Appliquée, Faculté des Sciences Agronomiques/Université d'Abomey – Calavi: 01 BP 526 Cotonou, Bénin ; Tél/Fax (229) 30 30 84 ; E-mail : akpona@gmail.com / bsinsin@gmail.com

Abstract

This paper provides preliminary results of the study of the ecology and conservation of tree cusped pangolin in Lama Reserve (6°55.8 – 58.8' N and 2°4.2 – 10.8'E) in Benin. An approach combining the capitalisation of traditional ecological knowledge and field data was adopted. 23 individual tree cusped pangolin were recorded and most of them were found in the natural forest (70%). The demographic structure of *Manis tricuspis* populations showed a predominance of juveniles (43%) with 35% adults and 22% yearlings. The age classes were more represented in natural forest than in plantations. The population structure was different between the two habitats. Pangolin density was estimated to 0.51 individuals / km² during the dry season. This density could be higher during the dry season which corresponds to the active period of tree cusped pangolins. Habitat analysis showed that tree cusped pangolin preferred closed natural forests ("Noyau central", forest islands, etc). The species dwells in holes of tree species such as *Dialium guineense*. Vegetation cover of tree pangolin habitat varies between 20 % and 70%. Traditional hunting took place during the night in plantations, farms and natural forest. Hunters used very basic materials: stick, flashlight and bag for contention after capture. The majority of pangolin' hunters were farmers who hunted both for subsistence, medicinal and commercial purposes. Hunted pangolins were sold entirely across the main roads. The prices varied according to the place. For example a sub adult/adult of tree cusped pangolin costs about US\$ 4 (2,000 FCFA) in villages and US\$8 (4, 000 FCFA) in city markets. In Lama Forest reserve, bush fire (wild fire) had a negative impact on pangolins especially on farms and plantations during the dry season. During the data collection the remaining of 4 individuals were found in plantations after the first wildfire. We noticed that some socio-economic, ecological and cultural parameters did not allow the survival of that species and sustainable management strategies must be developed. Conservation

programmes developed should include some types of forest plantations as habitats for rare and threatened species.

Key words: Tree cusped pangolin, ecology, conservation, traditional ecological knowledge.

Threat assessment of spotted necked otter (*Lutra maculicollis*) in Southern Benin' wetlands.

Akpona A.H.¹, Sinsin, B.¹ & Mensah G.A.²

1. *Laboratoire d'Ecologie Appliquée, Faculté des Sciences Agronomiques/Université d'Abomey – Calavi: 01 BP 526 Cotonou, Bénin ; Tél/Fax (229) 30 30 84 ; E-mail : akpona@gmail.com / bsinsin@gmail.com*

2. *Institut National de recherches Agricoles du Bénin (INRAB): Tél : (229) 35 00 70 ; E-mail : ga_mensah@yahoo.com*

Abstract

Otters are very poorly known species in most parts of Africa especially in Benin. This is due to the specificity and low accessibility of their habitat (valley, rivers), their behaviour, the difficulty to capture them and the lack of specific census methods. A monitoring and threats assessment by interview of local people carried out in 2004 by the Laboratory of Applied Ecology in Southern Benin' wetlands (6°28'N et 7°N ; 2°23'E et 2°35'E) allow to assess threats affecting spotted necked otters (*Lutra maculicollis*)'s survival. The results showed that the distribution of spotted necked otter was related to water regime, vegetation and halieutic resources. The demographic structure of the otter populations showed a dominance of yearlings (46.7%) against respectively 28. 3% and 25% for young and adults, and a numerical superiority of males over females. Local communities developed and improved each year non-selective hunting techniques, increase pollution of water points and overexploite wetlands resources to struggle against otter's damages. Eight hunting's methods that are not selective for sex and age have been developed in the study area. To those hunting's methods should be added accidental catching and other threats linked to spotted necked otters' habitat. Water ponds were polluted by chemical for fishing, the common exploitation of water points and over fishing in competition with otters. Spotted necked otters are highly endangered in Benin wetland and extinction could occur if the current threats are maintained. Strategic and sustainable conservation and management programs must be developed for the safeguard of the species and its habitat.

Key words: spotted necked otters, demographic structure, threats, wetlands, Benin.

Small mammals faunal inventory in Ivory Coast and arenaviruses reservoirs : results of three years' study.

Allali B.K.¹, Kouassi S.K.¹, Kabi M.², Dosso H.², Akoua Koffi C.¹, Dosso M.¹, ter Meulen J.³, Denys C.⁴

1. Department of epidemic viruses, Pasteur Institute, 01 PO BOX 490 Abidjan 01. dve.ipci@yahoo.fr / akouame@yahoo.fr

2. Ecology Research Centre, Abidjan- Ivory Coast.

3. Tropical Medicine Institute of Hamburg – Germany.

4. National museum of Natural History, Paris – France

Abstract

Small mammals are known to cause damages to agriculture and also to be reservoirs of pathogens agents of bacterial, parasitic and viral diseases like Lassa fever which is the cause of an important morbidity and mortality in West Africa particularly in Sierra Leone, Liberia and Guinea. The rodents of the *Mastomys* genus constitute the natural reservoir of Lassa virus which belongs to the family of Arenaviridae. In Ivory Coast, a sero-epidemiologic investigation carried out in 2000 in the western part of the country revealed that about 26% of forest workers were carriers of IgG anti Lassa virus. In order to contribute to the identification of the reservoir of the Lassa virus a research project was launched in Ivory Coast to assess to identify the species reservoir of rodents and to precise its habitat and demography.

The sampling was carried out in a standardized way in 9 localities along two transects from December 2003 to November 2005. In each locality 200 Sherman traps were set for 3 consecutive nights in the houses, in cultivated houses and in savannahs or forests according to a protocol already used in Guinea. Each captured rodent was autopsied in order to take blood, liver and spleen in search of arenaviruses and for molecular identifications. The biological specimens for morphological and molecular analyses were sent the National Museum of Natural History of Paris while deep frozen organs were sent to Hambourg for virology analysis. During the six fieldworks representing a general effort of 12 771 trap-nights, 1452 small mammals were obtained among which *Mastomys* represented 59% of the captures, followed by *Mus* (*Nannomys*), *Crocidura*, *Lophuromys*, *Mus musculus*, *Uranomys*, *Rattus rattus*, *Praomys*, *Tatera*, *Lemniscomys*, *Hylomyscus*, *Myomys*, *Malacomys*, *Graphiurus*, *Dasymys* and

Thamnomys. Ninety percent of the *Mastomys* were captured inside the houses, the 10 remaining % were trapped in all other environments. Molecular analyses by cyt. B displays a strong dominance of *M. natalensis* species compared to a low proportion of *M. erythroleucus*. Such a work evidences that the natural reservoir of Lassa virus represented by *Mastomys natalensis* really exists in Ivory Coast both in West and East parts of the country. So, it is important to make the population and the medical personnel be aware of hemorrhagic fever symptoms caused by Lassa virus and other Arenaviruses.

Key words: Rodents, shrews, Lassa fever, taxonomy, anthropised zones, Ivory Coast

Rodent crop damage in the Kisangani region (DR Congo): preliminary data on damage and rodent ecology in experimental crop fields

Amundala D.¹, Kennis J.², Leirs H.^{2,3} and Dudu A.M.¹

1. *Laboratoire d'écologie et de gestion des ressources animales (LEGERA) – Animal ecology and resource management laboratory, University of Kisangani, Kisangani, B.P. 2012, Democratic Republic of Congo*

2. *Evolutionary Biology Group, University of Antwerp, Groenenborgerlaan 171, B-2020 Antwerpen, Belgium*

3. *Danish Pest Infestation Laboratory, Danish Institute of Agricultural Sciences, Skovbrynet 14, DK-2800 Kongens Lyngby, Denmark*

Abstract

Rodent crop damage is increasing over the last decade in the lowland tropical rainforest region around Kisangani (DR Congo). We wanted to assess the damage caused, to study the role of different rodent species as pests and eventually to formulate feasible rodent control strategies. We study three permanent sites in the hinterland of Kisangani: Lubuya Bera, Bakumu Mandombe and Bamanga. At each site, one grid is placed in an experimental field and another is placed in semi-natural habitat nearby for comparison. Maize and rice are planted during the two cultural seasons (March to April and September to October) on our experiment fields. These cultures were selected because of the significant damage rodents inflict on them and because of their economical importance. Rodent damage is assessed by counting the number of maize stems attacked during each phenological stage together with the number of maize ears attacked. For rice we measured the surface areas damaged. The population ecology of rodent pests is studied using standard Capture-Mark-Recapture techniques during all phenological stages. We use one hundred evenly spaced Sherman traps in a one hectare grid. Captures are low in our experimental fields during sowing, germination and growth stages. At maturity and after cereal harvest, the genus *Mus* followed by *Lophuromys* are most captured in fields which are surrounded by recently abandoned fields. In fields surrounded by older fallow fields, *Lophuromys* is less represented. *Praomys* sp. species progressively colonise the field during maturation. Data on rodent densities linked to the assessed crop damage in the different

experimental fields will be presented in the poster.

Keywords: CMR, *Mus*, Sherman traps, phenological stages, rice, maize, capture-mark-recapture.

Sustainable small stock farming and ecosystem conservation in Southern Africa: a role for small mammals

Avenant N.L.

*National Museum and Centre for Environmental Management, University of the Free State, Bloemfontein, South Africa
(navenant@nasmus.co.za)*

Abstract

In southern Africa caracal *Caracal caracal* and black-backed jackal *Canis mesomelas* have become a major threat to the small stock farming industry. Due to current management practises (such as uncontrolled blanket-control and poisoning), biodiversity in small stock farming areas in South Africa are under constant threat, while small stock losses continue to escalate. Not much ecological research has been done on caracal and black-backed jackal. Only one study has correlated home range use of caracal with its diet and prey abundance in specific plant communities and on various contours and slopes. Small mammals were by far the most important prey in this study. This added to our understanding of the role of caracal in that specific ecosystem. The study also indicated the role that the social behaviour of caracal can play in prohibiting caracal population explosions, the protection of natural prey populations and diversity, and limiting the predation on unnatural, “easy” small stock by non-territorial cats. The observed impact of small mammal diversity and density on caracal social and ranging behaviour, thus, laid the foundation for the holistic *Canis Caracal* Programme; i.e. the management of caracal and black-backed jackal to “limit” stock loss, as apposed to eradicating them in order to “stop” stock loss. In this programme the monitoring of small mammal populations will also contribute towards evaluating ecosystem integrity and, ultimately, lead to best small stock farming and problem animal control practises.

Correlating small mammal community characteristics with habitat integrity in the Caledon Nature Reserve, South Africa

Avenant N.L.¹, Watson J.P.² & Schulze E².

1. *National Museum and Centre for Environmental Management, University of the Free State, Bloemfontein, South Africa;*

2. *Department of Tourism, Environment & Economic Affairs, Free State Province, South Africa*

Abstract

Small mammals form a vital component of Free State ecosystems. Monitoring them has been suggested as a relatively quick and cheap method of indicating healthy or unhealthy ecosystem functioning. Changes in small mammal habitats are associated with changes in small mammal diversity, and ecological disturbance of these habitats is associated with the presence or absence of small mammal indicator species and decreases in small mammal species richness. This study quantifies habitat-specific small mammal patterns in terms of Shannon diversity in the Caledon Nature Reserve, Free State province, South Africa. Small mammal community variables were correlated with an Ecological Index (\approx EI value of veld), the leading method used to interpret habitat integrity in Free State nature reserves, and a useful tool driving management decisions. It also reports on the seasonal abundance, species richness, evenness and diversity of small mammals present in specific habitats and addresses the most successful methods to sample these taxa - such as the duration of trapping to ensure unbiased sampling, and in which season should effort be concentrated to get optimal results. Our results support expectations that the number of specialist species increases with succession, *M. coucha* dominance acts as an indicator of habitat disturbance, rodents conform to Tilman's hump-shaped curve model, and adds to a baseline of diversity indices in a variety of grassland habitats. These data should benefit the monitoring, conservation and management of ecosystems, environmental impact assessments, ecological research, and small mammal collections.

Taxonomic revision of the genus *Triaenops* (Chiroptera) in the Afro-Arabian region

Benda P.^{1,2} and Vallo P.^{3,4}

1. National Museum (Natural History), Prague, Czech Republic; Email: petr.benda@nm.cz

2. Charles University in Prague, Czech Republic

3. Institute of Vertebrate Biology AS CR, Brno, Czech Republic

4. Masaryk University, Brno, Czech Republic

Abstract

The genus *Triaenops* Dobson, 1871 has been considered monospecific in its Afro-Arabian range (*T. persicus* Dobson, 1871), while three other species are recognised to inhabit Madagascar (*T. rufus* Milne-Edwards, 1881, *T. furculus* Trouessart, 1906, and *T. auritus* Grandidier, 1912). We analysed representative samples of *T. persicus* from East Africa and South Arabia using both morphologic and molecular genetic approaches. Morphologic comparison showed three distinct morphotypes in the set, one African and two Arabian. While the Arabian forms occur in sympatry and differ mainly in size, the allopatric African form showed differences in skull shape. Cytochrome *b* gene based molecular genetic analysis revealed significant divergences (ca. 6–7%) among these morphotypes, which would justify assigning separate specific statuses to them. Thus, our revision suggests a split of the *T. persicus* rank into three species: *T. afer* Peters, 1877 in Africa, and *T. persicus* s.str. and an undescribed form in South Arabia. We acknowledge grant supports of the work (GACR 206/05/2334, GAAS CR IAA6093404).

Notes on systematics of the *Rhinolophus ferrumequinum* Group (Chiroptera) in Africa

Benda P.^{1,2}, Vallo P.^{3,4} and Reiter A.⁵

1. National Museum (Natural History), Prague, Czech Republic; Email: petr.benda@nm.cz

2. Charles University in Prague, Czech Republic

3. Institute of Vertebrate Biology AS CR, Brno, Czech Republic

4. Masaryk University, Brno, Czech Republic

5. South Moravian Museum, Znojmo, Czech Republic

Abstract

In Africa, the *R. ferrumequinum* group consists of five species, from which two occur also in the Palaearctic, *R. ferrumequinum* and *R. clivosus*. We analysed an extensive material of these two species originating from South, East, and North Africa as well as from Europe and Southwest Asia, using morphologic and molecular genetic approaches. Morphometric analysis divided the examined specimens of various geographic origin into groups basically responding to two known species, although large individuals of *R. clivosus* conformed in size to smaller ones of *R. ferrumequinum*. In both species, cline shifts in metric characters were present and the largest representatives of *R. ferrumequinum* meet the smallest bats of the *R. clivosus* rank in the Levant. Genetic analysis (cytochrome *b*) of the complex showed five main lineages. Most distinct was the Libyan form of *R. clivosus* from Cyrenaica, which constitutes a new species within the complex. Remaining lineages represent (1) Asian *R. ferrumequinum* (*nippon*), (2) and (3) Afro-Arabian forms of *R. clivosus* (South African *augur* and Yemeni *acrotis*), and (4) little divergent haplotypes of both species from western Palaearctic. Size-distinct Egyptian forms of *R. clivosus* (*clivosus* and *brachygnathus*) showed close genetic affinity. The Middle Eastern haplotypes of *R. ferrumequinum* slightly diverged from the compact European sublineage. Low divergence was shown between the Maghessian *R. ferrumequinum* and Libyan *R. clivosus* from Tripolitania. On the DNA level we proved that the high phenotype variation in the *R. ferrumequinum/clivosus* complex does not respond to the genetic variation. This suggests a relatively quick and recent spreading throughout the Afrotropics and Palaearctic. Our view on the *R. ferrumequinum/clivosus* complex represents a challenge for taxonomic revision of the *ferrumequinum* group. We acknowledge grant supports of the work (GACR 206/05/2334, GAAS CR IAA6093404).

Chromosomal diversification of the African pygmy mouse, *Mus minutoides* (Rodentia; Muridae): from taxonomy to sex chromosome evolution

Britton-Davidian J.¹, Veyrunes F.^{1, 2}, Watson J.³, Catalan J. 1 and Robinson T.J.⁴

1. Institut des Sciences de l'Evolution (UM2-CNRS), Université Montpellier 2, Laboratoire Génétique & Environnement, Pl. E. Bataillon, cc065, 34095 Montpellier cedex 5, France. E-mail: britton@isem.univ-montp2.fr

2. Department of Veterinary Medicine, Comparative Genomics group, University of Cambridge, United Kingdom

3. Free State Department of Tourism, Environmental and Economic Affairs, Bloemfontein, South Africa
Department of Zoology, University of Stellenbosch, South Africa

Abstract

The African pygmy mice are small-sized rodents belonging to the genus *Mus* (subgenus *Nannomys*). A previous cytogenetic and molecular study showed that *Mus minutoides* populations form a monophyletic clade widespread throughout sub-Saharan Africa. Within this clade characterized by the sex autosome fusions (X.1) and (Y.1), an extraordinary chromosomal diversification ($2n=18-34$) has taken place due to the fixation of autosomal centric fusions. In particular, the karyotypic analysis of specimens from South Africa indicated that two cytotypes were present, one with $2n=34$ and the other with $2n=18$. G-banding analysis of samples with the latter diploid number allowed us to identify no less than four distinct karyotypes differing by the composition of the autosomal fusions present; this diversity suggests that several chromosomally differentiated taxa exist in this region. Not only is the chromosomal radiation exemplary in *M. minutoides*, but further cytogenetic studies uncovered a unique case of sex chromosome evolution. In effect, chromosome painting analyses using the Y probe of the house mouse showed that several populations belonging to the two cytotypes harboured XY females. Additional cytogenetic and molecular studies are required to unravel the taxonomic status of the different populations, the mode and tempo of chromosome evolution, as well as the origin and genetic basis of the change in sex chromosome determination.

Noteworthy records of Bats (Chiroptera) from Senegal

Červený J.^{1,2}, Koubek P.¹, Bryja J.¹, Konečný A.^{1,3,4} and **Benda P.**^{5,6}

1. Institute of Vertebrate Biology AS CR, Brno, Czech Republic

2. Czech University of Life Sciences, Praha, Czech Republic

3. Masaryk University, Brno, Czech Republic

4. Centre de Biologie et de Gestion des Populations, Montferrier sur Lez, France

5. National Museum (Natural History), Prague, Czech Republic; petr.benda@nm.cz

6. Charles University in Prague, Czech Republic

Abstract

The knowledge of bat fauna of Senegal is relatively poor. Our bat investigations in this country were focused mainly to the area of the National Park Niokolo Koba (SE Senegal), which represents a mosaic of different habitats. We present results conducted during eight field trips made in the from 2002 to 2007, when bats were captured to mistnets or harp traps above the water or in the savannah/forest, occasionally were recorded directly in their shelters (underground spaces, tree hollows, buildings). We found at least 33 chiropteran taxa, however, several species identifications is better to consider preliminary because of unclear situation in several genera (*Rhinolophus*, *Hipposideros*, *Scotophilus*, etc.) and successive detailed morphologic, cytogenetic and molecular studies are necessary. The records of *Nanonycteris veldkampii* (for the first time recorded in Senegal, from three sites), *Rhinolophus* cf. *fumigatus* and *Hipposideros jonesi* (first records), *Rhinophoma hardwickii*, *Rhinolophus alcyone*, *Hipposideros cyclops*, *H. cf. gigas*, *Lavia frons*, and *Myotis bocagei* (second records), and *Lissonycteris angolensis* (fourth record in Senegal), seem to be the most important faunal results of our project. We acknowledge grant support of the work (GAAS CR IAA6093404).

Kinship structure and dispersal pattern in the highly fluctuating rodent *Mastomys huberti* in West-Africa.

Cosson J.F. and Granjon L.

UMR CBGP (INRA / IRD / Cirad / Montpellier SupAgro), Campus international de Baillarguet, CS 30016, F-34988 Montferrier-sur-Lez cedex, France

Abstract

Genetic structure can be strongly affected by variation through time and space of population size and migration rate. In the Inner Delta of the Niger River (Mali) the multimammate rat (*Mastomys huberti*) is characterized by large demographic fluctuations. The annual flood of the Niger River strongly influences the spatial dynamics of *M. huberti* populations by reducing available ground surface up to 90%, thus causing local extinction and population fragmentation. After the drop in water level, alluvial, rice-cultivated, plains are rapidly recolonized by rats. Such a dynamics should theoretically lead to a low genetic diversity because of regular genetic drifts during phases of low population numbers. During the dry season however, high migration rates from genetically differentiated remnant populations may counterbalance local genetic loss and maintain a high genetic diversity through time. Thanks to a genetic and demographic survey over three years we describe how the respective strength of drift and migration interact along the yearly cycle to shape the genetic diversity of the *Mastomys huberti* population. Yearly population recovery following the flood results both from local reproduction and high migration rates.

Key words: Bottlenecks, effective population size, gene flow, population dynamics, sex-biased dispersal, immigration, genetic diversity

Survival, recruitment and population size of *Mastomys erythroleucus* using 4 years of capture-recapture data from the Niger River Valley in Mali.

Crespin L., Granjon L., Papillon Y., Abdoulaye D. and Sicard B.

Centre de Biologie et de Gestion des Populations (UMR 022), IRD, Campus international Baillarguet CS 30016, 34988 Montpellier-sur-Lez cedex France. Email: laurent.crespin@mpl.ird.fr.

Abstract

The multimammate rats (*Mastomys* spp.) are known as major pest species in West Africa. To alleviate the burden *Mastomys* takes on human activities, much work have been generated about population dynamics in different habitats, countries or species. Most of the studies have investigated either survival or reproduction and it has been shown in several species that an intrinsic factor, i.e. abundance, impacts survival and that an extrinsic factor, i.e. rainfall, impacts survival and/or reproduction. However, and although data collected in enclosure experiments have generally reported that recruitment depends on the variation of population size in small mammals, the recruitment has less thoroughly been investigated in *Mastomys*. In this paper, we thus use 4-years of capture-recapture data collected all year round at a site annually flooded by the River Niger in Mali (Djoliba) to describe the variations of survival and recruitment in a natural population of *Mastomys erythroleucus*, in relation to the abundance of the population and cumulative rainfall. More specifically, we use recent capture-recapture methodology to carry out analyses of population size, survival and recruitment. Our results show that population abundance impacts on the recruitment (the more rats, the lesser recruitment) but there is no relationship between survival and abundance, nor between rainfall and either demographic parameter.

Small Mammals Taxonomy and Biogeography in Guinea

Denys, C.¹, Lecompte E.², Lalis A.¹, Aniskine, V.³, Kourouma F.⁴, Kouassi Kan S.⁵, Fichet-Calvet E.¹, P. Barrière⁶, Camara C.⁴, Koivogui L.⁴

1 UMR 5202 – MNHN – Department Systematics and Evolution – 55, rue Buffon – 75005 Paris, France Email: denys@mnhn.fr

2 UMR CNRS 5174 "Evolution et Diversité Biologique", Université Paul Sabatier, Bat. 4R3 118, route de Narbonne, 31062 Toulouse cedex 9, France

3 Severtsov Institute, Russia

4 PFHG – CHU Donka & CERPA Guinea

5 Institut Pasteur de Cote d'Ivoire – Abidjan, Cote d'Ivoire.

6 Univ. Rennes I, France

Abstract

Recent works have shown that small Mammals diversity is clearly underestimated due to the numerous cryptic species that characterize tropical Africa. By being situated in border of the Guineo-Congolese hotspot, Guinea display many transition / ecotone habitats. Moreover, the country suffers from deforestation and culture extension whose consequences on biodiversity are not yet fully known. Here, we make the point for the situation of anthropized zones versus non perturbed areas of Guinea. After three years (2003-2006) in 34 localities of Guinea, we trapped 3341 small mammals, made 96 karyotypes and sequenced (Cyt.B) nearly all the specimens. This allowed to precise the faunal lists of the country as well as some distribution ranges and to describe some new species. Concerning rodent pests, we can now precise the distribution and habitats of the three sibling species of *Mastomys* recovered in Guinea. We can distinguish coastal Guinea which yielded only *M. erythroleucus*, *M. huberti* and where *M. natalensis* is absent from Upper, Central and Forest Guinea where *M. natalensis* and *M. erythroleucus* are present. Such a work highlights the importance of integrative approach in order to properly evaluate small Mammals biodiversity before any ecological, conservation or control studies.

Key words: West Africa, biodiversity, rodents, soricomorpha, taxonomy, biogeography, anthropisation

Ecology and conservation of mongoose species in the Lama and Niaouli classified forests of Southern Benin.

Key words: Mammals, Mongoose, Niaouli, Lama.

Djaoun S. Dossa F.F., Sinsin B.

Laboratory of Applied Ecology, faculty of Agronomic Sciences, University of Abomey-Calavi, Benin;
E-mail: sylvestrechabi@gmail.com

Abstract

The conservation of the mongoose depends on scientific understanding of their behavior and ecology. The ecology of the four mongoose species in Southern Benin was examined using a combination of indigenous knowledge surveys of both individuals and focus groups, and faunal observations at fixed points. Three diurnal species of mongoose were identified, *Crossarchus obscurus*, *Herpates ichneumon*, *Herpates paludinosus*, through direct field observations and an additional, nocturnal, species, *Ichneumia albicauda*, was identified using indigenous knowledge surveys. Diurnal species were observed to be active between 7 and 9 am and 5 and 7 pm. During these times, Mongoose colonies of 12 to up to 21 individuals in the dry season moved between plant communities to find food (55% of observations). These colonies consist of more adults (67.9%) than young (32.1%). Stomach content analysis and feeding observations reveal that invertebrate species including crickets (*Eyprepocnemis plorans*, *Scapsipedus* sp.), earth worms (*Lumbricus terrestris*), ants (*Formica fusca*), and moth larvae (*Melolontha melolontha*) as well as the fruits of *Dialium guineense* and *Elaeis guineensis* make up the majority of their diet. Interview data also reveal that mongooses are recognized as snake predators and thus their presence is appreciated for reducing snake bites in local communities (84.3% of interviews in Niaouli). Mongoose prefer habitat removed from human presence as demonstrated by less frequent observation in the wetlands of the Niaouli (20.8 %) where the local people regularly use the Ava River compared with high level observation in the less accessed plateau forest (79.2 %). In addition the larger area of the Lama Classified Forest (4777 ha) allows for more intra site movements as opposed the inter site movements observed in the Niaouli forest due to its small size (120 ha). Thus the conservation of mongoose species depends on the availability of food resources, reduction of human pressure, and total area of available habitat.

The socio-cultural importance of mongoose species in the Lama and Niaouli classified forests of Southern Bénin

Djagoun S. Dossa F.F., Sinsin B.

*Laboratory of Applied Ecology, faculty of Agronomic Sciences, University of Abomey-Calavi, Benin;
E-mail: sylvestrechabi@gmail.com*

Abstract

Although they are important both to local human populations and ecosystem functioning, small mammals have been marginalized by natural resource managers and conservationists. This study examined ethnozoological knowledge of species of mongoose by interviewing individuals (100 for each of two sites) and focus groups. The local human population is very familiar with species of mongoose and values them, in particular, for their medicinal value (43% of surveys) for treating cardiac arrest and high childhood fever. The most widely known ritual value is the use of marsh mongoose to consult the oracle. Mongoose meat is also an important protein source for local populations who compare it to pork. Certain species, such as *Crossarchus obscurus*, are seen as natural pesticides in *Holi* and *Aizo* regions, since their insectivorous diet controls termites, crickets, and ants in agricultural fields. Mongooses are recognized as natural predators of snakes and are thus appreciated for their role in reducing snake bites (77.6% of interviews in Niaouli and 84.3% in the Lama). The moving of mongoose colonies is a favorite scene of tourists in the Niaouli forest whose small size makes the *Crossarchus obscurus* population particularly visible. In contrast, the inchneumon mongoose (*Herperts ichneumon*) is known as a predator of domestic fowl and is thus found and disliked near settlements. Similarly, the marsh mongoose (*Herperts paludinosus*) is known to destroy fishing nets and is thus an enemy of local populations. Mongooses are hunted because of these pest behaviors with jaw traps and, most destructive, rifles. Most hunters (83%) find mongooses easy targets with rifles and can kill between 2 and 5 individuals with one shot since they often congregate. The high level of use of the mongoose presents a threat to its conservation.

Key words: Mammals, Mongoose, Niaouli, Lama.

Importance of protected area in biodiversity conservation in Benin: case study of Bat

Djossa B.A.¹, Fahr J.², E.V Kalko², Sinsin B.¹

*1. Laboratoire d'Ecologie Appliquée FSA/UAC
01BP 526 Tél. & Fax:(229) 21303084 Cotonou
Bénin*

*2. Department of Experimental Ecology (BIO
3), Albert-Einstein Allee 11, 89069 Ulm.*

Abstract

Bat survey in Benin started in 1968 with naturalists of Smithsonian Institution. Only few and sporadic investigations occurred with foreign naturalists since this time and from 2003 Benin native naturalists started prospecting bat. But few ecosystems have been surveyed up to now. 50 bat species are recorded for Benin at this stage of knowledge on this small mammal group. Bat captured in Pendjari region (within and around Biosphere Reserve of Pendjari) between 2004 and 2006 contributed to reach 32 bat species (64 % of known bat species) for this region, showing the highest diversity at the country level. Of the 11 known fruit bat species for the whole country, 8 (73 %) are recorded in Pendjari region. Rare and less common fruit bats occurred mainly or exclusively within the Biosphere Reserve of Pendjari. This result demonstrated the importance of protected area in bat conservation in Benin.

Key words: bat, conservation, protected area, Benin.

Dynamics of the distribution, socio-ecological behavior and status of conservation of Geoffroy's Pied Colobus (*Colobus vellerosus*) in Benin.

Djossou Diego S. & Sinsin B.

*Faculté des Sciences Agronomiques /
Université d'Abomey Calavi; BP 526
Cotonou ; djegosyl@yahoo.fr*

Abstract

The present study was carried out in the sacred forest of Kikele at 7 km from Bassila, and 41 villages sampled in the occurrence area of Geoffroy's pied colobus (*Colobus vellerosus*) in Benin and distributing in the guineo-congolese, sudano-guinean then sudanian zones. Eco-ethological data, spacial distribution and the status of conservation of Geoffroy's pied colobus in Benin were gathered through daily surveys and exploratory inquiries of hunters. Geoffroy's pied colobus is a sociable and diurnal species, occurring in gallery forests, swamp forests and dense forests. Known as leaf eaters, they eat also fruits, seeds and buds. In the Kikele sacred forest, 18 individuals of these colobus were record among which 62% were adults, 16% subadults, 11% young and 11% babies, a population with a multimale/multifemale structure. This number, compared to data of 1996 and 2001 showed an annual increase of the population. Factors of the demographic dynamics of colobus monkeys were birthrate and mortality as affected by ecological factors. Geoffroy's pied colobus distribution area in Benin extended from the protect forests of Lama (6° 55'N) to the protected forest of Oueme Superior (9° 45'N) through the complex of the Oueme valley, the Lokoli forest, the protected forest of Oueme Boukou, Monts Kouffe, Wari-Marou, Penessoulou, the region of Bassila (sacred forest of Kikele) and the reafforestation perimeter of Parakou, covering total of 9.000 km². The dynamics of the distribution showed a regression in Geoffroy's pied colobus distribution from 56.000 km² in 1953 to 9.000 km² at present. This present distribution consists of a mosaïque of relictual habitats isolated or sometimes interconnected. Pressure come from poaching, fragmentation of the ecological block, habitat destruction and food resources diminishing. The conservation of Geoffroy's pied colobus population in Benin is necessary because of its endogenous status and sacred as noticed the population in Kikele and other muslim communities, and the beauty of the species.

Key words: Geoffroy's pied colobus, Kikele, Benin, eco-ethology, distribution, endogenous status and regression.

Mycobacterial flora of rodents and insectivores in Africa: a longitudinal study in Morogoro, Tanzania

Key words: Rodents, insectivores, mycobacteria, Tanzania

Durnez L.^{1,2}, Boeykens N.¹, Machang'u R.R.³, Katakweba A.³, Kazwala R.R.³, Katholi C.R.⁴, Portaels F.² and Leirs H.^{1,5}

1.University of Antwerp, Belgium; Email: lies.durnez@ua.ac.be, ldurnez@itg.be

2.Institute of Tropical Medicine, Antwerp, Belgium;

3.Sokoine University of Agriculture, Morogoro, Tanzania;

4.University of Alabama at Birmingham, USA;

5.University of Aarhus, Kongens Lyngby, Denmark

Abstract

With rising numbers of HIV/AIDS patients in developing countries, the control of mycobacterial infections is of growing importance. Until present it is not clear how and if rodents and insectivores could play a role in spreading the disease. Therefore the mycobacterial flora of these animals was studied. Rodents and insectivores were trapped in the wet and dry season of two consecutive years. Trapping took place in farms with known tuberculin reactor status of cattle and a few other sites. Pieces of organs were pooled and examined for mycobacteria by PCR and culture methods. In total, 645 animals were trapped (152 insectivores). Significantly less *Rattus rattus* and more *Mastomys natalensis* were caught on reacting farms. Based on the mycobacterial culture results, a total prevalence of 3.6% was estimated. A higher prevalence occurred in animals caught on reacting farms (3.8%) than non-reacting farms (0%) and a slightly higher prevalence in animals caught in Mwembesongo (5.1%) and at the slaughterhouse (5.2%). A higher prevalence was observed in insectivores (*Crocidura hirta*, 8.3%) in comparison with rodents (2.4%) and in the rodent species *Cricetomys gambianus* (17.9%) in comparison with other rodents (1.3%). Potentially pathogenic nontuberculous mycobacteria (*M. goodii*, *M. intracellulare*, *M. columbiae*, *M. chimaera* and *M. chelonae*) were isolated from *C. gambianus*, *M. natalensis*, *R. rattus* and *C. hirta*. Since mycobacteria were only isolated from rodents caught on reacting farms, rodents could transmit mycobacteria to cattle. Two small mammal species had a higher carrier rate of mycobacteria, namely *C. gambianus* and *C. hirta*.

The role of Rodents and Insectivores as reservoir of Buruli Ulcer in Benin: work in progress

Durnez L.^{1,2}, Suykerbuyk P.², Johnson C.R.³, Leirs H.^{1,4} and Portaels F.²

1.University of Antwerp, Belgium; Email: lies.durnez@ua.ac.be, ldurnez@itg.be

2.Institute of Tropical Medicine, Antwerp, Belgium;

3.Programme National de lutte contre l'Ulcère de Buruli, Cotonou, Benin;

4.University of Aarhus, Kongens Lyngby, Denmark

Abstract

Buruli ulcer (BU), caused by *Mycobacterium ulcerans*, is a debilitating skin disease. Very little is known about the epidemiology of the disease. *M. ulcerans* specific DNA (IS2404) has been identified in water related organisms but the reservoir and mode(s) of transmission of this disease are not yet determined. Mammals are until now the only naturally infected creatures found from which *M. ulcerans* could be cultivated. Several rodents can be experimentally infected by *M. ulcerans* confirming that they are susceptible to *M. ulcerans* infections. Therefore we suggest a rodent species as part of the reservoir of *M. ulcerans*. To test this hypothesis, rodents and insectivores were trapped in Benin. Trapping occurred in highly endemic villages and lowly endemic villages. Organs from rodents and insectivores were analyzed by culture and PCR methods for the detection of *M. ulcerans*. In total, 575 animals were collected: 336 in highly endemic villages, 225 in lowly endemic villages, and 14 grasscutters. Analysis of samples is ongoing. Until now, organs of 130 and faeces of 37 rodents and insectivores are analyzed by IS2404 PCR. None of the samples tested positive. A number of samples have already been cultured. From the samples of six animals mycobacteria other than *M. ulcerans* were isolated. Different arguments are available for the role of rodents and insectivores as a reservoir for Buruli ulcer, but until now the presence of *M. ulcerans* in these animals has not been confirmed. Since this study is still ongoing, no definite conclusions can be made yet.

Key words: Rodents, insectivores, Buruli ulcer, Benin

Diversity of shrews in different habitat of South Benin

Ekue, M.R.M.¹ & Bekker J.P.²

1. Faculté des Sciences Agronomiques,
Université d'Abomey-Calavi & Réseau
Rongeurs et Environnement (RéRE) ; 05 BP
993 Cotonou, Bénin, Email:
mrekue@gmail.com,

2. Vereniging voor Zoogdierkunde en
Zoogdierbescherming (VZZ) Netherlands,
Email: jpbekker@zeelandnet.nl

Abstract

Located in the so-called Dahomey Gap (an abrupt climatically induced rain forest fragmentation in West Africa during the late Holocene), the South of Benin has a diversity of ecosystems serving as refuge for small mammals. This study was conducted as part of a broad field survey aiming to know the diversity, distribution and status of small mammals in all phytogeographic zones of Benin. Sessions of capture of shrews using Longworth, Sherman and pitfall traps were conducted in the evergreen forest of Niaouli, the swamp forest of Lokoli, the forest of Agrimey (mainly *Tectona grandis* plantation established in degraded areas of the semi-deciduous rainforest of Lama) and in the botanical and zoological garden of the University of Abomey-Calavi. A restricted number of owl pellets (*Tyto alba*) from the evergreen forest of Niaouli revealed *Crocidura olivieri*. Determinations were made using available keys and were confirmed by comparison of the specimens with material in the Museum Alexander Koenig in Bonn (Germany). 18 specimens of shrews were collected all member of the genus *Crocidura* and belonging to 6 species. *Crocidura grandiceps*, *Crocidura lamottei* and *Crocidura poensis* are the first records for Benin. Results are discussed in relation to habitat characteristics in the area.

Key words: Shrews, Insectivora, Benin

Monitoring of the rare Beecroft Flying Squirrel (*Anomalurus beecrofti* Fraser, 1853) in the sacred forest of Kikélé in Benin

Ekue, M.R.M.¹, Bekker J.P.², Tchibofo S.¹, Sinsin B.¹ & Assogbadjo A.E.¹

1. Faculté des Sciences Agronomiques, Université d'Abomey-Calavi & Réseau Rongeurs et Environnement (RéRE); 05 BP 993 Cotonou, Bénin, E-mail : mrekue@gmail.com

2. Vereniging voor Zoogdierkunde en Zoogdierbescherming (VZZ) Netherlands

Abstract

Anomalurus beecrofti is one of the two species of flying squirrel known in Benin. Previous study has shown that the species are rare and endangered due to habitat destruction and fragmentation, subsistence hunting and uses in traditional medicines. Covering an area of 11.42 ha, the sacred forest of Kikélé is entirely protected due to the occurrence of the colobine monkey *Colobus vellerosus* considered as a divinity by the family who own the forest. The relative quietude prevailing in the forest makes it an ideal shelter for some species of fauna including *A. beecrofti*. The occurrence of *A. beecrofti* in this forest offers an opportunity to monitor this population and to document its basic ecological requirements, prerequisite for the formation of effective conservation programs. This study aimed to determine the relative density and to characterise the habitat of *A. beecrofti* in the sacred forest of Kikélé. Point transect technique was used for surveying and monitoring of squirrels between 6:00 and 18:00 hours and visual observation was the method used for detection. Vegetation was characterized in the forest to determine habitat parameters associated with the occurrence of Beecroft flying squirrel. Result of three months survey showed that the density of Beecroft flying squirrel varied between 0.7 and 1.1 individuals/ha. The fluctuation of the population is likely due to the possible periodic migration toward the state forests of Monts Kouffé and Wari Maro (282.050 ha) situated near the sacred forest of Kikélé. *A. beecrofti* was mainly restricted to dry deciduous forest dominated by *Holoptelea grandis* and *Celtis integrifolia*, and riparian forest dominated by *Erythrophleum suaveolens* and *Albizia glaberrima*. The species preferentially used tall, large, fruit and nut trees (like *Elaeis guineensis*, *Cola gigantea*, *Vitex doniana*, *Khaya senegalensis* etc.) within the forest. Such trees are better resources for food and nest and enable longer and possibly more economical glides. Since illegal hunting is still

going on in the state forests of Monts Kouffé and Wari Maro measures to secure the possible migration corridor are proposed. It is also suggested to continue monitoring this population over a period of one year including the uses of other indirect methods such as feeding signs. The feeding habit and the reproductive biology should be investigated to be able to make an effective conservation programs.

Microgeographical distribution of shrews (Soricomorpha, Soricidae) in lowland tropical forests from the Congo River Basin (Kisangani, Dr Congo)

Gambalemoke, M.¹, Mukinzi I.¹, Amundala D.¹, Gembu T.¹, Kaswera K.¹, Katuala G.B.¹, Dudu A.¹, Barriere P.³, Hutterer R.⁴, Leirs H.^{5,6}, Vanlinden B.⁵ and Verheyen E.²

1. Université de Kisangani, Laboratoire d'Ecologie et de Gestion des Ressources Animales, B.P. 2012 Kisangani (DR Congo). E-mail:

2. Royal Belgian Institute of Natural Sciences (RBINS), Vertebrate Department, Molecular Laboratory, Vautierstraat 29, Brussels, Belgium.

3. Université de Rennes 1, UMR 6553 – CNRS, Ecosystèmes, Biodiversité et Evolution, Station Biologique de Paimpont, F-35380 Paimpont, France.

4. Zoologisches Forschungsmuseum Alexander Koenig D-53113 Bonn (Germany)

5. Evolutionary Biology Group, Universiteit Antwerpen, Groenenborgerlaan 171, B-2020 Antwerpen, Belgium.

6. University of Aarhus, Danish Pest Infestation Laboratory, Department of Integrated Pest Management, Skovbrynet 14, DK-2800 Kongens Lyngby, Denmark

Abstract

Research on the biodiversity of shrews was conducted in seven inter-riverine forest blocks: Djabir, Maiko, Masako, Yoko, Yelenge, Baliko and Bomane. By using the transect technique with Pitfall combined with Sherman, Museum Special and Victor traps, we collected 860 shrews from primary forests, secondary forests, marshy secondary forests, old fallow land and old palm plantation. They represent 5 genera and 19 species: *Scutisorex* (1 species), *Crocidura* (12 species), *Paracrocidura* (2 species), *Sylvisorex* (3 species) and *Suncus* (1 species). *Sylvisorex n_sp1* will be described as a new species in the Kisangani region. Primary forests, secondary forests and old fallow land are the habitats with the highest species diversity. We sampled 15 species in each of these habitats compared to 7 species in old palm (*Elaeis guineensis*) plantation and only 1 species in marshy secondary forests. Larger shrews (*Crocidura olivieri*, *Scutisorex somereni*) occur in all types of prospected habitats. *Crocidura cf muricauda* was caught only in an old palm plantation. *C. denti*, *C. latona*, *C. dolichura*, *C. caliginea*, *C. ludia*, *C. littoralis*, *C. littoralis sp2-3*, *Paracrocidura schoutedeni*, *Sylvisorex ollula* and *Suncus infinitesimus* occur in the same proportion in

primary and secondary forests. *Sylvisorex johnstoni* was caught mainly in primary forest.

Key words: Shrews, micro-geography, distribution, Congo River basin

Shrew trap efficiency: experience from primary forests, secondary forests, old fallow land and old palm plantation in the Congo River Basin (Kisangani, Dr Congo).

Gambalemoke, M.¹, Mukinzi I.¹, Amundala D.¹, Katuala G.B.¹, Kennis J.⁴, Dudu A.¹, Hutterer R.⁴, Barriere P.³, Leirs H.^{4,5} and Verheyen E.²

1. *Université de Kisangani, Laboratoire d'Ecologie et de Gestion des Ressources Animales, B.P. 2012 Kisangani (DR Congo). E-mail: <sgambalemoke@yahoo.fr>*,

2. *Royal Belgian Institute of Natural Sciences (RBINS), Vertebrate Department, Molecular Laboratory, Vautierstraat 29, Brussels, Belgium.*

3. *Zoologisches Forschungsmuseum Alexander Koenig D-53113 Bonn (Germany)*

4. *Evolutionary Biology Group, Universiteit Antwerpen, Groenenborgerlaan 171, B-2020 Antwerpen, Belgium.*

5. *University of Aarhus, Danish Pest Infestation Laboratory, Department of Integrated Pest Management, Skovbrynet 14, DK-2800 Kongens Lyngby, Denmark*

Abstract

We investigated the trap efficiency of four different trap types for capturing shrews. The four trap types used were: Pitfall traps (buried buckets), Sherman LFA traps (Aluminium foldable live traps) and two types of snap traps (Victor and Museum Special). We trapped in four inter-riverine forest blocks: Baliko, Bomane, Maiko and Djabir. In total, the trapping effort was 1,680 trap nights for Pitfalls and 15,120 for the combination of Sherman-Victor-Museum special traps. During our research, we caught 367 Shrews of which 70 % were caught using Pitfalls, 16.1 % using Sherman traps, 8.99 % using Victor traps and 4.90 % using Museum Special traps. In general, *Crocidura olivieri* and *C. denti* are caught often using all four trap types. *Scutisorex somereni* was particularly not captured using Sherman LFA, Victor and Museum special traps. Smaller shrews such as *C. littoralis*, *C. littoralis* sp2-3, *C. dolichura*, *C. latona*, *C. ludia*, *C. crenata*, *C. cf muricauda*, *C. caliginea*, *C. cf poensis*, *Paracrocidura schoutedeni*, *Paracrocidura* sp, *Sylvisorex ollula*, *S. johnstoni*, *Sylvisorex n_sp1* and *Suncus infinitesimus* are mainly trapped with Pitfalls. Pitfalls are the most efficient traps to capture Shrews: not only do they have a much higher efficiency or trapping Shrews, Shrew diversity is also much higher in Pitfalls.

Key words: Shrews, traps, efficiency, Congo River basin

Social relationships in *Mastomys huberti* as deduced from field and laboratory analyses of multiple capture data

Granjon, L. and Cosson, J.-F.

UMR CBGP (INRA / IRD / Cirad / Montpellier SupAgro), Campus international de Baillarguet, CS 30016, F-34988 Montferrier-sur-Lez cedex, France

Abstract

Multiple captures in capture-mark-release (CMR) programs conducted in rodent populations can provide useful information on the social structure of the population under study. Adding genetical analyses to these field data may make this information even more accurate, and enable to describe social links between individuals at a very fine level. In this frame, we analyzed in details the distribution and composition of multiple captures obtained during a 3-year CMR follow-up of a population of the murid rodent *Mastomys huberti* in an agro-ecosystem of the Niger River Inner Delta in Mali. One hundred and twenty six multiple captures were recorded (112 double and 14 triple), representing more than 16% of the total number of individual capture events over the whole study period. Seasonal variations in the incidence of multiple captures (relative to simple captures) were evidenced, associated with a clear trend of the young to be involved in multiple captures more often than expected. The analysis of inter-individual associations revealed that juveniles (weight < 21g) were captured together more often than expected, suggesting that they usually forage in groups. This trend was also recovered when the limit adult-young was taken at 30g of weight, but it was then accompanied by a clear deficit of captures involving one young and one adult individuals of the same sex, especially in males. This pattern could illustrate a phase when negative intraspecific interactions occur, possibly linked to dispersal of subadults, particularly male ones. Genotypic characterization of a significant proportion of pairs of individuals involved in multiple captures enabled to draw some preliminary conclusions concerning the relative importance of relatedness in the pattern of interindividual interactions in this species.

Key words: Rodents, social structure, CMR, kinship

A computer-assisted identification key using Xper² for genets and oyans (Carnivora, Viverridae, *Genetta* spp. and *Poiana* spp.)

Gaubert P.¹ and Chalubert A.²

1. Muséum National d'Histoire Naturelle, Département Milieux et Peuplements Aquatiques, UR IRD 131 - UMS MNHN 403, 43 rue Cuvier, 75005 Paris, France – Email: gaubert@mnhn.fr;

2. Université Pierre et Marie Curie, UMR 5143 Paléodiversité, Équipe Systématique, Recherche informatique et Structuration des cladogrammes, Laboratoire Informatique et Systématique (LIS), 12 rue Cuvier, 75005 Paris, France.

Abstract

We built a computer-assisted identification key (CAIK) using Xper² in order to provide a practice, yet unavailable, tool for the problematic identification of the Genettinae species (*Genetta* spp. and *Poiana* spp.). A total of 45 discrete characters was defined after the observation of > 4.500 specimens, representing 19 species. We propose a Discrimination Index that may be used to quickly assess the discriminative power at the character or partition-level of a given data matrix. Characters related to skull and coat (and to a lesser extent, hair ultrastructure) were the most discriminant to reach species identification within Genettinae. *Genetta maculata* and *G. "leetae"*, which belong to the large-spotted genet complex, could not be distinguished due to their extreme level of similarity. The CAIK of Genettinae we propose herein may be used to assist regular-basis update of distribution ranges, especially in the case of poorly-known or IUCN-listed species, in connexion with GIS-databases.

Key words. *Genetta*, *Poiana*, Genettinae, Viverridae, Carnivora, Africa, computer-assisted identification key, Xper²

Comparative physiology of thermoregulation in sibling species of the Genus *Mastomys* – The response to photoperiod challenges

Haim A.² and Van Aarde R.J.¹

1. University of Pretoria, Pretoria 0002, South Africa;

2. Department of Biology, University of Haifa, Haifa 31905, Israel, Email: ahaim@research.haifa.ac.il

Abstract

Daily rhythms of body temperature (T_b) and oxygen consumption (VO_2) were studied in two sibling species of the multimammate mouse, genus *Mastomys*, from different ecological backgrounds: *M. coucha* abundant in the more arid central parts of South Africa and *M. natalensis*, which is primarily distributed in the mesic eastern parts of the country. The response of the thermoregulatory system to photoperiod challenges was studied by acclimating the mice to long day (16L:8D, LD-acclimation) and short day (8L:16D, SD-acclimation) at a constant ambient temperature of 25°C. *M. natalensis* were collected from coastal dune forests north of Richards Bay, Quazolo-Natal while *M. coucha* were collected Pretoria, Gauten, South Africa. T_b (rectal) was measured by using a copper-constantan thermocouple connected to an APPA 51 digital thermometer. VO_2 was measured using an open circuit system. The percent of O_2 in exhalant samples were recorded every two minutes from an Applied Electrochemical S-3A oxygen analyzer. Our results show marked differences in T_b and VO_2 daily rhythm patterns, under SD-acclimation between the sibling species. The differences between the sibling species are discussed in relation to the different climatic conditions in the different ecosystems. To the best of our knowledge, this is the first time that physiological differences between the two siblings are measured by using chronobiological methods. Our results support the segregation of the two species, based on cranial morphology and other cyto genetically and biochemical studies.

Key words: Daily rhythms, metabolic rates, thermoregulation, ecosystems

Rodent pest problems and community trap barrier system practice in the peripheral zone of Ranomafana National Park, Madagascar.

Haingotiana, R.¹, Soloniaina, C. J.C.¹,
Lehtonen, J.², Ovaskainen, O.²

1. *MICET (Madagascar Institut pour la Conservation des Ecosystème Tropicaux), Antananarivo, Madagascar;*

2. *University of Helsinki, Finland.*

Abstract

In Madagascar, the main problem caused by the rodent pest is the damage in agricultures. The irrigated rice is the most attacked. For being able to protect the agriculture and fighting against rats, monthly trapping of rodents were done in four different types of habitats (rice field, dry farming, house, and bushy land) in two villages of Ranomafana, Madagascar since 2005. The aim is to get some data concerning the variation in abundance with the habitats, the seasonal variation of abundance, and the reproduction of rodents in order to trap rats in the appropriate place in the right time during the year. The CTBS (Community Trap Barrier System) was also used in the first time in Madagascar in the same village sites since 2005 until now. *Rattus rattus* comprised the highest proportion of rodents caught in the TBS, as well as during the monthly trapping. The number of rats caught increases since March and the maximum abundance attain in May. Breeding season takes place between January and May when the percentage of pregnant female among adult female captured is high. No reproduction occurs between June and December. Rodents were more trapped in the rice field just after the rice harvesting (April-June). Most of rats were caught in the dry farming in July, November and December.

Key words: Madagascar, rodent, habitats, rice field, abundance, breeding season, CTBS

Diversité des micromammifères dans la ville côtière de Cotonou au Bénin en Afrique de l'Ouest et prévalence des ectoparasites.

Houemenou G., Codjia J.T.C., Libois R.

Résumé

Cette étude a permis de réaliser l'inventaire des micromammifères de la ville côtière de Cotonou au Bénin en Afrique de l'ouest. Les ectoparasites associés à ces micromammifères ont été également inventoriés. Pour conduire l'étude, quatre vingt (80) pièges dotoirs grillagés (fabrication artisanale inspirée du modèle Firobin) et plusieurs types d'appât (poisson fumé, farine de blé pétrie avec la sardine, noix de palme) ont été utilisés. Les pièges ont été posés dans 21 stations réparties dans deux groupes de milieux : milieux habités (marqués par la présence ou l'absence de caniveaux à ciel ouvert, de dépotoirs sauvages, et de structures de collectes de déchets) et milieux non habités caractérisés par les savanes marécageuses, des marécages boisés et des palmeraies. Au total 348 individus ont été capturés pour un effort de piégeage de 2652 nuits-pièges consenti. *Rattus rattus* représente 59,77% des captures suivi de *Mastomys* sp 13,5% et *Crocidura olivieri* 8,6% ; les autres espèces : *Mus domesticus*, *Malacomys longipes*, *Arvicanthis niloticus*, *Crocidura* sp, *Rattus norvegicus*, *Dasymys rufulus*, *Tatera kemp* et *Taterillus gracilis* sont faiblement représentées. L'indice d'abondance de *Rattus rattus* est de 0,078 (208 *Rattus rattus* /2652 nuits-pièges). Les animaux capturés étaient transportés au laboratoire pour diverses manipulations. Au total 269 ectoparasites sont récoltés soit un indice ectoparasitaire global de 0,77 par mammifère (269/348). Cent huit (108) individus toutes espèces confondues sont parasités soit 31% des individus capturés. L'indice ectoparasitaire général est de $2,49 \pm 2,69$ par hôte infesté (269/108). Les individus *Rattus rattus* sont numériquement les plus parasités (67% du total des individus parasités). Les Siphonaptères constituent la majorité des ectoparasites récoltés (65%) : *Xenopsylla cheopis* 63,19% et *Xenopsylla brasiliensis* 1,85%. L'indice pulicidien général est de 0,5. La prévalence pulicidienne est de 0,25%. Les stations où *Xenopsylla cheopis* est présente sont en majorité (7/9) caractérisées par la présence des ordures. Sa présence serait donc surtout conditionnée par l'insalubrité. L'indice d'abondance de *Rattus rattus* est élevé dans les mois de juin et juillet qui correspondent aux mois de la grande saison pluvieuse. Il en est de même pour l'indice

cheopis de *Rattus rattus*. Les communautés de micromammifères de la ville de Cotonou sont dominées par *Rattus rattus* et leur ectoparasite dominant est par *Xenopsylla cheopis*. Ces rongeurs constituent dès lors un risque potentiel pour la santé de la population étant donné que la ville de Cotonou dispose d'un port maritime et n'est pas à l'abri d'importation par voie de mer de rats porteurs de puces éventuellement pestigères.

Habitat fragmentation and small mammals' diversity in the Albertine Rift

Kaleme P.K.^{1,2}, Mwanga J.M.², Bates J.M.³, Ndara B.R.², Kerbis-Peterhans J.³, Huhndorf M.³, Bowie R.C.K.⁴, Van Vurren B.J.¹ and Kazadi, M.M.²

1. Molecular laboratory of Evolution genomic Group, Department of Botany and Zoology, Stellenbosch University, Private Bag XI, Matieland, South Africa; Email: princekaleme@yahoo.co.uk

2. Département de Biologie, CRSN-Lwiro/ Bukavu, DR Congo

3. Department of Zoology, Field Museum of Natural History, Chicago, USA

4. Department of Integrative Zoology, University of California, Berkeley, USA

Abstract

The Albertine Rift has been identified as a “biodiversity hotspot”, an “ecoregion” and an “endemic bird area”. As such, it is recognized as an area of global importance for conservation because it contains many endemic and threatened species. Habitats in this region are composed of Afromontane forest. Many of the sites have received limited or no attention for the small mammal fauna. Redressing this lack of knowledge is of importance: (1) many species of small mammals occur in this type of habitat; (2) this region houses one of the highest human population densities. In this study, we inventoried rodents and insectivores in four sites using snap, Sherman live traps and pitfall buckets. The highest numbers of species were found in Kahuzi-Biega National Park (55 species) and Itombwe massif (36 species), while the lowest were found in Mt Tshiabirimu (19 species) and Kabobo-Misotshi (17 species). It is likely that these species numbers are an under-estimate as several of the specimens collected may represent new species to science. Tolerant species such as *Praomys jacksoni*, *Lophuromys flavopunctatus*, *Oenomys hypoxanthus* were recorded irrespectively of the level of habitat disturbance. Importantly, however, species such as *L. rahmi*, *Myosorex spp.*, *Sylvisorex spp.*, or *Praomys degraaffi* that are known to be less tolerant to disturbance were recorded only in intact habitats. The lower species numbers for Mount Tshiabirimu and Kabobo-Misotshi can be attributed to sampling bias. Although preliminary, these results indicate that there is a pressing need for intensive surveys complimented by genetic studies.

Biologie, écologie de *Rhynchocyon cirnei stuhlmanni* et *Petrodromus tetradactylus* (Macroscelididae, Mammalia) dans les aires forestières autour de Kisangani (R D Congo) dans une perspective de la bonne gestion et la conservation

Kaswera Kyamakya Consolate

Université de Kisangani; Email:
Consolatekyams@yahoo.fr

Abstract

La R.D. Congo est couverte de vastes étendues forestières parmi lesquelles des larges parties restent non encore explorées. Ce grand laboratoire vivant compte un grand nombre d'animaux dont les Macroscélidés demeurent peu ou mal connus. Les derniers travaux sur ce groupe en R. D. C datent de 1948. Par contre les forêts où leurs présences avaient été signalées subissent actuellement des pressions anthropiques non précédentes (Exploitations de bois, de minerais, et d'autres ressources). La présente étude est menée pour connaître l'état actuel tant du groupe que celui de l'habitat. Elle permettra également de définir l'habitat et le statut des espèces en vue de leur préservation. L'objectif est donc approfondir la connaissance de *Rhynchocyon* et *Petrodromus*, actualiser des données sur la biologie, l'écologie et vérifier la distribution des différentes espèces dans les aires forestières autour de Kisangani en vue de la valorisation, la bonne gestion et la conservation de ces ressources animales. Longtemps considérée comme une sous espèce, quelques scientifiques soutiennent aujourd'hui que *R.c.stuhlmanni* est bel et bien une espèce à part entière. La présente étude pourra contribuer à éclaircir cette situation en disponibilisant les tissus des organes pour les analyses d'ADN qui seront complétées par des analyses des données morpho métriques. *Rhynchocyon cirnei* figure sur la liste rouge des espèces vulnérables de l'I U C N; par contre à Kisangani, cette espèce considérée comme gibiers à poils continue à subir une pression de la part de la population locale pour leur consommation. D'une façon pratique, *Rhynchocyon* ne fait l'objet d'aucune stratégie de protection alors qu'il figure sur la liste des animaux totalement protégés en R. D. Congo. En ce qui concerne la localisation, la sous espèce *Rhynchocyon cirnei stuhlmanni* est connue dans les blocs forestiers situés sur la rive droite du fleuve Congo tandis que *Petrodromus tetradactylus* se situe quant à lui sur la rive gauche du même fleuve Congo. Nous utilisons différentes méthodes pour observer et capturer les bêtes. La capture

n'intervient qu'après l'entrevue avec les chasseurs, la population locale et les trafiquants des gibiers. Les sites de capture retenus sont Djabir, Axe routier Kisangani-Ubundu, village Maiko et PK 126 Route Ituri. Les bêtes capturées sont identifiées, pesées, mesurées et conservées dans du formol aldéhyde. La régularité, la structure de la population, le sex-ratio, le régime alimentaire sont déterminés. Quelques animaux sont sacrifiés pour ces études. L'effort de capture par espèce est aussi calculé. Les données récoltées dans les différents habitats sont comparées. The abstract text should not be more than 300 words, and enclosed separately. Please check that all special characters are correct. If this is impossible, please mention below, in the comments box, how the characters should print.

Mots clés: Biologie, écologie, conservation, Macroscelididae, Kisangani

Zoogeography of *Praomys*, *Lophuromys*, and *Deomys* species in the lowland rainforest around Kisangani and the influence of the Congo River and tributaries on their distribution

Katuala, P.G.B.¹, Kennis, J.², Nicolas, V.³, Wendelen, W.⁴, Hulselmans, J.², Verheyen, E.^{5,2}, Van Houtte, N.², Dierckx, T.², Dudu, A.M.¹, Leirs, H.^{2,6}

1. University of Kisangani, Animal ecology and resource management laboratory (LEGERA), B.P. 2012, Kisangani, Democratic Republic of Congo

2. University of Antwerp, Evolutionary Biology Group, Groenenborgerlaan 171, B-2020 Antwerpen, Belgium

3. MNHN, Laboratoire Mammifères et Oiseaux, Département de Systématique et Evolution, UMR 5202, USM 601, 55 rue Buffon, 75005 Paris, France

4. Royal Museum for Central Africa, Vertebrate Section, Leuvensesteenweg 13, B-3080 Tervuren, Belgium

5. Royal Belgian Institute for Natural Sciences, Vertebrate department, Vautierstraat 29, B-1000 Brussel, Belgium

6. University of Aarhus, Danish Pest Infestation Laboratory, Department of Integrated Pest Management, Skovbrynet 14, DK-2800 Kongens Lyngby, Denmark

Abstract

Praomys, *Lophuromys* and *Deomys* are among the most common Muridae from the rainforests in the Kisangani region. For this region, four *Praomys* and *Lophuromys* species and only a single *Deomys* species were recorded so far, but their distribution ranges remain poorly known. We have studied their distribution ranges and whether or not the Congo River and its tributaries constitute dispersal barriers for these rodents. Between November 2001 and May 2007, we sampled seven localities on both banks of the Congo River and its tributaries. A total of 42,466 trapping nights resulted in a specimen collection of 1185 *Praomys*, 233 *Lophuromys* and 209 *Deomys ferrugineus*. As expected, the distribution ranges and the importance of the Congo River as a barrier for dispersal differ between species. For example, *P. misonnei* only occurs on the right bank of the Congo, while *P. lukolelae* is restricted to the left bank. In contrast, *P. jacksoni* and *P. mutoni* are found on both sides of the Congo River. The distribution ranges of all *Lophuromys* species seem affected by the presence of rivers. Both *L. dudui* and *L. luteogaster* occur only along the right bank of Congo River, the distribution

range of the latter is even restricted to the right bank of Lindi River, a right bank tributary of Congo River. *L. huterreri* and *L. rita* are only found on the left bank of Congo River. Further sampling is required to understand why *D. ferrugineus* and *L. luteogaster* (both restricted to the right bank) were not captured in Basoko on the right bank of Aruwimi (Ituri) river, while they were found in Epulu. Our results illustrate that the Congo River and some of its tributaries represent dispersal barriers for numerous species, and that more data are required to understand why the distribution ranges of some species are more/less influenced by the same barriers.

Key words: Zoogeography, barrier, rainforest, *Praomys*, *Lophuromys*, *Deomys*

The genital tract of *Gerbillus tarabuli* and *Psammomys obesus*, orchiectomized in breeding season: comparative histophysiological effect

Keddache A., Mataoui H., Amirat Z. and Khammar F.

Laboratoire de Recherches sur les Zones Arides, FSB, USTHB, BP 39, El Alia, 16111, Algiers, Algeria; Email: aa_ke@yahoo.fr; kkhammar@yahoo.fr

Abstract

In dry and hostile environment, rodents develop physiological, comportemental and ecological strategies. The variations occurred especially in endocrine functions such as sexual activity and metabolic functions. In previous studies, we have already describe annual variations in reproductive activities in some Saharan Gerbillidae, (*Psammomys obesus*, *Meriones libicus*, *Gerbillus gerbillus* and *Gerbillus tarabuli*) and try to elucidate the endogenous determinism of these variations. The present study was designed to investigate the ponderal, histological and biochemical repercussion of castration carried out during the breeding season, followed by testosterone replacement upon some parameters of genital tract in the sand rat, *Psammomys obesus* and the great gerbil, *Gerbillus tarabuli*. *Gerbillus tarabuli* and *Psammomys obesus* freshly live-trapped in the West Algerian Sahara, were bilaterally orchiectomized by abdominal route under ether anaesthesia. Testosterone treatment began 50 days after castration (75 µg of testosterone enanthate per 40 µl sesame's oil /animal) for 7days. Proteins of the seminal vesicles were analysed by Monodimensional electrophoresis in denaturant conditions on polyacrylamide mini-gel (SDS-PAGE) at 12%. In the genital tract of *Gerbillus tarabuli* and *Psammomys obesus* orchiectomy induced: A dramatic decrease weight in organs of the male genital tract: proximal epididymis, distal epididymis, ductus deferens and seminal vesicles. An important reduction of luminal diameter; the number and the size of epithelial cells and supranuclear zona are appreciably reduced . Testosterone replacement restored histological parameters of control group and induced significant rise in cellular epithelial heights and supranuclear zona. Expression of some androgenodependent proteins induced by testosterone in seminal vesicles are: 66.9, 46, 33.4 , 30, 12.9 and 9.4 kDa. Suppression of some androgenodependent proteins by testosterone are present in seminal vesicles: 82.9, 78.6, 74.5, 63.5, 43.7and 16.7 kDa. This

study showed that orchiectomy caused important histological and biochemical modifications in genital tract, whereas testosterone replacement restored normal status. These findings suggested the relationships between testosterone and genital tract activity in these Saharan rodent species.

Key words: Sahara, Gerbillidae, orchiectomy, genital tract, histophysiology.

Cryptic diversity within species or different species? A taxonomical question studied using the *Praomys* and *Hylomyscus* Rodentia Genera of the Kisangani Region (Dr Congo) as an example

Kennis J.¹, Nicolas V.², Katuala P.G.B.³, Wendelen W.⁴, Hulselmans J.¹, Verheyen E.⁵, Van Houtte N.¹, Dierckx T.¹, Dudu A.M.³, Leirs H.^{1,6}.

1. University of Antwerp, Evolutionary Biology Group, Groenenborgerlaan 171, B-2020 Antwerpen, Belgium

2. MNHN, Laboratoire Mammifères et Oiseaux, Département de Systématique et Evolution, UMR 5202, USM 601, 55 rue Buffon, 75005 Paris, France

3. University of Kisangani, Animal ecology and resource management laboratory (LEGERA), B.P. 2012, Kisangani, Democratic Republic of Congo

4. Royal Museum for Central Africa, Vertebrate Section, Leuvensesteenweg 13, B-3080 Tervuren, Belgium

5. Royal Belgian Institute for Natural Sciences, Vertebrate department, Vautierstraat 29, B-1000 Brussel, Belgium

6. University of Aarhus, Danish Pest Infestation Laboratory, Department of Integrated Pest Management, Skovbrynet 14, DK-2800 Kongens Lyngby, Denmark

Abstract

Several evolutionary scenario's attempt to explain the origin and geographic distribution of species assemblages from the African lowland rainforests. However, taxonomy of many groups is insufficiently known to allow meaningful zoogeographical analyses. In this context we studied the taxonomic composition of *Praomys* and *Hylomyscus*, two widespread murid genera in the Kisangani region (DR Congo). Within both genera species are morphologically rather similar. We combined craniometrical and molecular (cytochrome b sequencing) data to identify Operational Taxonomical Units (OTUs) linked to species names. We made a direct comparison of our craniometric data with the relevant types. We collected and analysed 1185 *Praomys* and 527 *Hylomyscus* specimens. Four known *Praomys* species are present in the region: *P. misonnei*, *P. lukolelae*, *P. jacksoni* and *P. mutoni*. Our mitochondrial DNA sequences indicate that four allopatric groups can be identified within *P. jacksoni*, of which two are present in the Kisangani region. Since this observation is confirmed by craniometric data, the taxonomical status of these four distinct groups is questionable: are these distinct species or is

this variability within one species? *P. mutoni* is an example of a contrasting situation: very little genetic variation was detected. Our preliminary results indicate that the taxonomy of the *Hylomyscus* species is more complex. Although our data confirm the presence of *H. stella* and *H. aeta* in the Kisangani region, the *H. parvus* specimens (identified based on skull characteristics), fall apart in 3 to 4 distinct genetic groups. The important genetic differentiation between these groups implies that it is possible that they represent distinct species. It is clear that we will need more data to evaluate this problem.

Keywords: *Praomys*, *Hylomyscus*, taxonomy, morphometry, craniometry, sequencing, speciation

Silvery mole-rat – hearing and vocalization

Knotková, E.,¹ Veitl, S.,² Šumbera, R.,¹ Sedláček, F.^{1,3}

¹ *University of South Bohemia, České Budějovice, Czech Republic;*

² *University of Duisburg-Essen, Essen, Germany;*

³ *Institute of Systems Biology and Ecology, České Budějovice, Czech Republic*

Abstract

Life in underground bares many restrictions and senses are among the most affected features. Dark environment and absence of air currents disqualifies the sight and olfaction, whereas touch could be used only for a short range. Therefore, the most important sense for communication is hearing. Its evolution has been shaped mainly by special acoustics of the underground burrows where lower sounds with frequency 0.5 – 1 kHz are best transmitted for the longest distances. We analysed hearing abilities of solitary subterranean bathyergid, the silvery mole-rats, therefore we miss information on hearing in any solitary mole-rat species. Within the tested frequencies (0.25 - 16kHz), lowest thresholds (22 dB SPL on average) were found at 1 kHz. Low sensitivity and restricted high frequency hearing range in silvery mole-rats and other audiogram features have all traits typical for subterranean mammals. Underground acoustics as well as the restricted hearing range shape frequency of vocalization. The dominant frequencies of the analysed sounds extended from 0.34 – 13.17 kHz. Due to the narrow frequency range of vocalization, motivation is predominantly expressed by the rate of tonality rather than by frequency changes. In comparison with social species, solitary silvery mole-rats produce fewer calls. They lack contact and alarm calls, but have rich repertoire of mating calls. Acoustic signals seem to be the most suitable for lowering of natural aggressiveness during their mating period. The study was funded by the GACR 206/04/P116 and MSMT 6007665801.

Key-words : Silvery mole-rat, audiogram, vocalization

The invasive Black Rat in Senegal: gene flow and colonisation pattern

Key words: *Rattus rattus*, invasion, genetic structure, gene flow, Senegal

Konečný, A.^{1,2,3}, Bryja, J.^{1,2}, Cosson, J.-F.³, Brouat, C.³, Galan, M.³, Loiseau, A.³, Tatar, C.³, Djigo, Ch. A. T.⁴, Koubek, P.¹ and Duplantier, J.-M.³

1. Institut of Vertebrate Biology, Academy of Sciences, Brno, Czech Republic;

2. Masaryk University, Brno, Czech Republic;

3. Centre de Biologie et de Gestion des Populations, Montferrier sur Lez, France;

4. Direction of National Park Niokolo Koba, Tambacounda, Senegal.

Abstract

The black rat (*Rattus rattus*) has invaded during several centuries a large part of the planet due to the commercial transport by human. In Senegal, it has probably been brought in by the Portuguese sailors during the fifteenth century and has stayed for a long time in the coastal towns before spreading into the inland. In the course of the two last decades the black rat has occupied villages around the National Park Niokolo Koba and more recently the town of Kédougou in the south-east Senegal. The aim of this study is to describe the way of black rat's invasion into the inland of Senegal by using data on nuclear genetic variation.

Fourteen populations (234 individuals) through the Senegal (from west to east) were sampled and the population genetic structure was analysed at 7 microsatellite loci.

The black rat population in Senegal is highly structured with similar allelic richness in all populations indicating that the invasions do not cause the loss of genetic variability. The analysis of genetic variation by both the standard and the Bayesian approach shows two possible scenarios of the invasion from the seaside to the central Senegal: either from Dakar or from ports of the south-west Senegal (region of Casamance). From the central Senegal the rats have spread along the road to Tambacounda (east Senegal) and then along other important roads in the direction of north-east (to the Bakel region) and south-east (to the Kédougou region). There are some villages without rat populations between larger towns occupied by rats which suggests transport of rats by camions that do not stop in small villages. The installation of black rat in the south-east of the country is uncertain and still dynamic, probably because of the competition with an autochthonous synanthropic murine species, *Mastomys natalensis*, which occurs in Senegal only in that region.

Taxonomy and biogeography of the African Pygmy Mice, Subgenus *Nannomys* (*Rodentia*, *Murinae*, *Mus*) in Ivory Coast and Guinea

Kouassi S¹, Allali¹ B., Akoua – Koffi¹ C., Nicolas V.², Coulibaly¹ G. D., Dosso³ H., Dosso¹ M., Koivogui⁴ L., Aniskine⁵ V., Colyn⁶ M., Verheyen⁷ E., **Denys² C.**

¹ Pasteur Institute Ivory Coast., Email: kkstephy@yahoo.fr

² UMR5202CNRS – MNHN Paris – Dept. Systématique & Evolution, France, Email: denys@mnhn.fr

³ Univ. Cocody- Abidjan. Ivory Coast ,

⁴ Projet Fièvres Hémorragiques, Guinea,

⁵ Severtsov Institute, Russia,

⁶ Univ. Rennes I , France,

⁷ Brussels University, Belgium.

Abstract

African rodents are known to damage crops and to affect stored food. Moreover, several species are known reservoirs and vectors of several human diseases like Lassa fever or LCMH. Recent investigations in Guinea and Ivory Coast showed that *Mus* (*Nannomys*) are hosts of new arenaviruses. However, the taxonomy and biogeography of the western pigmy-mice is far from being well known, due to the existence of many cryptic species in this taxon.

To gain an insight in the taxonomy and geographical distribution of this subgenus in West Africa, we have performed a molecular, cytogenetical and morphological inventory of *Nannomys* species diversity in several biogeographic zones.

This allowed the discrimination of 5 species in Guinea and 4 in Ivory Coast. *N. mattheyi*, *N. minutoides*, *N. setulosus*, *N. baoulei*, *N. musculoides* were recorded in Guinea. The same species, except, *N. mattheyi* were found in Ivory Coast. Our study allowed to precise the identification of the natural reservoir of a new arenavirus in Ivory Coast. Some biogeographical conclusions about *Nannomys* spp. distributions in both countries in function of vegetation and riverine barriers will be provided.

Key-Words: *Mus*, West Africa, DNA sequencing, Morphometrics, Cytogenetics

The problem of species identification in biology: the case of *Mastomys* (Rodentia: Muridae)

Lalis A. and Denys C.

UMR CNRS 5202 – USM 601, Origine, Structure et Evolution de la Biodiversité, Département Systématique et Evolution, Muséum National d'Histoire Naturelle, CP 51, 55 rue Buffon, 75005 Paris, France; Email : lalis@mnhn.fr.

Abstract

The multimammate rats (*Mastomys*) are better discriminated in general through genetical analyses than on morphological grounds and are well known for their high interspecific variability preventing fiable identifications. This study attempts to find diagnostic cranial characters with geometric morphometrics in two sympatric species of Guinean *Mastomys*. A set of 250 genetically determined individuals has been analysed. Several populations have been considered in relation with different parameters : locality, habitat, season (access to food resources), sex and age classes. Age class was determined on the basis of body weight following Lalis *et al.* (2006). 3D landmarks were chosen in each of three views (dorsal, ventral and lateral) of the skull of *Mastomys*. Landmarks configurations were superimposed separately by a least-squares generalized Procrustes algorithm. Residuals from the mean landmark locations (= Procrustes residuals) together with centroid size constitute the shape and size variables respectively used in the multivariate statistical analyses. The results have showed that we never achieved a total discrimination among species and we confirm the high variability in size and shape of the *Mastomys*, both within and between species. At a local scale, we better discriminate the two species than at larger geographic scale. This could be the result of ecological partitioning of the habitats and diets in sympatry. But we obtain a better discrimination at intraspecific level than at interspecific one. Consequently, the cranial characters using the statistical formalism of geometric morphometrics are not sufficient to be a valid identification criteria. It is only by combining sets of characters (external, skull, dental morphology) that it is possible locally to determine the species with 100% confidence.

Key-words: Taxonomy, 3D Geometric morphometrics, skull, variability

Rodent and flea communities in villages with different plague frequency in the Western Usambara Mountains, Tanzania

Laudisoit A.^{1,2}, Neerinckx S.^{2,3}, Leirs H.^{2,4}, and Makundi R.H.⁵

¹ *University of Liège, Belgium ;*

² *University of Antwerp, Belgium ;*

³ *Catholic University of Leuven, Belgium ;*

⁴ *Danish Pest Infestation Laboratory, University of Aarhus, Denmark;*

⁵ *Sokoine University of Agriculture, Morogoro, Tanzania.*

Abstract

Plague, caused by infection with *Yersinia pestis*, persists in many parts of the world, with several hundreds of cases reported to the WHO annually, mostly from Africa. In Tanzania, 7603 cases have been reported from the Lushoto focus of human plague between 1980 and 2004.

In this area of 1200km², frequent plague outbreaks are observed in some villages, whereas the disease is uncommon in other villages in the same vicinity.

The understanding of plague transmission and maintenance in sylvatic environment passes by the description of host-parasite associations within the focus by regular trappings. In 2005 and 2006, trappings were carried out in various biotopes (houses, fields, forest) of 4 villages with low and high plague frequency and incidence. During those capture campaigns, 2049 fleas and 834 small mammals have been collected with at least 22 identified flea species (of which 2 totally new species for science) and 22 small mammal species.

Here, we report differences in ectoparasitic fleas of small mammals between the 4 study villages and discuss their role in plague epidemiology. We also examine the main host-flea associations in relation with biotope features.

Back to Belgium, specific multiple-PCR tests for *Yersinia pestis* were also performed on rodents'spleens and randomly on some specimens of fleas ; all screened samples were negative. Since no plague cases have been reported from the area since 2003, this result is not surprising. However, such "quiescence" periods are an intrinsic characteristic of endemic foci and a description of host and vector communities during enzootics and inter-epidemics might be an important key to understand what happens during epizootics and epidemics.

Our results give a first insight into the relative specificity between host and ectoparasites in a particular set of environmental features taken

as a limiting factor that could influence plague spread or resurgence.

Keywords: Rodent, flea, plague, host-parasite relationships

Preliminary study of *Praomys rostratus* (Rodentia: Muridae) population structure in forest fragments from the northern limit of its distribution in West Africa.

Lecompte E.¹, Konecny A.^{2,3}, Bryja J.² & Granjon L.³

1. UMR CNRS 5174 "Evolution et Diversité Biologique", Université Paul Sabatier, Bat. 4R3 118, route de Narbonne, 31062 Toulouse cedex 9, France. emilie.lecompte@hotmail.fr

2. Department of Population Biology, Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, 675 02 Studenec 122, Czech Republic.

3. Centre de Biologie et de Gestion des Populations (UMR 022), IRD, Campus international Baillarguet, CS 30016, 34988 Montferrier-sur-Lez cedex, France.

Abstract

The genetic variability and structure of the forest rodent *Praomys rostratus* populations from gallery forests and forest patches at the northern edge of the species distribution were examined to evaluate the role of habitat patchiness in structuring patterns of diversity. A preliminary analysis of 12 polymorphic microsatellite loci studied on 147 specimens from 13 populations (from Mali, Burkina Faso, Senegal and Côte d'Ivoire) is presented here. High levels of genetic variability were detected (5-40 alleles per locus), and the average number of alleles per locus and population ranged from 4.71 to 8.14. The allelic richness per locus and population ranged from 1.0 to 8.64 (including null alleles, based on minimum sample size of 5) and the expected heterozygosity from 0.65 to 0.87. Departures from Hardy–Weinberg expectations (HWE) due to a deficit of heterozygotes across populations for all loci suggested population structure (Wahlund Effect). Within populations, six over 12 loci present a departure from HWE probably due to the presence of null alleles. A data set corrected by using null alleles frequency estimated for each locus and population was run to estimate genetic differentiation based on multilocus F_{ST} . Significant differentiation was identified between most pairs of populations, even populations from very closed localities. Genetic and geographical distances were significantly correlated ($r=0,461$, $P=0,001$), supporting the isolation by distance hypothesis. These results are also discussed taking into account the current pattern of connectivity between these forest fragments, and what we know of their history during recent times.

Zoonotic diseases: a new boost for African Small Mammal Biology

Leirs H. ^{1 & 2}

¹ *Evolutionary Biology Group, Universiteit Antwerpen, Groenenborgerlaan 171, B-2020 Antwerpen, Belgium;*

² *Danish Pest Infestation Laboratory, University of Aarhus, Faculty of Agricultural Sciences, Department of Integrated Pest Management, Skovbrynet 14, DK-2800 Kongens Lyngby, Denmark; Email: herwig.leirs@ua.ac.be*

Abstract

The last decade has seen a strongly increased interest in infectious diseases and new and (re-)emerging pathogens, often of zoonotic origin with reservoirs in wildlife. Consequently, there is also a renewed attention for the role that small mammals play in the ecology and epidemiology of such infections. Those animals are indeed a potential reservoir for numerous pathogens and they have been involved (or suspected to be involved) in several important outbreaks of diseases. The growing interest for wildlife-borne diseases can be seen on all continents, but Africa attracts some special attention. This is linked to the high biodiversity there, the fact that small mammals have been largely unexplored with regard to infectious diseases and the growing contact between humans and wildlife in previously untouched areas. Outbreaks of hemorrhagic fevers for which the reservoir is not even known, the existence of very active plague foci or instances where exported small mammals initiated an epidemic of a tropical disease at northern latitudes, further contributed to this impression.

In recent years, a number of studies have been undertaken to investigate the role that small mammals play in the ecology and epidemiology of different zoonotic infections in Africa and it is expected that this trend will continue for some time. I will indicate a number of fields where more knowledge is urgently needed, related to several disciplines of African small mammal biology.

A fundamental question remains to identify the reservoir of several infections. For some diseases (e.g. Ebola and Marburg fever, caused by filoviruses) the reservoir is still unknown although evidence points towards bats. Other diseases have since long been recognised as "rodent-borne", like Lassa fever or plague. Yet for plague, we do not even

know which species are active reservoirs outside epidemic or epizootic periods. For Lassa fever in Western Africa, the reservoir was only recently confirmed to be *b* and not the other species of the genus in the region, which explains also the distribution of the disease. These kinds of questions require proper taxonomic knowledge of the small mammals and their arthropod ectoparasites and there is still a lot of work to do related to this there will be a growing need for fast and reliable identification of small mammal species. Information about the geographical and ecological distribution of small mammals will be indispensable for predicting where particular diseases can be expected. Temporal patterns in the population dynamics of small mammals will be important for understanding e.g. seasonality in disease patterns. Modelling will be a big help here. I will present a number of examples and discuss how African small mammal biologist can make important contributions here.

Keywords : Rodentia, infections, disease, zoonoses

A comparative study of Rodent and Shrew diversity and abundance in and outside the N'Washitshumbe enclosure site in Kruger National Park

MacFadyen D.¹, van der Merwe M.¹ & Bredenkamp G.²

1. Mammal Research Institute, Department Zoology and Entomology, University of Pretoria, South Africa, 0002. E-Mail: Duncan.MacFadyen@eason.co.za

2. Department of Botany, University of Pretoria, South Africa, 0002

Abstract

Understanding the extent and cause of small mammal diversity and movement in an area is one of the major challenges in modern ecology. Rodents are a very successful group forming the largest Order of mammals, but monitoring trends in populations remains complicated, especially when populations are influenced by changes in vegetation structure, seasonal climate fluctuations and different management practices. This project aims to determine the biodiversity of rodent populations in the northern plains of the Kruger National Park and to investigate the possible role they may play as bio-indicators for different management practices. Movement of rodents from one area to the next is expected to be restricted due to changes in the habitat structure. This study describes the results of small mammal trapping in, surrounding and outside the N'washitshumbe enclosure site, an area enclosed since 1968 for the protection of endangered antelope species in the northern plains of the Kruger National Park, South Africa. The study refers to plant association, seasonal change, management practices (e.g. presence or absence of fire and elephant impact) and community dynamics of rodents. It is argued that progress in estimating rodent diversity to develop an understanding of small mammal community dynamics will be enhanced by building local inventories of fluctuations of species diversity and abundance, and in descriptive and experimental studies of the structure of the communities.

**Parasites of small mammals from Mlawula
Nature Reserve and Vuvulane, Swaziland.**

Mahlaba Themb'alilahlw A. M.

*University of Swaziland; P/B 4; KWALUSENI;
Swaziland; Phone:+268 5184011; Fax: +268
5185276; E-mail:
tmahlaba@science.uniswa.sz*

Abstract

One hundred and thirty seven small mammals collected in Swaziland were examined for digestive system helminths and ectoparasites. Ectoparasites collected included the ticks *Ixodes sp.* and *Boophilus sp.*, the mite *Allodermanyssus sp.* and another species of mite. The gastrointestinal tracts contained the helminths *Syphacia sp.*, *Heligmonina sp.*, *Trichuris sp.*, *Protospirura sp.*, two unidentified nematode species and three different cestode species. *Heligmonina sp.* is a new species and *Syphacia sp.* is probably a new species. Infestations by more than one ectoparasite species or gut parasite species per host were very uncommon in the sample from Mlawula Nature Reserve while a large number of specimens from Vuvulane had more than two gut parasites.

Preliminary attitudes of Swazi farmers on Rodents and Rodent Pest Management.

Makhosazana Dlamini

*University of Swaziland; P/B 4; KWALUSENI;
Swaziland; E-mail:
tmahlaba@science.uniswa.sz*

Abstract

A knowledge, attitude and practices questionnaire was administered on 250 small scale farmers in Mahlanya Lobamba area in Swaziland. This study was aimed at determining attitudes of small scale Swazi farmers towards rodent and the damage they cause to crops in the fields and grains in storage and other damages in and around household. Information gathered was used to evaluate the existing attitudes and practices so as to get an estimate of the degree of awareness of rodents' management and their impacts on farmer's crops. The findings show that rats are a problem, cause large economic losses and pose serious health concerns. Regardless people still feel it is impossible to control them using available and known methods. This may be because the available knowledge on rat control methods is limited mostly to acute poison and traps which are not very effective. It can also be deduced that most farmers are clueless about the degree and scope of damage caused by rats on their agricultural crops and food storage, thus making it difficult for them to understand their true impact. It was also gathered that rodent problems continuously increase because of lack of knowledge of developed methods of controlling them sustainably and also lack of knowledge on factors that affect rodent population. It can be concluded that there is a need to avail. data from rodent pest management so as to raise farmer's awareness about the true impacts of rodents. Effective methods aimed at controlling rats' need to be developed so as to minimize rodent's impacts on people's livelihood.

Diversity and population dynamics of Rodents in a farm-fallow mosaic fields in Central Tanzania

Makundi, R.H., Massawe, A.W., Mulungu, L.S. and Katakweba, A.

Pest Management Centre, Sokoine University of Agriculture, P.O. Box 3110, Morogoro, Tanzania. Email: rmakundi@suanet.ac.tz, rmakundi@yahoo.com

Abstract

We investigated species diversity of rodents in two fields in Berega, central Tanzania. One of the fields (BEA) had been intensively cultivated and underwent primary succession in the duration of the study. The other (BEB) had bushes, tall grass with scattered trees. We investigated the abundance and population dynamics of the five dominant species through Capture-Mark-Release technique for two consecutive years. The rodent communities in the two fields consisted of *Mastomys natalensis*, *Aethomys chrysophilus*, *Tatera leucogaster*, *Acomys spinosissimus*, *Arvicanthis neumanni*, *Graphiurus* sp., *Nannomys minutoides*, *Saccostomus mearnsi*, *Lemniscomys striatus* and *L. griselda*. A higher species diversity and richness (10 species) in field BEB than in BEA (6 species) was attributed to the undisturbed habitat characteristics approaching those of savanna woodland. In both fields, the total abundance of species was dominated by *M. natalensis*. For the five dominant species, abundance in BEA was in the order *M. natalensis* (69.9%) > *A. chrysophilus* (9.6%) > *T. leucogaster* (9.3%) > *A. neumanni* (6.8%) > *A. spinosissimus* (4.1%). In BEB, the following order was observed *M. natalensis* (67.6%) > *T. leucogaster* (11.2%) > *Aethomys chrysophilus* (8.0%) > *A. neumanni* (10.3%) > *A. spinosissimus* (2.9%). In both fields, *M. natalensis* had a much higher rate of change in numbers than the other species, but was highest in BEA, which was in primary succession. The population trends of the species showed that none remained stable; all had distinct seasonal patterns of population dynamics, related to reproduction patterns, habitat characteristics and weather patterns; the latter influence the food quality, vegetation structure and cover. In the more heterogeneous habitat (BEB) fluctuations of *M. natalensis* were much lower than in BEA, a more homogenous habitat, but peaked in both habitats in July to August. Abundance for all the species was low and rarely surpassed 10 animals/ha at the end of the dry season, compared to >100 animals/ha for *M. natalensis* at the end of the wet season. Competitive

interactions between species were not investigated, but probably also affected their population dynamics.

Key words: Rodents, central Tanzania, diversity, population dynamics

Breeding patterns of five species of Rodents in farm-fallow mosaic fields in Central Tanzania

Massawe A. W., Makundi, R.H., Mulungu, L.S. and Katakweba, A.

Pest Management center, Sokoine University of Agriculture, P.O. Box 3110, Morogoro, TANZANIA; Email: massawe@suanet.ac.tz, apiamas@yahoo.com

Abstract

We investigated the breeding patterns of five species of rodents (*Mastomys natalensis*, *Aethomys chrysophilus*, *Tatera leucogaster*, *Acomys spinosissimus*, *Arvicanthis neumanni*) inhabiting farm-fallow mosaic fields in Berega, Central Tanzania during an ongoing ecological study using Capture-Mark Recapture technique. The study area has a single wet season, in which the rains fall in November extending to April/May. The end of June – October is the dry season. The five species showed seasonality in reproductive activity which was strongly linked to the rainfall pattern. In all the species, reproductively active males (with scrotal testes) and females (either perforated vagina, lactating or pregnant) were found in the population as early as December, but when early rains occurred, some individuals were in reproductive condition in November. These seasonal variations in breeding were evident in all the species, but breeding intensified during the later part of the wet season (March – May) and ceased in the dry season. The association between rainfall and breeding conditions show that rodents in this locality optimize exploitation of the available resources during the rainy season to maximize reproduction.

Key words: Breeding, rodents, farm-fallow, Tanzania

Inventaire des mammifères Rongeurs et leurs rôles dans les écosystèmes de la réserve de biosphère de la Pendjari au Nord-Ouest du Bénin

Mensah G. A., Pomalegni S. C. B., Anagonou G. P., Anani K. C., Gnanhoui David S. S. S., Akpona A. H., Guidibi E. A. T., Ogouma E. E., Toudonou C. A. S. & Youlou A. D.

Abstract

Les mammifères rongeurs de la Réserve de Biosphère de la Pendjari (RBP) sont très peu connus voire négligés au profit de la grande faune alors qu'ils jouent un rôle très indispensable dans la chaîne alimentaire et dans le maintien de l'équilibre de l'écosystème. L'inventaire des rongeurs est fait pour une meilleure connaissance de cette frange de la microfaune et une meilleure maîtrise de leur dynamique et de leur distribution géographique. Il a été combiné pour faire cet inventaire les méthodes de contacts/observations, de captures et d'enquêtes ethnozoologiques auprès des populations riveraines afin de maximiser les résultats de la collecte des données. A la fin des investigations il a été inventorié suivant les bandes pluviométriques de la RBP, 37 différentes espèces de rongeurs, regroupées en 5 familles : la famille des Sciuridae avec 7 espèces ; la famille des Muridae avec 27 espèces (2 espèces de la sous-famille des Cricetomyinae, 4 espèces de la sous-famille des Dendromurinae, 2 espèces de la sous-famille des Gerbillinae et 19 espèces de la sous-famille des Murinae) ; la famille des Myoxidae avec 1 espèce ; la famille des Hystricidae avec 1 espèce ; la famille des Thryonomyidae avec 1 espèce. Les différentes espèces de rongeurs inventoriées sont : *Acomys cineraceus*, *Arvicanthis niloticus*, *Cricetomys emini*, *Cricetomys gambianus*, *Dasymys rufulus*, *Dendromus messorius*, *Funisciurus anerythrus*, *Funisciurus leucogenys*, *Funisciurus substriatus*, *Graphiurus lorraineus*, *Graphiurus nagtglasii*, *Heliosciurus gambianus*, *Heliosciurus rufobanchium*, *Hylomyscus alleni/stella*, *Hystrix cristata*, *Lemniscomys striatus*, *Lemniscomys zebra*, *Lophuromys sikapusi*, *Malacomys longipes*, *Mastomys erythroleucus*, *Mastomys hildebrandtii*, *Mus haussa*, *Mus musculus*, *Myomys daltoni*, *Myomys derooi*, *Praomys tullbergi*, *Potoxerus stangeri*, *Rattus rattus*, *Steatomys caurinus*, *Steatomys cuppedius*, *Steatomys jacksoni*, *Tatera guinea*, *Tatera kempii*, *Taterillus gracilis*, *Thryonomys swinderianus*, *Uranomys ruddi* et *Xerus erythropus*. Il a été trouvé dans la RBP 5 espèces parmi les 11 rongeurs menacées au

Bénin : *Funisciurus leucogenys*, *Funisciurus substriatus*, *Hystrix cristata*, *Malacomys longipes* et *Steatomys cuppedius*. Les rongeurs occupent divers couverts végétaux qui leur permettent d'être à l'abri des prédateurs et d'avoir de la nourriture. Les formations végétales comme les savanes herbeuses arborées, les savanes herbeuses arbustives, les galeries forestières, les surfaces défrichées et des champs en jachères sont principalement celles colonisées par les différentes espèces de rongeurs rencontrées dans la RBP. Les impacts des feux de végétation d'aménagement utilisés par le Service Ecologie de la Direction du Parc National de la Pendjari sur les rongeurs ne sont pas à ignorer car ils exposent ces derniers à leurs prédateurs en les privant de leurs abris et de leurs aliments les quelques premiers jours qui suivent le passage des feux. Mieux, parmi ceux surpris par ces feux, certains arrivent à s'y en sortir indemnes, d'autres ont quelques séquelles (poils et griffes brûlés), quelques uns sont trouvés agonisants avec les poils et griffes brûlés, puis finissent par mourir.

L'analyse des résultats de l'inventaire a permis de sélectionner 4 différentes espèces de rongeurs comme animaux biomarqueurs et sentinelles sur la base des 4 critères de choix suivants : -i- taux de contacts/captures ; -ii- présence dans au moins 3 des 4 bandes pluviométriques ; -iii- habitat de prédilection ; -iv- régime alimentaire. Ainsi, 4 espèces de rongeurs sont retenus comme indicateurs biologiques dans la RBP, à savoir : *Arvicanthis niloticus* (rat roussard), *Hystrix cristata* (porc-épic), *Thryonomys swinderianus* (grand aulacode) et *Xerus erythropus* (écureuil fouisseur). En plus de leur rôle d'indicateurs biologiques, les rongeurs permettent le maintien de la chaîne alimentaire car ils constituent une proie pour beaucoup d'autres animaux notamment les oiseaux rapaces, les petits mammifères carnivores/carnassiers, les ophiidiens et autres reptiles (crocodiles, varans, etc.) puis non seulement une source de protéines mais aussi et surtout une source pour les recettes médico-magiques pour l'homme. Somme toute une carte de distribution des rongeurs capturés et observés (contacts) donc rencontrés, ainsi que leurs indices de présence (crottes, terriers, empreintes, etc.) est faite et elle montre leur répartition géographique dans les écosystèmes de la RBP.

Mots clés: rongeurs, espèce, inventaire, méthodes, distribution, Bénin.

The importance of developmental instability and canalization regarding the development of the skull of the Multimammate Rat (*Mastomys natalensis*)

Meulepas G.¹, Leirs H.^{1,2} and Van Dongen S.¹

1. University of Antwerp, Department of Biology, Groenenborgerlaan 171, B-2020; Antwerpen, Belgium; Email: greet.meulepas@ua.ac.be

2. University of Aarhus, Danish Pest Infestation Laboratory, Department of Integrated Pest Management, Skovbrynet 14, DK-2800 Kongens Lyngby, Denmark

circumstances. Skulls will then be measured on both sides and analysed using geometric morphometrics techniques.

Abstract

Developmental instability and canalization are two aspects of developmental homeostasis that are hypothesised to play an important role in the evolution of phenotypic traits. However, research in this area is still at its infancy. We started investigating the skull of the multimammate rat, *Mastomys natalensis*, as for this species it is known that in the wild, depending on the rainfall during November-December and thus the food available, three different growing patterns exist. Long periods of drought initiate a long growth stop (α -generation) while in higher abundancies of germinating seeds either a short growth stop (β -generation) or no growth stop at all (γ -generation) occur. Food availability is a factor of influence on the development of *M. natalensis* and has especially an impact on the development of the skull. In this study we will investigate the relation between growing pattern and morphology of the skull in order to examine the impact of food stress on development and the amount of canalization. Our first research included 859 individuals which were life trapped in Morogoro in the years 1986 and 1987. Within these years the three generations were present starting with the β -generation in 1986 which produced the γ -generation early next year which was followed by the α -generation in the middle of 1987. Our results are based on linear measurements of the skull and show that there is a clear difference in morphology between the three generations. Specific characteristics of each generation make it possible to predict what growth pattern an individual has followed, with relative high accuracy. In order to investigate this further we will breed multimammate rats under different dietary conditions to attain the three different growing patterns under controlled environmental

Small Mammals diversity from Mount Kupe in Southwest Cameroon

Key-Words: Rodents, shrews, taxonomy, mountain forest, cryptic species

Missoup Alain D.^{1,2,3}, Nicolas V.¹, Massoma D.³, Bilong Bilong C. F.², Denys, C.¹

¹.UMR 5202 – USM 601 Muséum National d'Histoire Naturelle, Paris, France; Email: missoup@mnhn.fr

². Laboratory of Zoology, The University of Yaounde I, Yaoundé, Cameroon

³. Departement of Biology of Animal Organisms, The University of Douala, Douala, Cameroon

Abstract

Extending from the Gulf of Guinea to the Biu Plateau and Mandara mountains the Cameroon Volcanic Line is a major tectonic feature of West Africa situated in the Guineo-Congolese forest. The Kupe mountain (2064m), is the first major inland peak after the Cameroon Mt and a priority for conservation. If data concerning the biodiversity of large mammals exist, there is a lack of knowledge for the small ones which were not investigated since Eisentraut (1968). Moreover, the recent discoveries of cryptic diversity in the tropical rodent and shrews increase their interest for new taxonomical inventories. Small mammals were trapped from 850m up to the summit using Sherman and traditional traps. Specimens were determined through molecular analyses and classical morphometrics. Among the 94 micromammals (4 shrews and 89 rodents) captured we identified a single shrew species and 16 rodent species. *Hylomyscus* is the dominant rodent genus and is found at all altitudes. Two cryptic species were identified, one of which is probably new. Most of the captures were obtained at 800 -1000 m in a preserved lowland forest close to a river and in Nyasoso village. Commensals species like *Mus musculus* and *Mastomys natalensis* were obtained close to the houses. The genera *Oenomys*, *Lemniscomys*, *Praomys*, *Lophuromys*, *Dendromus* and *Grammomys* were collected in the cultivated areas; while *Praomys*, *Malacomys*, *Hylomyscus*, *Crocidura* and *Hybomys* were found in the undisturbed forest. *Deomys* was recovered only at 1500m. *Cricetomys* was captured at the summit and in the village. Our study represents the first combined morphological and molecular inventory of the small mammals for Kupe mountain and highlights the importance of using an integrative approach to identify species.

Species diversity and distribution of Rodents and Shrews associated with altitudinal variations on Mount Kilimanjaro, Tanzania.

Mulungu, L.S.², Makundi, R.H.¹, Massawe, A.W.¹, Machang'u, R.S.¹, Mbiye, E.N.²

1. Pest Management Centre, Sokoine University of Agriculture, P.O. Box 3110, Morogoro, Tanzania. 2. Department of Wildlife Management, Faculty of Forest and Nature Conservation, Sokoine University of Agriculture, P.O. Box 3009, Morogoro, Tanzania.

Abstract

A total of 750 rodents and shrews were trapped in several sites on Mt. Kilimanjaro and two low land sites between October, 2002 and August 2003. Species diversity and altitudinal variations in their distribution were established. Trap success and diversity of species varied with vegetation, being highest in the forest, followed by disturbed forest and lowest in the low land areas. The distribution patterns and species diversity of rodents and shrews on Mt. Kilimanjaro appears to be largely influenced by habitat complexity and heterogeneity. Similarly, species richness was highest in the forest compared to the other collection sites on the mountain. The study shows that Mt. Kilimanjaro forest is a complex ecosystem with high species diversity and richness and is relatively stable than the low land.

Key words: Altitudinal, Rodents, Mt. Kilimanjaro, Shrews, species diversity, species distribution, Tanzania.

Daily variations of metabolic rates in two coexisting desert rodent species – their responses to reciprocal signals released from urine odors

Netser, S., Idelovici, B. and Haim, A.

*Department of Biology, University of Haifa –
Oranim, Kiryat Tivon 36006, Israel
ahaim@research.haifa.ac.il*

Abstract

The Golden spiny mice (*Acomys russatus*) and the Bushy-tailed gerbil (*Sekeetamys calurus*) are Arabo-sinaitic species distributed in extreme rocky habitats through various altitudes from the shores of the Dead Sea 400m below sea level up to the summits of the High Mountains in Southern Sinai above 2600m. In the presence of the common spiny mouse *Acomys cahirinus*, or chemical signals released by it, *A. russatus* is diurnal. The objective of this study was to assess the impact of chemical signals in the urine of *S. calurus* on metabolic daily rhythms of *A. russatus* measured as oxygen consumption (VO_2). Individuals of both species were acclimated to an ambient temperature of $27\pm 1^\circ\text{C}$ and a photoperiod of 12L:12D, the measurements were carried out in metabolic chambers which contained food and a water source, in two phases the first of 48h and the second of 72h. O_2 values were measured using a computerized system. After 48h of habituation, the tested individuals were exposed to a urine signal of the reciprocal species, and measurements went on for another 72h. The results of our study show that while the urine of *A. russatus* did not have a significant effect on VO_2 daily rhythms of *S. calurus* those of *A. russatus* were affected. There was an advance in VO_2 night increase of about one hour and an increase in VO_2 values. These results suggest that the biological clock of *A. russatus* responds to chemical signals released in the urine of *S. calurus*.

Key words: Daily rhythms, coexistence, rocky habitats, desert, spiny mouse.

Combining molecular and morphometrical data to solve species limits and species' geographical distribution: a case study in subtropical Africa

Nicolas V., Akpatou B., Kerbispeterhans J., Olayemi A., Decher J., Isaquou D., Missoupe A.D., Denys C., Barriere P. and Colyn M.

Muséum National d'Histoire Naturelle, Département de Systématique et Evolution, UMR 5202, Laboratoire Mammifères et Oiseaux, 55 rue Buffon, CP 51, 75005 Paris, France. vnicolas@mnhn.fr

Abstract

The genus *Praomys* (Rodentia, Muridae) is widely distributed in the African tropics. The species are cryptic, rendering species taxonomy unclear. Discrepancies between studies exist concerning the species status of *P. misonnei* and *P. tullbergi* and their geographical distribution. We combined molecular (cytochrome b gene sequencing) and morphometric (multivariate analyses of cranio-dental measurements) data to determine the species status of *P. misonnei* and *P. tullbergi* and to precisely define their geographical distribution. 186 specimens from 11 countries were included in our molecular analyses. Using neighbour joining, maximum-parsimony, maximum-likelihood and Bayesian analyses we inferred intra and inter-specific relationships. Our results show that *P. misonnei* and *P. tullbergi* are two reproductively isolated species. Within *P. tullbergi* no phylogeographical structure was found, while in *P. misonnei* we identified four major geographical clades: a West African clade (Ghana, Benin), a Nigerian clade, a West Central African clade (Cameroon, Central African Republic, Gabon, Republic of Congo) and an East African clade (Uganda, Kenya, east of the Democratic Republic of Congo). *P. tullbergi* and *P. misonnei* can be separated craniometrically by means of multivariate statistics. Within *P. misonnei* high geographical morphometrical variability was identified, and it was congruent with molecular structuration. To conclude, *P. tullbergi* and *P. misonnei* are distinct species with an allopatric distribution. *Praomys tullbergi* occurs in West Africa from eastern Guinea to western Ghana. *Praomys misonnei* is widely distributed from eastern Ghana to Kenya, with representatives found in Togo, Benin, Nigeria, Cameroon, Central African Republic, Gabon, Democratic Republic of Congo and Uganda. The Volta River may have acted as a long-term extrinsic barrier to

gene flow, impacting the phylogeography of these two species.

Phylogeographical structure and regional history of *Lemniscomys striatus* (Rodentia: Muridae) in Tropical Africa

Nicolas V., Mboumba J.F., Verheyen E., Denys C., Lecompte E., Olayemi A., Missoup A.D., Katuala P. and Colyn M.

Muséum National d'Histoire Naturelle, Département de Systématique et Evolution, UMR 5202, Laboratoire Mammifères et Oiseaux, 55 rue Buffon, CP 51, 75005 Paris, France. vnicolas@mnhn.fr

Abstract

This study aims to elucidate the phylogeography of the murid rodent *Lemniscomys striatus* and to evaluate the relative roles of ecological change, habitat patchiness, rivers and geological barriers in structuring patterns of diversity. The extent of phylogeographic patterns and molecular genetic diversity (Cytochrome *b* gene) were addressed in a survey of 123 individuals from 41 localities. Using neighbour joining, maximum-parsimony, maximum-likelihood and genetic structure analyses, we inferred intraspecific relationships and tested hypotheses for historical patterns of gene flow within this species. Our results identified four major geographical clades within the species: a West African clade, a Benin-Nigeria clade, a Central African clade and an East African clade. Several sub-clades were identified within these four major clades. Restricted gene flow with isolation by distance was recorded, which is congruent with the low dispersal ability of such a small murid rodent. No clear signal of population expansion was detected within clades or sub-clades. The western rift system and the Volta and Niger rivers may have acted as long-term extrinsic barrier to gene flow, conducting the emergence of the four main clades. The observed pattern of mitochondrial variation observed within each clade is likely to result from late Pleistocene climatic and vegetation changes. Up to 14 different sub-species of *L. striatus* were described based on pelage coloration and crania-dental morphology. In the last revision of the species, only five sub-species were recognised. Our results show that several forms that were considered as synonyms in the last revision should be considered as distinct.

Dietary selection in *Mastomys natalensis* (Rodentia: Muridae) in the maize agro-ecosystems of Central and South-Western Tanzania

Odhiambo R.O., Makundi R.H., Leirs H. and Verhagen R.

Pest Management Centre, Sokoine University of Agriculture, Morogoro, Tanzania, Department of Biology, Evolutionary Biology, University of Antwerp, Belgium and Danish Pest Infestation Laboratory, Danish Institute of Agricultural Sciences, Department of Integrated Pest Management, Lyngby, Denmark

Current address for ROO: Department of Zoology, Maseno University, P. O. Box 333 Maseno 40105, Kenya. Email: rodhiambo2003@yahoo.com

Abstract

We studied the feeding habits of *Mastomys natalensis* by analyzing a total of 2934 stomachs from individuals snap trapped from maize fields and the surrounding fallow land of central and south-western Tanzania between February 2001 and October 2002. *Mastomys natalensis* had a wide range of food items in their diet however, there was a clear seasonal effect on the consumption of the different food categories. They fed more on the other plant materials during the dry season. Seeds, arthropods and grasses became important during the wet season. Maize seed was the most preferred diet category when available. The shift towards greater consumption of maize when available coupled by the high densities attained by this species, render it the greatest potential rodent pest in the study areas.

Key words: *Mastomys natalensis*, diet, feeding habits, Tanzania

Morphometric characterization of *Cricetomys* in the forest zone of South Western Nigeria

Olayemi A.¹ and Akinpelu A.I.²

1. Natural History Museum, Obafemi Awolowo University, HO 220005, Ile Ife, Osun State, Nigeria. ayyolayemi@yahoo.com, aolayemi@oauife.edu.ng

2. Department of Zoology, Obafemi Awolowo University, HO 220005, Ile Ife, Osun State, Nigeria.

Abstract

This study was carried out to identify distinguishing morphometric characters between taxa from the genus *Cricetomys* in the rainforest. Specimens were captured from Asejire, Ife and Osogbo in rainforest zone of south western Nigeria, and dimensions of 22 morphometric characters were taken to the nearest 0.01mm. Statistical analysis of morphometric data was carried out using principal components analysis (PCA) and discriminant functional analysis (DFA). 97.06% of specimens concurred with their *a priori* grouping according to sex in the DFA, and this detection of sexual dimorphism in *Cricetomys* led to clearer characterizations of the constituent taxa within the genus. In the PCA, the characters with the heaviest eigen loadings in male specimens were zygomatic width (-0.5411), cranial length (0.3907) and rostrum depth (-0.3646); while the heaviest loadings in females were for mandible depth (0.6722), rostrum depth (0.3864) and zygomatic width (0.3701). Also, in the DFA, only 88.89% of morphometric characterizations in female specimens concurred with *a priori* groupings according to pelage pattern. Findings from this study reinforce the view that pelage characterizations are not entirely reliable. This sets the stage for further research, using the morphometric characters identified in this study, possibly in combination with molecular data such as DNA sequences, to form a multifaceted device for the recognition of *Cricetomys* taxa in the forests of Africa.

Various Murid rodents from Nigeria represent cryptic, previously undescribed taxa: preliminary Dna evidence

Olayemi A.¹, Nicolas V.², Colyn M³., Leirs H.^{4,5} and Verheyen E.^{5,6}

1. Natural History Museum, Obafemi Awolowo University, HO 220005, Ile Ife, Osun State, Nigeria. ayyolayemi@yahoo.com, aolayemi@oauife.edu.ng

2. Muséum National d'Histoire Naturelle, Département de Systématique et Evolution, UMR 5202, Laboratoire Mammifères et Oiseaux, 55 rue Buffon, CP 51, 75005 Paris, France

3. UMR CNRS 6553 Ecobio, Université de Rennes 1, Station Biologique, 35380 Paimpont, France.

4. University of Antwerp, Evolutionary Biology Group, Groenenborgerlaan 171, Antwerpen B-2020, Belgium

5. University of Aarhus, Danish Pest Infestation Laboratory, Department of Integrated Pest Management, Skovbrynet 14, DK-2800 Kongens Lyngby, Denmark

6. Royal Belgian Institute of Natural Sciences, Vertebrate department, Vautierstraat 29, 1000 Brussels, Belgium.

Abstract

Nigeria represents an interesting and diversified landscape, containing several small mammal fauna whose taxonomic statuses have either remained unresolved or have been taken for granted, with designations based on partial, mainly phenetic, evidence. Many of these taxa are yet to be characterized using molecular techniques. This pilot study uses mitochondrial DNA cytochrome *b* sequences to characterize and identify selected murid rodents in south western Nigeria. Preliminary phylogenetic trees were constructed to infer relationships among the sampled taxa and to provide tentative species identifications. These analyses were based on the sequences we obtained in combination with sequences from Genbank and also unpublished sequences of murids from other African countries. The results obtained so far indicate that although the assayed Nigerian samples cluster closely to *Lophuromys sikapusi*, *Praomys misonnei* and also representatives of the *Hylomyscus alleni* species-complex, they form distinct monophyletic clades. Our preliminary results point to a need for taxonomic review of these murid populations from south western Nigeria, a project that will require us to combine molecular data with appropriate morphological and craniometric data of the relevant types. It seems plausible that further sampling in other

ecological zones within Nigeria as well as in neighbouring countries may reveal more undescribed taxonomic murid diversity. Finally, more fine-grained sampling may allow us to obtain more detailed information on the distribution ranges of these potentially new species.

Paternity and relatedness in the natural population of the solitary Bathyergid, the silvery mole-rat *Heliophobius argenteocinereus*

Patzenhauerová, H.¹, Bryja, J.¹ and Šumbera, R.²

1 Institute of Vertebrate Biology AS CR, Brno, Czech Republic;

2 University of South Bohemia, České Budějovice, Czech Republic

Abstract

The African mole-rats are subterranean rodents that form a wide range of social systems varying from solitary to eusocial species. Based on the spatial distribution of burrow systems, low population density, absence of sexual dimorphism and expected limited aboveground movement, it was assumed that solitary silvery mole-rat has monogamous mating system, but until now no genetic data were available. The aim of this study was (1) to check the litters containing at least three embryos for the occurrence of multiple paternity (2) to analyse in detail the paternity and relatedness in one population living in miombo in Malawi.

Ten litters with three or more offspring originating from five localities were examined by using eight polymorphic microsatellite loci to identify the number of fathers siring the litter. Furthermore, 54 specimens from one population were captured and sampled for relatedness. By using Cervus 3.0, we identified the most likely parents for each offspring.

No multiple paternity in larger (>3 offspring) litters, i.e. maximum of two paternal alleles in one litter was observed. We identified the father of three litters from the Mpalanganga locality - all these litters were sired by the same male. In seven subadult mole-rats born in previous season, we revealed the mother and in four cases we identified the father. Again, it was the only one male who fathered these subadults (but different of the male that sired the offspring one year later) indicating variation in male reproductive success.

The study was funded by the GACR 206/04/P116 and MSMT 6007665801.

Key words: Bathyergidae, mating system, paternity, *Heliophobius*

Contribution of the adrenal zona glomerulosa of the gerbil, *Gerbillus tarabuli*; in the development of physiological adaptations strategies under depletion water

Saadi, L.¹ & Lebailin.²

1. Département de Biologie, Faculté Agro-Véto-Biologie, Université SAAD DAHLEB de BLIDA, Algeria ; Fax : 021321282067 or 021325431164 ; e-mail : maboite_s@yahoo.fr

2. Laboratoire de Physiologie Animale, Ecole Normale Supérieure de KOUBA, Algeria

Abstract

The desert rodents succeeded in developing strategies of physiological adaptations in order to ensure their body homeostasis. A present study seeks the implication of adrenal zona glomerulosa of *Gerbillus tarabuli*, deserted rodent well adapted to water depletion, in the maintenance of hydromineral metabolism. The gerbils were exposed to the experimental hydromineral stress. Thin sections of the adrenal glands were observed in photonic and electron microscopy. Compared with dehydrated gerbils, the glomerulosa cells showed a regression of cytoplasmic lipid compartment, presence of endocytosis elements and development of the chondriome. The histo-ultrastructural modifications indicates that experimental hydromineral stress exerts a potent stimulatory effect on adrenal zona glomerulosa cells which secretes aldosterone, hydromineral hormone. These data strongly suggest the involvement of the gerbil adrenal zona glomerulosa in the maintenance of hydromineral metabolism and in developing strategies of structural and physiological adaptations under water depletion.

Key words: *Gerbillus tarabuli*, Adrenal zona glomerulosa, aldosterone, homeostasis, experimental hydromineral stress.

How subterranean rodents explore subterranean ecotope, the case of a solitary afrotrropical bathyergid, the Silvery mole-rat

Šklíba, J.¹, Šumbera, R..¹, Elichová, M..¹ and Burda, H.²

¹ University of South Bohemia, České Budějovice, Czech Republic;

² University of Duisburg-Essen, Essen, Germany

Abstract

Despite their important role of ecosystem engineers, spatial activity of free-living subterranean rodents is still poorly known, due to their cryptic way of life. In the present study we combined radio-telemetry of individual animals and mapping of their burrow systems to shed light on spatial activity and burrow dynamics in a solitary subterranean rodent, the silvery mole-rat *Heliophobius argenteocinereus*. Its burrow systems are dynamic structures with new tunnels being excavated and older burrows being backfilled at a high rate. The silvery mole-rat (weighting on average 170 g) excavates about 0.75 m of new tunnels per day. Home ranges continuously shifted in space, and a new nest was established on average every month. In sites with low food supply, the mole-rats dug at a faster rate and produced more mounds per time unit. In harder soils, burrow systems were shorter and backfilling of older tunnels was more frequent. These strategies apparently reflect energetically optimal solutions to given problems - hard soil and/or low food supply. Subterranean rodents thus can adjust their burrowing strategy to the microenvironmental conditions. The actual temporo-spatial activity is much more extensive than would be guessed from aboveground marks.

The study was funded by the GACR 206/04/P116 and MSMT 6007665801.

Key-words: Bathyergidae, burrow dynamics, *Heliophobius*, home range, spatial activity

Reactions to disturbances in the context of antipredatory behaviour in a solitary subterranean rodent

Šklíba, J.¹, Šumbera, R.¹ and Chitaukali W.N.²

¹ University of South Bohemia, České Budějovice, Czech Republic;

² University of Malawi, Zomba, Malawi

Abstract

We investigated reactions of free-living silvery mole-rats *Heliophobius argenteocinereus* to anthropogenic disturbances. Mole-rats detected soil vibrations caused by man carefully walking at a distance of up to 6 m (proved by radio-telemetry). Occasionally, mole-rats encountered outside a nest retreated there after this type of disturbance. After having their burrows broken into, the mole-rats retreated into deep tunnels, separating themselves from the rest of the burrows by soil plugs. The capture rate of silvery mole-rats using special live traps designated for subterranean rodents was low, which contrasts with that of social bathyergids. Antipredatory function of examined behaviours is discussed. The study was funded by the GACR 206/04/P116 and MSMT 6007665801.

Key Words: antipredatory behaviour, Bathyergidae, *Heliophobius*, seismic cues, subterranean rodent

Relationship between various rainfall distributions and the demography of the Multimammate Mouse (*Mastomys natalensis*): upgrade from local to regional control strategies.

Sluydts V.¹, Leirs H.^{1,2}

1. Evolutionary Biology Group, University of Antwerp, Groenenborgerlaan 171, B-2020 Antwerpen, Belgium

2. Danish Pest Infestation Laboratory, University of Aarhus, Faculty of Agricultural Sciences, Department of Integrated Pest Management, Skovbrynet 14, DK-2800 Kongens Lyngby, Denmark

Abstract

The multimammate mouse (*Mastomys natalensis*) has a distribution range from Sub-Saharan Africa to the Cape. The species is known for its capabilities to irrupt to high densities whereby it can cause severe damage to crops in agricultural fields. It also acts as a vector for various diseases. Long-term capture-recapture studies have been carried out in Morogoro, Tanzania to elucidate the mechanism behind existing within- and between-year variations in demography of the species. The rainfall pattern in Morogoro is characterised by bimodality, with a first and variable peak in December and a second and more secure peak in April. Heavy rains during the first peak have been related to *M. natalensis* outbreaks and a logistic regression with cumulative rainfall during the months December-January was able to forecast regional mouse outbreaks. It was also demonstrated that both density dependent and independent (rainfall) act on various demographic traits. This was summarized into a bio-economic tool, capable of the simulation of mouse densities and used to compare the effect of various rodent control strategies on crop damage. The key question of this research is whether the multimammate mouse is locally adapted to different rainfall distributions. Can they breed all-year round when there is no seasonality in rainfall? Can they irrupt when there is no bimodality in the rainfall distribution each year? During two European projects (Ratzooman and Staplerat) 21 monthly capture-recapture data sets of 2-3 years each were collected in 6 different East-African countries. The places from which these data have been collected represented four categories of rainfall distributions: unimodal, bimodal with a variable first peak, bimodal with a non-variable first peak and continuous. Preliminary analysis demonstrated seasonality in reproduction over all sites in the unimodal

and bimodal rainfall categories. Replicates within the same locality show a fair degree of parallelism, indicating robustness of the obtained information. All-year round breeding was observed for the sites lacking a dry season. Preliminary survival analysis of *M. natalensis* females at two localities (Tanzania and South-Africa) showed it to be affected by both population density and rainfall. In general *M. natalensis* seem to respond in a fairly similar way to rainfall and density over much of East-Africa. This suggests that a first step in extending the bio-economic model from a local to a regional scale is to include different rainfall regimes, while the underlying mechanism that determines how mice react to rainfall remains identical.

Key words: Capture-recapture, reproduction, survival, multi-state, multimammate mouse

Patterns of surface temperatures in two mole-rats (Bathyergidae) with different social systems as revealed by IR-thermography

Šumbera, R.¹, Zelová, J.¹, Kunc, P.², Knížková, I.² and Burda, H.³

¹ University of South Bohemia, České Budějovice, Czech Republic;

² Institute of Animals Science, Prague, Czech Republic;

³ Institute of Biology, University of Duisburg-Essen, Essen, Germany

Abstract

Furred subterranean mammals face the problem of dissipating heat to the environment because high humidity and absence of air flow in sealed belowground tunnels constrain heat loss from body by convection and evaporation. In order to detect body areas responsible for heat loss, surface temperatures in two species of African mole-rats were measured at different ambient air temperatures by infrared thermography. Fur characteristics were also evaluated. Thinner pelage of the ventrum, its moderate temperature and large size suggest that ventral side of the body is the main thermal avenue for heat loss in both species. Interspecific differences could be explained by different fur characteristics connected with social thermoregulation. Compared to the social *Fukomys mechowii*, the solitary *Heliophobius argenteocinereus* has denser and longer fur on most of its body; its surface temperature was thus lower than in *F. mechowii* at lowered ambient temperatures. On the other hand, the denser and longer hair cover in *H. argenteocinereus* impedes heat dissipation at highest ambient temperatures (and probably also during digging activity) resulting in increase of core body temperature. *Heliophobius argenteocinereus* seems to be more sensitive to overheating than *F. mechowii*. At lower air temperatures, the social species uses huddling to combat hypothermia. The study was funded by the GACR 206/04/P116 and MSMT 6007665801.

Key words: surface temperature, *Fukomys mechowii*, *Heliophobius*, Bathyergidae, sociality, heat dissipation, thermoregulation, IR-thermography, hair

Managing Rodent zoonoses in an urban informal settlement in Durban, South Africa

Taylor P.J.¹, Arntzen L.², M. Hayter³, Iles M.⁴, Frean J.² and Belmain S.⁴

1. Durban Natural Science Museum, Durban, South Africa;

2. National Health Laboratory Service, National Institute for Communicable Diseases, Johannesburg, South Africa;

3. City Health: Communicable Diseases, eThekweni Municipality, Durban, South Africa;

4. Natural Resources Institute, Kent, United Kingdom

Key words: Zoonoses, rodents, *Rattus norvegicus*, *tanezumi*, *rattus*, Durban, leptospirosis, toxoplasmosis, plague

Abstract

“RatZooMan” (Rodent Zoonosis Management: www.nri.org/ratzooman/) is an international project concerning zoonoses in four African countries; this study reports data from one site, Durban, a major harbour on the east coast of South Africa. Blood and tissue samples of 248 rodents of four species (*Rattus norvegicus*, *Rattus tanezumi*, *Mus musculus domesticus*, *Mastomys natalensis*), from the greater Durban region were tested for infections of plague, leptospirosis and toxoplasmosis. Samples came predominantly from the harbour and commercial districts of Durban and the Cato Crest informal shack settlement. To determine environmental and socioeconomic disease risk factors in Cato Crest, rodent trapping was accompanied by parallel studies of soil PH and socioeconomic factors. No rodents were positive for plague, but five Norway rats, *R. norvegicus* (2.5% of sample tested) were positive for toxoplasmosis, and 19 (10.3% of sample tested) were positive for leptospirosis. Infections were concentrated in two major foci: a localised area of Cato Crest (leptospirosis and toxoplasmosis prevalence was 39% and 8% respectively) and the CBD of Durban (38% and 12.5% respectively). The leptospirosis hotspot in Cato Crest was a “tuck shop” in a valley where the soil was constantly damp, and litter abounded, thus ensuring ideal conditions for the proliferation of rats and the spread of leptospirosis. The results guided precise and effective action by vector control staff (e.g. multi-feed rodenticide baiting) to prevent serious disease outbreaks. Recent serology tests of humans living in Cato Crest (n = 219) showed 0% exposure to plague, 23% to leptospirosis and 35% to toxoplasmosis. Compared to shack-dwellers, residents of brick houses showed slightly lower exposure to both diseases (12% for leptospirosis and 23% for toxoplasmosis).

Four new species of Laminate-Toothed Rats (*Otomys*) endemic to the “Montane Circle” Of East Africa

Taylor P.J.¹, Maree S.², Sandwyk J.², Kerbis³, Stanley W.T.³ and Carleton M.⁴

1. Durban Natural Science Museum, Durban, South Africa (Email: taylorpeter@durban.gov.za);

2. University of Pretoria, Pretoria, South Africa;

3. Field Museum of Natural History, Chicago, USA;

4. Smithsonian Institution, USA

Abstract

We adopted an integrated systematic approach to delimit evolutionary species and describe phylogeographic structure in *Otomys denti* (from the Albertine Rift, Nyika Plateau, and northern Eastern Arc) and *O. lacustris* (from the Southern Rift in Tanzania and Zambia, and the southern Eastern Arc). Both molecular (cytochrome-*b* sequences, 1140 base pairs, *n*=16) and craniometric (classical, *n*=100 and geometric, *n*=89) approaches failed to corroborate the currently recognized species limits of *denti* and *lacustris*. *Otomys denti sungae* from widely separated mountain ranges of the northern Eastern Arc and Nyika Plateau was distinct genetically and morphometrically, and more closely related to *O. lacustris* than to *O. denti* (including *kemp*) from the Albertine Rift. Within both *O. lacustris* and *O. d. sungae*, our combined analyses provided evidence for the phylogeographic separation of Eastern Arc and Southern Rift populations. Within the Albertine Rift (*denti-kemp*), populations from individual mountain ranges differed significantly in skull size and shape, but no phylogeographic separation occurred between *denti* from the Ruwenzoris and *kemp* from the southern Albertine Rift. Past dependency on few morphological characters and a polytypic species concept has obscured phylogenetic relationships and cryptic species in this group. The recent discovery of a geographically isolated *Otomys* population from the Kenyan Aberdares Range having a five-laminate lower M1 peculiar to *lacustris* (but other characters typical of *tropicalis*) constitutes another undescribed, montane-endemic species of this speciose genus. We thus recognize six species in this group (an increase of four), each endemic to the Albertine, Southern or Kenyan Rift or the Eastern Arc.

Key words: Rodents, *Otomys*, montane, Rift, DNA sequences, geometric morphometrics

Skull shape variation in relation to biting performance in teeth-digging African mole-rats (*Fukomys*, Bathyergidae, Rodentia)

Van Daele P. A.A.G.¹, & Adriaens D.²

1. Ghent University, Evolutionary Morphology of Vertebrates, K.L. Ledeganckstr. 35, B- 9000 Ghent, Belgium (email: paul.vandaele@ugent.be), Belgium

2. Antwerp University, Laboratory for Functional Morphology, Universiteitsplein 1, B-2610 Antwerpen, Belgium

Abstract

Phenotypic variation originates from adaptations to local environments and phylogenetic constraints. The obligatory subterranean African mole-rats of the genus *Fukomys* have been shaped within the context of their underground habitat, posing particular limits on the animals' morphology. Especially the biting apparatus is likely shaped by strong evolutionary constraints, as it is used for feeding on hard geophytes, for digging complex tunnel systems, and for defensive purposes and social interactions in a colony. We studied interspecific differences in bite performance among three lineages, in relation to their skull anatomy and skull shape using landmark based geometric morphometric techniques. Scaling of bite force is positively allometric relative to body weight. Moreover, differences in maximal biting force exist between taxa. These results are interpreted in relation to jaw mechanics, whereby possible spatial trade-offs with e.g. the brain, the auditory and olfactory systems are considered. Relying on a molecular phylogeny, this study enabled us to analyze the evolutionary pattern behind the variation in structure and performance of the biting apparatus in *Fukomys* mole-rats.

The difference in occurrence of a bar across the foramen ovale between *Thryonomys gregorianus* and *Thryonomys swinderianus*.

Van der Merwe, M.

University of Pretoria, Pretoria, South Africa.

Abstract

Due to a great similarity between the external features of the two cane rat species, *Thryonomys gregorianus* and *Thryonomys swinderianus*, it is sometimes difficult to distinguish between them, especially when dealing with juveniles and subadult cane rats or similar-sized adults. It becomes even more difficult when trying to identify similar sized skulls. The presence of a bar across the foramen ovale in the skull of *T. gregorianus* proved to be a significant characteristic to distinguish between the skulls of the two species. However, because it is not 100% absent in all *T. swinderianus* skulls, it should be used in combination with other characteristics to distinguish between the skulls of the two species.

Key words: Rodents, Greater and Lesser cane rats, *Tryonomys swinderianus* and *Thryonomys gregorianus*.

Roosting ecology of the banana bat, *Neoromicia nanus*, in Mpumalanga, South Africa.

Van der Merwe, M.

University of Pretoria, Pretoria, South Africa.

Abstract

The social structure of banana bats, *Neoromicia nanus*, was studied in relation to reproductive events over an annual cycle in banana plantations in Mpumalanga, South Africa. This insectivorous bat is one of the smallest bat species in South Africa. They typically roost in furled banana or *Strelitzia* leaves, preferring medium-sized furled leaves. Group composition of banana bats was found to vary considerably over the annual cycle. Changes in group composition were linked to reproductive events. Mixed sex groups began to form during February and lasted until October. Despite frequent copulations in this population during the period late March to July, fertilization did not occur until ovulation in late July/ early August. Numbers of mixed sex groups were highest immediately prior to ovulation. During the lactation period, females formed maternity colonies composed of lactating females and juveniles.

Key words: Banana bat, *Neoromicia nanus*, sex ratio, mating strategies, social structure.

Craniometric, cytogenetic and genetic characterization of the Kilimanjaro *Lophuromys aquilus* True 1892 population, its implications for the taxonomy of the *L. flavopunctatus* species complex and the description of five new taxa (Rodentia: Muridae)

Walter Verheyen¹, Jan Hulselmans¹, Theo Dierckx¹, Loth Mulungu, Erik Verheyen^{1,3}, Marco Corti⁴, Julian Peterhans Kerbis⁵ & Herwig Leirs^{1,6}

1. University of Antwerp, Evolutionary Biology Group, Groenenborgerlaan 171, B-2020 Antwerpen, Belgium

2. Sokoine University of Agriculture, P.O. BOX 3006, Chuo Kikuu, MOROGORO, Tanzania

3. Royal Belgian Institute for Natural Sciences, Vertebrate department, Vautierstraat 29, B-1000 Brussel, Belgium

4. Università di Roma "La Sapienza", Dipartimento di Biologia Animale e dell'Uomo, Via Borelli 50, 00161, Roma, Italy

5. Field Museum of Natural History, Chicago, Illinois 60605-2496, USA

6. University of Aarhus, Danish Pest Infestation Laboratory, Department of Integrated Pest Management, Skovbrynet 14, DK-2800 Kongens Lyngby, Denmark

Abstract

Based on craniometric measurements and mtDNA sequences of >3000 *Lophuromys flavopunctatus* sensu lato specimens collected throughout East Africa, five new allopatric and montane species are described. Our approach, that consists of measuring skulls of a series of localities (topo-typical if possible), allowed us to compile a number of Operational Taxonomical Units (OTU's) from across the geographic range of this species complex. The outcome of diverse multivariate analyses complemented with the available chromosomal data allowed us to (i) evaluate the craniometrical variation within this dataset, (ii) to link some OTU's with specific (topo) types, and (iii) to identify OTU's which cannot be linked to described species, and that are therefore represent undescribed species. The combination of the outcome of this craniometrical analysis with mtDNA sequences and chromosomal data illustrates how type specimens can be incorporated in taxonomic revisions.

Key words: *Lophuromys aquilus*, taxonomy, cytochrome *b*, craniometry, morphology

Contribution to the systematics and zoogeography of the East-African *Acomys spinosissimus* Peters 1852 species complex and the description of two new species (Rodentia: Muridae)

Walter Verheyen¹, Jan Hulselmans¹, Wim Wendelen², Herwig Leirs^{1,5}, Marco Corti³, & Erik Verheyen^{1,4}

1. University of Antwerp, Evolutionary Biology Group, Groenenborgerlaan 171, B-2020 Antwerpen, Belgium

2. Royal Museum for Central Africa, Vertebrate Section, Leuvensesteenweg 13, B-3080 Tervuren, Belgium

3. Università di Roma "La Sapienza", Dipartimento di Biologia Animale e dell'Uomo, Via Borelli 50, 00161, Roma, Italy

4. University of Aarhus, Danish Pest Infestation Laboratory, Department of Integrated Pest Management, Skovbrynet 14, DK-2800 Kongens Lyngby, Denmark

5. Royal Belgian Institute for Natural Sciences, Vertebrate department, Vautierstraat 29, B-1000 Brussel, Belgium

Abstract

Based on the comparative study of specimen collections from Tanzania, Zambia, Zimbabwe, Mozambique, DR Congo and South Africa, we revised the taxonomic status of the putative *Acomys spinosissimus* complex using external morphology, craniometry, enzymes, mitochondrial DNA sequences and karyology. Our results confirm that *A. spinosissimus* represents a complex of closely related species with seemingly non-overlapping distribution ranges. The distribution range of *A. spinosissimus* appears to be restricted to an area bordered by the Zambesi and Limpopo Rivers, while the reinstated *A. selousi* (that includes *A. transvaalensis*) occurs further to the South (*i. e.* northern limit seemingly just north of the Limpopo River). The investigated populations north of the Zambesi River are both morphologically and genetically clearly distinct from *A. spinosissimus* and *A. selousi*. More in particular two new allopatric species are described for Tanzania, each one occurring along one side of the Eastern Arc Mountains. Finally, the area North of the Zambesi River appears to be occupied by OTU's 40 and 41 that may represent an additional undescribed taxon.

Key words: *Acomys spinosissimus*, taxonomy, cytochrome *b*, craniometry, morphology, enzymes

An overview of Chiropteran fauna in Lama Forest Reserve, Southern Benin

Voglozin A. and Sinsin B.

Laboratory of Applied Ecology, Faculty of Agronomics Sciences, University of Abomey-Calavi, Bénin

Email: nohemivog@yahoo.fr

Abstract

We present the results of the first comprehensive survey of the chiropteran fauna of a forest-savannah mosaic in Benin, West Africa. Chiroptera have been chosen in an attempt to an understanding of the spatial, structural and functional relationships among the different elements of the forest landscape which consists of natural forest, degraded forest and surrounding plantations. Sampling sites were chosen and bats surveys were made. Bats were captured with standard mist nets. We herein make an inventory of 17 species: *Eidolon helvum*, *Epomophorus gambianus*, *Epomophorus cf. labiatus*, *Epomops franqueti*, *Megaloglossus woermanni*, *Micropteropus pusillus*, *Nanonycteris veldkampii*, *Hypsignatus monstrosus*, *Hipposideros beatus*, *Hipposideros cyclops*, *Hipposideros commersoni*, *Nycteris hispida*, *Pipistrellus nanus*, *Pipistrellus nanulus*, *Scotophilus dinganii*, *Chaerephon pumila*, *Mops condylurus*. The 2 new species of Chiroptera caught the first time in Benin in 2003 are *Epomophorus labiatus* Temminck (1837) and *Megaloglossus woermanni* Pagenstecher (1885). *Nanonycteris veldkampii*, *Hypsignatus monstrosus* and *Hipposideros beatus* are new record for Lama Forest Reserve.

Keywords : Chiroptera, Lama forest reserve, first records, Bénin.

INDEX

A

Abdel-Rahman E.H. 5, 6, 7
Abdoulaye D. 21
Adriaens D. 73
Akinpelu A. I. 63
Akoua-Koffi C. 8, 12, 45
Akpato B. 60
Akpona A. H. 9, 10, 11, 55
Akran V. 8
Allali B.K. 8, 12, 45
Amirat Z. 41
Amundala D. 13, 31, 32
Anagonou G. P. 55
Anani K. C. 55
Aniskine V. 22, 45,
Arntzen L. 71
Assogbadjo A. E. 30
Avenant N.L. 14, 15

B

Barrière P. 22, 31, 32, 60
Bates J.M. 38
Belmain S. 71
Benda P. 16, 17, 19
Bryja J. 19, 44, 48, 65
Brouat C. 44
Bekker J. P. 30
Bilong Bilong P. 57
Bloomer P. 5
Boeykens N. 27
Bowie R. C. K. 38
Bredenkamp G. 50
Britton-Davidian J. 18
Burda H. 67, 70

C

Camara C. 22

Carleton M. 72
 Catalan J. 18
 Cervený J. 19
 Chalubert A. 34
 Chimimba C. T. 5
 Chitaukali W. N. 68
 Codjia J.T.C. 37
 Colyn M. 45, 60, 61, 64
 Contrafatto G. 5, 6, 7
 Corti 76, 77
 Cosson, J.F. 20, 33, 44
 Coulibaly G.D. 8, 45,
 Crespín L. 21

D

Decher J. 60
 Denys C. 6, 8, 12, 22, 45, 46, 57, 60, 61
 Dierckx T. 40, 42, 76
 Djagoun S. 23, 24,
 Djossa B.A. 25
 Djossou Djego S. 26
 Djigo C. A. T. 44
 Dlamini Makhosazana 52
 Dossa F.F. 23, 24
 Dosso H. 8, 12, 45,
 Dosso M. 8, 12, 45
 Ducroz J. F. 6
 Dudu A. M. 13, 31, 32, 40, 42
 Duplantier J. M. 44
 Durnez L. 27, 28

E

Ekué M. R. M. 29, 30
 Elichova M. 67

F

Fahr J. 25
 Fichet-Calvet E. 22
 Frean J. 71

G

Galan M. 44
 Gambalemoke M. 31, 32
 Gaubert P. 34
 Gembu T. 31
 Gnanhoui David S. S. S. 55
 Granjon, L. 20, 21, 33, 48
 Guidibi E. A. T. 55
 Gunther S. 8

H

Haim A. 35, 59
 Haingotiana R. 36,
 Hayter M. 71
 Houemenou G. 37
 Huhndorf M. 38
 Hulselmans, J. 40, 42, 76, 77
 Hutterer R. 31, 32

I

Idelovici B. 59
 Iles M. 71
 Isaquou, D. 60

J

Johnson C. R. 28

K

Kabi M. 12
 Kaleme P. K. 38
 Kalko E.V. 25
 Kaswera K. C. 31, 39
 Katakweba A. 27, 53, 54
 Katholi C. R. 27
 Katuala P. G.B. 31, 32, 40, 42, 61
 Kazadi M. M. 38
 Kazwala R.R. 27
 Keddache A. 41
 Kennis J. 13, 32, 40, 42
 Kerbis-Peterhans J. 38, 60, 72, 76
 Khammar F. 41
 Knizkova I. 70
 Knotkova E. 43, 44,
 Koivogui L. 22, 45,
 Konecny A. 19, 44, 48,
 Kouakou B. 8
 Kouassi Kan S. 8, 12, 22, 45
 Koubek P. 19, 44
 Kourouma F. 22
 Kunc P. 70

L

Lalis A. 22, 46
 Lamb J.M. 5, 6, 7
 Laudisoit A. 47,
 Lebailin 66
 Lecompte E. 6, 22, 48, 61
 Lehtonen J. 36
 Leirs H. 13, 27, 28, 31, 32, 40, 42, 47, 49, 56,
 62, 64, 69, 76, 77
 Libois R. 37
 Loiseau A. 44,

M

MacFayden D. 50
 Machang'u R. R. 27, 58
 Mahlaba T. A. M. 51
 Makundi R. H. 47, 53, 54, 58, 62
 Maree S. 72
 Massawe A. W. 53, 54, 58
 Massoma D. 57
 Mataoui H. 41
 Mbije E. N. 58
 Mboumba J. F. 61
 Mensah G.A. 11, 55
 Meulepas G. 56
 Missoup Alain D. 57, 60, 61
 Mitchell A. 6
 Mukinzi I. 31, 32

Mulungu L.S. 53, 54, 58, 76
Mwanga J. M. 38

N

Ndara B. R. 38, 42
Neerinckx, S. 47
Netser S. 59
Nicolas, V. 40, 45, 57, 60, 64

O

Odhiambo R. O. 62
Ogouma E. E. 55
Olayemi A. 60, 61, 63
Ovaskainen O. 36

P

Papillon, Y. 21
Patzenhauerova H. 65
Pomalegni S. C. B. 55,
Portaels F. 27, 28

R

Reiter A. 17
Robinson T.J. 18

S

Saadi L. 66
Schulze E. 15
Sedlacek F. 43
Sicard B. 21
Sinsin B. 10, 11, 23, 24, 25, 26, 30, 78
Skliba J. 67, 68
Sluydts V. 69
Soloniaina C.J.C. 36
Stanley W. T. 72
Sumbera R. 43, 65, 67, 68, 70
Suykerbuyk P. 28

T

Tatard 44,
Taylor P. J. 5, 6, 7, 71, 72
Tchibozo S. 30
Ter Meulen J. 8, 12
Toudonou C. A. S. 55

V

Vallo P. 16, 17
Van Aarde R.J. 35
Van Daele P. A. A. G. 73
Van der Merwe, M. 50, 74, 75
Van Dongen S. 56
Van Houtte N. 40, 42,
Van Vurren B. J. 38
Vanlinden B. 31
Veitl S. 43
Verhagen R. 62
Verheyen E. 31, 32, 40, 42, 45, 61, 64, 76, 77
Verheyen W. 76, 77
Veyrunes F. 18

Voglozin A. 78

W

Watson J. 15, 18
Wendelen, W. 40, 42

Y

Youlou A. D. 55

Z

Zelova J. 70